2.3

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TII

TARA STREET STATION
MINED AND OTHER DESIGN OPTIONS

ML1-JAI-ARC-MS14-XX-PP-Y-00001

(January 2019)

JACOBS

IDOM

CONTENTS

Figure 1: Route Map

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1 SITUATION OVERVIEW

1.1 A NEW CITY CENTRE STATION

TARA STREET STATION ARRANGEMENT

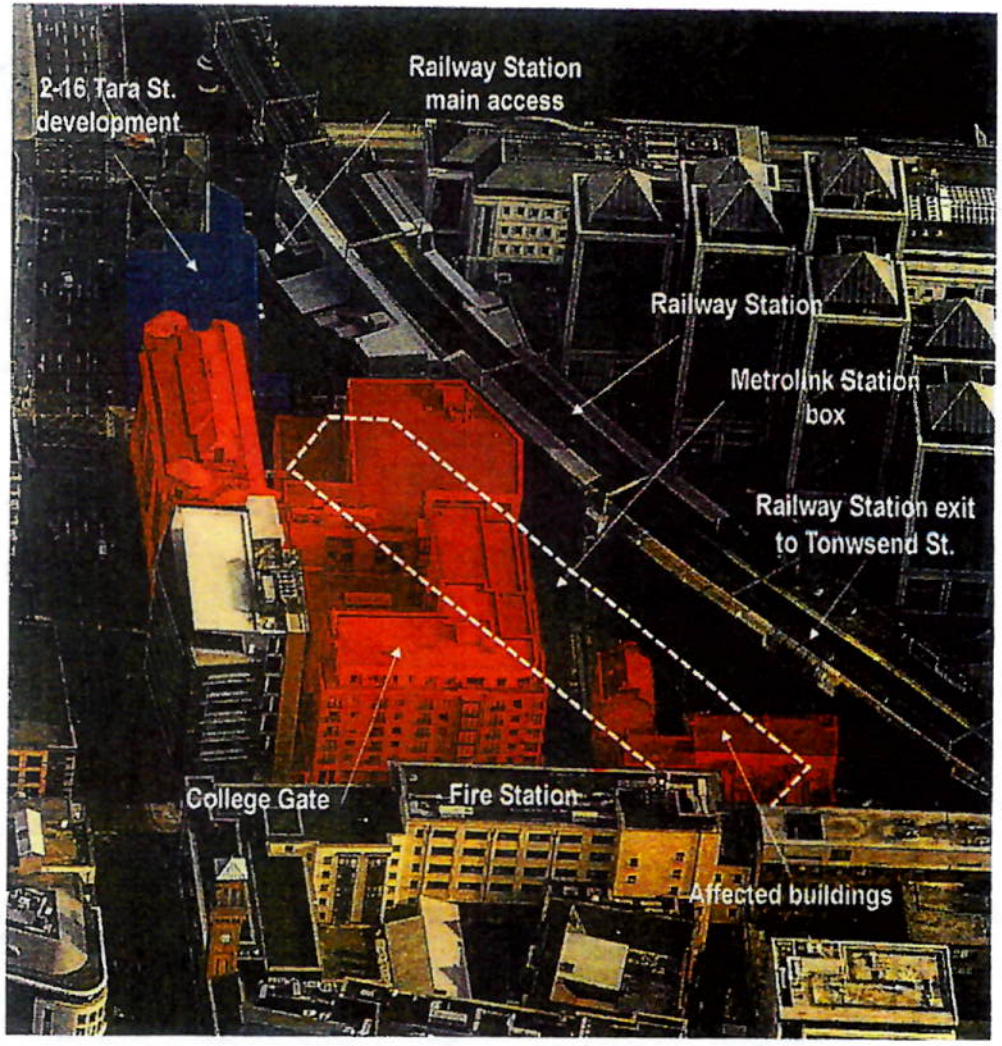
- **Location:** Close to existing Tara Street (DART) railway station in a high density city office area.
- **Station Type:** Underground Station (24m deep) with traction power substation and interchange facilities with the DART station.
- **Transport Integration: Bus -** Four service lines. **Train -** DART and Dublin Commuter services. **Bike station -** to be provided. **Taxi rank & drop off bays -** to be provided.
- **Opportunities:** Over Site Development (OSD) to integrate with the interchange station, commercial properties, and retail areas. A new public realm space might be feasible above the station box.

CONSTRAINTS ON DEVELOPMENT

- **Existing Buildings:** New developments affected and some demolition required.
- **Traffic disruption:** City area impact and specifically on Fire station operations and George's Quay Plaza underground parking

STAKEHOLDERS

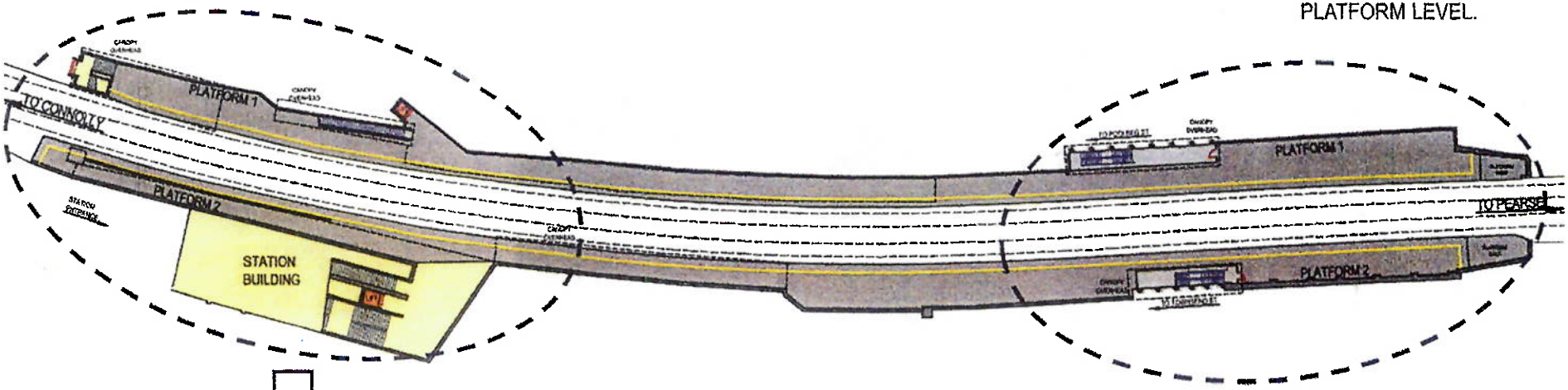
- DART, Irish Rail, CIE
- Dublin City Council
- Affected housing owners at College Gate
- Developers

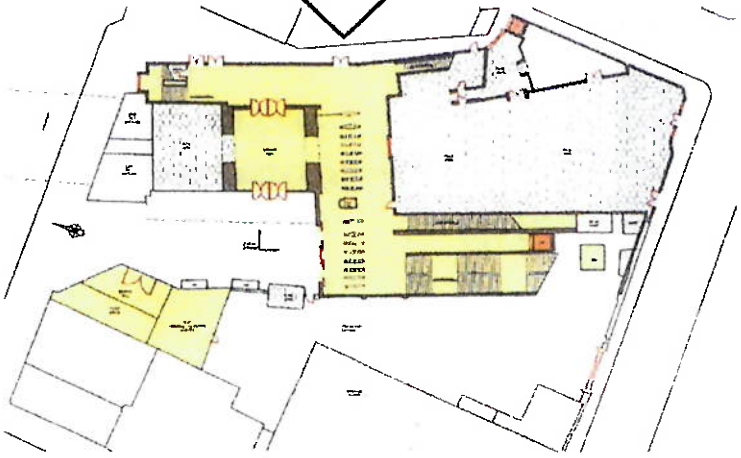


1.2 THE EXISTING TARA STREET (DART) STATION

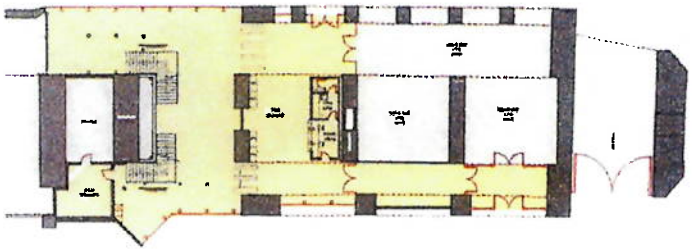
NOTE: The DART Station is owned by Irish Rail and any works considered necessary in relation to Metrolink is the responsibility of Irish Rail.

PLATFORM LEVEL.





NORTHERN CONCOURSE, Station main entrance



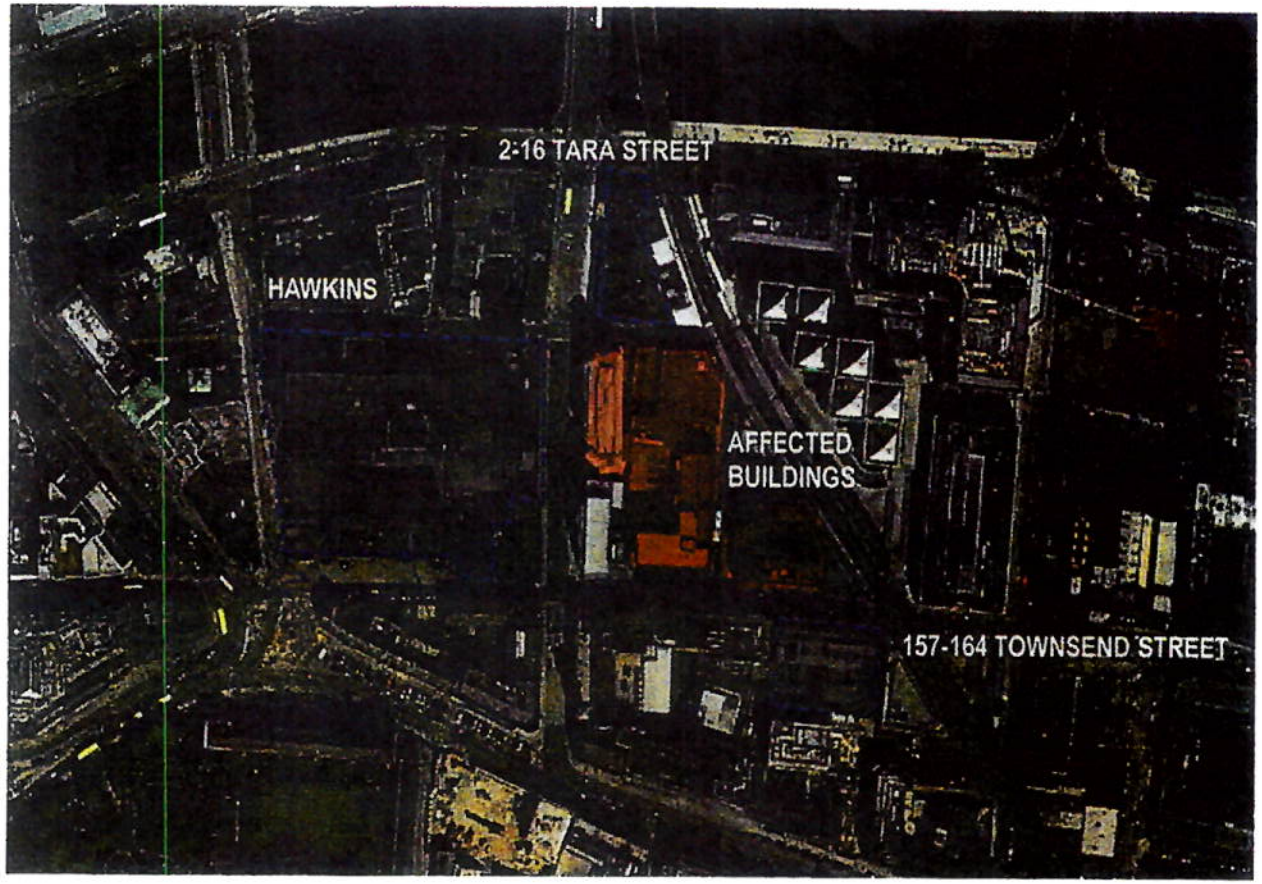
SOUTHERN CONCOURSE, open during working days (Monday to Friday) only in peak hours

1.3 DEVELOPMENTS NEARBY

- **2-16 TARA STREET**
  - Offices and Hotel
  - Twenty-storey building
  - Two basements
  - Metrolink Tunnel under the site
  - Site recently denied planning permission.

- **157-164 TOWNSEND STREET.**
  - Office Development
  - Seven-storey building
  - Two basements
  - Metrolink Tunnel under the site.

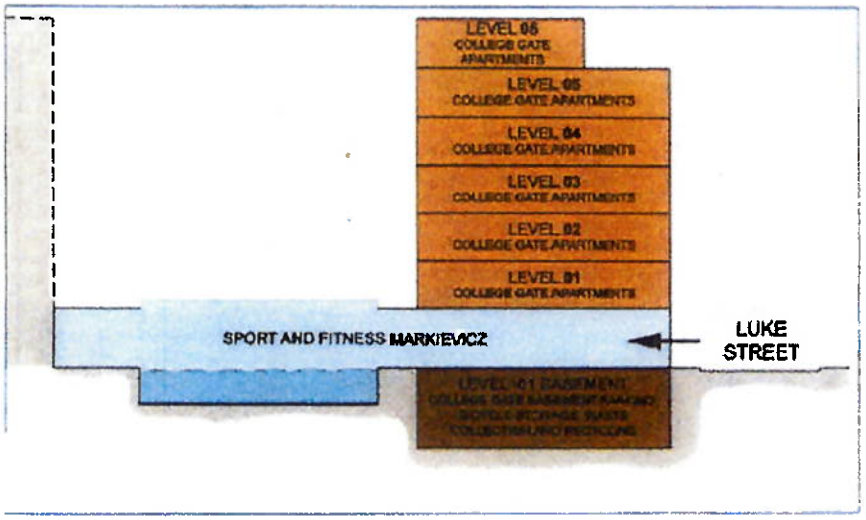
- **HAWKINS HOUSE**
  - Site is not affected by Metrolink alignment



1.4 AFFECTED BUILDINGS

College Gate & DCC Markievicz Leisure Centre

- **Residential units:** 70 apartments on 6 upper storeys
- **Markievicz Leisure Centre**: at ground level
  - renovated completely in 2016
  - Owned by Dublin City Council
  - Only public leisure centre with 25m swimming pool in Dublin City Centre
- **Basement Level:** residential car park, bicycle storage and waste management



