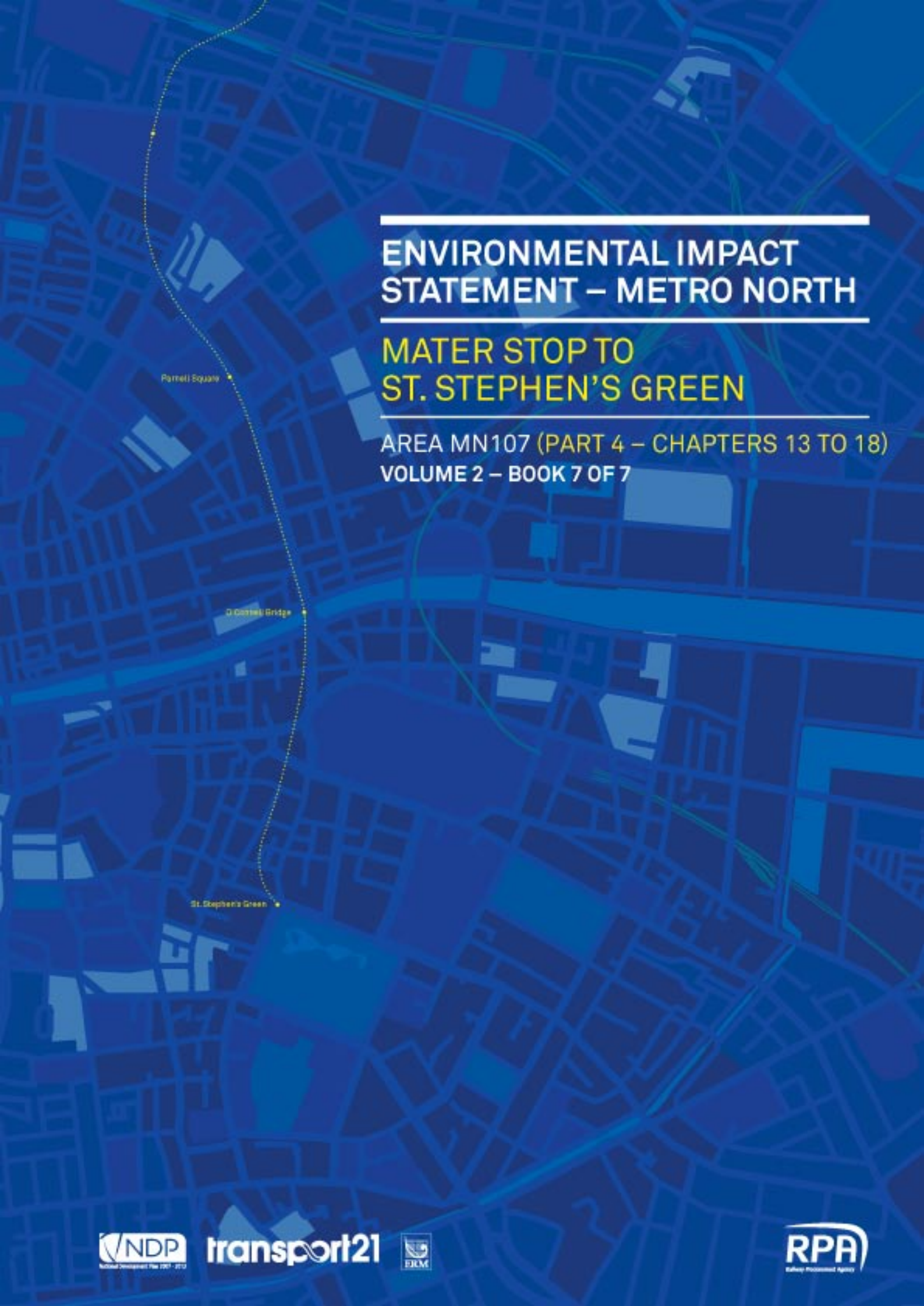


ENVIRONMENTAL IMPACT STATEMENT – METRO NORTH

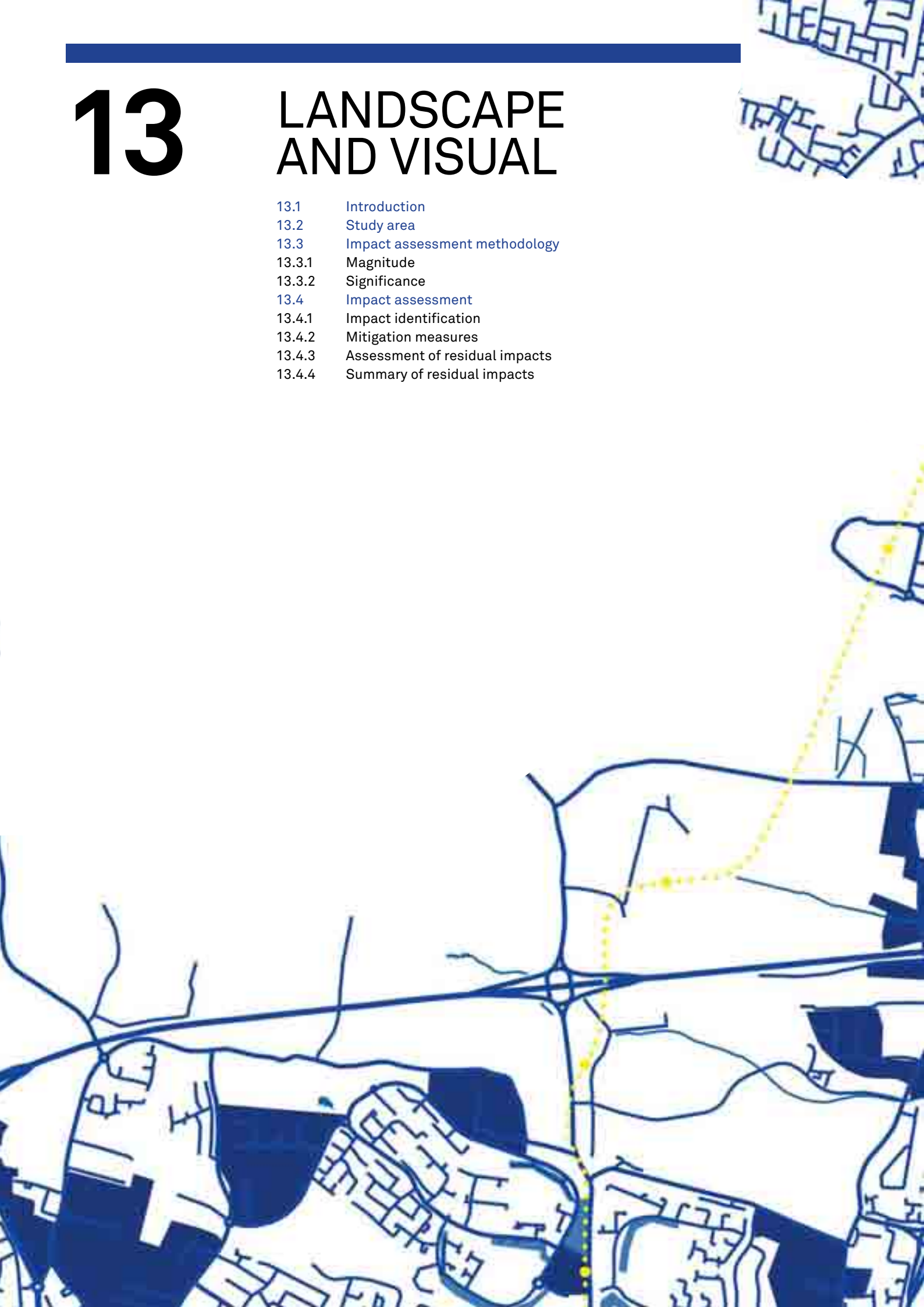
MATER STOP TO ST. STEPHEN'S GREEN

AREA MN107 (PART 4 – CHAPTERS 13 TO 18)

VOLUME 2 – BOOK 7 OF 7

NDP transport21 RPA

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 MN107.

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 MN107.

13.2 STUDY AREA

The study area corresponds to the potential zone of visual influence of the proposed scheme and includes tunnelled sections. The study area is illustrated on 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 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 to be effective in providing visual screening of the 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 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

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.

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

13.4 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, rolling stock, 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 as a result of the visibility of the 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

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 Operation

In assessing the impact of the 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 indicated in the Landscape Insertion Plans (see pages 195 to 233).

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

- ecologically sensitive integration of the 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 proposed scheme as well as compensate for the loss of habitat;
- consideration of the landscape character and context of the scheme in the preparation of the landscape design which 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 MN107

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 pages 195 to 233))
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 25
GLM 2	Planting to be introduced to compensate for vegetation loss and contribute or reinstate local landscape character.	LLCA 25
SLM 19a	Replacement street tree planting.	
SLM 19b	Reinstate walls and railings at Parnell Square	
SLM 25a	Reinstate waterbody at St. Stephen's Green. Reinstate feature island and carry out planting on island at St. Stephen's Green.	
SLM 25b	Reinstate Arch, walls and railings at St. Stephen's Green	

13.4.3 Assessment of residual impacts

13.4.3.1 Project scenario: construction phase

LLCA 19: North Frederick Street and Parnell Square East Area

Compound 17, Parnell Square, is located within this character area and will be present for 4 years. It serves for the construction of the Stop and will be an area of intense construction activity in an area of high landscape/townscape sensitivity.

Sensitive receptors both landscape and visual will incur temporary impacts due to construction activity in this LLCA. Due to the high sensitivity and magnitude of change it is considered that the significance of this construction impact is High.

LLCA 20: O'Connell Street Area

Compound 18, O'Connell Bridge, is partly located within this character area and will be present for 4 years. It serves for the construction of the Stop and will be an area of intense construction activity in an area of high landscape/townscape sensitivity.

The compound will contain offices and welfare facilities and will have some storage and fabrication facilities.

Sensitive receptors both landscape and visual will incur temporary impacts due to construction activity in this LLCA. Due to the high sensitivity and medium magnitude of change it is considered that the significance of this construction impact is Medium.

LLCA 21: River Liffey and Quays
Compound 18, O'Connell Bridge, is mainly located within this character area and will be present for 4 years. It serves for the construction of the Stop and will be an area of intense construction activity in an area of high landscape/townscape sensitivity.

The compound will contain offices and welfare facilities and will have some storage and fabrication facilities. Visual impacts will arise from the installation of the Bailey bridge across the River Liffey.

Sensitive receptors both landscape and visual will incur temporary impacts due to construction activity in this LLCA. Due to the high sensitivity and magnitude of change it is considered that the significance of this construction impact is High.

LLCA 22: Westmoreland Street Area
Compound 18, O'Connell Bridge, is partly located within this character area and will be present for 4 years. It serves for the construction of the Stop and will be an area of intense construction activity in an area of high landscape/townscape sensitivity.

The compound will contain offices and welfare facilities and will have some storage and fabrication facilities. Visual impacts will arise from the installation of the Bailey bridge across the River Liffey.

Sensitive receptors both landscape and visual will incur temporary impacts due to construction activity in this LLCA. Due to the high sensitivity and medium magnitude of change it is considered that the significance of this construction impact is Medium.

LLCA 23: Trinity College
There are no construction impacts arising from the alignment due to it being located below the ground. In addition, there are no compounds proposed within this LLCA.

LLCA 24: Grafton Street Area
There are no construction impacts arising from the alignment due to it being located below the ground. In addition, there are no compounds proposed within this LLCA.

LLCA 25: St. Stephen's Green
Compound 19, St. Stephen's Green will be located in this LLCA for a period of four years. It will contain office and welfare facilities and will include fabrication and equipment storage facilities. It will mainly serve for the construction of the Stop.

The compound will occupy a large area of the park at its main entrance and will dislodge park users and visitors.

The construction of the actual Stop requires the removal of the existing lake, the island and a large number of mature and significant trees. In addition large areas of shrubbery will require removal.

Such is the very high magnitude of change to both visual and landscape receptors of high sensitivity, it is judged that the significance of the construction impact is Very high.

13.4.3.2 Project scenario: operational phase

The impacts on both landscape and visual amenity in these LLCAs are discussed below. 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 these LLCAs.

LLCA 19: North Frederick Street and Parnell Square East Area

Direct impacts
The entire alignment is below ground in this small LLCA there is no direct landscape impact from the alignment.

The Parnell Square Stop is located within this LLCA and the Stop structure, lift access, emergency exits and vents will all be new elements in this streetscape. In order to accommodate these structures two large trees require to be removed.

There will be an impact on the existing walls and railings at the entrance to the Garden which require removal to construct the underground sections of the Stop. However, it is proposed that these will be reinstated during completion of the works.

The landscape/townscape character of this area has been judged as of high sensitivity (functional value)and the quality as very high. The quality of the new structures therefore need to be of similar high quality and not detract or diminish this LLCA.

The lightness of the various proposed structures, constructed primarily from glazing, will assist in minimising their impacts on the character of the Square and the adjacent streetscapes.

Table 13.5 Direct impacts on LLCA 19

Loss of landscape elements and features
- Loss of two trees.
- Removal of existing walls and fencing.
Changes to local topography as a result of earthworks structures
- None
Changes arising from the Introduction of proposed structures
- Introduction of Stop structure and associated infrastructure

Landscape impacts (Indirect effects)
There are no indirect effects on the landscape/ townscape as a consequence of the proposed scheme.

Visual impacts
Three viewpoints are located within LLCA 19 (19a, 19b and 19c). A description of the visual impacts that occur at these viewpoint locations is provided in Table 13.13. 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 pages 195 to 233). The evaluation of impacts described in Table 13.13 takes into consideration the effects of these mitigation measures.

There will be changes to the views for motorists travelling through and around Parnell Square. These low sensitivity receptors will observe a change in the streetscape with the introduction of a number of new structures. Pedestrians, tourists and visitors to the Garden of Remembrance will also be subject to visual change and, due to their slower pace; the magnitude of change will be higher than motorists with a passing interest.

There are high buildings adjacent the development which are mainly commercial, however there may be residential receptors in upper floors. They will be able to perceive a change but this is unlikely to be there main point of focus.

The key to minimising visual impacts will be the detailing of the Stop and the accompanying infrastructure.

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 Viewpoints 19a and 19b are considered to be of High significance. Visual impacts at Viewpoint 19c are considered to be of Medium significance. In order to aid the reader, a photomontage of Viewpoint 19a (On Parnell Square East opposite Garden of Remembrance) has been prepared and is shown on page 234 of this chapter.

LLCA 20: O'Connell Street Area

Direct impacts
The entire alignment is below ground in this LLCA and therefore there is no direct landscape impact from the alignment.

This area has been judged as being of high quality and high landscape/townscape sensitivity. The main Stop entrances and various infrastructure elements will be new features in the streetscape and they will occupy O'Connell Street and Westmoreland Street.

The location, immediately adjacent the River Liffey, is a prominent one and a large number of the buildings in the area are protected. It is important that this location does not become cluttered with inappropriate features which diminish the setting of these buildings.

The new structures are dispersed in the area, serving the two sides of the river. This will assist in mitigating the townscape impact and reducing the magnitude of change that might arise from locating one large structure at this location.

Table 13.6 Direct impacts on LLCA 20

Loss of landscape elements and features
- None
Changes to local topography as a result of earthworks structures
- None
Changes arising from the Introduction of proposed structures
- Introduction of new modern structures including servicing structures into existing sensitive streetscape - Impact of new structures on townscape/ landscape character

Landscape impacts (Indirect effects)
There are no indirect effects arising from the alignment due to the underground location of the track.

Visual impacts
One viewpoint is located within LLCA 20 (20a). A description of the visual impacts that occur at this viewpoint location is provided in Table 13.13. 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 this location are shown in detail in the Landscape Insertion Plans (see pages 195 to 233). The evaluation of impacts described in Table 13.13 takes into consideration the effects of these mitigation measures.

The location, immediately adjacent the River Liffey, is a prominent one and one visited frequently by tourists. These receptors are considered of high sensitivity. In addition, O'Connell Street is a famous promenade in Dublin and also heavily frequented by tourists.

