



Upton House
Market Street
Charlbury
Oxford OX7 3PJ
tel 01608 810374
fax 01608 810093
e-mail info@gwp.uk.com
www.gwp.uk.com

FINAL VERSION 31st MARCH 2009

FIRST REPORT OF THE INDEPENDENT ENGINEERING EXPERT PANEL,
DUBLIN METRO NORTH:
**A REVIEW OF THE ENVIRONMENTAL IMPACT STATEMENT
AND OTHER ELEMENTS OF THE RAILWAY ORDER
APPLICATION FOR DUBLIN METRO NORTH**

FOR
**RESIDENTS' GROUPS AND OTHER INTERESTED PARTIES
&
RAILWAY PROCUREMENT AGENCY**

VOLUME II
(OF 3)

**CONSIDERATION OF THE CONCERNS AND COMMENTS
OF RESIDENTS AND OTHER INTERESTED PARTIES**

MARCH 2009

CONTENTS

1.	INTRODUCTION	2
1.2	Information gathering.....	2
1.3	Scope and structure of Volume II.....	2
2.	GENERAL COMMENTS	2
3.	ISSUES OF GENERAL CONCERN AT MORE THAN ONE	
	LOCATION	2
3.1	Airborne noise during construction and operation	2
	<i>Noise during construction of the metro.....</i>	<i>2</i>
	<i>Noise during operation of the metro.....</i>	<i>2</i>
	<i>Sources of information.....</i>	<i>2</i>
	<i>Comment</i>	<i>2</i>
3.2	Vibration and ground borne noise during construction and operation	2
	<i>Vibration and ground borne noise during construction</i>	<i>2</i>
	<i>Vibration and ground borne noise during operation of the metro.....</i>	<i>2</i>
	<i>Sources of information.....</i>	<i>2</i>
	<i>Comment</i>	<i>2</i>
3.3	Dust and other airborne emissions during the construction and operational periods.....	2
	<i>Sources of information.....</i>	<i>2</i>
	<i>Comment</i>	<i>2</i>
3.4	Construction traffic impacts and pedestrian safety during the construction period.....	2
	<i>Sources of information.....</i>	<i>2</i>
	<i>Comment</i>	<i>2</i>
3.5	Impact of the construction works on surface water	2
	<i>Sources of information.....</i>	<i>2</i>
	<i>Comment</i>	<i>2</i>
3.6	Potential for the tunnelling works to cause settlement	2
	<i>Sources of information.....</i>	<i>2</i>
	<i>Comment</i>	<i>2</i>
3.7	Potential effects of tunnel construction and metro operation on human health.....	2
	<i>Sources of information.....</i>	<i>2</i>
	<i>Comment</i>	<i>2</i>
3.8	Impact of Metro North on property prices and local planning zones	2
3.9	Control of contractor performance and what will happen if things go wrong	2
	<i>Comment</i>	<i>2</i>
3.10	Light pollution	2
4.	LOCATION-SPECIFIC ISSUES.....	2
4.1	Impact of construction of Parnell Square station on Colaiste Scoil Mhuire	2
4.2	Drumcondra Station	2
4.3	Construction and operation of St Patrick's ventilation shaft	2
4.4	Construction of the crossover tunnel.....	2
4.5	Griffith Avenue Station.....	2
4.6	Impact of tunnelling and metro operation beneath Corpus Christi Girls' National School.....	2
4.7	Tunnel launch site in Albert Park	2
4.8	Construction and operation of Dublin City University (DCU) stop and its proposed location	2
	<i>Comment</i>	<i>2</i>
4.9	Footbridge linking clubhouse facilities and pitches at Fingallians' GAA club.....	2

4.10	Proposed elevated section of track adjacent to Carlton Court, Swords	2
4.11	Construction and operation of the depot, station and park and ride facilities at Belinstown and the location of the car parks and access points	2
4.12	Long term temporary loss of sports facilities in Albert College Park	2
4.13	Impacts of the scheme on the Axis Arts Centre and Theatre	2
	<i>Concerns relating to the design of the interface between the stop and the Plaza to the east of the station</i>	<i>2</i>
	<i>Concerns relating to the construction period.....</i>	<i>2</i>
	<i>Concerns relating to the operation of the metro and the station.....</i>	<i>2</i>

FIRST INDEPENDENT ENGINEERING EXPERTS' REPORT:

A REVIEW OF THE RAILWAY ORDER APPLICATION FOR DUBLIN METRO NORTH AND CONSIDERATION OF THE CONCERNS OF RESIDENTS AND OTHER INTERESTED PARTIES**VOLUME II: CONSIDERATION OF THE CONCERNS AND COMMENTS OF RESIDENTS AND OTHER INTERESTED PARTIES****1. INTRODUCTION**

1.1.1 This volume of the report summarises the general and specific issues raised by members of the public during meetings and correspondence with the Independent Engineering Experts during the period August 2008 to January 2009. It is an expanded version of Section 5 of the draft report for comment issued by the Independent Engineering Expert team on 8th October 2008, and further sections have been added (as well as further details added to existing sections) since the final draft issued in December 2008.

1.1.2 For each topic covered, the main objectives of this volume of the report are to:

- Provide cross references to information in Volume I of this report and the Railway Order Application that is relevant to the questions and concerns that have been raised with us to date (and which address the comments and feedback we have received on the October draft);
- Navigate the Railway Order Application documents (especially the EIS) so as to find information relevant to each issue considered below;
- Provide an update (where relevant) on the current status of ongoing discussions between residents' groups and RPA and on progress with important schemes for property protection and monitoring; and
- Provide assistance to residents and others in framing their questions, concerns and requests for information, whether made directly to RPA or at an oral hearing (or both).

1.2 Information gathering

1.2.1 Ruth Allington of GWP met with representatives of residents' groups and other organisations during two visits to Dublin (12th to 15th August and 8th to 12th September). A record of the groups she met in August and September is included in Appendix 1 (in Volume III). Further meetings were held during the week commencing 20th October 2008 to present the report and allow discussion and feedback; Appendix 1 also includes a record of these meetings. Before finalising this report, a further visit was made in January 2009 and this has given rise to further comment and requests for additional material/clarification to be included in the report, particularly in this section.

1.2.2 We received written feedback on our original draft report for comment from RPA on 24th October 2008. This was circulated to all parties with whom we are in direct contact and is included in this report as Appendix 3 (in Volume III). Feedback from residents and others was obtained during meetings in October, by email, and in telephone conversations. We attempted to incorporate all of the feedback and comment in this report (primarily by expanding Volume I and providing cross-references to that material in this volume). A final draft was issued on 19th December 2008 and this has led to further discussion and

requests for our consideration of new issues not covered in the final draft. These further discussions (during and after our meetings with residents during the week commencing 20th January 2009) have been taken into account in this final version of the report. Changes that have been made to Volume II since the December final draft have been summarised in a document circulated separately (also available to download from www.metronorthexperts.com).

- 1.2.3 We are aware that many individual residents and groups of residents made written submissions to An Bord Pleanála by the due date at the end of October 2008. We have seen some of these submissions where they have been sent to us in draft or as submitted (or are available on websites), but by no means all. We have not reviewed or commented on submissions except where asked to do so, and then only from a factual/technical point of view. We hope that the report will assist those who make submissions at the oral hearing on 1st April 2009 to prepare for the hearing and as a source of reference during the hearing.

1.3 Scope and structure of Volume II

- 1.3.1 In Section 2 we make some general comments relevant to the status of the design in the Railway Order Application. In Section 3 we summarise issues that we have found to be of general concern, and in Section 4 we record location-specific issues that have been raised with us. For each area of concern (both general and location-specific), we provide a summary of the nature of that concern (generally through a series of questions that reflect residents' concerns as expressed to us) and reference to the relevant paragraphs in Volume I of this report and/or the EIS. In some cases, we provide a note of our understanding of the current status of ongoing discussions with the RPA and/or a summary of our opinions or observations on the subject being addressed.

2. GENERAL COMMENTS

- 2.1.1 The experts working on the EIS have generally made conservative assumptions in their assessments of the impacts of the scheme (*e.g.* by assuming that, where a receptor will be affected by several noise sources, all of the noise sources will be active at the same time). In other words, for key areas of concern, they have attempted to model a 'worst case' situation within the reference design which the contractors should be able to improve upon by design and programming. Where impacts predicted on this basis would exceed proposed threshold values, various mitigation measures have been described. Nevertheless, for impacts that can be monitored and controlled on a quantitative basis, some residual impacts (*i.e.* impacts that remain after mitigation measures have been applied) have been identified that are significant. It appears therefore that additional mitigation measures will be needed over and above those assumed in the EIS; this applies to airborne noise, vibration and groundborne noise, primarily during the construction phase. It may also apply to the control of surface water and mitigation of flood risk at and around the depot site at Belinstown.

- 2.1.2 It will not be until the final design is produced by the contractors who will construct the metro that many of the questions listed in the paragraphs in Sections 3 and 4 below can be answered in detail. However, the engineers who produce the final design will have to take full account of all the conditions attached to the Railway Order (and contractual requirements relating to their performance – especially limits on environmental impacts that can be monitored). Further discussions with RPA and oral submissions to An Bord Pleanála relating to issues of concern to residents are therefore likely to focus on all or some of the following:

- Requests for particular environmental limits to be prescribed in conditions, in general, at particular locations, at particular times of day *etc* (*e.g.* maximum vibration levels at inhabited properties).
- Requests for specific mitigation measures to be required to be included in the detailed design (*e.g.* screening, limitations on hours of working *etc*).
- Requests for conditions to be imposed requiring monitoring schemes for major measurable impacts (*e.g.* noise, vibration, settlement, dust, air quality, groundwater levels *etc*) to be agreed and implemented before construction proceeds, accompanied by proposals as to public disclosure of the information, responsibilities for undertaking the monitoring and the locations of monitoring equipment).
- Requests requiring the RPA to establish a means for obtaining a technical response to enquiries and concerns from those affected by the works.
- Requests for conditions to be imposed requiring RPA to set up a complaints procedure and dispute resolution process relating to all significant impacts, to be agreed and implemented before construction proceeds.
- Requests for conditions to be imposed requiring RPA to operate a property protection scheme to ensure that property owners who experience damage to their properties have their problems rapidly addressed.
- Requests for An Bord Pleanála to require design changes to avoid significant effects and improve the scheme.

