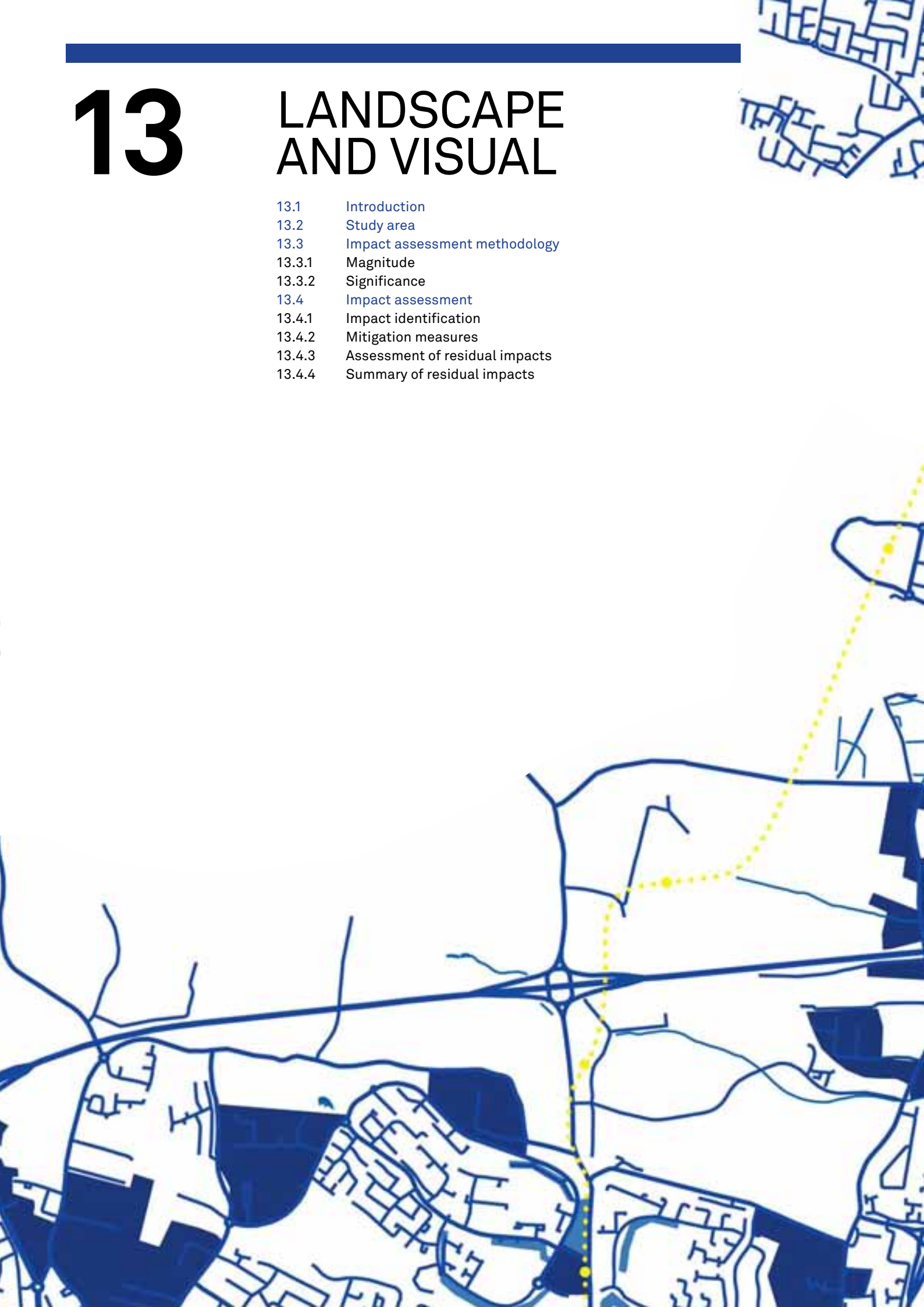
ENVIRONMENTAL IMPACT STATEMENT – METRO NORTH

DUBLIN AIRPORT SOUTH PORTAL TO SANTRY AVENUE

AREA MN104 (PART 3 – CHAPTERS 13 TO 18)

VOLUME 2 – BOOK 4 OF 7

13 LANDSCAPE AND VISUAL



This chapter of the EIS evaluates the potential for landscape and visual impacts arising from the construction and operation of the proposed scheme in Area MN104.

13.1 INTRODUCTION

This chapter of the EIS evaluates the potential for landscape and visual impacts arising from the construction and operation of the proposed scheme in Area MN104.

13.2 STUDY AREA

The study area corresponds to the potential zone of visual influence of the proposed scheme. The study area is illustrated in the maps (Baseline Landscape and Visual) included in Volume 3, Book 1 of 2.

The dimensions of the study area vary in width depending on the local landscape. In built-up areas, the study area typically extends to the edges of the buildings on either side of the centre line of the the proposed scheme. The dimensions of the study area are generally wider in locations where the proposed alignment runs through open space or farmland where longer distance views are possible.

13.3 IMPACT ASSESSMENT METHODOLOGY

The source and type of all potential impacts is described in Section 13.4.1.

Mitigation measures to be put in place are defined in Section 13.4.2. 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 impacts on landscape and visual amenity are assessed based on the assumption that all mitigation planting will be established successfully and good growth and development will have taken place over a 15-year period from implementation of the planting. The planting is therefore assumed effective in providing visual screening of the proposed scheme which will be most effective during the summer months and hence the impact of the scheme is expected to be significantly reduced.

Residual impacts that persist after mitigation measures have been put in place are evaluated in terms of magnitude and significance as described in this section. A summary of all residual impacts is provided in Section 13.4.4.

13.3.1 Magnitude

The magnitude of change affecting landscape or visual receptors depends on the nature, scale and duration of the particular change that is envisaged, the location in which it is proposed, and the overall effect on a particular view. This may be very small if the scheme is at some distance. In a landscape, the magnitude of change will depend on the loss or change in any important feature or change in the backdrop to, or outlook from, a landscape. The angle of view, duration of view, distance from the proposed scheme, degree of contrast with the existing view and the extent of visibility all influence the magnitude of the change in view.

The criteria used to assess the different levels of magnitude of change associated with impacts on landscape are shown in Table 13.1. The criteria used to assess the different levels of magnitude of change associated with impacts on visual amenity are shown in Table 13.2.

Table 13.1 Criteria for assessment of magnitude of change on landscape

Criteria	Magnitude of change
- A clearly evident and frequent or continuous change in key landscape characteristics or components affecting an extensive area.	very high
- A clearly evident change either over a restricted area or infrequently perceived or a moderate change in key landscape characteristics or components, frequent or continuous and over a wide area.	high
- A moderate change either over a restricted area or infrequently perceived or a small change in key landscape characteristics or components over a wide area.	medium
- A barely or rarely perceptible change in key landscape characteristics or components.	low
- Imperceptible change.	very low

Table 13.2 Criteria for assessment of magnitude of change in visual amenity

Criteria	Magnitude of change
- Major changes in view such as at close distances, affecting a substantial part of the view, continuously visible for a long duration, or obstructing a substantial part or important elements of view.	very high
- Clearly perceptible changes in views such as at intermediate distances, resulting in a either a distinct new element in a significant part of the view, or a more wide ranging, less concentrated change across a wider area.	high
- Moderate changes in views, such as at long distances, or visible for a short duration, perhaps at an oblique angle, or which blends to an extent with the existing view.	medium
- Change which is barely visible, such as at very long distances, or visible for a very short duration, perhaps at an oblique angle, or which blends with the existing view.	low
- Imperceptible change.	very low

Table 13.3 Criteria for assessment of impact significance

		Magnitude of change				
		very low	low	medium	high	very high
Sensitivity of landscape / viewpoint (Functional value)	low	Not significant	Low significance	Low significance	Medium significance	Medium or High significance
	medium	Not significant	Low significance	Medium significance	High significance	High or Very high significance
	high	Not significant	Low significance	Medium or High significance	High or Very high significance	Very high significance

13.3.2 Significance

Significance is determined by considering the sensitivity (functional value) of the landscape or visual receptor and the magnitude of change expected as a result of the scheme. Each case is assessed on its own merits as significance is not absolute and factors unique to each circumstance need to be considered. However, the general principles underpinning the evaluation of significance are set out in Table 13.3 and this table provides a guide to the application of professional judgement and experience in each individual case.

13.4 IMPACT ASSESSMENT

13.4.1 Impact identification

Sources of impact on landscape and visual amenity include the following:

- All above ground structures including track sections, light metro vehicles (LMV) elevated structures, bridge crossings, roads and road realignments, buildings, earthworks, Park & Ride facilities, the depot, stops and associated furniture;
- Lighting.

These sources of impact will result in the following impact types:

Direct Impacts

- Loss of landscape elements, including permanent land loss, vegetation losses, severance of watercourses, loss of built elements (which are part of the existing landscape or townscape fabric);
- Changes in physical topography as a result of the introduction of earthworks embankments or cuttings;
- Physical changes arising from the introduction of new structures into the receiving landscape or townscape.

Indirect Impacts

- Change to the character of a local landscape arising because of the visibility of the proposed scheme.

Landscape and Visual impacts may be:

- Positive: a change, which improves the quality of the environment (for example, improving landscape diversity, removal of existing negative aspect etc.);
- Neutral: a change, which does not affect the quality of the environment;
- Negative: a change, which reduces the quality of the environment (for example, impact on broadleaved woodland, obstructing an existing view etc).

13.4.2 Mitigation measures

13.4.2.1 Construction phase

The following mitigation measures will be applied throughout the construction phase to minimise landscape and visual impacts:

- Fencing will be erected around all temporary work sites;
- Materials and machinery will be stored tidily during the works;
- Portable machinery will be stored behind fencing in compounds when not in use;
- Roads providing access to site compounds and work areas will be maintained free of excessive dust and mud as far as is reasonably practical;
- Lighting of compounds and work sites will be restricted to agreed working hours and that which is necessary for security;
- Temporary fencing, barriers, traffic management and signage will be removed when no longer required;
- All existing trees to be retained will be protected prior to the commencement of construction in accordance with BS 5837 (or an equivalent standard);
- On completion of construction, all remaining spoil and construction material will be removed;
- Work sites and other land occupied temporarily will be reinstated.

The assessment of residual construction impacts assumes that the mitigation measures described in this section are implemented.

13.4.2.2 Operational phase

In assessing the impact of the proposed scheme on the landscape and visual environment, account was taken of various measures that will be taken to mitigate potential adverse effects. The landscape mitigation measures are described in this section and illustrated in the Landscape Insertion Plans see page 185 to page 239.

The mitigation measures that will apply to the scheme overall include the following:

- ecologically sensitive integration of the proposed scheme into the receiving environment. The proposed landscape treatments will complement the surrounding ecological network and will counter the potential barrier and fragmentation effect of the scheme as well as compensate for the loss of habitat;
- consideration of the landscape character and context of the proposed scheme in the preparation of the landscape design that will also consider the road user. The scheme will aim to retain and reinforce regional identity where possible;
- use of landscape planting treatments that require minimal long term maintenance and whose species content match or enhance the character of the surrounding area;
- a range of different habitats will be created to enhance local biodiversity including grasslands, scrub, woodland planting and hedgerows.