As this is such a busy street with traffic both vehicular and pedestrian, the visual impacts of small new structures in this location is likely to be of a low magnitude. Even with the high sensitivity of the visual receptors the significance is judged as Low. Residents who might occupy flats in the vicinity of the scheme are likely to be focused on the wider street and river environment rather than on the local street pattern and grain.

Motorists, commuters and workers are likely to suffer impacts of a Low significance due to their low sensitivity.

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 Viewpoints 20a are considered to be of Low significance.

LLCA 21: River Liffey and Quays

Direct impacts
The entire alignment is below ground in this LLCA and therefore there is no direct landscape impact from the alignment.

This area has been judged as being of high quality and high landscape/townscape sensitivity. The main Stop entrances and various infrastructure elements will be new features in the streetscape and they will occupy a number of streets either side and along the river.

The location, immediately at the River Liffey, is a prominent one and a large number of the buildings in the area are protected. It is important that the proposed features do not diminish the setting of these buildings.

The new structures are dispersed in the area, serving the two sides of the river. This will assist in mitigating the townscape impact and reducing the magnitude of change that might arise from locating one large structure at this location.

Table 13.7 Direct impacts on LLCA 21

Loss of landscape elements and features
- None
Changes to local topography as a result of earthworks structures
- None
Changes arising from the Introduction of proposed structures
- Introduction of new modern structures including servicing structures into existing sensitive streetscape
- impact of new structures on townscape/ landscape character

Landscape impacts (Indirect effects)
There are no indirect effects arising from the alignment due to the underground location of the track.

Visual impacts
The location, immediately adjacent the River Liffey is a prominent one and visited frequently by tourists. These receptors are considered of high sensitivity. In addition, the River has a recently installed boardwalk which is frequently accessed.

As this is such a busy street with traffic both vehicular and pedestrian, the visual impacts of small new structures in this location are likely to be of a low magnitude. Even with the high sensitivity of the visual receptors the significance is judged as Low. Residents who might occupy flats in the vicinity of the development, are likely to be focused on the wider street and river environment rather than on the local street pattern and grain.

Motorists, commuters and workers are likely to suffer visual impacts of a Low significance due to their low sensitivity.

LLCA 22: Westmoreland Street Area

Direct impacts
The entire alignment is below ground in this LLCA and therefore there is no direct landscape impact from the alignment.

This area has been judged as being of high quality and high landscape/townscape sensitivity. The main Stop entrances and various infrastructure elements will be new features in the streetscape and they will mainly occupy Westmoreland Street.

A large number of the buildings in the street are protected. It is important that this location does not become cluttered with inappropriate features which diminish the setting of these buildings. The detail design of these structures is therefore critical.

Table 13.8 Direct impacts on LLCA 22

Loss of landscape elements and features
- None
Changes to local topography as a result of earthworks structures
- None
Changes arising from the Introduction of proposed structures
- Introduction of new modern structures including servicing structures into existing sensitive streetscape
- impact of new structures on townscape/ landscape character

Landscape impacts (Indirect effects)
There are no indirect effects arising from the alignment due to the underground location of the track.

Visual impacts
One viewpoint is located within LLCA 22 (22a). A description of the visual impacts that occur at this viewpoint location is provided in Table 13.13. 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 this location are shown in detail in the Landscape Insertion Plans (see pages 195 to 233). The evaluation of impacts described in Table 13.13 takes into consideration the effects of these mitigation measures.

The location of Westmoreland Street particularly at its junction with O'Connell Bridge is a prominent one and visited frequently by tourists. These receptors are considered of high sensitivity. This has been taken into account in the location of the entrance structures and servicing facilities in Westmoreland Street.

As this is such a busy street with traffic both vehicular and pedestrian, the visual impacts of small new structures in this location are likely to be of a low magnitude. Even with the high sensitivity of the visual receptors the significance is judged as Low. Residents who might occupy flats in the vicinity of the development, may notice a change in the local street pattern.

Motorists, commuters and workers are likely to suffer visual impacts of a Low significance due to their low sensitivity.

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 Viewpoints 22a are considered to be of Medium significance.

LLCA 23: Trinity College

Direct impacts
The entire alignment is below ground in this LLCA and therefore there is no direct landscape impact from the alignment. No other features of the scheme appear above ground level within this very small LLCA.

Table 13.9 Direct impacts on LLCA 23

Loss of landscape elements and features
- None
Changes to local topography as a result of earthworks structures
- None
Changes arising from the Introduction of proposed structures
- None

Landscape impacts (Indirect effects)
There are no indirect effects arising from the alignment due to the underground location of the track.

Visual impacts
The entire alignment is below ground in this LLCA and the tunnelling method of construction means there is no visual impact. No other features of the scheme appear above ground level.

LLCA 24: Grafton Street Area

Direct impacts
The entire alignment is below ground in this LLCA and therefore there is no direct landscape impact from the alignment. No other features of the scheme appear above ground level within this LLCA.

Table 13.10 Direct impacts on LLCA 24

Loss of landscape elements and features
- None
Changes to local topography as a result of earthworks structures
- None
Changes arising from the Introduction of proposed structures
- None

Landscape impacts (Indirect effects)
The entire alignment is below ground in this LLCA and the tunnelling method of construction means there is no indirect landscape impact.

Visual impacts
One viewpoint is located within LLCA 24 (24a). A description of the visual impacts that occur at this viewpoint location is provided in Table 13.13. 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 this location are shown in detail in the Landscape Insertion Plans (see pages 195 to 233). The evaluation of impacts described in Table 13.13 takes into consideration the effects of these mitigation measures.

The entire alignment is below ground in this LLCA and the tunnelling method of construction means there is no visual impact. No other features of the scheme appear above ground level. However, several feature located within the adjacent LLCA (25) are visible from this LLCA.

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 Viewpoints 24a are considered to be of High significance.

LLCA 25: St. Stephen's Green

Direct impacts
Within this clearly defined LLCA, the alignment is completely underground and is within a tunnel. Impacts arise mainly from construction activity, discussed previously in this section and from the various structures which are required at ground level.

The scheme requires the removal of approximately 40 trees of various species and sizes, a large proportion of which are large, mature and very significant trees. The loss of each tree is significant in itself however the loss of so many closely grouped trees has a significant impact on the parkland character of the park.

The trees proposed for removal are located in close proximity to the existing northern lake. These trees are part of the unique setting of the lake, framing views and screening other parts of the park. This gives the impression that the park is larger than it is in reality.

The lake is a very significant feature and is proposed for temporary use as part of the construction compound. Although proposed for replacement, the existing mature and scenic appearance of the lake and its associated mature vegetation will take a considerable time to recreate.

There are a number of external structures proposed for location within the actual park. The detailed design and location of these structures will require considerable care to minimise their impact on the park. Their interaction with existing features is another consideration.

A number of vents and roof lights are proposed for the middle of the reinstated island in the lake. The details of these structures and how they are made as inconspicuous as possible will require special attention.

The mitigation strategy for the park will require at the very least the replacement of lost vegetation. However even using large semi mature nursery plant material, the replacement plants will be significantly smaller and the canopy less dense, and it will be many years before the same landscape character can be restored.

The park is historically important, is a National Monument and is within a Conservation Area. It contains several protected structures and its surrounding walls and railings are protected. Part of these walls and railings, including the Fusilier's Arch, will require temporary removal in order to construct some of the underground elements. The park has been judged as of very high landscape quality and of high sensitivity.

Outside the perimeter of the Park, a number of structures are proposed which provide access to the Stop. These structures, lifts and escalators are placed symmetrically either side of the arched northern entrance to the park. They are proposed as modern, sleek mainly glazed structures which are appropriate to the modern appearance of the two affected streets; St. Stephen's Green West and North. St. Stephen's West already has tram structures and facilities constructed from high quality materials.

Table 13.11 Direct impacts on LLCA 25

Loss of landscape elements and features
- Removal of mature trees and vegetation
- Removal of lake and associated island and lakeside vegetation
- Temporary removal and replacement of existing walls, including Fusilier's Arch and boundary railings.
Changes to local topography as a result of earthworks structures
- NA
Changes arising from the Introduction of proposed structures
- Service facilities located in replacement island.
- Removal of vegetation to accommodate vents, maintenance buildings and emergency stairs
- Change in park character due to number of new service buildings and structures
- Additional structures in St. Stephen's Green West and North

Landscape impacts (Indirect effects)
There are no indirect effects as a consequence of the location of the scheme within this LLCA.

Visual impacts
Two viewpoints are located within LLCA 25 (25a and 25b). A description of the visual impacts that occur at these viewpoint locations is provided in Table 13.13. 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 pages 195 to 233). The evaluation of impacts described in Table 13.13 takes into consideration the effects of these mitigation measures.

The main visual receptors affected by the proposed scheme will be the users of the park. These vary from tourists to workers at lunchtime. They are sensitive receptors at the higher end of the scale as they are present primarily due to the character and tranquillity of the park.

Park users will be subject to large magnitudes of visual change due to the relative immaturity of the replacement planting and the opening up of views of the rest of the park. In addition, there will be the introduction of a number of visible new structures which will not be solely for the benefit of the park but more to serve the stop below the park.

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 Viewpoints 25a are considered to be of High significance. In order to aid the reader, two 3D images of St. Stephen's Green have been prepared. Image 1 shows the proposed scheme from the footpath north of St. Stephen's Green and image 2 shows the construction compound (aerial view) after reinstatement (see pages 235 and 236).

13.4.4 Summary of residual impacts

A summary of all residual impacts is provided in Table 13.12 and Table 13.13.

Table 13.12 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 19	Location of Parnell Square Stop	Railings and walls Loss of 2 trees	Removal and replacement of walls and railings Loss of vegetation New structures in streetscape.	New street tree planting	high	low	Low
LLCA 20	Location of O'Connell Bridge Stop	Not applicable	Introduction of new structures in streetscape	Embedded design of appropriate high quality structures.	high	medium	Medium
LLCA 21	Location of O'Connell Bridge Stop	Not applicable	Introduction of new structures in streetscape	Embedded design of appropriate high quality structures.	high	very low	Not significant
LLCA 22	Location of O'Connell Bridge Stop	Not applicable	Introduction of new structures in streetscape	Embedded design of appropriate high quality structures.	high	low	Low
LLCA 23	No impact	Not applicable	Not applicable	Not applicable	low	very low	Not significant
LLCA 24	No impact	Not applicable	Not applicable	Not applicable	high	very low	Not significant
LLCA 25	St. Stephen's Green Stop entrances, servicing structures, lift and emergency access.	Length of walls and railings to be removed and replaced. 40 trees to be removed. Area of lake to be replaced. Area of Island to be replaced.	Loss of large area of vegetation. Change in character of park. New structures introduced into park changing historic pattern and context of park.	Replanting of new trees as significantly sized semi mature trees. Replacement of water feature and associated structures. Replacement of existing walls and railings. Careful design and location of structures within the park and on adjacent streets.	high	very high	Very high

Table 13.13 Summary of residual impacts on visual amenity at selected viewpoint locations

Viewer Type: H: Residents of dwellings, R: Recreational Users, T: Travellers, W: Workers

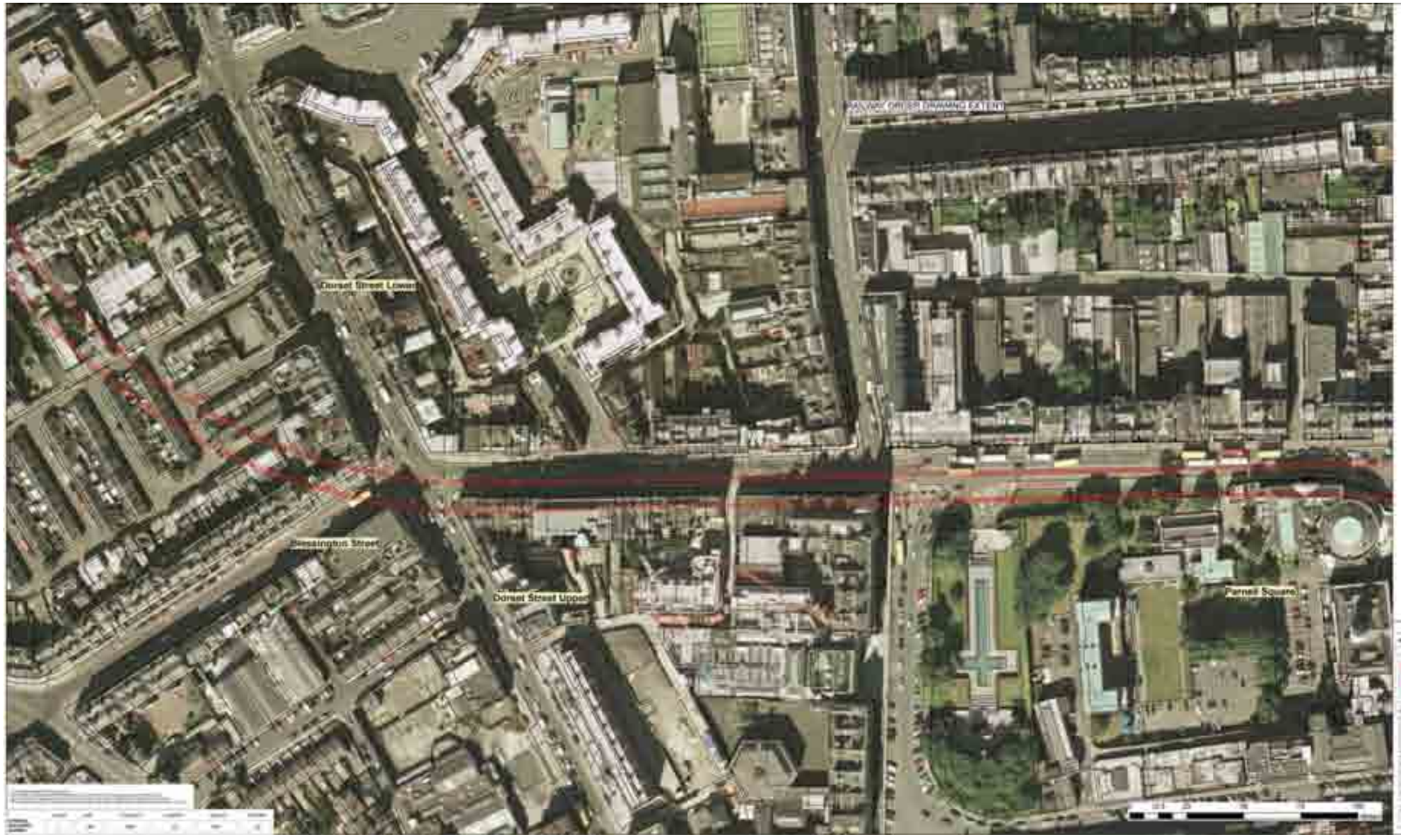
View point ID	Location and viewer type	Components of the existing view	Mitigation measures	Description of the proposed view (with landscape mitigation measures).	Sensitivity of viewpoint (Functional Value)	Magnitude (post mitigation	Significance (Post mitigation)
19a	On Parnell Square East opposite Garden of Remembrance(T)(H)	Entrance to Garden of Remembrance on Parnell Square East. Part of streetscape associated with Parnell Square North. (Please refer to page 234 for a photomontage of this location)	New street tree planting. Sympathetic design of entrance and other structures.	Entrance to Stop will be new feature in view. Service hatches and lifts may detract from current focus of view which is on existing entrance to park. (Please refer to page 234 for a photomontage of this location)	high	medium	High
19b	Parnell Square East outside the Garden of Remembrance (R) (H)	Streetscape associated with Parnell Square East including four-storey red brick terraces. Traffic.	New street tree planting. Sympathetic design of entrance and other structures.	Entrance to Stop will be new feature in view in addition to service hatches and lift facility. New street tree planting.	high	medium	High
19c	Parnell Square East (T) (H)	Streetscape associated with Parnell Square East including four-storey red brick terraces. Traffic. Part of Rotunda Hospital building.	New street tree planting. Sympathetic design of entrance and other structures.	Service hatches and lift facility will be visible in this view. Small part of Stop entrance may be visible.	medium	medium	Medium
20a	Central reservation pedestrian area on O'Connell Street (R) (T)	Streetscape associated with O'Connell Street. Monument to William Smith O'Brien in foreground	Embedded design of entrance and other structures.	New structures will be minor elements visible in background.	high	low	Low
22a	Corner of Westmoreland Street and Aston Quay (R) (T)	O'Connell Bridge and traffic. Quayside buildings. Recently introduced street tree planting in the far distance together with the Custom House building. Many pedestrians. The Spire monument.	Embedded design of entrance and other structures.	New structures will be elements in the view. However, they will not dominate the view but be part of this busy and diverse streetscape.	medium	medium	Medium
24a	On Grafton Street outside St. Stephen's Green Park (R).	Streetscape associated with Grafton Street and St. Stephen's Green North and West. Boer War Arch and St. Stephen's Green Park in background.	Embedded design of entrance and other structures.	New structures may be prominent elements in the view.	high	high	High

