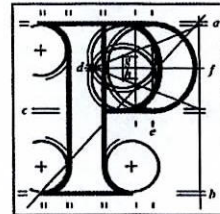


Our Case Number: ABP-314724-22

Your Reference: Jerdip Properties Unlimited Company



**An
Bord
Pleanála**

Punch Consulting Engineers
Carnegie House
Library Road
Dun Laoghaire
Co. Dublin
A96 C7W7

Date:

Re: Railway (Metrolink - Estuary to Charlemont via Dublin Airport) Order [2022]
Metrolink. Estuary through Swords, Dublin Airport, Ballymun, Glasnevin and City Centre to
Charlemont, Co. Dublin

Dear Sir / Madam,

An Bord Pleanála has received your recent submission and oral hearing request (including your fee of €100) in relation to the above-mentioned proposed Railway Order and will take it into consideration in its determination of the matter.

The Board will revert to you in due course with regard to the matter.

Please be advised, there is no fee for an affected landowner, listed on the schedule, to make an observation on this case. Further note, there is also no fee required to request an oral hearing, therefore, a cheque refund of €100 is enclosed.

The Board has absolute discretion to hold an oral hearing in respect of any application before it, in accordance with section 218 of the Planning and Development Act 2000, as amended. Accordingly, the Board will inform you on this matter in due course.

Please be advised that copies of all submissions/observations received in relation to the application will be made available for public inspection at the offices of the relevant County Council(s) and at the offices of An Bord Pleanála when they have been processed by the Board.

More detailed information in relation to strategic infrastructure development can be viewed on the Board's website: www.pleanala.ie.

If you have any queries in the meantime, please contact the undersigned. Please quote the above mentioned An Bord Pleanála reference number in any correspondence or telephone contact with the Board.

Teil
Glaao Áitiúil
Facs
Láithreán Gréasáin
Ríomhphost

Tel (01) 858 8100
LoCall 1800 275 175
Fax (01) 872 2684
Website www.pleanala.ie
Email bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

Yours faithfully,

PP EM

Niamh Thornton
Executive Officer
Direct Line: 01-8737247

Tell
Glao Áitiúil
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The Secretary

An Bord Pleanála,
64 Marlborough Street,
Dublin 1

AN BORD PLEANÁLA	
LDG-	<u>060541-23</u>
ABP-	
16 JAN 2023	
Fee: €	<u>100</u> Type: <u>Banknote</u>
Time: <u>13.04</u>	By: <u>hanel</u>

12/01/2023

222273-PUNCH-XX-XX-C0-TS-001

Dear Sir or Madam,

RE: SUBMISSION ON THE METROLINK ON BEHALF OF JERDIP PROPERTIES UNLIMITED COMPANY IN
RELATION TO PROPERTY AT THE ARTHUR COX BUILDING, 10 EARLSFORT TERRACE, DUBLIN 2,
D02T380

ABP Ref. NA29N.314724

Description - Metrolink Railway Order – Estuary through Swords, Dublin Airport, Ballymun, Glasnevin and City
Centre to Charlemont, Co. Dublin

Submission on behalf of: Jerdip Properties Unlimited Company, 10 Earlsfort Terrace, Dublin 2, D02 T380

Our client, Jerdip Properties Unlimited Company, welcomes the opportunity to make a submission on the
Railway Order for the Metrolink line. Our client has a number of observations and concerns in relation to
impact of the proposed Railway Order and the Metrolink project on its above property and would ask An
Bord Pleanála fully review same.

Our client also wishes to request that an Oral Hearing is held in respect of the Railway Order application so
that the points raised within this submission can be further clarified and addressed at the hearing for the
benefit of all parties. The proposal is of both national and local significance and accordingly warrants an Oral
Hearing.

We enclose the fee of €50.00 in respect of this submission (although we note that no fee is payable for landowners affected) a further fee of €50.00 in respect of the Oral Hearing request is also enclosed.

Yours sincerely

Robert Coughlan

Technical Director

PUNCH Consulting Engineers

Memorandum

Project Title	Project Metrolink – The Arthur Cox Building	From	Robert Coughlan, PUNCH Consulting Engineers
Project No	222273	To	An Bord Pleanála
Subject	Technical Submission to Railway (Metrolink–Estuary to Charlemont via Dublin Airport) Order 2022 at The Arthur Cox Building, 10 Earlsfort Terrace Dublin 02 T380	Cc	
Date	12-01-2023		

1.0 Introduction

PUNCH Consulting Engineers (PUNCH) have been appointed by Jerdip Properties Unlimited Company (JPUC) to produce a Technical Submission to An Bord Pleanála (ABP) in response to the Railway (Metrolink–Estuary to Charlemont via Dublin Airport) Order 2022 at The Arthur Cox Building, 10 Earlsfort Terrace, Dublin 2, D02 T380. JPUC wholly owned by the partners of Arthur Cox Solicitors are the sole tenants of the building.

The National Roads Authority, operating as Transport Infrastructure Ireland) (TII), applied for a Railway Order to An Bord Pleanála on the 30th September 2022. This order was for a Railway Metrolink–Estuary to Charlemont via Dublin Airport. On the 20th September 2022, as the tenant of the building, JPUC were served with an Information Pack relating to the Railway Order application. The submission is based on information received in that Information Pack and information on <https://www.metrolinkro.ie/>.

We understand Earldev Properties Unlimited Company (EPUC), as building owner and landlord, may also make a submission to ABP in relation to the building. We request that both submissions are read in conjunction with each other. The most relevant parts of the EPUC submission concerning JPUC are outlined and further developed in Section 2.0 below.

In this regard, EPUC reference the building as 13 and 14 Earlsfort Terrace, Dublin 2. This is in fact the same building as 10 Earlsfort Terrace, Dublin 2, D02 T380 and we note the documentation received from TII on the 20th September 2022, references the building as 10 Earlsfort Terrace, Dublin 2. For reference going

forward in this submission, the building at 10 Earlsfort Terrace, Dublin 2, D02 T380 will be referred to as The Arthur Cox Building, Ten Earlsfort Terrace, Dublin 2.

It is essential that each of the points raised in this submission are addressed in full by TII. It is noted that the comments in this submission will expand following further engagement with TII. It is vital to JPUC that the building remains fully operational during the works and cannot accept any interruption to its business.

As the Headquarters of a leading firm of solicitors, the building has been designed and fitted out to a very high standard with acoustic treatments a principal design parameter. Hence, the potential noise and disruption from the proposed works is a huge concern that needs to be fully explained and addressed by TII to avoid negative impacts on our client's business.

Similarly the impact of vibration on the building is of equal concern to our client and this issue must also be fully explained and addressed by TII as part of the process.

It is our belief that The Arthur Cox Building requires individual attention from TII as a standalone structure and we request that ABP condition same in any grant of the Railway Order.