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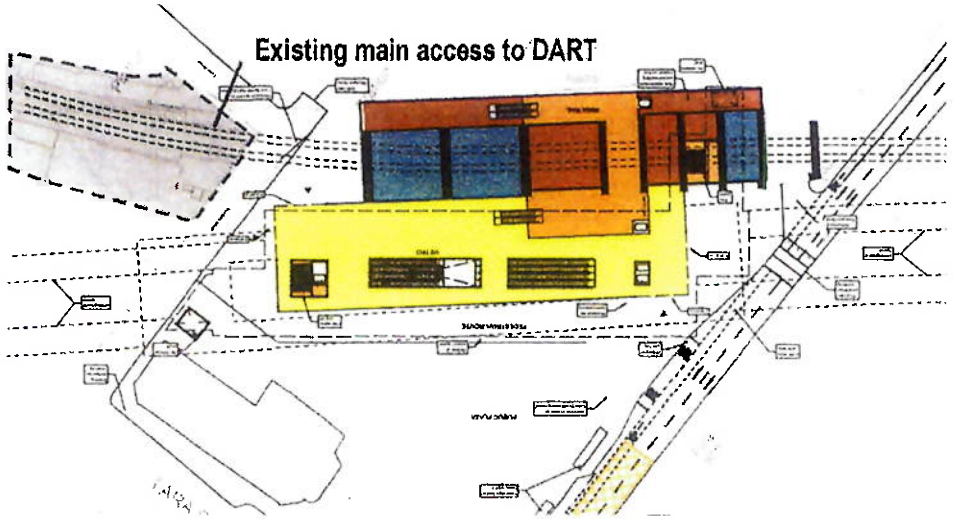
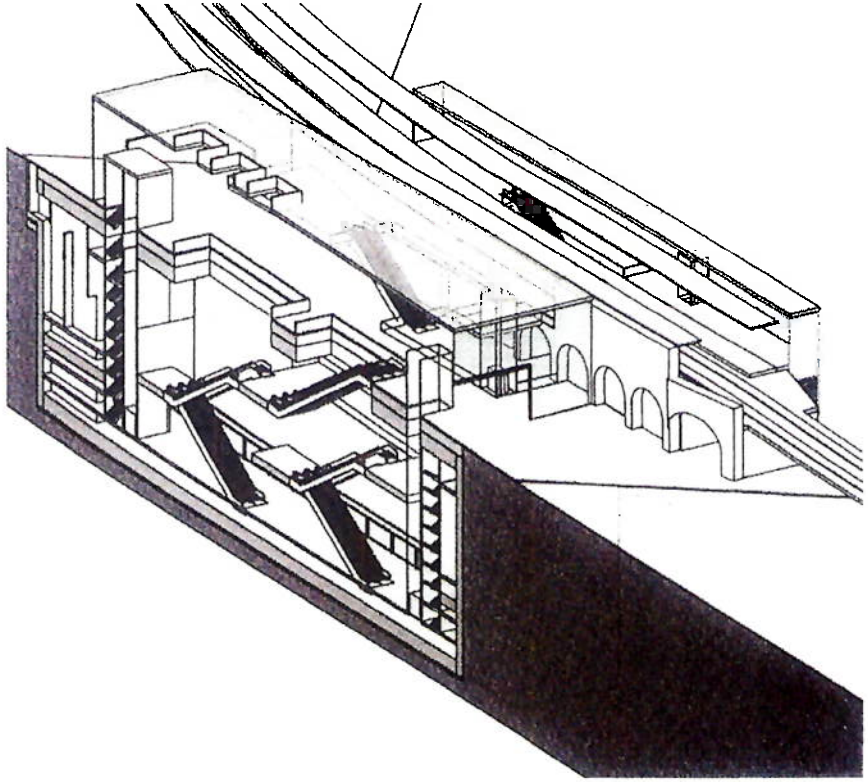
2 METROLINK STATION CONCEPT

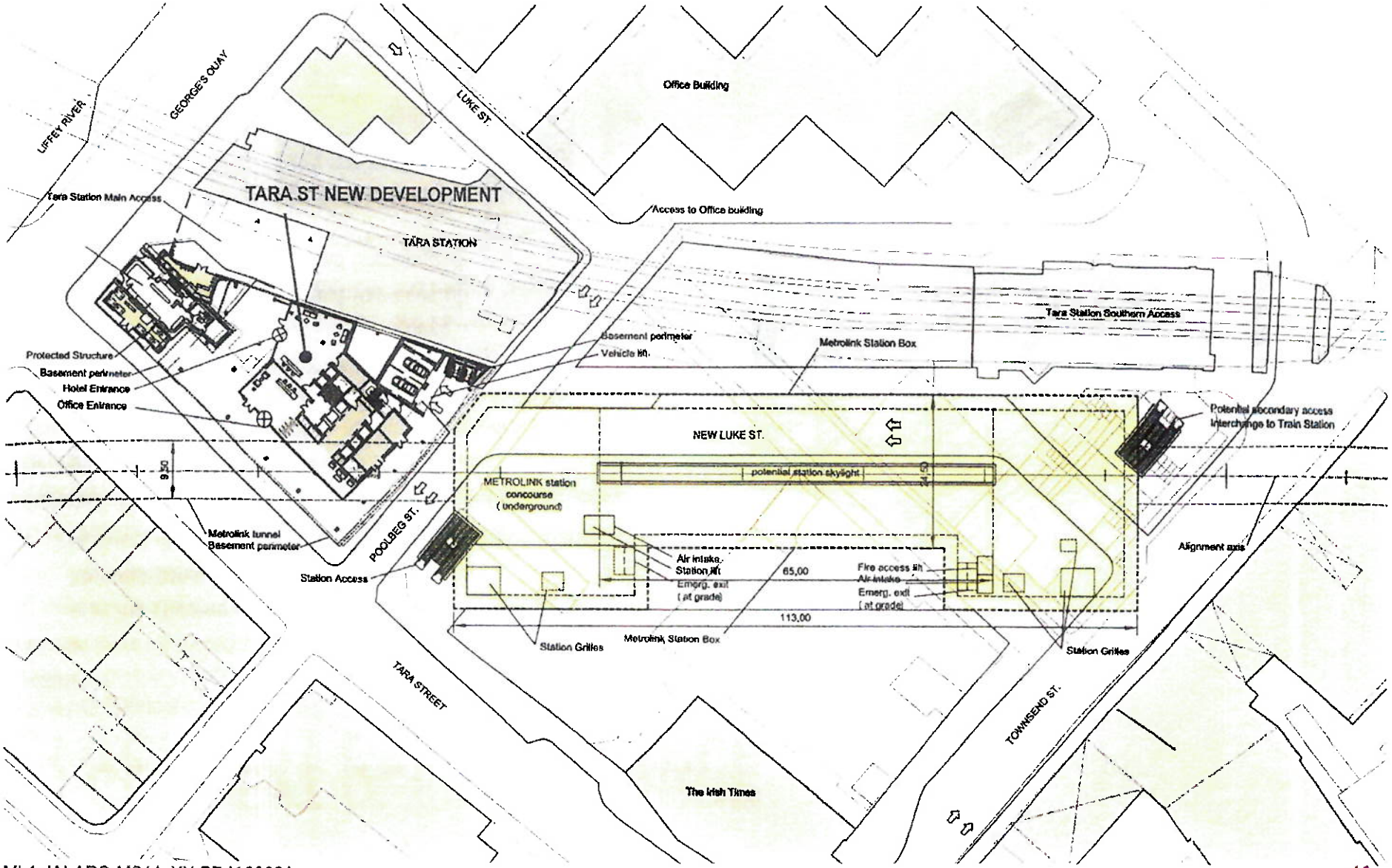
2.1 CONCEPT DESIGN BY ARUP

- New independent concourse south of existing Tara Rail Station main access.
- Shared intermodal concourse, both for Metrolink and Rail Station
  - Irish Rail Gateline at street level
  - Metrolink concourse at underground level
- Construction stage: avoids affecting the train station operation
- Operation stage: clearer from passenger point of view: unique access through an intermodal concourse.
- Demolition of College Gate building, Ashford House office building, two derelict Georgian buildings and four townhouses required
- Major refurbishment at Tara Rail Station required
- Lack of space for Back-of House facilities and traction substation while constrained by Poolbeg St and Townsend St.

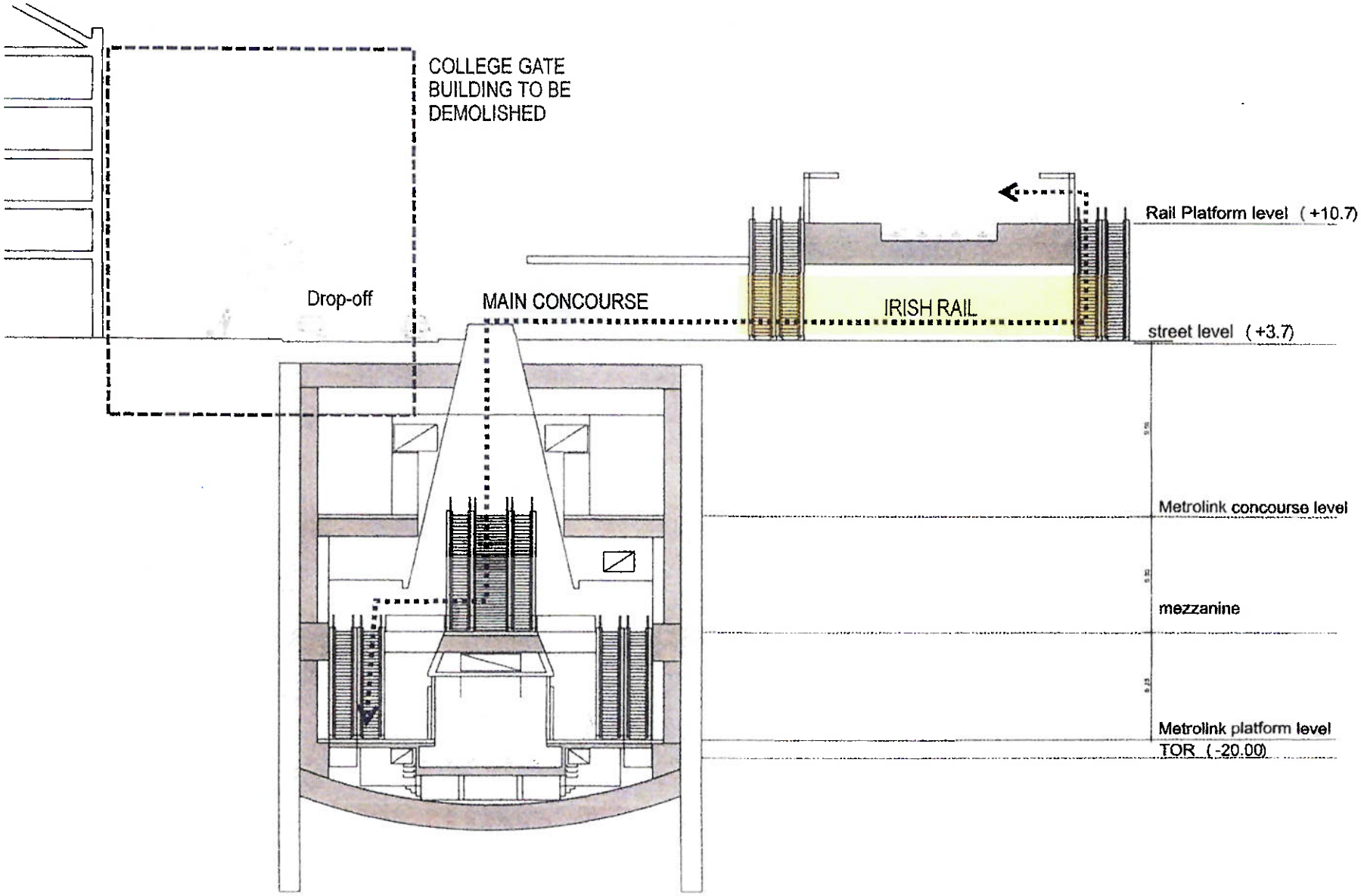




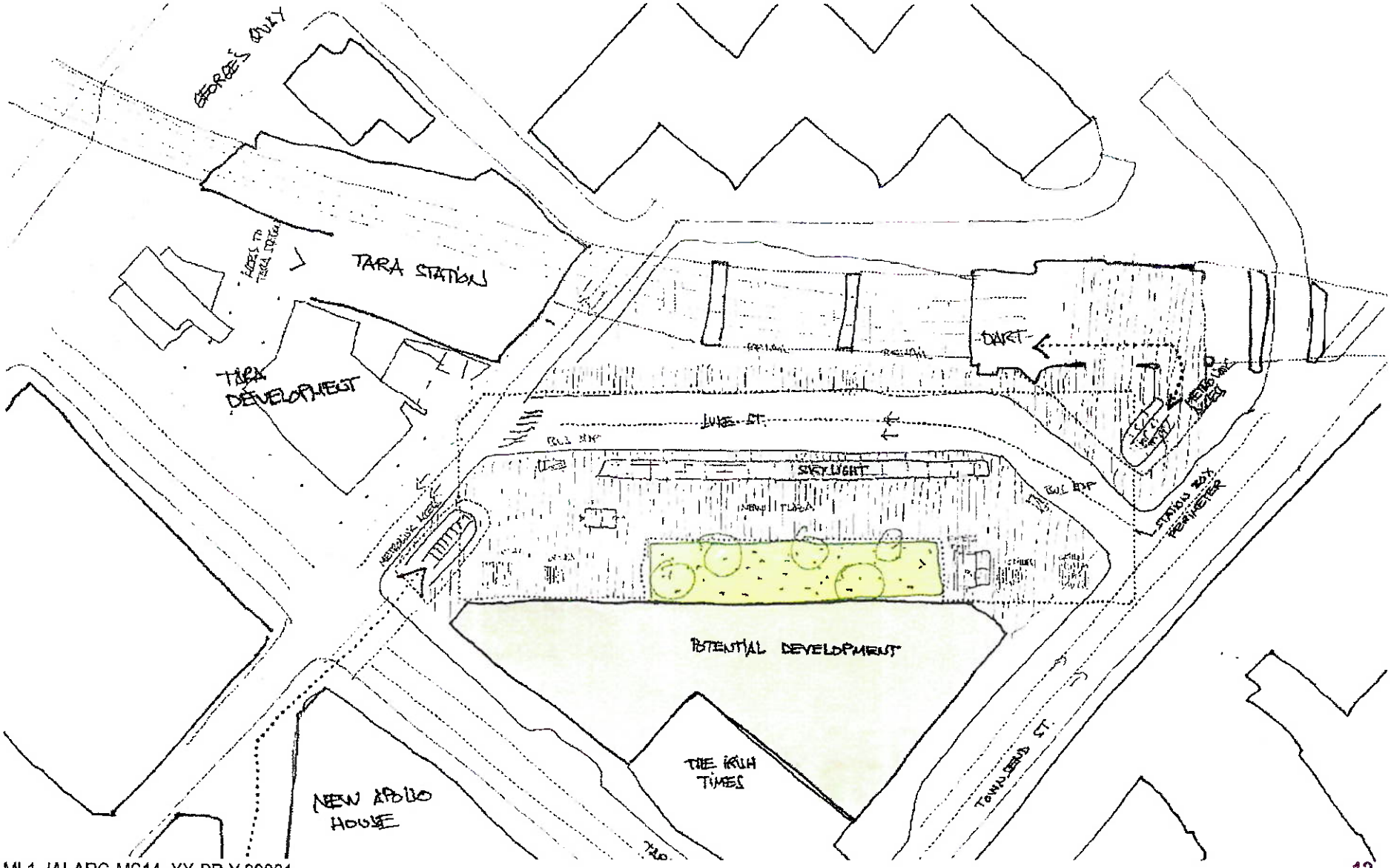
2.2 METROLINK STATION PLAN



2.3 METROLINK STATION CROSS SECTION



2.4 METROLINK STATION URBAN INTEGRATION



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3 ALTERNATIVE OPTIONS: PRELIMINARY STUDY

3.1 INTRODUCTION

Public Consultations for the Metrolink project prompted the "Save College Gate Group" to submit a document called, "**Analysis, concerns and alternative Metrolink station options based on documents published by Metrolink and other public sources.**"

In order to avoid the demolition of College Gate Building, the document proposes the following alternatives:

- **OPTION 1:** Station under Hawkins Development
- **OPTION 2:** Station moved northwards under Tara Street and a proposed new CIE development
- **OPTION 3:** Station moved southwards