View point ID	Location and viewer type	Components of the existing view	Mitigation measures	Description of the proposed view (with landscape mitigation measures).	Sensitivity of viewpoint (Functional Value)	Magnitude (post mitigation	Significance (Post mitigation)
25a	On footpath at edge of lake near entrance to Yeats memorial (R).	Lakeland setting. Vegetated island (Pulham Rock Feature). Cascade. Distant view of the Boer War Arch entrance. Foliage of overhanging large willow tree foreground.	Replace lake, replanting off trees and other vegetation, careful placement of new structures within park. Replacement of boundary walls and railings.	Island restored with young vegetation cover. Rock and water cascade features restored and young tree planting present in background. Building facades visible in background due to relative immaturity of new trees.	high	high	High
25b	Footpath adjacent to lake (R).	Footpath and trees associated with Lime Walk. Mature vegetation on the park boundary. Boer War Arch. Facades (in part) of St. Stephen's Green North and West		Building facades visible in background due to immaturity of replacement planting. New tree planting in place, grass, paving all reinstated. Trees are not yet significant features due to relative age compared to stature of those removed.	high	very high	Very high

landscape Baseline Plans and Landscape Insertion Plans

Baseline Plans
St. Joseph's Parade to Cavendish Row

fold-out



Proposed Metro North Alignment

RPA

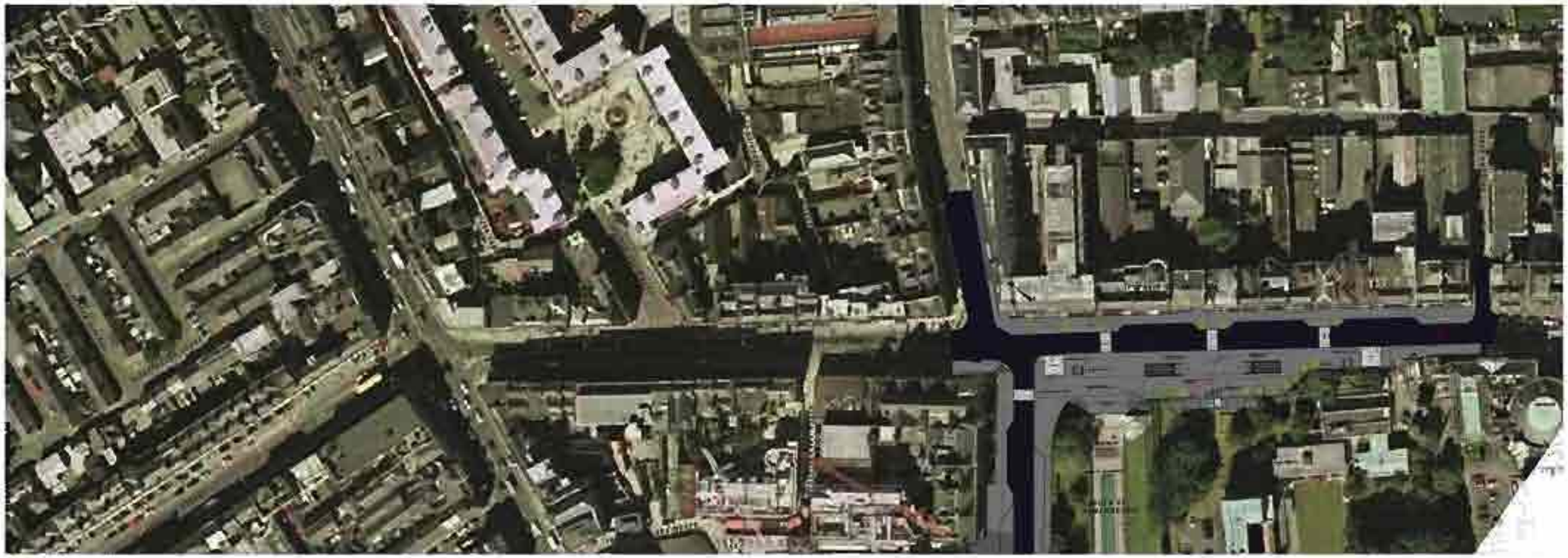
METRO

RAILWAY WORKS

BASELINE LANDSCAPE

Landscape Insertion Plans
St. Josephs Parade
to Cavendish Row

fold-out



RAILWAY WORKS

LINE WR – ALIGNMENT DETAILS

ST.JOSEPH'S PARADE TO CAVENDISH ROW

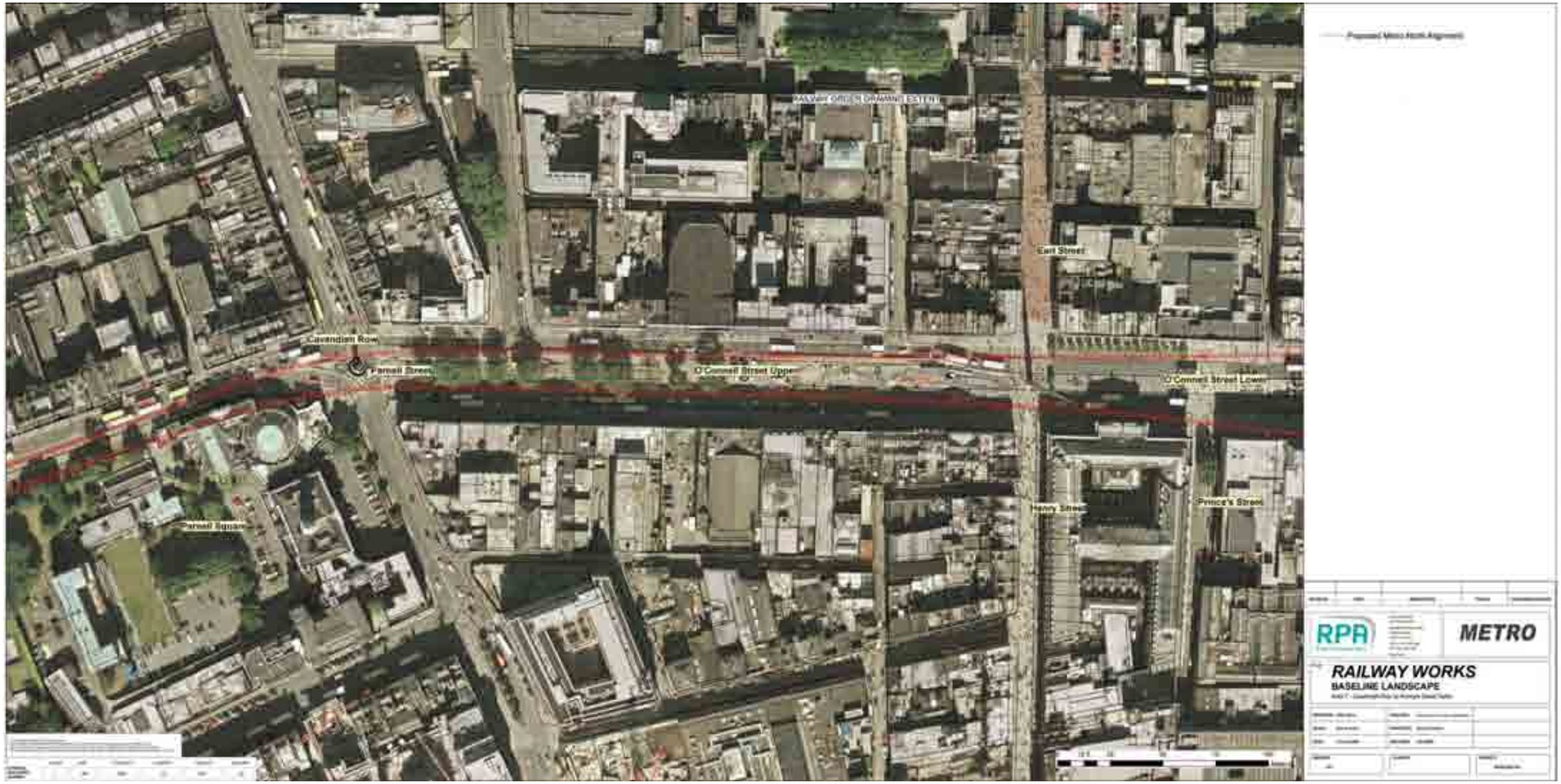
METRO

RPA

107

Baseline Plans
Cavendish Row to
Prince's Street North

fold-out



RPA

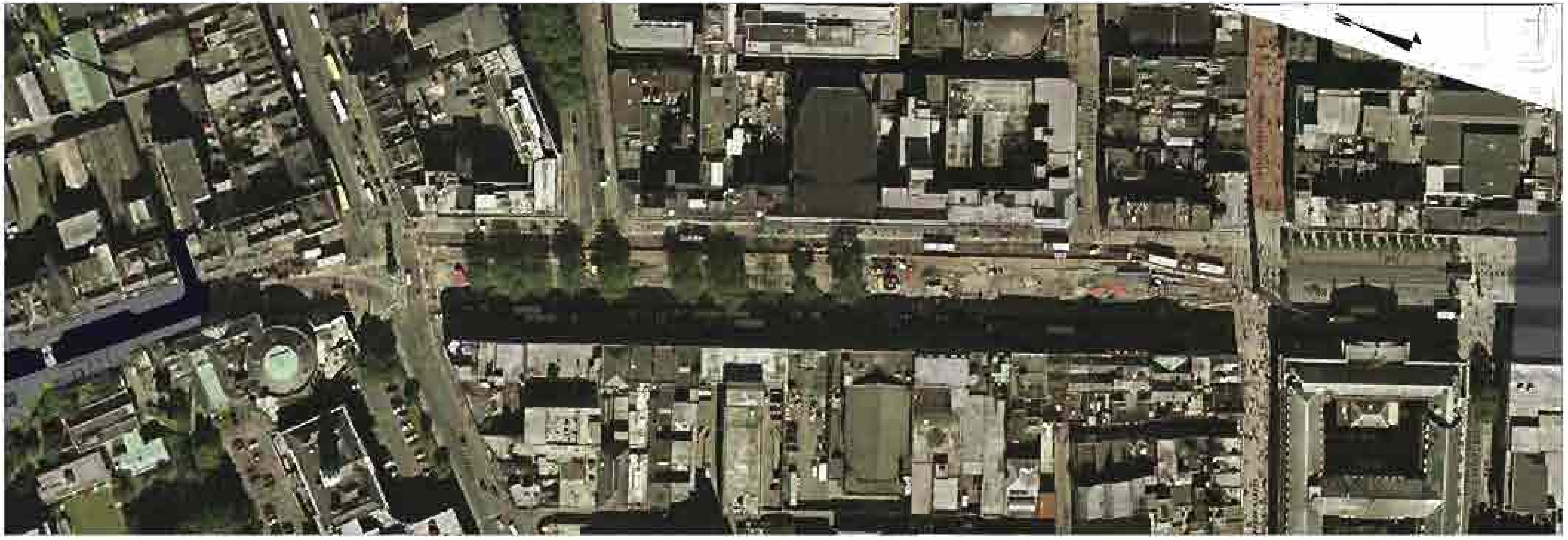
METRO

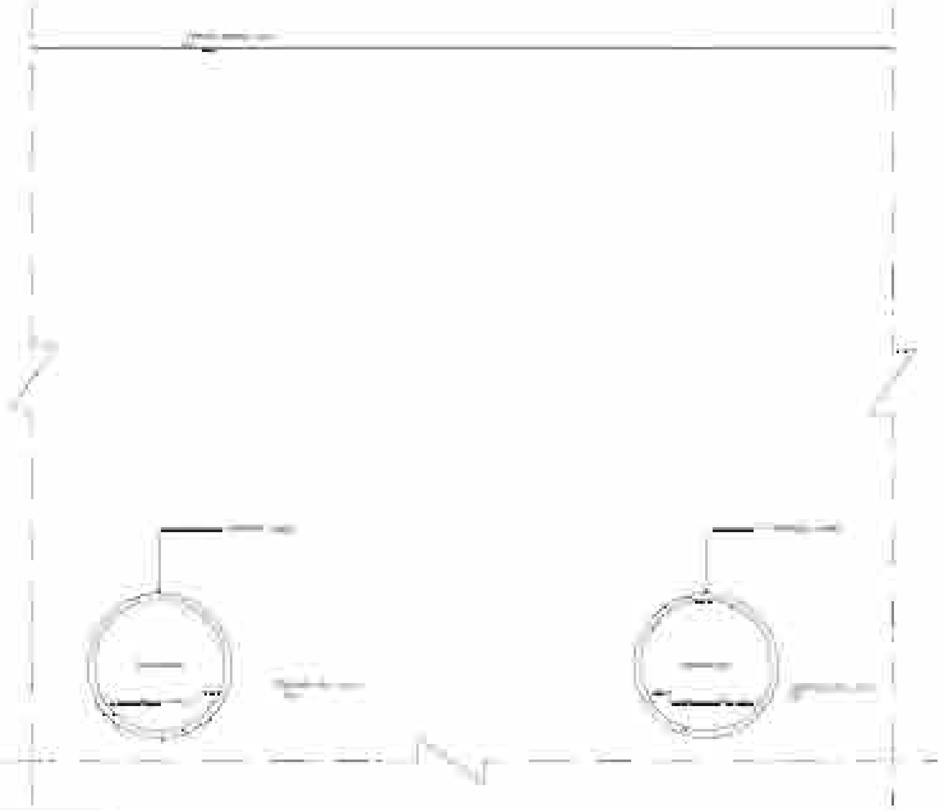
RAILWAY WORKS

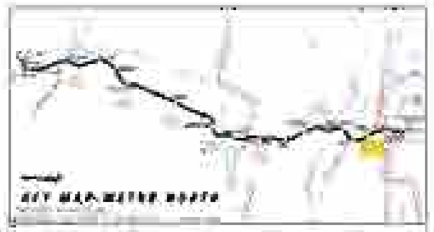
BASELINE LANDSCAPE

Landscape Insertion Plans
Cavendish Row to
Prince's Street North

fold-out







DRAWING LEGEND

METRO

RAILWAY WORKS

LINE MN - ALIGNMENT DETAILS
CAVENDISH ROW TO PRINCE'S STREET NORTH

107

MN-XX-107-A-B

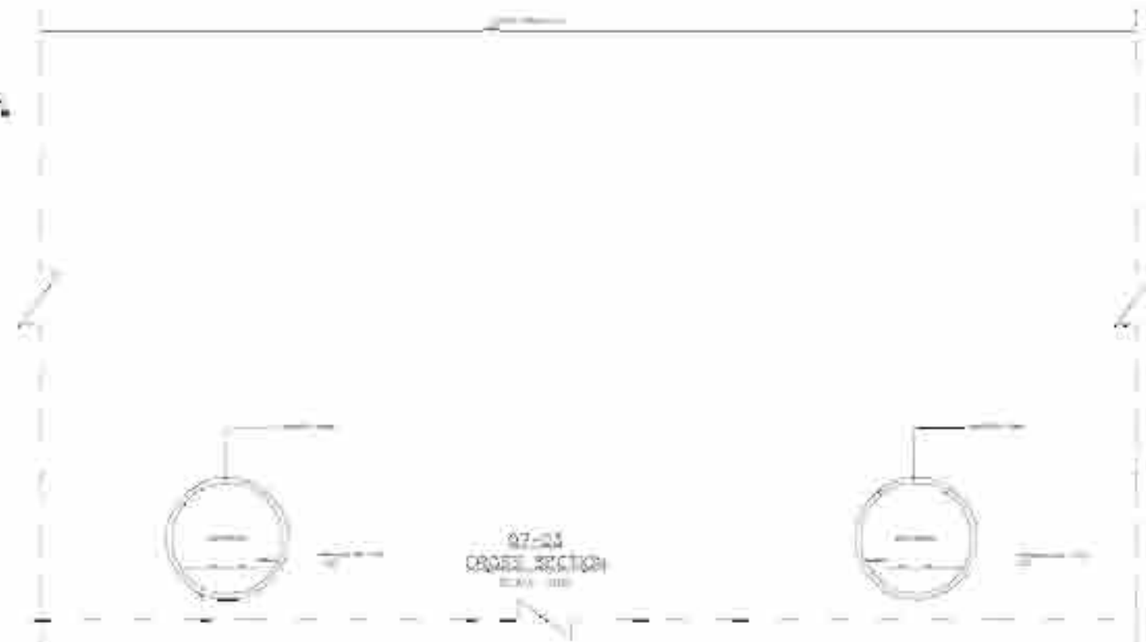
Landscape Baseline Plans
Prince's Street North to College Street


