Our Case Number: ABP-314724-22

Planning Authority Reference Number:

Your Reference: OPW National History Museum

An Bord Pleanála

Downey Planning
29 Merrion Square
Dublin 2
D02 RW64

Date: 24 January 2023

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

Dear Sir / Madam,

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

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

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

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

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

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

Teil	**Tel**	(01) 858 8100
Glao Áitiúil	**LoCall**	1890 275 175
Facs	**Fax**	(01) 872 2684
Láithreán Gréasáin	**Website**	www.pleanala.ie
Ríomhphost	**Email**	bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

Yours faithfully,

pp EM

Niamh Thornton
Executive Officer
Direct Line: 01-8737247

Teil	**Tel**	(01) 858 8100
Glao Áitiúil	**LoCall**	1890 275 175
Facs	**Fax**	(01) 872 2684
Láithreán Gréasáin	**Website**	www.pleanala.ie
Ríomhphost	**Email**	bord@pleanala.ie

64 Sráid Maoilbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902

OPW Oifig na nOibreacha Poiblí Office of Public Works

16th January 2023

An Bord Pleanála
64 Marlborough Street
Dublin 1
D01 V902

Re: Railway (Metrolink–Estuary to Charlemont via Dublin Airport) Order 2022 – Submissions by the Commissioners of Public Works in Ireland

To whom it may concern,

The Commissioners of Public Works in Ireland (hereinafter, The Office of Public Works (OPW)), wish to express their overall support for the Metrolink project and welcome the economic, social and tourism benefits of this major transport infrastructure to the city of Dublin.

The OPW is presenting individual submissions for consideration by An Bord Pleanála, as part of the Railway (Metrolink–Estuary to Charlemont via Dublin Airport) Order 2022 process. This cover letter forms part of the overall submission(s) and introduces observations relating to properties owned, controlled, or for which the OPW has a responsibility, along the proposed railway route.

Any issues raised in these submissions stem from the statutory role and responsibility of the Commissioners of Public Works to ensure the protection and preservation of critical State properties, historic/national monuments and the continuity of State business throughout the project.

The OPW wishes to acknowledge the positive engagement between officials from TII and the OPW over the past number of years. However, we note that there are a number of outstanding matters relating to the construction and operation phases of Metrolink which they would wish to have addressed as part of the confirmation process. While specific issues have been identified in the submissions prepared by Downey Planning,

Ceann Oifig, Sráid Jonathan Swift, Baile Átha Troim, Co. na Mí, C15 NX36
Head Office, Jonathan Swift Street, Trim, Co. Meath, C15 NX36
T +353 46 942 6000 | info@opw.ie
www.opw.ie

who have been retained as consultants advising the OPW, this covering letter sets out some, more general comments for consideration by An Bord Pleanála.

It should be noted that the submissions now made are based on the information provided at this consultation phase. Critical aspects of this project relating to physical construction methodologies have not yet been determined and, therefore, a full analysis of any impacts on properties is not possible. In that regard, submissions are only possible and limited to the information that has been made available at this juncture.

Legal Requirements

As noted above, the OPW is supportive of the Metrolink project. However, this is subject to all statutory requirements being complied with, in light of the Commissioners' duties under the Commissioners of Public Works (Functions and Powers) Act 1996 and other Acts.

Apart from that broad statutory provision, there are two specific statutory provisions to draw to the Bord's attention.

First, s.15 of the St Stephen's Green (Dublin) Act 1877 (the "**1877 Act**") provides that the Commissioners of Public Works shall maintain St. Stephen's Green as an ornamental park or pleasure ground for the recreation or enjoyment of the public and may erect any lodges or ornamental buildings or indeed provide ornamental fountains or waterworks.

This is subject to s.116 of the Dublin Transport Act 2008 (the "**2008 Act**") which dis-applies s.15 of the 1877 Act

A. to anything done for the purposes of surveys and inspections under s.36 of the Transport (Railway Infrastructure) Act 2001 (the "**2001 Act**"),
B. to any railway works (within the meaning of s.2 of the 2001 Act) carried out on or under Saint Stephen's Green pursuant to a railway order under s.43 of the 2001 Act, or
C. to restrict the operation of a railway, light railway or metro (within the meaning of s.2 of the 2001 Act) on or under Saint Stephen's Green.

While the OPW is of the view that this section is broad enough to capture the elements of construction and operation of the Metrolink project, insofar as it potentially affects or impacts on St. Stephen's Green, it only dis-applies s.15 of the 1877 Act in those particular circumstances and does not repeal same. Therefore, the confirmation of the Railway Order should ensure that the proposed Metrolink project properly falls into one or more of the criteria in s.116 of the 2008 Act.

Secondly, the Commissioners of Public Works are of the view that the requirements in the National Monuments Act 1930, as amended, would have to be complied with, irrespective of the confirmation of the Railway Order and that a Ministerial consent or consents will have to be obtained by TII where there is potential demolition of a national monument.

There is a further consideration that s.14D of the 1930 Act was inserted by the European Union (Environmental Impact Assessment of Proposed Demolition of National Monuments) Regulations 2012 (S.I. No.249/2012) (the "**2012 Regulations**") to give effect to the Environmental Impact Assessment ("**EIA**") Directive. The 2012 Regulations require the carrying out of an EIA where a decision to grant consent under s.14(2)(a) of the 1930 Act, or to issue directions under s.14A(4)(d) of that Act, would result in the demolition of a national monument. Thus, where the Minister is considering whether or not to grant a consent or issue directions, as the case may be, and it appears to the Minister that the granting of the consent or the issuing of the directions, as the case may be, would result in the demolition of a national monument but the applicant has not submitted an environmental impact statement ("**EIS**") (now an environmental impact assessment report ("**EIAR**")) to the Minister, the Minister is obliged to call for an EIAR to be submitted.

In particular, given the scale of loss of foliage at Saint Stephen's Green Park (which is a designated national monument), the proposed project could be deemed to amount to the destruction of part of a national monument and therefore a Ministerial consent will be required under the National Monuments legislation. While this will be required in any event, it is recommended that an express condition be attached to the railway order and have proposed some suggested wording later in this submission.

Staged Assessments

In the Railway Order application, the EIAR refers to Stage 3 assessments for certain properties of historical significance, cultural or monument status or protected structures. This will be a critical factor for the OPW and a requirement for detailed consultation in relation to the design development phase of the project. It is not possible at this stage to assess or fully comprehend the extent of the impacts on sensitive and historic properties. Therefore, it is imperative that the OPW is afforded an opportunity to input into this critical stage in the process, to protect such significant structures and ensure the success of the project overall for the State. Accordingly, it is recommended that the Bord exercises its power under s.43 of the Transport (Railway Infrastructure Act 2001) and attach a condition to the confirmation of the railway order which requires TII to consult with, (and provide and agree method statements), the OPW in advance of works being carried out. The proposed wording is set out later in this submission.

The properties for which a Stage 3 assessment is critical are listed in Appendix A.

In addition, while Stages 4 and 5 are not included in the Railway Order application or EIAR, the OPW considers these stages as key to the success of the project overall. The OPW would welcome the inclusion of the Stages in the process, to facilitate a process of monitoring the necessary mitigations implemented, in advance of closing out the completion of the project. These stages are further described in Appendix D. Additionally, any issues arising in Stages 3 and beyond, that result in material changes to the scheme and/or impacts on properties not set out in this current Railway Order Application should necessitate a new, additional Railway Order application, as it is likely to be materially different to that submitted in this current application. Alternatively, the Railway Order should be amended and the OPW would draw the Bord's attention to s.146D of the Planning and Development Act 2000, as inserted by s.30 of the Planning and Development (Strategic Infrastructure) Act 2006, which allows for the amendment of railway orders.

On a related point, clarity from TII is required on apparent discrepancies between drawings submitted by TII in the Railway Order. In particular, the tunnel alignment on contour drawings appear incorrect in certain places and this is referenced in some of the individual property submissions.

Property Submissions

There are individual submissions accompanying this letter with detailed observations on each property. We respectfully request that these detailed observations are considered by An Bord Pleanála and that the OPW is afforded the opportunity to discuss those observations at an oral hearing in due course. The opportunity to present at an oral hearing would be considered an important part of the process, given the national significance of the State properties that may be impacted by the Metrolink development. These include St. Stephen's Green Park (a national monument), the Houses of the Oireachtas, Government Buildings, the Cultural Institutions such as the National Museum, the National Gallery, the National Concert Hall and the GPO, among others.

In summary, the individual submissions to An Bord Pleanála cover a number of matters relating to State properties, including:

- **Building type**: All of the historic properties in the Government business district in Dublin 2, in particular, will have varying levels of sensitivity to settlement, vibration, etc. A number of these also house equipment that is sensitive to vibration, noise, etc. and have lower ground operational areas or deep foundations. The OPW would respectfully request that an express condition be

attached to the railway order that acknowledges and mitigates any adverse impact on the subject properties.

- **Future developments**: The OPW would seek to ensure that the routing of any MetroLink tunnel would not limit the State's capacity to develop its property - vertically or horizontally - particularly around or below Leinster House, Government Buildings, the National Gallery, the National Museum, and the National Concert Hall complexes. By way of example - the future of the National Concert Hall (NCH) property includes a Master Plan, currently being developed, and envisages a new Children's Science Museum on the complex. Planning Permission is in place for some extensive developments, including lower levels of buildings that may impact the MetroLink tunnel.

  The OPW would respectfully request that an express condition be attached to the railway order that acknowledges and mitigates any restrictions on future development of the subject properties.

- **Security**: The Preferred Route runs beneath the Dáil, Seanad, and Committee Chambers, as well as Government Buildings. A thorough risk assessment from the perspectives of State security will be critical to understanding the implications during any construction and operating phases.

  The OPW would respectfully request that an express condition be attached to the railway order that acknowledges and mitigates any adverse impact on the security of the subject properties.

- **Vibration, Noise, Electromagnetic Radiation and Interference**: The Oireachtas Chambers have extremely low tolerance for any external noise, vibration, or electromagnetic interference during and post construction.

  The National Museum of Ireland holds the National Archaeological Collection on behalf of the State. The National Collection contains hundreds of thousands of objects including fragile artefacts such as prehistoric ceramic vessels, and Greek and Roman ceramic and glass vessels. The National Gallery of Ireland, in particular, has concerns about the effect of ongoing low-level vibrations on priceless paintings in the State collection.

  In terms of the National Concert Hall's activities, the impact of noise and vibration during the construction and operational phases of the MetroLink are matters that would require to be mitigated.

  The former Department of Arts, Heritage and the Gaeltacht had previously expressed to the OPW the significant concerns of the Boards of Governors of the Cultural Institutions (the National Gallery, the National Museum, the National Library and the National Concert Hall).

The OPW would respectfully request that an express condition be attached to the railway order that acknowledges and mitigates any adverse impact on the subject properties.

- **Potential impacts to National Monuments:**
    - **St. Stephen's Green Park:** The OPW acts on behalf of the relevant Minister in the operation, care and maintenance of St. Stephen's Green Park; and so shares the concerns of our colleagues in the Dept. of Housing, Local Government & Heritage that the proposed station location would have a direct, severe, negative, profound and permanent impact on the heritage value of the Green.

      As presented, the proposals would not seem sufficiently sympathetic to the history and environment of the spaces within and around the Green. The OPW would urge An Bord Pleanála, when considering any Railway Order Application, to also consider the unique, inherent importance of St Stephen's Green Park to the people of Dublin and in light of the specific legal protection which has been identified above.

    - **Moore Street/Moore Lane**: The impact on the national monument properties on Moore Street now appears to be very significant, in particular in relation to the 'cut and cover' works zone proposed for the Metrolink station box. The proposed development works are very close to the boundary of the monument and includes the public roadway, Moore Lane, behind the monument site. There are also likely to be serious and lengthy impacts and disruption to the operation of a new centre of commemoration planned for the site, with a substantial State investment due to be made over the coming years.

The OPW has discussed most of these concerns with TII as part of a consultation process between our organisations over the past number of years, but would like to ensure these points are formally included in the conditions attached to any Railway Order granted.

Legal Agreements

The Commissioners of Public Works would seek to enter into appropriate, property-specific legal agreements with TII, to ensure the protection of key State properties and of the State's activities undertaken within those and other properties. Given the importance of such properties and activities, the Commissioners of Public Works consider it appropriate that An Bord Pleanála would make the Railway Order conditional on such legal agreements being in place between TII and the OPW. Creating such legal agreements between TII and the OPW would be possible only after TII make available the more detailed design and risk-mitigation measures for the construction and operational phases of the MetroLink project, and before any development begins. Therefore, the OPW would request that this aspect be reflected in the conditions set out

by An Bord Pleanála to TII, as this would provide assurances to the Commissioners of Public Works relating to future legal agreements that protect and secure State property and activities from risks associated with the construction or operations of the MetroLink.

In that regard, the OPW would suggest wording for conditions as follows (or such equivalent wording as the Bord determines appropriate). In respect of the need to ensure compliance with the National Monuments Acts:

"Prior to commencement of development, TII must ascertain whether the proposed Metrolink project will potentially result in the total or partial destruction of any national monuments and, if so, must comply with the requirements of s.14 of the National Monuments Act 1930, as amended,"

In terms of the sensitivity of the uses within many of the properties referenced in the submissions, coupled with their historic importance, the OPW respectfully requests that An Bord Pleanála consider attaching conditions to the Railway Order that ensures continuous monitoring of those properties to prevent any negative impacts. This is referenced further in the individual submissions.

In that regard, the following wording is proposed:

"Prior to commencement of development, TII will prepare detailed method statements which shall be submitted to the relevant planning authority for agreement by the planning authority. Insofar as the proposed works affect any State properties, TII shall consult and agree with the Commissioners of Public Works, and other impacted State bodies, any method statements prior to submitting to the relevant planning authority for agreement".

The OPW would also welcome the following condition to ensure that there is appropriate monitoring of the effects of the proposed Metrolink project on State parties:

"TII will be required to monitor the physical impacts of the proposed Metrolink project and future operations, on State properties in terms of noise, vibration, business interruption, loss of ecological and amenity value and submit reports (of a nature and to a standard agreed with the Commissioners and, as necessary, their clients at intervals to be agreed), to both the OPW and the relevant planning authority".

Flood Risk Management

The OPW also wishes to highlight to the Bord the area of flood risk management. As the Bord may be aware, the Guidelines on the Planning System and Flood Risk Management (DHPLG/OPW, 2009) set out a transparent framework for the

consideration of flood risk in the planning processes, including planning applications and development management. The Guidelines stress the need for a proportionate assessment of the flood risk, taking into account the potential impacts of climate change, and the need for the management of flood risk for development in flood-prone areas.

The Climate Change Sectoral Adaptation Plan for Flood Risk Management (OPW, 2019), that was approved by Government in October 2019, further emphasises the need for the consideration of the potential impacts of climate change on flooding and flood risk in the planning and design of future assets. The Metrolink will be a highly valuable piece of critical infrastructure that may well be highly vulnerable in the event of inundation, and as such, taking account of the policies referred to above, a detailed flood risk assessment might be expected of fluvial, coastal and pluvial flood risks (in addition to sealing against groundwater), with any flood risks, such as via inflow from station entrances, ventilation systems, etc., managed to a suitably high standard of protection (e.g., the 0.1% annual exceedance flood event probability), taking account of the potential impacts of climate change.

As stated above, we would respectfully welcome the opportunity to present to An Bord Pleanála at an Oral Hearing, should the Bord deem it appropriate.