Additional landscape mitigation measures that will be implemented repeatedly in particular locations along this area of the alignment are listed in Table 13.4.

Table 13.4 Mitigation measures specific to Area MN104

Landscape mitigation measures	Description and purpose	Area in which mitigation will be put in place (Additional detail regarding mitigation measures is provided in the Landscape Insertion Plans see page 185 to page 239)
GLM 1	As much existing vegetation as possible will be retained within and adjacent to the scheme. Vegetation to be retained will be protected in accordance with BS5837. Where any woodland is removed for essential safety reasons the potential effects of wind-throw will be assessed and appropriate measures included in the design to mitigate any effects.	LLCA 9 Particularly along the widened and realigned Ballystruan Lane. LLCA 10
GLM 2	Planting to be introduced to compensate for vegetation loss and contribute or reinstate local landscape character.	LLCA 9 LLCA 10
GLM 3	Planting and/or hedgerow to be introduced to mitigate loss of landscape pattern and contribute to or reinstate local landscape character.	LLCA 9 At Park & Ride facility.
SLM 9a	Planting to be introduced to soften earthworks embankment and assist its integration into the receiving landscape.	LLCA 9 At Airport Portal and associated cuttings.
SLM 9b	Planting to be introduced to soften earthworks embankment and assist its integration into the receiving landscape.	LLCA 9
SLM 9c	Screen planting required around proposed surface car park.	LLCA 9 At Park & Ride facility
SLM 10a	Planting to be introduced to soften earthwork structures and integrate same into the receiving landscape.	Planting required along and adjacent realigned road.

13.4.3 Assessment of residual impacts

13.4.3.1 Project scenario: construction phase

LLCA 9: Santry Semi Developed Farmland

There are three construction compounds proposed for this local landscape character area. Compound 8 is for the South Portal Airport Tunnel and occupies a considerable area of agricultural land to the south of Old Airport Road. It will contain offices and welfare facilities and will be used for storage and stockpiling. It will be located for 5 years in total. Within this compound, the southern entrance portal will be constructed.

There are a few sensitive visual receptors scattered about the area with one property very close just west of Compound 8.

Compound 8a is the Dardistown Park & Ride compound and includes the Dardistown Stop. The extent of this generally corresponds to the proposed size of the Park & Ride facility. It will be located for 2 years in agricultural land, fairly remote from sensitive receptors except for a few isolated farm buildings.

Compound 9 serves the northern part of the M50 viaduct and will contain offices, welfare facilities and will store materials and assist with the movement of spoil. It is located along the line of Ballystruan Lane, leading up to the embankments of the M50. Neighbouring landuse is mainly industrial or commercial.

Most of the alignment in this character area is track laid on embankment or in cutting. Construction activities will include the movement of vehicles, construction workers and overhead works. As well as work to the new track, there is some road realignment for Ballystruan Lane including new embankments and bridges. This will increase construction activity in the area and is an indirect construction impact on the landscape and on nearby visual receptors. Some of the road works are close to the entrance to the Sillogue Golf Course.

The landscape is judged to have a low landscape sensitivity (functional value) and there are few sensitive visual receptors in the area. Due to the number of construction compounds within this area, in addition to the road and alignment works it is judged that there will be a Medium significance of landscape impact and a Low visual significance because of construction activities. The nature of these impacts is short term.

LLCA 10: Balcurris and Santry Demesne
Two construction compounds are proposed for this local landscape character area. Compound 10 is located at the south part of the M50 Viaduct and is partly located within this LLCA. It will be present for 2 years and will house offices and welfare facilities. It will also be used as a store and area for spoil clearance. The particular location for this compound is heavily vegetated with a mixture of trees, shrubs and scrub. The quality of the landscape in this garden area has been described in the baseline Landscape and Visual chapter of this EIS (Volume 1, Chapter 21) as high. There will be considerable change to this particular area of landscape because of the scheme alignment and its elevation. The location of Construction Compound 10 could result in further change unless planting unaffected by the scheme is retained and protected. Due to the restriction in space available, this is very unlikely to be achievable.

Construction Compound 10a is at the Northwood Stop and would be present for 4 years. There are a number of roadside trees at the boundary along Old Ballymun Road, which should be protected and retained, as they are significant elements along this road.

There is the requirement to realign and construct new access roads in this area as well as take the scheme across Old Ballymun Road. Construction activity will therefore be intense in this local area.

Within this particular area, landscape impacts due to construction activity are judged to be High. Similarly, there are a number of sensitive visual receptors in this area and construction impacts on these receptors are judged to be High.

For the remainder of the alignment, construction activities will be confined to below and along the alignment of Ballymun Road (R108). Much of this work will be similar to general road works with barriers, construction workers and various vehicles. There are likely to be large cranes present for placing concrete tunnel sections but again this type of activity is not unusual for a busy road corridor.

It is considered for the remainder of the alignment, landscape and visual impacts from construction will be of Low significance due their context within a busy road corridor. All impacts noted are temporary in nature.

13.4.3.2 Project scenario: operational phase

The impacts on both landscape and visual amenity in this LLCA are discussed in this section. The impacts on landscape are described in terms of the direct effects (direct physical changes) that are predicted to occur and indirect effects (effects on landscape character arising from the visibility of the scheme).

The visual impact assessment was undertaken from specific viewpoint locations within the visual envelope of the scheme within this LLCA.

LLCA 9: Metropark Semi Developed Farmland
This Local Landscape Character area will be directly affected by the scheme which will pass through this LLCA.

A tunnel portal at the northern end of this section will facilitate the transition of the proposed alignment from underground below the airport, to an above ground structure. The alignment will extend southwest in an earthworks cutting. The proposed alignment extends in a westerly direction on embankment involving removal of some hedgerow vegetation. The proposed Dardistown Stop will permanently displace an area of relatively undeveloped land and hedgerow vegetation losses will occur. The alignment advances in a southwesterly direction in a cutting and thereafter on embankment culminating in a proposed bridge crossing over the M50 at the southern end of this LLCA involving loss of an area of woodland associated with the Motorway. A proposed local road realignment will be located southwest of the Dardistown Stop which will result in vegetation losses.

Table 13.5 Direct impacts on LLCA 9

Loss of landscape elements and features
- Loss of a section of hedgerow vegetation including mature trees at the northern end of this section, adjacent to a local road (Ballystruan Lane)
- Permanent loss of an area of land to accommodate the proposed tunnel portal.
- Loss of a section of hedgerow located south of the location for the tunnel portal.
- Loss of sections of three hedgerows, two of which contain mature trees. These losses are associated with the proposed Dardistown Stop and car parking facility.
- Permanent loss of an area of land associated with the Dardistown Stop and car parking facility.
- Loss of sections of two hedgerows because of the proposed alignment crossing a local road, west of the proposed Dardistown Stop.
- Loss of sections of two hedgerows, one containing mature trees, associated with the proposed local road realignment and tie in to the existing R106 road.
- Some buildings will have to be removed to facilitate the local road realignment.
- Loss of a section of hedgerow containing mature trees associated with the local road realignment and proposed tie in located north of the M50 motorway.
- Loss of areas of trees along the cuttings of the M50 associated with the proposed crossing.
Changes to local topography as a result of earthworks structures
- Earthworks embankment associated with a part of the alignment located adjacent the M50.
- Earthworks embankment associated with the access road and cuttings associated with the tunnel portal.
Changes arising from the Introduction of proposed structures
- Tunnel Portal and associated building at the northern end of this section. 18,900m²
- Dardistown Stop and associated car parking facilities. Car park area 12,528m².
- Proposed alignment measuring 1,637m length.
- Proposed road realignment.
- Bridge crossing at intersection of proposed local road realignment and route alignment.
- Bridge crossing over the existing M50 Motorway.

Landscape Impacts (Indirect effects)
Indirect effects will also arise in this local landscape character area because of the visibility of the proposed scheme. The large, flat and open nature of this landscape means that views are quite open in most directions. This is also attributable to the absence of hedgerows. The sections on embankments will be most exposed and will have the most influence on the landscape character. Conversely, sections in cuttings will have least effect. The scheme is assessed to cause a high magnitude of change in this landscape of low sensitivity resulting in an impact of medium significance.

Visual Impacts
One viewpoint is located within LLCA 9 (9a). A description of the visual impacts that occur at this viewpoint location is provided in Table 13.8. For each viewpoint, the visual baseline is presented as a brief description of the main components in the existing view. The mitigation measures to be employed at these locations are shown in detail in the Landscape Insertion Plans (see end of page 185 to page 239).

The evaluation of impacts described in Table 13.8 takes into consideration the effects of these mitigation measures.

The portal from the airport tunnel will be visible locally, particularly from the Southern Perimeter Road, although planting mitigation and the fact that this is in cutting will reduce this impact. The Park & Ride area at Dardistown including the associated buildings, fencing, lighting and CCTV poles will be visible in the wider area. Screen planting within and on the boundary of the area will eventually mitigate most of these elements.

The general alignment including the overhead infrastructure and passing LMVs, will be visible, particularly the elevated sections on embankments. Views may be available from the Sillogue Park Golf Course although this is unlikely due to the existing screening along Ballymun Road.

Views will be available of the proposed bridge crossing over the M50 Motorway.

It is predicted that there will be adverse visual impacts associated with the infrastructure during years 1 to 15 as the planting will be in an immature state. Visual impacts at Viewpoint 9a are considered to be of Low significance.

LLCA 10: Balcurris and Santry Demesne
This Local Landscape Character area will be directly affected by the scheme.

Table 13.6 Direct impacts on LLCA 10

Loss of landscape elements and features
- Loss of an area of woodland within the Santry Demesne (directly south of the proposed M50 crossing) associated with the proposed alignment.
- Severance and loss of a shamrock shaped maze feature associated with the proposed alignment.
- Loss of mature trees arising from the severance of a double avenue within the Santry Demesne associated with the proposed alignment.
- Loss of an area of vegetation in order to facilitate proposed road realignment works.
- Loss of a section of one hedgerow associated with the proposed realignment.
- Loss of an area of woodland associated with the proposed Northwood Stop.
- Loss of areas of vegetation associated with the scheme at the southern end of this LLCA at Ballymun Road.
Changes to local topography as a result of earthworks structures
- Earthworks embankment measuring 563m length associated with the proposed alignment.
- Earthworks cutting measuring 72m length associated with the proposed road realignment.
Changes arising from the Introduction of proposed structures
- Bridge crossing at intersection of proposed local road realignment and the route alignment.
- Northwood Stop and substation
- Proposed alignment measuring 916m length
- Proposed road realignment
- Portal to underground cut and cover section of alignment
- Substation for tunnel fans at St. Margaret's Road junction with R108

Landscape Impacts (Indirect effects)
Indirect effects will also arise in this local landscape character area although these will be local due to the limited visibility of the proposed scheme in the area. In addition, at the point of joining the R108, the remainder of the alignment is below ground. However, the character of the area will significantly change because of the introduction of the alignment through the garden areas and the direct affect on various landscape elements.