2.1.3 It is likely, and would be highly desirable, that significant progress can be made between residents and the RPA in reaching agreement on some **location-specific** issues through discussion and negotiation in the period between the close of submissions to An Bord Pleanála and an oral hearing. **Clearly, this approach is not appropriate unless the party in discussion with the RPA has full authority to bind itself to any agreement reached (*e.g.* a design change or monitoring commitment relating to a specific residential property or other facility).** Some matters have already been progressed in this way and in other cases discussions are continuing. Such discussions and negotiations are likely to be particularly successful in communicating and agreeing appropriate monitoring schemes, agreeing how community liaison and sharing of monitoring information will be managed, and agreeing property protection arrangements. **We would anticipate that** submissions at an oral hearing relating to any matters that had been discussed and in respect of which agreements had been reached (*e.g.* to make a design change or implement a specific mitigation measure) would reflect progress that had been made and inform An Bord Pleanála of any design changes or undertakings proposed by RPA (that would then become part of the application for its consideration). There will inevitably remain differences of opinion between RPA and residents (*e.g.* residents may seek a design change which RPA is not prepared at this stage to offer, or some residents may seek a change that is not acceptable to others), but ongoing consultation will still be helpful in focusing on the issues to be resolved by An Bord Pleanála in its determination of the application and setting of conditions.

3. ISSUES OF GENERAL CONCERN AT MORE THAN ONE LOCATION

3.1 Airborne noise during construction and operation

Noise during construction of the metro

3.1.1 All of those who have expressed an opinion at this stage are concerned about noise from construction works. The following **general** questions have been raised:

- How noisy will the work be?
- When will noisy operations take place (*e.g.* hours of working)?
- How long will each noisy operation go on for and what will be the cumulative effects of construction operations going on concurrently?
- How will noise emissions be controlled?
- What limits will be set for noise, how will they be monitored and how will breaches of noise conditions be dealt with?
- Will residents have access to noise monitoring information so that they can see for themselves if noise limits have been exceeded? If not, will there be any independent monitoring of noise emissions and how will this be communicated to residents?
- What arrangements will be in place for receiving and dealing with complaints about noise?
- Why hasn't the existing noise environment been taken into account when setting proposed daytime limits (particularly in quiet residential areas of the city and rural and semi-rural areas at the north end of the line)?

There are also some location-specific concerns about noise that are covered in Section 4.

3.1.2 Residents were aware of noise measurements being taken in their streets and commented that both the number of locations monitored and the range of times of day and night when the monitoring took place appeared to them to have been rather low to give a representative sample of the baseline environment. Those who have read the EIS feel that this impression has been confirmed by the data presented in the appendices to the noise chapters and one person commented that *"this is not a fair representative measurement of 'ambient noise'."*

Noise during operation of the metro

3.1.3 In addition to concern about noise impacts of the construction of the metro there is also concern about noise during its operation, as summarised in the following questions:

- Will movement of trains through the underground sections of the metro (and at stations) be audible at street level?
- Where the metro runs at surface (especially on elevated sections), will it be possible to hear it above existing noise levels, especially at night? If so, how much more noisy will it be than it is now?
- Will the operation of the ventilation system for tunnels and underground stations give rise to noise on a continuous or intermittent basis? If so, will it be possible to hear it above existing noise levels, especially at night?

Sources of information

Independent Engineering Experts' report, March 2009 - FINAL
A review of the Railway Order application for Dublin Metro North

3.1.4 Information relevant to answering the various questions and concerns that have been brought forward in relation to airborne noise may be found in Volume I of this report, Section 4.2. This is presented in five sections:

- Introduction to airborne noise – important concepts and terminology
- Reference to relevant sections of the EIS
- Assumptions and methodology applied in the EIS
- Summary of EIS findings on airborne noise
- Comments

3.1.5 The RPA's comments on the list of questions in this section (Sections 5.3.1 and 5.3.2 in the draft report) can be found in Appendix 3 (Volume III) of this report. The RPA has provided the following additional comment relating to noise limits since the issue of the December 2008 final draft of this report:

The EIS limits are in line with precedent in many previous EIAs. It is not possible to predict construction noise levels as finely as on an hourly basis, and it is appropriate to allow necessary noisy activities to occur if offset by quieter times for the rest of the 12 hour period. The nature of the LAeq index is such that it is dominated by the short term noisy events even when calculated over 12 hours. Experience of major civil engineering projects has been that construction noise controls of the kind proposed for MN are generally successful.

Comment

3.1.6 The EIS identifies a number of locations where the threshold criteria for airborne noise assessment set out¹ will be exceeded during the construction and operational phase, based on the assumptions that underlie the assessment, even after mitigation is taken into account. However, the RPA's comments (Volume III, Appendix 3) provide reassurance that the contractor will be under an obligation to limit emissions of airborne noise so that the threshold criteria upon which the environmental assessment is based are not exceeded. Whilst this is far from clear in the EIS (which does not set out the limits proposed to be applied, only criteria for assessment of noise impacts) it is apparent from the RPA responses that their intention is that the criteria used for the assessment will become upper limits or thresholds to apply to the contractor. It will therefore be for the contractor to incorporate in the final detailed design and programming of the works measures to ensure that the airborne noise criteria in the EIS (or conditions imposed in the Railway Order when issued, if more stringent) will not be exceeded. In effect, the EIS draws to the contractor's attention locations where mitigation measures additional to those that have been assumed may be needed to achieve this (*e.g.* by programming the construction works to avoid the cumulative effects assumed in the EIS, by selecting different (quieter) construction plant, by adding barriers to reduce construction or operational noise, or by changing track design to reduce operational noise).

3.1.7 A similar situation arises in relation to operational noise; there are several locations where the operational noise is predicted to exceed the assessment criteria in the EIS. The implication is that the contractor will need to ensure that design changes are made and/or additional mitigation measures are incorporated at these locations to limit noise to the

¹ Tables 4.1 and 4.3 in Chapter 4 of each of the seven books comprising Volume 2 of the EIS

limits proposed (or any lower limits that may be imposed by conditions attached to the Railway Order).

3.1.8 The threshold criteria for construction noise during the day and evening (75dB and 65dB) have each been set 5dB higher than those in the relevant National Roads Authority guidance ("*Guidelines for the Treatment of Noise and Vibration in National Road Schemes*") and the reasons for this are stated in the EIS². We have made some observations in paragraphs 4.2.26 to 4.2.32 in Volume I in relation to these limits. Our opinion is that, even if the rationale for the 5dB over NRA guidelines is accepted, they ought to be lower where construction works continue for significant periods and/or where they take place in 'urban' areas where pre-existing noise levels are low (residential roads in parts of Drumcondra for example). We further consider that planning conditions referring to airborne noise should specify a period of less than 12 hours to which L_{Aeq} noise levels will relate and that it would also be reasonable to impose a maximum noise level not to be exceeded in any event (and a limitation on the length of time for which the maximum noise levels would be allowed within any 12 hour or shorter monitoring period).

3.1.9 The current baseline monitoring for noise in the EIS is insufficiently detailed to fully characterise the existing noise environment. We understand that the RPA is currently commissioning more comprehensive baseline monitoring for the metro scheme.

3.2 Vibration and ground borne noise during construction and operation

Vibration and ground borne noise during construction

3.2.1 Vibration and groundborne noise during construction works is of great concern to those who live above or close to proposed bored tunnels and the excavations required for underground stations and cut and cover tunnels. The following questions have been raised:

- When will operations that will give rise to vibration and ground borne noise take place (*e.g.* hours of working)?
- How long will each noisy operation go on for and what will be the cumulative effects of construction operations going on concurrently?
- Will vibration cause structural damage to houses, especially vulnerable older properties whose foundation conditions are not known (or where there are believed to be no foundations)?
- What limits will be set for vibration and ground borne noise, how will they be monitored and how will breaches of conditions be dealt with?
- Will residents have access to vibration monitoring information so that they can see for themselves if prescribed limits have been exceeded? If not, will there be any independent monitoring of vibration and ground borne noise and how will this be communicated to residents?
- What arrangements will be in place for receiving and dealing with complaints about vibration and ground borne noise?
- How far away from the centre lines of the tunnels will vibration occur?

² Volume 2, Books 1-7, Chapter 4, paragraph 4.3.2.1

- Is there a depth below which no vibration will be felt at the surface?
- If structural damage occurs, what arrangements will be in place to ensure that this is assessed and repaired speedily?

Vibration and ground borne noise during operation of the metro

3.2.2 Those who live immediately above the line of the bored tunnels have expressed concern about the possibility of feeling vibration when trains pass beneath in the tunnels. In addition to the nuisance aspects of such vibration, they are worried about potential health risks of being exposed to continuous low level vibration and ground borne noise when trains pass beneath, and about diminution of property values as compared with properties that are not immediately above or adjacent to the tunnel.