RAILWAY ORDER DRAWING EXTENT
Earl Street
Abbey Street Lower
O'Connell Street Lower
O'Connell Street
O'Connell Bridge
O'Connell Street
College Street
Westmoreland Street
Henry Street
Prince's Street
Abbey Street Middle
River Liffey
College Green
RPA
METRO
RAILWAY WORKS
BASELINE LANDSCAPE

Landscape Insertion Plans
Prince's Street North to College Street

fold-out

PLAN



RPA METRO

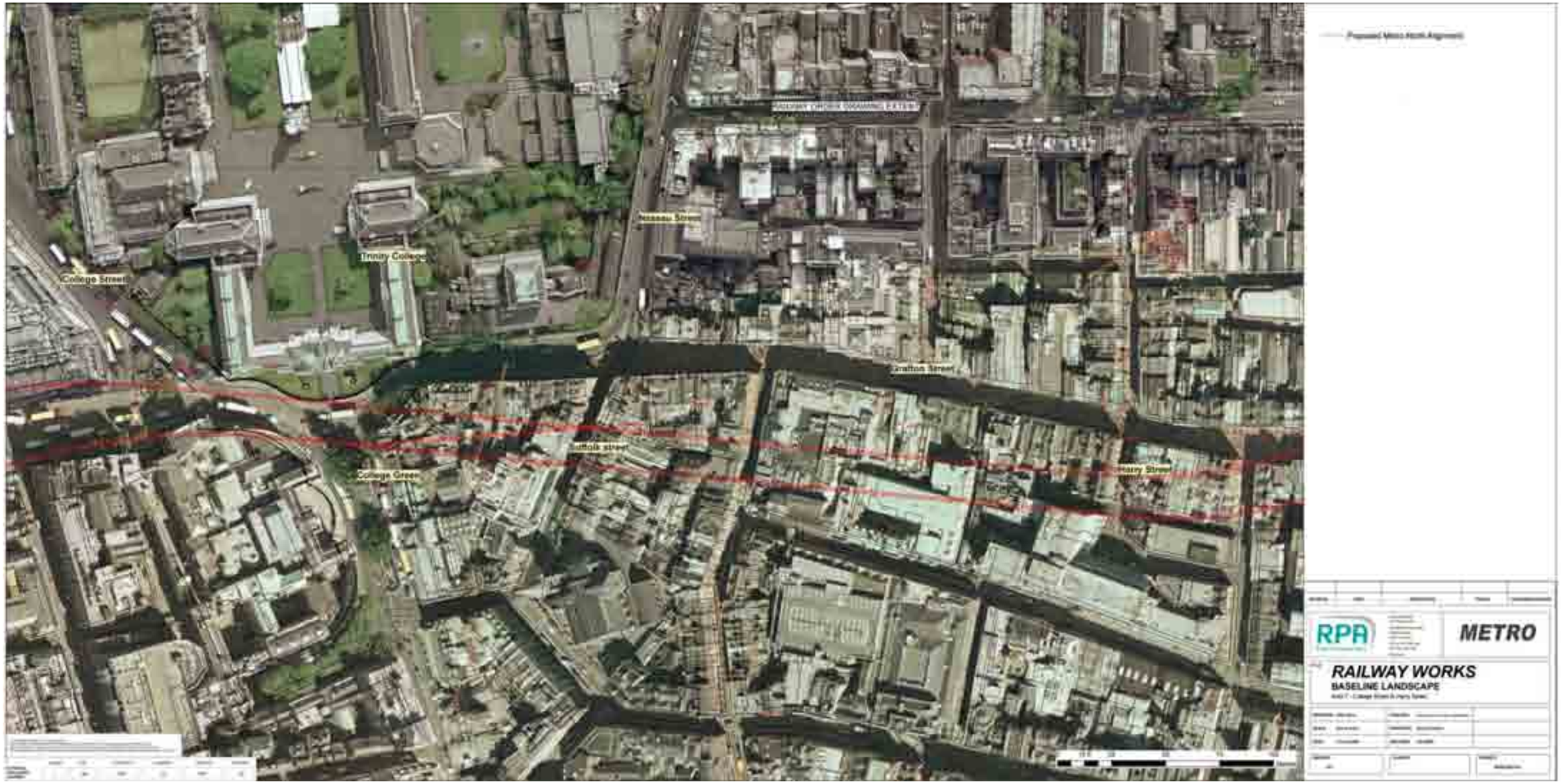
RAILWAY WORKS

LINE MN - ALIGNMENT DETAILS

PRINCE'S STREET NORTH TO COLLEGE STREET

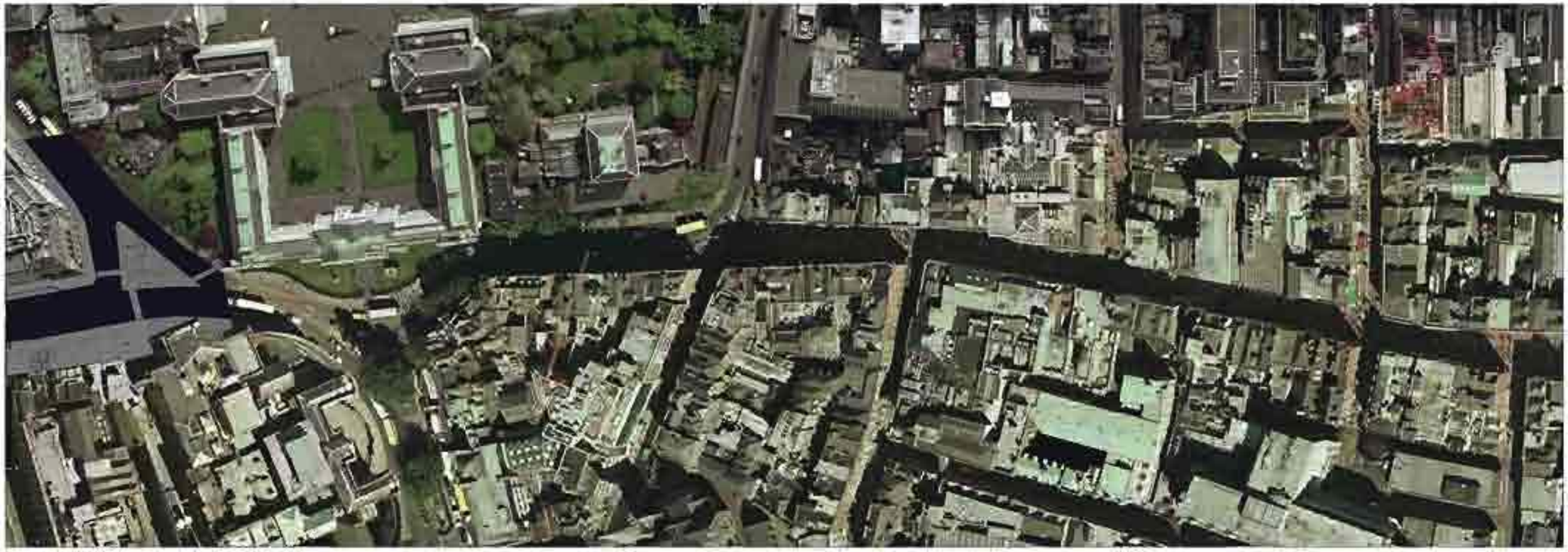
107

Landscape Baseline Plans
College Street
to Harry Street

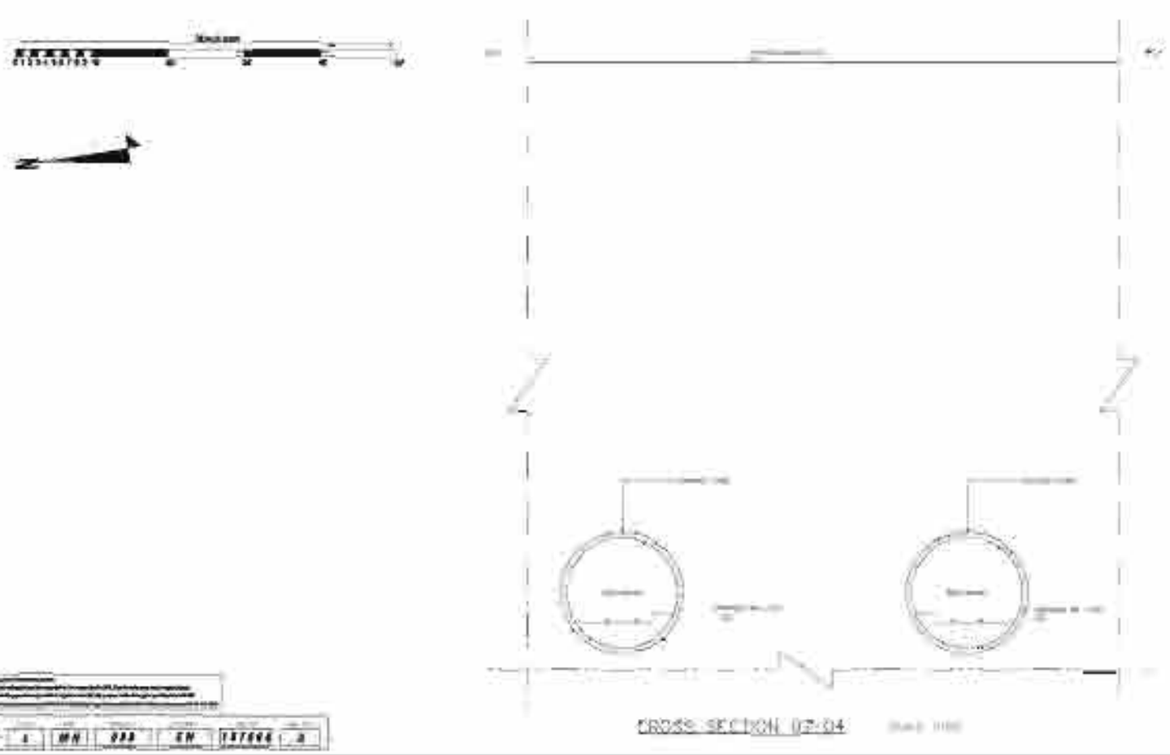

College Street
Trinity College
Nassau Street
Grafton Street
College Green
Suffolk street
Dawson Street
RPA
METRO
RAILWAY WORKS
BASELINE LANDSCAPE

Landscape Insertion Plans
College Street
to Harry Street

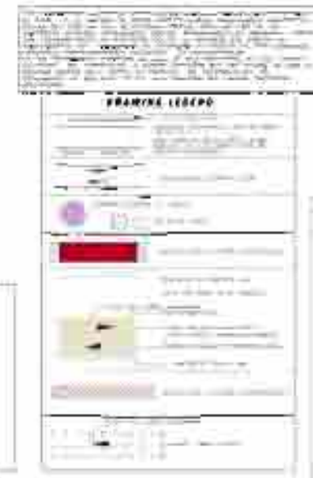
fold-out



LOCATION PLAN



CROSS SECTION 02-04



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METRO

RAILWAY WORKS

LINE MN - ALIGNMENT DETAILS

COLLEGE ST - HARRY ST

107

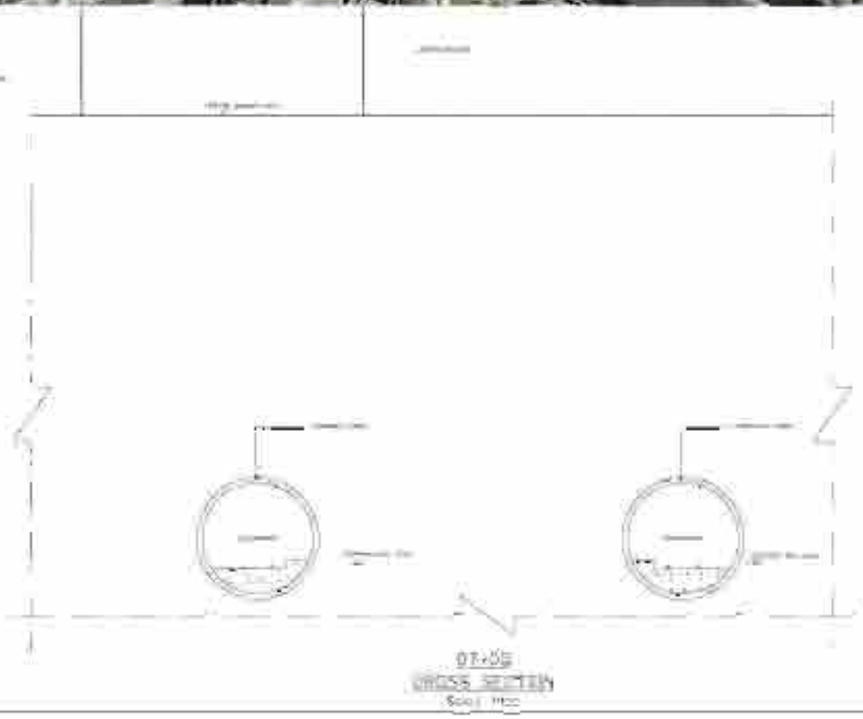
Landscape Baseline Plans
Harry Street to
St. Stephen's Green

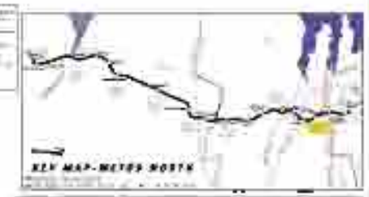

Proposed Metro North Alignment
St. Stephen's Green North
St. Stephen's Green
St. Stephen's Green South
St. Stephen's Green West
RPA
METRO
RAILWAY WORKS
BASELINE LANDSCAPE