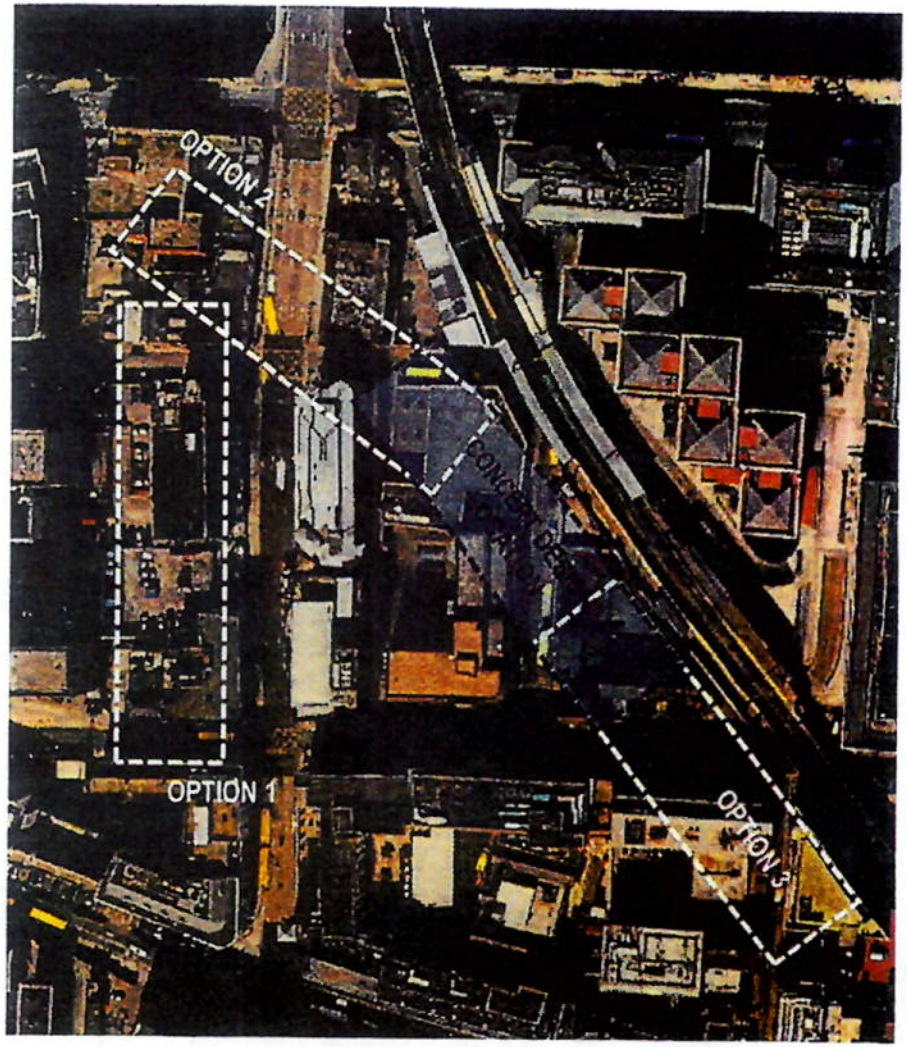
After due consideration the Metrolink project team is now able to propose an innovative solution that avoids demolition of the College Gate building. This is presented as a further Option 4 as below.

OPTION 4: Mined station at concept design location

The station location from concept design is retained but a new station construction method is proposed. This involves constructing two access shafts at each end of the original station box followed by a mined gallery in rock to connect the shafts.

These four alternative options have been studied and compared against the concept station configuration, which is presented here as Option 0. This has been included in the study as option 0 below.

- **OPTION 0:** Base scheme with station box and building demolition.



3.2 BASE SCHEME

Option 0

DESCRIPTION

- Station almost parallel to Tara Street (DART) Railway Station

ALIGNMENT

- Emerging Preferred Route (EPR) alignment.

CONSTRUCTION METHOD

- Top-down:
  - Requires all properties to be acquired on station footprint.
  - Surface restoration is needed and opportunities for new developments and / or public realm will be available.

IMPACTS

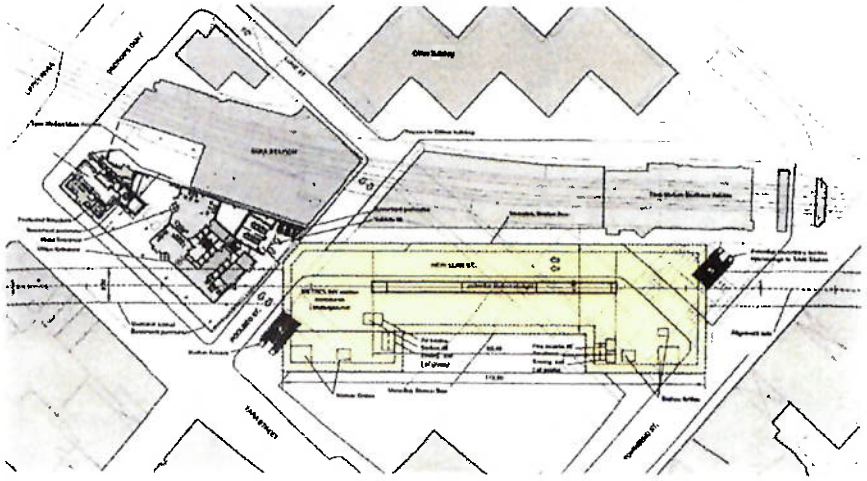
- Demolition of College Gate building, Ashford House office building, two derelict Georgian buildings and four townhouses.
- Poolbeg St. and Luke St. to be closed during construction and Townsend St. also affected.
- Utilities: - ESB Medium Voltage, 2440mm circular brick foul sewer, 1200mm circular concrete foul sewer, Low pressure gas main, Number of telecommunication ducts, 250 and 600mm watermains

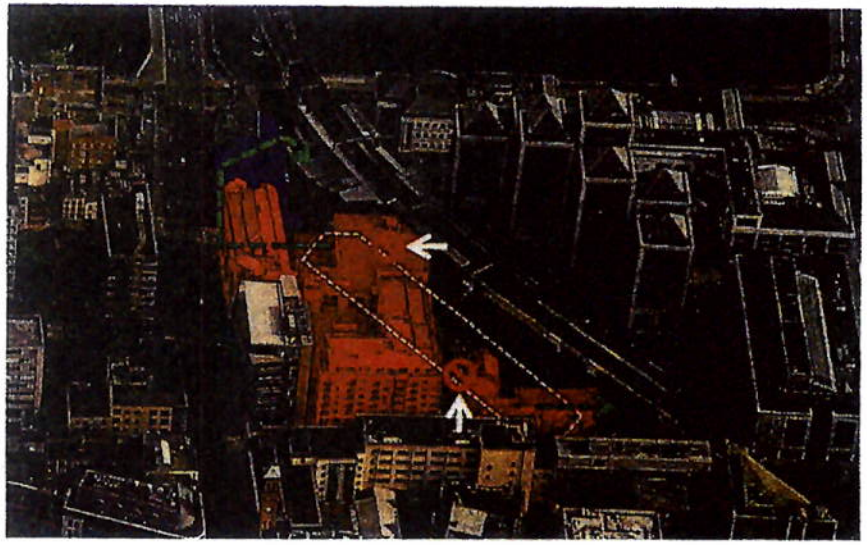
INTEGRATED METRO – DART STATIONS

- Enables passenger movement between transport modes.

URBAN INTEGRATION

- Two point station access from Tara St. and from Tara St. DART Station
- New plaza and Luke St. reconstruction is feasible over roof slab of new station with integration of station skylight and ventilation grilles in the new public realm.
- Potential for above-ground development beside the Irish Times building dividing walls.





4. ALTERNATIVES – PRELIMINARY STUDY

Option 1: Station under Hawkins Development

DESCRIPTION

- "Save College Gate Group" proposed to locate the station parallel to Tara Street, integrated in the new Hawkins development.

ALIGNMENT

- This option requires a complete re-alignment of the railway in this area.
- Impossible to reach O'Connell Street Station with this Tara Station position.

CONSTRUCTION METHOD

- Top-down:
  - Requires acquiring all properties on station footprint.
  - Surface restoration afterwards. Opportunities for new developments and / or public realm.

IMPACTS

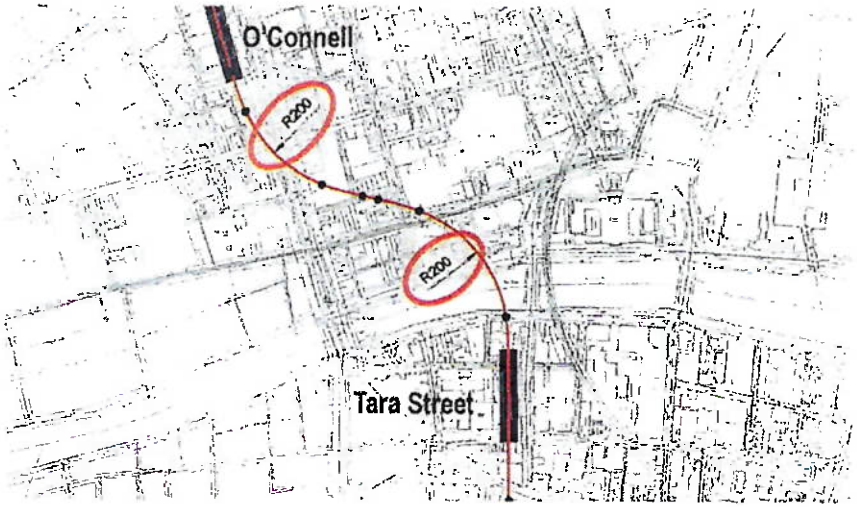
- Demolition of The Brokerage apartments and the Long Stone Pub at Townsend St. and Several 3 stories buildings and an apartment block at Poolbeg St.
- Townsend St. and Poolbeg St. closed during construction.
- Agreement with Hawkins Developer needed to integrate the station box and above ground elements in the development.
- Utilities - ESB medium Voltage, 225mm foul sewer, Low pressure gas main, Number of telecommunication ducts, 150mm watermain

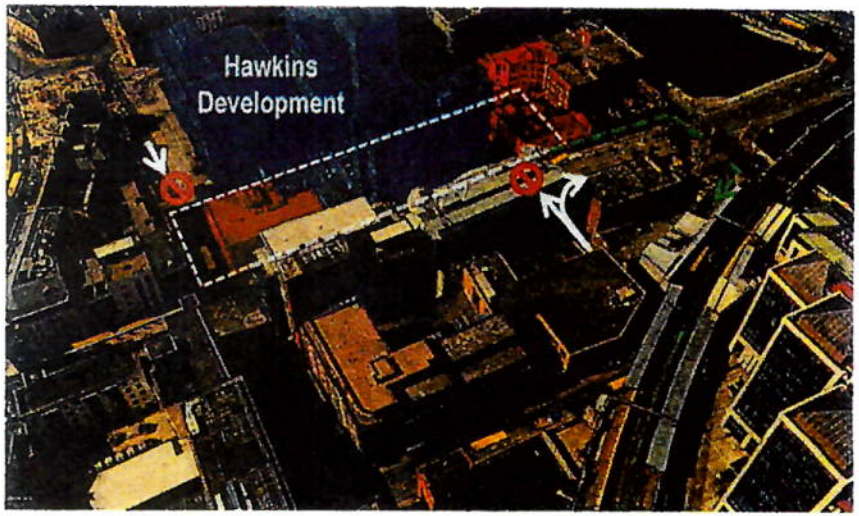
METRO - RAIL TRANSFER

- Metro station farther from Train station than EPR location.
- Interchange not clear and less practical: longer walking distance and need to cross a street. Pedestrian tunnel may be required.

URBAN INTEGRATION

- Access point, emergency exits and ventilations shafts to be integrated with new development.





4. ALTERNATIVES – PRELIMINARY STUDY

Option 2: Station moved northwards

DESCRIPTION

- "Save College Gate Group" proposed moving the station northwards to avoid demolishing College Gate apartments.
- DE has changed the proposed location to one that fits a feasible alignment.

ALIGNMENT

- This option requires changing the existing alignment.
- Exceptional alignment parameters values required to reach O'Conell station.

CONSTRUCTION METHOD

- Top-down:
  - Requires acquiring all properties on station footprint.
  - Surface restoration afterwards. Opportunities for new developments and / or public realm.

IMPACTS

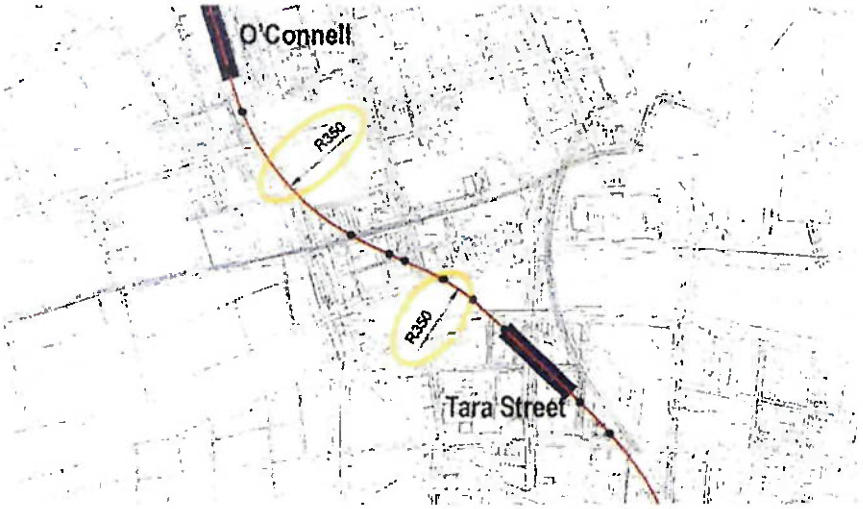
- Demolition of Ashford House office building and the entire city-block defined by Tara St., George's Quay, Corn Exchange Pl. and Poolbeg St.
- Tara St. and Poolbeg St. closed during construction.
- Agreement with 2-16 Tara St. developer needed to integrate station box and above ground elements in the development
- Utilities - 4x ESB medium Voltage, 600mm circular concrete foul sewer, 990x600mm egg shape brick foul sewer, 3x Low pressure gas main, Number of telecommunication ducts, 4", 600mm and 2x6" watermains

METRO - RAIL TRANSFER

- Transfer to Tara St. Rail Station using existing main access.

URBAN INTEGRATION

- Interchange flows to be coordinated with the new 2-16 Tara Street Development.



4. ALTERNATIVES – PRELIMINARY STUDY

Option 3: Station moved southwards

DESCRIPTION

- "Save College Gate Group" proposed moving the station southwards to avoid demolishing College Gate apartments.

ALIGNMENT

- This option requires changing the existing alignment.
- New alignment fulfills all parameters.

CONSTRUCTION METHOD

- Top-down:
  - Requires acquiring all properties on station footprint.
  - Surface restoration afterwards. Opportunities for new developments and / or public realm.