Visual Impacts
Three viewpoints are located within LLCA 10 (10a, 10b and 10c). A description of the visual impacts that occur at these viewpoint locations are provided in Table 13.8. For each viewpoint, the visual baseline is presented as a brief description of the main components in the existing view. The mitigation measures to be employed at these locations are shown in detail in the Landscape Insertion Plans (see page 185 to page 239). The evaluation of impacts described in Table 13.8 takes into consideration the effects of these mitigation measures.

Limited views will be available of elevated sections of the alignment from local roads. Local properties will have extensive and very close views of new embankments, the LMVs and associated overhead structures.

Views into and out of the Demesne grounds will be available due to the removal of extensive boundary vegetation.

The Northwood Stop will be locally visible, as will the substation adjacent to the entrance to the underground section of the alignment.

It is predicted that there will be adverse visual impacts associated with the infrastructure during years 1 to 15 as the planting will be in an immature state. Visual impacts at Viewpoint 10a are considered to be of Medium significance. Visual impacts at Viewpoint 10b are considered to be of Low significance. Visual impacts at Viewpoint 10c are considered to be of High significance

13.4.4 Summary of residual impacts

A summary of all residual impacts is provided in Table 13.7 and Table 13.8.

Table 13.7 Summary of residual impacts on landscape

LLCA ID	Sources of Impact	Amount	Impact Description	Mitigation measures	Sensitivity of LLCA (Functional Value)	Magnitude (post mitigation	Significance (Post mitigation)
LLCA 9	Tunnel Portal. Dardistown Stop and Park & Ride. Embankment and Cuttings. Bridges.	Area of Tunnel Portal. 18,891m² Earthworks embankments of 927m length. Area of Car Park. 12,528m²	Vegetation loss and severance of farmland. Change in Landscape Character.	GLM 1 SLM 9a SLM 9b SLM 9c	low	medium	Medium
LLCA 10	Northwood Stop. Embankment and Cuttings. Bridges. Road realignment.	Earthworks cuttings of 72m length. Earthworks embankments of 563m length.	Vegetation Loss Change in Landscape Character.	GLM 1 GLM 2 SLM 10a	medium	high	High

Table 13.8 Summary of residual impacts on visual amenity at selected viewpoint locations.

Viewer type: H: Residents of dwellings; R: Recreational users; T: Commuters/ pedestrians; W: Workers

View point ID	Location and viewer type	Components of the existing view	Mitigation measures are shown in the Landscape Insertion Plans, see page 185 to page 239	Description of the proposed view (with landscape mitigation measures).	Sensitivity of viewpoint (Functional Value)	Magnitude (post mitigation	Significance (Post mitigation)
9a	Outside entrance to Sillogue Golf Course (R), (T).	Local road and traffic. Large expanse of grassland. Industrial buildings in far distance. Hedgerow vegetation.	Planting to integrate the cuttings and embankments into the receiving landscape. SLM 9b	Overhead line equipment may be visible. Planted embankment rising to cross motorway may be visible.	medium	low	Low
10a	Dwelling on Old Ballymun Road (T)	View from road and footpath towards gated entry. Conifer hedge lined driveway. Open grassland beyond conifer hedge.	Planting to integrate realigned entrance and new road to stop into landscape.	Existing walls and gates removed and replaced by new access road to stop. Existing trees at boundary removed from view and replaced by view of LMVs alignment in middle ground.	low	high	Medium
10b	Corner of Old Ballymun Road and Northwood Avenue (T)	Open rough grassland. Mature trees in far distance. Mast.	Planting to integrate realigned entrance and new road into landscape.	Views of Northwood Stop and alignment. Removal of mature trees from view with young tree planting in distance.	low	medium	Low
10c	Within curtilage of dwelling on Ballymun Road (H)	Mature trees, driveway or hard surfaced area. Gate lodge.	Planting on embankments to integrate raised alignment.	View of Northwood Stop and planted embankment to raised track alignment. Mature trees missing from view.	high	high	High

Landscape Baseline Plans and Landscape Insertion Plans

Landscape Baseline Plans
Perimeter Road to Dardistown

fold-out


Perimeter Road
Airport long term car park
RAILWAY ORDER DRAWING EXTENT
Perimeter Road
Dardistown
Proposed Metro North Alignment
RPA
METRO
RAILWAY WORKS
BASELINE LANDSCAPE

Landscape Insertion Plans
Perimeter Road to Dardistown

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Landscape Baseline Plans
Dardistown

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RAILWAY ORDER DRAWING EXTENT

Proposed Metro North Alignment

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BASELINE LANDSCAPE

Landscape Insertion Plans
Dardistown

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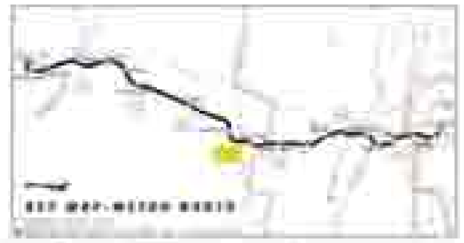
PLAN

CROSS SECTION



DRAWING LEGEND

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RAILWAY WORKS

LINE MN - ALIGNMENT DETAILS

DARDISTOWN

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Landscape Baseline Plans
Ballystruan Lane

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RAILWAY ORDER DRAWING EXTENT

Meat Packing Plant Access Road

Dardistown

Proposed Metro North Alignment

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RAILWAY WORKS

BASELINE LANDSCAPE

Landscape Insertion Plans
Ballystruan Lane

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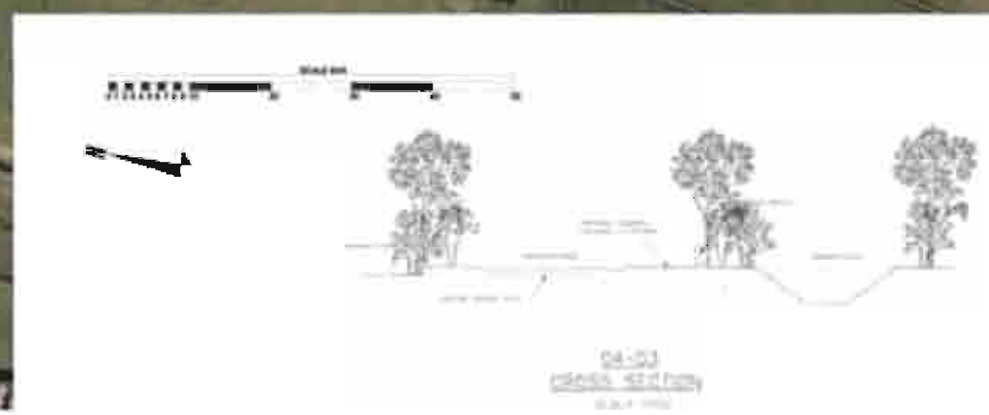

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LINE MN - ALIGNMENT DETAILS

BALLYBOUGH LANE

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Landscape Baseline Plans
Dardistown to M50 Motorway

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RAILWAY ORDER DRAWING EXTENT
Access Road
Proposed Metro North Alignment
RPA
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RAILWAY WORKS
BASELINE LANDSCAPE

Landscape Insertion Plans
Dardistown to M50 Motorway

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LINE MN - ALIGNMENT DETAILS
DANDISTOWN TO M50 MOTORWAY

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Landscape Baseline Plans
Meat Packing Plant Access Road

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RAILWAY ORDER BOUNDARY EXTENT

Meat Packing Plant Access Road

Proposed Metro North Alignment

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RAILWAY WORKS

BASELINE LANDSCAPE

Landscape Insertion Plans
Meat Packing Plant Access Road

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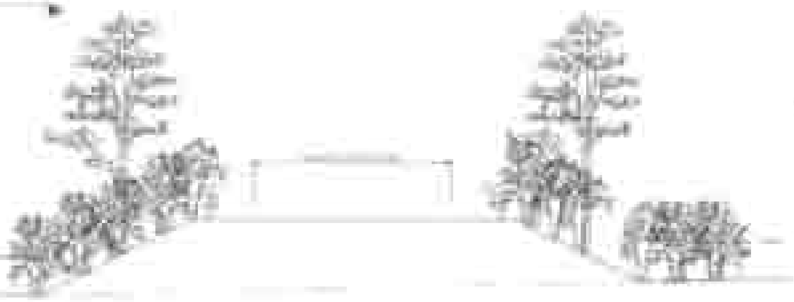
PLAN



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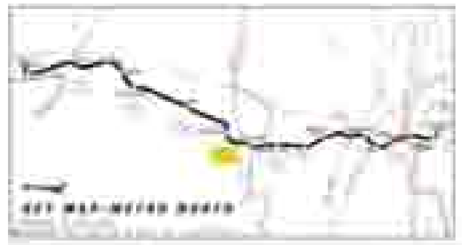

DRAWING LEGEND

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LINE MN - ALIGNMENT DETAILS

MEAT PACKING PLANT ACCESS ROAD

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Landscape Baseline Plans
M50 Motorway to Old Ballymun Road

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RAILWAY ORDER DRAWING REF EN
M50 Motorway
Santry Lodge
Old Ballymun Road
Ballymun Road
Proposed Metro North Alignment
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BASELINE LANDSCAPE

Landscape Insertion Plans
M50 Motorway to Old Ballymun Road

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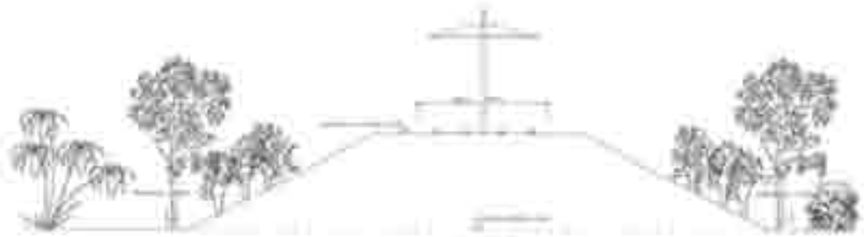

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RAILWAY WORKS

LINE MAP - ALIGNMENT DETAILS

MAS MOTORWAY TO OLD RAILYARD ROAD

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Landscape Baseline Plans
Old Ballymun Road to Santry Avenue