Yours sincerely,

Maurice Buckley

Chairman

Appendix A:

List of properties that require Stage 3 and further Stage assessments:

- Houses of the Oireachtas, Leinster House complex
- Government Buildings
- National Gallery
- National Museum
- National Library
- Natural History Museum
- National Concert Hall
- St. Stephen's Green Park
- 14-17 Moore Street and Moore Lane
- Garden of Remembrance
- General Post Office (GPO), O'Connell Street

Appendix B: relevant correspondence between OPW and TII

- **"Re: Metrolink - Emerging Preferred Route"** – Suzanne Angley (Metrolink Stakeholder Communications Coordinator) to Chairman's Office, 21st March 2018 (by registered post)
- **"Re: Metrolink"** - Aidan Foley (Project Director, Metrolink, Transport Infrastructure Ireland) to Caoimhe Allman (Assistant Principal Officer, Property Management – Owned Properties), 28th May 2018
- **"Re: Observations of the Commissioners of Public Works in Ireland regarding the proposed MetroLink route (Emerging Preferred Route)"** - Caoimhe Allman (Assistant Principal, Property Management, Office of Public Works) to Aidan Foley (Project Director, MetroLink, Transport Infrastructure Ireland), 9th July 2018
- **"Re: Metrolink (Emerging Preferred Route)"** - Aidan Foley (Project Director, Metrolink, Transport Infrastructure Ireland) to Caoimhe Allman (Assistant Principal Officer, Property Management – Owned Properties), 8th August 2018
- **"Re: Observations of the Commissioners of Public Works regarding the proposed MetroLink route"** – Catherine Eddery (Principal Officer, Property Management – Owned Properties) to Aidan Foley (Project Director, Metrolink, Transport Infrastructure Ireland), 20th December 2018
- **"FW: Metrolink - OPW high level obs from Paul Tighe"** – Catherine Eddery (Principal Officer, Property Management – Owned Properties) to Aidan Foley (Project Director, Metrolink, Transport Infrastructure Ireland), 17th January 2019
- **"Re: Observations of the Commissioners of Public Works regarding the proposed MetroLink station at St. Stephen's Green"** - Catherine Eddery (Principal Officer, Property Management – Owned Properties) to Aidan Foley (Project Director, Metrolink, Transport Infrastructure Ireland), 5th April 2019
- **"Re: Proposed Metrolink Station at St. Stephen's Green"** - Aidan Foley (Project Director, Metrolink, Transport Infrastructure Ireland) to Catherine Eddery (Principal Officer, Property Management – Owned Properties), 9th August 2019
- **"St. Stephen's Green"** – John McMahon (Commissioner, OPW) to Michael Nolan (CEO, Transport Infrastructure Ireland), 10th June 2020
- **"Re: Metrolink Proposals for St. Stephen's Green"** – John McMahon (Commissioner, OPW to Michael Nolan (CEO, Transport Infrastructure Ireland), 20th June 2020

Appendix C: relevant meetings between OPW and TII

- **"OPW Presentation"** – 3rd May 2018
- **"TII presentation"** – 14th December 2018 (attended by Chairman)
- **"TII presentation in response to OPW concerns"** – 18th January 2019
- **"OPW St Stephen's Green Meeting"** – 22nd May 2019
- **"St. Stephen's Green"** – 12th September 2019
- **"TII MetroLink project update to OPW"** – 5th June 2020
- **"Project Update to: Office of Public Works (OPW)"** – 31st May 2021
- **"Project Update to: Office of Public Works (OPW)"** – 15th September 2022

Appendix D – Ground Movement Assessment

The following sets out the requirements for assessing the impact of ground movement resulting from underground construction, such as tunnelling, embedded wall installation, and excavation for station boxes, together with requirements for monitoring and the close out.

The Designer shall investigate the potential for ground movement associated with the design and possible construction:

a) to assess risk of building damage by identifying those zones where the implementation of the design is likely to cause ground movements which will result in risk of Damage Category 2 'Slight' being exceeded (see Table 1) or where damage exceeds the agreed tolerable limits. To assess the risks of such degrees of damage occurring and either investigate alternative designs or advise interfacing Designers that alternatives need to be considered and modify the design as necessary. To undertake an assessment of the potential consequences where there is a significant likelihood that Risk of Damage Category 2 'Slight' will be exceeded or where damage exceeds the agreed tolerable limits and identify specifically what the risks are. Design protective measures where necessary to mitigate against the risk of damage exceeding Risk of Damage Category 2 or where damage exceeds the agreed tolerable limits;
b) to demonstrate that the environmental effects of excavation induced ground movements have been considered and taken account of in the design;
c) to assess the risk of damage to utilities and to design mitigation measures in agreement with the utility owner;
d) to assess the effects of excavation to existing above-ground and underground infrastructure and to design suitable mitigation measures;
e) to indicate where property may require demolition or structural modification;
f) to enable the preparation of contingency plans to deal with residual risks.

Stage 1 – Scoping

Schedules and plans shall be prepared to identify all assets assessed to experience ground movement exceeding 1mm using conservative parameters.

Stage 2 – Initial Assessment

The designer shall carry out initial assessment calculations using simple empirically calibrated methods and moderately conservative parameters to classify the risk of damage to assets. For masonry building structures the risk should be classified in accordance with Table 1. For non-masonry buildings and infrastructure the level of risk should be determined by ensuring that deformations do not exceed tolerable values determined in consultation with the asset owner.

A schedule and plans of predicted damage shall be prepared, along with outline trigger levels.

The assessment calculations shall be based on record drawings, where available and an inspection for assessment. Assets estimated to be a risk of damage greater than Category 2 'Slight' or where damage exceeds the agreed tolerable limits require further detailed assessment at Stage 3.

Table 1 - Building damage classification

Damage Category	Description of degree of damage+	Description of typical and likely forms of repair for typical masonry buildings	Approx. crack width* (mm)	Max. tensile strain %
0	Negligible	Hairline cracks		<0.05
1	Very slight	Fine cracks easily treated during normal redecoration. Perhaps isolated slight fracture in building. Cracks in exterior visible upon close inspection	0.1 to 1.0	0.05 to 0.075
2	Slight	Cracks easily filled. Redecoration probably required. Several slight fractures inside building. Exterior cracks visible; some repainting may be required for weather tightness. Doors and windows may stick slightly	1 to 5	0.075 to 0.15
3	Moderate	Cracks may require cutting out and patching. Recurrent cracks can be masked by suitable linings. Tuck pointing and possible replacement of a small amount of exterior brickwork may be required. Doors and windows sticking. Utility services may be interrupted. Weather tightness often impaired	5 to 15 or a number of cracks greater than 3	0.15 to 0.3
4	Severe	Extensive repair involving removal and	15 to 25 but also	> 0.3

		replacement of walls especially over door and windows required. Window and door frames distorted. Floor slopes noticeably. Walls lean or bulge noticeably. Some loss of bearing in beams. Utility services disrupted	depends on number of cracks	
5	Very severe	Major repair required involving partial or complete reconstruction. Beams lose bearing, walls lean badly and required shoring. Windows broken by distortion. Danger of instability	Usually > 25 but depends on No. of cracks	

+ In assessing the degree of damage, account must be taken of its location in the building or structure.
* Crack width is only one aspect of damage and should not be used on its own as a direct measure of it.
Burland, J.P. and Wroth, C.P., Settlement of Buildings and Associated Damage, Proceedings of a
Conference on the Settlement of Structures, Cambridge, 1974, pp 611 – 54 and 764 – 810;

The heritage value of a Listed or Protected Building should be considered during the initial assessment by reviewing the sensitivity of the building structure and of any particular features together with the initial assessment calculations. The heritage assessment examines the following:

a) the sensitivity of the building / structure to ground movements and its ability to tolerate movement without significant distress. The potential for interaction with adjacent buildings / structures is also considered. A score within the range of 0-2 should be allocated to the building/structure in accordance with the criteria setout in Table 2;
b) the sensitivity to movement of particular features within the building / structure and how they might respond to ground movements. A score within the range of 0-2 should be allocated to the building in accordance with the criteria set out in Table 2.

The scores for each of the two categories (a) and (b) should be combined and added to the category determined in Stage 2 to inform the decision making process. In general,

Listed Buildings which score a total of 3 or higher should be subject to further assessment as part of the Stage 3 – Detailed Assessment. Buildings that score a total of 2 or less are predicted to suffer a degree of damage which may be easily repairable using standard conservation based techniques and hence no protective measures for the building's particular features should be required. However, ultimately the professional judgement of engineering and historic building specialists should be used to determine whether additional analysis is required.

Table 2: Scoring for Sensitivity Assessment of Listed Buildings

Criteria		
Score	**a) Sensitivity of the structure to ground movements and interaction with adjacent buildings**	**b) Sensitivity to movement of particular features within the building**
0	Masonry building with lime mortar not surrounded by other buildings. Uniform facades with no particular large openings.	No particular sensitive features
1	Buildings of delicate structural form or buildings sandwiched between modern framed buildings which are much stiffer, perhaps with one or more significant openings.	Brittle finishes, e.g. tight-jointed masonry, which are susceptible to small movements and difficult to repair.
2	Buildings which, by their structural form, will tend to concentrate all their movements in one location.	Finishes which if damaged will have a significant effect on the heritage of the building, e.g. cracks through frescos.

Stage 3 - Detailed Assessment, Mitigation Design and Monitoring Plans

The Designer shall carry out detailed assessments of structures that will be affected by the works so that any monitoring works and mitigation works can be designed and implemented.

For structures at risk of exceeding Damage Risk Category 2 'Slight' or where damage exceeds the agreed tolerable limits the designer shall undertake a detailed assessment (more rigorous) to determine:

a) the influence of the structure and its foundations on the predicted ground movements (soil/structure interaction).
b) the volume loss at which the risk of damage to the structure (or any sensitive finishes/features) is 'slight' or better;
c) whether this volume loss may be achieved by the proposed excavation design/control measures;
d) any special control measures required to reduce the predicted damage to acceptable levels (i.e. Risk Category 2 'slight' damage category and below or below the agreed tolerable limits) such as significantly higher face pressures with EPBM tunnelling and the practicality of these;
e) the amount of ground movement that the structure (and or any sensitive finishes/features) can accommodate without exceeding Damage Risk Category 2 or where damage exceeds the agreed tolerable limits;
f) the level of residual risk if intrusive mitigation measures are not implemented.

The detailed assessments should include a number of iterations to determine how the risk of damage to a building may be reduced. Asset-specific empirical models shall be prepared successively using moderately conservative and best estimate parameters. If after these iterations the use of empirical methods do not reduce the risk of building damage to acceptable levels (i.e. Damage Category 2 'slight' damage category and below or below the agreed tolerable limits), the damage assessment shall be refined by increasing the sophistication of the analysis with the aim of reducing the risk of asset damage to acceptable levels and to eliminate the asset from further assessment.

If the risk of damage cannot be shown to be reduced by detailed assessment to acceptable levels, then mitigation measures shall be designed. The primary means of settlement mitigation shall be practical measures to control ground movement by good design and construction practice. This could include staged excavation sequences within sprayed concrete lining (SCL) works, ground treatment, face stabilisation, spiling / face dowels, increasing face pressure when using a tunnel boring machine (TBM), adopting stiffer walls/propping for rectangular shafts etc.

In the event that physical mitigation measures are still required (i.e. to control building damage to Damage Category 2 'slight' and below or below the agreed tolerable limits), the Designer shall seek to obtain the Asset Owners approval.

The Designer shall also undertake a comparative risk assessment to demonstrate that the risks associated with installation/implementation of any intrusive mitigation measures (such as compensation grouting) are no worse than the risks associated with the base case.

The relevant Local Authority and the OPW shall be consulted on the results of the Protected Building assessment reports and the proposals for protective measures, if any are required. The OPW shall also be consulted in relation to Listed or Protected Buildings where they would normally be notified or consulted on planning applications or listed building consent applications.

When considering the need and type of protective measures for Listed or Protected Buildings, due regard should be given to the sensitivity of the particular features of the building which are of architectural or historic interest and the sensitivity of the structure of the building to ground movement. Where the assessment highlights potential damage to the features of the building which it will be difficult or impossible to repair and/or if that damage will have a significant effect on its heritage value, the assessment may recommend appropriate measures to safeguard those features either in-situ or by temporary removal and storage off-site if those with relevant interest(s) in the building consent.

The form of monitoring of Listed Buildings should be determined based on the results of the assessment process.

Where repair works are necessary they will require the consent of those with relevant interest(s) in the building.

For railway track and track support structures the designer shall:

a) review the track surveys (including specifying additional surveys if required) and establish that ground movement can be accommodated without exceeding track standard operational tolerance in conjunction with the relevant Infrastructure Manager;
b) identify locations where fettling of the track is required pre construction and /or during construction to ensure the track geometry and clearances are acceptable.

The designer shall prepare plans and sections showing the zone of influence of the works that is defined by ground movements exceeding 1mm.

The designer shall develop an instrumentation and monitoring plan to validate that ground movements within the zone of influence are in accordance with design assumptions and that the infrastructure remains within acceptable limits. The designer shall ensure that there is a clear distinction between parameters measured to confirm the change in any parameter is in accordance with the design and parameters measured to limit damage to the assets. This plan shall identify the minimum period of time required to obtain base line data for each monitoring point.

Note: *A competent engineer responsible for the works shall consider those factors which may influence the monitoring data and shall determine an appropriate period and frequency for baseline monitoring. This decision making process will include an element*

of engineering judgement to account for the possible effects of any underlying environmental trends (seasonal, diurnal, tidal) in the assets under consideration.

Note: *The designer shall demonstrate that the monitoring system complies with the British Tunnelling Society Monitoring Underground Construction best practice guide.*

Note: A review of the monitoring system against the checklists provided in Appendix B of the BTS Monitoring Underground Construction best practice guide may be used as a tool to demonstrate compliance.

The detailed assessments shall define the control limits that need to be imposed on the TBM/SCL excavation in the zone of influence. The designer shall state these control measures on drawings and specifications.

The designer shall identify the critical parameters to be monitored and define the Asset Control Limits based on:

a) the ability of the asset or structure to withstand ground movement investigated
a) during the assessments carried out in Stage 2 and 3.
b) the risk to third party operations

The designer shall link the Asset Control Limits to actions within an Emergency Preparedness Plan.

The Instrumentation and Monitoring Plan and Emergency preparedness Plan shall be agreed with the relevant Asset Owner.

Stage 4 – Construction

Contingency plans shall be developed and agreed with the OPW to cover the risks posed to the OPW before commencement of the construction activity.

Contingency plans shall be implemented where the results of monitoring or inspection so indicate.

Ground movement and construction progress records shall be maintained and reported in regular reviews when construction processes are taking place within the zone of influence.

Predictions and assumptions made during design in respect of both ground movement and the effects which such ground movement will have on adjacent assets shall be verified by measurement during construction.

Stage 5 – Completion and Close-out

After ground movement has stopped, as confirmed by instrumentation and montoring, the designer shall prepare a "Completion Report". This shall include the following:

a) details of any modifications/mitigation measures to the existing structure;
b) graphs that show the ground movement and construction progress over time

a) with at least 3 months duration of readings which show no change;
b) a schedule showing actual movement compared to predicted movement;
c) a schedule of defects recording only the exceptions (changes) identified during the post construction defects survey;
d) details of any remedial works undertaken;
e) as-built records (including any temporary works remaining in situ on completion of the works).