Sources of information

3.2.3 Information relevant to answering the various questions and concerns that have been brought forward in relation to vibration and groundborne noise may be found in Volume I of this report, Section 4.3. This is presented in five sections:

- Introduction to vibration and groundborne noise – important concepts and terminology
- Reference to relevant sections of the EIS
- Assumptions and methodology applied in the EIS
- Summary of EIS findings on vibration and groundborne noise
- Comments

3.2.4 The RPA's comments on the list of questions in this section (Section 5.3.4 in the draft report) can be found in Appendix 3 (Volume III) of this report. A further comment has been provided by RPA following the issue of the final draft report in December 2008:

the contractor will be subject to vibration limits set at levels which will avoid structural damage.

Comment

3.2.5 The RPA has responded to questions relating to the amount of vibration that will be experienced, particularly during the construction phase as follows: "*Vibration limits have been chosen to avoid structural damage. Where any damage does occur, repairs will be made under the Property Owners' Protection scheme. This does not affect owners' statutory rights*" and "*Groundborne noise and vibration limits are set out in Volume 2 Chapter 5 of the EIS*". However, as noted in Section 4.3 of Volume I, no limits have actually been proposed in the EIS (Volume 2, Chapter 5) for vibration and groundborne noise during the construction period, although impact magnitudes have been defined (very low, low, medium, high, and very high).

3.2.6 The description of residual impacts (*i.e.* those that are expected to arise after mitigation) includes some that are identified as having high and very high impact magnitudes, giving rise to significant construction phase impacts. Given the RPA's assurance that "*vibration limits have been chosen to avoid structural damage*", it appears that the contractor will be expected to introduce more mitigation than is assumed in the assessments in order to reduce these impacts. It is implied in the EIS that the 'Low' impact thresholds may be those that are intended to provide upper vibration (and groundborne noise) limits, but this

needs to be clarified as currently the limits are not stated in the EIS. The following extract from Volume 2, Book 6, Chapter 5, Section 5.4.3.1 is an example of how we have reached this view (underlining highlights the material passage):

"There is a proposed cross passage near Woodvale Road directly below residential buildings, which has approximately 25m of ground cover. The likely PPV will be 37mm/s, $KB_{fmax} = 19$, in excess of the building damage threshold and in the Very High impact category for people in the building.....To limit the PPV to the Low impact category for daytime the charge weight per delay would have to be restricted to 0.8 to 1.0kg depending on the final tunnel alignment."

- 3.2.7 During the operational phase, we confirm that 25dB $L_{Amax,S}$ (the proposed limit for operational phase groundborne noise between Parnell Street and Albert College Park) is a very low limit for groundborne noise in residential properties; so low that people in these properties are very unlikely to hear a train passing beneath. Elsewhere, the proposed limit on groundborne noise inside residential property is 40dB $L_{Amax,S}$, which is a low level of groundborne noise. If there are locations that are deemed particularly sensitive to groundborne noise and where it is appropriate to impose a lower limit than 40dB $L_{Amax,S}$, the use of **floating slab track** (FST) rather than resilient rail support would reduce the groundborne noise impacts to ≤ 25 dB $L_{Amax,S}$.
- 3.2.8 Vibration from blasting (not the TBM) could, in some circumstances, cause structural damage. RPA has circulated details of the **Property Owners' Protection Scheme** it intends to implement as described below. Prior to developing and launching that scheme, it had already undertaken structural surveys at a representative sample of buildings (different types, ages, styles, materials, construction techniques etc) to establish their characteristics and potential vulnerability to damage caused by vibration (and settlement).
- 3.2.9 In January 2009, owners of residential and other non-commercial properties within 30m of proposed tunnels and 50m of proposed underground stop structures were sent a leaflet entitled **"Property Owners' Protection Scheme"**. In the leaflet and the covering letter, property owners were encouraged to participate in the scheme and a postage paid registration form was included to allow them to register.
- 3.2.10 The scheme (which it is intended will be operated by the contractor, when appointed) has the following elements:
- Establishment of a panel of three independent firms of building surveyors;
 - Invitation to those registered with the scheme to select one of the three panel firms to survey their property³.
 - Initial independent surveys will be carried out at all relevant properties shortly before construction works commence in each area and initial survey reports will be issued to property owners and the RPA.
 - After construction a final condition survey will be carried out by the same firm of surveyors and a second survey report will be issued.
 - During construction, and for 12 months after completion, if property owners notice any changes to their properties, the scheme allows for notification of the problem and

³ If property owners register but then express no preference when invited to do so, RPA will appoint a surveyor from the panel to carry out the independent initial survey.

an assessment to be carried out by the firm of surveyors who carried out the initial independent survey. In these circumstances, an interim survey report would be issued to the property owner and the RPA.

- If an interim (or final) survey report recommends repairs to rectify damage caused by Metro North, the recommended work will be implemented promptly (subject to an upper limit of €30,000).
- Disputes between property owners and RPA/its contractor would be referred to an independent expert nominated by the property owner from a qualified panel established by the Institution of Engineers of Ireland. The recommendation of the independent engineer will be binding on RPA.
- Participation in the scheme does not affect a property owner's legal rights.

3.2.11 Some residents consider that the leaflet, on its own, does not provide sufficient detail relating to the Property Owners' Protection Scheme. They were expecting to see rather more formal legal documentation. Our understanding is that no such formal documentation currently exists. Concerns have also been expressed regarding the upper limit of €30,000 and whether the scheme applies to schools and other non-residential, non-commercial property. RPA has reassured schools within the relevant areas that, although not residential property, they (and, we believe, other non-commercial residential property) will be covered by the Property Owners' Protection Scheme.

3.2.12 Our view is that, with one exception, the objectives and elements of the scheme are well described in the leaflet and we do not feel that extensive legal/contractual documentation should be necessary to allow property owners who live within the areas where the scheme will operate to make up their minds at this stage whether to register. The assurance that the scheme is in addition to all other legal rights and remedies is unequivocal. However, it is not clear to us from the leaflet whether independent initial surveys (and final surveys) will be offered to property owners within the geographical limits of the scheme if those property owners have not first registered with the scheme. Of course, there can be no compulsion for property owners to allow surveyors to enter their properties if they do not wish to participate, but it would seem more workable for the RPA to operate an 'opt out' approach rather than relying on an 'opt in' as is implied by the leaflet. We feel that the upper limit of €30,000 is likely to be sufficient to repair most damage that could occur.

3.3 Dust and other airborne emissions during the construction and operational periods

3.3.1 There is general concern about the health and nuisance impacts of dust and other airborne emissions that may arise from this project.

Sources of information

3.3.2 The EIS has considered the following air quality issues:

- Nuisance dust from excavation, transport and spoil handling operations;
- Vehicle emissions.

3.3.3 Air quality matters are covered in the following sections of the EIS:

- Volume 1, Chapter 8 (Human Health), Section 8.10, page 124
- Volume 2, Chapter 12 (Air and climatic factors)
- Volume 3, Annex G (Information support the air and climatic factors chapter)

- Also relevant is Volume 2, Chapter 7 (Traffic), where measures to be taken to reduce traffic congestion (and therefore emissions) are considered.
- 3.3.4 RPA's comments on dust control are included in Appendix 3 (Volume III); these indicate that a baseline dust study is in preparation and that dust levels will be monitored throughout construction.

Comment

- 3.3.5 The main emphasis of investigation and modelling has been on changes in air quality resulting from changes to traffic movements associated with the operation and construction of the scheme. Of particular concern to residents, however, is fugitive dust that could settle on their property, causing a nuisance or a health hazard.
- 3.3.6 The experts that undertook the assessment consider that the generation of dust from construction operations, whilst inevitable, should be successfully mitigated and its spread limited through appropriate 'good housekeeping' on construction sites (listed at Volume 2, Chapter 12, paragraph 12.4.2.1 in each of the Volume 2 books).
- 3.3.7 Emissions of dust and fine particulates *via* the ventilation system from the operating metro is assessed to be of negligible significance (Volume 2, Chapter 12, paragraph 12.4.3.2 – for sections of the scheme including underground elements). The EIS indicates that dust arising from the operation of trains on the above ground sections is expected to be negligible.
- 3.3.8 It will not be until a contractor is appointed and completes a final design for the works that detailed plans for management of potentially dusty activities can be made. Whilst we agree that the control of nuisance dust is largely a matter of good site housekeeping (as in the list provided in the EIS), combined with appropriate screening and avoidance of dusty activities, these need to be anticipated and integrated into site design and site management plans.
- 3.3.9 It is good practice for baseline monitoring of dust to be carried out before construction work commences and for meteorological data to be collected (at weather stations) as a basis for predicting the range of directions of spread (as noted above, RPA has committed to a dust baseline study and we understand that, at the time of writing, this is being commissioned). Dust monitoring will be needed throughout the construction period as a means for establishing the amount of dust that is leaving each relevant site, and triggering improvements in dust control at source. Although it seems likely that above ground sections of the metro will not give rise to dust emissions, confirmation of this through monitoring would be desirable.
- 3.3.10 Further comments relevant to the potential for other airborne emissions from tunnelling (*via* ventilation and other shafts) are included in the document "*Tunnelling questions and answers*" included in this report as Appendix 4 (Volume III).

3.4 Construction traffic impacts and pedestrian safety during the construction period

- 3.4.1 Residents living in streets around the proposed station and shaft excavations, and on the Ballymun Road and Upper Drumcondra Road routes for tunnelling spoil and construction traffic are extremely concerned about the impact of construction traffic (including private vehicles belonging to site workers) in the following respects:

- The noise, dust, emissions and road congestion impacts of additional traffic on the roads. This concern relates especially to the Ballymun Road (which will take all station spoil from Ballymun, DCU and Griffith Avenue Stops as well as all the tunnelling spoil arising from the tunnel portal in Albert Park) and Upper Drumcondra Road (which will take construction traffic and spoil relating to the construction of O'Connell Bridge North and Parnell Square and some (but not all) of the spoil from Drumcondra Stop);
- The inadequate widths of urban streets to accommodate heavy goods vehicles;
- Problems likely to be experienced by pedestrians crossing streets whilst stations and cut and cover
 - Danger to pedestrians using the streets being used for construction traffic bringing materials to the sites or removing spoil. The concern particularly relates to school students and their parents and carers on their way to and from school; and
 - Increased problems with parking private cars if construction workers park in streets around the proposed construction sites.

