PUNCH
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Lidl Ballymun MetroLink Site

ABP-314724

Attachment 4: PUNCH Civil/Structural Engineering Report - Module 2

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1 Report Authors

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2 Introduction

This report has been prepared as part of a submission by Lidl Ireland GmbH for the An Bord Pleanala Oral hearing relating to the Dublin MetroLink project - Ref ABP-314724-22 Submission Number 169. The report covers Civil and Structural Engineering matters specific to the site.

Lidl's site in Ballymun has been identified as a key site for the MetroLink project and in the permanent case will contain part of the proposed Northwood station, as well as connecting sections of tunnel. During the construction stage of the project, the site is proposed to be used as a key launch site for MetroLink tunnelling and associated construction activities. Hence, the site is of fundamental importance to the successful delivery of the MetroLink project.

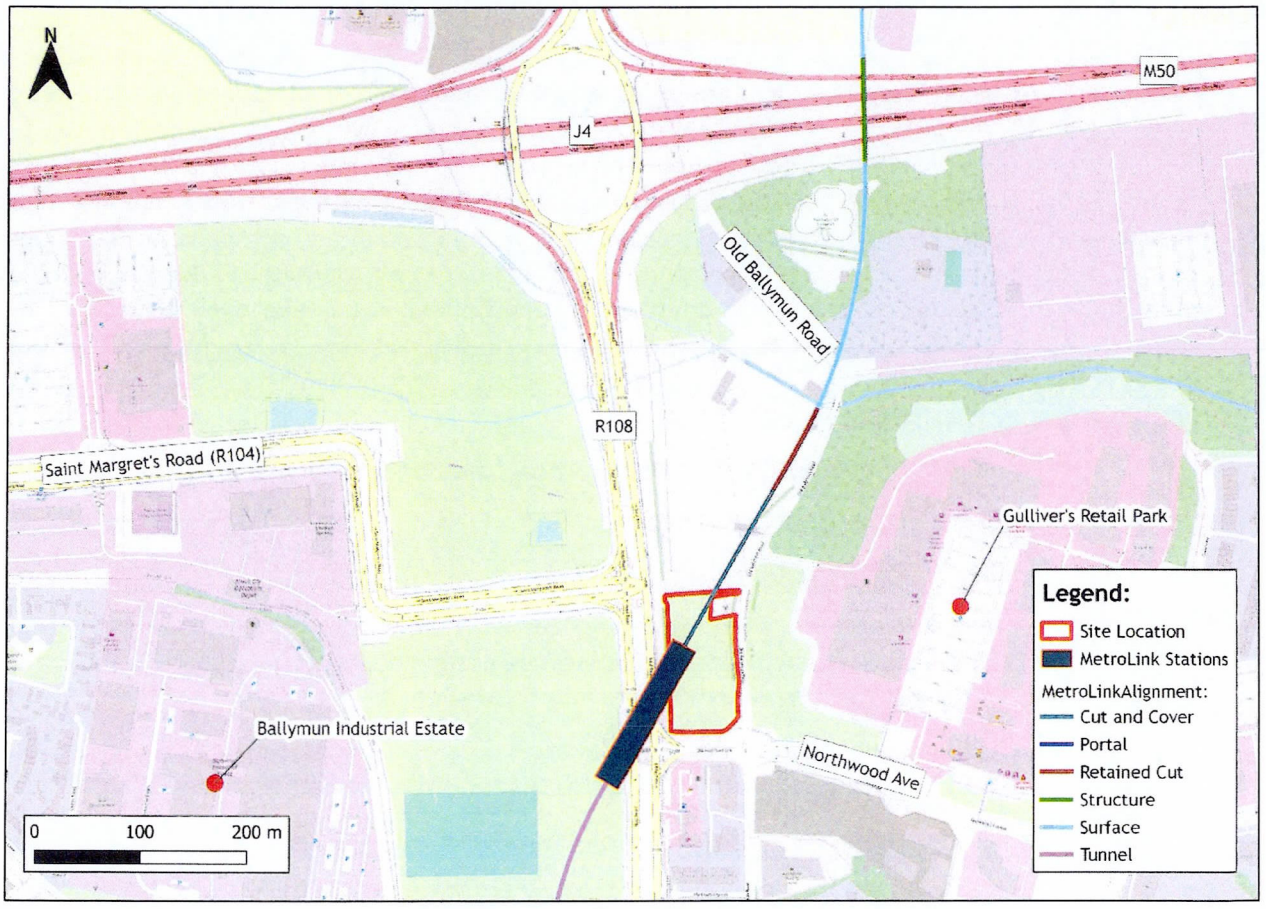


Figure 1: Site Location Map, with MetroLink Infrastructure included. The proposed Northwood Station encroaches on the Lidl site in Ballymun.

3 Site Development - Structural Engineering

It is Lidl's intention to develop this key site based on a planning application, which will optimise the sites' potential, within the parameters of the development zoning outlined in the applicable Fingal County Council Development Plan. It is essential therefore, that the presence of the Northwood Station and connecting tunnels do not negatively impact on the development potential of the site and hence these structures should be designed by TII to accommodate this future development.

From a Structural Engineering perspective this can simply be achieved by designing these MetroLink structures to cater for both over station/structure development and adjacent station/structure development. In effect, these MetroLink structures should be considered as foundations/substructures for the future Lidl development.

On the Lidl Ballymun site, from a planning perspective residential development up to 15 stories is permissible. It is the intention of Lidl to develop a scheme of this height, which is expected to include a basement, a Lidl retail store at ground floor level and residential units overhead. Therefore, from a Structural Engineering perspective the station building and tunnels, on the Lidl Ballymun site, must be designed to support the loads from such development, both on top of and adjacent to the station and tunnel. The implications of these requirements for the terms and conditions of any Board approval of the proposed railway works will be addressed further on behalf of Lidl at the hearing in Module 2. The final loads to be supported will be in accordance with Eurocode 1 "Actions on Structures" and "Building Regulations" current at the time of the station/tunnel design. On a preliminary basis, these unfactored loads have been calculated to be as follows:

A. Uniformly distributed unfactored vertical load on the station/tunnels of:

   (i) 165 kN/m2 Dead Load

   (ii) 45 kN/m2 Live Load

B. Lateral loads at ground level associated with the above vertical loads (surcharge) plus additional lateral wind loads which will be determined based on Eurocode 1 and the final building geometric design.

C. Additional concentrated point loads of:

   (i) 7,950 kN Dead Load

   (ii) 2,200 kN Live Load

   Based on an 8m x 6m column grid.

D. Additional concentrated line loads of:

   (iii) 1,320 kN/m Dead Load

   (iv) 360 kN/m Live Load

   Based on apartments walls at 8m centres.

Additionally, the station and tunnels will need to be designed to take full account of the following:

1. Deflections/settlements/differential settlements in line with current Eurocodes for building design and informed by appropriate site investigations.

2. Operational MetroLink Noise and Vibration limits to comply with Eurocodes and all relevant environmental standards, so as not to limit or prohibit any future use of the buildings on the site.