Landscape Insertion Plans
Harry Street to
St. Stephen's Green

fold-out

PLAN





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METRO

RAILWAY WORKS

LINE MN - ALIGNMENT DETAILS

RANAY STREET TO ST.STEPHEN'S GREEN

107

Area MN107
Viewpoint 19a

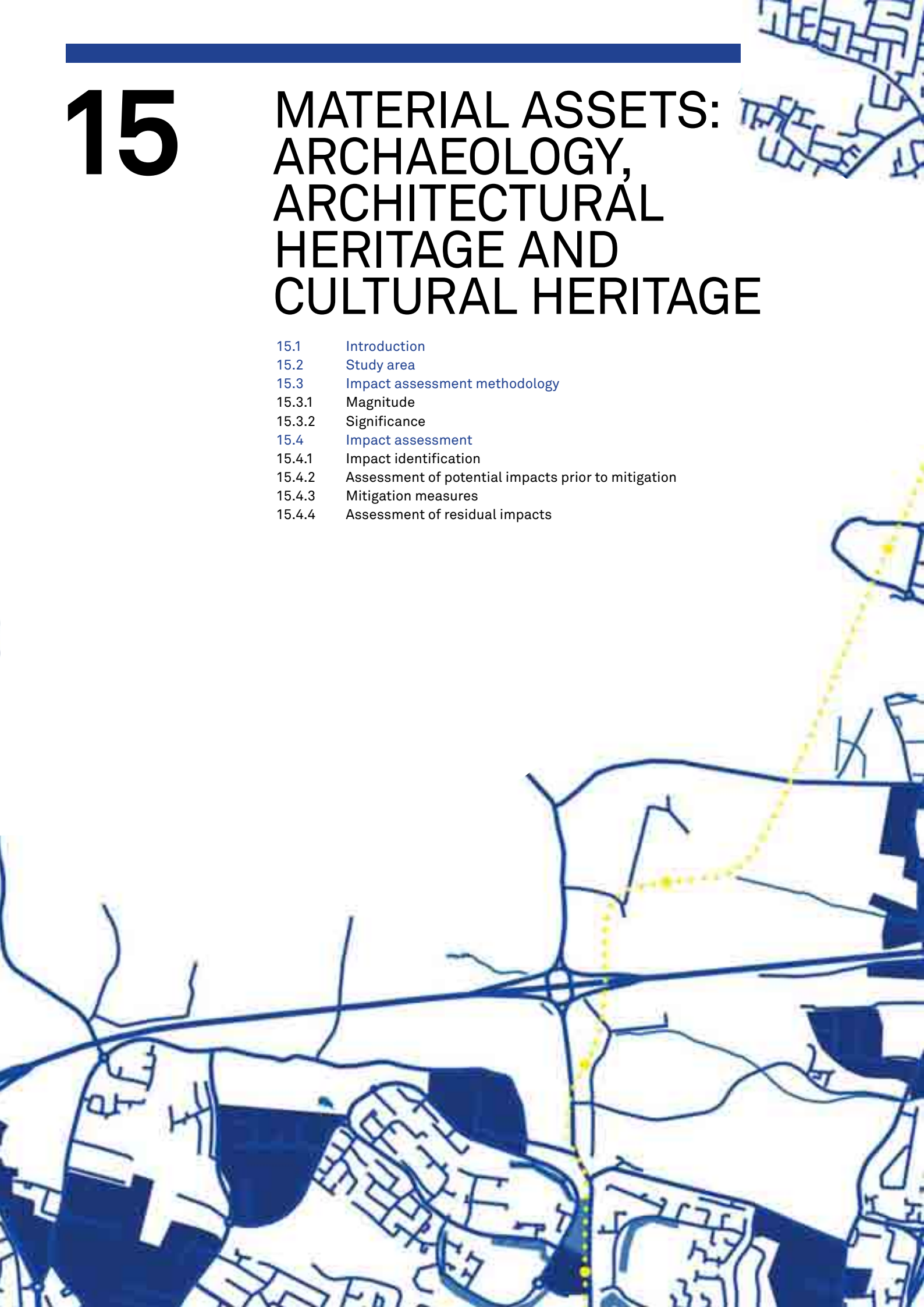
Image 1
(St. Stephen's Green North)

Image 2
(St. Stephen's Green)

14 MATERIAL ASSETS: AGRONOMY

No agricultural lands were recorded within the defined study area of MN107. Therefore no environmental assessment was undertaken.

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 MN107.

15.1 INTRODUCTION

This chapter of the EIS describes the potential impacts on archaeology and architectural heritage and cultural heritage, which may arise due to activities associated with the construction and operation of the proposed scheme in Area MN107. Cultural heritage comprises archaeology and architectural heritage and also includes environmental aspects that are dealt with in other chapters of the EIS including the Soil and Geology and Landscape and Visual chapters of this EIS (Volume 2, Chapters 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 Metro North scheme may have on archaeology, architectural and cultural heritage. Impacts on other aspects of cultural heritage are examined in the other chapters of the EIS described previously.

The proposed mitigation measures detailed in this EIS for archaeological impacts have been further developed and detailed in an Archaeology Strategy document for Metro North. 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 DoEHLG and 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 - Areas of archaeological potential	- 250m in areas of undeveloped Greenfield - 100m in developed areas - 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 section is set out in a number of steps:

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

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

15.3.1 Magnitude

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

Table 15.2 Criteria for assessment of impact magnitude

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

15.4 IMPACT ASSESSMENT

15.4.1 Impact identification

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

15.4.1.1 Archaeology

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

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

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

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

15.4.1.2 Architecture

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

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

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

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

15.4.2 Assessment of potential impacts prior to mitigation

15.4.2.1Project 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
MN107_ C01	HC#343 (Historic city). Zone of archaeological potential	- The construction of the stop boxes at St Stephen's Green, O'Connell Bridge, Parnell Square & Mater Hospital will impact on any surviving archaeological deposits. - The magnitude of these impacts is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.
MN107_ C02	HC#345 (Parnell Square). Conservation Area	- Parnell Square is a conservation area. The construction of the Parnell Square Stop box and Construction Compound 17 will impact on the historic streetscape, in particular any street furniture and paving. - The magnitude of this impact is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.
MN107_ C03	HC#116 (Parnell Square). Site of archaeological potential	- The construction of the Parnell Square Stop box will impact on any surviving archaeological deposits. - 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.
MN107_ C04	HC#105-115 (Nos. 4-14 Parnell Square). Protected Structures	- The construction of the Parnell Square Stop box will impact on the basements of the protected structures. - This impact will result in the partial loss of the structure. The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C05	HC#347 (O'Connell Street). O'Connell Street (and part of Westmoreland Street) Architectural Conservation Area.	- The construction of the above ground structures and Construction Compound 18 at various locations along the street will impact on the historic streetscape, in particular any street furniture and paving. - The magnitude of this impact is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.
MN107_ C06	HC#182 (William Smith O'Brien monument). National Monument	- The construction of the O'Connell Bridge Stop box will impact on this monument as its removal will be necessary. - Access to the monument will be restricted during construction - The magnitude of these impacts is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.
MN107_ C07	HC#189 (O'Connell monument). National Monument	- The construction of the O'Connell Bridge Stop box will impact on this monument as its removal will be necessary. - Access to the monument will be restricted during construction - The magnitude of these impacts is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.
MN107_ C08	HC#178-179 (Nos. 45-46 O'Connell Street Lower & 10-11 O'Connell Street Lower / 38-39 Abbey Street Lower). Protected Structures	- The construction of the O'Connell Bridge Stop box will impact on the basements of the protected structures. - This impact will result in the partial loss of the structure. The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.

Impact Ref #	Affected Area/Feature	Impact assessment prior to mitigation
MN107_ C09	HC#183-186 (Nos. 2-8 O'Connell Street Lower). Protected Structures	- The construction of the O'Connell Bridge Stop box will impact on the basements of the protected structures. This impact will result in the partial loss of the structure. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C10	HC#190 (1 O'Connell Street Lower). Protected Structure	- The construction of the O'Connell Bridge Stop box will impact on the basement of the protected structures. This impact will result in the partial loss of the structure. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance
MN107_ C11	HC#196 (56 O'Connell Street Lower). Protected Structure	- The construction of the O'Connell Bridge Stop box will impact on the basement of the protected structures. This impact will result in the partial loss of the structure. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C12	HC# 206 (Eden Quay & Burgh Quay). Recorded Monument	- The construction of a new bridge from Eden Quay to Burgh Quay will directly impact on the historic quay walls. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C13	HC#346 (The River Liffey). Conservation Area	- The river Liffey and its quays are designated a conservation area. The construction of the bridge and above ground structures at Aston Quay and Burgh Quay will impact on the historic streetscape. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C14	HC# 207 (Ferry site, River Liffey, Burgh Quay & Eden Quay). Recorded Monument	- The construction of the bridge between Eden Quay and Burgh Quay will impact on the monument site. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C15	HC#187 (O'Connell Street Lower & Westmoreland Street). Site of archaeological potential	- The construction of the O'Connell Bridge Stop boxes will impact on any surviving archaeological deposits. - 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.
MN107_ C16	HC#212 (22 Westmoreland Street). Protected Structure	- The construction of the O'Connell Bridge Stop box will impact on the basement of the protected structure. This impact will result in the partial loss of the structure. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C17	HC#228-231 (Nos. 26-29 Westmoreland Street). Protected Structures	- The construction of the O'Connell Bridge Stop box will impact on the basements of the protected structures. This impact will result in the partial loss of the structure. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.

Impact Ref #	Affected Area/Feature	Impact assessment prior to mitigation
MN107_ C18	HC#232-240 (Nos. 8-16 Westmoreland Street). Protected Structures	- The construction of the O'Connell Bridge Stop box will impact on the basements of the protected structures. This impact will result in the partial loss of the structure. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C19	HC#241 (32 Westmoreland Street). Protected Structure	- The construction of the O'Connell Bridge Stop box will impact on the basements of the protected structures. This impact will result in the partial loss of the structure. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C20	HC#243 (19-20 Fleet Street). Protected Structure	- The construction of the O'Connell Bridge Stop box will impact on the basements of the protected structures. This impact will result in the partial loss of the structure. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C21	HC#321-326 (Nos. 3-8 St. Stephen's Green). Protected Structures	- The construction of the St. Stephen's Green Stop box will impact on the basements of the protected structures. This impact will result in the partial loss of the structure. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C22	HC#338 (St. Stephen's Green Park). National Monument	- St. Stephen's Green is a National Monument. - The construction of the St. Stephen's Green Stop box and Construction Compound 19 will impact on the park with the Fusilier's Arch, Statues of Lord Ardilaun, Robert Emmet, O'Donovan Rossa memorial, African Rose bowl, foot rails, perimeter railings, perimeter granite footpath, granite bollards, metal bollards and Victorian landscaping (including the Pullham rock) all being removed. - Access to these areas of the park will be restricted for the duration of construction - The magnitude of these impacts is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.
MN107_ C23	HC#331 (St. Stephen's Green - Surrounding bollards and traditional-style lamp-posts). National Monument	- The construction of the St. Stephen's Green Stop box and Construction Compound 19 will impact on this street furniture as its removal will be necessary. St Stephen's Green is a National Monument. - The magnitude of these impacts is very high and the impact affects an area of very high functional value so the impact is considered to be of Very High significance.
MN107_ C24	HC#333 (St. Stephen's Green - Railings, gates and plinth walls of perimeter boundary). National Monument	- The construction of the St. Stephen's Green Stop box and Construction Compound 19 will impact on the park railings as its removal will be necessary. St. Stephen's Green is a National Monument. - The magnitude of these impacts is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.

Vibration impacts (Direct effects) may affect the integrity of a structure, particularly an historic structure. The operation of TBMs on or directly beneath structures may lead to damage should the vibrations become too severe. In addition it will be necessary to use Drill & Blast techniques for cross-passages.

It is unlikely that archaeological layers would be impacted in the same way as historic structures as detailed in the Vibration chapter of this EIS (Volume 2, Chapter 5). Heritage constraint features that may be subject to vibration impacts are set out in Table 15.4.

Table 15.4 Assessment of potential vibration impacts (Direct effects) during construction

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_C25	HC#40-42 (Nos. 65-67 Eccles Street). Protected Structures	- These buildings (protected structures) lie directly above the bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_C26	HC#62-65 (Nos. 20-23 Frederick Street). Protected Structures	- These buildings (protected structures) lie directly above the bored tunnels and lie within the vicinity of a cross passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_C27	HC#66-69 (Nos. 12-15 Frederick Street). Protected Structures	- These buildings (protected structures) lie within the vicinity of a cross passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_C28	HC#70-74 (Nos. 47, 1-4 Hardwicke Street). Protected Structures	- These buildings (protected structures) lie within the vicinity of a cross passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_C29	HC#75-81 (Nos. 28-34 Frederick Street). Protected Structures	- These buildings (protected structures) lie directly above the bored tunnels and lie within the vicinity of a cross passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_C30	HC#82-83 (Nos. 9-10 Frederick Street). Protected Structures	- These buildings (protected structures) lie within the vicinity of a cross passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_C31	HC#97 (16 Parnell Square). Protected Structure	- This building (protected structure) lies directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_C32	HC#122 (Gate Theatre). Protected Structure	- These buildings (protected structures) lie directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_ C33	HC#127-128 (Ambassador Cinema & Rotunda Hospital). Protected Structures	- These buildings (protected structures) lie directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_ C34	HC#130 (Fountain & water trough). Protected Structures	- These structures (protected structures) lie directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_ C35	HC#131 (Parnell Monument). Protected Structure	- These monuments (protected structures) lie directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_ C36	HC#145 (Fr Matthew Monument). Protected Structure	
MN107_ C37	HC#137-140 (Gresham Hotel, 42-44 O'Connell Street Upper). Protected Structures	- These buildings (protected structures) lie within the vicinity of a cross passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C38	HC#161-163 (Nos. 28-31 O'Connell Street Lower). Protected Structures	- These buildings (protected structures) lie within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C39	HC#166-167 (Nos. 17-27 O'Connell Street Lower). Protected Structures	- These buildings (protected structures) lie within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C40	HC#164-165 (Bollards & General Post Office O'Connell Street). Protected Structures	- These buildings (protected structures) lie directly above the proposed bored tunnels and lies within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C41	HC#171-172 (Nos. 40-44 O'Connell Street). Protected Structures	- These buildings (protected structures) lie directly above the proposed bored tunnels and lie within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C42	HC#178 (45-46 O'Connell Street). Protected Structure	- These buildings (protected structures) lie directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_ C43	HC#189 (O'Connell Monument). National Monument	- This building (National Monument) lies within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C44	HC#190-192 (1 O'Connell Street Lower & 1-2 Eden Quay). Protected Structures	- These buildings (protected structures) lie within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C45	HC#196-197 (56 O'Connell Street & 35 Bachelor's Walk). Protected Structures	- This building (protected structure) lies directly above the bored tunnels and lies within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique - The magnitude of this impact is High and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C46	HC#198-202 (28-34 Bachelor's Walk). Protected Structures	- These buildings (protected structure) lie within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C47	HC#208 (O'Connell Bridge). Protected Structures	- This structure (protected structure) lies directly above the bored tunnels and lies within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C48	HC#346 (The River Liffey). Conservation Area	- The river Liffey and its quays are designated a conservation area. The construction of the bridge and above ground structures at Aston Quay and Burgh Quay will impact on the historic streetscape. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C49	HC#211 (22 Aston Quay). Protected Structure	- This building (protected structure) lies directly above the bored tunnels and lies within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C50	HC#212 (22 Westmoreland Street). Protected Structure	- This building (protected structure) lies directly above the bored tunnels and lies within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_ C51	HC#210 (19 Aston Quay). Protected Structures	- This building (protected structure) lies within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C52	HC#342 (26 Aston Quay). Protected Structure	- This building (protected structure) lies within the vicinity of the O'Connell Bridge Stop which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C53	HC#228-231 (Nos. 26-29 Westmoreland Street). Protected Structures	- These buildings (protected structures) lie directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_ C54	HC#232-240 (Nos. 8-16 Westmoreland Street). Protected Structures	
MN107_ C55	HC#241 (32 Westmoreland Street). Protected Structure	- These buildings (protected structures) lie directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_ C56	HC#245 (35-36 Westmoreland Street). Protected Structure	
MN107_ C57	HC#247 (7 Westmoreland Street). Protected Structure	
MN107_ C58	HC#251 (40-41 Westmoreland Street). Protected Structure	- This building (protected structure) lies directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_ C59	HC#254 (Thomas Moore Monument). Protected Structure	- This monument (protected structure) lies directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_ C60	HC#263 (Goldsmith & Burke Monuments). Protected Structures	- These monuments (protected structures) lie within the vicinity of the College Green cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C61	HC#264 (Entrance gates and railings at Trinity College). Protected Structures	- These structures (protected structures) lie directly above the proposed bored tunnels and lies within the vicinity of the College Green cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_ C62	HC#265 (Bank of Ireland College Green). Protected Structure	- This building (protected structure) lies directly above the proposed bored tunnels and lies within the vicinity of the College Green cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C63	HC#266 (Henry Grattan Monument). Protected Structure	- This monument (protected structure) lies directly above the proposed bored tunnels and lies within the vicinity of the College Green cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C64	HC#269-270 (Nos. 32-34 College Green). Protected Structures	- These buildings (protected structures) lie within the vicinity of the College Green cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C65	HC#268 (35 College Green). Protected Structure	- These buildings (protected structures) lie directly above the proposed bored tunnels and lie within the vicinity of the College Green cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C66	HC#271-272 (Nos. 36-37 College Green). Protected Structures	
MN107_ C67	HC#273-279 (Nos. 112-118 Grafton Street). Protected Structures	- These buildings (protected structures) lie directly above the proposed bored tunnels and lie within the vicinity of the College Green cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C68	HC#280-281 (Nos. 108 & 110 Grafton Street). Protected Structures	- These buildings (protected structures) lie within the vicinity of the College Green cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C69	HC#286-287 (Nos. 22-23 Suffolk Street). Protected Structures	- These buildings (protected structures) lie directly above the proposed bored tunnels and lie within the vicinity of the College Green cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_ C70	HC#289-290 (Nos. 102-103 Grafton Street). Protected Structures	- These buildings (protected structures) lie within the vicinity of the College Green & Wicklow Street cross-passages which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_C71	HC#293 (96 Grafton Street). Protected Structure	- This building (protected structure) lies within the vicinity of the Wicklow Street cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_C72	HC#296 (38-46 Wicklow Street). Protected Structure	- This building (protected structure) lies directly above the proposed bored tunnels and lies within the vicinity of the Wicklow Street cross-passage which will be excavated using the Drill & Blast technique - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_C73	HC#297 (Nos. 6-12 Clarendon Street) Protected Structure.	- This building (protected structure) lies directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_C74	HC#309 (7-8 Harry Street). Protected Structure	- These buildings (protected structures) lie directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_C75	HC#312 (4 Harry Street). Protected Structure	
MN107_C76	HC#315 (64 Grafton Street). Protected Structure	- These buildings (protected structures) lie directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Low significance.
MN107_C77	HC#316-317 (Nos. 1-2 Chatham Street). Protected Structures	