IMPACTS

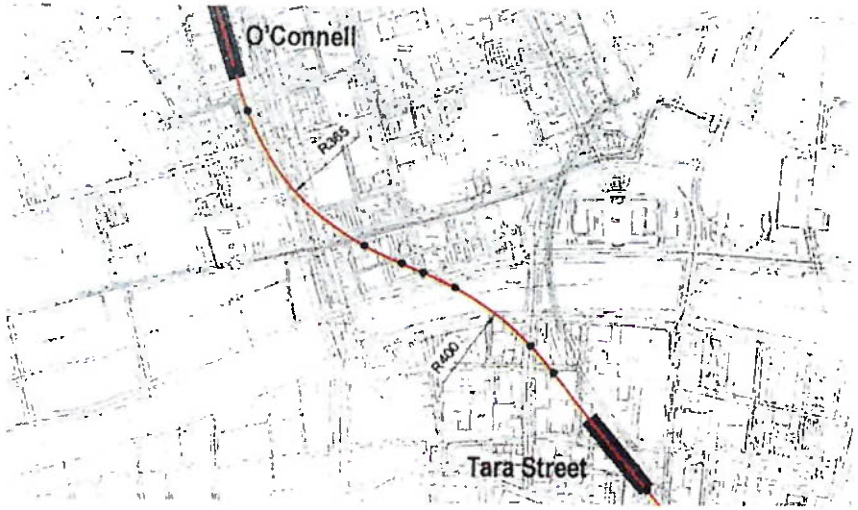
- Demolition of buildings at Townsend St. and Spring Garden Lane.
- Townsend St. and Spring Garden Lane closed during construction.
- Agreement with Townsend St. 157-164 developer needed to integrate the station box and above ground elements in the development.
- Utilities - 2x ESB medium Voltage, 2440mm circular brick foul sewer, 1200mm circular concrete foul sewer, Low pressure gas main, Number of telecommunication ducts, 250 and 600mm watermains

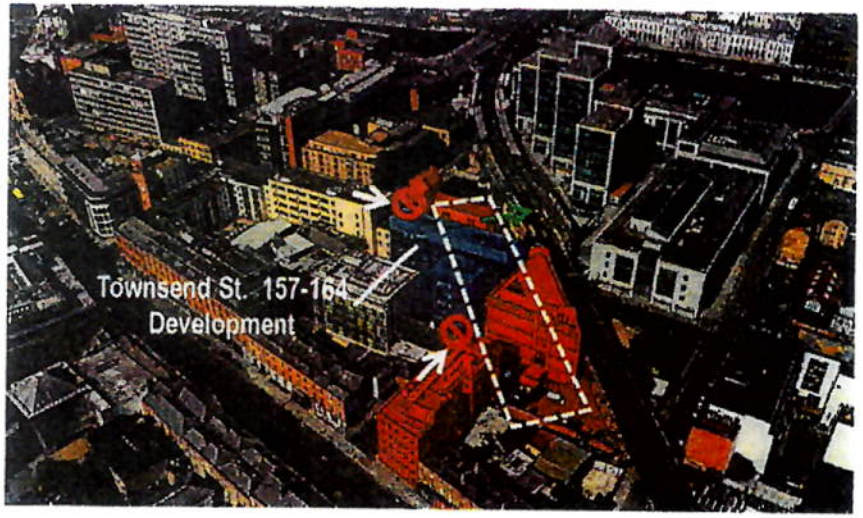
METRO - RAIL TRANSFER

- Transfer to Tara St. Rail Station using existing southern access.
  - Change from a peak hour access to a permanent access.
  - Refurbishment needed

URBAN INTEGRATION

- Potential above ground development between station box and Dublin Fire Brigade Headquarters.





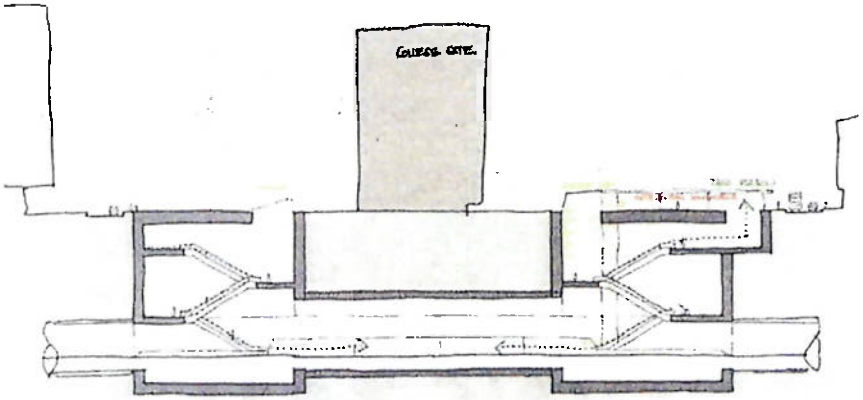
4. ALTERNATIVES – PRELIMINARY STUDY

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL

Option 4: Excavated station

DESCRIPTION

- To avoid demolition of College Gate building, the DE has proposed a new station typology that avoids changing the location and thus the alignment.
- A shaft at each station end includes escalators, stairs, lifts and BOH
- Excavated gallery between shafts at track level provides for the platforms.



ALIGNMENT

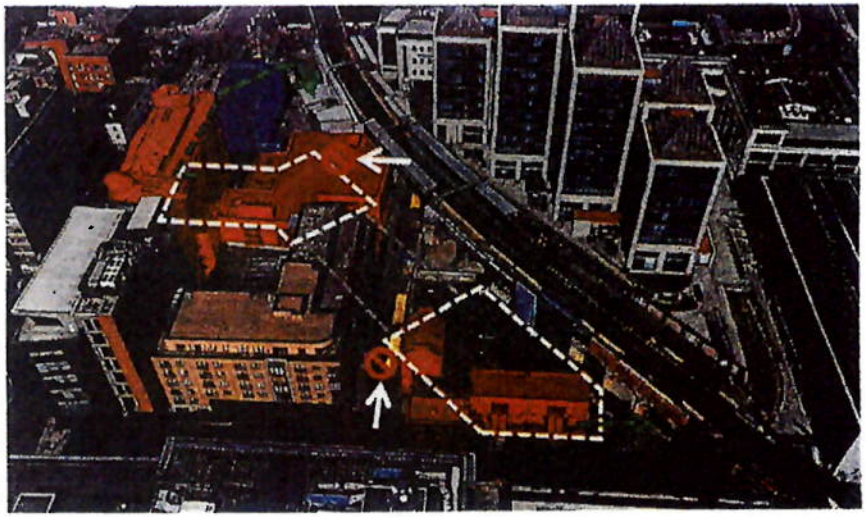
- EPR Alignment

CONSTRUCTION METHOD

- Top-down construction of access shafts
- Excavation of gallery between the shafts

IMPACTS

- Demolition of Ashford House office building, two derelict Georgian buildings and four townhouses.
- Poolbeg St and Luke St. closed during construction. Townsend St. affected
- Utilities - 2x ESB medium Voltage, 2440mm circular brick foul sewer, 900mm circular concrete foul sewer, Low pressure gas main, Number of telecommunication ducts, 6", 600mm watermains



METRO - RAIL TRANSFER

- Allows transfer with both rail station accesses.

URBAN INTEGRATION

- Two point access, one from Tara St. and other connecting to Tara Station
- Potential new plaza above station's shafts. Integration of station skylights and ventilation grilles on the new public realm.
- Potential above ground development above northern shaft

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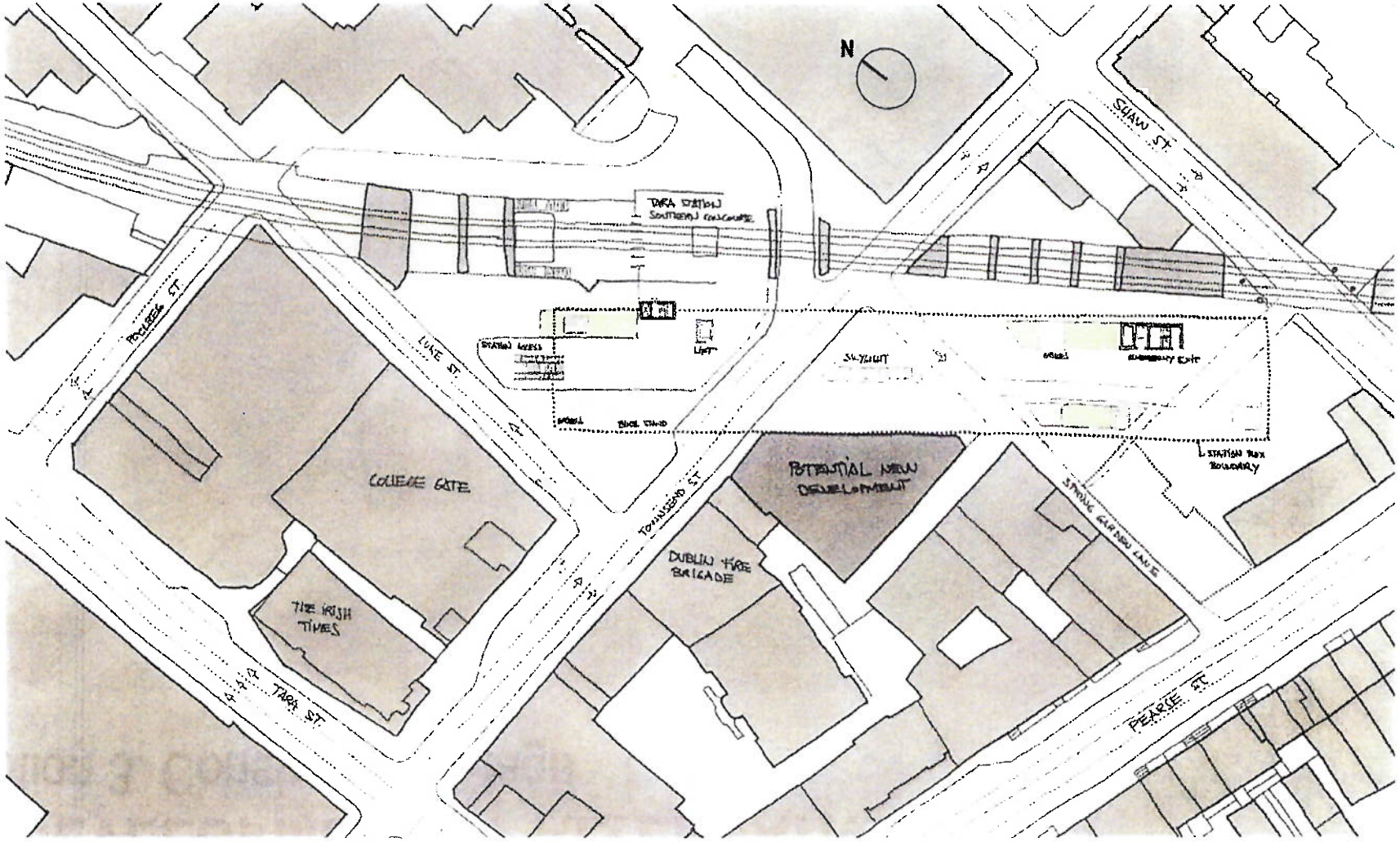
5 DEVELOPMENT OF ALTERNATIVES