4 Site Development - Civil Engineering

From a Civil Engineering perspective, following any grant of approval by the Board, which should make adequate provision for overstation development to meet the criteria outlined above, it is essential that detailed consultation takes place between Transport Infrastructure Ireland and Lidl throughout all stages of the station and tunnel design process, to ensure that the railway works do not constrain the future development potential and value of the Lidl site.

We set out some specific issues to be addressed by the Board in its decision, as follows:

4.1 The presence of the Northwood Station and connecting tunnels will represent a major constraint to the normal development of the site from a Civil Engineering perspective. The vertical and horizontal alignment of these structures therefore will significantly influence services crossing the site. It is important therefore that the design of the station/tunnel provides for crossing services, to ensure full services connectivity can be achieved throughout the Lidl site now and in the future.

4.2 An example of the importance of this relates to the design of Sustainable Urban Drainage Systems (SUDS) such as permeable paving and the location plus design of attenuation tanks or bio retention arrangements if applicable. It is crucial such on-site infrastructure can be optimally located on the site and all parts of the site can connect to such facilities without the station and tunnels acting as services connectivity barriers/blockers.

4.3 Given the extent of the works taking place at the site, and the potential duration for which the site will be used (which currently has not been clearly set out by TII), of up to or in excess of 10 years, it is clear that it is not possible for the land to be handed back *"in the same condition in which it was received"*. This is of particular concern given the potential for soil contamination due to construction activities at the site. Historical mapping indicates the site has not been developed on, and therefore, the risk of pre-existing contamination on the existing site is low. The long-term impact of the construction activities that will be carried out on site will change the existing use of the site from greenfield to non-greenfield. As set out in the EPA's "Guidance on waste acceptance criteria at authorised soil recovery facilities" there are significantly higher requirements for soil testing and classification in the removal of non-greenfield soil and stone waste than there is for removal of greenfield soil and stone. This has a direct financial implication on the site owner for future development. This issue was addressed in further detail in the Lidl/PUNCH submission in Module 1 and in this regard Lidl welcomes the confirmation by Transport Infrastructure Ireland to the Inspector at the hearing on 21 February 2024 that TII will implement the soil and groundwater testing and monitoring regime as requested in the PUNCH Consulting Report submitted at the hearing on the same day in respect of the Lidl lands.

4.4 TII should ensure that any proposed storm or foul drainage serving the proposed station should be coordinated with future development proposals for the Lidl site. For example, a proposed storm water sewer to serve station/tunnel should be installed to accommodate flows from the entire site. Additionally, any station/tunnel storm water attenuation requirements or similar should be placed within the station/tunnel footprint and not on the Lidl part of the yet to be developed site.

4.5 TII should ensure that any services running to/from the proposed station or require diversion due to the MetroLink works, should not be routed through the Lidl site so as not to impact on future development

or require the developer to divert any services in the future. Services running to/from the proposed station should not sterilise any portion of the Lidl Ballymun site.

4.6 Finished site levels for the proposed station at ground level should be coordinated with proposals for the development of the Lidl site, particularly in the context of basement car parking and ground floor retail uses planned.

5 Conclusions/Recommendations

We make the following conclusions/recommendations for the Board to take account of in its decision:

5.1 It is essential the Board's decision ensures that that the Northwood MetroLink station and connecting tunnels at the Lidl Ballymun site are designed to take full account of future development of the Lidl site and not restrict it in any way. This should include both over station and adjacent station development.

5.2 Structural loading quantum from the proposed Lidl development has been provided in Section 2 of this report. The implications of these requirements for the terms and conditions of any Board approval of the proposed railway works will be addressed further on behalf of Lidl at the hearing in Module 2.

5.3 Following the grant of any approval by the Board, it is essential that the MetroLink Structural Engineers engage fully with Lidl as part of the station/tunnel design process to ensure Lidl's future development plans for the site are taken into account and these plans are not negatively impacted by the presence of the Northwood station and connecting tunnels. In effect the station and tunnels need to be considered as the foundations for the future Lidl development and so a similar level of design coordination will be required as normally happens on all projects where the foundations are designed to support the scheme superstructure in all aspects.

5.4 From a Civil Engineering perspective it is essential the station and tunnels do not form a services barrier across the Lidl site. Hence, full services connectivity must be provided for across the station and tunnels.

5.5 It is essential the Lidl site is handed back free of soil contamination with appropriate evidence/verification in the form of EPA certification is provided prior to "hand back" to confirm this. Appropriate conditions should be attached to the Board's decision to ensure this as discussed in Module 1.

5.6 The design of the station/tunnels must be self-contained from a Civil Engineering perspective and all design requirements must be catered for within the footprint of the station/tunnel.

5.7 Finished site levels for the proposed station at ground level should be coordinated with proposals for development of the Lidl site, particularly in the context of basement car parking and ground floor retail uses planned.

5.8 The implications of all the above requirements for the terms and conditions of any Board approval of the proposed railway works will be addressed further on behalf of Lidl at the hearing in Module 2.

6 Conditions of Engagement

This survey and report was undertaken under the conditions of engagement Agreement RA9101 for the Appointment of Consulting Engineers for Report and Advisory Work Published in agreement with The Association of Consulting Engineers of Ireland.

Appendix A Commentary on TII "Draft Guidance Note for Developers" issued on 20/02/2024, following the commencement of the ABP Oral Hearing

Following the completion of this PUNCH report and the commencement of the An Bord Pleanala Oral Hearing on 19/02/2024, TII have issued various additional documents. Once such document titled "Draft Guidance Note for Developers" was issued on 20/02/2024 and its content is very significant to the development potential of the Lidl Ballymun site. Hence, we have prepared this addendum to our original Report addressing some of the key issues.

PUNCH Report Addendum 1

The TII "Draft Guidance Note for Developers" is a 13 page draft document which sets out an approach to asset protection for MetroLink infrastructure. The purpose of the document is stated as:

> *"This guidance note forms an asset protection approach developed by TII to ensure the integrity of the structures of MetroLink are safeguarded throughout their life in the context of adjacent development which may arise from time to time".*

The document defines exclusion zones, protection zones, loading conditions and or/processes to help ensure that the MetroLink subsurface assets are protected from the impact of third party development activities.

Refer Appendix B of this Report Addendum for the content of the document.

Our comments on the TII document are as follows:

a. The issued Draft Guidance Note for Developers is an important document from TII's perspective as it sets out measures to protect the MetroLink substructure assets.

b. The constraints set out in this document in relation to the development of the Lidl Ballymun site are extreme on two primary fronts. First, it sets out major limitations on vertical loading that can be imposed on the MetroLink Northwood station and connecting tunnels on the Lidl site. Second, the combined effect of development exclusion and protection zones appear to effectively render major parts of the Lidl site undevelopable.

c. In relation to Loading Constraints, Figure 2 of the TII document is reproduced herein and shows an allowable surcharge load of 20kN/m^2.