Sources of information

- 3.4.2 The traffic studies in the EIS are the most comprehensive in the document and are supported by the most detailed information. Baseline studies are reported in Volume 1, Chapter 15. Proposed construction traffic routes associated with each of the proposed construction sites are described in detail and shown on drawings in the EIS (Volume 2, Chapter 7, Volume 3, Section 5 (maps) – Map 15 of 15).
- 3.4.3 Although traffic routes have been planned in the EIS (and their strategic and local impacts assessed), the traffic plan presented in the EIS is described as "*a framework document within which the necessary mitigation measures will be developed through the various stages of design and construction*" (Volume 2, Chapter 7, paragraph 7.5.2). Therefore, until the final design is completed (taking account of local consultation and local planning and highway authority inputs), detailed local traffic management plans (*e.g.* details of site access arrangements, signage, barriers to separate construction traffic from pedestrians, traffic controls *etc*) cannot be finalised.

Comment

3.4.4 Whilst the traffic sections of the EIS are the most extensive and well supported in the document (as noted above), members of the public have not found it very easy to establish what the detailed traffic proposals are in their areas (largely because of the volume of material provided, and its technical content). The range of expertise on our team does not presently include expertise on traffic and we have not been able to do more than record and summarise the concerns of residents in this regard and make some general comments.

3.4.5 The **Ballymun Road** will be in almost continuous use during the construction period, both for the transport of tunnel spoil from the tunnel portal in Albert Park and station spoil from Griffith Avenue Stop whilst being, itself, the site for the construction of two underground stations (Ballymun and DCU) and cut and cover tunnel linking them. Residents along the Ballymun Road north of Griffith Avenue are extremely concerned about how this will impact upon them and do not feel that they have sufficient information about the proposals for programming the works that will affect them. Various ideas have been put forward in submissions for reducing traffic impacts, including the use of rail or conveyors within the cut and cover tunnels north of Albert Park to reduce or eliminate spoil haulage on Ballymun Road itself.

- 3.4.6 The **Upper Drumcondra Road** is another arterial route that, it appears from the EIS, will be significantly affected by construction traffic. The All Hallows Residents' Association and others who live in this area have made submissions about the unsuitability of this road to take HGVs, given the serious congestion that already limits traffic flow into and out of the city even after the improvements that have come about since the opening of the Port Tunnel. The residents consider that levels of noise, fumes, safety and visual intrusion are already unacceptable, even after the Port Tunnel was opened.
- 3.4.7 An additional/alternative route is shown on Traffic Map 15 in Volume 3, Book 1 of the EIS, running East from Drumcondra Stop to the south portal of the Port Tunnel and thence *via* the Port Tunnel. It is not clear on this drawing what proportion of traffic is to take this route and what proportion will use Drumcondra Road.
- 3.4.8 Some residents and other interested parties in residential streets around proposed stop locations and the St Patrick's ventilation shaft have suggested that, in the catchments of schools, limitations on traffic movements should be agreed so that for a period before school starts and a corresponding period after the end of the school day, construction traffic would not be permitted to use certain local roads. This appears to us to be a reasonable suggestion and we anticipate that discussions with the RPA will result in agreements as to general principles and specific proposals that can be incorporated in the contractor's eventual detailed traffic planning to balance the needs of the local residents with the needs of the project.

3.5 Impact of the construction works on surface water

Potential for flooding or increased flood risk

- 3.5.1 Residents are generally concerned about the possibility that the works will cause or exacerbate flooding, especially at locations where flooding has been experienced in recent times. The following questions have been posed and points raised:
- How much water will be pumped from tunnels, station excavations and shafts and will its discharge into receiving watercourses cause or exacerbate flooding? Residents observe that the drainage system in some areas is being increasingly overwhelmed by surface runoff in severe storm events and they are extremely concerned that this will be worsened by the addition of water discharged from construction sites.
 - The depot, station and park, ride facility and permanent landscaped mound to accommodate tunnel spoil at Belinstown will be constructed in the catchment of the Broad Meadow River. The residents' experience is that applications for domestic house building and extensions in the locality have generally been refused on the basis of flood risk and avoidance of building on the flood plain. They are very concerned about the flood risks associated with the proposed development, especially given their experience of flooding in the area as it is at present.

Potential for disruption of 'underground watercourses'

- 3.5.2 Residents in Ballymun and Griffith Avenue have told us about 'underground rivers' running beneath streets and houses in North Dublin. They cannot see any mention of these in the EIS and have expressed concern that they have not been taken into account in the Reference Design. In particular, they are concerned about the effects of diverting or blocking these culverted rivers and streams in the course of the works (and the flooding to which this may give rise) and in respect of the possible effects of tunnelling beneath them.

Sources of information

- 3.5.3 We have now included a section in Volume I on surface water; this is based on a more thorough review of the relevant chapters in the EIS than was possible during the preparation of the **October 2008** draft for comment. Whilst we have obtained a copy of the Greater Dublin Strategic Drainage Strategy (GSDSDS), which is a key reference in the EIS, it has not been possible to review this in detail given the time and resources available to complete this report.
- 3.5.4 Information relevant to answering the various questions and concerns that have been brought forward in relation to surface water impacts (quality and flood risk) may be found in Volume I of this report, Section 4.4. This is presented in five sections:
- Introduction to surface water – important concepts and terminology
 - Reference to relevant sections of the EIS
 - Assumptions and methodology applied in the EIS
 - Summary of EIS findings on surface water
 - Comments
- 3.5.5 The RPA's comments on the list of residents' issues recorded in this section (Section 5.3.18 in the **October 2008** draft report) can be found in Appendix 3 (Volume III) of this report.
- 3.5.6 The RPA has confirmed that it is aware of culverted rivers and streams crossing the alignment in North Dublin and that these are shown on its detailed 'services maps' that are available to tenderers. We have not seen these plans.
- 3.5.7 Since completion of the final draft report in December 2008, the RPA has provided us with the following comments on surface water impacts and their assessment:

Flooding at Batter Lane

The Metro depot and Batter Lane lie in the catchment of the Broad Meadow River, close to its northern watershed, which follows the line of Balheary Lane. West of Balheary Lane, the land falls generally westwards into the catchment of the Turvey Stream.

Gradients in the area are very slight or almost flat, and in some places ditches flow against the surface gradient. In particular, the south west corner of the proposed depot area (which includes the multi-storey car park and the Belinstown Stop) are located in an almost level area of ground, which ponds in wet weather. The southern end of Batter Lane is also reported to flood in heavy rain.

A main stream flows across Batter Lane just south of Jet View Farm (which I refer to as the 'Jet View Stream' throughout this letter and which is a tributary of the Broad Meadow River). It crosses beneath Batter Lane in a small pipe, and continues along an overgrown ditch on the east verge of the Lane, before crossing the proposed Depot area and heading south eastwards to join the Broad Meadow River. Flooding occurs at the crossing of Batter Lane because the existing culvert and ditch are blocked by vegetation and debris. Further upstream this stream also causes flooding of Balheary Lane some 300 metres north of its junction with Batter Lane.

The Metro Depot has to be built on a flat surface to prevent Light Metro Vehicles from rolling away when parked. This flat surface will be achieved by building up the lower land near Batter Lane to the same level as the higher ground to the north east. This will also have the advantage of hiding the operational area from the properties on the lower end of Batter Lane, and allow a landscaped slope to be formed to the east of the lane which can be planted to further obscure the Depot.

The Jet View Stream will be culverted beneath the raised depot in a 1.4 metre diameter pipe. Rainwater from the roofs and paved areas of the Depot will be collected and used for washing LMV's before being cleaned and returned to the stream south of the Depot at a controlled rate to prevent flooding. The Metro Operator will need to keep all these new drainage facilities clean and free running, in order to protect his operation, and this should provide a free outfall for drainage upstream of the depot.

Building a large new structure in a flood plain can take up storage space for floodwaters, and cause problems further downstream. However, the depot will be equipped with large underground storage reservoirs to hold floodwater, and the discharge rates from these reservoirs will be controlled so that they do not exceed normal flows. The rate of discharge will be as required by the Greater Dublin Drainage Strategy Report, which is used for all development in the Dublin area.

A new 1.4 metre diameter culvert for the Jet View Stream will also be provided under Batter lane, and a more direct channel will be built to connect to the culvert under the depot. New drains will be constructed along both sides of Batter Lane, both north and south of the new culvert, and this should prevent any flooding along the Lane as far south as the car park entrance.

The culverts beneath Batter Lane and the Depot have been sized to carry a 1 in 100 year storm with 300mm clearance above the water level. The theoretical flood flow rate has been increased by 20% to allow for the future effects of global warming, and by 60% to allow for inaccuracies in predictions.

The changes at the Depot site will not relieve the flooding problem at Balheary Lane, but will be of some assistance in preventing any backing up of water from the Batter Lane area.

More information can be found in the EIS Volume 2, Book 1, Chapter 11, pp181-188.