Schedule of Defects

A schedule of defects shall be recorded prior to the start of construction for all buildings, structures, utilities and facilities and Outside Party assets predicted to experience ground movement exceeding 1mm.

OPW
Oifig na nOibreacha Poiblí
Office of Public Works

Property: Natural History Museum

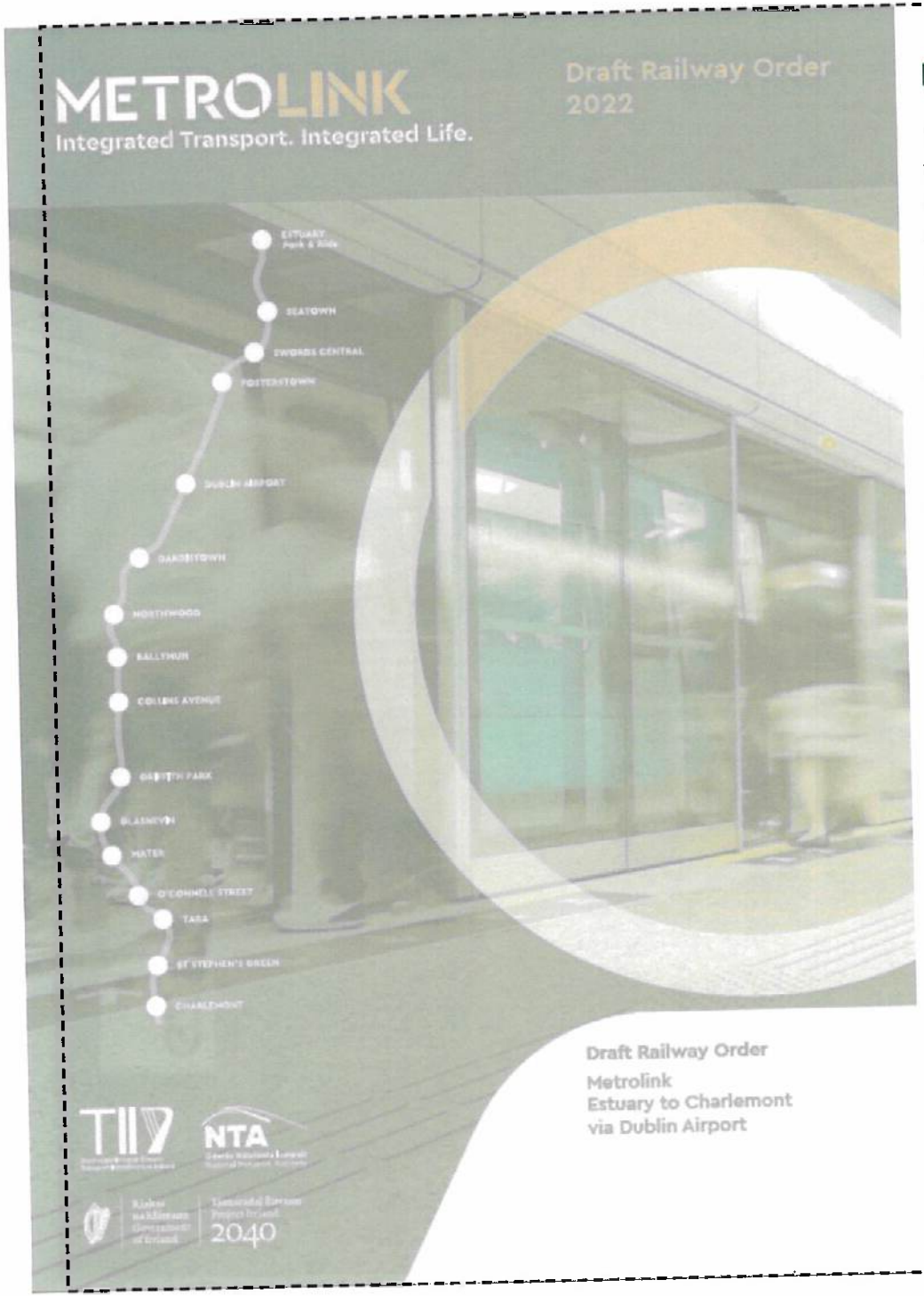
Location: Kildare Street, Dublin 2

Submission to the Draft Railway Order 2022 (MetroLink - Estuary to Charlemont via Dublin Airport)

January 2023

GZ Gall Zeidler Consultants

DOWNEY
29 MERRION SQUARE, D02 RW64
info@dwny.ie | www.dwny.ie
Tel. +353 (0)1 253 0220



EXECUTIVE SUMMARY

With reference to the Draft Railway Order 2022 (MetroLink - Estuary to Charlemont via Dublin Airport), the Office of Public Works (OPW), OPW Headquarters, Jonathan Swift Street, Trim, Co. Meath, welcomes this strategic project and recognises the significance of its delivery to provide for a sustainable, safe, efficient, integrated and accessible public transport service between Swords, Dublin Airport and Dublin City Centre.

With respect to the proportion of the State's property portfolio managed by the OPW, we will endeavour to share knowledge and information with Transport Infrastructure Ireland (TII) to facilitate the successful delivery of the project through a collaborative approach.

This submission has been prepared by DOWNEY in conjunction with Gall Zeidler Consultants, on behalf of The Commissioners of Public Works in Ireland (hereinafter the Office of Public Works (OPW)) and on foot of extensive consultation(s) with the OPW and its clients, which relates to the MetroLink route and its potential impact on the buildings located at the Natural History Museum at Kildare Street, Dublin 2.

With respect to this property, the OPW is seeking for An Bord Pleanála to recognise the sensitivity of the historic buildings at this location and the sensitive nature of the National collections housed therein. The OPW also seeks:

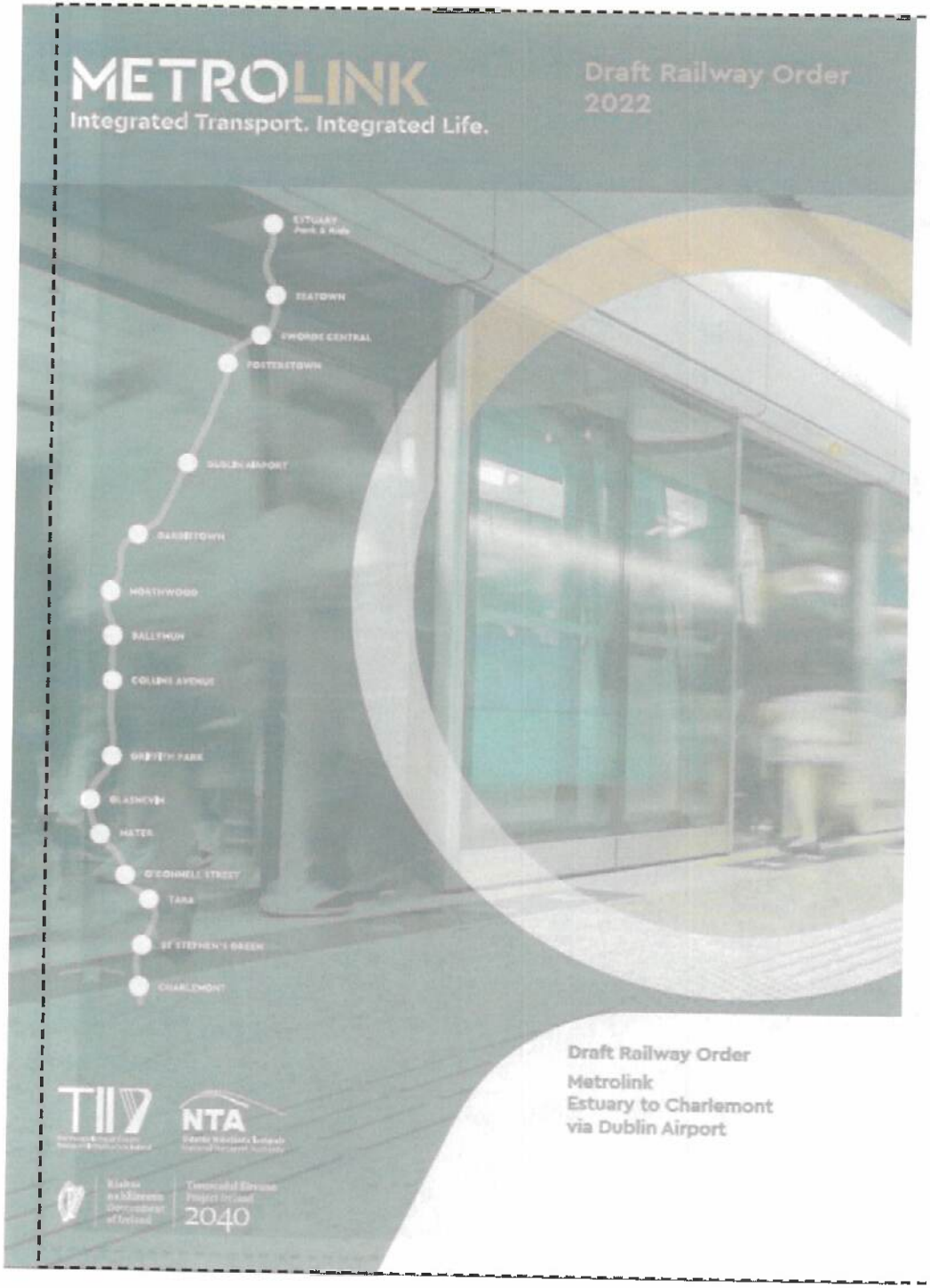
1) To ensure no disruption to the public access of the building and its day-to-day uses and functions,

2) To ensure no damage to the building, its architectural detailing, and the archive and collections kept within the NHM, pre-construction and post-construction surveys, trials and monitoring is required. This is mainly concerned with noise, vibration, and dust which can damage the building which is of historical significance as well as the valuable collections stored in the NHM.

3) Precedents to be included within the risk assessments so to ensure utilising best practice guidance within the implementation of the Project.

4) To ensure no adverse impact of the additional lorry movements on the NHM and its collections, for both deliveries and spoil removal, during construction of St. Stephen's Green and Tara stations, as the NHM is situated between the two.

5) To mitigate the noise and vibration to the acceptable levels for this cultural and government block by installing floating track slab between Chainage 17+980 and 18+400, which is the St. Stephen's Green Station.



6) Regarding the tunnel boring machine noise over a 2-week period when the noise is predicted to exceed the acceptable threshold, it is respectfully requested for the timeline of the work to be agreed in advance with the Natural History Museum and the OPW, to avoid any disruption to the functions of the Museum.

7) To ensure that all parts of the Natural History Museum are subject to Stage 3 assessment, and consequent, subsequent stages of assessment.

8) To consider the 2025 international event planned by the National Museum of Ireland (with Natural History Museum as part of this collective) to avoid any disruption to this grand event.

TABLE OF CONTENTS

This submission is made in response to the statutory review of the Draft Railway Order. Accordingly, this submission has been prepared in the context of "Draft Railway Order 2022; MetroLink - Estuary to Charlemont via Dublin Airport" which seeks to deliver the construction of a fully segregated and automated railway and metro mostly underground c. 18.8km in length with 16 stations running from north of Swords at Estuary through Swords, Dublin Airport, Ballymun, Glasnevin, and the City Centre to Charlemont. The Draft Order is currently on public display. We would respectfully request that An Bord Pleanála consider the content within this submission. DOWNEY would like to thank the Board for the opportunity to make this submission, on behalf of the Commissioners of Public Works in Ireland (hereinafter the Office of Public Works (OPW), a prescribed body for the project as advised by An Bord Pleanála.

Downey Planning Document Control			
	Name	**Date**	**Version**
Prepared by	I.C. MIPI	09/11/2022	V_01_DRAFT
	E.S. MIPI	18/11/2022	V_02_DRAFT
	E.S. MIPI	11/01/2023	V_02_DRAFT
	E.S. MIPI	13/01/2023	V_03_DRAFT
Approved by	D.D. MIPI	11/01/2023	V_02_ FINAL
	E.B. MIPI	13/01/2023	V_03_FINAL
	D.R. MIPI	15/01/2023	V_03_FINAL

1.0 INTRODUCTION

This submission has been prepared by DOWNEY, Chartered Town Planners, 29 Merrion Square, D02 RW64, in conjunction with Gall Zeidler, International Consulting Engineers specialising in tunnel and underground schemes, on behalf of the Commissioners of Public Works in Ireland (hereinafter the Office of Public Works (OPW)), OPW Headquarters, Jonathan Swift St, Trim, Co Meath and on foot of extensive consultation(s) with the OPW's clients, which relates to the MetroLink route and its relationship with the Natural History Museum at Kildare Street, Dublin 2.

With reference to the Draft Railway Order 2022 (MetroLink - Estuary to Charlemont via Dublin Airport), the OPW welcomes this strategic project and recognises the significance of its delivery to provide for a sustainable, safe, efficient, integrated, and accessible public transport service between Swords, Dublin Airport and Dublin City Centre.

2.0 THE OFFICE OF PUBLIC WORKS MANDATE

The OPW was established in 1831, by an Act of Parliament: An Act for the Extension and Promotion of Public Works in Ireland. Since then, generations have enjoyed and benefited from the OPW's specialist work on state buildings, heritage sites, national parks, and flood relief measures. The primary function of the OPW continues as a key player in the implementation of Government policy and advisory to the Minister of State in the disciplines of property (including heritage properties) and flood risk management.[1] The OPW has a strong reputation for expert knowledge and is an important resource for Government and State Agencies on specialist and professional advice on architectural projects, estate management, historic properties, engineering services, and flood risk management. This expert knowledge is crucial in supporting decisions across Government and is vital within the MetroLink's plan making process. The OPW will endeavour to share its knowledge and provide advice to Transport Infrastructure Ireland (TII hereinafter) as part of this submission to An Bord Pleanála on the Draft Railway Order application.

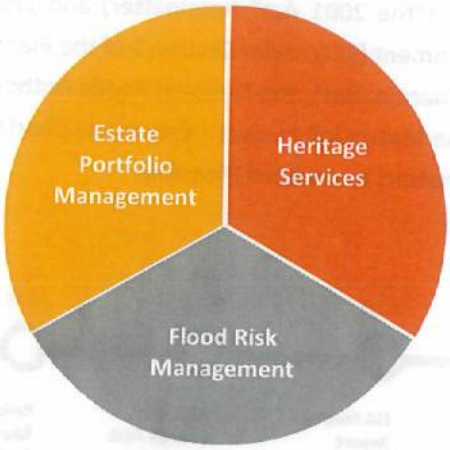


Figure 1. The OPW's Main Areas of Work

[1] *For more information, you can read the "Office of Public Works; Statement of Strategy 2021-2024" retrievable here: https://assets.gov.ie/134839/b52e1b97-bfe4-4948-9434-de0118f111bd.pdf*

The OPW provides a shared service in the area of property management and property maintenance incorporating architectural, engineering, valuation, quantity surveying, project management, art and facilities management and the conservation, preservation and presentation of heritage and cultural properties. The OPW is the lead agency for flood risk management in Ireland. This expertise will be maintained within the OPW's submission to support and engage with TII and the Draft Railway Order application.

The OPW manages a significant proportion of the State's property portfolio which stands at c. 2,500 properties and which accommodate Government Departments and includes c. 700 Garda properties. A key function of the OPW is the maintenance and operation of Ireland's most iconic heritage properties, including the State's two World Heritage Sites, c. 800 National Monuments and over 2,000 hectares of gardens and parklands.