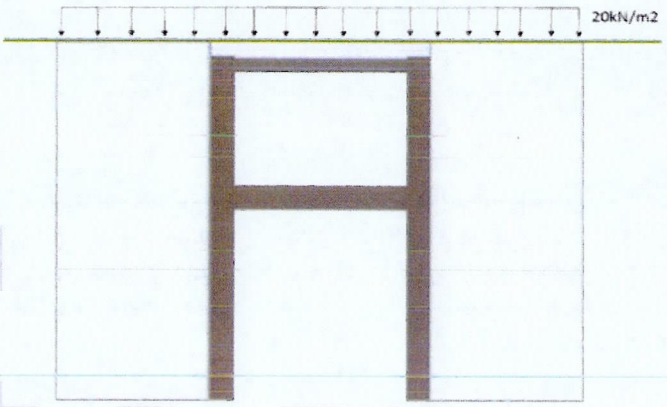
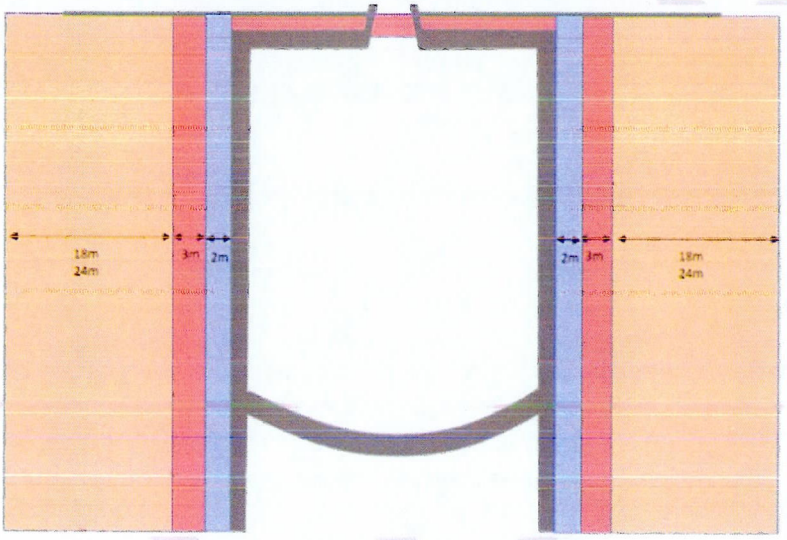


Figure 2: Imposed vertical loadings on cut & cover structures

Considering the uniformly distributed load calculated from the proposed Lidl 15 storey structure on the site equates to 210kN/m² (165kN/m² + 45kN/m²) plus additional point and line loads - Refer Section 3A-D of this report - it is clear the proposed Lidl development cannot proceed if the loading conditions in this TII document are applied to the Lidl site.

d. In relation to zones of exclusion/protection relative to the TII station and tunnel assets, a number of diagrams are provided on scenarios where these would apply. For the purpose of this document, we reproduce Figure 7 of the TII document herein.



Underground Station	Protection zone (m)
Dublin Airport	18
Northwood	18
Ballymum	18
Collins Avenue	18
Griffith	18
Glasnevin	24
Mater	24
O'Connell	24
Tara	18
St. Stephen's Green	18
Charlemont	18

Figure 7: Underground Station Protection and Exclusion Zones

By way of clarification the colours shown indicate the following:

- Blue "Line of Deviation": this colour immediately adjacent to the structure represents the "line of deviation" of the structure i.e. the Railway Order provides for some tolerance on the horizontal alignment of MetroLink.

- Red "Exclusion Zone": this colour represents the "exclusion zone". The definition provided by TII for exclusion zone is as follows:

> Exclusion Zone is the volume of subsoil along the bored tunnel, cut and cover tunnel and retained cut alignment in which no future works or developments are allowed to encroach. Future surface works or developments are allowed above a subsurface Exclusion Zone, provided the foundation does not intrude into the Exclusion Zone and the MetroLink structures are not adversely affected

In effect for the station plus cut and cover tunnels on the Lidl site, no development can take place in this zone.

- Orange "Protection Zone": This colour represents the "protection zone". The definition provided by TII for protection zone is a as follows:

> Protection Zone is the volume of subsoil and the area on the ground surface along the bored tunnel, cut-and-cover tunnel and retained cut alignment in which future works or developments could impact the MetroLink structures. Future works or developments are allowed in the Protection Zone with any depth of foundation, provided it does not adversely affect the MetroLink structures and is subject to written agreement with TII.

In this zone, work is permitted, but significant restrictions are in place on loading (20kN/m^2) and constraints on foundation location, type etc.
Considering the extent of this zone at the Lidl site (2m deviation + 3m exclusion + 18m protection on both sides at Northwood station), the negative impact on the development potential of the Lidl site is extreme - Refer to Appendix C of this report for an illustrative layout prepared by MCA Architects.

e. The document appears to be largely silent on how future sub-terranean services on the Lidl site will be treated i.e. constraints on how services such as watermains, gas mains, electrical/IT services, foul drainage, storm drainage etc will or will not be permitted to cross over the MetroLink assets. If such services were not to be permitted to traverse the site, or constrained in doing so, it would have a further major negative impact on the development potential of the site and effectively sever it from a services connectivity perspective.

f. This document, if adopted, would appear to deny the potential for overstation development, which we understood from responses from TII to previous submissions by LIDL Ireland GmbH (Submission 169) in "TII Response to Submissions No.s 141-320, plus Fingal County Council Submission (Section 5.2, Part 2 and 2)". While others representing Lidl will comment further on this from a site planning and zoning perspective, from a structural and civil engineering perspective, overstation development at this key site is relatively straightforward from a technical Engineering perspective and should be permitted in our view i.e. the TII station and tunnel infrastructure on this key Lidl site, should be designed by TII as simply the foundations for the Lidl development scheme. Adequate provision needs to be made for this in the Board's decision.

Appendix B - TII "Draft Guidance Note for Developers"

METROLINK

Integrated Transport. Integrated Life.

DRAFT GUIDANCE NOTE FOR DEVELOPERS

May 2023

Transport Infrastructure Ireland
National Transport Authority
Government of Ireland
Project Ireland 2040

1. Introduction

MetroLink includes *inter alia*: construction of a railway approximately 18.8 kilometres in length which is mostly underground comprising *inter alia* 9.4 kilometres section of single bore tunnel running beneath Dublin City Centre from Charlemont to Northwood Station, 2.3 kilometres section of single bore tunnel running beneath Dublin Airport; north of Dublin Airport the railway will emerge from tunnel and will run at surface level and in cut and cover structures to Estuary Station; surface running sections and cut and cover sections will include earthworks, the use of retained cut and cover structures, elevated sections; a new 99m long bridge will be constructed over the M50 and a 261m long multi-span Viaduct over the Broadmeadow and Ward River; the construction of 16 stations, including 11 underground stations at Dublin Airport, Northwood, Ballymun, Collins Avenue, Griffith Park, Glasnevin, Mater, O'Connell Street, Tara, St. Stephen's Green and Charlemont; 4 retained cut stations at Seatown, Swords Central, Fosterstown and Dardistown and 1 at grade station at Estuary; a multi-storey 3000 space park and ride close to the M1 Motorway will be provided at Estuary Station, a maintenance depot is located near Dardistown Station.

Details of the proposed scheme are available in the MetroLink Railway Order application and the horizontal and vertical alignment of the route is provided therein.