Of particular concern is the fact that all drawings in the Railway Order relate to an old building layout on this site, which was demolished circa 2014 and does not take any account of the actual design and structure of the Arthur Cox Building. This is a concern as The Arthur Cox Building has complex and sensitive basement, pile and façade structures which must be carefully considered in the proposed tunnel design. We would expect The Arthur Cox Building to be shown on all relevant drawings and the correct building parameters used in all assessments of the tunnel design.

We wish to confirm our client requests an Oral Hearing is held in respect of the Railway Order application and again the justification for this is outlined further in this submission. We enclose the fee of €50.00 in respect of this submission (although we note that no fee is payable for landowners affected) a further fee of €50.00 in respect of the Oral Hearing request is also enclosed.

2.0 Technical Observations

The following is the preliminary list of technical queries which we require to be fully assessed and resolved to our client's satisfaction prior to the proposed Oral Hearing. We request ABP condition in any grant of the Railway Order early engagement from TII to JPUC, to work through this technical list.

a. What is the Tunnel detail design procurement approach i.e. client design or contractor design?

In responding to this item, we ask that TII to consider the following along with any other items they consider relevant:

- i) A detailed design programme for the tunnel under the building is required.
- ii) If the tunnel design is by the main contractor, TII to confirm how soon after the grant of the Railway Order a Main Contractor be appointed?
- iii) TII to confirm estimated construction programme from when Arthur Cox are likely to experience noise and vibration from the Tunnel Construction Works?
- iv) TII to confirm what information JPUC will receive prior to the Oral Hearing?
- v) Assuming the detailed design is by the Main Contractor, TII to confirm the extent to which the Main Contractor will be required to engage with JPUC during the detailed design process?

b. Confirmation that a full copy of the detail design and construction package will be issued by TII in relation to The Arthur Cox Building.

In responding to this item, we ask that TII to consider the following along with any other items they consider relevant:

- i) We expect to see a full copy of the detailed design and construction package which allows for an independent assessment to be carried out by JPUC as they wish. We request confirmation of timelines from TII for this but note this needs to allow sufficient time for our client to fully review the proposals.
- ii) It is vital for JPUC that the building is not damaged during these works and the extent of building damage suggested by TII in the Railway Order is not acceptable.

iii) The efficient running of the business operations of The Arthur Cox Building is of paramount importance to JPUC. Whilst some disruption in terms of noise and vibration is likely, these levels cannot be such that they affect the company's daily operations. We would request that TII provide detailed reassurances on these matters.

c. Details and frequency of proposed condition surveys for The Arthur Cox Building by TII, both in advance of and during the construction works as well as during operational phase.

In responding to this item, we ask that TII to consider the following along with any other items they consider relevant:

- i) In the Damage Assessment Report of Building document on <https://www.metrolinkro.ie/>, it places the Arthur Cox Building (B-238) in Damage Category B (Refer to Appendix A). This cannot be accepted by JPUC and will likely affect the buildings basement, frame and facades which in turn affects the operations of the business.
- ii) The query relates to visual condition surveys of the building prior to and during construction works. There must be photographic condition surveys carried out by TII/Main Contractor to ensure any potential damage to the building is accurately recorded.
- iii) It is expected that the condition surveys continue post construction and in the tunnel operational stages and request frequency of these surveys to be confirmed by TII.
- iv) We request this information from TII as soon as possible to ensure the integrity of the building is maintained during all phases of the works.
- v) We request TII to confirm when guidelines regarding the process for remediation will be released, should remediation be required. It is our understanding these guidelines are under development by TII based on information from <https://www.metrolinkro.ie/>. We reiterate that damage to the building cannot be accepted but we need to understand the guidelines nonetheless.

d. Vertical settlement of the existing structure at The Arthur Cox Building from the proposed works.

In responding to this item, we ask that TII to consider the following along with any other items they consider relevant:

- i) The predicted settlement is a concern from available information on <https://www.metrolinkro.ie/>. The settlement contours on Volume 4, Chapter 20- Fig 20.16, sheet 29 of 30 (Refer to Appendix B), suggest settlement of 40-45mm in the calculated settlement trough. We request details from TII on how they established this deflection data.
- ii) There appears to be no evidence of undertakings on <https://www.metrolinkro.ie/> to confirm the quality of the rock at the tunnel level beneath The Arthur Cox Building. We request that geophysical surveys are carried out by TII on the rock at tunnel level from the existing basement. 2d Resistivity and Seismic Refraction surveys are suggested to determine the rock mass characteristics.
- iii) If a dense rock with little fractures is encountered during this testing, this potentially magnifies the noise and vibration levels through the building which is a concern. This would have further detrimental impacts on the operations of our client's business and we request detailed analysis of this issue by TII.

e. Vibration and Noise Impacts under the existing structure at The Arthur Cox Building from the proposed works.

In responding to this item , we ask that TII to consider the following along with any other items they consider relevant:

- i) There is a concern in relation to the identified noise and associated disruption contained within <https://www.metrolinkro.ie/>. A "Very High Adverse (significant)" residual impact is identified in the documentation. This is not acceptable to JPUC and will be detrimental to our client's daily operations . TII should access this further and mitigate this impact.
- ii) Whilst this impact is noted as being "short term", there is no clarity or estimate provided beyond this in relation to the duration of these works and associated negative impacts. We request TII to confirm duration of the proposed works and associated impacts on our client's building

- iii) We request An Bord Pleanála to condition an independent noise and vibration assessment of the building based on the individual site specifics and the building form itself.
 - iv) It is assumed that these noise levels of 50dB (Refer to Appendix C) are calculated on a Phase 1 Greenfield base level. The building and its secant piles are founded in rock. The concrete frame is also a very dense form of construction. If the rock is dense, there is a very efficient direct transmission path for noise and vibration through the building. Therefore, we are concerned noise levels could be greater than calculated and we need this concern to be robustly allayed by TII prior to commencement of work.
 - v) The building has been designed and fitted out to a very high standard with acoustic treatments a principal design parameter. This is to reduce background noise in the building. If noise is transferred up through the building, the existing acoustic fabric in the facades and internal partitions may magnify acoustic levels within the building. We need this concern to be robustly investigated and concerns allayed by TII prior to commencement of work.
 - vi) Vibration levels appear low in the documentation 0.269 VDV/day. Based on item e (iv) above, we are concerned vibration levels could be greater than calculated and we need this concern to be robustly investigated and concerns allayed by TII prior to commencement of work.
- f. Confirmation that the tunnel can be constructed in the proposed position/depth considering the depth of the existing rock, existing piles and formation level of the double basement at The Arthur Cox Building.**

In responding to this item, we ask that TII to consider the following along with any other items they consider relevant:

- i) We have concerns about the proposed tunnel level relative to that of the double basement structure and secant piled wall of 10 Earlsfort Terrace. Refer Appendix D of this submission for drawings illustrating the close proximity of the tunnel to the existing basement structure.
- ii) The proposed tunnel is approximately 6m below the lowest structural element and 5.35m below the lowest pile level. This proximity of significant engineering works to the underside of the structural support for The Arthur Cox Building is of serious concern.