Flooding at Griffith Avenue

The Griffith Avenue Metro Stop will introduce some additional paved area into the catchment of the Dublin City drainage network, and this will produce additional runoff. However, the amount additional paved area is relatively small, comprising an emergency exit (23 metres x 16 metres); a light well (16 metres x 7metres); and the entrance pavilion and canopy

(65 metres x 18 metres), a total of 1650 square metres. The associated access roads and building surrounds are to be constructed of permeable materials (topsoil and grass, or grass reinforced with a concrete grid) which will not produce any more run-off than at present.

The metro will be designed to comply with the requirements of the Greater Dublin Strategic Drainage Study, which is mandatory on all new developments in Dublin. The runoff from the structures will be stored underground on the site, and discharged at a rate equivalent to the run-off from the undisturbed land. This ensures that the Stop will not create any additional risk of flooding. The Dublin City Council Drainage Department will vet the detailed design plans of the Stop to ensure that these requirements are adhered to.

Flooding from the Tolka river

The tunnels will be some 25 metres below ground level in this area, and the tunnel walls will include waterproof membranes. Drainage systems and pumps within the tunnels will deal with any residual seepage, so that flooding of tunnels from the Tolka is extremely unlikely. There is no reason to suppose that the presence of the tunnels will cause flooding in the house basements. The flood defences of the River have recently been upgraded, so that the risk of flooding is significantly reduced.

Comment

- 3.5.8 Having now evaluated the surface water chapters of the EIS, undertaken a brief overview of the GDSDS, and considered the feedback from RPA set out above, we make the following observations relevant to public concern about flood risk.

- 3.5.9 Functional values are described as having been assessed by consideration of water quality as well as flood status. The water quality criteria are quantitative (based on Q-values), but it is not clear as to how flood risk has been taken into account either in defining functional values or in terms of assessing impact magnitudes. It would have been better in our view to have assigned functional values and assessed impact magnitudes separately for surface water quality and for the risk and consequences of flooding. The functional values that have been assigned to the various watercourses assessed appear to us to be reasonable in relation to water quality but do not highlight areas where flooding may occur and its impacts.
- 3.5.10 For most of the proposed alignment, impact on flood risk within the surface water catchments is likely to be negligible. This is because the 'footprint' of the works within the various catchments is relatively small, and because the amount of water to be discharged from the construction sites (and the finished metro facilities) into surface water courses is expected to be very small (and therefore will have a very small impact on flood flows in streams and rivers into which that water may be discharged).
- 3.5.11 However, the very large depot site at Belinstown is within an area where residents report that flooding that affects local roads and houses occurs fairly frequently (likely to be as a result of 'backing up' of flood waters in the drainage system). The potential for flood risk associated with the Belinstown Depot site has been recognised in the EIS and the following is stated in Volume 2, Book 1, Chapter 11, Section 11.4.2.2: *"The performance of the drainage system will also be assessed for extreme rainfall events (in excess of the design rainfall) to identify areas at risk of flooding. Adequate measures will be put in place to safely manage the flood water and reduce the risk of damage to lives and properties"*. To achieve this, a more comprehensive baseline survey will be needed in this area and a flood risk assessment will need to be carried out. This is an area where it may be possible to improve upon the current situation.
- 3.5.12 The further information provided by RPA in paragraph 3.5.7 above goes some way to addressing these issues, although it is surprising that none of this information, nor the baseline survey and (presumably) analysis and design on which the information was based, is included in the EIS.
- 3.5.13 We note that the Greater Dublin Strategic Drainage Study (GSDSDS) does not include any specific study, description or analysis of the catchment of the Broad Meadow River, and does not therefore prescribe allowable rates of discharge into the drainage network in this catchment (as appears to be implied). What the GSDSDS does do, however, is to set out approaches and methodologies (based on the principles of sustainable drainage) that should be applied to projects at the planning stage. Implementation of sustainable drainage systems (SUDS) does not merely involve the deployment of a collection of sustainable drainage techniques but is a holistic, catchment wide, approach to the design of drainage systems on a catchment scale that considers all relevant aspects, including water quality and flooding. We remain surprised that a flood risk assessment has either not been carried out so far at this site or, if it has, has not been reported in the EIS. It is unusual, in our experience, for an EIS relating to a project of this scale and importance to include: no detailed baseline studies of the catchment (in relation to flooding and flow capacity); no predictions of the actual quantities of water to be discharged from the site to surface water courses, and no assessment of their impacts in relation to flooding.
- 3.5.14 We consider that it would be appropriate for a condition to be imposed on the Railway Order requiring flood risk assessments to be carried out for the catchments to be affected by building on agricultural land (as at Belinstown) or discharge of storm water or groundwater to existing water courses, before construction proceeds. Such flood risk

assessments may indicate the need for modifications to the significant land raising suggested in the flood plain of the Broad Meadow River, off site improvement works to drainage structures and receiving watercourses to mitigate flood risk, and possibly the deployment of tunnel spoil to provide flood defences in areas that are already vulnerable to flooding.

- 3.5.15 Several watercourses are known to have been culverted or flow in tunnels or pipes beneath urban areas in North Dublin; where these will be intersected in cut and cover tunnels or station boxes, they will require temporary or permanent diversion to allow the works to proceed and maintain the flow in the watercourse. Intersection of such watercourses gives rise to the potential for contamination and also for changes to flow capacities. The detailed design will need to ensure that diverted tunnels or culverts have sufficient capacity to prevent backing up of water and flooding upstream. Where such watercourses are not actually intersected but cross the alignment of bored tunnels, they are potentially susceptible to settlement disrupting culvert or tunnel linings, giving rise to leakage. It will be important to identify all such 'underground' watercourses and monitor their condition before and after the works, providing for repairs to be carried out if settlement causes damage. Whilst this has not been recognised in the EIS, we have confirmed that RPA is aware of such streams and has made provision in its design to date for appropriate engineering measures to safeguard, replace or divert these structures where they cross the tunnel alignment.

3.6 Potential for the tunnelling works to cause settlement

- 3.6.1 Residents have expressed concern about the amount of settlement that may occur above or adjacent to the tunnels and the damaging effects that this may have on their properties.

Sources of information

- 3.6.2 Information relevant to residents' concerns about settlement may be found in Volume I of this report, Section 4.6. This is presented in five sections:

- Introduction to settlement – important concepts and terminology
- Reference to relevant sections of the EIS
- Assumptions and methodology applied in the EIS
- Summary of results of the settlement assessment
- Comments

- 3.6.3 The RPA's comments on the list of residents' issues recorded in this section (Section 5.2.23 in the draft report) can be found in Appendix 3 (Volume III) of this report.

Comment

- 3.6.4 As is described in Section 4.6 in Volume I of this report, the prediction of settlement on a location-specific basis requires detailed knowledge of the geology, the groundwater and the interaction of these with the tunnel excavation. Not until the construction phase is underway will detailed information be available from monitoring at the surface, monitoring of the geology and hydrogeology at the tunnel face and forward drilling. Using this information, property specific predictions of settlement can be made and, where necessary, adjustments to the tunnelling operation made to reduce settlement effects to a minimum.

- 3.6.5 The success of the responsive approach to predicting and minimising settlement described in Section 4.6 in Volume I depends on a carefully designed monitoring scheme and a robust process for using the data which arises from it.
- 3.6.6 The 4 stage assessment process described in the EIS in relation to ground movements and their effects on buildings and infrastructure is logical and represents established good practice. Stages 2B and 3 are based on the detailed design and actual construction methods to be used and therefore this assessment process is not yet complete and will logically continue into the detailed design and construction phases.
- 3.6.7 The 4 stage assessment process, eventually incorporating monitoring, should allow the identification of buildings where damage is expected to fall into the 'Moderate' category or above and specific protective/mitigation measures can then be designed and implemented. Where possible, it appears that the design objectives will be to restrict building damage to the 'Slight' category or below. This level of damage would be rectified under the Property Protection Scheme. **This is described in some detail in paragraphs 3.2.9 to 3.2.12 above.**
- 3.6.8 The EIS reports maximum settlements to be expected at various locations along the alignment with no explanation of how those values have been derived, and what they mean or the expected distribution of ground movements (relevant to an assessment of differential settlement as described above). Similarly, the EIS does not discuss the anticipated time over which ground movements will develop where they occur.

3.7 Potential effects of tunnel construction and metro operation on human health

- 3.7.1 The following issues have been identified as direct or indirect health concerns:
- Increased airborne particulates (PM10 and PM2.5) around ventilation shafts during operation and associated with construction traffic during construction;
 - Electromagnetic radiation originating at the railway line and its associated electrical services (this concern relates particularly to sections of the line in bored tunnels where they pass directly beneath properties, but also to emissions from surface sections of the line);
 - Stress and anxiety associated with anticipation of the scheme and exposure to a range of emissions and effects from its construction and operation;
 - Effects of long term exposure to low level vibration and ground-borne noise during the operation of the metro system;
 - Danger to pedestrians along construction traffic routes;
 - Potential for increase in radon risk; and
 - An expectation that activity at major construction sites in green areas of the city could lead to migration of rat populations to residential areas and school grounds.

Sources of information

- 3.7.2 There is a chapter in Volume 1 of the EIS dedicated to health effects (Chapter 8) and the baseline studies in Volume 1 and environmental assessments in Volume 2 identify a range of issues as effects on human beings (land-use; socio-economics; noise; vibration; radiation and stray current; and traffic). All of the matters listed above are addressed in these chapters with the exception of rat migration.

- 3.7.3 RPA's comments on these matters is included in the document in Volume III, Appendix 3 numbered 5.3.24. Since the issue of the final draft of this report in December 2008, RPA has provided the following additional comment on this issue:

The Metro North contractor will be obliged to comply with all Health and Safety legislation and to plan and organise its activities to preserve the safety, health and welfare of all persons resident, employed or present in proximity to the works. If a rodent problem arises, the contractor is obliged by law and by contract to take measures to control and eliminate the problem. The fact that any rodents exposed by the works will be controlled as above in effect means the rodent population in the area of the works is actually likely to decrease. The EIS (Volume 1 Section 8.13) predicts that there will be no significant impact on human health associated with rodents as a result of the project.