TII must ensure the MetroLink structures:

a) retain structural integrity,
b) emergency management capability is not compromised,
c) safety and free flow of users of the facility is maintained,
d) can be safely and adequately maintained at all times, and
e) are not put at risk by developer activities; TII as asset owner must be indemnified against any damage or disruption by any developer activity bearing potential threat to the infrastructure or its operation.

This Guidance Note forms an asset protection approach developed by TII to ensure the integrity of the structures of MetroLink are safeguarded throughout their life in the context of adjacent development which may arise from time to time.

This Guidance Note defines exclusion and protection zones, loading conditions and or/processes to help assure that the MetroLink subsurface assets are protected from the impact of third-party development activities.

At the time of preparation of this Guidance Note, MetroLink has not yet been constructed, and so this note is made publicly available by TII in order to communicate its requirements in anticipation of the new structures being in place. This Guidance Note shall be developed further as may be necessary at a later time to reflect TII requirements during construction and later post construction and during operation.

Developers will be required to examine the interface and potential interaction between any proposed development and the future construction of MetroLink and TII require that any new development proposal will be appropriately designed not to affect future construction and operation of MetroLink.

The purpose of this Guidance Note is to assist developers in understanding TII requirements for protection of MetroLink, and to provide guidance to developers on future land use development which may be undertaken without unduly affecting the structures.

Developers of any development in the vicinity of the MetroLInk Protection Zones are advised to consult with TII prior to making an application to the planning authority for planning approval.

The Guidance Note details the design considerations for MetroLink. Nothing in this Guidance Note anticipates or permits a specific configuration of loading from a developer.

If there is any doubt as to whether a developer needs to undertake technical engagement with TII on development proposals, there should be a presumption for contact being necessary.

TII expect to enter into specific legal agreement with any developers hoping to undertake construction over or adjacent to MetroLink. The agreements will specify the particular requirements of TII in response to the nature of the development proposed.

TII reserves the right to modify the requirements of their asset protection approach, (and this Guidance Note) from time to time as may be necessary

The limits of deviation referred to in this Guidance Note are those sought by the Railway Order Application. Once constructed, all relevant offsets quoted will be those from the as-constructed physical limits of the tunnel and other associated infrastructure, record copies of which will be provided by TII upon request.

2. Safeguarding Requirements

2.1. Structural Protection

2.1.1 For the purposes of structural protection of MetroLink from future works or development, TII requires that boundaries of Exclusion and Protection are enforced to safeguard the structures. Any proposed works or developments encroaching either of these zones would be subject to a legal agreement with approved asset protection arrangements in place, which fully includes methods of construction and potential construction and other temporary surcharges effects. These are defined below:

- Exclusion Zone is the volume of subsoil along the bored tunnel, cut and cover tunnel and retained cut alignment in which no future works or developments are allowed to encroach. Future surface works or developments are allowed above a subsurface Exclusion Zone, provided the foundation does not intrude into the Exclusion Zone and the MetroLink structures are not adversely affected

- Protection Zone is the volume of subsoil and the area on the ground surface along the bored tunnel, cut-and-cover tunnel and retained cut alignment in which future works or developments could impact the MetroLink structures. Future works or developments are allowed in the Protection Zone with any depth of foundation, provided it does not adversely affect the MetroLink structures and is subject to written agreement with TII.

2.1.2 Exclusion and Protection Zones are set out in the following for

a) U Section profile, retained cut profile, cut and cover profile, retained cut stations, underground stations, portals and shafts.
b) Tunnels,
c) Temporary Site Areas, and
d) Wayleave / Right of Way

2.1.3 U Section profile, retained cut profile, cut and cover profile, retained cut stations, underground stations, portals and shafts have been designed with an imposed vertical loading of 20kN/m^2. This imposed vertical loading for these structures is shown diagrammatically in Figures 1 and 2.

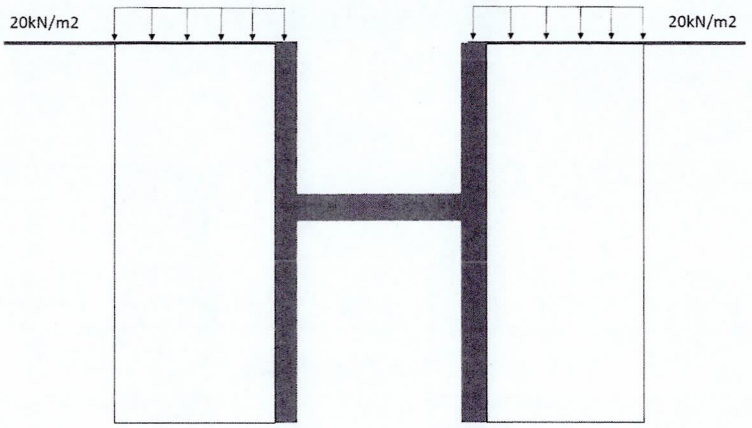


Figure 1: Imposed vertical loadings on open cut structures

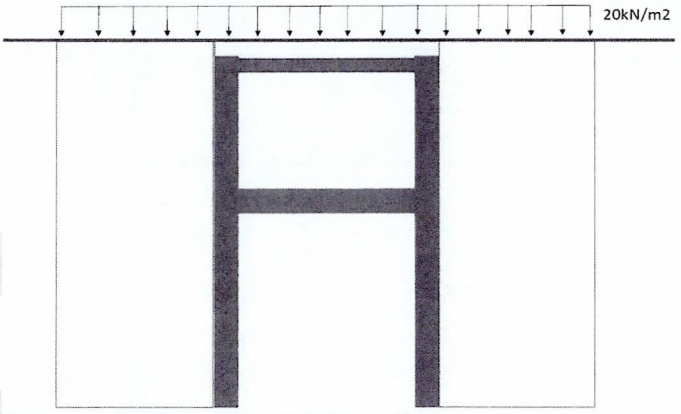


Figure 2: Imposed vertical loadings on cut & cover structures

Prior to construction no works other than works associated with the MetroLink RO may be undertaken within the proposed acquisition of land as set out in Schedule 2 of the Railway Order (which land includes for the limits of deviation).

In the case of any construction by others adjacent to and outside of the extent of the limits of deviation that could affect future designs of the MetroLink permanent works, developers are required to submit designs of proposed development works within this area.

Exclusion and Protection Zones are shown on the following drawings (exclusion zones indicated in red, protection zones are indicated in orange. The limits of deviation associated with each type of structure is indicated in blue. The extent of protection zones for Retained Cut and Cut & Cover structures varies by location. Appendix 1 describes the extent of protection zone required at the various locations along the scheme.