Impacts may also occur as a secondary effect of other environmental change. For example, a reduction in ground water levels, may affect the preservation of surrounding archaeological layers, or create unstable foundations for historic structures where organic (wood) materials may have been used as detailed in the Groundwater chapter of this EIS (Volume 2, Chapter 10).

Mitigation measures will insure that there will be no significant reduction in local groundwater levels at Parnell Square, O'Connell Bridge and St Stephen's Green. Heritage constraint features that may be subject to these types of secondary environmental impacts (Direct effects) are set out in Table 15.5.

Table 15.5 Assessment of potential secondary environmental impacts (Direct effects) during construction

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_C78	HC#116 (Parnell Square). Site of archaeological potential	- Any reduction in the surrounding water levels during and after the construction of the Parnell Square Stop box will impact on any surviving archaeological deposits. - 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.
MN107_C79	HC#187 (O'Connell Street Lower & Westmoreland Street) Site of archaeological potential	- Any reduction in the surrounding water levels during and after the construction of the O'Connell Bridge Stop boxes will impact on any surviving archaeological deposits. - 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.
MN107_C80	HC#338 (St Stephen's Green Park). National Monument	- Any reduction in the surrounding water levels during and after the construction of the St. Stephen's Green Stop box will impact on the park. St. Stephen's Green is a National Monument. - The magnitude of these impacts is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.
MN107_C81	HC#343 (Historic city). Zone of archaeological potential	- Any reduction in the surrounding water levels during and after the construction of the stop boxes at St. Stephen's Green, O'Connell Bridge, Parnell Square & Mater Hospital will impact on any surviving archaeological deposits. - The magnitude of these impacts is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.

The 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 negativeas detailed in the Landscape and Visual chapter of this EIS (Volume 2, Chapter 13). 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 construction

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_ C82	HC#345 (Parnell Square). Conservation Area	- Parnell Square is a conservation area. The construction of the above ground structures will impact on the historic streetscape. - The magnitude of this impact is medium and the impact affects an area of very high functional value so the impact is considered to be of Medium significance.
MN107_ C83	HC#346 (The River Liffey). Conservation Area	- The River Liffey and its quays are designated a conservation area. The construction of the above ground structures at Aston Quay and Burgh Quay will impact on the historic streetscape. - The magnitude of this impact is medium and the impact affects an area of very high functional value so the impact is considered to be of Medium significance.
MN107_ C84	HC#347 (O'Connell Street). Architectural Conservation Area	- O'Connell Street (and part of Westmoreland Street) is designated a conservation area. The construction of the above ground structures at various locations along the street will impact on the historic streetscape. - The magnitude of this impact is Medium and the impact affects an area of very high functional value so the impact is considered to be of Medium significance.
MN107_ C85	HC#338 (St Stephen's Green Park). National Monument	- St Stephen's Green is designated a National Monument. The construction of the above ground structures at various locations along and within the park will impact on the appearance of the National Monument. - The magnitude of these impacts is very high and the impact affects an area of very high functional value so the impact is considered to be of Very high significance.

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 as detailed in the Landscape and Visual chapter of this EIS (Volume 2, Chapter 13). Heritage constraint features that may be subject to visual impacts are set out in Table 15.7.

Table 15.7 Assessment of potential visual impacts (Indirect effects) during operation

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_001	HC#345 (Parnell Square Conservation Area	- Parnell Square is a conservation area. The construction of the above ground structures will impact on the historic streetscape. - The magnitude of this impact is medium and the impact affects an area of very high functional value so the impact is considered to be of Medium significance.
MN107_002	HC#346 (The River Liffey). Conservation Area	- The river Liffey and its quays are designated a conservation area. The construction of the bridge and above ground structures at Eden Quay and Burgh Quay will impact on the historic streetscape. - The magnitude of this impact is high and the impact affects an area of very high functional value so the impact is considered to be of High significance.
MN107_003	HC#347 (O'Connell Street). Architectural Conservation Area	- O'Connell Street is designated a conservation area. The construction of the above ground structures at various locations along the street and on both sides of the Liffey will impact on the historic streetscape. - The magnitude of this impact is medium and the impact affects an area of very high functional value so the impact is considered to be of Medium significance.
MN107_004	HC#338 (St Stephen's Green Park) National Monument	- St Stephen's Green is a National Monument. The construction of the above ground structures at various locations around and within the park will impact on the monument. - The magnitude of these impacts is medium and the impact affects an area of very high functional value so the impact is considered to be of Medium significance.

Vibration impacts (Direct effects) may affect the integrity of a structure, particularly an historic structure. The operation of LMVs on or directly beneath structures may lead to damage to historic buildings should the vibrations become too severe. It is unlikely that archaeological layers would be impacted in the same way as detailed in the Vibration chapter of this EIS (Volume 3, Chapter 5). Heritage constraint features that may be subject to vibration impacts are set out in Table 15.8.

Table 15.8 Assessment of potential vibration impacts (Direct effects) during operation

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN106_ O05	HC#40-42 (Nos. 65-67 Eccles Street) Protected Structures	- These buildings lie directly above the bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O06	HC#62-65 (Nos. 20-23 Frederick Street) Protected Structures	- These buildings lie directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O07	HC#75-81 (Nos. 28-34 Frederick Street). Protected Structures	
MN107_ O08	HC#97 (16 Parnell Square). Protected Structure	
MN107_ O09	HC#122 (Gate Theatre). Protected Structure	- This building lies directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O10	HC#127-128 (Ambassador Cinema & Rotunda Hospital). Protected Structures	- These buildings lie directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O11	HC#130 (Fountain & water trough). Protected Structures	- These structures lie directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O12	HC#131 (Parnell Monument). Protected Structure	- This monument lies directly above the proposed bored tunnels. The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O13	HC#145 (Fr Matthew Monument). Protected Structure	
MN107_ O14	HC#164-165 (Bollards & General Post Office O'Connell Street). Protected Structures	- These structures lie directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O15	HC#171-172 (Nos. 40-44 O'Connell Street). Protected Structures	- These buildings lie directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of very low significance.
MN107_ O16	HC#178 (45-46 O'Connell Street). Protected Structure	
MN107_ O17	HC#196-197 (56 O'Connell Street & 35 Bachelor's Walk). Protected Structures	

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_O18	HC#208 (O'Connell Bridge). Protected Structure	- This structure lies directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_O19	HC#211 (22 Aston Quay). Protected Structure	- This building lies directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_O20	HC#212 (22 Westmoreland Street). Protected Structure	
MN107_O21	HC#228-231 (Nos. 26-29 Westmoreland Street). Protected Structures	
MN107_O22	HC#232-240 (Nos. 8-16 Westmoreland Street) Protected Structures	- These buildings lie directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_O23	HC#241 (32 Westmoreland Street). Protected Structure	- This building lies directly above the proposed bored tunnels. - The magnitude of this impact is low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_O24	HC#245 (35-36 Westmoreland Street). Protected Structure	- This building lies directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_O25	HC#247 (7 Westmoreland Street). Protected Structure	
MN107_O26	HC#251 (40-41 Westmoreland Street). Protected Structure	
MN107_O27	HC#254 (Thomas Moore Monument). Protected Structure	- This monument lies directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_O28	HC#264 (Entrance gates and railings at Trinity College). Protected Structures	- These structures lie directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_O29	HC#265 (Bank of Ireland College Green). Protected Structure	- This building lies directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.

Impact Ref #	Affected Area/ Feature	Impact assessment prior to mitigation
MN107_ O30	HC#266 (Henry Grattan Monument). Protected Structure	- This monument lies directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O31	HC#268 (35 College Green). Protected Structure	- This building lies directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O32	HC#271-272 (Nos. 36-37 College Green). Protected Structures	
MN107_ O33	HC#273-279 (Nos. 112-118 Grafton Street). Protected Structures	
MN107_ O34	HC#286-287 (Nos. 22-23 Suffolk Street). Protected Structures	- These buildings lie directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O35	HC#296 (38-46 Wicklow Street). Protected Structure	- This building lies directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O36	HC#297 (Nos. 6-12 Clarendon Street). Protected Structure	- These buildings lie directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance
MN107_ O37	HC#309 (7-8 Harry Street). Protected Structure	
MN107_ O38	HC#312 (4 Harry Street). Protected Structure	- This building lies directly above the proposed bored tunnels. - The magnitude of this impact is very low and the impact affects an area of very high functional value so the impact is considered to be of Very low significance.
MN107_ O39	HC#315 (64 Grafton Street). Protected Structure	
MN107_ O40	HC#316-317 (Nos. 1-2 Chatham Street). Protected Structures	

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

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN107_ C01	HC#343 (Historic city). Zone of archaeological potential	- Archaeological assessment after site clearance followed by excavation should any deposits be shown to be present. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
MN107_ C02	HC#345 (Parnell Square). Conservation Area	- All street furniture will be restored and paving re-laid with the original material. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to low.
MN107_ C03	HC#116 (Site of archaeological potential Parnell Square).	- Archaeological assessment (including sub-surface investigations) after site clearance followed by excavation should any deposits be shown to be present. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
MN107_ C04	HC#105-115 (Nos. 4-14 Parnell Square). Protected Structures	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.
MN107_ C05	HC#347 (O'Connell Street). O'Connell Street (and part of Westmoreland Street) Architectural Conservation Area	- All street furniture will be restored and paving re-laid with the original material. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to low.
MN107_ C06	HC#182 (William Smith O'Brien monument). National Monument	- A detailed survey of the William Smith O'Brien monument should be undertaken with the specifications to be agreed with both DCC and DoEHLG - A detailed methodology for the removal, storage and reinstatement of monument should be agreed with both DCC and DoEHLG - Careful removal and re-erection on same position following completion of works. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to low.
MN107_ C07	HC#189 (O'Connell monument). National Monument	- A detailed survey of the O'Connell monument should be undertaken with the specifications to be agreed with both DCC and DoEHLG - A detailed methodology for the removal, storage and reinstatement of monument should be agreed with both DCC and DoEHLG - Careful removal and re-erection on same position following completion of works. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to low.
MN107_ C08	HC#178-179 (Nos. 45-46 O'Connell Street Lower & 10-11 O'Connell Street Lower / 38-39 Abbey Street Lower). Protected Structures	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN107_ C09	HC#183-186 (Nos. 2-8 O'Connell Street Lower). Protected Structures	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain High (IV).
MN107_ C10	HC#190 (1 O'Connell Street Lower). Protected Structure	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.
MN107_ C11	HC#196 (56 O'Connell Street Lower). Protected Structure	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.
MN107_ C12	HC# 206 (Eden Quay & Burgh Quay). Recorded Monuments	- A full measured, drawn and photographic survey of quay walls prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.
MN107_ C13	HC#346 (The River Liffey). Conservation Area	- Sensitive design of the bridge to allow it to fit into the conservation area. When this mitigation measure is taken into consideration, the magnitude of the impact will be medium.
MN107_ C14	HC# 207 (Ferry site, River Liffey, Burgh Quay & Eden Quay). Recorded Monument	- Archaeological assessment (including underwater archaeological survey) after site clearance followed by excavation should any deposits be shown to be present. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
MN107_ C15	HC#187 (O'Connell Street Lower & Westmoreland Street). Site of archaeological potential	- Archaeological assessment after site clearance followed by excavation should any deposits be shown to be present. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
MN107_ C16	HC#212 (22 Westmoreland Street). Protected Structure	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.
MN107_ C17	HC#228-231 (Nos. 26-29 Westmoreland Street). Protected Structures	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.
MN107_ C18	HC#232-240 (Nos. 8-16 Westmoreland Street). Protected Structures	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.
MN107_ C19	HC#241 (32 Westmoreland Street). Protected Structure	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.
MN107_ C20	HC#243 (19-20 Fleet Street). Protected Structure	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN107_ C21	HC#321-326 (Nos. 3-8 St Stephen's Green). Protected Structures	- A full measured, drawn and photographic survey of basements prior to removal. - When this mitigation measure is taken into consideration, the magnitude of the impact will remain high.
MN107_ C22	HC#338 (St Stephen's Green Park). National Monument	- Detailed requirements and mitigation measures in relation to the St Stephen's Green National Monument have been agreed with the OPW and DoEHLG. These requirements and mitigation measures will be further developed and detailed in consultation with DoEHLG and OPW. All preparatory works at St Stephen's Green necessary to minimise the potential impacts on the Green will be managed by RPA as an Enabling Works package in advance of the main infrastructure constructor commencing works in the Green - A detailed survey of the Fusilier's Arch monument is to be undertaken with the specifications to be agreed with both DCC and the DoEHLG. - A detailed methodology for the removal, storage and reinstatement of monument is to be agreed with both DCC and the DoEHLG. - Careful removal and re-erection on same position following completion of works. - Careful removal of street furniture and other associated park features (including trees) and re-erection on same position following completion of works. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to low.
MN107_ C23	HC#331 (St Stephen's Green - Surrounding bollards and traditional-style lamp-posts). National Monument	
MN107_ C24	HC#333 (St Stephen's Green - Railings, gates and plinth walls of perimeter boundary). National Monument	

For detail regarding mitigation measures to be put in place with respect to vibration impacts (Direct effects) during construction please refer to the Vibration chapter of this EIS (Volume 2, Chapter 5). A system of monitoring will be put in place for all structures, buildings and monuments specified in Table 15.4. When all of the specified mitigation measures are put in place, the magnitude of the impact for TBM vibration is considered to be very low, but drill and blast is high.

For detail regarding mitigation measures to be put in place with respect to potential secondary environmental impacts (Direct effects) during construction, please refer to the Groundwater chapter of this EIS (Volume 2, Chapter 10).