Comment

- 3.7.4 Rat nuisance and the possibility of construction works causing migration of rats is a matter that has been raised by a number of residents' groups. In our view, there is no reason why well run construction sites should give rise to a rat problem or make an existing rat problem worse, indeed every expectation that, if there is an existing rat problem, this will be sorted out in the course of establishing the site and all its attendant health and safety and 'housekeeping' requirements. There is also no reason why establishment of a construction site such as this should give rise to migration of rats causing problems in neighbouring streets. We have checked with RPA and they expect the issue of vermin generally to be dealt with in the health and safety provisions included in the contract when it is finally let.

3.8 Impact of Metro North on property prices and local planning zones

- 3.8.1 There is concern that the construction of the metro may adversely affect the value of property that lies immediately above the bored tunnels on the basis that the presence of the tunnel and its possible effects will make affected property less attractive than equivalent properties that are not above the tunnel. Another concern is that the introduction of the metro (and developments that may be permitted in association with it) could fundamentally change the character of areas of Dublin and give rise to revision of planning zones and status.
- 3.8.2 RPA has commented as follows (see Appendix 3, Volume III):

"There is no evidence to suggest that the presence of a tunnel beneath a property affects the property value. An examination of sales of property over Dublin Port Tunnel suggests that the presence of the tunnel does not affect sales price. Experience is that property values increase in the vicinity of high quality public transport services.

"Part of the benefit of Metro is that it will allow development along its length, contributing to economic growth. Development along the route of Metro will be controlled by the normal planning process, so that only appropriate development should result. The presence of Metro will reduce the need for future developments to incorporate very high volumes of car parking spaces."

3.9 Control of contractor performance and what will happen if things go wrong

3.9.1 Residents are particularly keen to ensure that there is a robust and responsive system for managing complaints and rectifying unforeseen damage or nuisance that may occur during the construction phase. Based on their understanding of the experience of residents affected by the construction of the Dublin Port Tunnel, and problems that have been experienced elsewhere in Dublin with construction projects such as the Mater Hospital redevelopment, they expect the RPA to put in place a system with the following key features:

- A 24 hour 'hotline' with a guarantee that the phone will be answered.
- An agreed process for considering and responding to complaints and concerns.
- A commitment to putting right any damage caused without involving those affected in disputes about liability.
- Wide distribution of clear and unambiguous literature informing people how they can make a complaint or raise a concern.
- Nomination of local representatives to be points of contact for residents, the RPA and the contractors.
- Regular updates as to progress of the works and the forward plans, particularly as they will affect residents (*e.g.* regular updates as to where the TBMs are working on a particular day and the forward plan over the following days or weeks).
- Dissemination of monitoring information in a transparent way.

3.9.2 Residents are particularly keen to agree the details of such a scheme with the RPA and its chosen contractor before the construction commences and ideally in advance of the oral hearing.

Comment

3.9.3 The RPA has indicated its support for such a system (reflecting the importance they attach to avoiding the problems that were experienced with the Dublin Port Tunnel) and we understand that they have made significant progress in developing proposals for discussion. The Property Owners' Protection Scheme that they have already developed (see paragraphs 3.2.9 to 3.2.12 above) will be an important part of the agreed scheme.

3.9.4 Some detailed comments and undertakings from the RPA are set out in section 5.3.27 of the document at Appendix 3, Volume III. Further comments received from the RPA since the issue of the final draft report in December 2008 are reproduced below:

The public will be given a free phone number for reporting complaints.

This hotline will be manned at all times during construction by a team competent to answer questions within a specified period of time. Further details of this service will be developed in due course, well before construction begins.

General information on the progress of Metro North is already available on www.rpa.ie.

3.10 Light pollution

3.10.1 Residents have asked about proposals for lighting at construction compounds and, during the operational phase, at stations and other facilities associated with the metro. They have expressed concerns that this will be intrusive. As far as we are aware, there are no specific proposals in the documentation in relation to lighting, but it is considered in the EIS in Chapter 8 of each of the books of Volume 2 (Flora and Fauna) and also in Chapter 13 (Landscape and Visual). We have not reviewed these chapters in detail but note that the following statements are made:

"Lighting of compounds and work sites will be restricted to agreed working hours and that which is necessary for security"
(paragraph 13.4.2.1 in Volume 2, Books 1-7, Chapter 13)

"- Construction/security/scheme lighting will be kept to a minimum and directed away from sensitive receptors (e.g. badger setts, otter holts, bat foraging habitats). All light will be directed downwards and the height of the light columns will be as low as possible, taking safety and visibility requirements into account. Low pressure sodium lighting will be used where possible as these lights have been shown to attract the lowest numbers of prey insects which attract feeding bats. Construction compounds will not be illuminated at night when working has ceased to avoid impacts to bats.

- Night time lighting at construction compounds will be restricted to the minimum necessary for safety purposes, to reduce the risk of disturbance impacts on bats and otters."
(paragraph 8.4.2 in Volume 2, Books 1-7, Chapter 8)

4. LOCATION-SPECIFIC ISSUES

4.1 Impact of construction of Parnell Square station on Colaiste Scoil Mhuire

4.1.1 Colaiste Scoil Mhuire is a school which will be very close to the proposed Parnell Square stop. The impact of noise on students' ability to concentrate and hear in the classrooms is a matter of concern. The school is in a listed building, and some mitigation measures such as the installation of double glazing cannot be implemented. The building is also at full capacity and it will not be practical to move students away from the façade immediately adjacent to the street where the works will be taking place.

4.1.2 There is also concern that disruption to routes to and from school and the likely length of time for which the disruption will go on will adversely affect enrolments in the school and retention of pupils.

4.1.3 The school board is in active discussions with RPA to identify workable solutions to mitigate the impact of the works on the school. There is a description of the techniques employed in constructing underground stations of the type proposed at Parnell Square at Section 3.2 in Volume I of this report.

4.1.4 Since the October draft of this report, the School Board has sent to RPA a document highlighting its concerns in more detail. We are advised that further meetings have taken place or are planned to identify mitigation methods appropriate at this location.

4.2 Drumcondra Station

- 4.2.1 The design of Drumcondra Station is intensely disliked by the residents we have met and is considered not to be sympathetic with the building façades on either side. There is also great concern about the arrangements for crossing the Drumcondra Road from the station entrance. Drumcondra Station will be one of the stations closest to Croke Park and residents argue that it will be impractical for the huge numbers of fans travelling to Croke Park to cross the road on match days without causing congestion on the pavements and/or the road. They would prefer to see a pedestrian bridge and/or an underpass.
- 4.2.2 RPA has provided comment on this issue in the document at Appendix 3, Volume III.

4.3 Construction and operation of St Patrick's ventilation shaft

- 4.3.1 Residents in the vicinity of St Patricks' ventilation shaft have expressed concern about the environmental effects during construction (described in a general way above) but also about the potential for noise and emissions from the ventilation system *via* the shaft during the operation of the metro.
- 4.3.2 Ventilation fan noise is discussed in Section 4.2 of Volume I of this report.
- 4.3.3 RPA responded to a range of questions about the operation of this facility in September to Residents for Realignment and it is expected that this dialogue will continue. Residents for Realignment also submitted a series of questions to the Independent Engineering Expert panel in January 2009; these and our answers to them are recorded in Appendix 4 to this report (see Volume III).

4.4 Construction of the crossover tunnel

- 4.4.1 Residents in the vicinity of the proposed crossover tunnel beneath St Patrick's College playing fields have expressed concern about the impacts of the construction of this element of the scheme. .
- 4.4.2 In particular, they seek information and reassurance about the following:
- The impact of blasting;
 - The proposals for spoil removal (*via* the ventilation shaft or *via* the main tunnel spoil disposal route?);
 - Any effects of the installation of rock bolts.
- 4.4.3 The RPA has provided responses to these points in Volume III, Appendix 3 (numbered 5.4.7. We note that it is said there that the EIS recommends limits on blasting; as is discussed in Section 4.3 of Volume I of this report, this is not strictly accurate. Blast vibration magnitudes are defined but limits are not set out.
- 4.4.4 The tunnelling questions and answers in Appendix 4, Volume III of this report include several which relate to the construction of the crossover tunnel.

4.5 Griffith Avenue Station

- 4.5.1 Concern has been expressed regarding the design of Griffith Avenue Station Plaza with respect to the avoidance of anti-social behaviour. There are also concerns relating to the potential for loss of trees.