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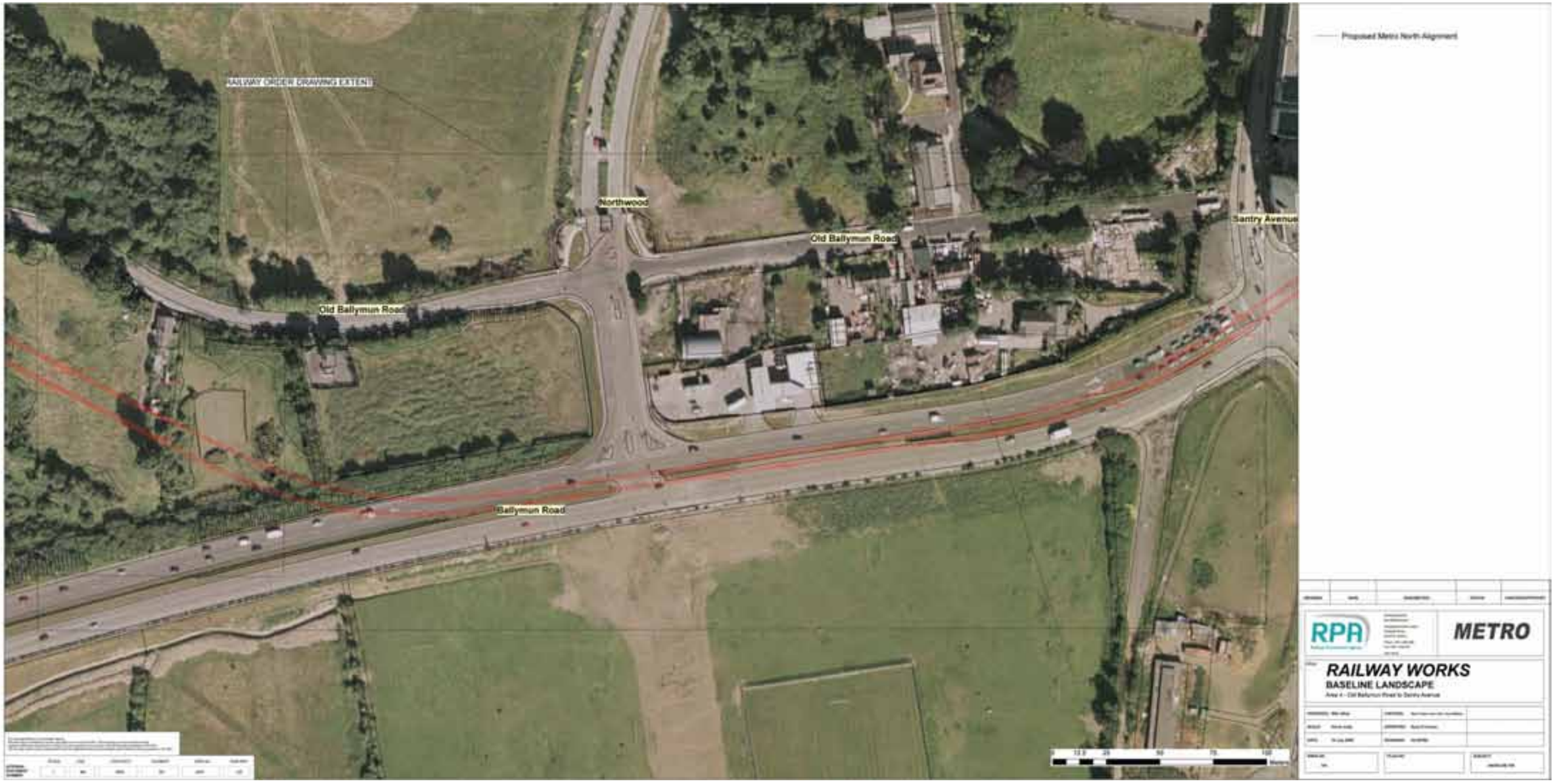
RAILWAY ORDER DRAWING EXTENT
Northwood
Old Ballymun Road
Old Ballymun Road
Santry Avenue
Ballymun Road
Proposed Metro North Alignment
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BASELINE LANDSCAPE

Landscape Insertion Plans
Old Ballymun Road to Santry Avenue

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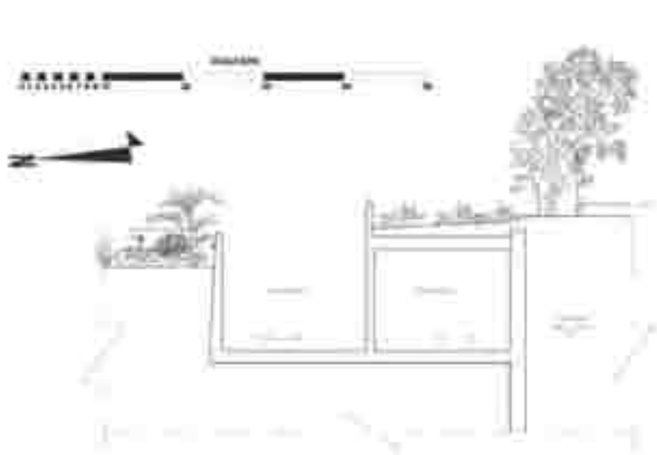

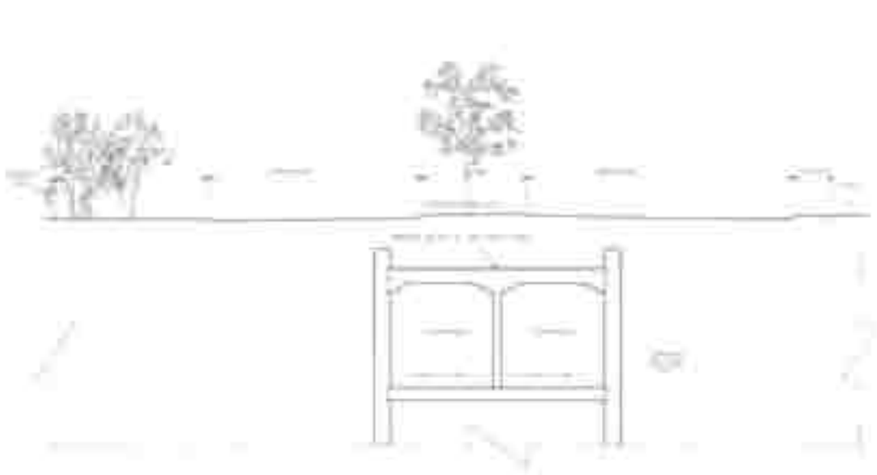

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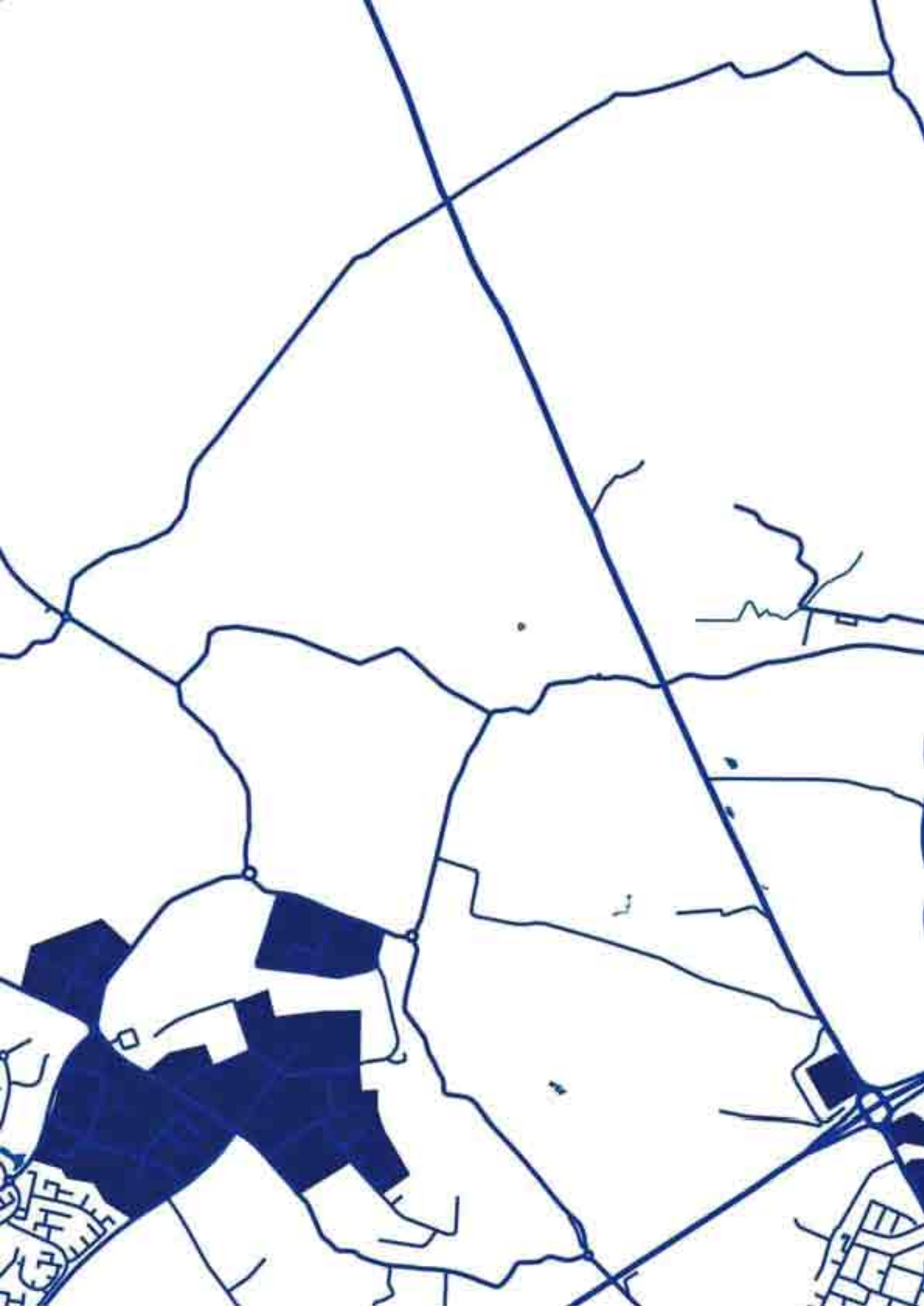
RAILWAY WORKS