Additionally, the OPW is a key player in infrastructure delivery for the State. In relation to flood risk management, the OPW has delivered some 150 flood relief schemes under the National Development Plan 2018-2027 as part of Project Ireland 2040 and maintains some 12,000km of river channels and 800km of embankments.

The OPW considers good governance to be central to the effectiveness of its operations, and recognises its importance in discharging its statutory, administrative and policy obligations.

It is the OPW's priority to maximise the efficient use and value of the State property portfolio, minimise the extent and impact of flooding, protect and promote our national built heritage, and excel in organisational performance and service. The OPW manages a significant number of properties along the route, including a number of historical and nationally important properties.

3.0 OVERVIEW OF THE DRAFT RAILWAY ORDER

On 30th September 2022, governed by Section 37 of the Transport (Railway Infrastructure) Act 2001 (as amended and substituted) ("the 2001 Act" hereinafter) and proposed within the definition of Strategic Infrastructure Development (SID) under Section 2 of the Planning and Development Act 2000 (as amended) ("the 2000 Act" hereinafter), the National Roads Authority (operating as TII) submitted the Draft Railway Order for the MetroLink Project - Estuary to Charlemont via Dublin Airport [2022] ("the proposed Project" hereinafter) to An Bord Pleanála.

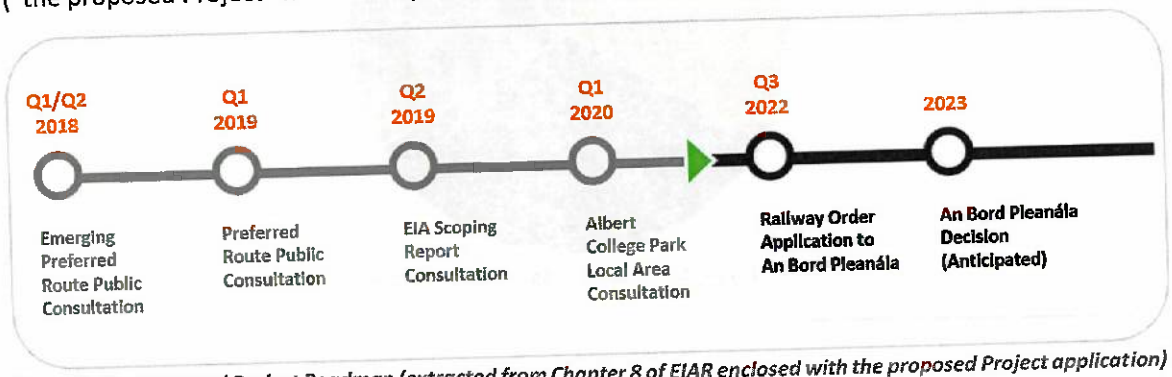


Figure 2. The Proposed Project Roadmap (extracted from Chapter 8 of EIAR enclosed with the proposed Project application)

With an objective to "*provide a sustainable, safe, efficient, integrated and accessible public transport service between Swords, Dublin Airport and Dublin City Centre*", the proposed Project seeks to deliver the construction of a fully segregated, high-capacity, and high-frequency automated railway and metro between Estuary Station and the Park and Ride facility, north of Swords via Dublin Airport to Charlemont Station, with approximately 18.8km length, which is mostly underground. The proposed Project comprises 16 new stations along the alignment, comprising of Estuary Station at surface level, four stations at Seatown, Swords Central, Fosterstown and Dardistown in retained cut, and Dublin Airport Station along with the remaining ten stations which will be underground.

Other principal project elements include a multi-storey 3,000-space Park & Ride facility at Estuary, two viaducts, one over the Broadmeadow and Ward Rivers, and one over the M50 Motorway, an Operational Control Centre, and Maintenance Depot at Dardistown, and intervention tunnels and shafts associated with Dublin Airport South Portal (DASP), located on the City Tunnel at Albert College Park, and south of Charlemont station.

The proposed Project has been designed to interchange with existing and future elements of the transport network. The key interchanges are as follows:

- Dublin Airport.
- The Western Commuter Line also known as the Maynooth Line (formerly the Midland Great Western Railway) and the South-Western Commuter Line also known as the Kildare Line (formerly Great Southern and Western Railway) at Glasnevin Station.
- The DART at Tara Station.
- Luas Lines (at O'Connell Street, St Stephen's Green and Charlemont Stations).
- The Dublin Bus network and the future BusConnects network.

Temporary elements to the proposed Project will comprise Construction Compounds, Logistics Sites, and Tunnel Boring Machine Launch Sites, which are essentially to facilitate the construction phase of the development. This encompasses 34 Construction Compounds, including 20 main Construction Compounds at each of the proposed station locations, the portal locations, and the Dardistown Depot location, as well as 14 Satellite Construction Compounds located at other locations along the alignment. Main logistics sites will be located at Estuary, near Pinnock Hill east of the R132 Swords Bypass and north of Saint Margaret's Road at the Northwood Compound. There will be two main Tunnel Boring Machine (TBM) launch sites, with one located at DASP, which will serve the TBM boring the Airport Tunnel and the second located at the Northwood Construction Compound, which will serve the TBM boring the City Tunnel.

TII carried out numerous public consultations on the Preferred Route over an eight-week period from the 26th of March 2019 to the 21st of May 2019. Over 1,000 people attended the five public events, which were held at key locations along the route. While extensive pre-planning consultations also took place between TII and the OPW, a detailed assessment of the individual properties affected has not yet taken place. The Draft Railway Order application 2022 is a Draft Order, and should the route be approved by An Bord Pleanála, further detailed design will be submitted which will require further consideration and approval. Factors such as the internal uses of the properties, their construction methods, age and historical importance and the effect of construction on these sensitivities has not

been assessed as part of the Project thus far. Additional consideration needs to be given to the potential effects on the built environment before a route and construction method can be confirmed. The OPW reserves the right to make further commentary, pending more detailed design proposals.

The statutory consultation period commenced on the 7th of October 2022, with an initial 6-week timeframe for submissions, i.e., the closing date for submissions was the 25th of November 2022 at 5.30pm. Pursuant to Section 40(1)(b) of the Act and as stated in the public notice published on the 25th of November 2022, this consultation period was further extended to the 16th of January 2023.

4.0 NATURAL HISTORY MUSEUM

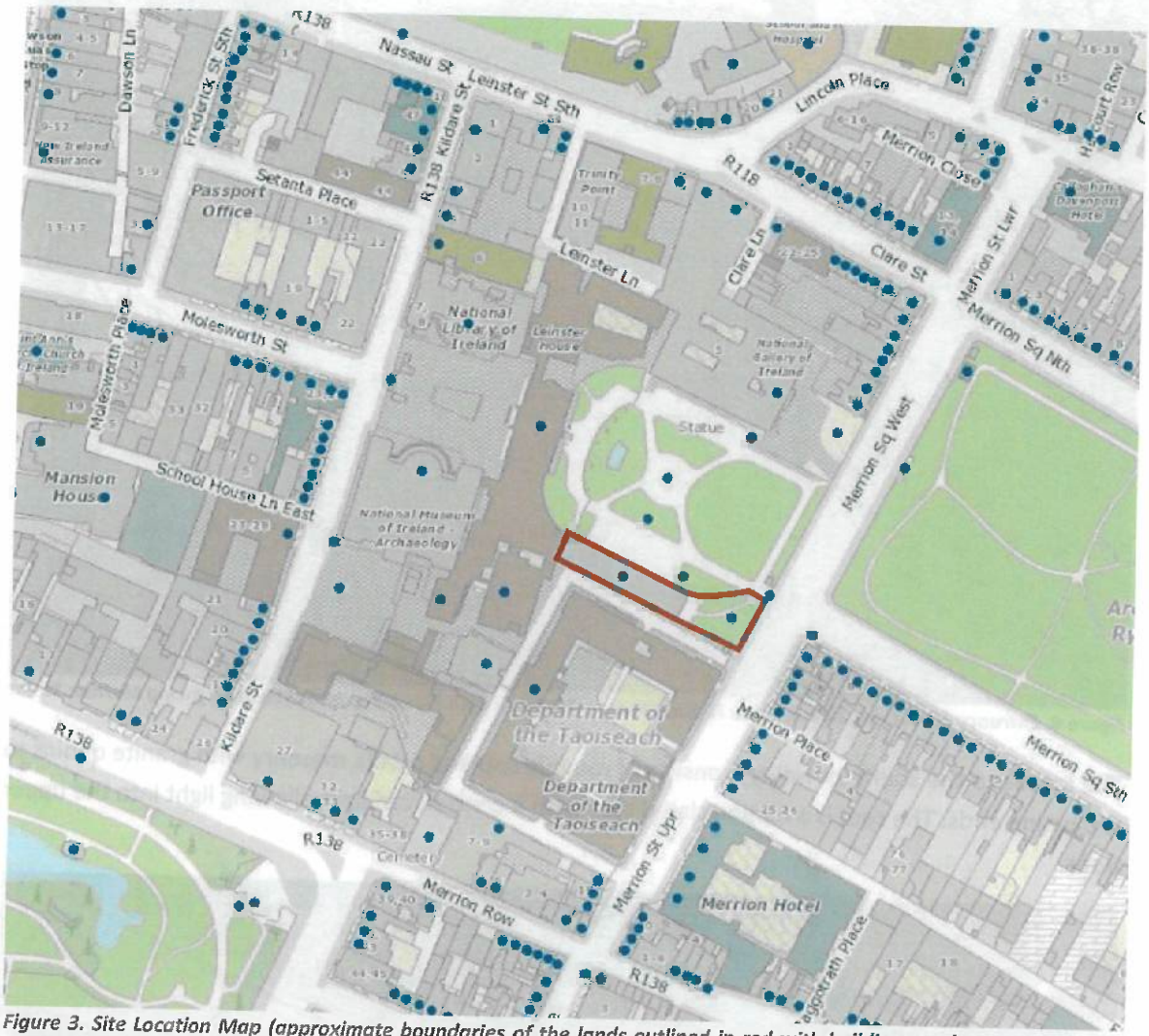


Figure 3. Site Location Map (approximate boundaries of the lands outlined in red with buildings and structures on the National Inventory of Architectural Heritage (NIAH) marked in blue (Map extract from archaeology.ie with Ordnance Survey Base-map)

4.1 Property Location & Description

The **National Museum of Ireland - Natural History** (Ard-Mhúsaem na hÉireann - Stair an Dúlra) is a branch of the National Museum of Ireland and is housed on Merrion Street, Dublin 2. Often described as the "Museum of a Museum" or "Dead Zoo", the Natural History Museum is a purpose-built museum building. The Natural History Museum houses a wide-ranging and comprehensive zoological collection of over 10,000 exhibits including Irish mammals, birds, fish, and insects, as well as mammals from around the world. With free admission, the museum receives a large number of visitors each year, with a total of 387,412 visitors being recorded in 2019.

The Natural History Museum is a detached rectangular-plan two-storey building, with three-bay front elevation, twelve-bay north elevation, and ten-bay south elevation, while three end bays of the long elevations are projecting slightly. With a hipped slate roof and central roof-light, leaded ridges and hips, the building has simple brick chimneystacks.

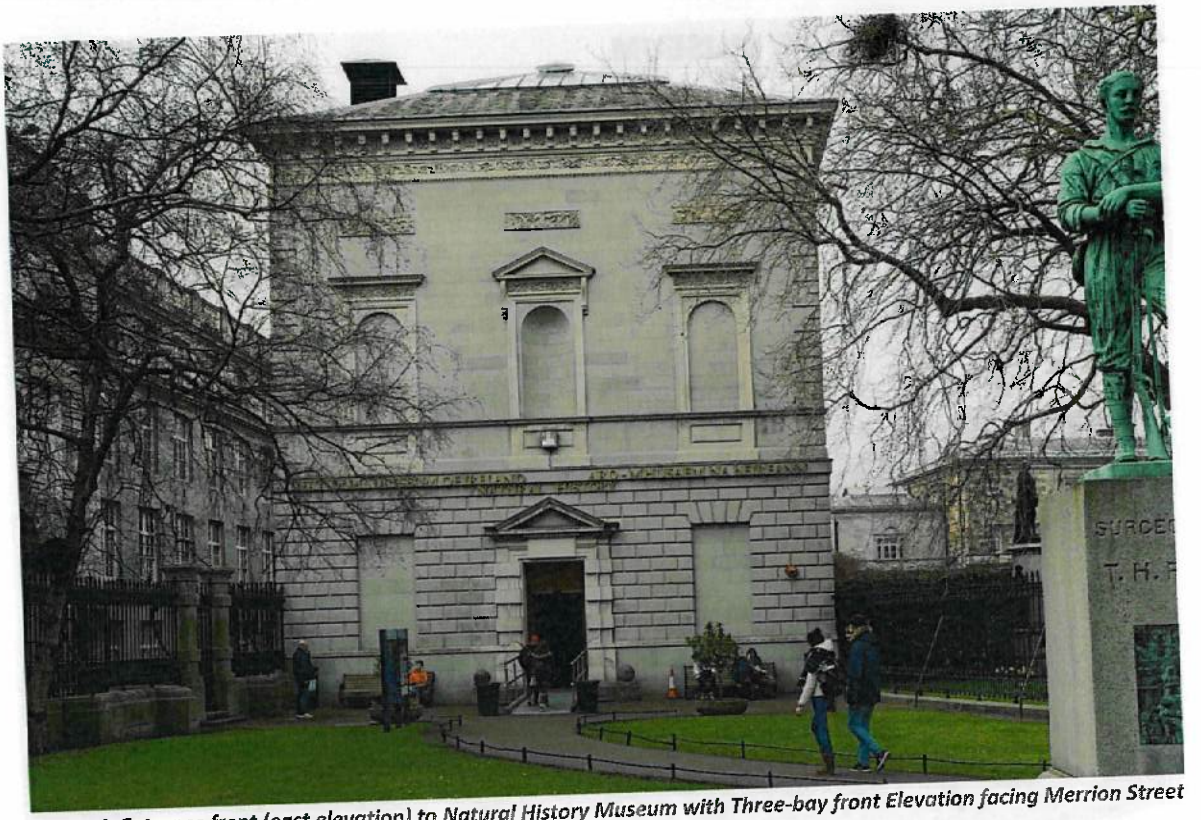


Figure 4. Entrance front (east elevation) to Natural History Museum with Three-bay front Elevation facing Merrion Street

The façade to the south, however, consists of roughly coursed rubble masonry with granite quoins to projecting ends. The roof is a hipped slated roof with a central roof light allowing light into the upper floor.