Table 15.10 Mitigation of potential secondary environmental impacts (Direct effects) during construction

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN107_ C62	HC#116 (Parnell Square). Site of archaeological potential	- Mitigation will ensure the existing natural water levels are maintained. - All mitigation measures for St Stephen's Green to be agreed with the OPW and Department of Environment, Heritage & Local Government. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to very low.
MN107_ C63	HC#187 (O'Connell Street Lower & Westmoreland Street) Site of archaeological potential	
MN107_ C64	HC#338 (St Stephen's Green Park). National Monument	
MN107_ C65	HC#343 (Historic city). Zone of archaeological potential	

For detail regarding mitigation measures to be put in place with respect to potential visual impacts (Indirect effects) during construction please refer to the Landscape chapter of this EIS (Volume 2, Chapter 13).

Table 15.11 Mitigation of potential visual impacts (Indirect effects) during construction

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN107_C66	HC#345 (Parnell Square). Conservation Area	- Mitigation will involve sensitive design of above ground structures both temporary and permanent in order to lessen the impact on the conservation area. - When this mitigation measure is taken into consideration, the magnitude of the impact decreases to medium for construction phase. -
MN107_C67	HC#346 (The River Liffey). Conservation Area	
MN107_C68	HC#347 (O'Connell Street) Architectural Conservation Area	
MN107_C69	HC#338 (St Stephen's Green Park). National Monument	- St Stephen's Green is designated a National Monument. Mitigation will involve sensitive design of above ground structures both temporary and permanent in order to lessen the impact on the monument. Mitigation will also involve the reinstatement of every element of the park to its original appearance upon completion of all works. - All mitigation measures to be agreed with the OPW and Department of Environment, Heritage & Local Government. - When these mitigation measures are taken into consideration, the magnitude of the impact remains at high for construction phase

15.4.3.2 Mitigation of potential operational impacts

For detail regarding mitigation measures to be put in place with respect to potential visual impacts (Indirect effects) during operation please refer to the Landscape chapter of this EIS (Volume 2, Chapter 13).

Table 15.12 Mitigation of potential visual impacts (Indirect effects) during operation

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN107_O01	HC#345 (Parnell Square). Conservation Area	- Mitigation will involve sensitive design of above ground structures both temporary and permanent in order to lessen the impact on the conservation area. - When this mitigation measure is taken into consideration, the magnitude of the impact is low for operational phase. -
MN107_O02	HC#346 (The River Liffey). Conservation Area	
MN107_O03	HC#347 (O'Connell Street) Architectural Conservation Area	

Impact Ref #	Affected Area/ Feature	Mitigation measures
MN107_ 004	HC#338 (St Stephen's Green Park). National Monument	- St Stephen's Green is designated a National Monument. Mitigation will involve sensitive design of above ground structures both temporary and permanent in order to lessen the impact on the monument. Mitigation will also involve the reinstatement of every element of the park to its original appearance upon completion of all works. - All mitigation measures to be agreed with the OPW and Department of Environment, Heritage & Local Government. - When these mitigation measures are taken into consideration, the magnitude of the impact is low for operational phase.

For detail regarding mitigation measures to be put in place with respect to vibration impacts (Direct effects) during operation to as detailed in the Vibration chapter of this EIS (Volume 2, Chapter 5). A system of monitoring will be put in place for all structures, buildings and monuments specified in Table 15.4. When all of the specified mitigation measures are put in place, the magnitude of the impact is considered to continue to be low.

For detail regarding mitigation measures to be put in place with respect to potential secondary environmental impacts (Direct effects) during operation please refer to the Groundwater chapter of this EIS (Volume 2, Chapter 10).

15.4.4 Assessment of residual impacts

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

Table 15.13 Summary assessment of residual impacts

Impact Ref #	Affected Area/ Feature	Impact type	Magnitude of impact taking into account mitigation	Functional value	Significance of impact taking into account mitigation
Construction					
MN107_ C01	HC#343 (Historic city). Zone of archaeological potential	Ground disturbance	very low	very high	Very low
MN107_ C02	HC#345 (Parnell Square). Conservation Area	Ground disturbance	low	very high	low
MN107_ C03	HC#116 (Parnell Square). Site of archaeological potential	Ground disturbance	very low	very high	Very low
MN107_ C04	HC#105-115 (Nos. 4-14 Parnell Square). Protected Structures	Ground disturbance	high	very high	High
MN107_ C05	HC#347 (O'Connell Street and part of Westmoreland Street) Architectural Conservation Area	Ground disturbance	low	very high	Low
MN107_ C06	HC#182 (William Smith O'Brien monument). Under National Monument consideration	Ground disturbance	low	very high	Low
MN107_ C07	HC#189 (O'Connell monument). National Monument	Ground disturbance	low	very high	Low

Impact Ref #	Affected Area/ Feature	Impact type	Magnitude of impact taking into account mitigation	Functional value	Significance of impact taking into account mitigation
MN107_ C08	HC#178-179 (Nos. 45-46 O'Connell Street Lower & 10-11 O'Connell Street Lower / 38-39 Abbey Street Lower). Protected Structures	Ground disturbance	high	very high	High
MN107_ C09	HC#183-186 (Nos. 2-8 O'Connell Street Lower). Protected Structures	Ground disturbance	high	very high	High
MN107_ C10	HC#190 (1 O'Connell Street Lower). Protected Structure	Ground disturbance	high	very high	High
MN107_ C11	HC#196 (56 O'Connell Street Lower). Protected Structure	Ground disturbance	high	very high	High
MN107_ C12	HC# 206 (Eden Quay & Burgh Quay). Recorded Monument	Ground disturbance	high	very high	High
MN107_ C13	HC#346 (The River Liffey). Conservation Area	Ground disturbance	medium	very high	Medium
MN107_ C14	HC# 207 (Ferry site, River Liffey, Burgh Quay & Eden Quay). Recorded Monument	Ground disturbance	very low	very high	Very low
MN107_ C15	HC#187 (O'Connell Street Lower & Westmoreland Street). Site of archaeological potential	Ground disturbance	very low	high	Very low
MN107_ C16	HC#212 (22 Westmoreland Street). Protected Structure	Ground disturbance	high	very high	High
MN107_ C17	HC#228-231 (Nos. 26-29 Westmoreland Street). Protected Structures	Ground disturbance	high	very high	High
MN107_ C18	HC#232-240 (Nos. 8-14 Westmoreland Street). Protected Structures	Ground disturbance	high	very high	High
MN107_ C19	HC#241 (32 Westmoreland Street). Protected Structure	Ground disturbance	high	very high	High
MN107_ C20	HC#243 (19-20 Fleet Street). Protected Structure	Ground disturbance	high	very high	High
MN107_ C21	HC#321-326 (Nos. 3-8 St Stephen's Green). Protected Structures	Ground disturbance	high	very high	High
MN107_ C22	HC#338 (St Stephen's Green Park). National Monument	Ground disturbance	low	very high	Low

Impact Ref #	Affected Area/ Feature	Impact type	Magnitude of impact taking into account mitigation	Functional value	Significance of impact taking into account mitigation
MN107_C23	HC#331 (St Stephen's Green - Surrounding bollards and traditional-style lamp-posts). National Monument	Ground disturbance	low	very high	Low
MN107_C24	HC#333 (St Stephen's Green - Railings, gates and plinth walls of perimeter boundary). National Monument	Ground disturbance	low	very high	Low
MN106_C25	HC#40-42 (Nos. 65-67 Eccles Street). Protected Structures	Vibration	low	very high	Low
MN107_C26	HC#62-65 (Nos. 20-23 Frederick Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_C27	HC#66-69 (Nos. 12-15 Frederick Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_C28	HC#70-74 (Nos. 47, 1-4 Hardwicke Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_C29	HC#75-81 (Nos. 28-34 Frederick Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_C30	HC#82-83 (Nos. 9-10 Frederick Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_C31	HC#97 (16 Parnell Square). Protected Structure	Vibration TBM	low	very high	Low
MN107_C32	HC#122 (Gate Theatre). Protected Structure	Vibration TBM	low	very high	Low
MN107_C33	HC#127-128 (Ambassador Cinema & Rotunda Hospital). Protected Structures	Vibration TBM	low	very high	Low
MN107_C34	HC#130 (Fountain & water trough). Protected Structures	Vibration TBM	low	very high	Low
MN107_C35	HC#131 (Parnell Monument). Protected Structure	Vibration TBM	low	very high	Low
MN107_C36	HC#145 (Fr Matthew Monument). Protected Structure	Vibration TBM	low	very high	Low
MN107_C37	HC#137-140 (Gresham Hotel, 42-44 O'Connell Street Upper). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High

Impact Ref #	Affected Area/ Feature	Impact type	Magnitude of impact taking into account mitigation	Functional value	Significance of impact taking into account mitigation
MN107_ C38	HC#161-163 (Nos. 28-31 O'Connell Street Lower). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C39	HC#166-167 (Nos. 17-27 O'Connell Street Lower). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C40	HC#164-165 (Bollards & General Post Office O'Connell Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C41	HC#171-172 (Nos. 40-44 O'Connell Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C42	HC#178 (45-46 O'Connell Street). Protected Structure	Vibration TBM	low	very high	Low
MN107_ C43	HC#189 (O'Connell Monument). National Monument	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C44	HC#190-192 (1 O'Connell Street Lower & 1-2 Eden Quay). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C45	HC#196-197 (56 O'Connell Street & 35 Bachelor's Walk). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C46	HC#198-202 (28-34 Bachelor's Walk). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C47	HC#208 (O'Connell Bridge). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C48	HC#346 (The River Liffey & Quays). Conservation Area	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C49	HC#211 (22 Aston Quay). Protected Structure	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C50	HC#212 (22 Westmoreland Street). Protected Structure	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C51	HC#210 (19 Aston Quay). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High

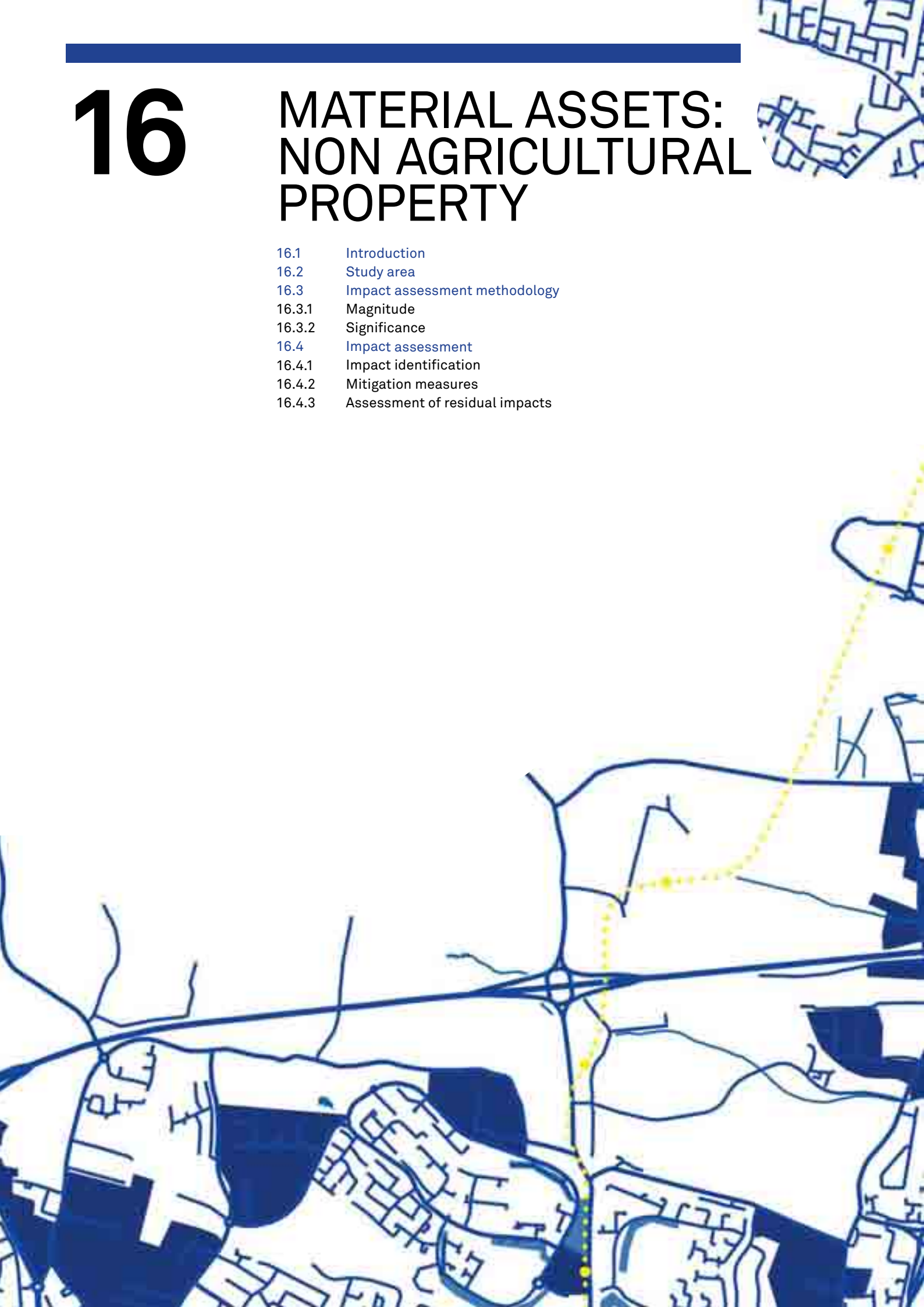
Impact Ref #	Affected Area/ Feature	Impact type	Magnitude of impact taking into account mitigation	Functional value	Significance of impact taking into account mitigation
MN107_C52	HC#342 (26 Aston Quay). Protected Structure	Vibration TBM, Drill & Blast	high	very high	High
MN107_C53	HC#228-231 (Nos. 26-29 Westmoreland Street). Protected Structures	Vibration TBM	low	very high	Low
MN107_C54	HC#232-240 (Nos. 8-16 Westmoreland Street). Protected Structures	Vibration TBM	low	very high	Low
MN107_C55	HC#241 (32 Westmoreland Street). Protected Structure	Vibration TBM	low	very high	Low
MN107_C56	HC#245 (35-36 Westmoreland Street). Protected Structure	Vibration TBM	low	very high	Low
MN107_C57	HC#247 (7 Westmoreland Street). Protected Structure	Vibration TBM	low	very high	Low
MN107_C58	HC#251 (40-41 Westmoreland Street). Protected Structure	Vibration TBM	low	very high	Low
MN107_C59	HC#254 (Thomas Moore Monument). Protected Structure	Vibration TBM	low	very high	Low
MN107_C60	HC#263 (Goldsmith & Burke Monuments). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_C61	HC#264 (Entrance gates and railings at Trinity College). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_C62	HC#265 (Bank of Ireland College Green). Protected Structure	Vibration TBM, Drill & Blast	high	very high	High
MN107_C63	HC#266 (Henry Grattan Monument). Protected Structure	Vibration TBM, Drill & Blast	high	very high	High
MN107_C64	HC#269-270 (Nos. 32-34 College Green). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_C65	HC#268 (35 College Green). Protected Structure	Vibration TBM, Drill & Blast	high	very high	High
MN107_C66	HC#271-272 (Nos. 36-37 College Green). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High

Impact Ref #	Affected Area/ Feature	Impact type	Magnitude of impact taking into account mitigation	Functional value	Significance of impact taking into account mitigation
MN107_ C67	HC#273-279 (Nos. 112-118 Grafton Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C68	HC#280-281 (Nos. 108 & 110 Grafton Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C69	HC#286-287 (Nos. 22-23 Suffolk Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C70	HC#289-290 (Nos. 102-103 Grafton Street). Protected Structures	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C71	HC#293 (96 Grafton Street). Protected Structure	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C72	HC#296 (38-46 Wicklow Street). Protected Structure	Vibration TBM, Drill & Blast	high	very high	High
MN107_ C73	HC#297 (Nos. 6-12 Clarendon Street) Protected Structure.	Vibration TBM	low	very high	Low
MN107_ C74	HC#309 (7-8 Harry Street). Protected Structure	Vibration TBM	low	very high	Low
MN107_ C75	HC#312 (4 Harry Street). Protected Structure	Vibration TBM	low	very high	Low
MN107_ C76	HC#315 (64 Grafton Street). Protected Structure	Vibration TBM	low	very high	Low
MN107_ C77	HC#316-317 (Nos. 1-2 Chatham Street). Protected Structures	Vibration TBM	low	very high	Low
MN107_ C78	HC#116 (Parnell Square). Site of archaeological potential	Secondary Env.	very low	high	Very low
MN107_ C79	HC#187 (O'Connell Street Lower & Westmoreland Street) Site of archaeological potential	Secondary Env.	low	very high	Very low
MN107_ C80	HC#338 (St Stephen's Green Park). National Monument	Secondary Env.	low	very high	Low
MN107_ C81	HC#343 (Historic city). Zone of archaeological potential	Secondary Env.	very low	very high	Very low
MN107_ C82	HC#345 (Parnell Square). Conservation Area	Visual	medium	very high	Medium

Impact Ref #	Affected Area/ Feature	Impact type	Magnitude of impact taking into account mitigation	Functional value	Significance of impact taking into account mitigation
MN107_C83	HC#346 (The River Liffey). Conservation Area	Visual	medium	very high	Medium
MN107_C84	HC#347 (O'Connell Street). Architectural Conservation Area	Visual	medium	very high	Medium
MN107_C85	HC#338 (St Stephen's Green Park). National Monument	Visual	high	very high	High
Operation					
MN107_O01	HC#345 (Parnell Square) Conservation Area	Visual impacts	low	very high	Low
MN107_O02	HC#346 (The River Liffey). Conservation Area	Visual impacts	low	very high	Low
MN107_O03	HC#347 (O'Connell Street). Architectural Conservation Area	Visual impacts	low	very high	Low
MN107_O04	HC#338 (St Stephen's Green Park) National Monument	Visual impacts	low	very high	Low
MN107_O05-40	All structures, monuments and buildings described in previous sections Protected Structures	Vibration	very low	very high	Very Low

Parnell Square Stop (platform level)

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 MN107.