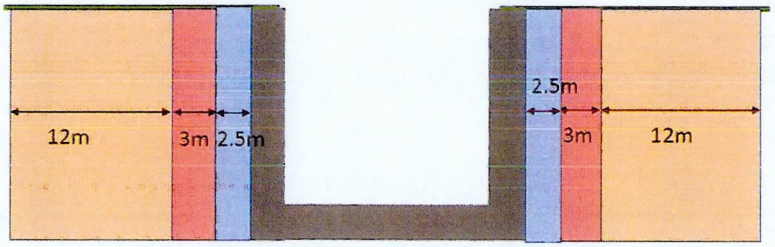


Figure 3: U Section Protection and Exclusion Zones

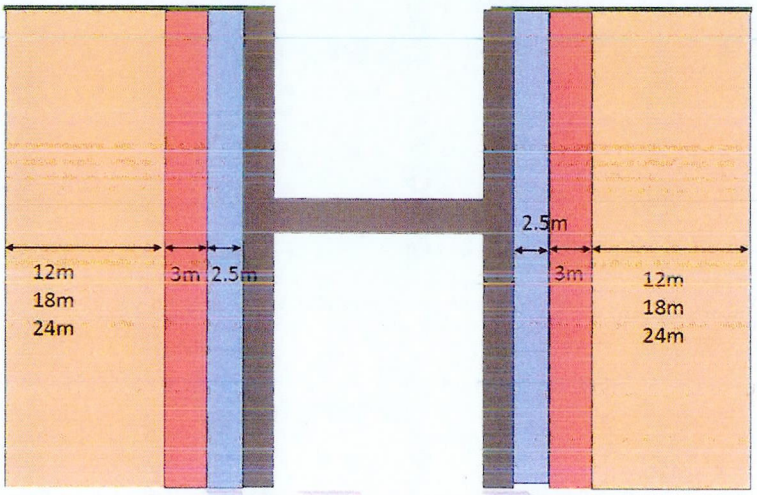


Figure 4: Retained Cut Section Protection and Exclusion Zones

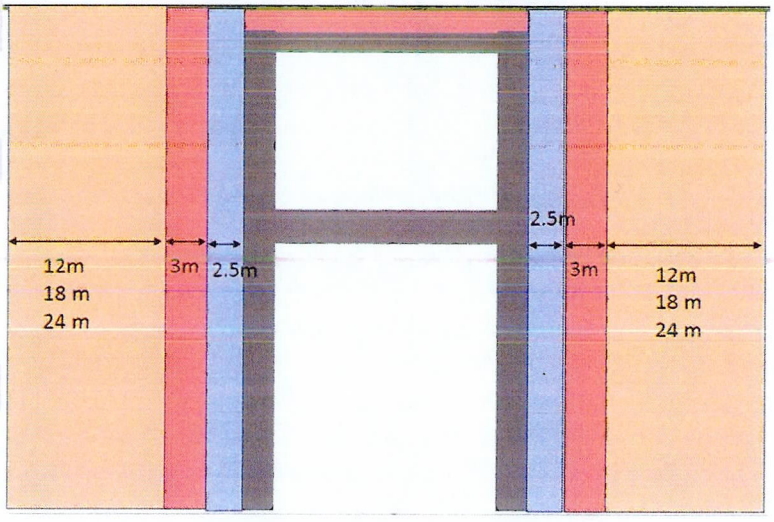


Figure 5: Cut & Cover Section Protection and Exclusion Zones

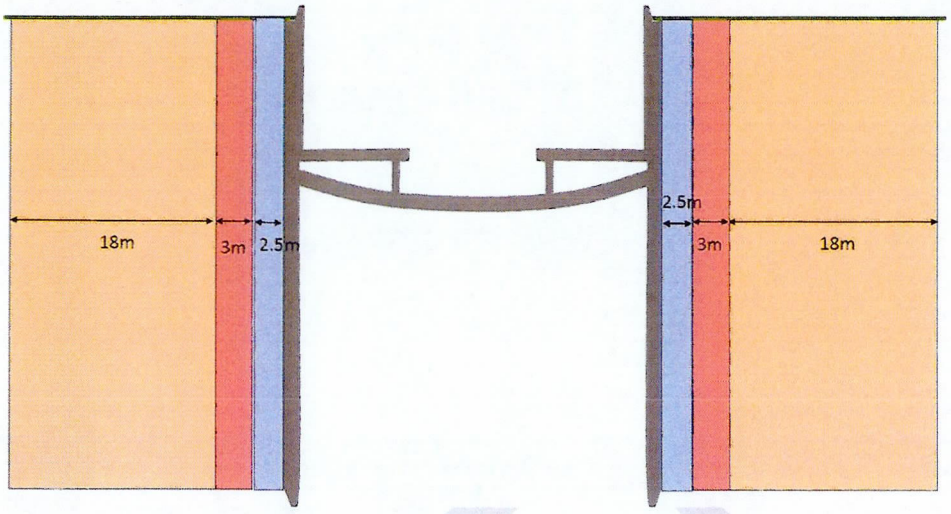


Figure 6: Retained-Cut Section Protection and Exclusion Zones

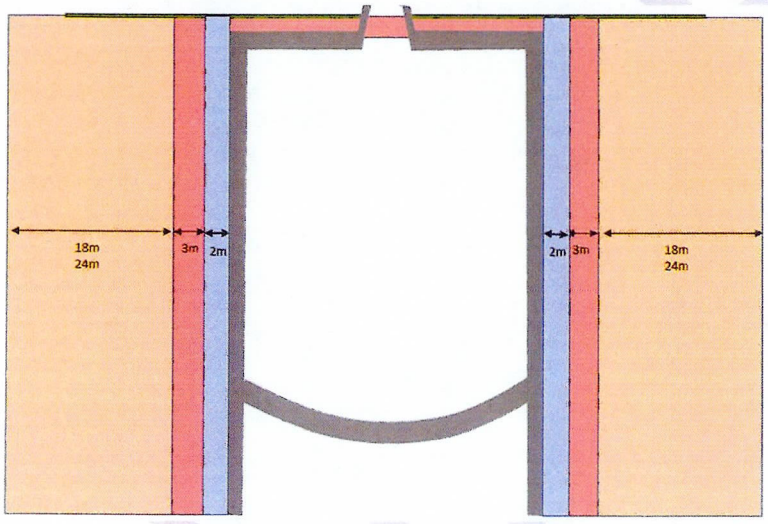


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Figure 7: Underground Station Protection and Exclusion Zones