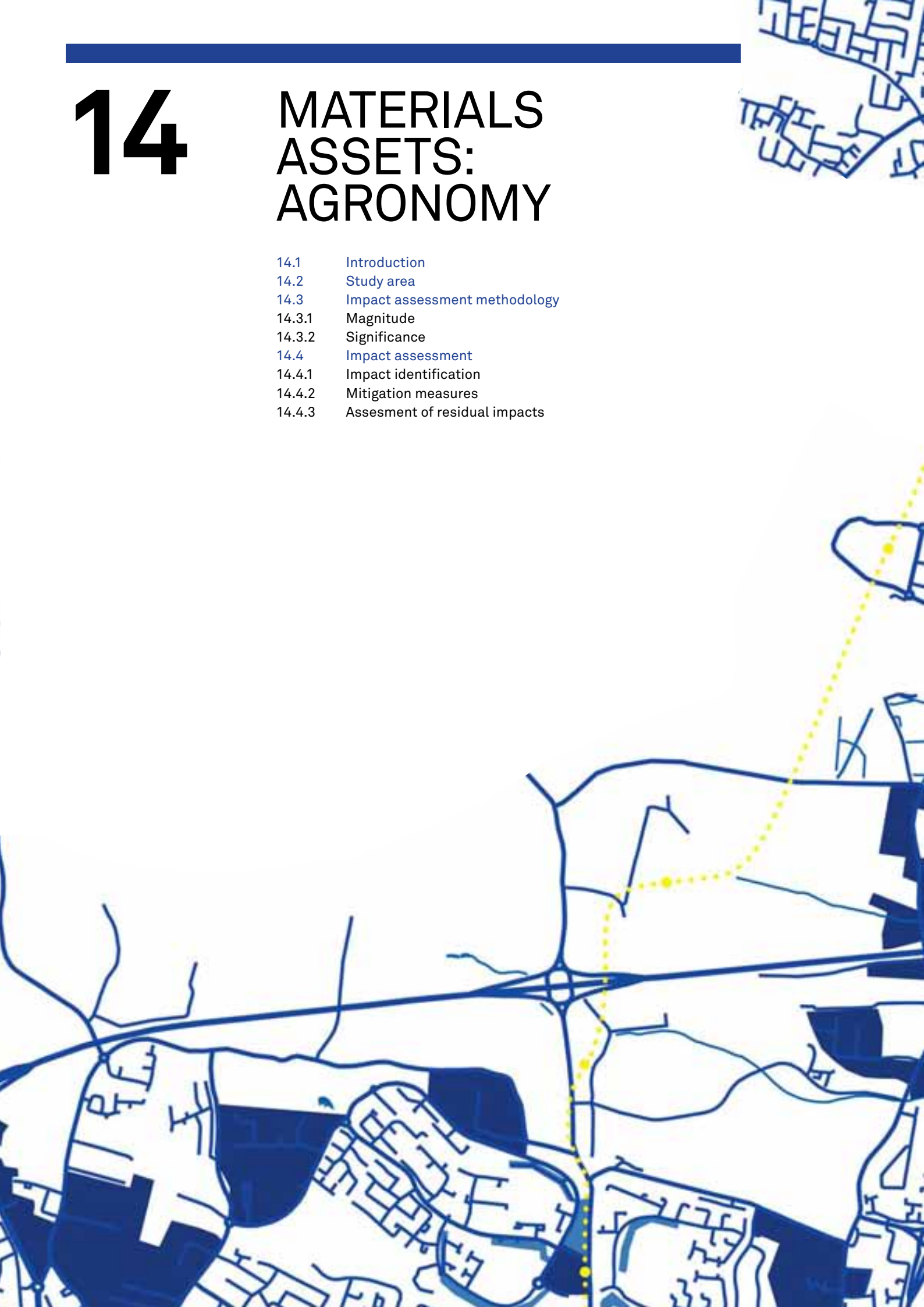
LINE MAP ALIGNMENT DETAILS

OLD BALLYMUN ROAD TO SANTRY AVENUE

104



14 MATERIALS ASSETS: AGRONOMY



This chapter of the EIS evaluates the potential for impacts on agronomy due to the construction and operation of the proposed scheme in Area MN104.

14.1 INTRODUCTION

This chapter of the EIS evaluates the potential for impacts on agronomy due to the construction and operation of the proposed in Area MN104.

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.	81ha

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
- 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
- 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
- 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
- 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
- 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. A farm will have a lower functional value if it is zoned for development because the land will not be in agricultural use in the longer term.

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 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 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, air, 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 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 who lose buildings to the development will be compensated to allow them to build replacement buildings.
- 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 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 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, air, other
- The contractor will liaise with land owners prior to the finalisation of the design of the proposed scheme. Any issues predicted to occur as a result of disturbance caused during the construction works will be addressed during 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 re organisation of farm enterprises by farmers 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 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 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 previously may not be carried out in agreement with land owners.

14.4.3 Assesment of residual impacts

14.4.3.1 Project scenario: construction phase

There are 81ha of agricultural land in the proposed scheme which are directly affected by the proposed scheme – 100% of this land has a medium functional value for the purpose of impact assessment, due to being zoned for industrial use. Although 81ha 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 low magnitude and are not considered to be significant. Agricultural lands within Area MN104 account for 23% of the total agricultural area directly affected by the scheme.

Land-take
Approximately 36ha of agricultural land will be required for the construction of the scheme during the construction phase. 25.3ha will be 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 41% during construction.

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 medium 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 the land take impact during the construction phase is very high and is considered to be of High significance. This impact cannot be completely mitigated.

Severance
During the construction phase severance will affect 100% of the agricultural area. Approximately 26ha will be severed during the construction phase - 46.5% 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 study area is medium 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 other severed parts of the study area and in the absence of direct agricultural access across the scheme the magnitude of the impact from severance during the construction phase is very high and considered to be of High significance. This impact cannot be completely mitigated.

Disturbance: traffic, noise, lighting, air other
During the construction phase there will be temporary disturbance to the day to day operation of the farm 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 (100% of the agricultural area). These enterprises are less sensitive to disturbance due to lighting, interrupted water supplies and interrupted farm access. The potential magnitude of impact on agriculture due to disturbance during the construction phase would be very high if mitigation was not put in place and the functionality of the study area is medium therefore this impact would be considered to be of High significance. Mitigation measures to be put in place with respect to noise/lighting/air are described in Section 14.4.2. When these measures are taken into account, the magnitude of the disturbance impact during construction phase is medium and is considered to be of Medium significance.

Table 14.3 Summary details of individual farm in the study area

Farm I.D. (Refer to Baseline Agronomy maps included in Volume 3, Book 1 of 2, for location of land parcels)		8
Area (ha) of affected farmland		81
Type of Farm Enterprise		Part of a larger tillage farm with one outlying farm. Total tilled area approx 110 ha. Cereals and potatoes grown.
Land type and quality	Soil Association	No 38
	Land quality	Good quality
% of total Agricultural lands along the scheme		23.0%
Land taken (ha)	Permanent/residual	10.9
	Temporary	25.3
% land taken	Permanent/residual	13.5%
	Temporary	31.2%
Severance		Yes
% land severed (of the area remaining)	Permanent/residual	49%
	Temporary	46.4%
Nature of impact (before mitigation) (Refer to maps (Baseline Agronomy) as provided in Volume 3, Book 1 of 2)		Very high construction phase impact from land loss and Medium residual impact from land loss. Very high construction phase impact and Very high residual impact from severance.
Magnitude of impact after mitigation (residual)	Permanent/residual	Medium (land loss), Very high (severance)
	Temporary	Very high
Functionality		Medium
Significance of impact after mitigation (residual)	Permanent/residual	High
	Temporary	High
Recommended mitigating measures (see notes 1 - 4 below)		As per 1 - 4 below. Access to severed land to be maintained via public road network.

Recommended mitigation measures common to all farms:

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. Fence off all construction areas;
4. The land within the construction compounds will be reinstated.

14.4.3.2 Project scenario: operational phase

Land take
Approximately 11ha 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 14%.

The potential magnitude of impact on agriculture due to land-take during the operational phase would be Medium if mitigation was not put in place and the functionality of the study area is medium 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 residual impact from land-take is medium and is considered to be of Medium significance. This impact cannot be completely mitigated.

Severance
Severance will permanently affect 100% of the agricultural area and will create 1 new land segment in the study area giving a permanent increase of 50% in segmentation. Approximately 34.4ha will be severed due to the operation of the scheme - 49% 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 study area is medium 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 other severed parts of the study area and in the absence of direct agricultural access across the scheme the magnitude of impact from severance is very high and is considered to be of High significance. This impact cannot be completely mitigated.

Disturbance: traffic, noise, lighting, air other
Noise sources and light emissions in this area during operation include the road traffic metro vehicles, the stops and the Park & Ride area.

Mitigation measures to be put in place with respect to noise are set out in Section 14.4.2. When these measures are taken into account, the magnitude of these impacts is considered to be very low. Noise/dust/lighting does not typically lead to a reduction in crop growth. The residual impact is therefore considered to be not significant.

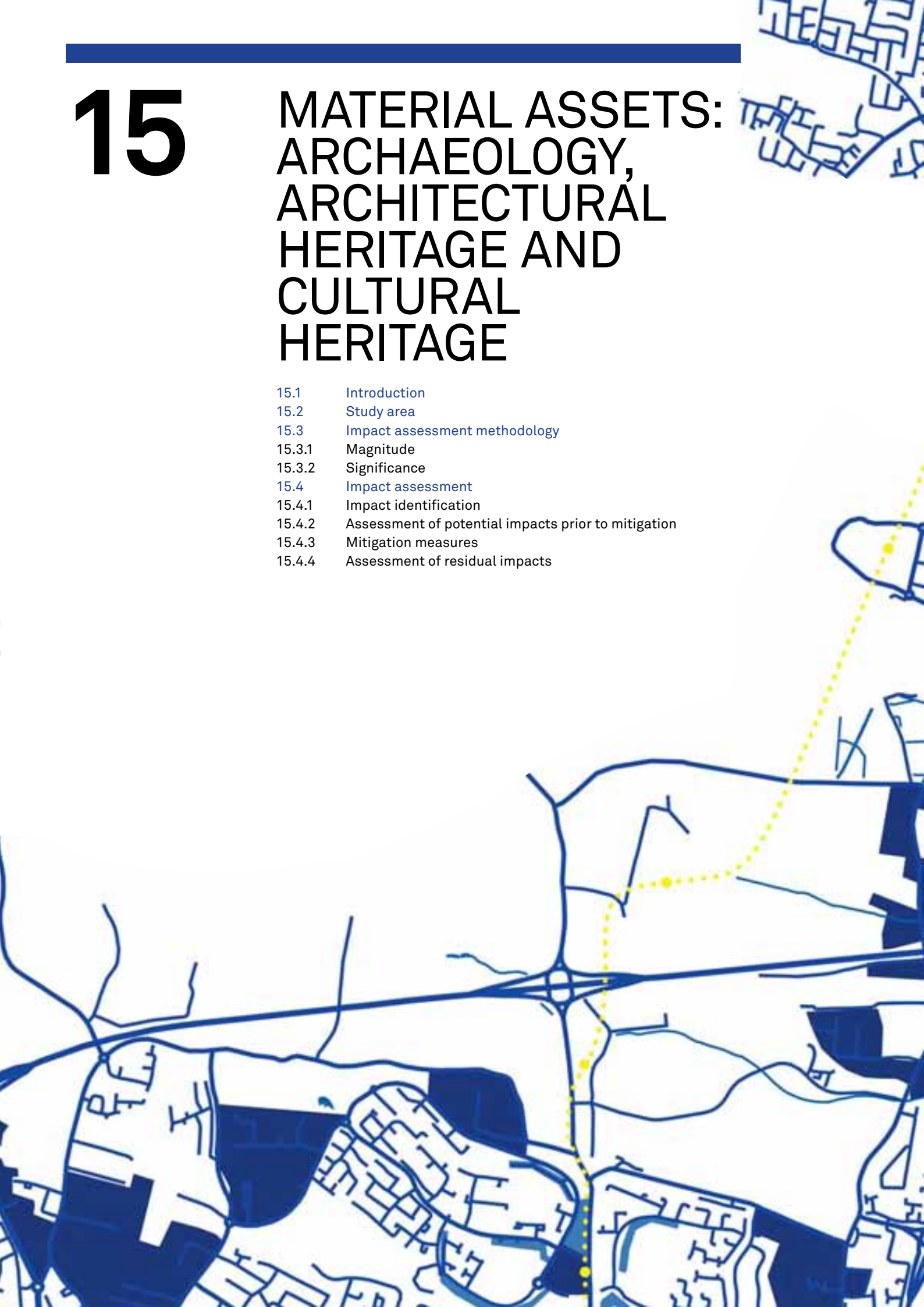
There may be some increases in traffic along local road networks adjoining the Stop and Park & Ride facilities but in general traffic volumes along the scheme will reduce and the residual impact on agriculture from changes in traffic volumes is assessed to be not significant.