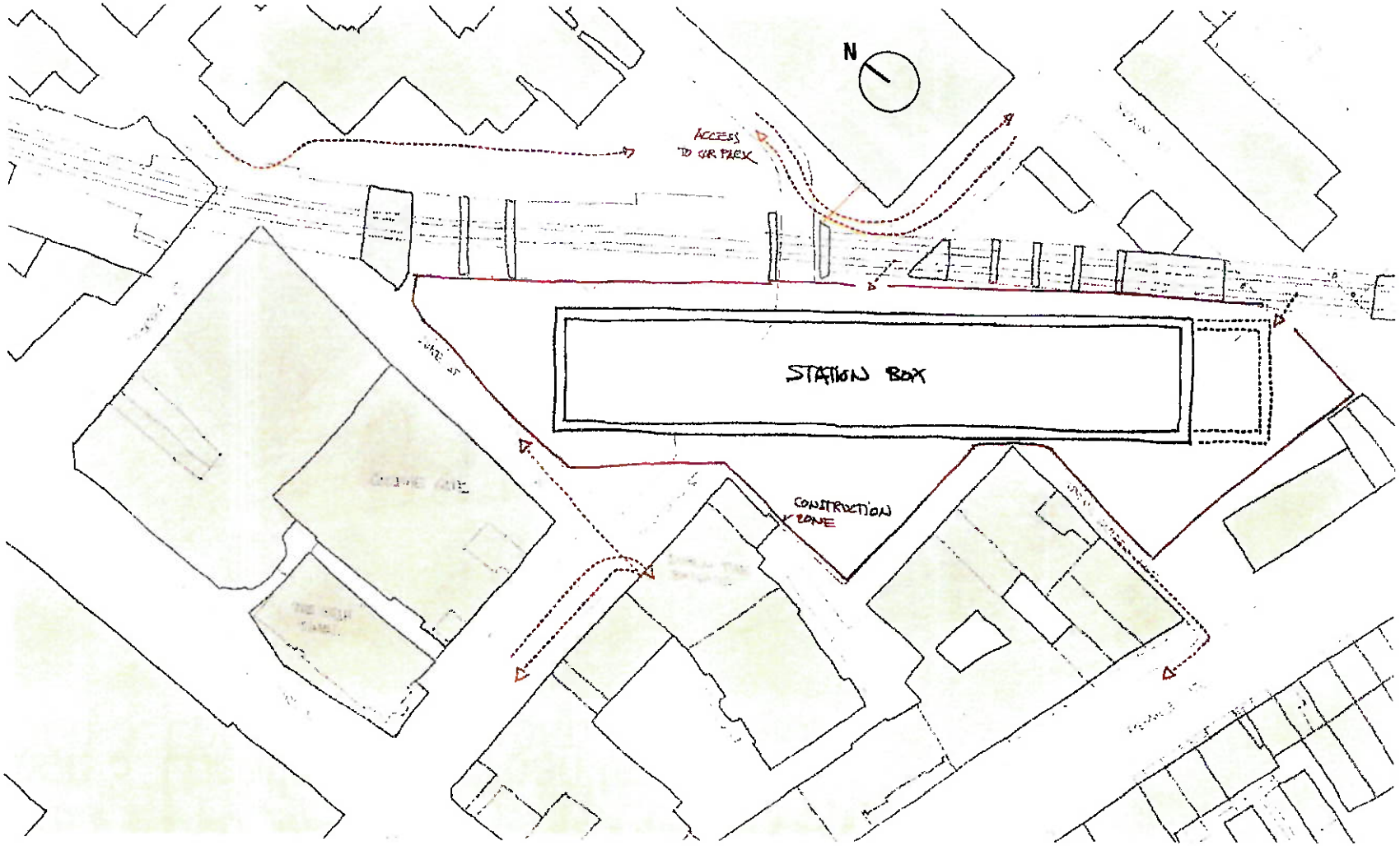
5. DEVELOPMENT OF ALTERNATIVES

Option 3. Location and Urban Integration



5. DEVELOPMENT OF ALTERNATIVES

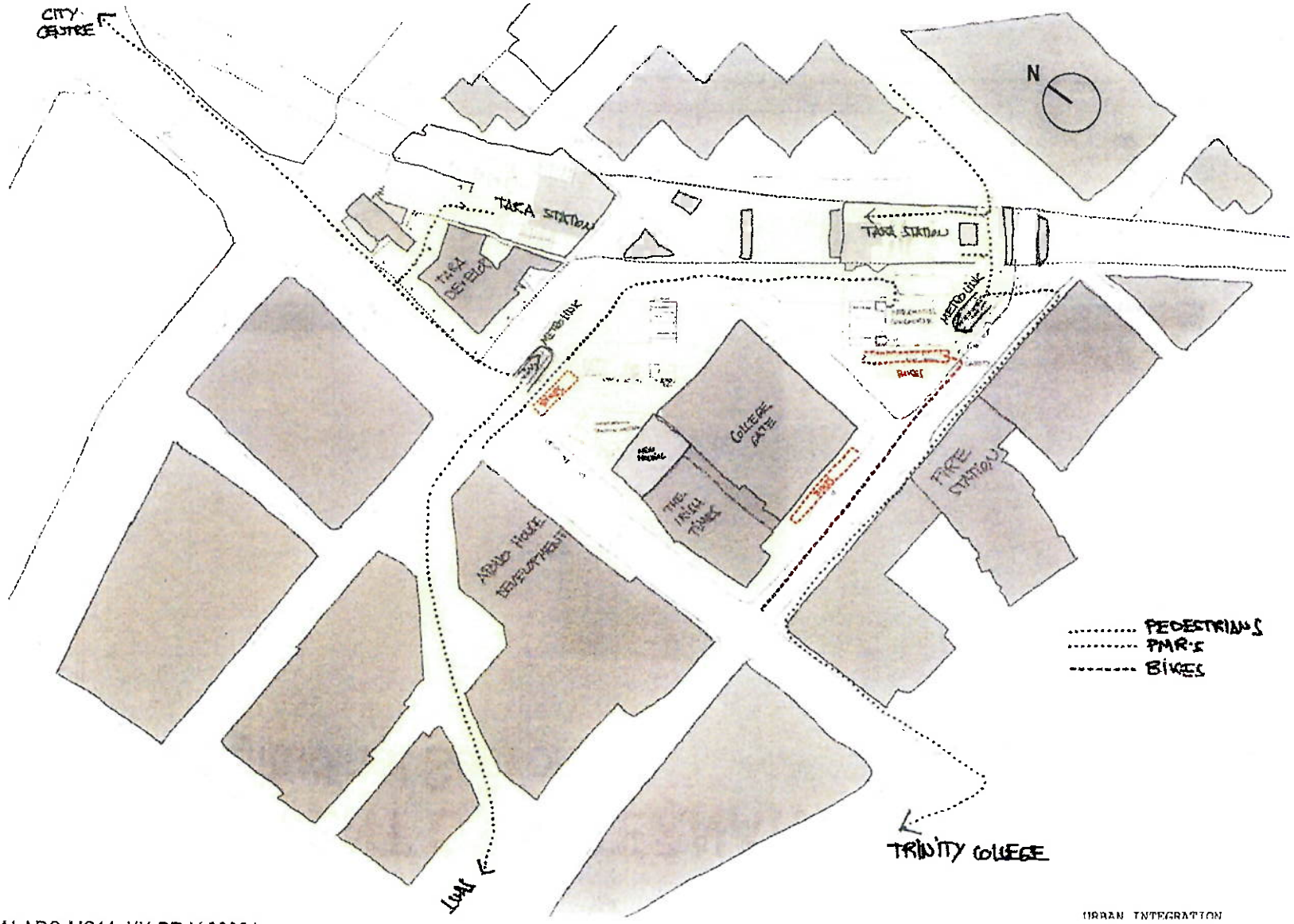
Option 3. Construction Stage



5. DEVELOPMENT OF ALTERNATIVES

Option 4. Location and Urban Integration

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL



5. DEVELOPMENT OF ALTERNATIVES

Option 4. Longitudinal Section

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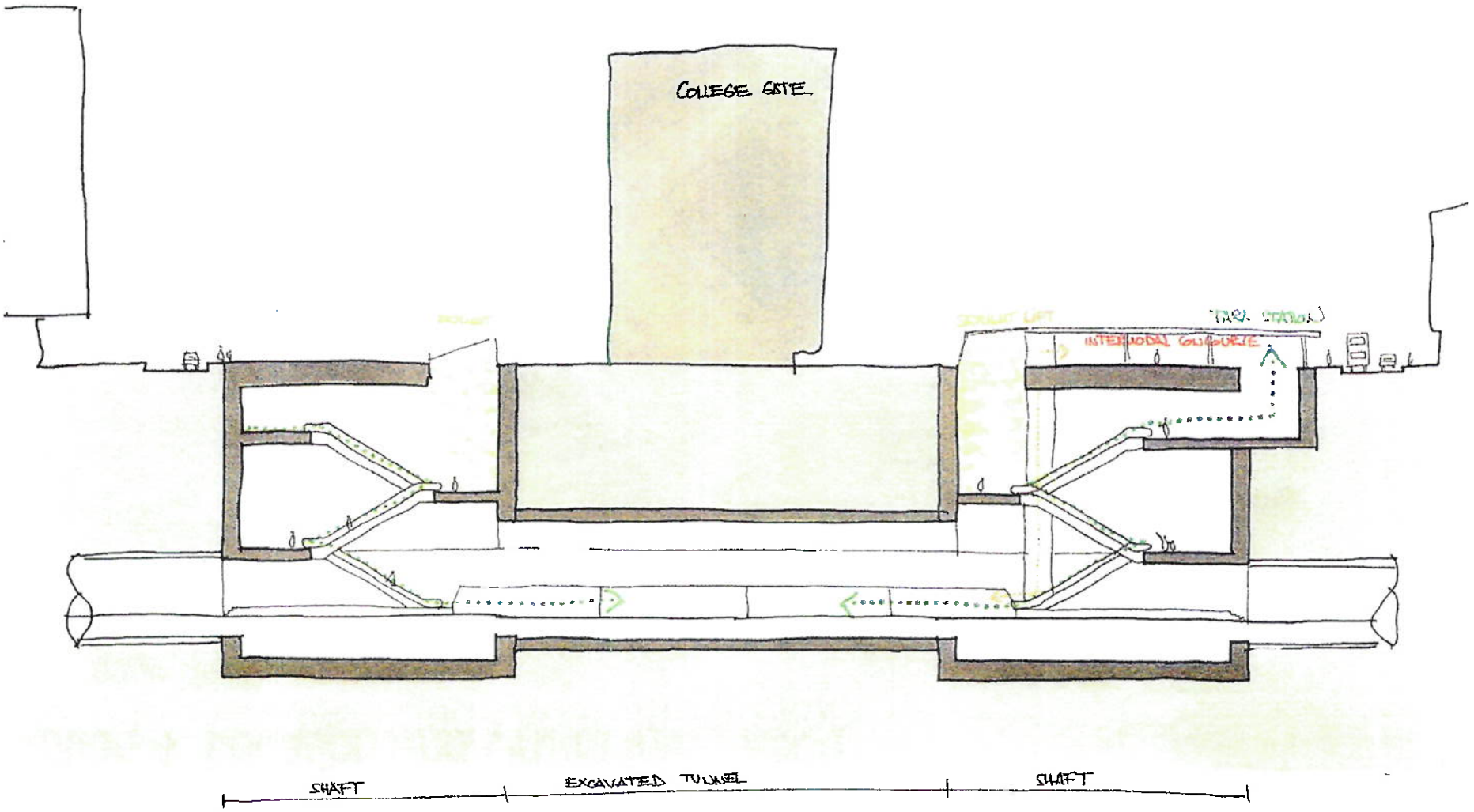
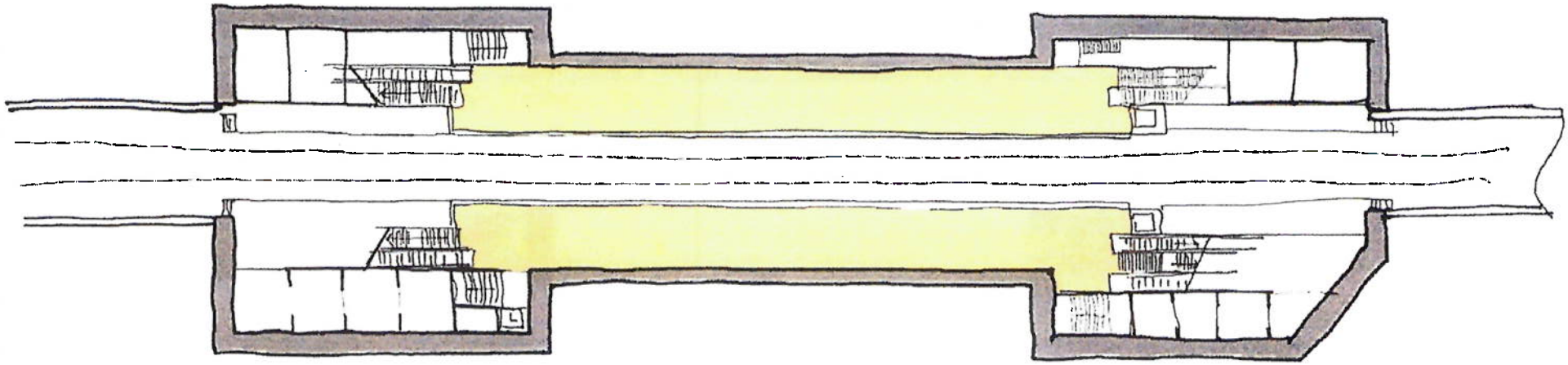