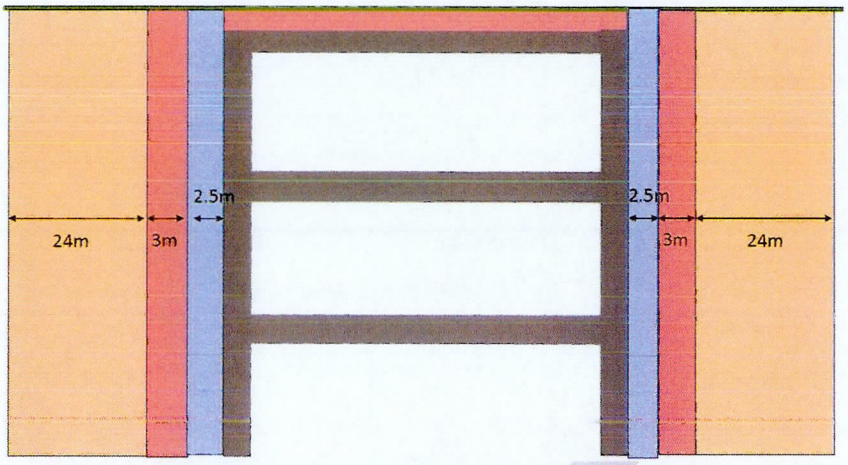


Figure 8: Portals Protection and Exclusion Zones

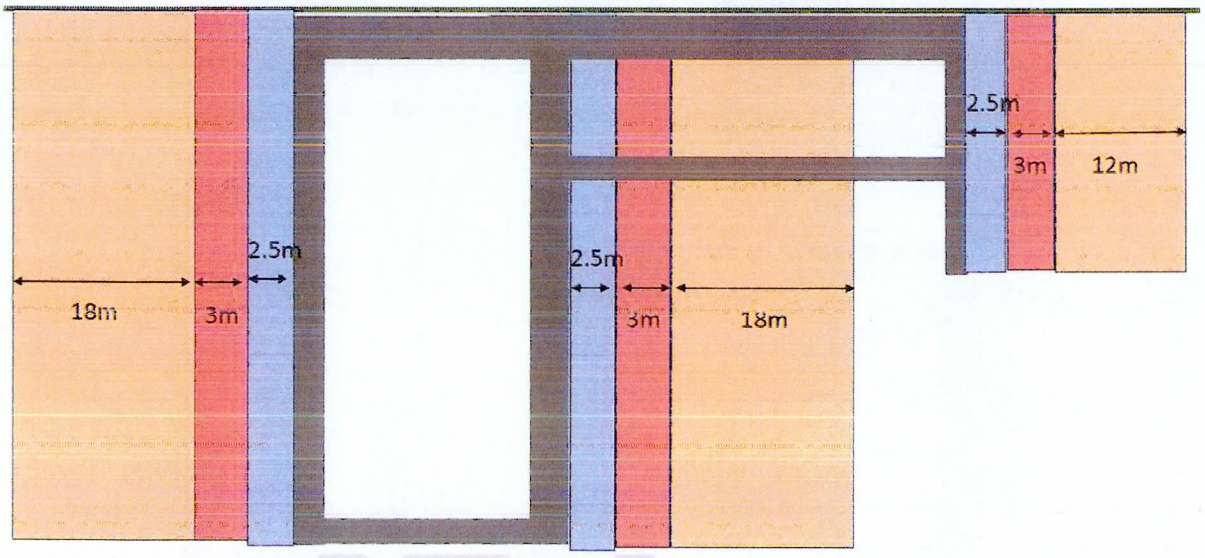


Figure 9: Shaft Protection and Exclusion Zones

2.1.4 Tunnels

The tunnel lining design has been prepared on the basis that the bored tunnels are able to carry an over site load of 75kN/m^2. The imposed vertical loading for the tunnels is shown diagrammatically in the following.

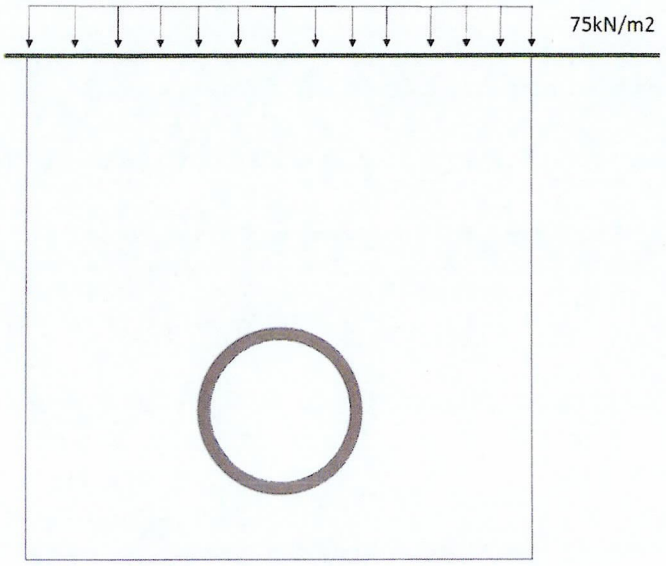


Figure 10: Imposed vertical Loadings - Bored Tunnel

At this time the bored tunnel detailed design is not finalised. Similarly, the horizontal and vertical alignment of the route has not been finalised and in areas the tunnel wall could lie at the extreme extent of the limits of deviation. Exclusion and Protection zones for the bored tunnels are shown on the following drawings.

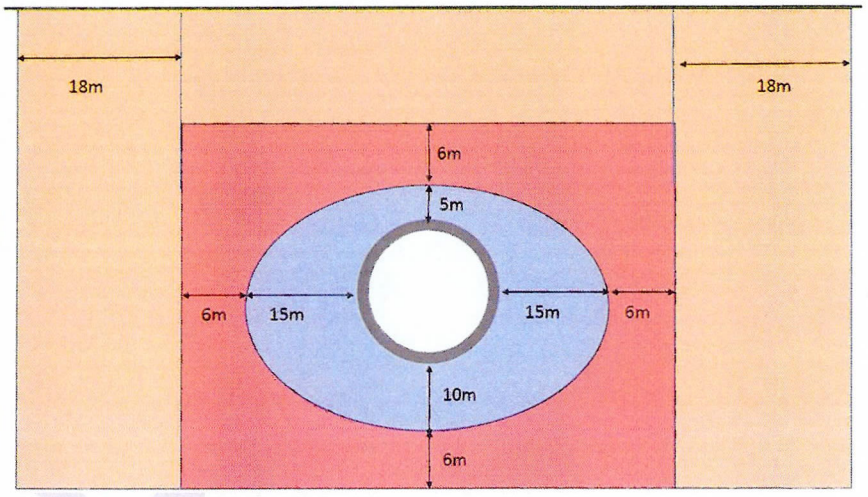


Figure 11: Bored Tunnel Protection and Exclusion Zones

2.1.5 Temporary Site Areas (Areas shown on Schedule 4 of the Railway Order)

Prior to construction no works other than works associated with the MetroLink RO may be undertaken within the Proposed Temporary Site areas.

From immediately outside of these lands, development may proceed without reference to TII

2.1.6 Wayleave / Right of Way (Areas shown on Schedule 5 of the Railway Order)

Prior to construction no works other than works associated with the MetroLink RO may be undertaken within the Wayleave / Right of Way

From immediately outside of these lands, development may proceed without reference to TII

2.2. Detailed Assessments by Developers

2.2.1 Developer Assessment Requirements, Prior to Construction of MetroLink.

Any Developer seeking permission to work in the vicinity of the proposed MetroLink infrastructure prior to construction of MetroLink will need to demonstrate that the foundations of their proposals do not obstruct the route of the tunnels if their development precedes MetroLink and that the development does not adversely affect future construction and operation of MetroLink. Developers shall take due cognisance of the Exclusion and Protection Zones

2.2.2 Developer Assessment Requirements, MetroLink already Built or under Construction.

Any Developer seeking permission to work in the vicinity of MetroLink infrastructure where MetroLink is already built or is under construction will need to demonstrate that the integrity of the tunnels and other structures is not adversely impacted. Developers shall take due cognisance of the Exclusion and Protection Zones

2.2.3 In executing any assessment TII requires that the MetroLink geology model be augmented by site investigation data gathered by the Developer where applicable.