Disturbance of drainage
The 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 high if mitigation was not put in place and the functionality of the study area is medium 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.

Water sources and water quality impacts
Water is a necessary resource for agriculture in the study area as a potable supply for irrigation, spraying 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 not significant.

15 MATERIAL ASSETS: ARCHAEOLOGY, ARCHITECTURAL HERITAGE AND CULTURAL HERITAGE



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 MN104.

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 scheme. Cultural heritage comprises archaeology and architectural heritage and also includes environmental aspects that are dealt with in other chapters of this EIS including Landuse, Soil and Geology and Landscape and Visual (Volume 2, Chapters 2, 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 and architectural 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 the 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.

Dardistown Park & Ride

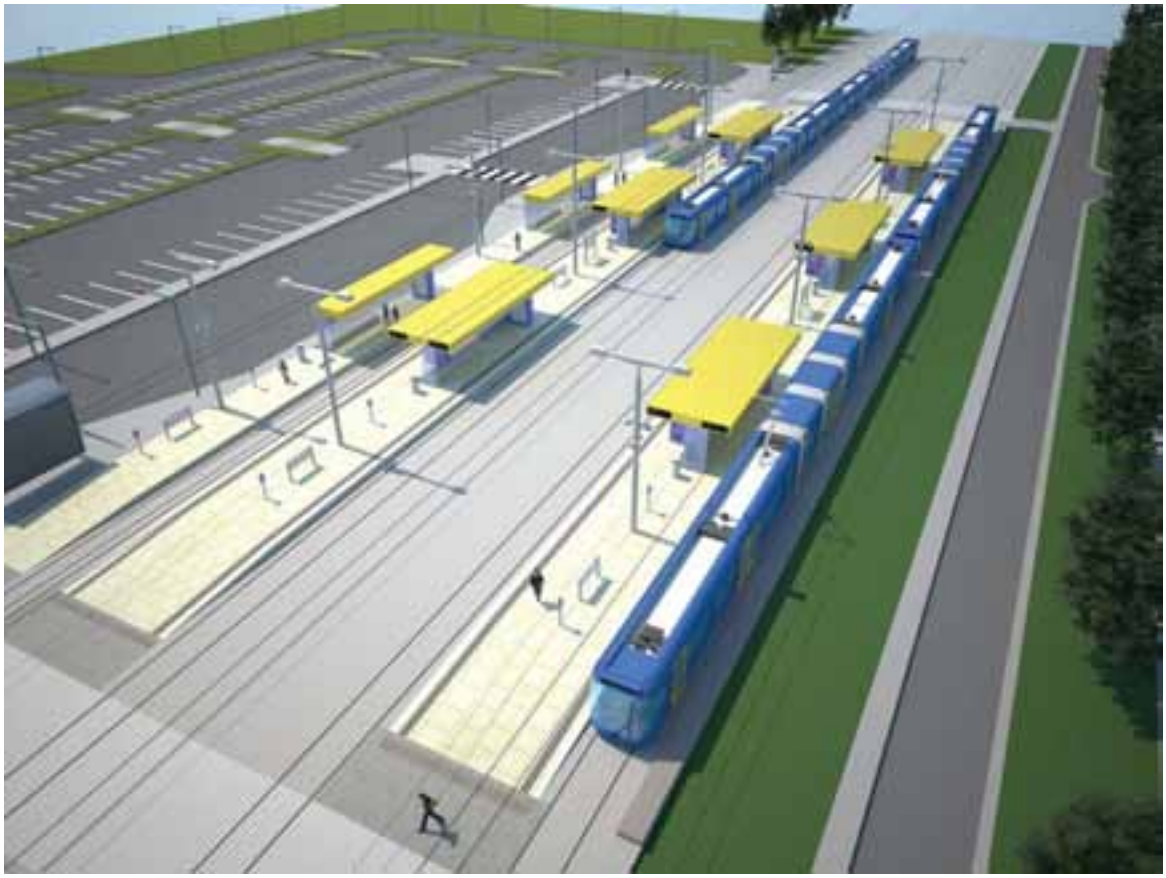


Table 15.2 Criteria for assessment of impact magnitude

Criteria	Impact magnitude
- 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
- 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
- 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
- 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
- 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 chapters of this EIS (Volume 1, Chapter 23).

15.4 IMPACT ASSESSMENT

15.4.1 Impact identification

The potential for impacts on archaeology and architectural 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
MN104_C01	HC#18 (Ballystruan) Site of archaeological potential	- Identified from aerial photography, this site will be impacted by the construction of the permanent way and Construction Compound 8. - The magnitude of this impact is very high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_C02	HC#418 (Ballystruan) Townland boundary	- The construction of the scheme and Construction Compound 8A will directly impact on this boundary. This impact will result in the total loss of the boundary. - The magnitude of this impact is very high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_C03	HC#19 (Ballymun) Site of archaeological potential	- Identified from aerial photography, this site will be impacted by the construction of the permanent way and Construction Compound 9. - The magnitude of this impact is very high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_C04	HC#20 (Ballymun) Site of archaeological potential	- The site, a mid-18th century Charter School Identified from 1st edition Ordnance Survey map, will be impacted by the construction of the permanent way. - The magnitude of this impact is very high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_C05	HC#407 (Charter School/ Santry Lodge). Structure of Architectural Merit	- The construction of the scheme and Construction Compound 10A will directly impact on the curtilage of this house of architectural merit. This impact will result in the total loss of the avenue from the gate to the house. - The magnitude of this impact is high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_C06	HC#408 (Gate Lodge for Charter School/Santry Lodge). Structure of Architectural Merit	- The construction will directly impact on the curtilage of this house of architectural merit. This impact will result in the total loss of the avenue from the gate to the house. - The magnitude of this impact is high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_C07	HC#409 (House, Ballymun Road). Structure of Architectural Merit	- The construction will directly impact on the curtilage of this house of architectural merit. This impact will result in the total loss of the garden. - The magnitude of this impact is high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_C08	HC#401 (Ballymun) Townland boundary	- The construction of the alignment and Construction Compound 10A will directly impact on this boundary. This impact will result in the total loss of the boundary. - The magnitude of this impact is very high and the impact affects an area of high functional value so the impact is considered to be of 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 visual impacts (Indirect effects) associated with construction

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN104_C09	HC#407 (Charter School/Santry Lodge). Structure of Architectural Merit	- The construction of the scheme and Construction Compound 10A will directly impact on the curtilage of this house of architectural merit. - The magnitude of this impact is high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_C10	HC#408 (Gate Lodge for Charter School/ Santry Lodge). Structure of Architectural Merit	- The construction will directly impact on the curtilage of this house of architectural merit. - The magnitude of this impact is high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_C11	HC#409 (House, Ballymun Road). Structure of Architectural Merit	- The construction will directly impact on the curtilage of this house of architectural merit. - The magnitude of this impact is high and the impact affects an area of high functional value so the impact is considered to be of High significance.

Table 15.5 Assessment of potential unknown impacts

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN104_C12	Areas around: The Perimeter Road (Dublin Airport) to M50. The M50 to Ballymun Road.	- The magnitude and significance of impacts in this area cannot be assessed based on existing information because these areas are green undeveloped areas

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.

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

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN104_O01	HC#407 (Charter School/Santry Lodge).	- The construction of permanent way, walls and other associated features necessary for the metro will impact on the visual integrity of this house of architectural merit.
	Structure of Architectural Merit	- The magnitude of this impact is high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_O02	HC#408 (Gate Lodge for Charter School/ Santry Lodge).	- The construction of permanent way, walls and other associated features necessary for the metro will impact on the visual integrity of this house of architectural merit. This impact will result in the total loss of the avenue from the gate to the house.
	Structure of Architectural Merit	- The magnitude of this impact is high and the impact affects an area of high functional value so the impact is considered to be of High significance.
MN104_O03	HC#409 (House, Ballymun Road).	- The construction of permanent way, walls and other associated features necessary for the scheme will impact on the visual integrity of this house of architectural merit.
	Structure of Architectural Merit	- The magnitude of this impact is high and the impact affects an area of high functional value so the impact is considered to be of High significance.

15.4.3 Mitigation measures

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

15.4.3.1 Mitigation of potential construction impacts

Table 15.7 Mitigation of potential impacts (direct effects) associated with ground disturbance

Impact Ref #	Affected Area/ Feature	Mitigation measure
MN104_C01	HC#18 (Ballystruan)	- Archaeological assessment followed by excavation should any deposits be shown to be present.
	Site of archaeological potential	- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
MN104_C02	HC#418 (Ballystruan)	- Drawn sections and photographic survey of the boundary prior to removal.
	Townland boundary at	- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
MN104_C03	HC#19 (Ballymun).	- Archaeological assessment followed by excavation should any deposits be shown to be present.
	Site of archaeological potential	- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
MN104_C04	HC#20 (Ballymun)	- Archaeological assessment followed by excavation should any deposits be shown to be present.
	Site of archaeological potential)	- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.

Impact Ref #	Affected Area/ Feature	Mitigation measure
MN104_C05	HC#407 (Charter School/ Santry Lodge).	- Sensitive landscaping specifically designed to minimise the impact of the severance of the house from its avenue and surrounding demesne. A photographic survey of the lands will be submitted to the Irish Architectural Archive.
	Structure of Architectural Merit	- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to medium.
MN104_C06	HC#408 (Gate Lodge for Charter School/Santry Lodge).	- Sensitive landscaping specifically designed to minimise the impact of the severance of the house from its avenue and surrounding demesne. A photographic survey of the lands will be submitted to the Irish Architectural Archive.
	Structure of Architectural Merit	- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to medium.
MN104_C07	HC#409 (House, Ballymun Road).	- HC#409 (House, Ballymun Road). Sensitive landscaping specifically designed to minimise the impact of the severance of the house from its curtilage. A photographic survey of the lands will be submitted to the Irish Architectural Archive.
	Structure of Architectural Merit	- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to medium.
MN104_C08	HC#401 (Ballymun)	- HC#401 (townland boundary at Ballymun). Drawn sections and photographic survey of the boundary prior to removal.
	Townland boundary	- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.