5. DEVELOPMENT OF ALTERNATIVES

Option 4. Plan Section

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL

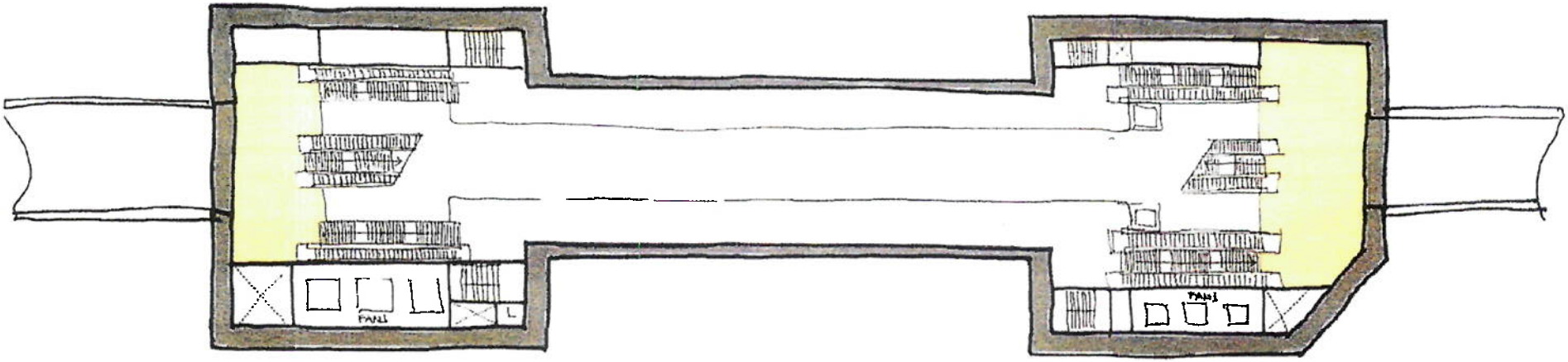


PLATFORM LEVEL -26 M

5. DEVELOPMENT OF ALTERNATIVES

Option 4. Plan Section

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL

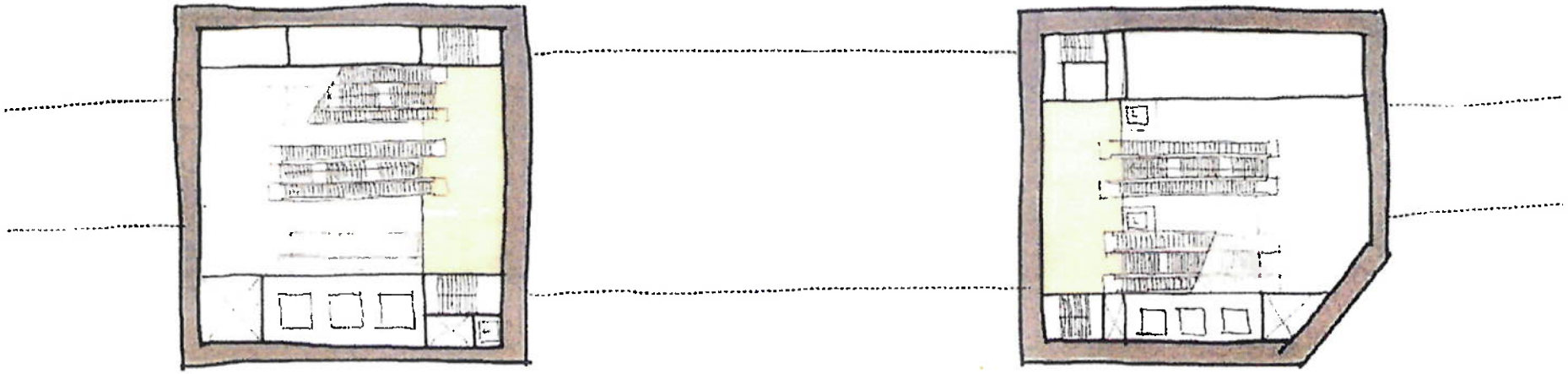


INTERMEDIATE LEVEL -19,75 M

5. DEVELOPMENT OF ALTERNATIVES

Option 4. Plan Section

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL

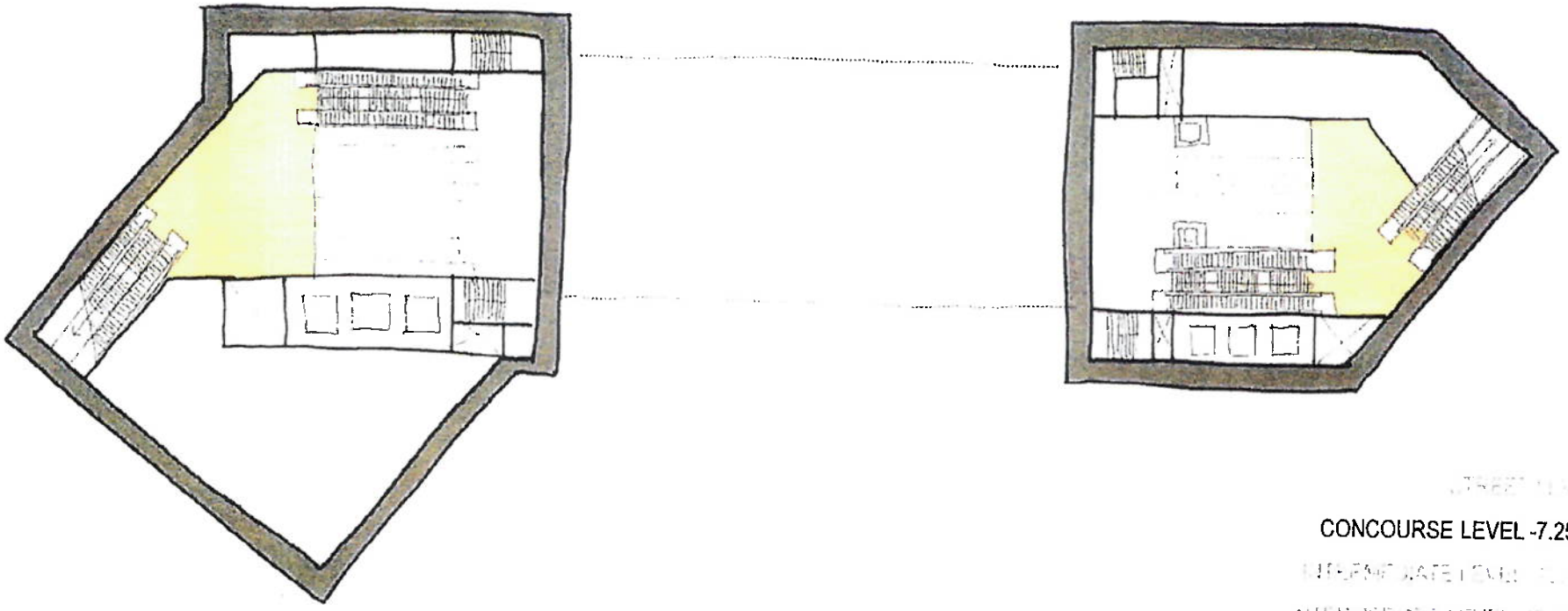


INTERMEDIATE LEVEL -13.5 M

5. DEVELOPMENT OF ALTERNATIVES

Option 4. Plan Section

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL

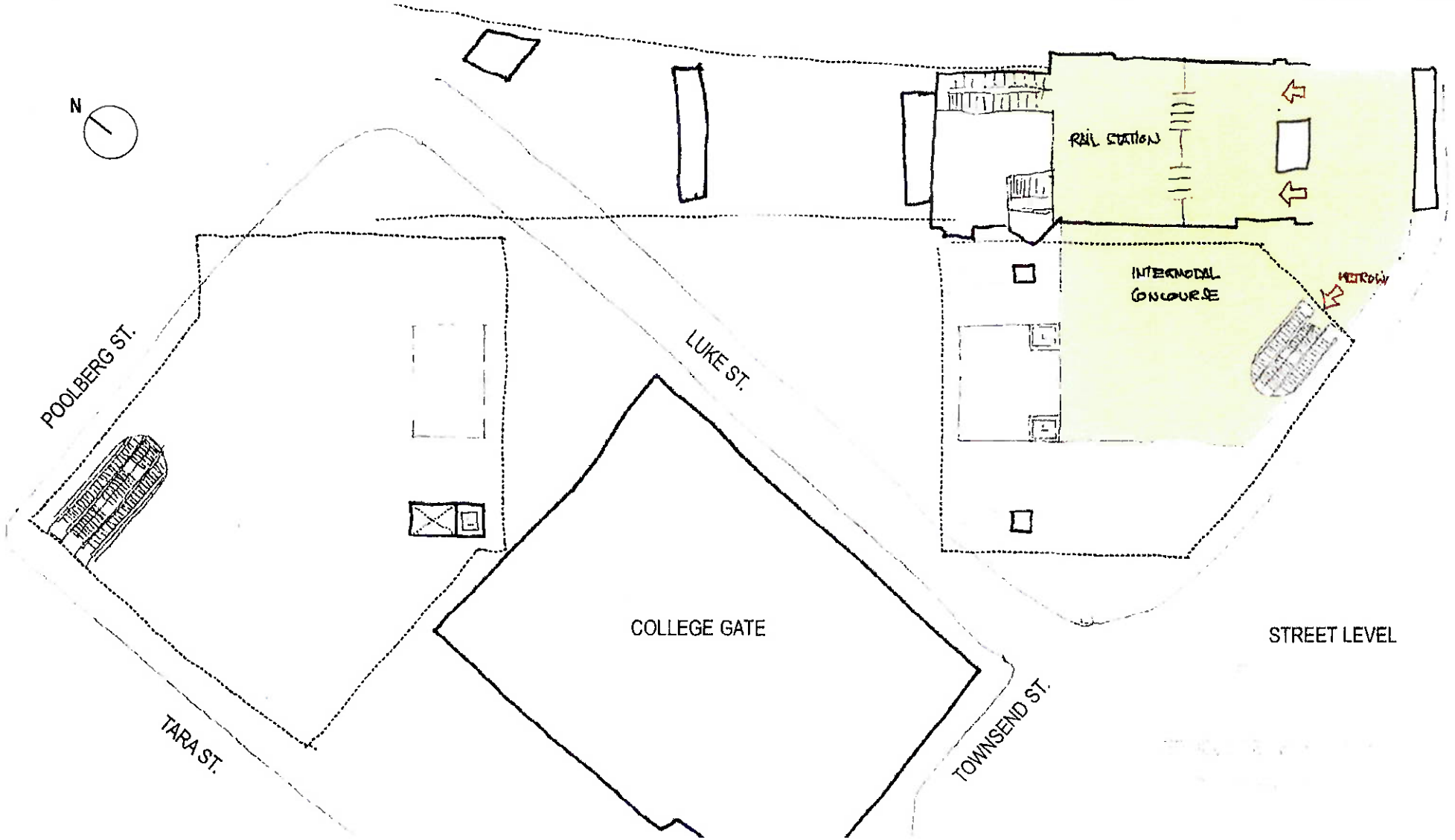


CONCOURSE LEVEL -7.25 M

5. DEVELOPMENT OF ALTERNATIVES

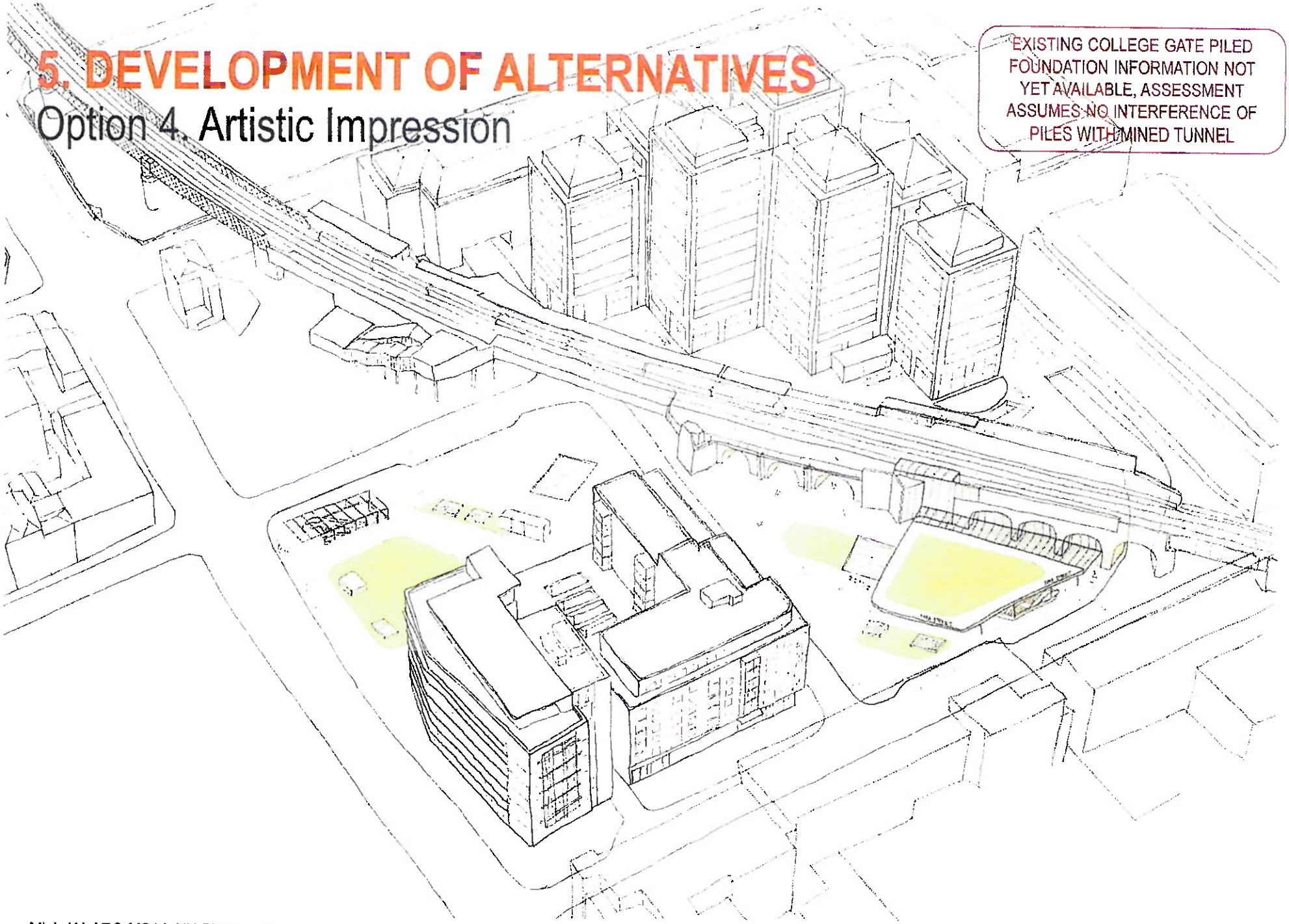
Option 4. Plan Section

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL



5. DEVELOPMENT OF ALTERNATIVES

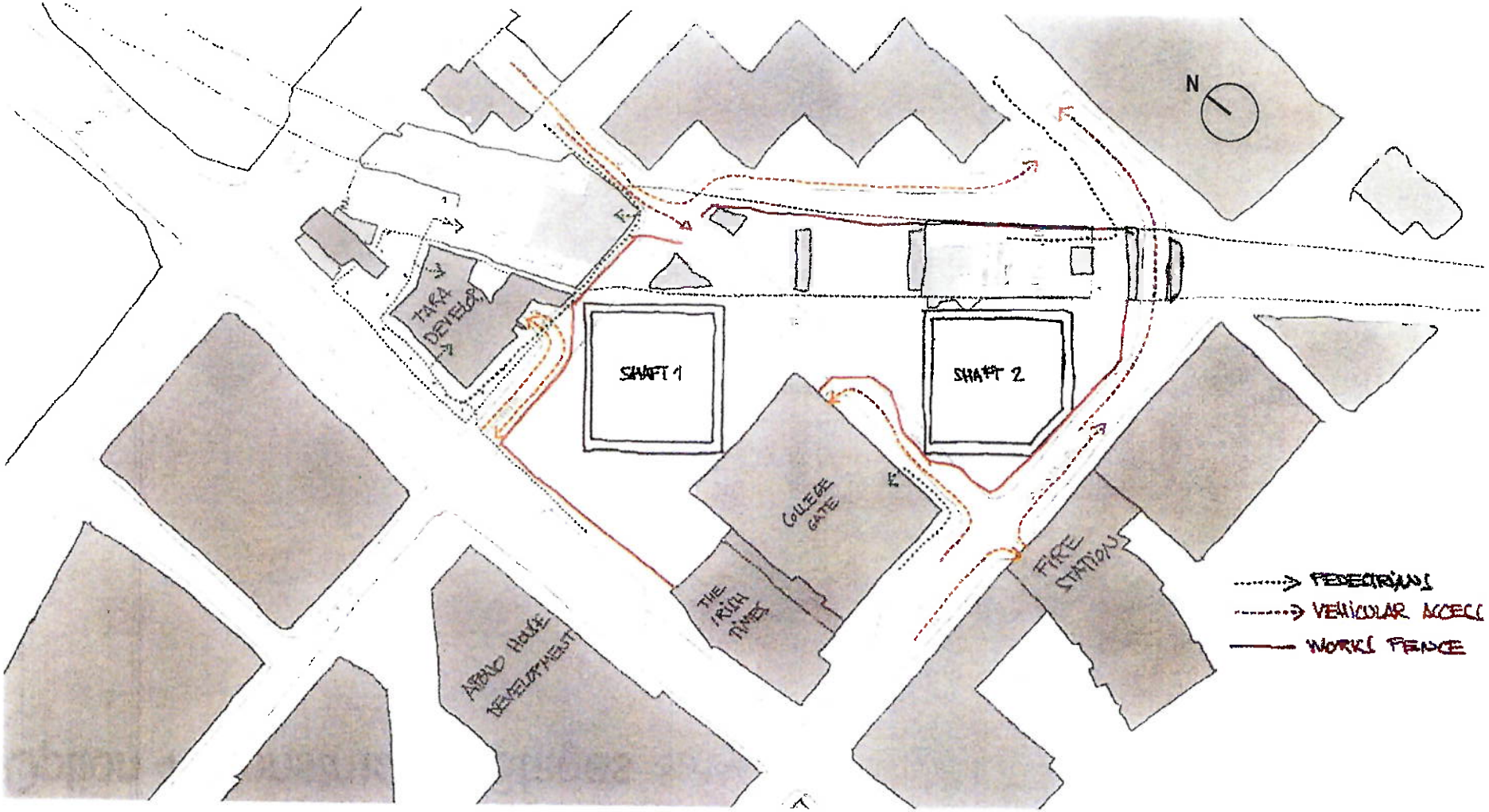
Option 4. Artistic Impression



5. DEVELOPMENT OF ALTERNATIVES

Option 4. Construction Stages

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL

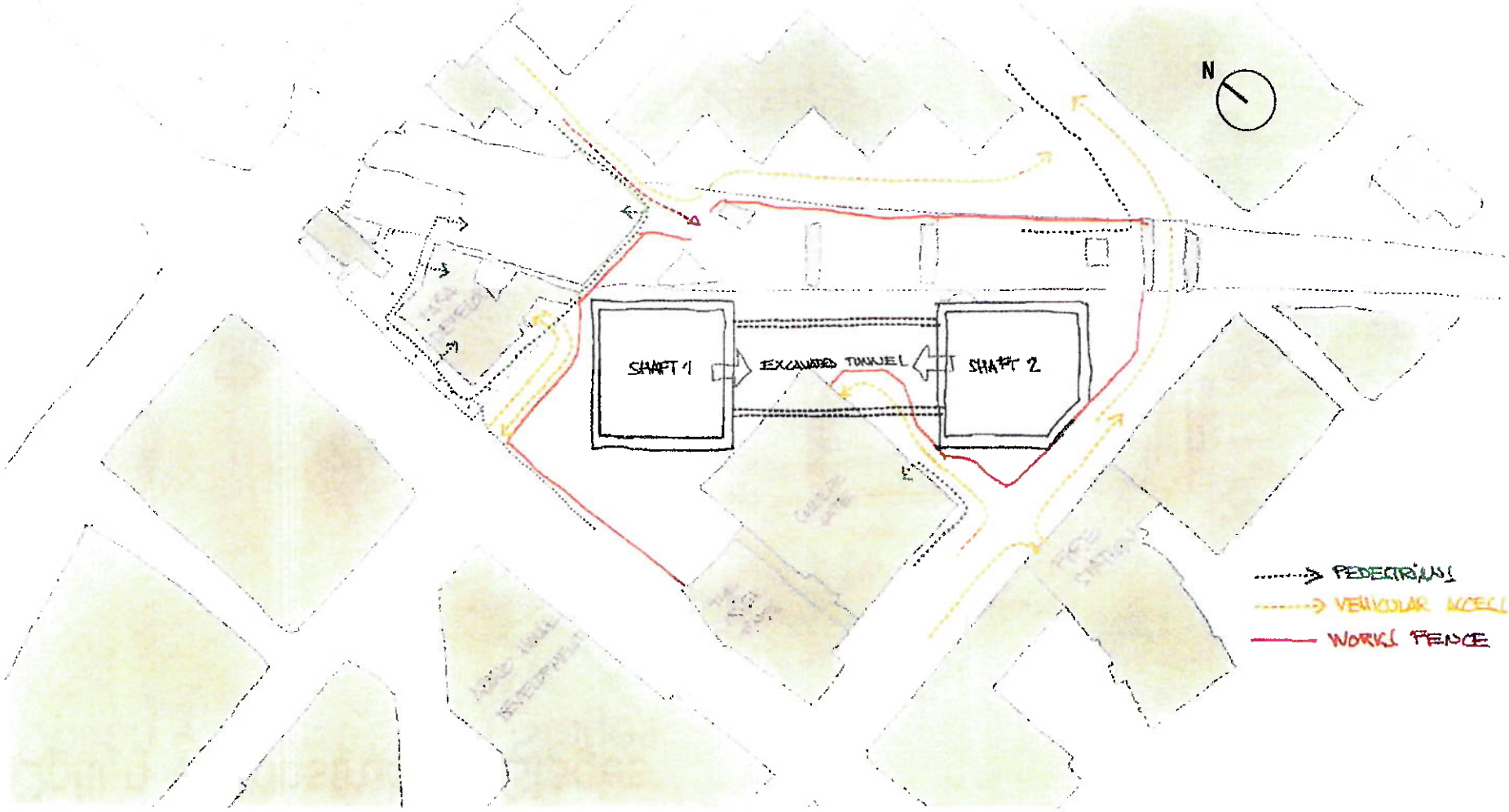


STAGE 1 TOP-DOWN CONSTRUCTION OF 1 SHAFT AT EACH END OF THE STATION

5. DEVELOPMENT OF ALTERNATIVES

Option 4. Construction Stages

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL

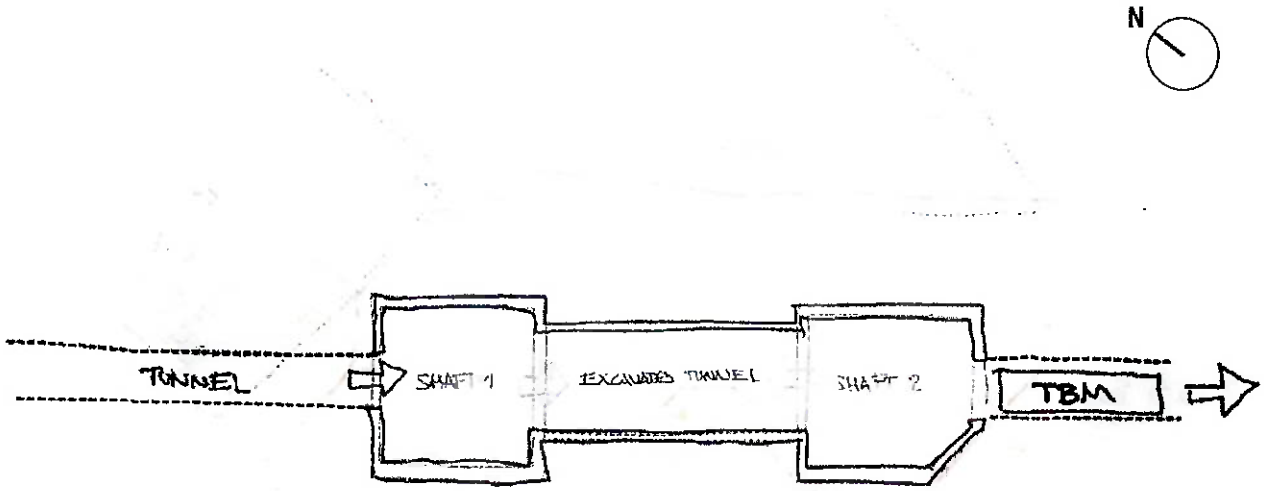


STAGE 2 EXCAVATE A GALLERY BETWEEN THE SHAFTS

5. DEVELOPMENT OF ALTERNATIVES

Option 4. Construction Stages

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL



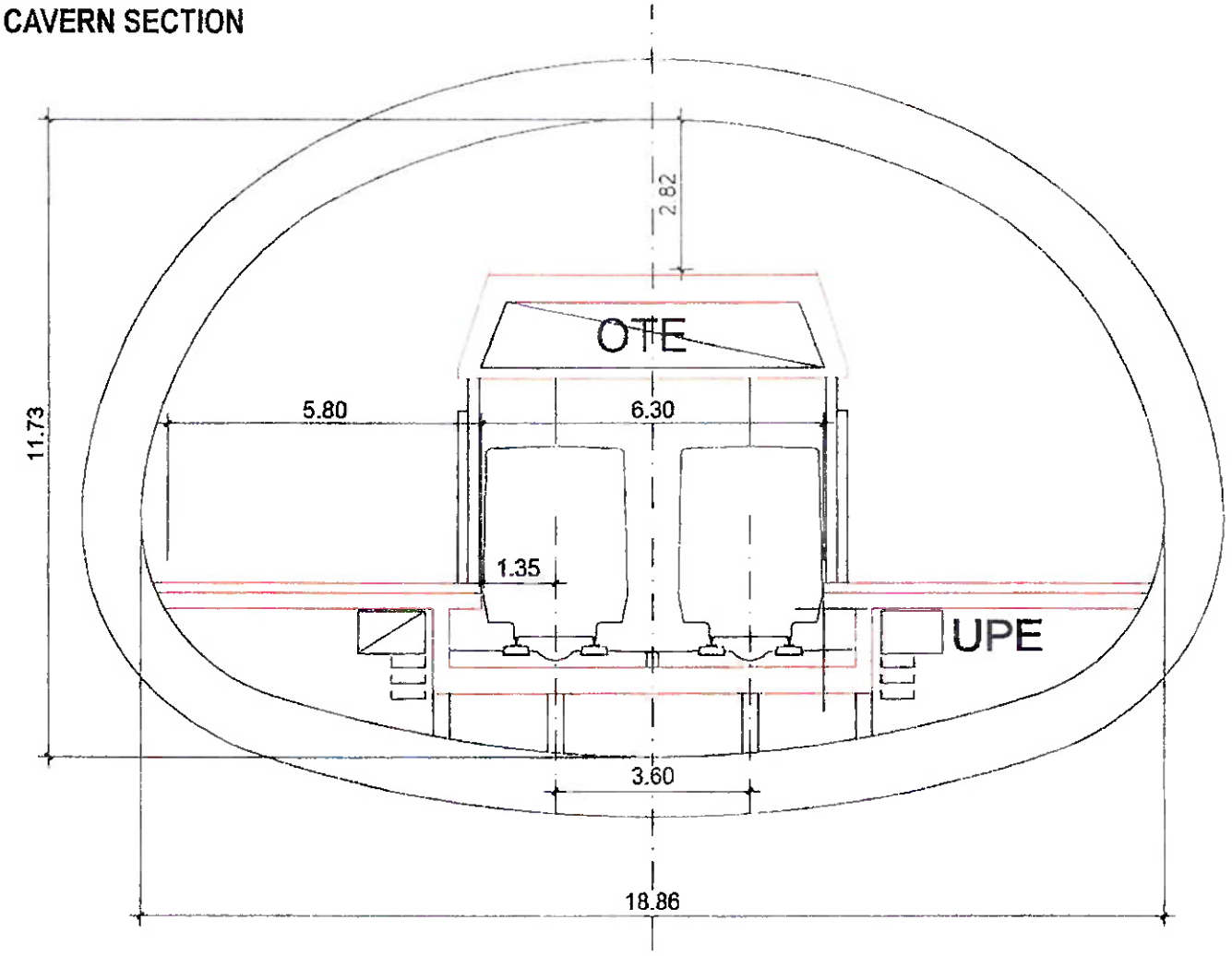
STAGE 3 TBM PASSES THROUGH THE STATION

5. DEVELOPMENT OF ALTERNATIVES

Option 4. Geotechnics

FINAL ASSESSMENT DEPENDING ON EXISTING FOUNDATION INFORMATION

PROPOSED CAVERN SECTION



5. DEVELOPMENT OF ALTERNATIVES