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. Impacts on agricultural properties are assessed in the Agronomy chapters of this EIS (Volume 2, Chapter 14).

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

16.4.2 Mitigation measures

In cases where footbridges or properties 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 underground 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 is 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 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 scheme.

16.4.3 Assessment of residual impacts

16.4.3.1 Project scenario: construction phase

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

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

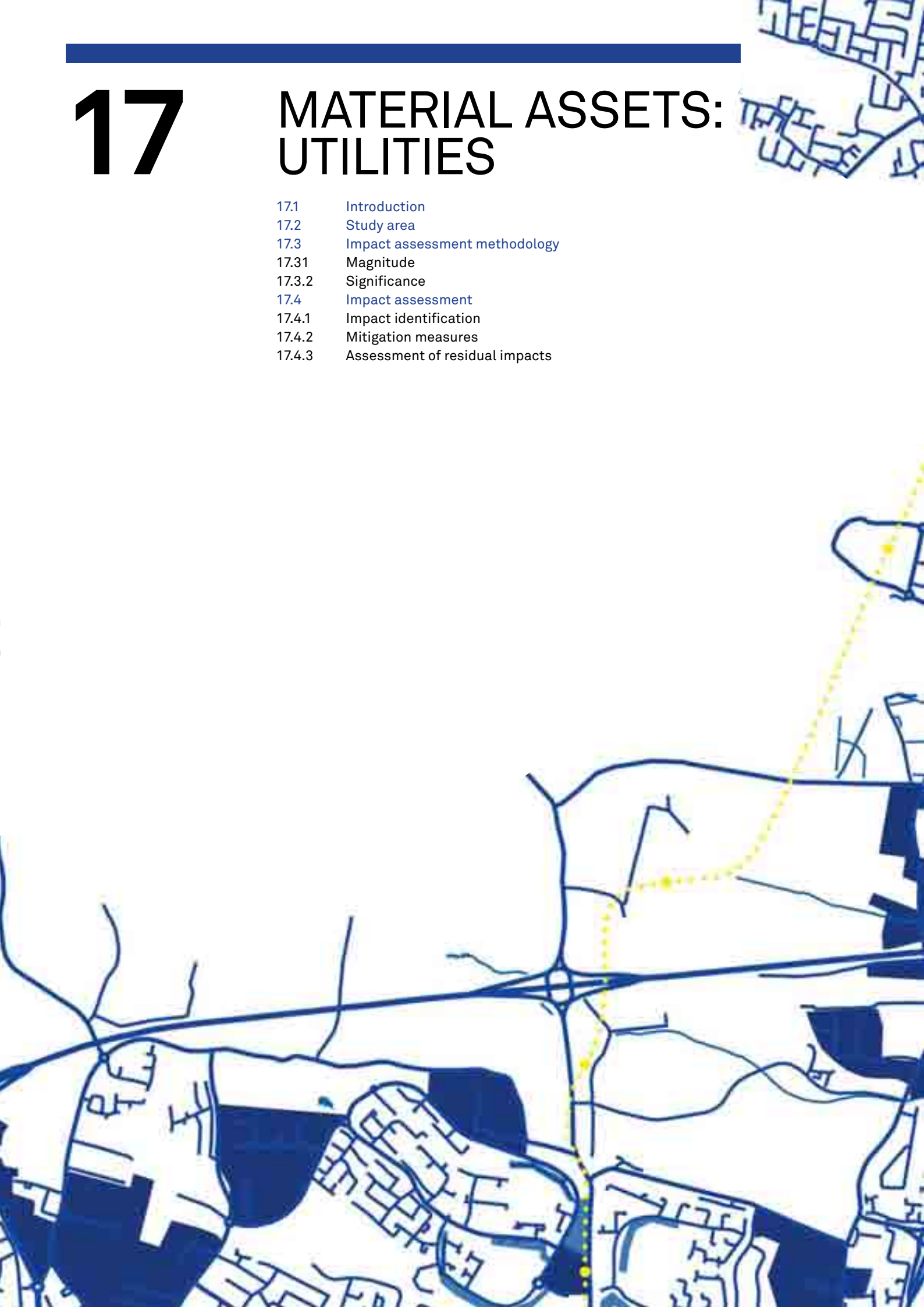
Property	Functional value	Impact	Mitigation measure	Residual impact magnitude	Residual impact significance
Various properties situated above bored tunnel alignment as listed in the Railway Order	very high	Permanent land-take of Subtstratum for Metro Lin	Property Protection Scheme	medium	Medium significance
Various basements on Parnell Square East	very high	Permanent land-take for Metro Line/Stop	Compensation	medium	Medium significance
Part of grounds of Rotunda Hospital	very high	Permanent/ Temporary land-take for Metro Line/Stop	Compensation	medium	Medium significance
Part of St. Stephen's Green	very high	Permanent/ Temporary land-take for Metro Line/Stop	Reinstatement	medium	Medium significance

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 prop erty 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 MN107.

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 MN107.

This chapter specifically refers to impacts on over and underground utility infrastructure such as water, gas, electricity, sewers, surface water drainage and telecommunications. It includes an evaluation of the impacts associated with protection, diversion and relocation of utility services equipment and plant in the vicinity of surface running tracks, stops, tunnels, ventilation shafts and other areas associated with the proposed scheme. Any impacts due to electromagnetic interference are addressed in the Radiation and Stray Current chapter of this EIS (Volume 2, Chapter 6). Indirect impacts that may occur due to the activities and potential disruption caused during utilities diversions are addressed in other chapters of the EIS. Examples include the 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 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 the study area have been identified; extensive consultations have taken place with stakeholders including Statutory Undertakers, Local Authorities and other relevant parties. Reviews of relevant existing service networks and civil infrastructure have been carried out to identify potential impacts on existing service networks.

A schedule of proposed utility diversions has been prepared which identifies infrastructure requiring diversion and includes information on the type and size of each utility. This schedule also identifies the necessary mitigation measures required by the utility company and the contractor to facilitate the implementation of works. A summary of this schedule 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 MN107 include, but are not limited to the diversion of water mains of varying diameters and materials, gas mains (local distribution) of varying diameters and materials, drainage pipes (surface water, sewage, and combined systems) of various diameters, alteration of manholes, duct systems for telecommunications providers, street lighting, traffic lighting and signals, cable TV operators and ESB (local distribution and high voltage), including miscellaneous chambers as detailed in Table 17.2. The works also include any alterations to service connections to individual properties necessitated by the diversion of the associated main utility services.

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

Table 17.2 Impacts and mitigation measures

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
Aurora	100mm Comms Duct	31.6	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2x100 Duct	197.3	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
LUAS	2x100 Duct	208.3	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2x150 Duct	13	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	Luas Substation	30	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
Traffic	1x100 Duct	22	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
	2x100 Duct	178.2	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	4x150 Duct	19	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	4x100 Duct	8	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	6x100 Duct	61.3	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
Alt Comms	CCTV	405.9	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	6 x 100 Duct	145.8	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	8x100 Duct	130	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	4x100 Duct	30	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
BT Ireland	60mm Duct	2.1	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1x110 Duct	102.4	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2x100 Duct	162.8	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2x110 Duct	323.4	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	4x100 Duct	12	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	6x100 Duct	109	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	6x110 Duct	105.5	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
	Unknown	8	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
NTL	1x100 Duct	12	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2x100 Duct	225	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2x100 & 1x50	4	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
Public Lighting	50mm Duct	13	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	100mm Duct	2	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	6x100mm Duct	16	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2x110mm Duct	162	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1 LV	92	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1. No LV Supply	331	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
Gas Distribution	250mm PE 25 mbar	527	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	63mm PE 25 mbar	63	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	315mm PE 25 mbar	162	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	Unknown	25	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	Gas Feed	21	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
	63mm Gas Feed	9	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	60mm Connection	5	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	63mm Connection	34	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	125 PE (6in) 25 mbar	331	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	125 PE (8in) 25 mbar	125	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	125 PE (12in) 25 mbar	78	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	250 PE (12in) 25 mbar	112	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	315 PE (24in) 25 mbar	164	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	315 PE (36in) 4 bar	115	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
ESB Transmission	HV 38 KV Cable	115	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
ESB Distribution	1 x LV	306.3	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2 x LV	173.6	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	12 x LV	48	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1 x MV	311.8	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2 x MV	411	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
	Unknown	12	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	MV Ducts	89	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	Connection	22.3	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1 x 100mm Duct	138.8	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	4 x 100mm Duct	16	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1 MV & 1 LV Supply	135	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2 MV & 2 LV Supply	277.4	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1 x LV Supply	175	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1 x LV & 5 x MV	50	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	7 x 125mm Duct	22	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	8 MV, 7 LV & 5 Spare	100	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	20 x 125mm Duct	57	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
DCC Water	5" CI	173	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	6" CI	545	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	7" CI	183	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
	9" CI	125	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	12" CI	128	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	16" CI	130	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	18" CI	85	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	24" CI	57	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	27" CI	141	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	300mm PE	67	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	300mm DI	42	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	300mm Water main	51	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	180mm PE Watermain	158	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	250mm HPPE Main	58	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	400mm HPPE Main	503	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	Water Connection	96	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	Water pipe + Valve Meter	18	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	Unknown	119	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
			Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
DCC Drainage	150mm Surface	25	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	200mm Surface	20	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	225mm Surface	8	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	250mm Foul	15	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1,620mm x 1,010mm Combined	23	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1,370mm x 920mm Combined	126	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1,370mm x 950mm Combined	102	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
			Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
Eircom	2x50	148	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	1x100	296	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	2x100	206	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	3x100	126	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	4x100	306	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	5x100	16	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low

Utility Type	Description/ Pipe Size	Approximate length that may be impacted upon (m)	Likely mitigation measures	Potential duration of disrupted service (Magnitude of residual impact)	Significance of residual impact
	6x100	43	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	8x100	192	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	9x100	203	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	12x100	44	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	25x100	81	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low
	30x100	23	Decommission/ Divert/ Protect Permit to dig system and liaison with service provider	Temporary/ Short-term (low)	Low

17.4.3.2 Operational phase

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

Typical Metro Escalator

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.

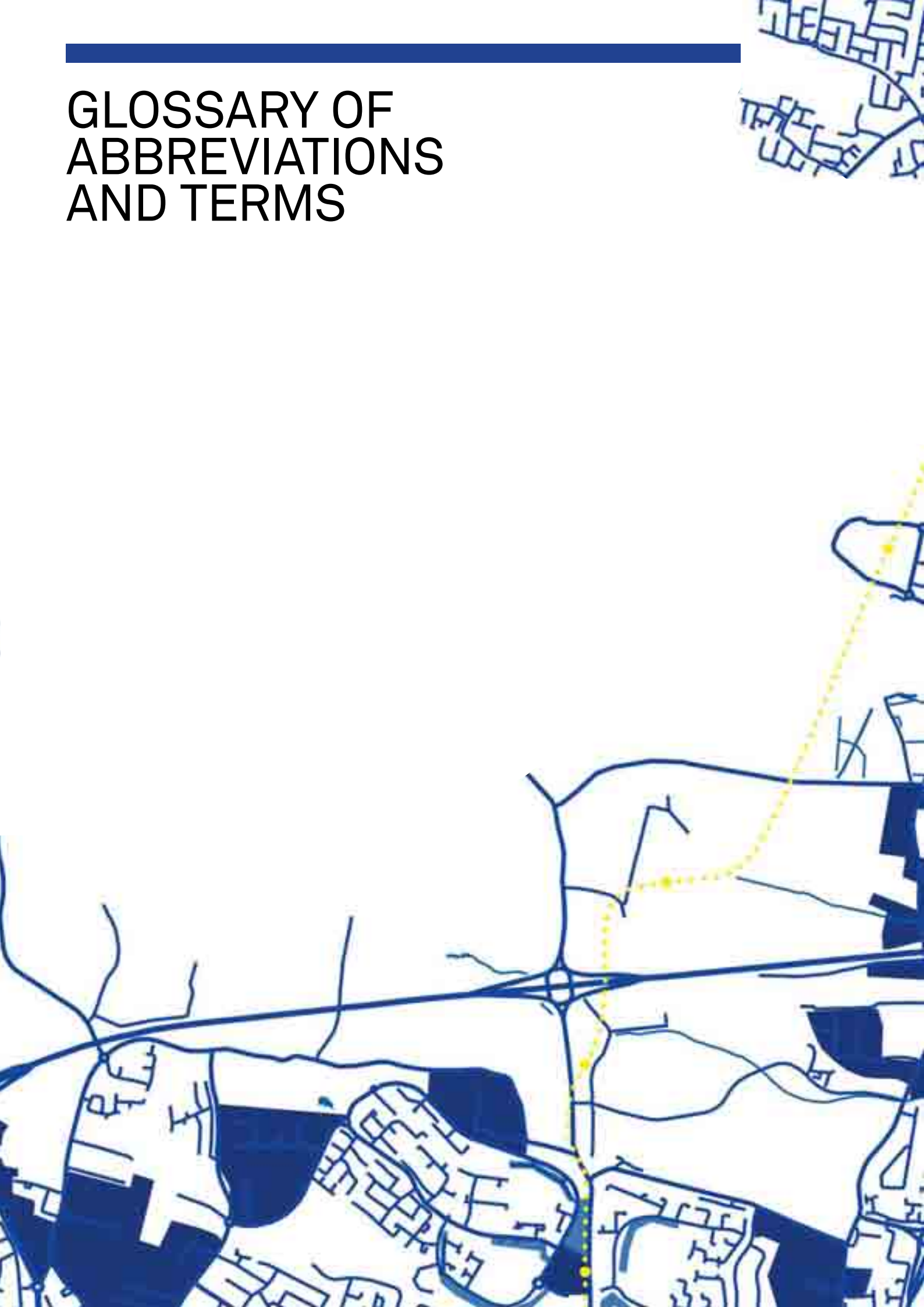
During the construction phase of the scheme, several other projects are likely to take place within the study area. A review of planning applications has been undertaken (as described in the Baseline Landuse chapter of this EIS (Volume 1, Chapter 10)) to identify such developments. Examples include, 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.