Table 15.8 Mitigation of potential visual impacts

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN104_C09	HC#407 (Charter School/ Santry Lodge).	- The construction of permanent way, walls and other associated features necessary for the metro will impact on the visual integrity of this house of architectural merit.
	Structure of Architectural Merit	- Mitigation will involve sensitive design of above groundstructures both temporary and permanent in order to lessen the impact on the house of architectural merit.
		- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to Medium (III) for construction phase
MN104_C10	HC#408 (Gate Lodge for Charter School/Santry Lodge).	- The construction of permanent way, walls and other associated features necessary for the metro will impact on the visual integrity of this house of architectural merit. This impact will result in the total loss of the avenue from the gate to the house.
	Structure of Architectural Merit	- Mitigation will involve sensitive design of above ground structures both temporary and permanent in order to lessen the impact on the house of architectural merit.
		- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to medium for construction phase
MN104_C11	HC#409 (House, Ballymun Road).	- Mitigation will involve sensitive design of above ground structures both temporary and permanent in order to lessen the impact on the house of architectural merit.
	Structure of Architectural Merit	- When this mitigation measure is taken into consideration, the magnitude of the impact decreases to medium for construction phase

Table 15.9 Mitigation of potential unknown impacts (direct effects) during construction

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN101_C12	Perimeter Road (Dublin Airport) to M50. M50 to Ballymun Road.	- This stretch of undeveloped green field land requires standard archaeological assessment including geophysical survey, test excavation and excavation should any archaeological deposits be shown to survive. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low for construction phase

15.4.3.2 Mitigation of potential operational impacts

Table 15.10 Mitigation of potential visual impacts (indirect effects) during operation

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN104_001	HC#407 (Charter School/ Santry Lodge). Structure of Architectural Merit	- Sensitive landscaping specifically designed to minimise the impact of the severance of the house from its avenue and surrounding demesne. A photographic survey of the lands will be submitted to the Irish Architectural Archive. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to low for operational phase.
MN104_002	HC#408 (Gate Lodge for Charter School/ Santry Lodge). Structure of Architectural Merit	- Sensitive landscaping specifically designed to minimise the impact of the severance of the house from its avenue and surrounding demesne. A photographic survey of the lands will be submitted to the Irish Architectural Archive. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to medium for the operational phase.
MN104_003	HC#409 (House, Ballymun Road). Structure of Architectural Merit	- Mitigation will involve sensitive design of above ground structures both temporary and permanent in order to lessen the impact on the house of architectural merit. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to medium for the operational phase.

15.4.4 Assessment of residual impacts

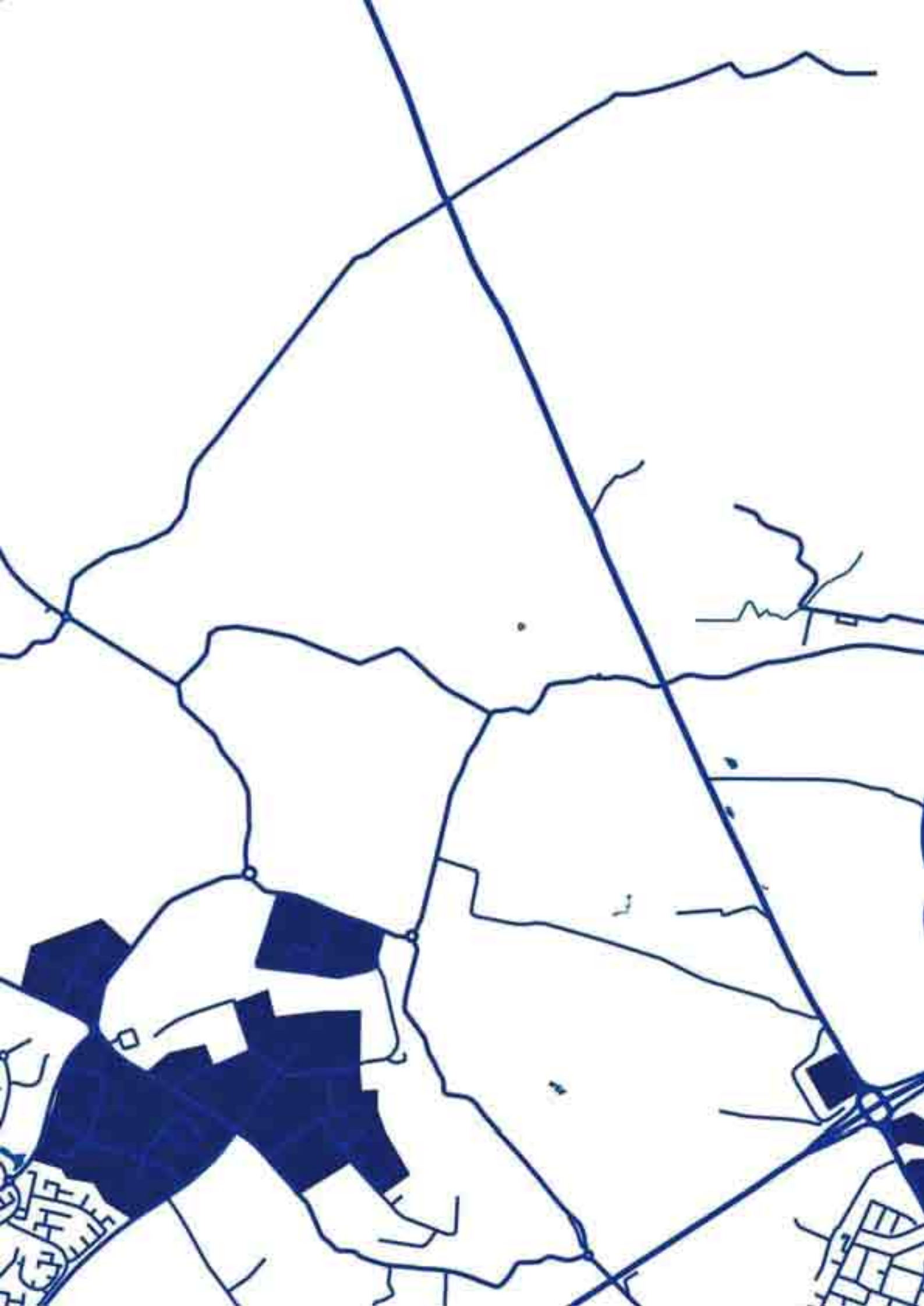
A summary of the residual impacts associated with the scheme is provided in Table 15.11.

Table 15.11 Summary assessment of residual impacts

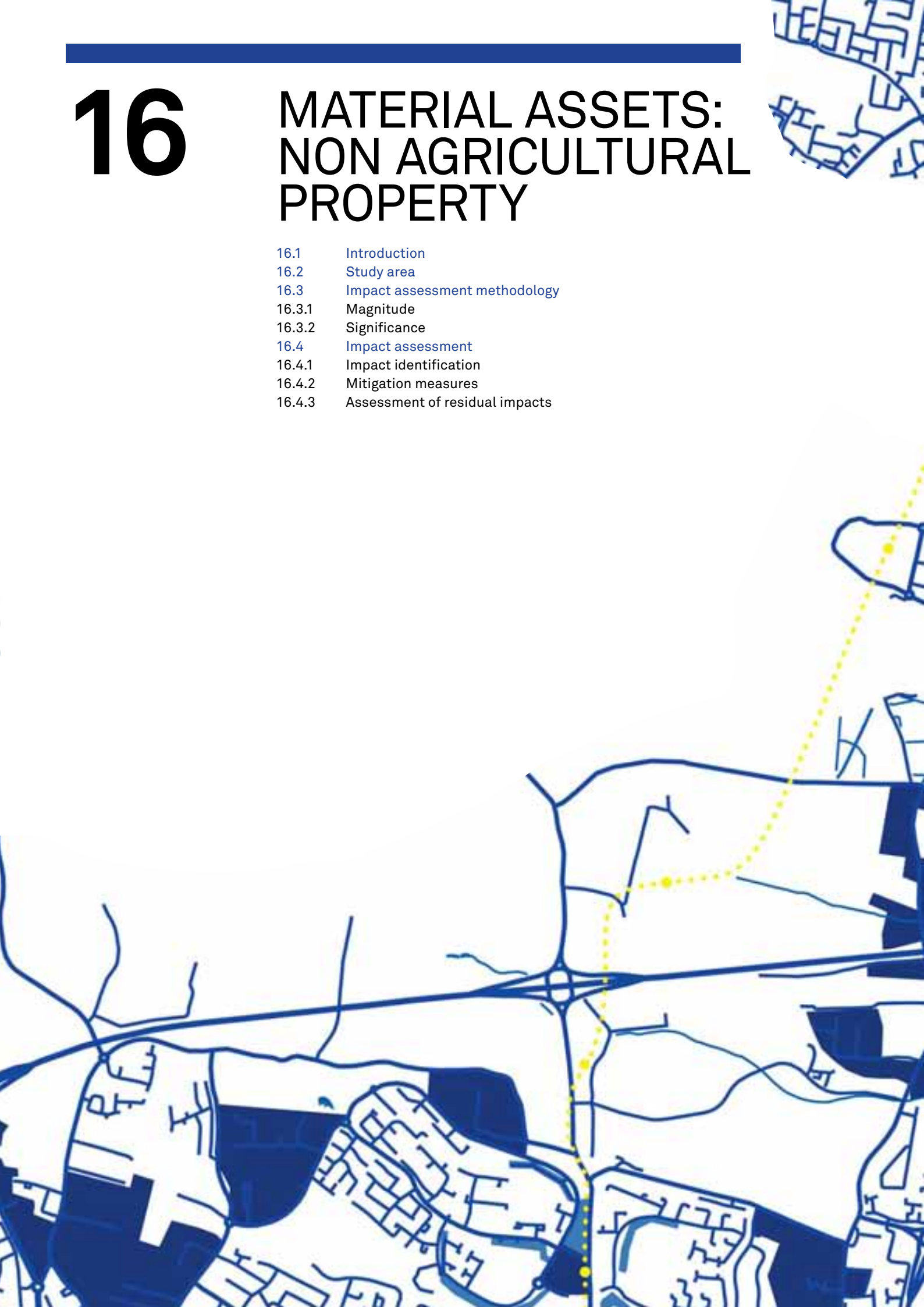
Impact Ref #	Affected Area/ Feature	Impact type	Magnitude of impact taking into account mitigation	Functional value of area affected	Significance of impact taking into account mitigation
Construction phase					
MN104_C01	HC#18 (Ballystruan) Site of archaeological potential	Ground disturbance	very low	high	Very low
MN104_C02	HC#418 (Ballystruan) Townland boundary	Ground disturbance	very low	high	Very low
MN104_C03	HC#19 (Ballymun) Site of archaeological potential	Ground disturbance	very low	high	Very low
MN104_C04	HC#20 (Ballymun) Site of archaeological potential	Ground disturbance	very low	high	Very low
MN104_C05	HC#407 (Charter School/Santry Lodge) Structure of Architectural Merit	Ground disturbance	medium	high	Medium
MN104_C06	HC#408 (Gate Lodge for Charter School/Santry Lodge) Structure of Architectural Merit	Ground disturbance	medium	high	Medium
MN104_C07	HC#409 (House, Ballymun Road). Structure of Architectural Merit	Ground disturbance	medium	high	Medium
MN104_C08	HC#401 (Ballymun) Townland boundary	Ground disturbance	very low	high	Very low
MN104_C09	HC#407 (Charter School/ Santry Lodge) Structure of Architectural Merit	Visual	medium	high	Medium
MN104_C10	HC#408 (Gate Lodge for Charter School/Santry Lodge) Structure of Architectural Merit	Visual	medium	high	Medium
MN104_C11	HC#409 (House, Ballymun Road). Structure of Architectural Merit	Visual	medium	high	Medium

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
MN101_ C12	Perimeter Road (Dublin Airport) to M50. M50 to Ballymun Road.	Potential Unknown	very low	medium	Very Low
Operational phase					
MN104_ 001	HC#407 (Charter School/ Santry Lodge) Structure of Architectural Merit	Visual impact	low	high	Low
MN104_ 002	HC#408 (Gate Lodge for Charter School/Santry Lodge) Structure of Architectural Merit	Visual impact	medium	high	Medium
MN104_ 003	HC#409 (House, Ballymun Road) Structure of Architectural Merit	Visual impact	medium	high	Medium

Dardistown Stop and Park & Ride



16 MATERIAL ASSETS: NON AGRICULTURAL PROPERTY



This chapter of the EIS evaluates potential impacts on non agricultural property arising from the construction and operation of the proposed scheme in Area MN104.