Option 4. Geotechnics

FINAL ASSESSMENT DEPENDING ON EXISTING FOUNDATION INFORMATION

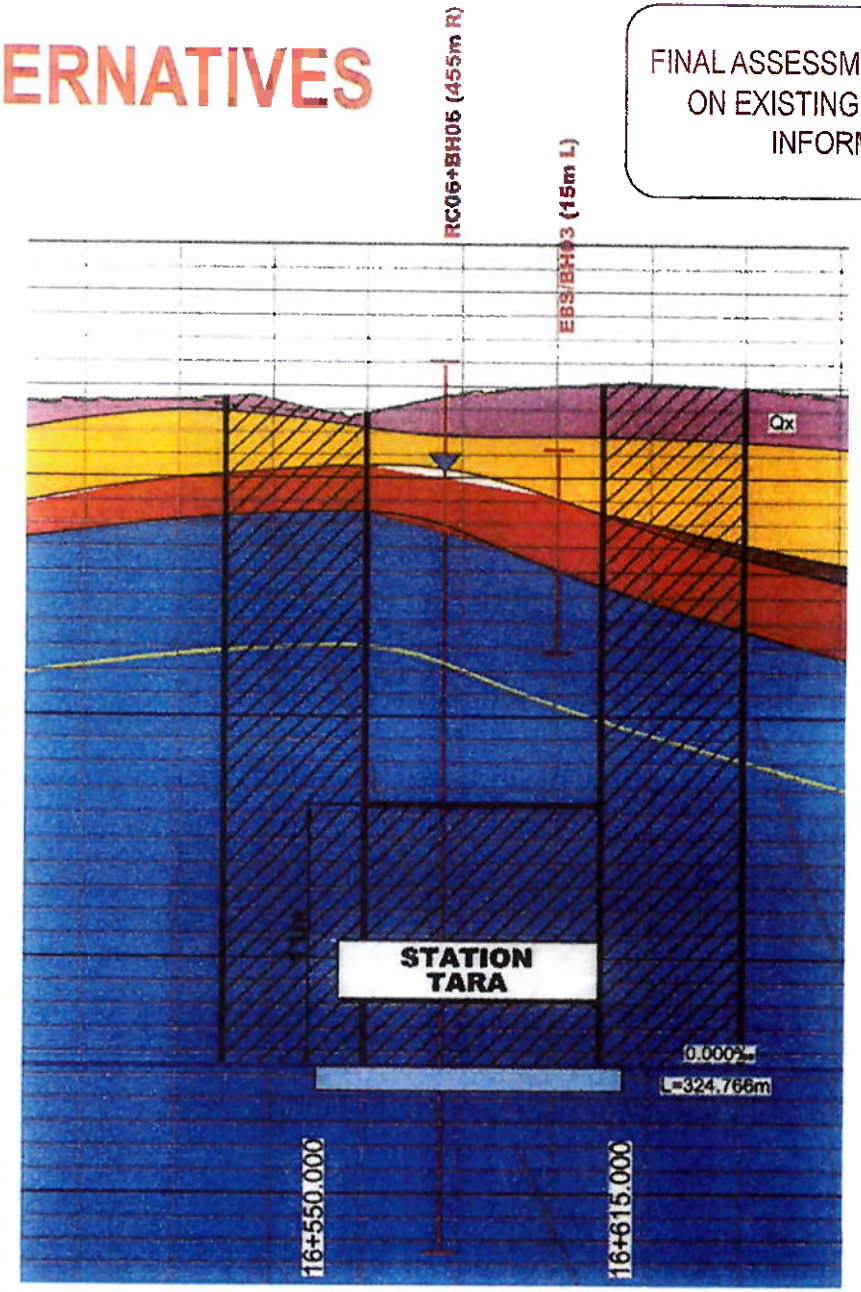
PROPOSED CAVERN SECTION

SOIL LAYERS:

- Made ground (QX)
- Brown Boulder Clay (QBR)
- Black Boulder Clay (QBL)
- Alluvial sand and gravels (QAG)
- Transition Soil/Rock (QTR)

ROCK LAYERS:

- Argillaceous Bioclastic Limestone (CMUP) Upper member of Malahide Formation
- Biomicritic Limestone with thin shale interbedded (CMLO) Lower member of Malahide Formation
- Micritic Limestone (CWA) Waulsortian Formation
- Calcareous Shale (CTO) Tober Formation
- Argillaceous Limestone (CLU) Lucan Formation



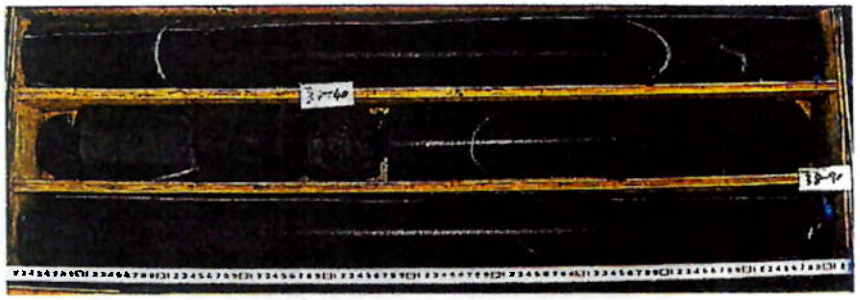
5. DEVELOPMENT OF ALTERNATIVES

Option 4. Geotechnics

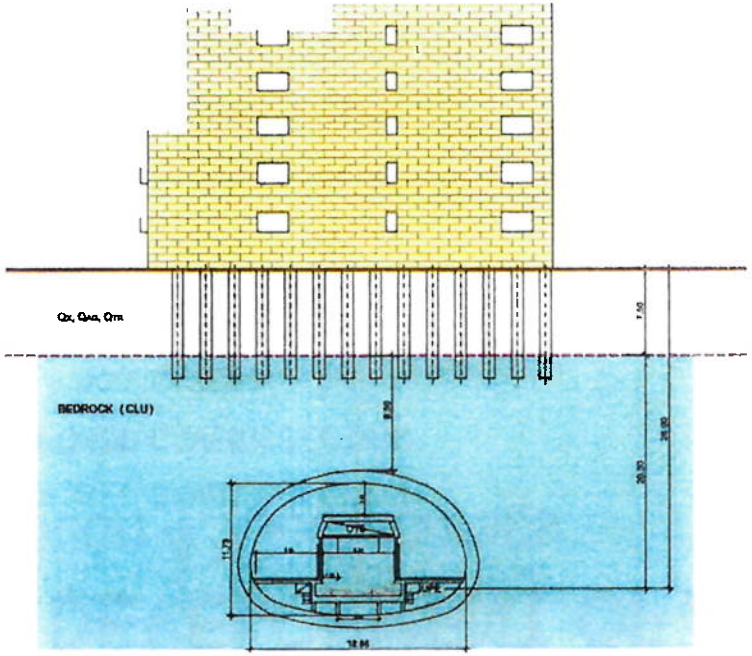
FINAL ASSESSMENT DEPENDING ON EXISTING FOUNDATION INFORMATION

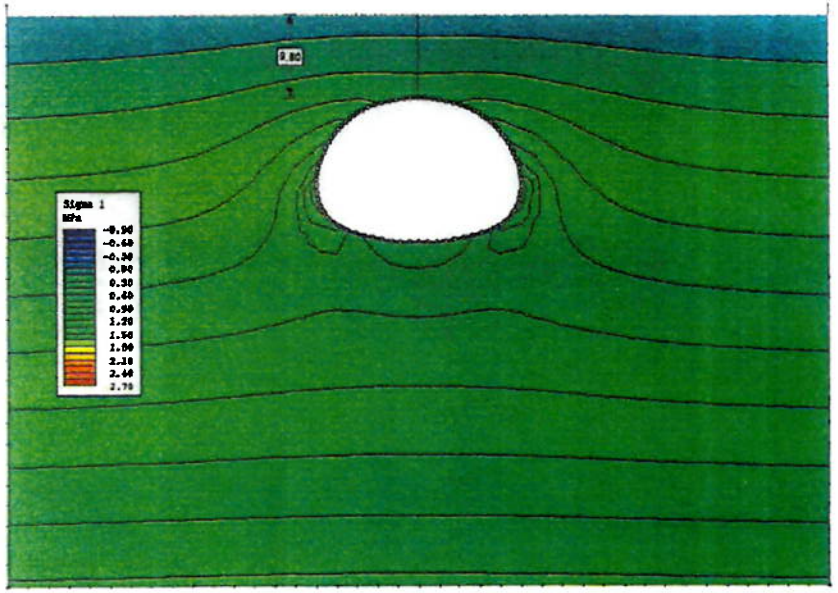
FEASIBILITY OF EXCAVATION

- Considered feasible since the overburden of Carboniferous Rock (CLU) is around 10 meters (Boreholes UBN3 and BH1.ILS)
- Even with the building driven piles foundation the mine excavation can be accomplished. **Detailed analysis is required** for possible mitigation measures.
- The examine analysis shows a good behaviour of the discharging excavation arch.



Appearance of Lucan formation (CLU)





Examine analysis

5. DEVELOPMENT OF ALTERNATIVES

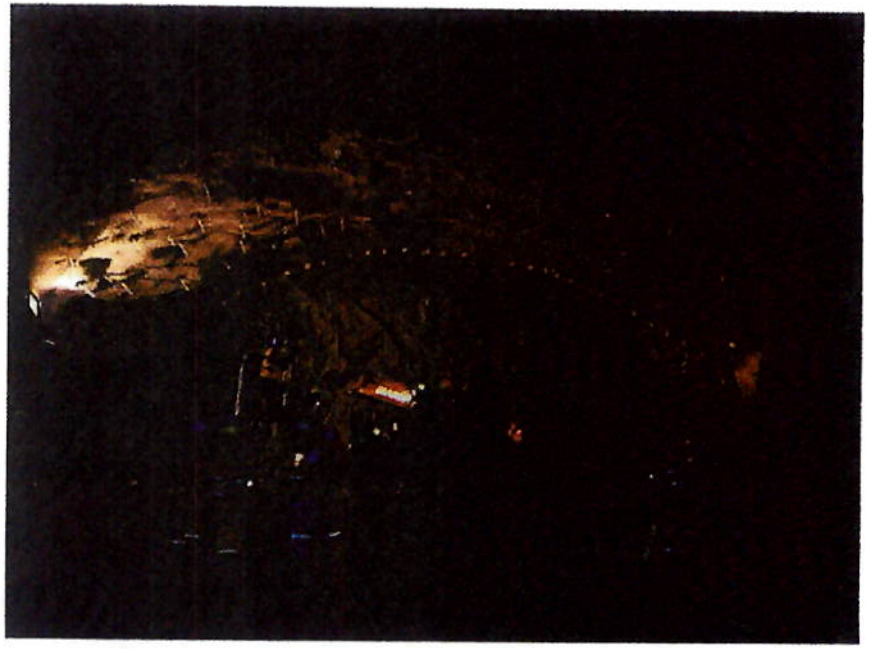
Option 4. Geotechnics

FINAL ASSESSMENT DEPENDING ON EXISTING FOUNDATION INFORMATION

MINED EXCAVATION

- The mined excavation can be executed by a traditional method
- Considering the size of the tunnel and the quality of the terrain, it can be possible to excavate the tunnel section in several phases
- The support will be accomplished as usual by means of bolts, steel arches and sprayed concrete.