- 4.5.2 It is a firm proposal in the Railway Order Application to retain all of the Plain trees along Griffith Avenue and we have checked on the engineering drawings and can confirm that this is possible both during construction and during operation. We believe that there may be some other trees at or close to the site which residents would like to see retained.
- 4.5.3 RPA's response to the concerns set out above can be found in Appendix 3, Volume III of this report (numbered 5.4.9). Since the issue October draft report, GADRA has asked a detailed set of questions about the design of the station and drawn attention to some aspects of the Railway Order Drawings that appear to be draughting errors. We understand that RPA is working to provide the detailed information and clarification that they have asked for.
- 4.5.4 There have also been questions asked by residents of Courtlands relating to the relationship between Griffith Avenue Stop and the proposed DCU development planned for this area. As well as providing references to relevant drawings in the Railway Order Application, we provided the following feedback in relation to the DCU development:
- 4.5.5 *"No application has so far been made for the DCU development and therefore that there is no certainty whatsoever that the DCU development will be built concurrently with the Metro. The only application is for construction of Dublin Metro on this piece of land. Accordingly, whether or not DCU wishes to progress their development concurrently with the Metro, their ability to do so will depend on succeeding in obtaining planning permission to do so. Their application will have to be accompanied by an Environmental Impact Statement which will have to consider (and justify) the cumulative impacts of the construction phase of the project if it is to be concurrent with station construction and consider and justify the cumulative impact of their development with the metro in place. We have not seen DCU's plans and so cannot comment on any details of their proposals".*

4.6 Impact of tunnelling and metro operation beneath Corpus Christi Girls' National School

- 4.6.1 The bored tunnel route passes beneath the Corpus Christi Girls' National School buildings. The School Board is extremely concerned not only about the potential for settlement and vibration damage to the structure during construction but also about long term effects associated with the operation of the metro immediately beneath the school. They are seeking reassurances on a range of subjects relating to effects on human health that there is 'no risk'.
- 4.6.2 They do not understand why it is not possible to move the tunnels so as to utilise the green space around the school and between the school and the church and thereby avoid any residual risks to the children and staff, however small (*i.e.* they argue for a precautionary principle to apply). They note that the alignment was chosen deliberately to avoid a hospital for vulnerable adults on Hampstead Avenue and cannot understand why the same consideration was not extended to young children. They also observe that a minor realignment to avoid the school should not result in an increase in the number of houses beneath which the tunnel would pass (although some new properties would be affected and some currently affected would be excluded), and that the curves required here to ensure reaching the Griffith Avenue Station at its proposed location would be no more extreme than those proposed elsewhere along the line.
- 4.6.3 The RPA's responses in this regard are recorded in Appendix 3, Volume III (numbered 5.4.11). As is noted in Section 4.6 of Volume I of this report, the amount of settlement predicted where there will be intact rock above the top of the tunnel will be considerably

smaller than that expected in lengths of tunnel where the top of the tunnel will be in sediments on top of the rock (*i.e.* above rockhead). Reference to the table in Appendix 2, Volume III demonstrates that, beneath Corpus Christi GNS, there will be rock cover above the top of the tunnel.

4.7 Tunnel launch site in Albert Park

4.7.1 Residents who live close to Albert Park are concerned about the following effects during the period of its use as a tunnel launch site and temporary storage/despatch location for tunnel spoil:

- Noise;
- Dust;
- Vibration;
- Appearance of the perimeter fencing;
- Impact on property prices and ability of residents to sell their homes during the period of operation of the site;
- The potential polluting impact of chemical treatments that may be used for ground improvement where the tunnel passes from superficial materials into bedrock;
- Surface water discharge and flooding; and
- Construction traffic and spoil lorries on local roads (danger, congestion, emissions *etc.*).

4.7.2 Residents in this area are seeking assurances that traffic planning will include a parking plan (and restrictions on parking by contractors in residential streets such as Hampstead Avenue). They are also expecting a world class monitoring system for all the impacts controlled by the Railway Order and would like to see a Property Owners' Protection Scheme that covers a wider range of impacts on property owners than just structural damage (to include dust nuisance, fumes, parking, noise, stress, anxiety *etc.*)

4.7.3 There are currently no details of the way in which this site will be operated, its layout and access arrangements; these are matters for the contractor. As described in Section 3.1 in Volume I of this report this is a situation that is to be expected at this stage of the planning and design process. However, the uncertainty to which this gives rise is considerable. It is unusual, in our experience, for such an important element of such a major scheme (and one which will be operating night and day for up to 6 years) not to have been described in rather more detail in the EIS and its impacts predicted and assessed taking a range of possible scenarios.

4.7.4 As indicated in Section 3 above, it will be important that conditions are set so as to ensure that the contractor's design and planning are regulated by appropriate environmental constraints. We would normally expect that the planning authority would require details of the activities to be carried out at the site and the environmental protection measures proposed to be submitted and approved before work commences.

4.7.5 Since the October draft, residents who live close to the tunnel launch site have also expressed concern about intrusive lighting, the possibility of tunnel spoil mounds being visible from outside the site, the effects of ground improvement likely to be required as the tunnel passes from sediments into rock just north of Hampstead Avenue, and the environmental consequences of any ground improvement works that may be necessary in

this location (particularly in respect of the introduction of hazardous substances which may pollute groundwater).

4.7.6 Residents of Hampstead Avenue and nearby streets are most concerned that the tunnel alignment, where it emerges from the park, should be kept east of the gate lodge on Hampstead Avenue where there are abundant green areas (we understand that they have petitioned RPA on this subject and that this concern has been expressed in particular in relation to their opposition to the movement of the DCU Stop into the park (see below). They are also concerned about the implications of the lateral limits of deviation, which they regard to be too large, and increase the risk that a contractor will construct the tunnel in a position that will adversely impact on their properties.

4.8 Construction and operation of Dublin City University (DCU) stop and its proposed location

4.8.1 There has been considerable public debate and consultation about the location of the DCU Stop and whether the line should be elevated or in cut and cover tunnel where it leaves Albert Park and passes along this part of the Ballymun Road. This is reported in the EIS in Volume 1, Chapters 5 (Alternatives) and 7 (Consultation).

4.8.2 Residents of the Ballymun Road and Albert College Estate, whilst welcoming the decision to amend the reference design to put the line and station underground (the original proposal was for elevated track), remain extremely unhappy about the proposed location of the DCU stop on the narrow strip of green space immediately adjacent to the Albert College estate, a scout hut and sheltered accommodation for elderly people. They object not only to its location, but also to aspects of its size and appearance, as well as to the fact that it has an entrance at either end, which they regard as unnecessary.

4.8.3 Part of the consultation described in Chapter 7 of Volume 1 of the EIS involved circulation of four possible options for the location and construction of this station and canvassing of local opinion regarding preferences. The residents consider that the consultation exercise described in outline in the EIS was biased by the way the four options were described to those consulted and that the analysis of the returns was statistically flawed. They contend that the effect of the fundamental flaws in this consultation process was to afford more weight to the opinions of occasional park users who live a considerable distance from the DCU stop location (and had been mobilised by an alarmist campaign relating to the loss of the park and the knock on effects to the alignment to the south) than to those who would be most directly affected by the construction and operation of the stop.

4.8.4 According to the EIS, a stop in Albert Park was rejected in favour of the location shown in the Railway Order Application on the basis of the permanent effects of the stop on ecological value of the park and the permanent loss of a football pitch. The residents feel that the very considerable impacts on them during construction and operation of the station should have been afforded greater weight in comparison with the ecological and amenity considerations at the park. They remain convinced that it should be possible to construct a station in the corner of the park with minimal (or no) permanent ecological impact beyond that which will arise from the significant disturbance in this area which will occur in any event and without any or any significant loss of sports facilities and open space. They have repeatedly asked RPA to commission an independent examination of the feasibility of this option (option 4 or a variant of option 4) and a comparative analysis with the option taken forward to the Reference Design. They do not see themselves as being on the opposite side of an argument with residents to the south, who are implacably opposed to a station within the park because of the effect that they believe it will have on

the tunnel alignment and fears of significant loss of the park area; they believe that there is a 'win-win' situation if only there was commitment to considering the options rationally and objectively.

4.8.5 The text below is an excerpt from a submission made to RPA by Ballymun Road Area Association (BRAA) and Albert College Residents' Association (ACRA) in September 2007:

1. *"We also take this opportunity to reiterate our request for the funded services of a suitable independent expert to enable certain issues to be assessed and clarified in a balanced and constructive manner."*
2. *"It is our hope that by this submission, and by the follow through work in conjunction with the requested independent expert, an agreed solution centred around Option 4 can be arrived at, which once again would represent a "win win" for all concerned."*
3. *"Furthermore, we recognise that in adopting Option 4, there are consequential issues and opportunities that will call for further investigation. (This would apply with any option). Moreover, there is still scope for adjustment and refinement of this option towards achieving further improvement in the direction of an optimized solution. We are prepared to participate in the process, aided by the requested resourcing of an independent technical expert."*
4. *"We submit that there is scope for adjustment and refinement to Option 4 which would further optimise the functionality and quality of the solution it offers. Among the points for further clarification and creative development are:*
 - * *Potential to optimise the footprint of the station by moving its commencement point slightly northward and slightly westward*
 - * *The alignment curvature issue, consistent with maintaining compatibility with GADRA objectives*
 - * *Examination of park restoration options to accommodate, inter alia, football pitches*
 - * *The most suitable ventilation duct and plantroom arrangements*
 - * *Empathetic landscaping of the station*
 - * *Arrangements for ventilation buildings*
 - * *Arrangements for emergency exits."*

4.8.6 The residents note that the established trees at the north-west corner of Albert Park, where the station would be located, will be removed in any event as part of the proposed scheme to allow the cut and cover tunnels to be constructed. They therefore argue that the ecological impact of a new station with an equivalent or greater number of trees planted around it on the eastern and southern sides would represent no greater adverse ecological impact than the re-establishment of trees in the current locations. With imaginative engineering and a willingness to seek a suitable compromise solution, they believe that, if extended slightly outside the park boundary, it may also be possible to re-establish a football pitch when the park is reinstated following decommissioning of the tunnel launch site.

- 4.8.7 The RPA comment on these points (as set out in the October draft of this report) is included in Volume III, Appendix 3 (numbered 5.4.16 and 5.4.17).