- iii) The existing double basement is waterproofed with a Rascor White Tank Injection System and relies solely on the reinforced concrete structure to prevent water ingress. Hence, this form of waterproofing is very sensitive to ground movements and the design of the tunnel must take this into account.
- iv) The basement structure is below the water table level and the basement slab is very sensitive to vibrations and any adverse cracking to the slab would cause significant water ingress issues.
- v) We request that TII comment on each of the items above and confirm the integrity of the building will not be compromised by the proposed works

g. Written confirmation from TII of any anticipated negative impacts on the building and its tenants at 10 Earlsfort Terrace during the construction phase.

In responding to this item , we ask that TII to consider the following along with any other items they consider relevant:

- i) PUNCH request TII to issue details and timelines of any negative impacts for JPUC on the normal execution of their business operations during construction phase of the works.

h. Written confirmation from TII of any anticipated negative impacts on the building and its tenants at The Arthur Cox Building during the operational phase.

In responding to this item , we ask that TII to consider the following along with any other items they consider relevant:

- i) PUNCH request TII to issue details and timelines of any negative impacts for JPUC on the normal execution of their business operations during the operational phase of the works.

i. Confirmation that the structural integrity of the building at The Arthur Cox Building will not be affected in any way by the proposed works during the construction and operational phase.

In responding to this item, we ask that TII to consider the following along with any other items they consider relevant:

- i. In the Damage Assessment Report of Building document on <https://www.metrolinkro.ie/>, it places the Arthur Cox Building (B-238) in Damage Category B. We note that because of the foundations proximity to the tunnel the building is classed as an "At Risk" building and that the Phase 3 assessment be undertaken. This Phase 3 assessment, as we understand it, will be a detailed assessment of the Ground Movement Response for the Arthur Cox Building specifically. We request timelines of when this will be carried out by TII.
- ii. JPUC will not accept building damage and the integrity of the building and particularly the basement cannot be compromised in any way. The basement is designed as part habitable for staff of the building and cannot allow any water ingress.
- iii. The superstructure and facades cannot be damaged. Should remediation be required to the superstructure, the work practices and daily operations of the company will be hugely affected.

3.0 Conclusions

- i) The project is of both Local and National significance and accordingly warrants an Oral Hearing. Our client wishes to request that an Oral Hearing is held in respect of the Railway Order application, so that the points raised within this submission can be further clarified and addressed in detail at the hearing for the benefit of all parties.
- ii) We wish to develop and resolve each of the observations made in this submission in advance of any future Oral Hearing and request immediate engagement with TII accordingly. We request that ABP condition same in any grant of the Railway Order.
- iii) JPUC primary concern is the effect the proposed works will have on the business operations of its company. As a leading firm of solicitors, its operations cannot be negatively impacted

by the proposed Metrolink works. We would request immediate engagement with TII to allay these concerns.

- iv) There are serious concerns based on information received that the building will be damaged by the proposed Metrolink works. We would request immediate engagement with TII to allay these concerns.

Yours sincerely



Robert Coughlan

BE CEng MIEI MISTructE- Technical Director

PUNCH Consulting Engineers

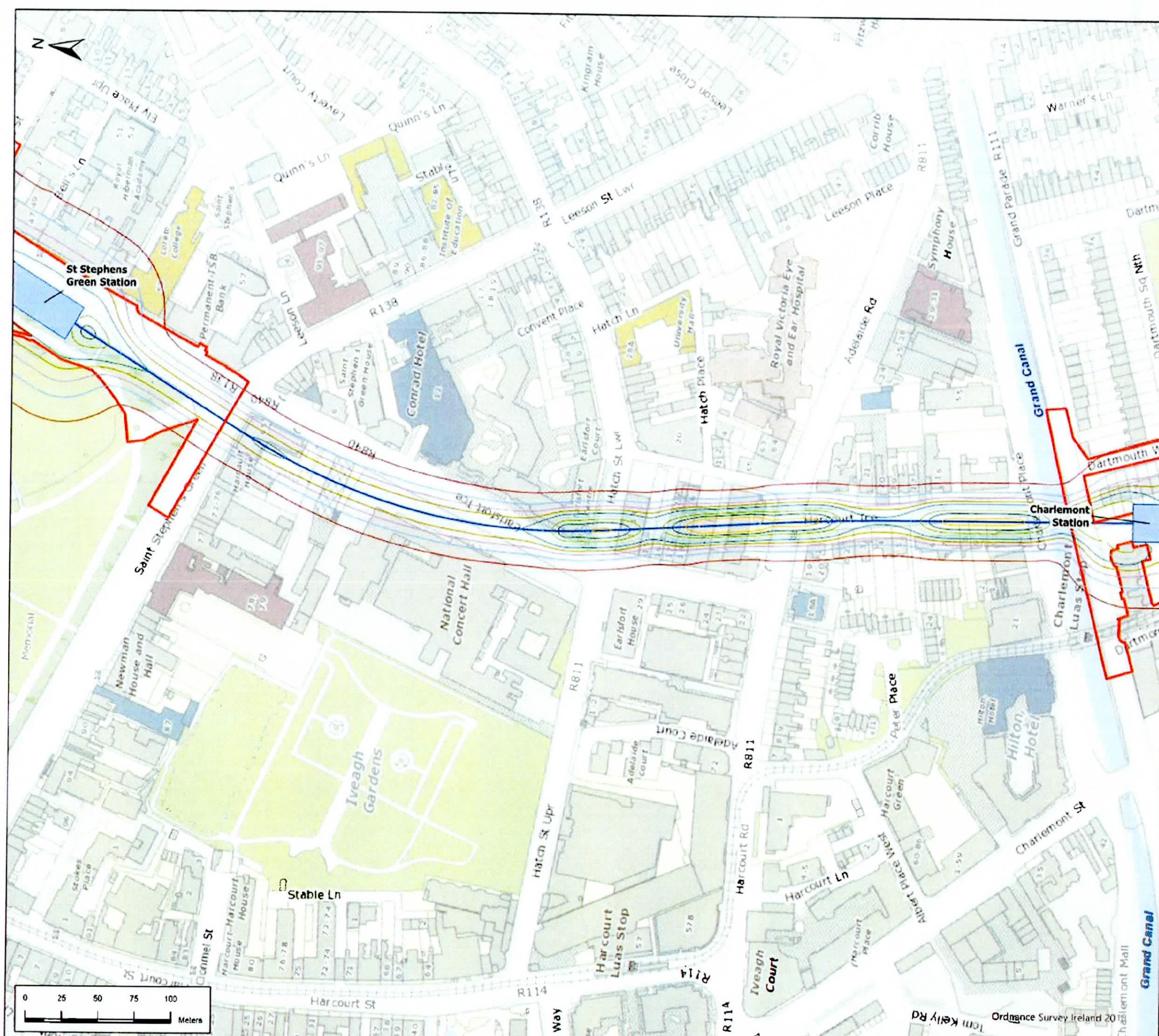
Appendix A – Extract of Damage Assessment Report of Building and Other Assets