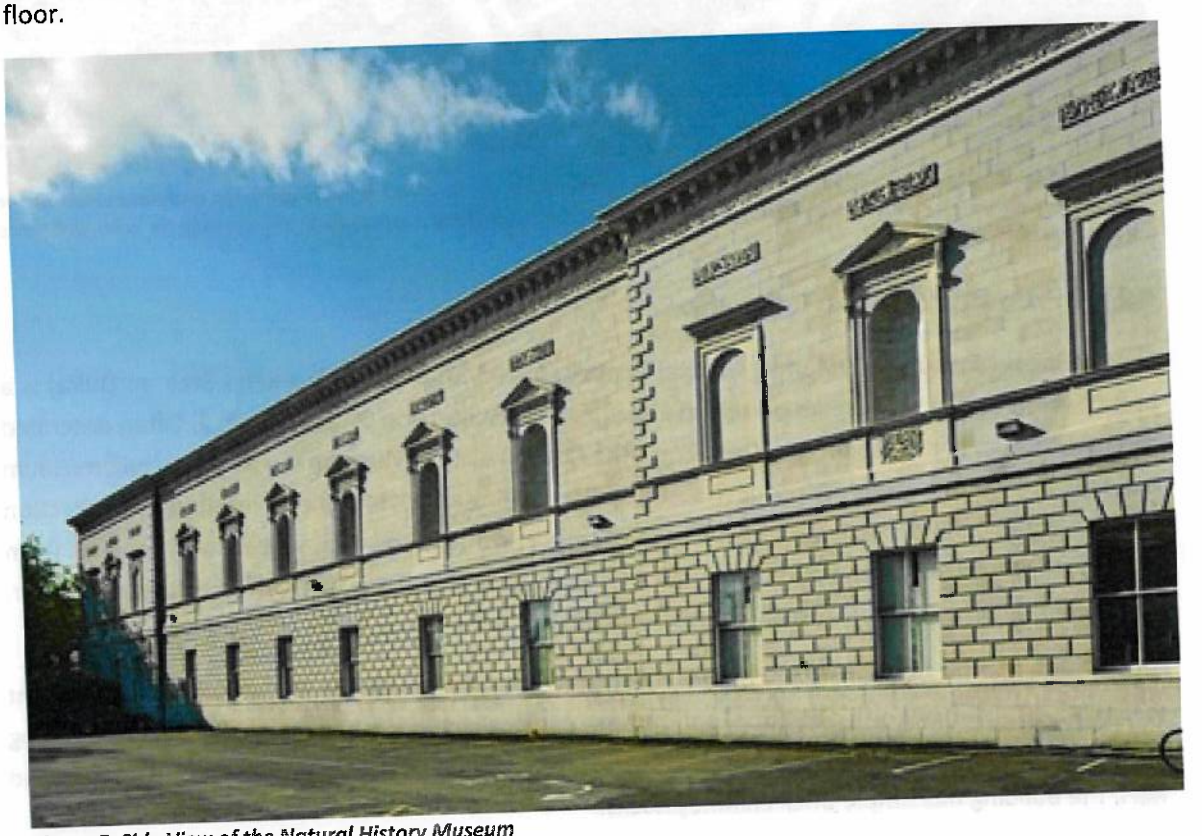


Figure 5. Side View of the Natural History Museum

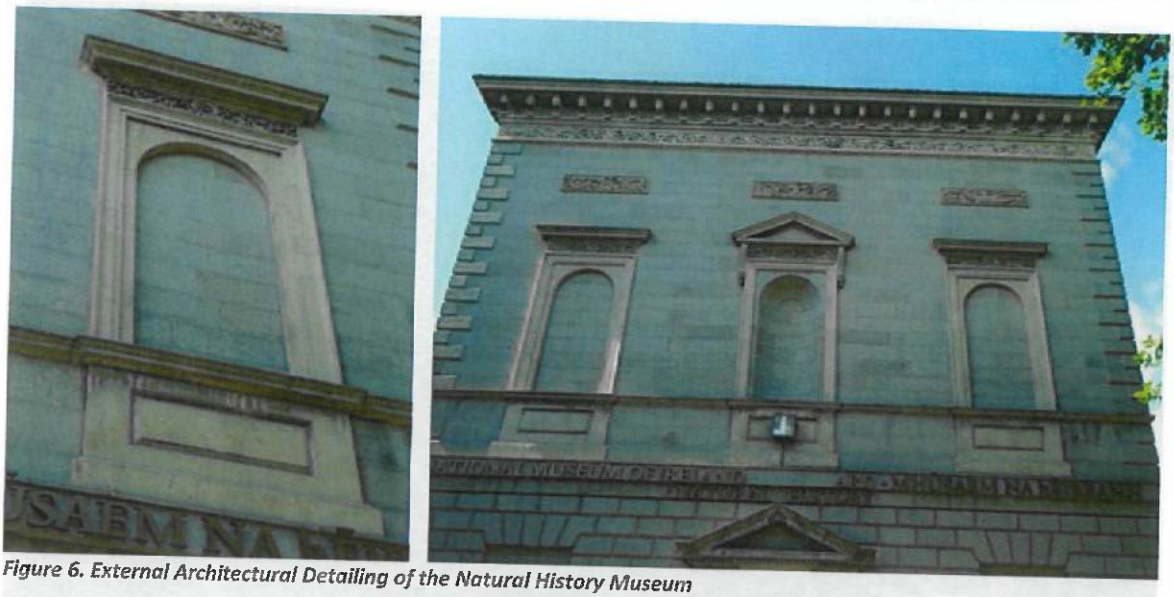


Figure 6. External Architectural Detailing of the Natural History Museum

Figure 7. South-facing Elevation Consisting of Roughly Coursed Rubble Masonry with Granite Quoins at Projecting Ends

The ground and upper floors have full length galleries, with the upper floor being a triple-height gallery with balconied upper levels. The ground floor has a red and black quarry tiled floor with cast-iron ventilation grilles throughout; and features supporting cast-iron columns. The balconied upper levels are supported on a cast-iron supporting structure in paneled posts and beams. The original glazed timber display cases have been maintained throughout the galleries. The building itself is located between Government Buildings and Leinster Lawn, with the grassed area to the front and side of the building enclosed by cast-iron railings supported on granite piers, matching those to Leinster House.

Figure 8. Upper floor Featuring Balconied Upper Levels Supported by Cast-iron Structure Encase in Paneled Posts and Beams, with Central Roof-light Visible

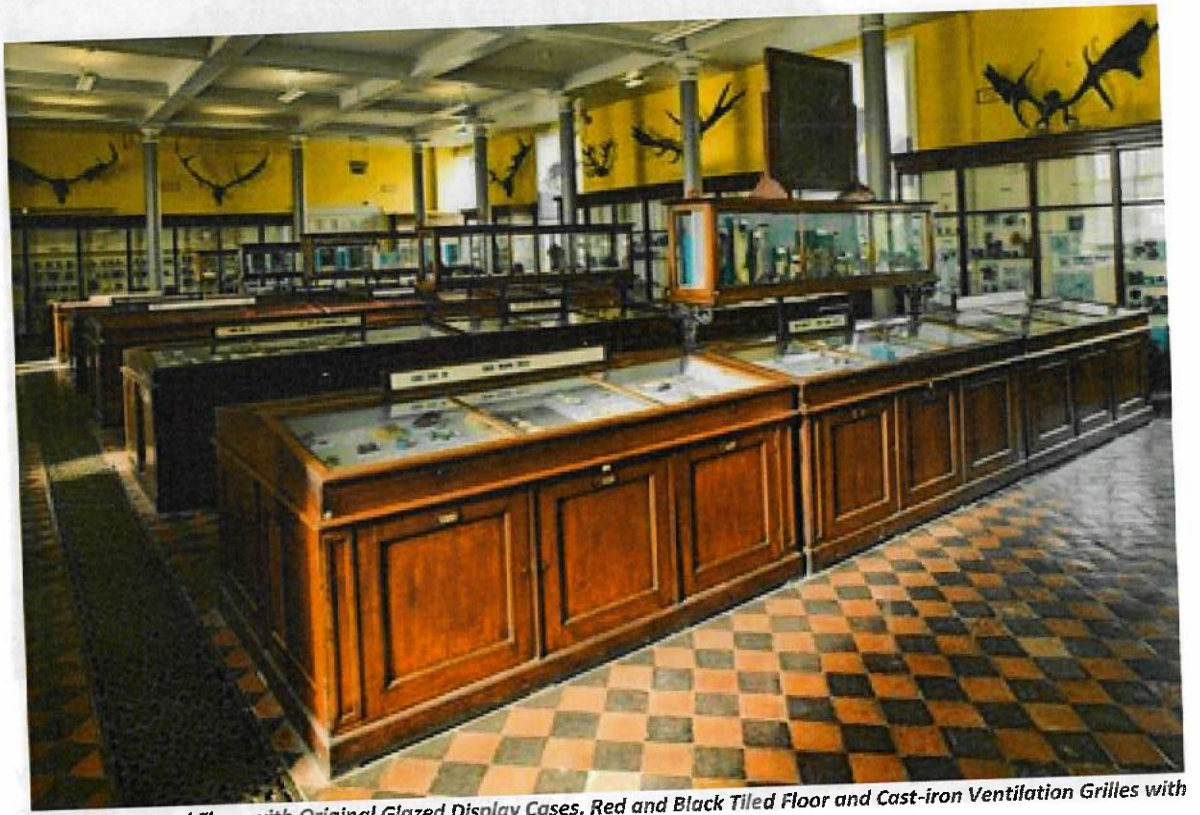


Figure 9. Ground Floor with Original Glazed Display Cases, Red and Black Tiled Floor and Cast-iron Ventilation Grilles with Supporting Columns Visible in the Background

The majority of openings are blind, resulting in a rather austere presence externally, relieved by some good, if restrained, carved detailing in Portland stone. However, the device contributes to an impressive internal space, with an upper gallery, lit entirely from above.

The following is a non-exhaustive list of building sensitivities to take into account in the Stage 3 and further assessments (construction and operation stage). We would recommend close liaison with Library and the OPW personnel at all stages of the project:

Building Sensitives

- Building structure and heterogeneity
  - The response of a building that combines traditional and early modern construction may be difficult to predict.
  - This is a Victorian structure; the presence of cast-iron concealed within walls, and exposed, structural, and non-structural elements is to be considered, noting the brittleness of cast iron.
  - The balcony and wall structures are connected, movement could impact on cabinets and collections.
  - Presence of iron dowels fixing stone.
  - Early concrete and clinker filled floors.
  - The floor is laid onto soil.
- Windows, roof-lights
  - The extensive roof-light should be assumed to be very fragile.
  - Circa 1855 windows with some original glass; early glass is thin and very fragile.
- Special finishes and features
  - Original tiled floors with cast iron vent covers- the potential impact of vibration and settlement needs to be considered.
  - Cantilevered staircase to west end of the building.
- Other aspects of note
  - Risk of water ingress through roof covers, roof-lights, flashings, and rainwater goods. Monitoring to detect movement and/or water ingress at earliest opportunity to prevent damage to the building and collections.

4.2 Historical Context/Conservation Status

Constructed in 1856, the building was originally built as an extension to Leinster House, where the Royal Dublin Society was based at the time, to house the Society's growing natural history collection. The building was designed by architect Frederick Clarendon, Office of Public Works, and the National Gallery on the other side of Leinster Lawn echoed it exterior form and design. From 1857, the Royal Dublin Society hosted many exhibitions in the museum. In 1877, ownership of the museum and its collections was transferred to the State by an act of parliament, and it became known as the *Museum of Science and Art, Dublin.*

In the 1920's, when the Royal Dublin Society vacated Leinster House to allow the new Irish Free State Government to have their seat there, the colonnade which connected the museum to Leinster House was closed off. In 1921, the overall museum in Ireland officially became known as the National Museum of Ireland and after a short period of being closed to the public, the Natural History Museum was (re)opened in 1924.

Today, the Natural History Museum remains part of/falls under the National Museum of Ireland, which is an autonomous semi-state institution as established under the provisions of the National Cultural Institutions Act, 1997. The National Museum of Ireland has a unified organisation structure with a single overall Director and a Board, which has a Head of Collections for each of its major collections including Natural History. This building is a Protected Structure and, as part of the group including Leinster House, is of international significance.

The building has closed twice for improvements in more recent years - for nearly three years between 2007 and 2010 and two years between 2020 and 2022 - reopening in August of this year (2022).

Clarendon had an engineering background, and his structural expertise is much in evidence in the interior, which is exceptionally well preserved in its original form, consisting of two long open galleries, the upper having tiered perimeter balconies supported on a cast-iron supporting structure that is both functional and decorative.

The Natural History Museum and the National Gallery of Ireland frame Leinster House in a symmetrical setting to Merrion Square, like the wings of a Palladian composition. The continuous railings and gates that extend from the Natural History Museum, via Leinster Lawn to the National Gallery of Ireland, unite these buildings in our psyche. This is fitting considering the shared history of the two institutions, carved out of the flanks of Leinster Lawn, and later as developing cultural institutions, under and/or influenced by the RDS and its activities (in the case of the NLI, Dargan was the funder of the originating exhibition) and from 1877, their public role.

Located within the Conservation Area in Dublin City Development Plan 2022-2028, the Natural History Museum is a Protected Structure registered under RPS. Ref. No. 5186 of the Dublin City Council Record of Protected Structures list. The building is of Architectural, Artistic, Cultural, Historical, Scientific, and social significance at a national level, containing collections of national and international significance.

Structure	RPS No.	NIAH Ref	Importance	NIAH Categories
Natural History Museum	5186	50100238	National	Architectural, Artistic, Cultural, Historical, Scientific, Social
Statue of Surgeon (Major Parke, in grounds of NHM)	5187	50100240	Regional	Artistic, Historical, Technical
Railings (Merrion Square)	-	50100237	Regional	Architectural, Artistic

Notwithstanding the NIAH assessments of individual buildings, there can be no doubt about the international significance of this important city block/cultural quarter. The Natural History Museum is an integral part of and contributes to an outstanding cultural landscape of international value containing very important and significant buildings.

4.3 Current Use/Uses

The Natural History Museum is a branch of the National Museum of Ireland. The building houses a wide-ranging and comprehensive zoological collection of more than 10,000 exhibits. As well as the museum itself, there is a small museum gift shop and welfare facilities. The first, second and third floors of the museum are currently closed to the public.

There is a collection of late nineteenth century blaschka glass models of world renown. These are exceptionally fragile and vulnerable to any movement. Other fragile items are historic bottles with specimens & formaldehyde. All organic preserved specimens have inherent vulnerabilities. The nature of the wall and balcony structures and of cabinets is such that any movement of the external wall or floors may cause movement of the cabinets and damage to collections. The cabinets themselves are of fragile joinery and very thin fragile glass.

The building is in use as a National Cultural Institution. Uninterrupted access to the building is necessary at all times for the conduct of the business of the Natural History Museum and for access by emergency services (e.g., fire services and ambulance).

The OPW/the State and their authorised agents require access to the building at all times for the purpose of facilities management, maintenance, repairs and any major conservation, repair or development programmes, planned, or as may arise during the construction period of MetroLink.

4.4 Planning Context

In terms of the planning history pertaining to the subject property and the surrounding area, in particular recent and live application(s) with an expected notable impact, and as outlined in the Planner's Report of the Draft Railway Order 2022, *"The alignment between Tara Station and St. Stephens Green Station will be in tunnel aligned in a southerly direction. No above ground elements are proposed on this section of the alignment."*

It is noted that DOWNEY have also carried out an examination of the planning history pertaining to the subject property and the surrounding area, which determined that there is no planning application made on the site nor its adjacent properties.

In relation to the Draft Railway Order's consistency with planning policy and planning guidelines, a non-exhaustive list of planning policy and legislation at National, Regional, and Local levels, is included in Appendix 1 of this submission. The Board are invited to refer to this for further details. We would respectfully request that An Bord Pleanála ensure that TII have fully assessed the Project with regard to existing planning policy, as well as adherence to the relevant local policies and guidelines pertaining to each individual property.

DOWNEY note that this proposed Draft Railway Order is a strategic long-term development and An Bord Pleanála may consider Draft Development Plans in assessing the Project. It is also crucial to note that on foot of a granted Order and during the detailed design stage, a revision to planning policy is expected, whereby adopted plans and legislation may have to be adhered within this stage. This may require an amendment to the Draft Railway Order and further assessment, including public consultation.

4.5 Potential Development of the Property

The Natural History Museum is a protected structure in a sensitive location. The future development potential of this property lays in the possibility of building multiple basement levels.