Comment

4.8.8 It has become apparent to us in our discussions with residents' groups covering areas immediately to the south of Albert College Park that it is widely believed that any movement of the station into the park would have a knock on effect (for engineering reasons) on the alignment of the tunnels to the south. This belief appears to have been a key reason for mobilising support during the consultation period in Autumn 2007 for options 1 and 2 (station location next to the Albert College estate). It appears to us that these fears are unfounded for two reasons. First, RPA (*via* its chief engineer, Mr Rory O'Connor) has reportedly told representatives of residents of Ballymun Road, Albert College and Hampstead Park that this was a misconception at the time of the consultation. Second, the position of the tunnels and station shown schematically on the Option 4 sketch circulated with the consultation is in almost exactly the same place as the Reference Design alignment now proposed.

4.8.9 It is beyond our brief to undertake the independent engineering evaluation that has been requested by the residents of the section of the Ballymun Road nearest to the DCU stop and the residents of Albert College estate. However, this seems to us to be a reasonable request, even now, given the extremely brief treatment of the subject in the EIS and the evident significant adverse effects of construction and operation of this station on those who live close to it. It does appear that station design options such as locating entrances to the station in the pavement or road verges to allow the 'roof' of the station to be part of a playing field, have not been considered in detail.

4.9 Footbridge linking clubhouse facilities and pitches at Fingallians' GAA club

4.9.1 Fingallians GAA Club currently has a footbridge between its club house and eastern pitches and pitches on the western side of the R132. This is used by large numbers of children on a regular basis and enables them to cross safely with the minimum of adult supervision before, during and after training sessions. It is proposed that the metro will be elevated at this point and that the bridge will have to be removed to make way for it. The Club has asked for a replacement bridge to be provided further north but RPA engineers prefer a road level crossing controlled by traffic lights, which the Club does not consider to be safe or appropriate.

4.9.2 We understand that agreement has now been reached between RPA and Fingallians' GAA Club for the provision of a new footbridge further north. The comments numbered 5.4.20 in Appendix 3, Volume III are therefore superseded.

4.10 Proposed elevated section of track adjacent to Carlton Court, Swords

4.10.1 Carlton Court, Swords is a residential street parallel to and on the west side of the R132 and north of Pinnock Hill Roundabout. Carlton Court is separated from the road by a substantial row of trees, which provide good visual screening when in leaf. It is proposed that the line will be elevated by around 7m to clear the Pinnock Hill Roundabout and fall to road level approximately half way along Carlton Court. The residents have been provided with an artist's impression showing a train on the elevated section in the winter. They observe that the trees do not provide any screening and that the trains will be clearly

visible from a number of the houses. They are very concerned about visual impact, privacy issues, noise and vibration and would prefer the line to cross the Pinnock Hill Roundabout in an underpass. RPA has rejected this proposal on the basis that Fosterstown Stop would have to be underground to achieve this and this reduces accessibility. The residents do not think this is correct; they feel that the stop could be in a cutting without adverse impacts on accessibility.

4.10.2 RPA has stated its position in the document at Volume III, Appendix 3. The Carlton Court residents have made submissions to An Bord Pleanála putting their case for an underpass but they are also keen on exploring with the RPA potential mitigation measures to address privacy and noise issues through screening erected immediately alongside the track (*i.e.* attached to the structure of the elevated section if the current proposal for elevated track prevails). In discussions and correspondence, the RPA appear to have dismissed any such screening options as being too visually intrusive; in our view, this is not a foregone conclusion and trackside screening solutions would merit further consideration. If the Carlton Court residents are faced with a choice between reduced noise from train wheels and possibly also a remedy to the privacy issues at night, and changes to the visual appearance of an already very substantial structure, they could express an informed preference. Their acceptance of a trackside screening option would not give rise to impacts on any other group and so it is difficult to understand RPA's rejection of the idea.

4.10.3 Discussions between the Carlton Court residents and the RPA in late 2008 and early 2009 led to an artist's impression being produced by the RPA that shows a substantial wall high enough to screen views of the elevated section from upstairs windows. This wall would be oppressive and is not something that the residents wish for (RPA would not, in any event, be prepared to offer it).

4.11 Construction and operation of the depot, station and park and ride facilities at Belinstown and the location of the car parks and access points

4.11.1 The residents who live along Batter Lane and other roads in the vicinity of the proposed station, depot and multi-storey car park and ride facility at Belinstown are extremely concerned about the impact of the construction and operation of this facility.

4.11.2 They particularly feel that the proposed location of the multi-storey car parks brings a substantial building far too close to properties, giving rise to inevitable disturbance during construction and the prospect of noise and traffic in a currently quiet rural location. They also feel that the character of this rural area will be completely changed by the facility.

4.11.3 The residents of the area around the proposed Batter Lane facilities are generally aware of emerging proposals by Fingal County Council to construct a Swords bypass and to extend the limits of Swords to the north. They would like to see a 'joined up' approach to strategic planning of infrastructure and related development in this area so as to give them the opportunity to evaluate the overall and cumulative impacts of what is proposed and in the 'pipeline'.

4.11.4 They would like to see a dedicated access road inside the site boundary so as to avoid completely the use of Batter Lane for access to the facility and cannot understand why, given the size of the site, the multi-storey car parks have been positioned so close to properties.

- 4.11.5 They are also concerned about the effects of the scheme on flood risk. They note that flooding is already a problem at this locality and residents have always understood flood risk to be a major planning constraint on development, in the catchment of the Broad Meadow River, so they are concerned to see proposals for land raising, buildings and other structures in the catchment in an area close to the edge of the flood plain.
- 4.11.6 RPA has responded to these concerns in Appendix 3, Volume III, in numbered points 5.4.26 and 5.4.27.

4.12 Long term temporary loss of sports facilities in Albert College Park

- 4.12.1 Na Fianna CLG currently uses sports pitches in Albert College Park and elsewhere in the City to coordinate sporting and cultural activities for over 2500 members and field approx 100 teams in various Gaelic sporting codes, with an emphasis on juvenile players. The Albert College Park pitches were used in 2007 for in excess of 80 games. Na Fianna is extremely concerned about the implications of the withdrawal of public sporting facilities currently in use at Albert College for several years due to the proposed use of part of Albert College Park for the tunnel launch site, especially in light of difficulties that it already experiences in obtaining access to sufficient facilities to meet the demand of its teams.
- 4.12.2 Na Fianna believes that the onus for provision of alternative facilities should be a condition of planning approval. Since the final draft of this report was issued in December 2008, we understand that RPA has informed Na Fianna of an agreement reached with Dublin City Council to provide a financial contribution to the Council to allow them to provide alternative pitches for all of the users of the pitches in Albert College Park.

4.13 Impacts of the scheme on the Axis Arts Centre and Theatre

- 4.13.1 Representatives of the Forum for the Arts, Ballymun and the management of the Axis Arts Centre and Theatre have expressed the following concerns about the construction and operation of the Metro, and particularly Ballymun Stop.

Concerns relating to the design of the interface between the stop and the Plaza to the east of the station

- 4.13.2 Representatives of the Forum for the Arts object to the design of the proposed plaza (referred to as the "Rummey Design") on the East side of the station; this plaza development has yet to be granted permission. They appreciate that the design of the metro stops at the entrance to the station but they have concerns that the metro has been designed assuming that the plaza will be constructed as shown and that the promoters of the "Rummey Design" will justify their scheme on the basis that this is the only scheme that will fit with the proposed metro. In other words, Forum for the Arts wishes to be reassured that the "Rummey Design" for the plaza has not 'driven' the design of the station entrance and vice versa, such that public debate about alternatives would now be futile.
- 4.13.3 The particular concerns about the plaza are that the amphitheatre bowl and pavilion, with its steep steps, offer an unfriendly and unsafe prospect to passengers and patrons (both the aged and the very young).

4.13.4 The RPA has told us that the design of the entrance does not depend on the plaza being constructed according to the "Rummey Design" and this is why the details are 'greyed out' on the design drawings. We understand that, if the Plaza 'amphitheatre' were not to be constructed as shown, this would not alter the design of the east entrance to the station. The station would still be accessed *via* open steps along the eastern wall and this wall and part of the roof would be glazed as shown to introduce natural light to the entrance hall. The difference from what is shown on the 'structures' drawings in the Railway Order Application would be that the stairwell in front of the station would be more restricted in size and there would be a high retaining wall on the east side of the staircase (rather than the more open 'amphitheatre'. It appears that it would be equally feasible to have a totally underground staircase on this side as is proposed on the west side of the station, where the station entrances are set into the pavement.

Concerns relating to the construction period

4.13.5 The east entrance of Ballymun Stop will be approximately 75m from the façade of the Axis Centre. Whilst recognising that there is a reasonable separation distance between the centre and the construction works, representatives of those involved with the arts centre have expressed general concern about the effects of noise, dust, vibration *etc* during the construction. They do accept that these impacts will be largely confined to the daytime, when theatre use is limited. Of greater concern to them is the effect that the works may have on public access to the centre if it becomes difficult to cross the Ballymun Road, when there are excavations going on.

4.13.6 We feel sure that the contractor should be able to develop an acceptable pedestrian safety and access plan to ensure that residents of Ballymun who use the Axis facilities can traverse the construction site safely and conveniently.

Concerns relating to the operation of the metro and the station

4.13.7 When the metro is operating, the main concern of those associated with the Axis Theatre is the potential for groundborne noise disrupting theatrical performances or affecting the basement recording studio facilities. We understand that the RPA has confirmed that they will offer the Axis Theatre (and recording studio) the same upper limit on groundborne noise (*i.e.* 25dB) as will apply to other theatres along the route. It may be that separation distance alone can be shown to be sufficient to achieve this without deploying floating slab track. However, if this is not the case, the inclusion of floating slab track along this length of line would certainly limit the ground borne noise to the negligible levels offered to other theatres elsewhere along the alignment.

**Dublin Metro North Independent Expert Panel
March 2009**