Ref	Chainage	Description	Height (m)	Number of Floors	Length (m)	Depth of basement (m)	Initial Phase 2a Assessment Damage Category	Refined Phase 2a Assessment Damage Category	RPS, NIAH, RMP or other heritage (Y/N/unknown)	Continue to next assessment phase? (Y/N)	Comments
B-207	19997	Residential	7.0	2	10.5	0.0	N/A	N/A	N	N	Outside 1mm contour
B-208	19999	Residential	7.0	2	10.4	0.0	N/A	N/A	N	N	Outside 1mm contour
B-209	19949	Commerce & Residential	11.0	3	14.5	0.0	N/A	N/A	N	N	Outside 1mm contour
B-210	19908	Commerce & Residential	8.3	2	11.9	0.0	N/A	N/A	N	N	Outside 1mm contour
B-211	19915	Commerce & Residential	8.3	2	7.8	0.0	N/A	N/A	N	N	Outside 1mm contour
B-212	19831	Residential	11.1	3	3.4	-2.3	N/A	N/A	Y	N	Outside 1mm contour
B-213	19820	Residential	11.1	3	4.5	-2.3	N/A	N/A	Y	N	Outside 1mm contour
B-214	19820	Commerce & Residential	9.4	2	18.0	0.0	N/A	N/A	N	N	Outside 1mm contour
B-215	19820	Commerce & Residential	9.4	2	17.6	0.0	N/A	N/A	N	N	Outside 1mm contour
B-217	19700	Kids Inc - Creche & Montessori, Ranelagh	10.0	3	21.5	0.0	0 (Negligible)	0 (Negligible)	N	N	Damage category 2 or below
B-218	19660	Residential	8.2	2	12.2	0.0	N/A	N/A	N	N	Outside 1mm contour
B-219	19660	Residential	8.1	2	12.3	0.0	N/A	N/A	N	N	Outside 1mm contour
B-220	19620	Residential	11.4	3	10.2	0.0	0 (Negligible)	0 (Negligible)	N	N	Damage category 2 or below
B-221	19620	Residential	11.4	3	11.0	0.0	0 (Negligible)	0 (Negligible)	N	N	Damage category 2 or below
B-222	19540	Residential	11.4	3	7.1	0.0	0 (Negligible)	0 (Negligible)	N	N	Damage category 2 or below
B-223	19540	Residential	11.4	3	7.6	0.0	0 (Negligible)	0 (Negligible)	N	N	Damage category 2 or below
B-224	19520	Residential	7.0	2	6.9	0.0	0 (Negligible)	0 (Negligible)	N	N	Damage category 2 or below
B-225	19520	Residential	7.0	2	6.7	0.0	0 (Negligible)	0 (Negligible)	N	N	Damage category 2 or below
B-228	19300	Carrolls Building	24.5	7	48.3	0.0	2 (Slight)	2 (Slight)	Y	Y	Special building Case A too (refer to section 4.1)
B-230	2840	Hertz, Swords Business Park, Swords, Co. Dublin	12.0	2	196.4	0.0	2 (Slight)	2 (Slight)	N	Y	Damage category 2 or below Case A (refer to section 4.1)
B-231	7040	Our Lady Queen of Corballis Heaven, Corballis Road North, Dublin Airport, Swords Co. Dublin	7.0	2	47.2	0.0	N/A	N/A	Y	N	Outside 1mm contour
B-232	11480	The Sentinel Building, Gateway View, Dublin 11 - Apartments 1-8 & Retail Unit	31.5	9	11.2	0.0	1 (Very Slight)	0 (Negligible)	N	N	Damage category 2 or below
B-233	11500	Apartments 40-42, Gateway View Dublin 11	12.2	4	11.1	0.0	0 (Negligible)	0 (Negligible)	N	N	Damage category 2 or below
B-234	14820	Unknown	7.1	2	7.9	0.0	N/A	N/A	N	N	Outside 1mm contour
B-235	15460	54 Goldsmith St, Phibsborough, Dublin 7	3.5	1	14.7	0.0	2 (Slight)	1 (Very Slight)	N	N	Damage category 2 or below
B-236	15620	15 Berkeley Road, Phibsborough, Dublin 7	7.0	2	17.2	0.0	1 (Very Slight)	1 (Very Slight)	N	Y	Damage category 2 or below Case A (refer to section 4.1)
B-237	15680	Residential	7.0	2	13.0	0.0	1 (Very Slight)	1 (Very Slight)	N	Y	Damage category 2 or below Case A (refer to section 4.1)
B-238	18980	Arthur Cox Building	40.0	7	17.8	-8.1	2 (Slight)	2 (Slight)	N	Y	Case B (refer to section 4.1)
B-239	13120	Residential	8.7	2	5.0	0.0	0 (Negligible)	0 (Negligible)	N	N	Damage category 2 or below
B-240	7060	Presbytery, Corballis Road North, Dublin Airport, Swords Co. Dublin	7.0	2	18.2	0.0	1 (Very Slight)	1 (Very Slight)	Y	Y	Special building

BUILDING CODE	BUILDING DESCRIPTION			BUILDING LOCATION			BUILDING INFORMATION			
	NAME	CONSIDERATION	CATEGORY	Chainage	Drain (m)	Dmax (m)	Height (m)	N° Floors	Length (m)	Depth (m)
B-238	Arthur Cox Building	0	0	18+880	0.00	17.81	40.0	7	17.81	-8.10
B-239	Residential	Residential	0	13+120	10.51	15.50	8.7	2	4.98	0.00
B-240	Presbytery, Corballis Road North, Dublin Airport, Swords Co. Dublin	Presbytery	Church	7+060	42.82	61.12	7.0	2	18.20	0.00
B-241	Hotel Winns	Hotel	0	17+020	0.00	4.28	21.0	8	4.28	-3.00
B-242	Residential	0	0	19+780	61.95	61.79	10.5	3	10.08	0.00
B-243	Unknown	0	0	14+840	121.02	133.44	7.9	3	12.42	0.00
B-244	Residential	Residential	0	14+100	0.00	11.03	7.0	2	11.03	0.00
ST-1	Airport Road	Road	Road	8+320	0.00	115.88	0.0	0	115.88	0.00
ST-2	Ballymum's Road Gas Station	Petrol Station	Petrol Station	12+860	28.55	49.28	0.0	0	82.88	0.00
ST-3	Mobhi's Road Bridge	Bridge	Single Span	13+900	17.68	37.03	0.0	0	21.75	0.00
ST-4	Railway	Railway	Railway	14+880	0.00	116.51	0.0	0	116.51	0.00
ST-5	Near Cross Guns Quay (nearly B-202) / Floodgates	Watergate	Watergate	14+940	0.00	41.08	0.0	0	41.08	0.00
ST-6	O'Connell Street cross	Main Street	Road	18+900	0.00	57.84	0.0	0	57.84	0.00
ST-7	Bridge between O'Connell Street and Butt Bridge	Bridge	Multiple Span	17+120	9.11	57.72	0.0	0	48.05	0.00
ST-8	Bridge over Pootberg Street corner with Lucka Street	Bridge	Single Span	17+380	22.81	42.47	0.0	0	38.33	0.00
ST-9	Bridge over Townsend Street	Bridge	Single Span	17+500	23.05	31.94	0.0	0	21.13	0.00
ST-10	Bridge Over Shaw Street	Bridge	Single Span	17+580	25.39	41.19	0.0	0	38.89	0.00
ST-11	Bridge over Dartmouth Road	Bridge	Single Span	19+420	7.68	21.74	0.0	0	17.42	0.00
ST-12	Bridge over Northbrook Road	Bridge	Single Span	19+520	9.42	21.13	0.0	0	15.15	0.00
ST-13	Bridge over Ranselagh Road	Bridge	Single Span	19+780	24.89	39.94	0.0	0	53.47	0.00
ST-14	Bridge over Cullenswood Road	Bridge	Single Span	19+943	2.69	14.67	0.0	0	15.83	0.00
ST-15	Embankment carrying LUAS, masonry faced circa 4-5m in height, interspersed with ST-11 to ST-14	Embankment	Embankment	19+350 - 19+750	0	35	5	0	400	0