5.0 MATERIAL CONSIDERATIONS

The alignment drawing ML1-JAI-EIA-ROUT_XX-DR-Y-04025 and the Contour drawing ML1-JAI-EIA-ROUT_XX-DR-Y-21148 show different alignments. This error has resulted in deficient information within the SID application submitted under Section 2 of the Planning and Development Act 2000 (as amended), to assess the vulnerability of damage due to vibration cause by both tunnelling and operation of underground train on this section of the alignment. This affects several buildings under the management of the OPW particularly with Kildare Street, Merrion Square and St Stephens Green areas.

6.0 LEGAL CONSIDERATIONS

The Commissioners of Public Works would seek to enter into appropriate, property-specific legal agreements with TII, to ensure the protection of key State property and of the State's activities undertaken within those and other properties. Given the importance of such properties and activities, the Commissioners of Public Works consider it appropriate that An Bord Pleanála would make the draft Railway Order conditional on such legal agreements being in place between TII and the OPW. Creating such legal agreements between TII and the OPW would be possible only after TII make available the more detailed design and risk-mitigation measures for the construction and operational phases of the MetroLink project, and before any development begins.

Therefore, the Commissioners of Public Works would request that this aspect be reflected in the conditions set out by An Bord Pleanála to TII, as this would provide assurances to the Commissioners of Public Works relating to future legal agreements that protect and secure State property and activities from risks associated with the construction or operations of the MetroLink.

7.0 ENGINEERING CONSIDERATIONS

This Section will cover the technical information from the engineers as it relates to the property.

7.1 General Considerations

7.1.1 Route Alignment

The tunnel alignment does not pass directly beneath the Natural History Museum building however there is inconsistency in the alignment between Tara Station and St. Stephen's Green. The alignment drawing ML1-JAI-EIA-ROUT_XX-DR-Y-05025 and the Contour drawing ML1-JAI-EIA-ROUT_XX-DR-Y-21148 show different alignments.

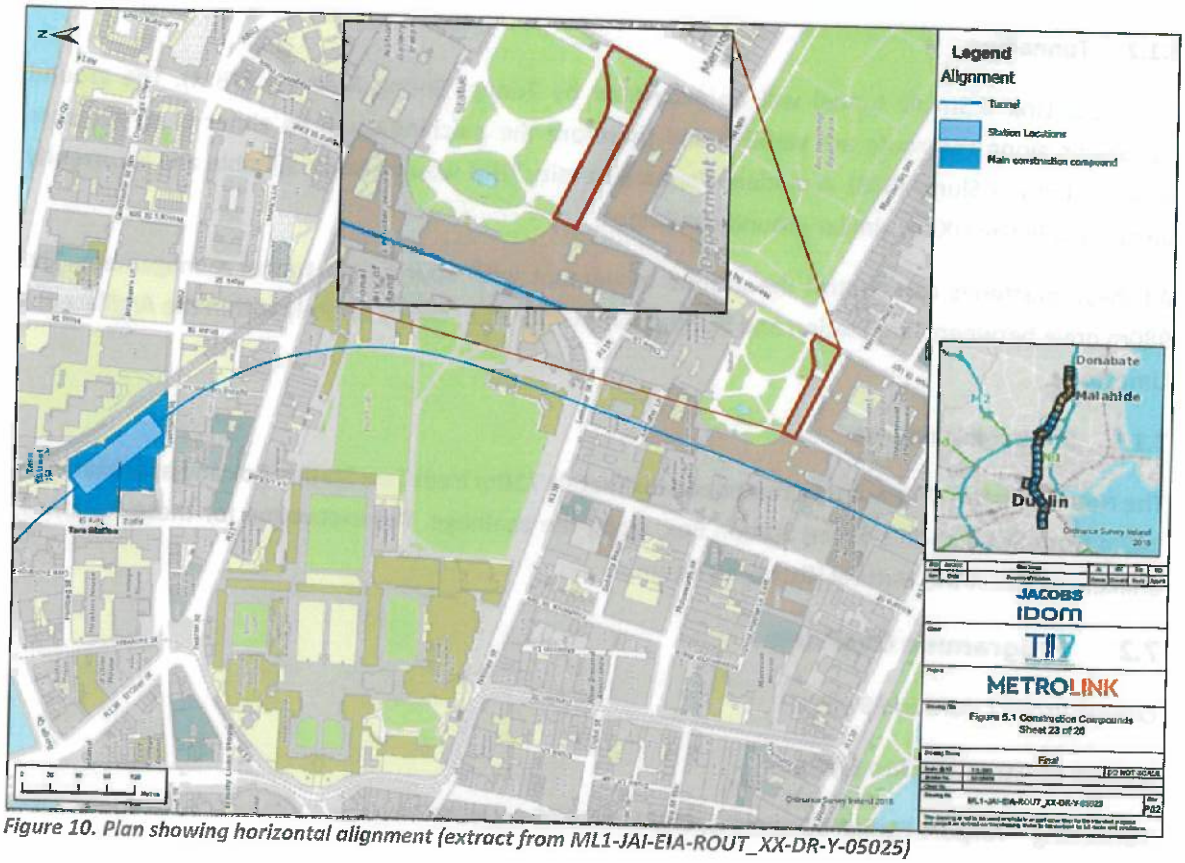


Figure 10. Plan showing horizontal alignment (extract from ML1-JAI-EIA-ROUT_XX-DR-Y-05025)

Many of the reports refer to chainages along the alignment. However, there are no plans that indicate these chainages, and this makes reviewing the Draft Railway Order and EIAR difficult.

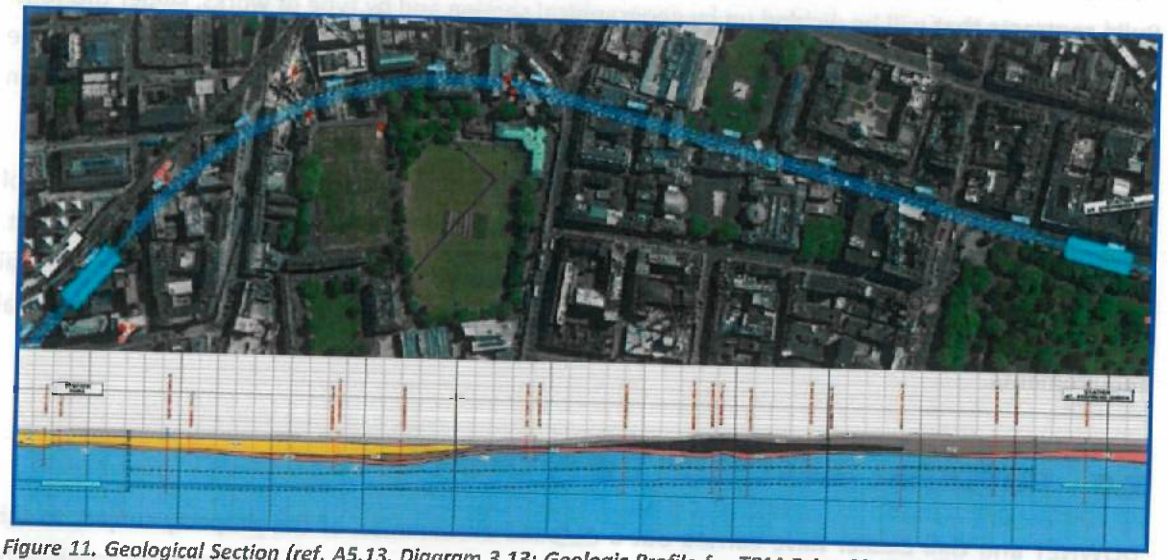


Figure 11. Geological Section (ref. A5.13, Diagram 3.13: Geologic Profile for TBM Drive C8- Tara Station to St Stephen's Green)

In the proximity of the Natural History Museum, the proposed MetroLink 8.5m ID tunnel will be excavated through Argillaceous Limestone rock (CLU) that underlies Brown Boulder Clay (QBR), containing fluvio-glacial sands and gravels. Cover to the tunnel crown is 23.75m including 10.25m of rock cover.

7.1.2 Tunnelling

The MetroLink 8.5m ID tunnel will be excavated by Tunnel Boring Machine (TBM). The ground conditions along the route are variable and therefore the machine could be either Earth Pressure Balance (EPB) or Slurry (STB). A modern Variable Density TBM would also be suitable and is currently being used in the UK for similar ground conditions.

All these machines can control the ground movement with appropriate tunnel management. The 980m drive between Tara Station and St. Stephen's Green (C8) will be entirely within the Argillaceous Limestone.

7.1.3 Station Excavation

The Natural History Museum is situated approximately 720m from Tara Station Box and approximately 240m from St Stephen's Green Station Box, along the chainage. The excavation for these stations is unlikely to affect the Natural History Museum.

7.2 Programme Overview

Overall Project duration 9 years

Station construction 3 to 6 years

Tunnelling – Airport Tunnel 30 months, City Tunnel 45 months

7.3 Contractual Arrangement

TII intends to procure the detailed design and construction of the proposed Project using Design and Build contracts that will be divided up by geographical section and by type of works. Under this form of contract, the contractor(s) will ultimately be responsible for the final detailed design of the proposed Project and for preparing a more detailed Construction Environmental Management Plan (CEMP) for each specific package of works, as outlined in Section 1.3.

The contractor(s) appointed will be responsible for the organisation, direction, and execution of environmental related activities during the detailed design and construction of the proposed Project. The contractor(s) is required to undertake all activities in accordance with the relevant environmental requirements including the consent documentation and other regulatory and contractual requirements.

8.0 POTENTIAL IMPACTS ON THE PROPERTY

DOWNEY and Gall Zeidler have carried out a detailed examination of the property subject to this submission; and having regard to the status and current use of the property and identified constraints, the following raises issues regarding potential impacts of the MetroLink on the property. This has been elaborated to include potential impacts during the construction and operation phases of developing MetroLink, as well as any impediments and/or implications for future development of the property.

8.1 Monitoring

Given the sensitivity of the uses within this property, coupled with its historic importance, we request that An Bord Pleanála attach a condition to the Draft Railway Order that ensures continuous monitoring of the property to prevent any negative impacts. Access to all properties must be agreed in advance with the OPW and its clients. It is recommended that this monitoring takes place at least 3 months in advance of the construction of the Project and at least 6 weeks post the operational stage of the MetroLink.

8.2 Security Issues

Given the nature of the State properties affected by the Project, we would respectfully refer An Bord Pleanála to Part XI of the Planning & Development Act 2000 (as amended), which states that:

> *"Development by State authorities. 181.—(1) (a) The Minister may, by regulations, provide that, except for this section F902[and sections 181A to 181C], the provisions of this Act shall not apply to any specified class or classes of development by or on behalf of a State authority where the development is, in the opinion of the Minister, in connection with or for the purposes of public safety or order, the administration of justice or national security or defence and, for so long as the regulations are in force, the provisions of this Act shall not apply to the specified class or classes of development.*
>
> *b(iii) the making available for inspection by members of the public of any specified documents, particulars, plans or other information with respect to the proposed development;"*

It is essential that security issues do not arise in the event of sensitive information being shared on the structure and operation of these properties. However, the OPW understands the importance of the detailed design stage of the Project and the wish to ensure that the detailed assessment of these properties takes place in the early stages of the design process, in conjunction with the OPW, to ensure that these sensitive State buildings are not negatively impacted upon by the proposed Project. The OPW will liaise with TII and An Bord Pleanála on this matter.

All employees contracted to work on behalf of the TII on this Project, and any associated works, must adhere to the properties protocol around access, security, and safety. This applies to all persons entering or working in proximity of the property.

The day-to-day operations of the property cannot be interrupted by disruptions to any utilities.

The design and operation of the MetroLink should be in line with best international practice, in relation to anti-terrorism and security measures.

8.3 During Construction of the MetroLink

8.3.1 Ground movement

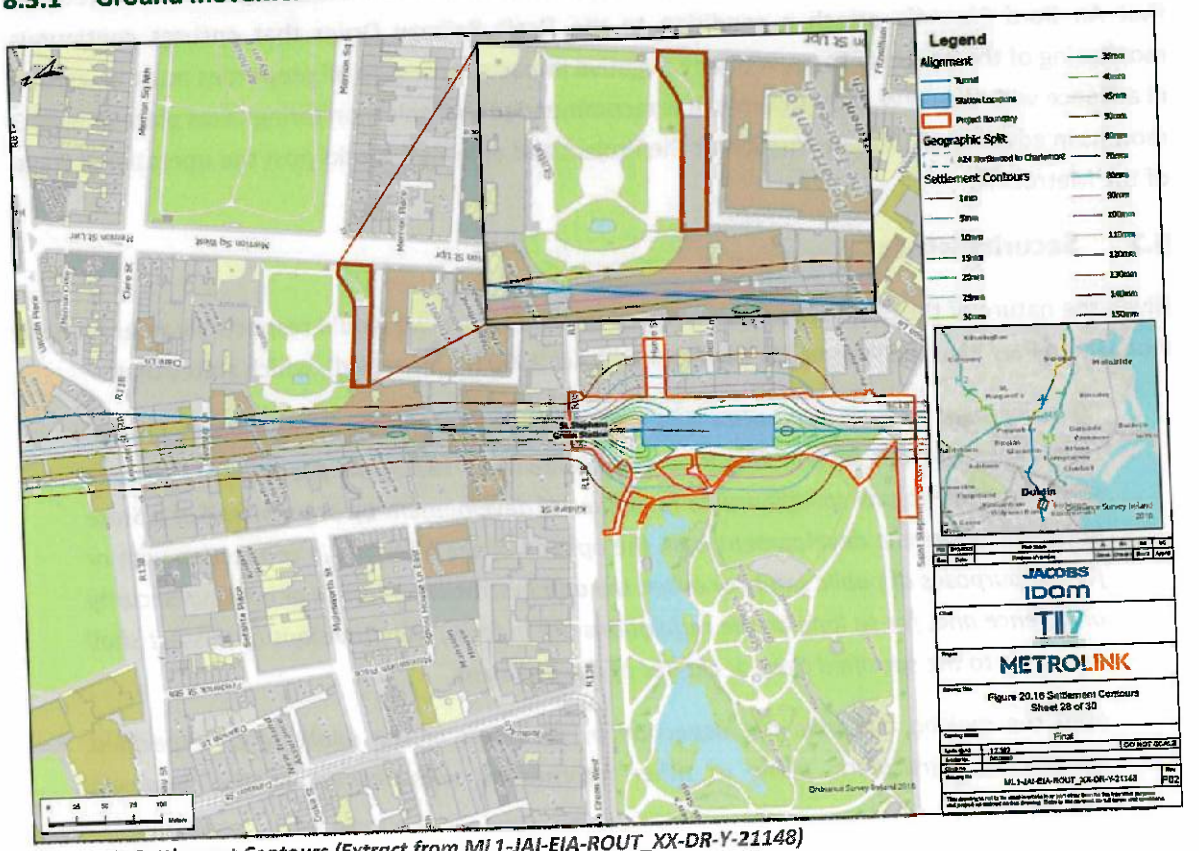


Figure 12. Settlement Contours (Extract from ML1-JAI-EIA-ROUT_XX-DR-Y-21148)

Key points of the staged analysis for ground movement impacts on structures is provided below with a summary of the process provided in Appendix 2 enclosed with this submission.

Stage 1: Defines extent of ground movement using Moderately Conservative parameters. The parameters considered by MetroLink are:

- Volume Loss, $V_s = 0.75$
- Trough Width parameter, $k = 0.4$

These are considered appropriate for defining the zone of influence.