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 MN104.

16.2 STUDY AREA

All of the properties to be impacted upon as part of the 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 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. Potential impacts on property due to ground settlement are addressed in the Soil and Geology chapter of this EIS (Volume 2, Chapter 9).

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 chapters of this EIS e.g. Noise, Vibration and Archaeology, Architectural Heritage and Cultural Heritage (Volume 2, Chapters 4, 5 and 15 respectively).

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.

RPA are committed to having a Property Protection Scheme in place prior to construction works commencing. 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, Soil and Geology, Air and Climatic Factors and Landscape and Visual chapters of this EIS (Volume 2, Chapters 5, 9, 12 and 13 respectively).

In addition to the above mitigation measures, in a number of cases, where demolition of properties is to occur, RPA has offered compensation. 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

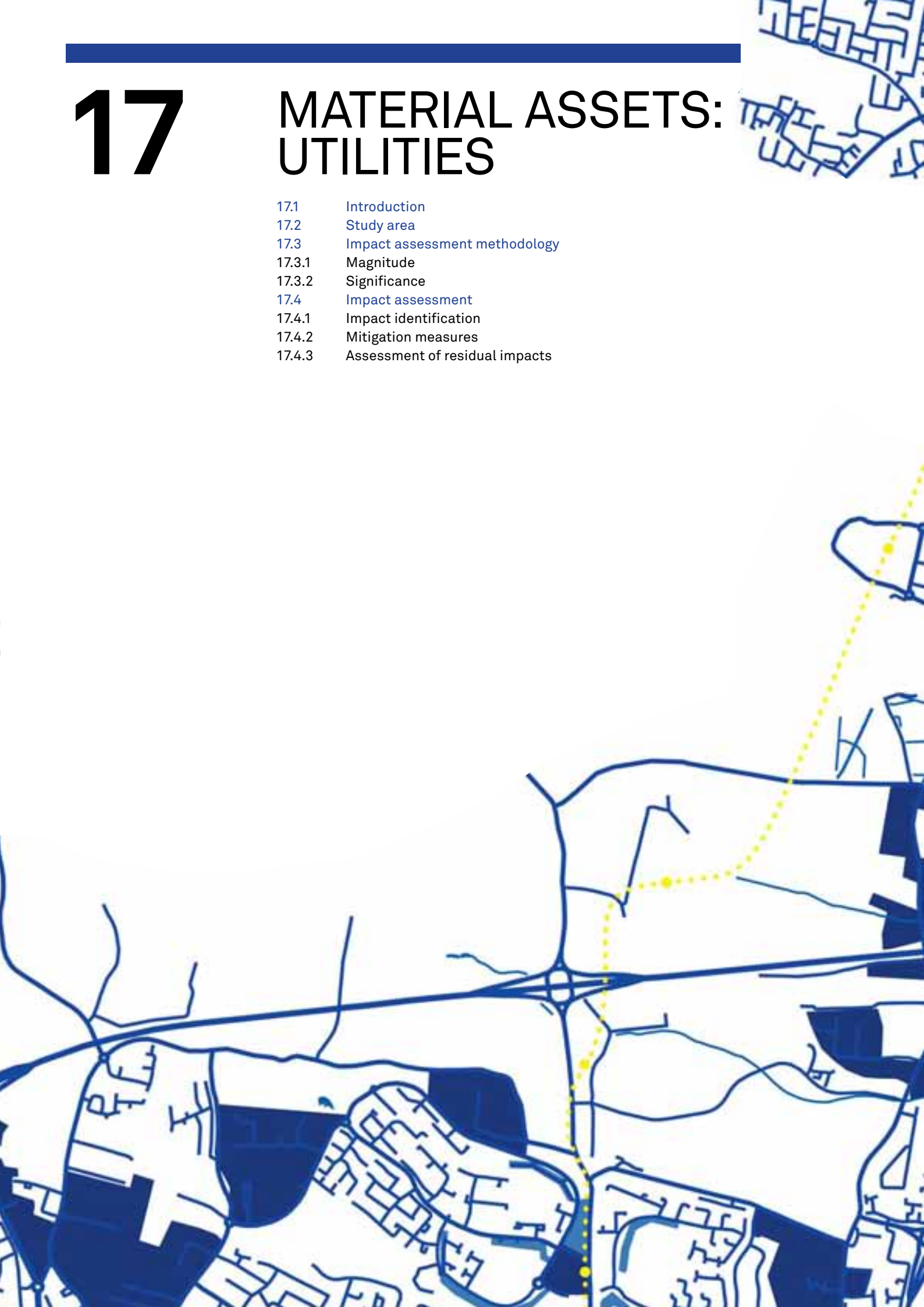
16.4.3.1 Project scenario: construction phase

No direct impacts on non agricultural property will occur during the construction phase of the proposed scheme. Potential indirect impacts due to issues such as vibration, ground settlement or dust are addressed in the Vibration, Soil and Geology, Air and Climatic Factors and Landscape and Visual chapters of this EIS (Volume 2, Chapters 5, 9, 12 and 13 respectively).

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.

17 MATERIAL ASSETS: UTILITIES



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 MN104.

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 MN104.

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 the Socio-economics and Traffic chapters of this EIS (Volume 2, Chapters 3 and 7 respectively).

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.

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; - 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

17.3.2 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.

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 the study area is recognised. Utility services within Area MN104 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 MN104 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 MN104 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.

Typical Light Metro Vehicle (LMV)

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
Gas Distribution	180 PE 4 bar	25	Protect Permit to dig system and liaison with service provider	Short term (low)	Low
ESB Distribution	10 kV Overhead Cable	123.4	Protect Permit to dig system and liaison with service provider	Short term (low)	Low
FCC Water	50mm uPVC	138	Protect Permit to dig system and liaison with service provider	Short term (low)	Low
FCC Drainage	450mm Combined	43	Protect Permit to dig system and liaison with service provider	Short term (low)	Low
Eircom	2x100 PP	223	Divert Permit to dig system and liaison with service provider	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 proposed scheme will not impact on utility services.

18 INTERRELATIONSHIPS, INTERACTIONS AND 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 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	Ground-water	Surface Water	Soil and Geology	Landscape and Visual	Flora and Fauna	Material Assets: Agronomy	Material Assets: Archaeology, Architectural Heritage and Cultural Heritage	Material Assets: Utilities	Material Assets: Non Agricultural Property
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: Utilities		■	■		■	■	■		■	■	■					■	
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	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. The potential for traffic emissions to have an indirect impact on climate (in terms of climate change) has also been considered.
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.

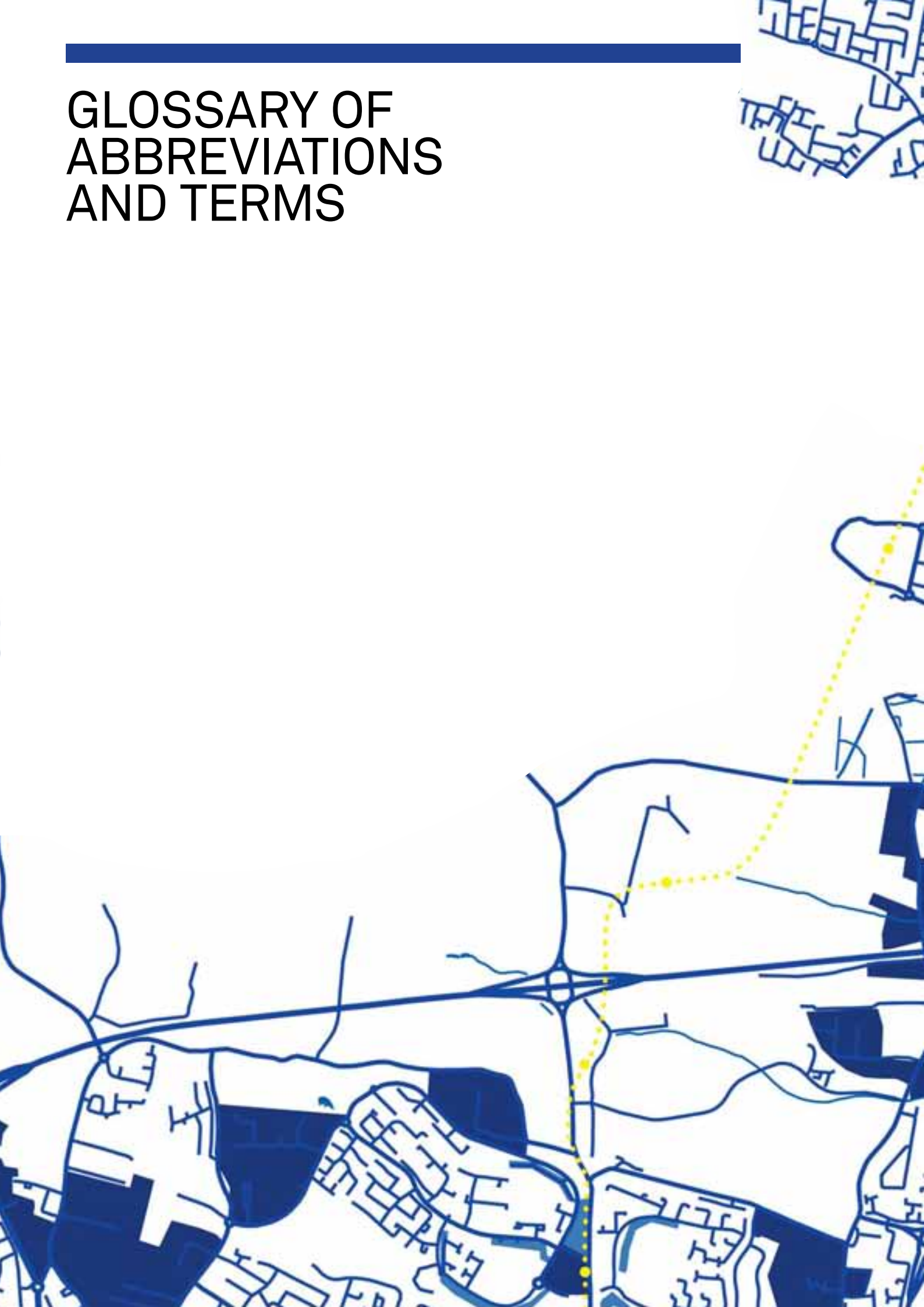
During the construction phase of the scheme, several other projects are likely to take place within the study area. A review of planning applications has been undertaken (as described in the Baseline Landuse chapter of this EIS (Volume 1, Chapter 10) to identify such developments. Examples include, but 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 calanders.
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/m³	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)	The systematic, reproducible and interdisciplinary identification, prediction and evaluation, mitigation and management of impacts from a proposed development and its reasonable alternatives. 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.
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.