Specific Building	Parameter	Critical Segment	Start [m]	End [m]	Curvature	Max Slope	Max Settlement [mm]	Max Tensile Strain [%]	Min Radius of Curvature (Hogging) [m]	Min Radius of Curvature (Sagging) [m]	Damage Category
	Min Radius of Curvature (Hogging)	2	1.3161	13.476	Hogging	0.00131644	12.729	0.03766	8904.7	-	0 (Negligible)
	Min Radius of Curvature (Sagging)	-	-	-	-	-	-	-	-	-	-
B-238	Max Slope	2	11.666	24.465	Sagging	0.0035255	37.127	0.084266	-	1106.5	2 (Slight)
	Max Settlement	2	11.666	24.465	Sagging	0.0035255	37.127	0.084266	-	1106.5	2 (Slight)
	Max Tensile Strain	1	0	11.666	Hogging	0.003512	22.526	0.081991	2510.6	-	2 (Slight)
	Min Radius of Curvature (Hogging)	3	24.465	39.738	Hogging	0.0035255	22.484	0.086642	2481.8	-	2 (Slight)
	Min Radius of Curvature (Sagging)	2	11.666	24.465	Sagging	0.0035255	37.127	0.084266	-	1106.5	2 (Slight)
B-147	Max Slope	1	0.63901	18.749	Hogging	0.0027837	21.409	0.082142	3797.9	-	2 (Slight)
	Max Settlement	2	18.749	34.225	Sagging	0.0027837	35.374	0.051998	-	1693.3	1 (Very Slight)
	Max Tensile Strain	1	0.63901	18.749	Hogging	0.0027837	21.409	0.082142	3797.9	-	2 (Slight)
	Min Radius of Curvature (Hogging)	1	0.63901	18.749	Hogging	0.0027837	21.409	0.082142	3797.9	-	2 (Slight)
	Min Radius of Curvature (Sagging)	2	18.749	34.225	Sagging	0.0027837	35.374	0.051998	-	1693.3	1 (Very Slight)
B-148	Max Slope	1	0	10.529	Sagging	4.80E-04	2.1536	0.023084	-	11336	0 (Negligible)
	Max Settlement	1	0	10.529	Sagging	4.80E-04	2.1536	0.023084	-	11336	0 (Negligible)
	Max Tensile Strain	1	0	10.529	Sagging	4.80E-04	2.1536	0.023084	-	11336	0 (Negligible)
	Min Radius of Curvature (Hogging)	-	-	-	-	-	-	-	-	-	-
	Min Radius of Curvature (Sagging)	-	-	-	-	-	-	-	-	-	-
B-149	Max Slope	1	0	0.80962	Sagging	0.0021328	20.392	0.0013888	-	26179	0 (Negligible)
	Max Settlement	1	0	0.80962	Sagging	0.0021328	20.392	0.0013888	-	26179	0 (Negligible)
	Max Tensile Strain	2	0.80962	19.331	Hogging	0.0021328	18.67	0.06187	5584.5	-	1 (Very Slight)
	Min Radius of Curvature (Hogging)	2	0.80962	19.331	Hogging	0.0021328	18.67	0.06187	5584.5	-	1 (Very Slight)
	Min Radius of Curvature (Sagging)	-	-	-	-	-	-	-	-	-	-
B-150	Max Slope	1	0	1.5245	Sagging	0.0014762	26.028	0.14025	-	46442	2 (Slight)
	Max Settlement	1	0	1.5245	Sagging	0.0014762	26.028	0.14025	-	46442	2 (Slight)
	Max Tensile Strain	1	0	1.5245	Sagging	0.0014762	26.028	0.14025	-	46442	2 (Slight)
	Min Radius of Curvature (Hogging)	-	-	-	-	-	-	-	-	-	-
	Min Radius of Curvature (Sagging)	-	-	-	-	-	-	-	-	-	-
B-228	Max Slope	1	0	16.33	Sagging	0.00727	31.844	0.031428	-	91.156	0 (Negligible)
	Max Settlement	1	0	16.33	Sagging	0.00727	31.844	0.031428	-	91.156	0 (Negligible)
	Max Tensile Strain	2	16.33	48.526	Hogging	0.0012618	19.772	0.08396	3586	-	2 (Slight)
	Min Radius of Curvature (Hogging)	2	16.33	48.526	Hogging	0.0012618	19.772	0.08396	3586	-	2 (Slight)
	Min Radius of Curvature (Sagging)	1	0	16.33	Sagging	0.00727	31.844	0.031428	-	91.156	0 (Negligible)
B-151	Max Slope	1	0	12.672	Sagging	0.0010204	37.218	0.096401	-	4181.7	2 (Slight)
	Max Settlement	1	0	12.672	Sagging	0.0010204	37.218	0.096401	-	4181.7	2 (Slight)
	Max Tensile Strain	1	0	12.672	Sagging	0.0010204	37.218	0.096401	-	4181.7	2 (Slight)
	Min Radius of Curvature (Hogging)	-	-	-	-	-	-	-	-	-	-
	Min Radius of Curvature (Sagging)	1	0	12.672	Sagging	0.0010204	37.218	0.096401	-	4181.7	2 (Slight)
B-152	Max Slope	1	0	9.235	Sagging	3.30E-04	2.6011	0.021665	-	32622	0 (Negligible)
	Max Settlement	1	0	9.235	Sagging	3.30E-04	2.6011	0.021665	-	32622	0 (Negligible)