The extent of the zone of influence is defined by the 1mm contour line (Dark Red) and the Natural History Museum is outside of the zone of influence of the Building Damage assessment Report.

Stage 2: Three sections were considered in the assessment. The assessment concludes that the risk of damage to the Natural History Museum is Category 0, Negligible. However, as a "Special building" it shall progress to stage/Phase 3 assessment.

Stage 3: The EIAR states that a Stage 3 assessment will be carried out for the National History Museum by the Contractor appointed to construct this section of the MetroLink. The OPW expects to be consulted on the detail, scope of this assessment and programme for these assessments. It would be

helpful if TII were to develop a Design Standard to ensure that all Stage 3 analyses of the OPW properties are carried out equally.

No mention of Stage 4 or 5 has been found in the Draft Railway Order or EIAR. Industry best practice as applied to London's Elizabeth Line (Crossrail) required that two further Stages in the Assessment of ground movement were undertaken during the project.

Stage 4 (Construction Stage): This stage is where any mitigation is implemented, and the monitoring of the stakeholders' infrastructure is carried out. Also, the pre-construction defect surveys are carried out prior to any excavation. The OPW requires to review the detailed proposals for mitigation and monitoring. Monitoring proposals submitted to the OPW for review should include deep level monitoring and ground water level monitoring in addition to the building and surface monitoring typically implemented. The deep level monitoring will provide valuable data relating to the rock behaviour and has been usefully employed on HS2.

The OPW will facilitate and observe the pre-construction defect surveys. It is noted that these shall be carried out by Professionally Qualified Engineers or Surveyors. The OPW requests that only Engineers or Surveyors with proven competence in relation to (historic) buildings of this fabric type, period and nature are selected. The contractor(s) will coordinate pre-construction defect surveys for identified properties, liaising (in conjunction with the employer) with the building surveyor employed to carry out the surveys and maintaining a dialogue with the relevant property owners throughout the duration of the works.

Stage 5 (Close out): Once the excavation (tunnelling and station excavation) has been completed then the Contractor will want to decommission his monitoring. The OPW expects to be provided with close out reports for the monitoring of its property. As a minimum the close out report should include details of any mitigation carried out, a list of any repairs, time history graphs showing the movements monitored.

8.3.2 Utilities

There is no indication that any utility diversions will be required in the vicinity of the Natural History Museum.

8.3.3 Noise and Vibration

(a) Tunnelling

EIAR Chapter 14 Ground Borne Noise and Vibration Measures identifies the impact on the neighbouring structures; based on the National Gallery's assessment, the impact to the Natural History Museum during TBM excavation:

- Ground borne noise 44 dBA L_{Amax} – Significant Impact
- Ground borne vibration >VC-A – No Significant Impact

EIAR Table 6.2- GNV1 states that there is no effective mitigation available and therefore the impact will be managed by detailed consultation with the building owners.

The OPW requires specific vibration limits to be applied to The Natural History Museum and that TII ensure that a monitoring regime is implemented. EIAR Table 6.2- ANV16. sets out requirement for pre- and post-construction surveys of structures vulnerable to vibration induced damage. The OPW requires pre- and post-construction surveys of structures vulnerable to vibration induced damage to be carried out and this should include the Natural History Museum.

(b) Station Excavation

GNV2 states that monitoring of blasting and re-optimising the blast design (minimising the explosive charge considering the results) will be carried out as standard. A5.20 Blasting Strategy provides information on the classification of buildings and potential damage due to blasting for the station excavations. There are also calculations for estimated magnitude of the peak particle velocity (ppv) for various explosive charges. The assumption is that the lowest charge would be implemented to avoid damage. The Natural History Museum is located far enough away from either station excavation for the predicted peak particle velocity to be less than 1mm/s.

8.3.4 Work Sites

(a) Dust

Appendix A16.4 of the EIAR requires a Dust Management Plan to be produced and implemented. The tunnelling will not generate dust in the vicinity of the Natural History Museum. The Station construction sites are at least 200m from the Natural History Museum and therefore dust from these constructions sites is unlikely to affect this building.

(b) Ground Water Control

There is an assumption that the tunnelling will not affect the ground water above the tunnel, however there should be a ground water monitoring scheme implemented to confirm this and a contingency plan to manage any residual risk.

(c) Working Hours

Tunnelling: Working Hours will be 24 hours a day, 7 days a week for the tunnelling works using a 3x8hr shift pattern, with a total of 4 crews.

Station Excavation: Working Hours will be:

- Monday to Friday: 07:00 to 19:00
- Saturday: 07:00 to 13:00

The Natural History Museum is located between Tara Street and St. Stephen's Green stations. The construction of these stations will generate additional lorry movements, for both deliveries and spoil removal, that TII and their contractors will need to manage to minimise impact in the vicinity.

(d) Intervention Strategy

Maintenance of the TBM is crucial for efficient and safe operation and this is carried out during Interventions. Mostly these are planned to avoid sensitive receptors and an approval process will be

implemented to manage the locations. However, unplanned interventions will be unavoidable to deal with unexpected events.

8.4 During Operation of the MetroLink

8.4.1 Noise and Vibration

TII proposes to mitigate the noise and vibration resulting from the railway operations by installing floating track slab to meet thresholds of 25 dBLamax,s and VC-D respectively. EIAR Chapter 14 Table 14.47 provides some guidance on where this will be constructed but it is not clear exactly where. The OPW requests that floating track slab is installed between Chainage 17+980 and 18+400 (St. Stephen's Green Station). This would mitigate the noise and vibration to acceptable levels under all the Government buildings, museums, and the Natural History Museum.

The vibration during railway operations will not impact the building fabric or structure.

8.4.2 Future Development

Provided the proposed railway alignment does not change then there will be no restriction on future development for the Natural History Museum.

8.4.3 Evacuation Strategy

The are no planned intervention/evacuation shafts between Tara Station and St. Stephen's Green. However, it is understood that the Fire Brigade have not accepted the strategy proposed by TII. This may have an impact on the Natural History Museum should any intermediate shafts be required and will impact on the security of the complex.

8.5 Future Development

The OPW reserves the right to develop the subject property in the future, this includes property above and below ground, subject to normal planning criteria. It is important that the development of the MetroLink does not interfere with extant planning permissions pertaining to the subject property and the right of the applicant to develop these, in advance, in tandem or post operation of the MetroLink Project.

9.0 CONCLUSION

This submission has been prepared by DOWNEY, Chartered Town Planners, 29 Merrion Square, D02 RW64, in conjunction with Gall Zeidler, International Consulting Engineers specialising in tunnel and underground schemes, on behalf of the Commissioners of Public Works in Ireland, OPW Headquarters, Jonathan Swift St, Trim, Co Meath and on foot of extensive consultation(s) with the OPW's clients, which relates to the MetroLink route and its relationship with the Natural History Museum at Kildare Street, Dublin 2.

With reference to the Draft Railway Order 2022 (MetroLink - Estuary to Charlemont via Dublin Airport), the OPW welcomes this strategic project and recognises the significance of its delivery to provide for a sustainable, safe, efficient, integrated, and accessible public transport service between Swords, Dublin Airport and Dublin City Centre.

With regard to the Gall Zeidler assessment, the risk of damage to the Natural History Museum from ground movement is negligible. Pre-construction, post-construction surveys, monitoring should be requested. During the passage of the Tunnel Boring Machine (TBM) the noise is predicted to approach and possibly exceed the acceptable threshold (45 $dBL_{Amax,s}$)and this may last for 2 weeks. The vibration from the passage of the TBM is predicted to be-insignificant.

With respect to this property, the OPW is seeking for An Bord Pleanála to recognise the historic significance of the building and the highly sensitive national collections contained therein. The OPW also seeks:

1) To ensure no disruption to the public access of the building and its day-to-day uses and functions.
2) To ensure no damage to the building, its architectural detailing, and the archive and collections kept within the NHM, pre-construction and post-construction surveys, trials and monitoring is required. This is mainly concerned with noise, vibration, and dust which can damage the building which is of historical significance as well as the valuable collections stored in the NHM.
3) Precedents to be included within the risk assessments so to ensure utilising best practice guidance within the implementation of the Project.
4) To ensure no adverse impact of the additional lorry movements on the NHM and its collections, for both deliveries and spoil removal, during construction of St. Stephen's Green and Tara stations, as the NHM is situated between the two.
5) To mitigate the noise and vibration to the acceptable levels for this cultural and government block by installing floating track slab between Chainage 17+980 and 18+400, which is the St. Stephen's Green Station.
6) Regarding the tunnel boring machine noise over a 2-week period when the noise is predicted to exceed the acceptable threshold, it is respectfully requested for the timeline of the work to be agreed in advance with the Natural History Museum and the OPW, to avoid any disruption to the functions of the Museum.
7) To ensure that all parts of the Natural History Museum are subject to Stage 3 assessment, and consequent, subsequent stages of assessment.
8) To mitigate the noise and vibration to the acceptable levels for this cultural and government block by installing floating track slab between Chainage 17+980 and 18+400, which is the St. Stephen's Green Station.
9) To consider the 2025 international event planned by the National Museum of Ireland (with Natural History Museum as part of this collective) to avoid any disruption to this grand event.

In light of the above, DOWNEY respectfully request that An Bord Pleanála consider the issues raised by the OPW and Natural History Museum into consideration when assessing the Draft Railway Order 2022 (MetroLink - Estuary to Charlemont via Dublin Airport).

APPENDIX 1: LIST OF PLANNING LEGISLATION & POLICY DOCUMENTS

This appendix provides a non-exhaustive list of planning policy, legislation, and guidelines. We would respectfully request that An Bord Pleanála ensure that TII have fully assessed the Project with regard to existing planning policy, as well as adherence to the relevant local policies and guidelines pertaining to each individual property.

DOWNEY note that this proposed Draft Railway Order is a strategic long-term development and An Bord Pleanála may consider Draft Development Plans in assessing the Project. It is also crucial to note that on foot of a granted Order and during the detailed design stage, a revision to planning policy is expected, whereby adopted plans and legislation may have to be adhered within this stage. This may require an amendment to the Draft Railway Order and further assessment, including public consultation.

Legislative Context

- **Planning and Development Act 2000 (as amended)**

The proposed Project comes within the definition of Strategic Infrastructure Development (SID) under Section 2 of the Planning and Development Act 2000 (as amended). 'Strategic Infrastructure Development' means *"any proposed railway works referred to in section 37(3) of the Transport (Railway Infrastructure) Act 2001 (as amended by the Planning and Development (Strategic Infrastructure) Act 2006."*

- **Planning and Development Regulations 2001 (S.I. No. 600 of 2001)**

The principal regulations underpinning the Planning and Development Acts are the Planning and Development Regulations 2001 (S.I. No. 600 of 2001). A number of Regulations amending the 2001 Regulations have been made, which, taken together, are collectively cited as the Planning and Development Regulations 2001 to 2022.

An unofficial consolidation of the Planning and Development Regulations 2001-2022 has been prepared for ease of reference by users and has no legal status. This can be accessed here: Planning and Development Regulations 2001-2022.

- **Directive 2014/52/EU3**

Directive 2011/92/EU, passed on 13th December 2011, pertains to the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU (hereafter referred to as the 'EIA Directive'), passed on 16th April 2014, which sets the requirements for EIA in European law. It requires EIA to be carried out for certain public and private projects listed in Annexes I and II of the EIA Directive.

The requirements of Directive 2014/52/EU were transposed into Irish law with the adoption of the S.I. No. 743/2021 - European Union (Railway Orders) (Environmental Impact Assessment) (Amendment) Regulations 2021 (hereafter referred to as the EIA Regulations), which amend the Transport (Railway Infrastructure) Act 2001 to bring it in line with Directive 2014/52/EU.

- **Transport (Railway Infrastructure) Act 2001 (as amended)**

The 2001 Act provides for a Railway Order application to be made by the Applicant to An Bord Pleanála.

"37(1) An application may be made to An Bord Pleanála ('the Board') for a railway order by the Dublin Transport Authority ('DTA'), the Agency, CIÉ or another person. Where any part of the proposed railway works in the application is within the functional area of the DTA the applicant (not being the DTA) must have obtained the prior written consent of the DTA for the application

(2) An application under subsection (1) shall specify whether the application is in respect of a light railway, metro or otherwise.

(3) An application under subsection (1) shall be made in writing in such form as the Minister may specify and shall be accompanied by—

(a) a draft of the proposed order,

(b) a plan of the proposed railway works, MetroLink Planning Report

(c) in the case of an application by the Agency or a person with the consent of the Agency, a plan of any proposed commercial development of land adjacent to the proposed railway works,

(d) a book of reference to a plan required under this subsection (indicating the identity of the owners and of the occupiers of the lands described in the plan), and

(e) a statement of the likely effects on the environment (referred to subsequently in this Part as an 'environmental impact assessment report') of the proposed railway works, and a draft plan and book of reference shall be in such form as the Minister may specify or in a form to the like effect."

Section 37 (4) of the 2001 Act sets out that "The construction of railway works, the subject of an application for a railway order under this Part, shall not be undertaken unless the Board has granted an order under Section 43".

A number of other relevant documents have also been prepared as part of the Draft Railway Order application, including the following, provided as stand-alone documents.

- Wider Effects Report; and
- Natura Impact Statement
- National Cultural Institutions Act 1997

- **The National Cultural Institutions Act**

The National Cultural Institutions Act sets the framework for which National Cultural Institutions must operate. The act provides for the establishment of Boards for the national institutions.

- **National Cultural Institutions (National Concert Hall) (Amendment) Bill 2022**

A Bill entitled an Act to provide for the transfer of certain functions, staff, property, rights and liabilities of RTÉ to the National Concert Hall; to provide for the validity and effect of acts by RTÉ and the National Concert Hall in relation to that transfer; to extend the functions of the National Concert Hall and to make certain changes to its board and, for those purposes to amend the National Cultural Institutions (National Concert Hall) Act 2015; to increase the aggregate amount of liability in respect of undertakings given for cultural objects on loan from a person resident outside the State and, for that purpose to amend the National Cultural Institutions Act 1997; to make certain changes to the objects of RTÉ and, for that purpose to amend the Broadcasting Act 2009; and to provide for related matters.