TII further requires that the Developer considers, inter alia, and where applicable, the following variables in its analysis:

- Geological model of the site
- Depth and lateral location of the tunnel relative to the surface development
- Depth and breadth of the building excavation
- Sequencing of excavations
- Distribution and magnitude of the building loads
- Groundwater levels and any changes that may arise in the short or long term
- Tunnel lining type and profile
- Geotechnical properties of the ground
- Positioning of any ground reinforcement or piles relative to the tunnel
- Direction of all stressing loads at all stages of the works
- Effect of ground volume losses during tunnelling operations
- Construction and operational noise and vibration and affect on adjacent development
- Other relevant variables

2.2.4 In addition, Developers shall ensure that their developments do not affect the proposed MetroLink ventilation and emergency management capability. In this regard, consideration shall be made of the MetroLink fire strategy in particular in relation to smoke egress, provision of clean air, passenger escape routes, access for emergency services and the like.

3. Insurance and Indemnities Protection

TII requires that reasonable insurance be provided by the developer and indemnifies TII against any costs associated with repairs that are necessary on the MetroLink structures arising out of a developer's actions.

4. Legal Agreements

TII expect formal legal agreements to be entered into with any developer to formalise and describe the provisions set out in this Guidance Note.

Appendix 1. Retained Cut and Cut & Cover Protection Zones Distribution

Structure	Chainage Start	Chainage End	Length (m)	Protection Zone (m)
Retained cut	1+913.229	3+120.000	60	
U Section	1+973.229	1+995.108	21,88	
U Section	1+995.108	2+057.166	62,06	
U Section	2+057.166	2+109.606	52,44	
U Section	2+109.606	2+156.848	47,24	
Retained cut	2+156.848	2+177.932	21,08	
Retained cut	2+177.932	2+184.000	6,07	
C&C 1	2+184.000	2+196.280	12,28	
C&C 1	2+196.280	2+263.116	66,84	
C&C 1	2+263.116	2+274.000	10,88	
Retained cut	2+274.000	2+293.018	19,02	
Retained cut	2+293.018	2+373.000	79,98	
C&C 2	2+373.000	2+410.000	37	12
C&C 2	2+410.000	2+600.533	190,53	
C&C 2	2+600.533	2+627.616	27,08	
C&C 2	2+627.616	2+721.955	94,34	
C&C 2	2+721.955	2+736.237	14,28	
C&C 2	2+736.237	2+798.917	62,68	
C&C 3	2+897.549	2+914.690	17,14	
C&C 3	2+914.690	2+922.338	7,65	
C&C 3	2+922.338	2+940.000	17,66	
Retained cut	2+940.000	2+998.236	58,24	
C&C 4	2+998.236	3+068.237	70	
Retained cut	3+068.237	3+120.000	51,76	
Retained cut	3+120.000	3+181.145	61,15	
C&C 5	3+181.145	3+189.173	8,03	
Retained cut	3+189.173	3+226.816	37,64	
Retained cut	3+226.816	3+245.365	18,55	
C&C 6	3+245.365	3+265.871	20,51	
C&C 6	3+265.871	3+292.457	26,59	18
C&C 6	3+292.457	3+331.736	39,28	
C&C 6	3+331.736	3+390.640	58,9	
C&C 6	3+390.640	3+436.561	45,92	
C&C 6	3+436.561	3+480.000	43,44	
C&C 6	3+480.000	3+515.226	35,23	

Structure	Chainage Start	Chainage End	Length (m)	Protection Zone (m)
C&C 6	3+515.226	3+612.074	96,85	
Retained cut	3+612.074	3+667.552	55,48	
C&C 7	3+667.552	3+766.800	99,25	
C&C 8	3+865.432	3+900.750	35,32	
Retained cut	3+900.750	3+960.000	59,25	
Retained cut	3+960.000	3+980.000	20	
C&C 9	3+980.000	4+028.445	48,45	
Retained cut	4+028.445	4+118.444	90	
C&C 10	4+118.444	4+138.444	20	12
Retained cut	4+138.444	4+200.000	61,56	
Retained cut	4+200.000	4+240.002	40	
Retained cut	4+240.002	4+277.162	37,16	
C&C 11	4+277.162	4+442.676	165,51	
Retained cut	4+442.676	4+491.140	48,46	
C&C 12	4+491.140	4+518.140	27	
Retained cut	4+518.140	4+552.998	34,86	
Retained cut	4+552.998	4+581.721	28,72	
Retained cut	4+581.721	4+608.908	27,19	
Retained cut	4+608.908	4+666.846	57,94	
C&C 13	4+666.846	4+707.372	40,53	
C&C 13	4+707.372	4+736.187	28,81	
C&C 14	4+831.619	4+891.940	60,32	
Retained cut	4+891.940	4+913.077	21,14	
Retained cut	4+913.077	4+940.725	27,65	18
Retained cut	4+940.725	4+967.971	27,25	
Retained cut	4+967.971	4+977.038	9,07	
Retained cut	4+977.038	4+982.780	5,74	
Retained cut	4+982.780	4+993.226	10,45	
C&C 15	4+993.226	5+030.015	36,79	

Structure	Chainage Start	Chainage End	Length (m)	Protection Zone (m)
Retained cut	5+030.015	5+071.977	41,96	12
Retained cut	5+071.977	5+100.622	28,65	
C&C 16	5+100.622	5+183.710	83,09	
Retained cut	5+183.710	5+229.948	46,24	
Retained cut	5+229.948	5+361.766	131,82	
U Section	5+361.766	5+404.174	42,41	
U Section	5+404.174	5+486.291	82,12	
U Section	5+486.291	5+551.874	65,58	
U Section	5+551.874	5+588.906	37,03	
Retained cut	5994.44200	6+014.382	19,94	
Retained cut	6+014.382	6+022.036	7,65	
C&C 17	6+022.036	6+085.517	43,48	24
C&C 18	8+476.042	8+541.246	65,2	
C&C 18	8+541.246	8+610.680	69,43	
C&C 18	8+610.680	8+648.391	37,71	
U Section - C&C	8+648.391	8+752.980	104,59	18
U Section	8+752.980	8+810.000	57,02	
U Section	8+810.000	9+021.907	211,91	
C&C 19	9+128.223	9+191.168	62,94	
C&C 19	9+191.168	9+217.960	26,82	
C&C 19	9+217.960	9+302.963	84,97	
C&C 19	9+302.963	9+375.000	72,04	12
U Section	9+375.000	9+395.011	20,01	
U Section	9+395.011	9+443.954	48,94	
U Section	9+443.954	9+486.366	42,41	
U Section	9+486.366	9+567.000	80,63	
Retained cut	9+992.000	10+057.431	65,43	
Retained cut	10+057.431	10+083.337	25,91	
C&C 20	10+083.337	10+119.541	36,2	
C&C 20	10+119.541	10+152.164	32,62	18
C&C 20	10+152.164	10+188.602	36,44	
C&C 20	10+188.602	10+251.148	62,55	