**Appendix B - Volume 4, Chapter 20- Fig 20.16, sheet 29
of 30**





- ### Legend
- Alignment**
- Tunnel
 - Station Locations
 - Project Boundary
- Geographic Split**
- AZ4 Northwood to Charlemont
- Settlement Contours**
- 1mm
 - 5mm
 - 10mm
 - 15mm
 - 20mm
 - 25mm
 - 30mm
 - 35mm
 - 40mm
 - 45mm
 - 50mm
 - 60mm
 - 70mm
 - 80mm
 - 90mm
 - 100mm
 - 110mm
 - 120mm
 - 130mm
 - 140mm
 - 150mm



P02	8/12/2022	Final Issue	JL	RH	RE	NC
Rev	Date	Purpose of revision	Drawn	Checked	Rev'd	App'd







Client _____

Project _____

Drawing Title _____

Figure 20.16 Settlement Contours
Sheet 29 of 30

Drawing Status _____

Final

Scale 1/2" = 1' A3	1:2,500	DO NOT SCALE
Jacobs No.	32106600	
Client No.		

Drawing No. _____

Rev _____

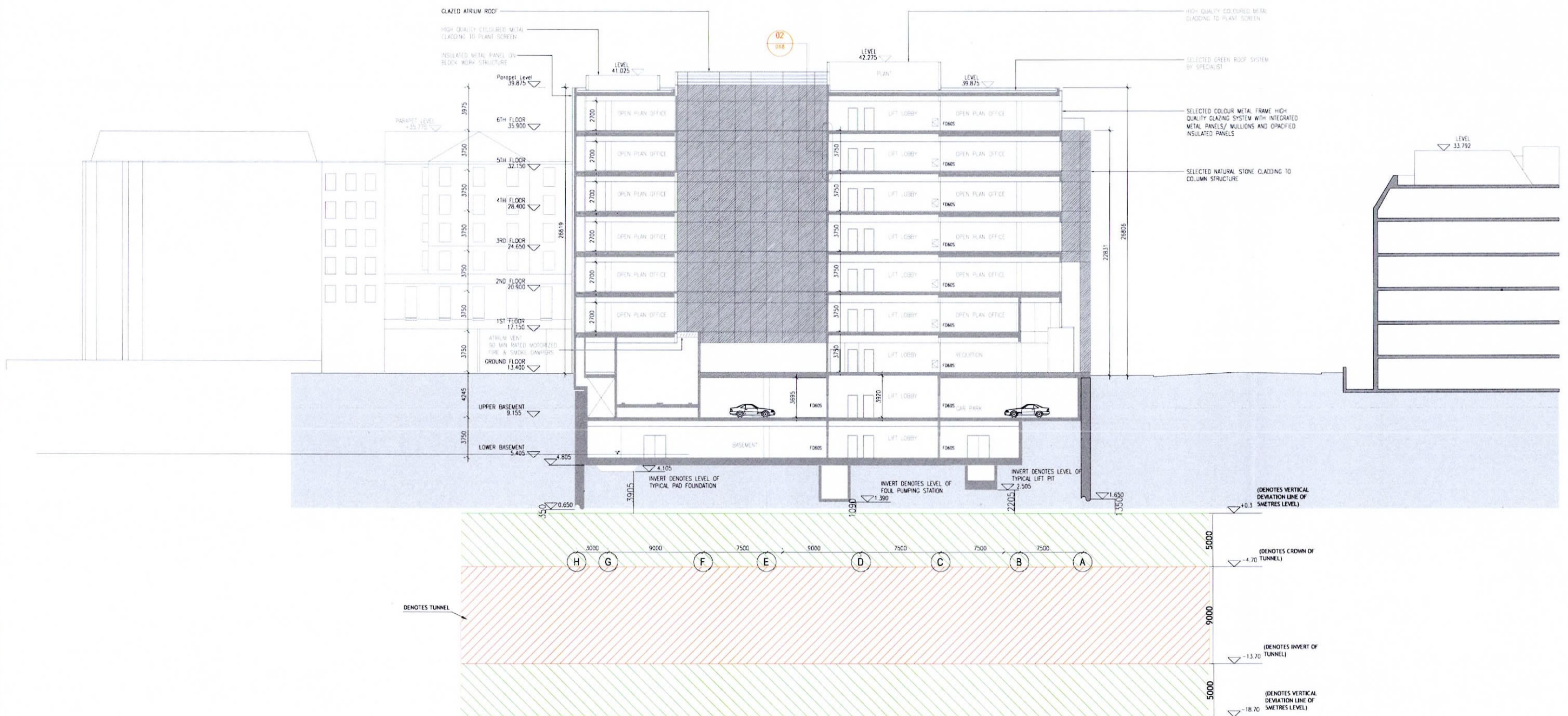
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P02

Appendix C – Noise Thresholds for Metrolink Documentation

Address (Section AZ4)	Construction - TBM				Construction - Mechanical Excavation				Blasting		Operation			
	L _{ASma} x dB(A)	VC	VDV day	VD V nig ht	L _{ASma} x dB(A)	V C	VD V day	VD V nig ht	Ppv	AO p dB	L _{ASm} ax dB(A)	VC	VDV day	VDV night
EARLSFORT COURT 16 HATCH STREET LOWER DUBLIN 2	44	>VC-A	0.195	0.1 64							21	>VC-A	0.002	0.001
DELOITTE HOUSE 29 EARLSFORT TERRACE DUBLIN 2	44	>VC-A	0.194	0.1 63							23	>VC-A	0.003	0.002
20 ON HATCH HATCH STREET LOWER DUBLIN 2	44	>VC-A	0.195	0.1 64							22	>VC-A	0.003	0.002
10 EARLSFORT TERRACE DUBLIN 2	50	>VC-A	0.269	0.2 26							36	>VC-A	0.01	0.005
15 EARLSFORT TERRACE DUBLIN 2	50	>VC-A	0.269	0.2 26							36	>VC-A	0.01	0.005
16 EARLSFORT TERRACE DUBLIN 2	50	>VC-A	0.269	0.2 26							36	>VC-A	0.01	0.005
25/26 EARLSFORT TERRACE DUBLIN 2	44	>VC-A	0.19	0.1 6							22	>VC-A	0.003	0.002
17 EARLSFORT TERRACE DUBLIN 2	49	>VC-A	0.263	0.2 21							35	>VC-A	0.009	0.005
18 EARLSFORT TERRACE DUBLIN 2	49	>VC-A	0.261	0.2 19							34	>VC-A	0.009	0.005
19/20 EARLSFORT TERRACE DUBLIN 2	50	>VC-A	0.274	0.2 31							37	>VC-A	0.011	0.006
2 HATCH PLACE DUBLIN 2	44	>VC-A	0.189	0.1 59							21	>VC-A	0.002	0.001
4 HATCH PLACE DUBLIN 2	42	>VC-A	0.17	0.1 43							16	>VC-A	0.002	0.001
1 HATCH PLACE DUBLIN 2	45	>VC-A	0.203	0.1 7							24	>VC-A	0.003	0.002
3 HATCH PLACE DUBLIN 2	43	>VC-A	0.177	0.1 49							18	>VC-A	0.002	0.001
23 EARLSFORT TERRACE DUBLIN 2	42	>VC-A	0.175	0.1 47							18	>VC-A	0.002	0.001
ANCONA HOUSE 61 ADELAIDE ROAD DUBLIN 2	42	>VC-A	0.174	0.1 46							16	>VC-A	0.002	0.001
HYDE HOUSE 65 ADELAIDE ROAD DUBLIN 2	46	>VC-A	0.22	0.1 85							27	>VC-A	0.004	0.003
65A ADELAIDE ROAD DUBLIN 2	50	>VC-A	0.275	0.2 31							36	>VC-A	0.01	0.006