National Planning Policy Context

The key provisions of the national planning policy, including the Planning Guidelines, as it relates to the proposed project are set out. A summary list of the relevant national planning policies and planning guidelines consist of the following:

- All-Ireland Pollinator Plan 2021-2025
- Architectural Heritage Protection Guidelines for Planning Authorities
- Climate Action Plan 2023
- Guidelines for Landscape and Visual Impact Assessment
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018)
- Heritage at the Heart: Heritage Council Strategy 2018-2022
- Housing for All – A New Housing Plan for Ireland
- Investing in Our Transport Future – Strategic Investment Framework for Land Transport 2015
- National Adaptation Framework 2018 accompanied with Sectoral Adaptation Plan for Transport Infrastructure 2019
- National Biodiversity Action Plan 2017-2021
- National Development Plan 2021-2030
- National Investment Framework for Transport in Ireland 2021
- National Landscape Strategy for Ireland 2015-2025
- National Planning Framework (Project Ireland 2040)
- National Sustainable Mobility Policy
- Places for People – National Policy on Architecture
- Road Safety Strategy 2021-2030
- Smarter Travel – A Sustainable Transport Future; A new Transport Policy for Ireland 2009-2020
- Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities December 2022
- The National Cycle Policy Framework 2009-2020
- The Sustainable Development Goals National Implementation Plan 2018-2020
- The White Paper, Ireland's Transition to a Low Carbon Energy Future 2015-2030

- Town Centre First
- Traffic and Transport Assessment Guideline
- Transport Access for All 2012
- Urban Development and Building Height Guidelines 2020

Regional Planning Policy Context

The key provisions of the regional planning policy as it relates to the proposed project are now set out in the following sections. A summary list of the relevant regional planning policies consists of the following:

- Draft Greater Dublin Area Cycle Network Plan 2021
- Draft Greater Dublin Area Transport Strategy 2022-2042
- Dublin Agglomeration Environmental Noise Action Plan 2018-2023
- Dublin Metropolitan Area Strategic Plan (MASP)
- Greater Dublin Area Cycle Network Plan
- Regional Spatial and Economic Strategy for the Eastern and Midland Region 2019-2031
- Transport Strategy for the Greater Dublin Area 2016-2035

Local Planning Policy Context

The key provisions of the local planning policy as it relates to the proposed project are now set out. A summary list of the relevant local planning policies consists of the following:

- Ballymun Local Area Plan 2017
- Barryspark & Crowcastle Masterplan 2019
- Dardistown LAP 2013
- Docklands Public Realm Plan
- DRAFT Fingal County Development Plan 2023-2029
- DRAFT Lissenhall East Local Area Plan
- DRAFT Scheme of Special Planning Control: O'Connell Street and Environs 2022
- DRAFT Sustainable Swords Strategy
- Dublin Airport Local Area Plan
- Dublin City and County Archaeology GIS Dataset
- Dublin City Biodiversity Action Plan 2021-2025
- Dublin City Centre – Developing the Retail Core
- Dublin City Council Climate Action Plan 2019-2024
- Dublin City Development Plan 2016-2022
- Dublin City Development Plan 2022-2028
- Dublin City Industrial Heritage Record
- Dublin City Park Strategy 2019-2022
- Dublin City Strategic Heritage Plan 2022-2028
- Estuary Central Masterplan
- Fingal County Development Plan 2017-2023

- Fostertown Masterplan 2019
- George's Quay Local Area Plan 2012 (Extended to July 2022)
- Grafton Street Quarter Public Realm Plan
- Local Environmental Improvement Plans
- Merrion Square Conservation Plan
- Moore Street and Environs Local Area Plan
- Moore Street Battlefield Site Plan
- National Concert Hall Statement of Strategy 2022-2026
- National Gallery of Ireland – Strategic Plan 2019-2023
- National Library Ireland 2022 – 2026 Strategy
- National Museum 2019 – 2022 Strategic Plan: Building Capacity, Driving Change
- Oireachtas Strategic Plan 2022-2024
- Scheme of Special Planning Control: O'Connell Street & Environs 2016
- Seatown North Masterplan
- Seatown South Masterplan
- South Fingal Transport Study 2019
- St. Stephen's Green Park Conservation Management Plan 2015-2020
- Strategic Development Regeneration Area 2: Ballymun
- Strategic Development Regeneration Area 18: National Concert Hall Quarter
- The Future of the South Georgian Core
- The Heart of Dublin – City Centre Public Realm Masterplan
- Your City Your Space – Dublin City Public Realm Strategy
- Your Swords – An Emerging City Strategic Vision 2035

APPENDIX 2: GROUND MOVEMENT ASSESSMENT

The following sets out the requirements for assessing the impact of ground movement resulting from underground construction, such as tunnelling, embedded wall installation, and excavation for station boxes, together with requirements for monitoring and the close out.

The Designer shall investigate the potential for ground movement associated with the design and possible construction:

a) To assess risk of building damage by identifying those zones where the implementation of the design is likely to cause ground movements which will result in risk of Damage Category 2 'Slight' being exceeded (see Table 1) or where damage exceeds the agreed tolerable limits. To assess the risks of such degrees of damage occurring and either investigate alternative designs or advise interfacing Designers that alternatives need to be considered and modify the design as necessary. To undertake an assessment of the potential consequences where there is a significant likelihood that Risk of Damage Category 2 'Slight' will be exceeded or where damage exceeds the agreed tolerable limits and identify specifically what the risks are. Design protective measures where necessary to mitigate against the risk of damage exceeding Risk of Damage Category 2 or where damage exceeds the agreed tolerable limits.

b) To demonstrate that the environmental effects of excavation induced ground movements have been considered and taken account of in the design.

c) To assess the risk of damage to utilities and to design mitigation measures in agreement with the utility owner.

d) To assess the effects of excavation to existing above ground and underground infrastructure and to design suitable mitigation measures.

e) To indicate where property may require demolition or structural modification.

f) To enable the preparation of contingency plans to deal with residual risks.

Stage 1 – Scoping

Schedules and plans shall be prepared to identify all assets assessed to experience ground movement exceeding 1mm using conservative parameters.

Stage 2 – Initial Assessment

The designer shall carry out initial assessment calculations using simple empirically calibrated methods and moderately conservative parameters to classify the risk of damage to assets. For masonry building structures the risk should be classified in accordance with Table 1. For non-masonry buildings and infrastructure, the level of risk should be determined by ensuring that deformations do not exceed tolerable values determined in consultation with the asset owner.

A schedule and plans of predicted damage shall be prepared, along with outline trigger levels.

The assessment calculations shall be based on record drawings, where available and an inspection for assessment. Assets estimated to be a risk of damage greater than Category 2 'Slight' or where damage exceeds the agreed tolerable limits require further detailed assessment at Stage 3.

Table 1. Building Damage Classification

Damage Category	Description of degree of damage*	Description of typical and likely forms of repair for typical masonry buildings	Approx. crack width** (mm)	Max. tensile strain %
0	Negligible	Hairline cracks		<0.05
1	Very slight	Fine cracks easily treated during normal redecoration. Perhaps isolated slight fracture in building. Cracks in exterior visible upon close inspection	0.1 to 1.0	0.05 to 0.075
2	Slight	Cracks easily filled. Redecoration probably required. Several slight fractures inside building. Exterior cracks visible; some repainting may be required for weathertightness. Doors and windows may stick slightly	1 to 5	0.075 to 0.15
3	Moderate	Cracks may require cutting out and patching. Recurrent cracks can be masked by suitable linings. Tuck pointing and possible replacement of a small amount of exterior brickwork may be required. Doors and windows sticking. Utility services may be interrupted. Weather tightness often impaired	5 to 15 or a number of cracks greater than 3	0.15 to 0.3
4	Severe	Extensive repair involving removal and replacement of walls especially over door and windows required. Window and door frames distorted. Floor slopes noticeably. Walls lean or bulge noticeably. Some loss of bearing in beams. Utility services disrupted	15 to 25 but also depends on number of cracks	> 0.3
5	Very severe	Major repair required involving partial or complete reconstruction. Beams lose bearing, walls lean badly and required shoring. Windows broken by distortion. Danger of instability	Usually, > 25 but depends on No. of cracks	

** In assessing the degree of damage, account must be taken of its location in the building or structure.*

*** Crack width is only one aspect of damage and should not be used on its own as a direct measure of it. Burland, J.P. and Wroth, C.P., Settlement of Buildings and Associated Damage, Proceedings of a Conference on the Settlement of Structures, Cambridge, 1974, pp 611-54 and 764-810.*

The heritage value of a Listed or Protected Building should be considered during the initial assessment by reviewing the sensitivity of the building structure and of any particular features together with the initial assessment calculations. The heritage assessment examines the following:

a) The sensitivity of the building/structure to ground movements and its ability to tolerate movement without significant distress. The potential for interaction with adjacent buildings/ structures is also considered. A score within the range of 0-2 should be allocated to the building/structure in accordance with the criteria set out in Table 2.

b) The sensitivity to movement of particular features within the building/structure and how they might respond to ground movements. A score within the range of 0-2 should be allocated to the building in accordance with the criteria set out in Table 2.

The scores for each of the two categories (a) and (b) should be combined and added to the category determined in Stage 2 to inform the decision-making process. In general, Listed Buildings which score a total of 3 or higher should be subject to further assessment as part of the Stage 3 – Detailed Assessment. Buildings that score a total of 2 or less are predicted to suffer a degree of damage which may be easily repairable using standard conservation-based techniques and hence no protective measures for the building's particular features should be required. However, ultimately the professional judgement of engineering and historic building specialists should be used to determine whether additional analysis is required.

Table 2. Scoring for Sensitivity Assessment of Listed Buildings

Criteria		
Score	**a) Sensitivity of the structure to ground movements and interaction with adjacent buildings**	**b) Sensitivity to movement of particular features within the building**
0	Masonry building with lime mortar not surrounded by other buildings. Uniform facades with no particular large openings.	No particular sensitive features
1	Buildings of delicate structural form or buildings sandwiched between modern framed buildings which are much stiffer, perhaps with one or more significant openings.	Brittle finishes, e.g., tight-jointed masonry, which are susceptible to small movements and difficult to repair.
2	Buildings which, by their structural form, will tend to concentrate all their movements in one location.	Finishes which if damaged will have a significant effect on the heritage of the building, e.g., cracks through frescos.

Stage 3 – Detailed Assessment, Mitigation Design and Monitoring Plans

The Designer shall carry out detailed assessments of structures that will be affected by the works so that any monitoring works and mitigation works can be designed and implemented.

For structures at risk of exceeding Damage Risk Category 2 'Slight' or where damage exceeds the agreed tolerable limits the designer shall undertake a detailed assessment (more rigorous) to determine:

a) The influence of the structure and its foundations on the predicted ground movements (soil/structure interaction).

b) The volume loss at which the risk of damage to the structure (or any sensitive finishes/features) is 'slight' or better.

c) Whether this volume loss may be achieved by the proposed excavation design/control measures.

d) Any special control measures required to reduce the predicted damage to acceptable levels (i.e., Risk Category 2 'slight' damage category and below or below the agreed tolerable limits) such as significantly higher face pressures with EPBM tunnelling and the practicality of these.

e) The amount of ground movement that the structure (and or any sensitive finishes/features) can accommodate without exceeding Damage Risk Category 2 or where damage exceeds the agreed tolerable limits.

f) The level of residual risk if intrusive mitigation measures are not implemented.

The detailed assessments should include a number of iterations to determine how the risk of damage to a building may be reduced. Asset-specific empirical models shall be prepared successively using moderately conservative and best estimate parameters. If after these iterations the use of empirical methods do not reduce the risk of building damage to acceptable levels (i.e., Damage Category 2 'slight' damage category and below or below the agreed tolerable limits), the damage assessment shall be refined by increasing the sophistication of the analysis with the aim of reducing the risk of asset damage to acceptable levels and to eliminate the asset from further assessment.

If the risk of damage cannot be shown to be reduced by detailed assessment to acceptable levels, then mitigation measures shall be designed. The primary means of settlement mitigation shall be practical measures to control ground movement by good design and construction practice. This could include staged excavation sequences within sprayed concrete lining (SCL) works, ground treatment, face stabilisation, spiling/face dowels, increasing face pressure when using a Tunnel Boring Machine (TBM), adopting stiffer walls/propping for rectangular shafts etc.

In the event that physical mitigation measures are still required (i.e., to control building damage to Damage Category 2 'slight' and below or below the agreed tolerable limits), the Designer shall seek to obtain the Asset Owners approval.

The Designer shall also undertake a comparative risk assessment to demonstrate that the risks associated with installation/implementation of any intrusive mitigation measures (such as compensation grouting) are no worse than the risks associated with the base case.

The relevant Local Authority and the OPW shall be consulted on the results of the Protected Building assessment reports and the proposals for protective measures, if any are required. The OPW shall also be consulted in relation to Listed or Protected Buildings where they would normally be notified or consulted on planning applications or listed building consent applications.

When considering the need and type of protective measures for Listed or Protected Buildings, due regard should be given to the sensitivity of the particular features of the building which are of architectural or historic interest and the sensitivity of the structure of the building to ground movement. Where the assessment highlights potential damage to the features of the building which it will be difficult or impossible to repair and/or if that damage will have a significant effect on its heritage value, the assessment may recommend appropriate measures to safeguard those features either in-situ or by temporary removal and storage off-site if those with relevant interest(s) in the building consent.

The form of monitoring of Listed Buildings should be determined based on the results of the assessment process.

Where repair works are necessary, they will require the consent of those with relevant interest(s) in the building.

For railway track and track support structures the designer shall:

a) Review the track surveys (including specifying additional surveys if required) and establish that ground movement can be accommodated without exceeding track standard operational tolerance in conjunction with the relevant Infrastructure Manager.

b) Identify locations where fettling of the track is required pre-construction and/or during construction to ensure the track geometry and clearances are acceptable.

The designer shall prepare plans and sections showing the zone of influence of the works that is defined by ground movements exceeding 1mm.

The designer shall develop an instrumentation and monitoring plan to validate that ground movements within the zone of influence are in accordance with design assumptions and that the infrastructure remains within acceptable limits. The designer shall ensure that there is a clear distinction between parameters measured to confirm the change in any parameter is in accordance with the design and parameters measured to limit damage to the assets. This plan shall identify the minimum period of time required to obtain base line data for each monitoring point.

Note: *A competent engineer responsible for the works shall consider those factors which may influence the monitoring data and shall determine an appropriate period and frequency for baseline monitoring. This decision-making process will include an element of engineering judgement to account for the possible effects of any underlying environmental trends (seasonal, diurnal, tidal) in the assets under consideration.*

Note: *The designer shall demonstrate that the monitoring system complies with the British Tunnelling Society Monitoring Underground Construction best practice guide.*

Note: *A review of the monitoring system against the checklists provided in Appendix B of the BTS Monitoring Underground Construction best practice guide may be used as a tool to demonstrate compliance.*

The detailed assessments shall define the control limits that need to be imposed on the TBM/SCL excavation in the zone of influence. The designer shall state these control measures on drawings and specifications.

The designer shall identify the critical parameters to be monitored and define the Asset Control Limits based on:

a) The ability of the asset or structure to withstand ground movement investigated.

a) During the assessments carried out in Stage 2 and 3.

b) The risk to third party operations.

The designer shall link the Asset Control Limits to actions within an Emergency Preparedness Plan.

The Instrumentation and Monitoring Plan and Emergency preparedness Plan shall be agreed with the relevant Asset Owner.

Stage 4 – Construction

Contingency plans shall be developed and agreed with the OPW to cover the risks posed to the OPW before commencement of the construction activity.

Contingency plans shall be implemented where the results of monitoring or inspection so indicate.

Ground movement and construction progress records shall be maintained and reported in regular reviews when construction processes are taking place within the zone of influence.

Predictions and assumptions made during design in respect of both ground movement and the effects which such ground movement will have on adjacent assets shall be verified by measurement during construction.

Stage 5 – Completion and Close-out

After ground movement has stopped, as confirmed by instrumentation and monitoring, the designer shall prepare a "Completion Report". This shall include the following:

a) Details of any modifications/mitigation measures to the existing structure.

b) Graphs that show the ground movement and construction progress over time.

c) With at least 3 months duration of readings which show no change.

d) A schedule showing actual movement compared to predicted movement.

e) A schedule of defects recording only the exceptions (changes) identified during the post construction defects survey.

f) Details of any remedial works undertaken.

g) As-built records (including any temporary works remaining in situ on completion of the works).

Schedule of Defects

A schedule of defects shall be recorded prior to the start of construction for all buildings, structures, utilities and facilities and Outside Party assets predicted to experience ground movement exceeding 1mm.