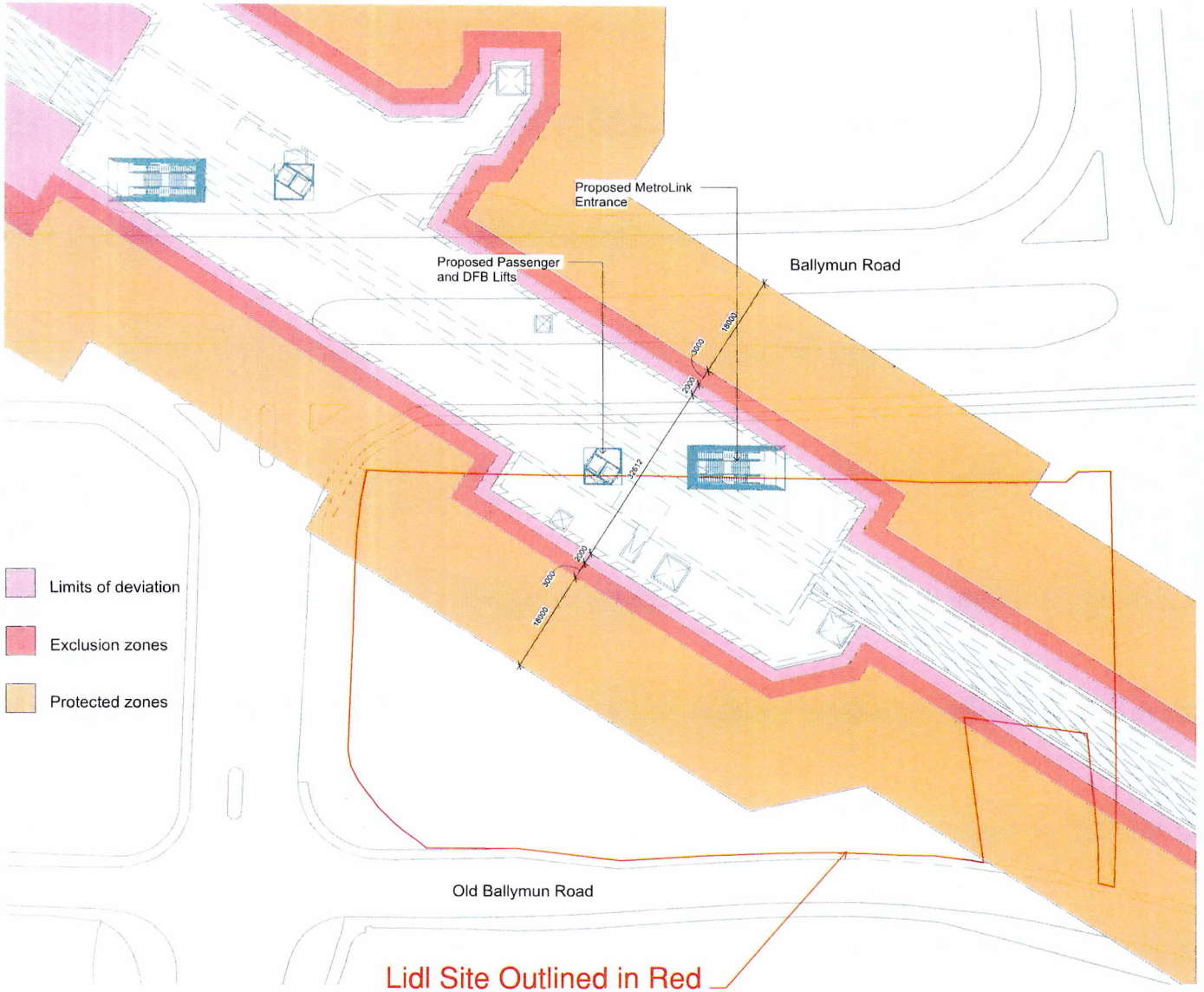
Depot side track 1

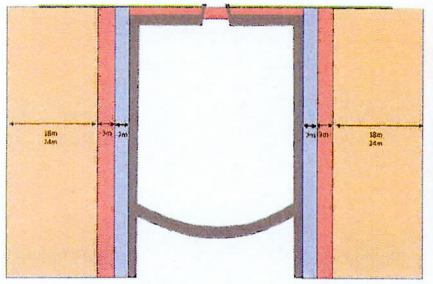
Structure	Chainage Start	Chainage End	Length (m)	Protection Zone (m)
U Section - C&C	+0.000	+104.470	104,47	18
U Section	+104.470	+161.490	57,02	
U Section	+161.490	+373.399	211,91	
C&C 19	+543.095	+562.172	19,08	
C&C 19	+562.172	+577.850	15,68	
C&C 19	+577.850	+733.085	155,24	
C&C 19	+733.085	+774.869	41,78	
C&C 19	+774.869	+855.172	80,3	
U Section	+855.172	+926.953	71,78	
U Section	+926.953	+996.479	69,53	
C&C	+996.479	Depot		

Depot side track 2.B

Structure	Chainage Start	Chainage End	Length (m)	Protection Zone (m)
C&C 19	+83.753	+112.391	28,64	24
C&C 19	+112.391	+144.643	32,25	
C&C 19	+144.643	+376.917	232,27	
C&C 19	+376.917	+457.344	80,43	
U Section	+457.344	+547.939	90,6	
U Section	+547.939	+630.000	82,06	
C&C	+630.000	Depot		

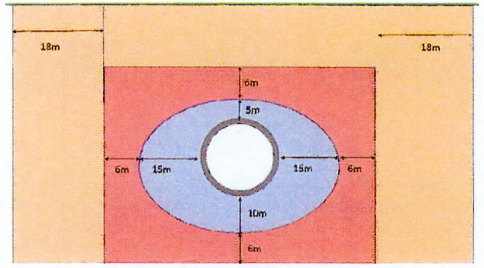
Appendix C - MCA Architects Site Plan Showing Impact of Exclusion and Protection Zones on Lidl Site



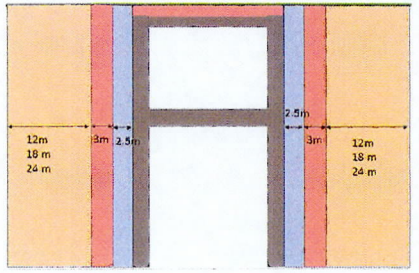


Underground Station Protection and Exclusion Zones

Underground Station	Protection zone (m)
Dublin Airport	18
Northwood	18
Ballymun	18
Collins Avenue	18
Griffith	18
Glasnevin	24
Mater	24
O'Connell	24
Tara	18
St. Stephen's Green	18
Charlemont	18



Bored Tunnel Protection and Exclusion Zones



Cut & Cover Section Protection and Exclusion Zones

Site with Exclusion Zones Overlaid

NOTES

Check all dimensions on site. Do not rely on scaled dimensions. This drawing must be read in conjunction with all relevant contract documents.

N

Rev	Date	Description	Drn	Chkd

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Project	LIDL NORTHWOOD
Drawing	SITE WITH EXCLUSION ZONES
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Job No	2020.15
Sheet	A1
Scale	1 : 400
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