**Appendix D – Drawings Indicating the Proposed
Metrolink on Plan beneath the Building and Full
Section Showing the Tunnel in Close Proximity to
the Building**



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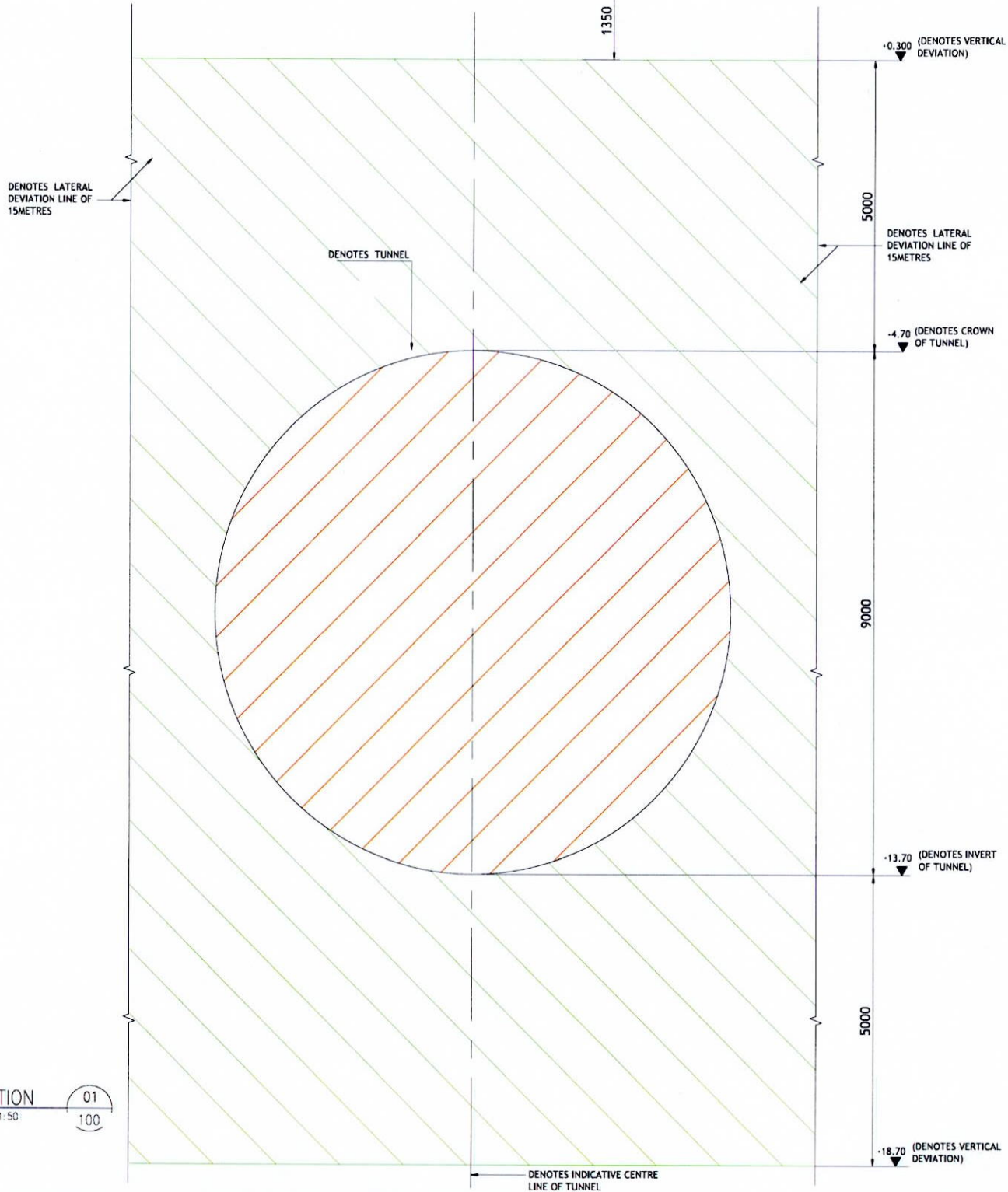
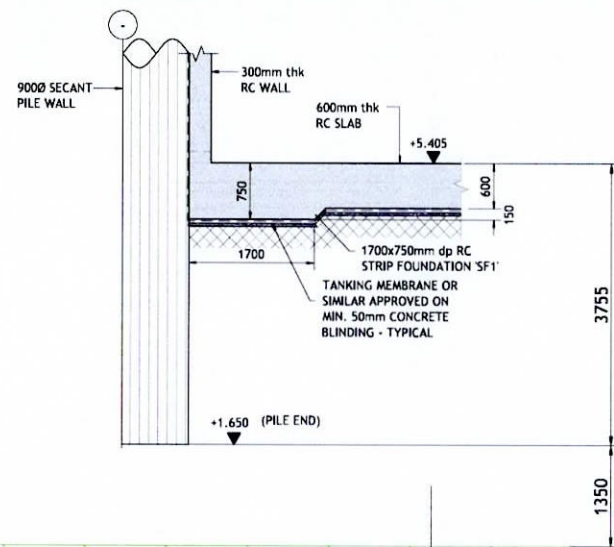


Rev	By	Date	Amendment	Rev	By	Date	Amendment
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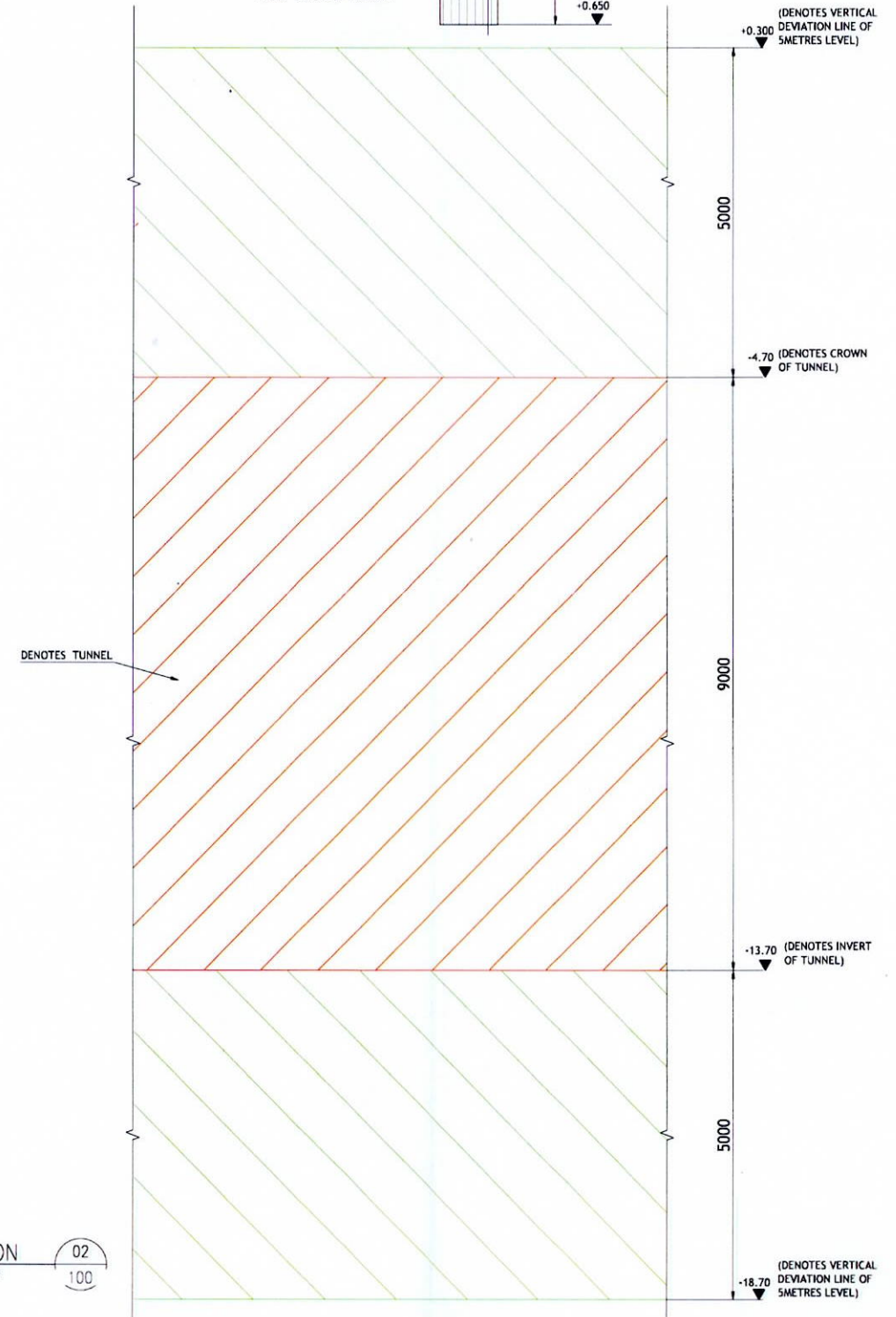
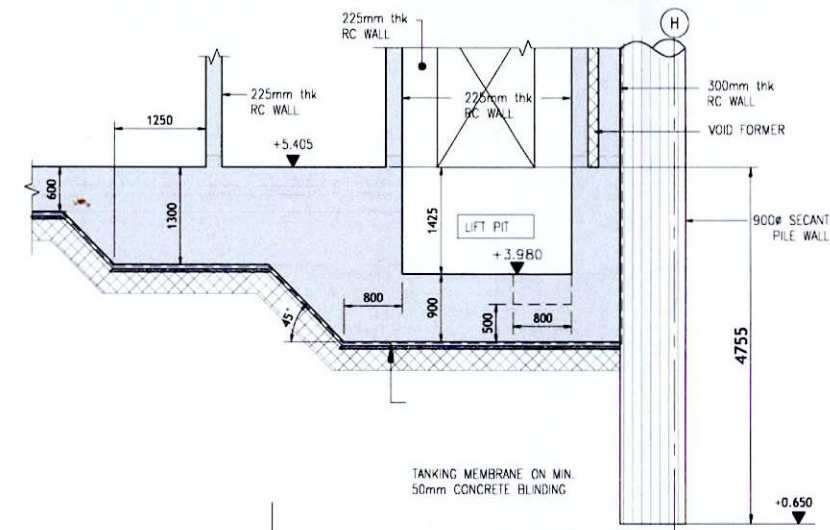
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Project:		PROJECT METROLINK AT EALRSFORT TERRACE / HATCH STREET							
Title:		FULL BUILDING SECTION WITH PROPOSED METROLINK TUNNEL							
Drawn:	B. Mavudri	Date:	May 2014	Reviewed:	B. Mavudri	Engineer Check:	R. Coughlan	Approved:	R. Coughlan
Project No:	222202	Document No:	222202-PUNCH-XX-FN-M2-S-101	Drawing Status:	S3				
Scale:	1:125	Document Title:	222202-PUNCH-XX-FN-DR-S-103	Revision No:	P01				



SECTION 01
SCALE 1:50



SECTION 02
SCALE 1:50

NOTES:
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Rev	Amendment	By	Date	Rev	Amendment	By	Date
P01	ISSUED FOR INFORMATION	BM	21/10/2022				

Rev	Amendment	By	Date


























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PROJECT METROLINK AT EALRSFORT TERRACE / HATCH STREET					
INTERFACE OF PROPOSED METROLINK & EXISTING BASEMENT STRUCTURE - SECTIONS (SHEET 1 OF 2)					
Drawn by	May 2014	Checked by	Engineer's Name	Approved	
B. Mandel		B. Mandel	R. Coughlan	R. Coughlan	
Project No.	222202	222202-PUNCH-XX-FN-M2-S-101	Drawing Status	53	
Scale	1:125	222202-PUNCH-XX-FN-DR-S-101	Revision	P01	

1. DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.



- | | |
|---|-----------------------------|
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|  | RC COLUMN AND REFERENCE TAG |
|  | 900mm SECANT PILE WALL |
|  | 225 THICK RC WALLS U.N.O. |
|  | 225 THICK RC WALLS U.N.O. |
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|  | 225 THICK RC WALLS U.N.O. |
|  | 225 THICK RC WALLS U.N.O. |

SCALE 1:50



Client:	EARLDEV PROPERTIES LTD
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Project:	PROJECT METROLINK AT EALRSFORT TERRACE / HATCH STREET				
Title:	INTERFACE OF PROPOSED METROLINK & EXISTING BASEMENT STRUCTURE				
Drawn by:	B. Manuvel	Issue Date:	October 2022	Reviewed by:	B. Manuvel
Project No:	222202	Project Name:	222202-PUNCH-XX-FN-M2-S-100	Approved:	R. Coughlan
Scale:	1:125	Drawn on:	222202-PUNCH-XX-FN-DR-S-100	Revision:	P01