Example of tunnel with similar size supported by steel arches and concrete



Example of tunnel with similar size supported by bolts and concrete

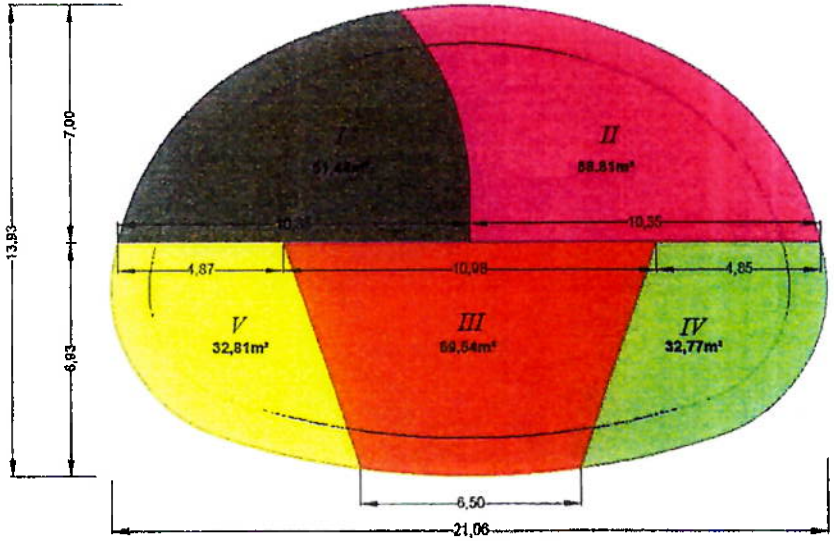
5. DEVELOPMENT OF ALTERNATIVES

Option 4. Geotechnics

FINAL ASSESSMENT DEPENDING ON EXISTING FOUNDATION INFORMATION

CONSTRUCTION PHASES

- For every construction method exposed below, the construction of the cavern will be divided in multiple phases:
  - Phase I: Excavation of left side drift
  - Phase II: Excavation of right side drift
    - ➢ Min distance of 25 m between excavation front of Phase I and Phase II
  - Demolition of temporary wall between Phase I and Phase II
  - Finish full length of top heading
  - Phase III: Excavation of central trench
  - Phase IV: Excavation of right bench
  - Phase V: Excavation of left bench
    - ➢ Min distance of 25 m between excavation front of Phases III, IV and V



Constructive Method	Advantages	Disadvantages	Comments
D&B	• Low rate cost-time	• Low vibration control expected • Low control on over excavation • Necessary specialist workers (blasting works) • Use explosives in urban area	• Maximum operation charge limited
D&B with electronic detonator	• Low-medium rate cost-time • Maximum vibration control	• Medium-low control on over excavation • Necessary specialist workers (blasting works) • Use of explosives in urban area	
Roadheaders	• Very low level of vibrations expected • No explosives involved • No over excavation • Less specialised level of workers	• Medium rate cost-time • High size of the machinery involved	

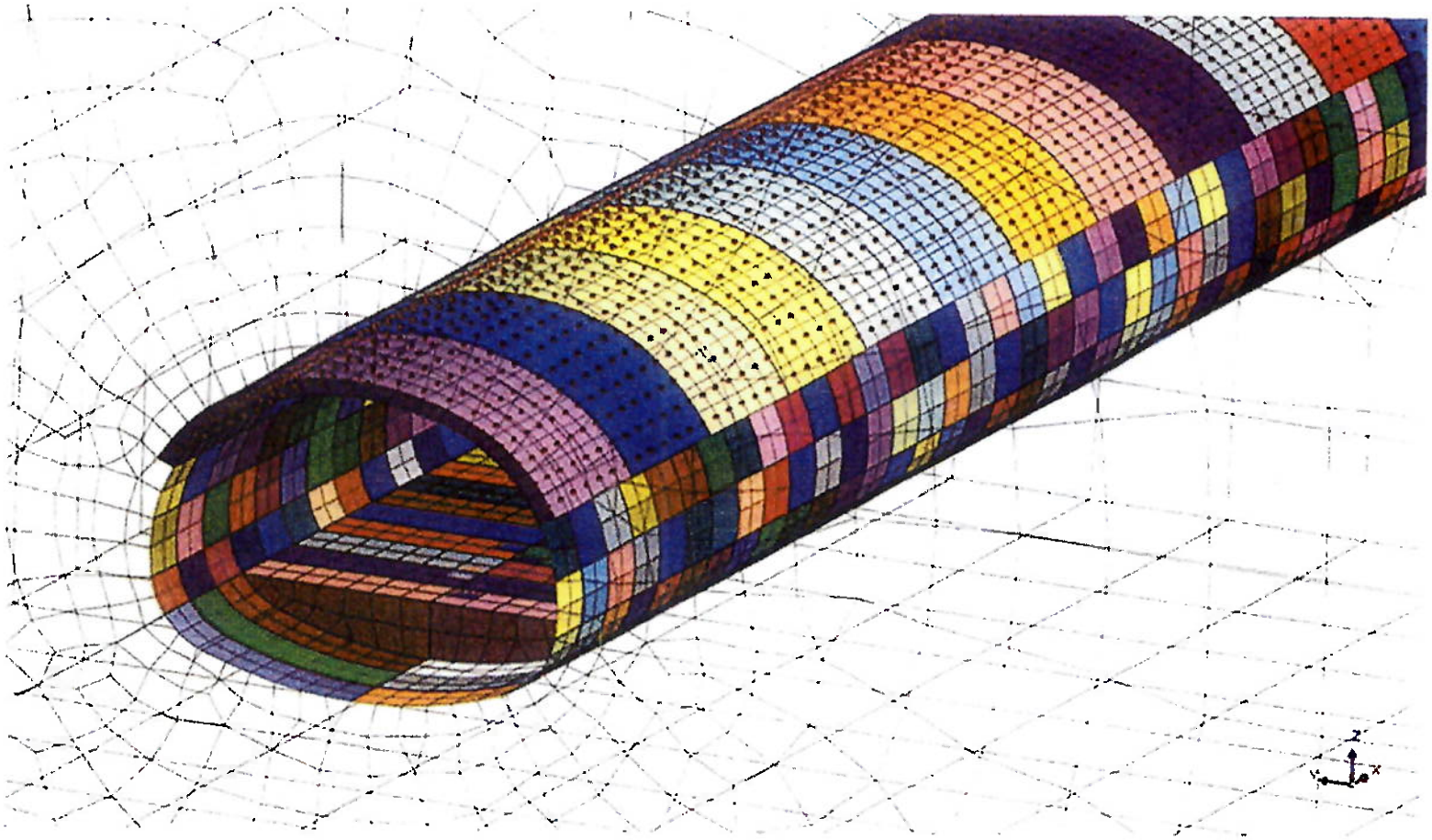
5. DEVELOPMENT OF ALTERNATIVES

Option 4. Geotechnics

FINAL ASSESSMENT DEPENDING ON EXISTING FOUNDATION INFORMATION

CONSTRUCTION PHASES

- Example of tunnel with similar excavation phases



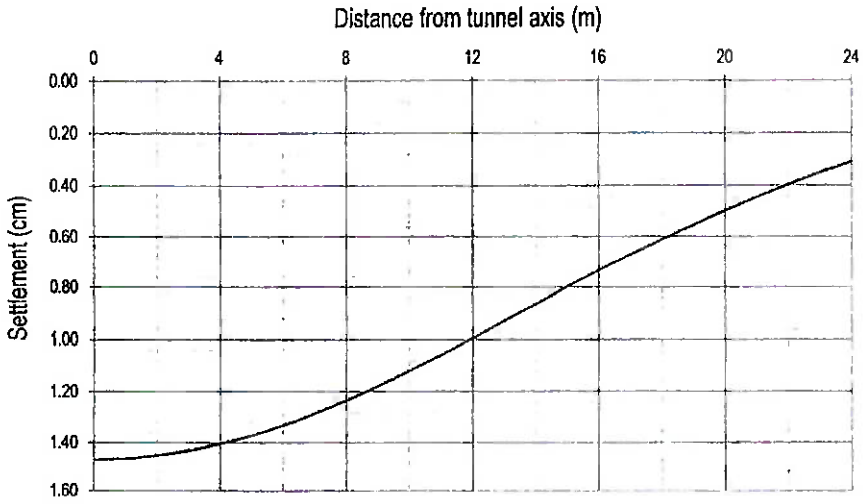
5. DEVELOPMENT OF ALTERNATIVES

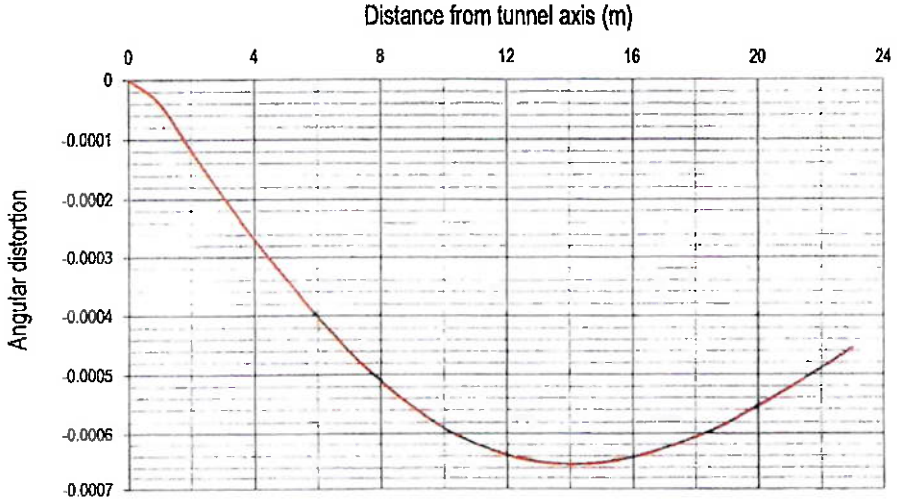
Option 4. Geotechnics

FINAL ASSESSMENT DEPENDING ON EXISTING FOUNDATION INFORMATION

SETTLEMENT ASSESMENT

- A preliminary specific settlement assessment by soil volume loss has been done for the whole cavern dimensions.
- Considering Vs=0,5 and K=0,8 the maximum settlement expected is 1,40 cm and the maximum angular distortion is 1/1,785.
- As excavation face will be divided into several phases, the final settlement value is expected to be quite lower.
- Final settlement will be obtained through a **detailed analysis** with numerical simulation.
- The settlement can be further reduced with mitigation measures such as:
  - Divide the excavation face into smaller phases
  - Reduce excavation span and increase support stiffness
  - Reinforce excavation face by means of micropile forepoles, fibreglass bolts, jet grouting forepoles, injections at the crown…
  - Soil grouting at foundation level
  - Compensation grouting





5. DEVELOPMENT OF ALTERNATIVES

Option 4. Geotechnics

FINAL ASSESSMENT DEPENDING ON EXISTING FOUNDATION INFORMATION

SETTLEMENT ASSESMENT

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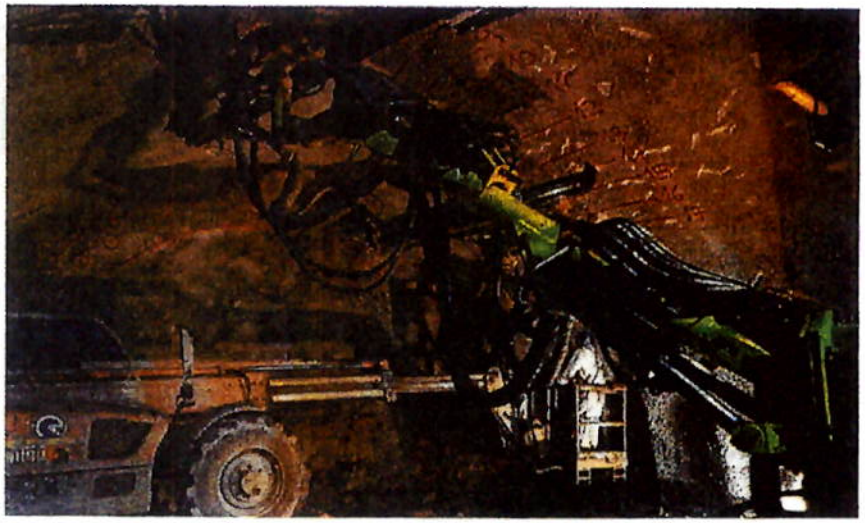
  - Divide the excavation face into smaller phases
  - Reduce excavation span and increase support stiffness
  - Reinforce excavation face by means of micropile forepoles, fiberglass bolts, jet grouting forepoles, injections at the crown...
  - Soil grouting at foundation level
  - Compensation grouting

Example of tunnel with top bench in three phases



Example of tunnel with mircopile forepole

5. DEVELOPMENT OF ALTERNATIVES

Option 4. Geotechnics

FINAL ASSESSMENT DEPENDING ON EXISTING FOUNDATION INFORMATION

PROPOSED NEW GEOTECHNICAL CAMPAIN

Taking into account sensitivity of geotechnics for cavern station feasibility it is considered important to have boreholes just at Tara station location.

Additional geotechnical investigatin is proposed for this option:

- 3 boreholes for pumping tests and geotechnical study

LOCATION	HOLE NUMBER	TYPE / DRILLING METHOD (Note 1i)	REMARKS	PHASE / PRIORITY	Comments
Tara Station Pumping test - Area 6	NBH25	CP/GB	Geobore-S Borehole, Observation well for the pumping test	I	
	NBH26	CP/GB (200mm)	Geobore-S Borehole, Pumping well for the pumping test	I	
	NBH26A	GB (200mm casing only)	Geobore-S Borehole, Pumping well for the pumping test	I	
	NBH64	CP	Gas monitoring standpipe	I	
	NBH27	CP/GB	Geobore-S Borehole, Observation well for the pumping test	I	

Geobore-S Borehole

Geobore-S Borehole, Pumping well for the pumping test

Gas monitoring standpipe

Trial Pit for Plate bearing tests

Note 1: GB – Geobore S (core to be recovered)

CP – Cable percussive

CP/GB – Cable percussive with follow on Geobore S (Core to be recovered)

TP – Test Pit

METROLINK

NTA Údarás Náisiúnta Iompair

TII

6 TRAFFIC AND TRANSPORT ASSESSMENT

6. TRAFFIC AND TRANSPORT ASSESSMENT

Introduction

The Following Options* for Tara St. Station Location have been assessed for Traffic/Transport Assessment:

- Option 0
- Option 2
- Option 3
- Option 4

(*Option 1 has not been assessed. Due to the inherent geometrical alignment constraints, it is assumed to be non-compatible with the proposed scheme.

- **These Options have been assessed based on the following criteria:**
- Fire Brigade emergency routes
- North/southbound pedestrian movements
- East/westbound pedestrian movements
- North/southbound cyclist movements
- East/westbound cyclist movements
- Bus routes
- Relocation/removal of bus stops
- Pedestrian access to DART station
- Local access/car parking
- Wider Traffic Impacts

6. TRAFFIC AND TRANSPORT ASSESSMENT

Fire Brigade emergency routes

OPTION 0

- Existing routes via Luke St. and Poolbeg St. impacted due to the road closures.
- Existing eastbound route impacted by Townsend St. lane reduction.
- Potential alternative routes via Tara St. or Pearse St.
- No impact on the eastbound route.

OPTION 2

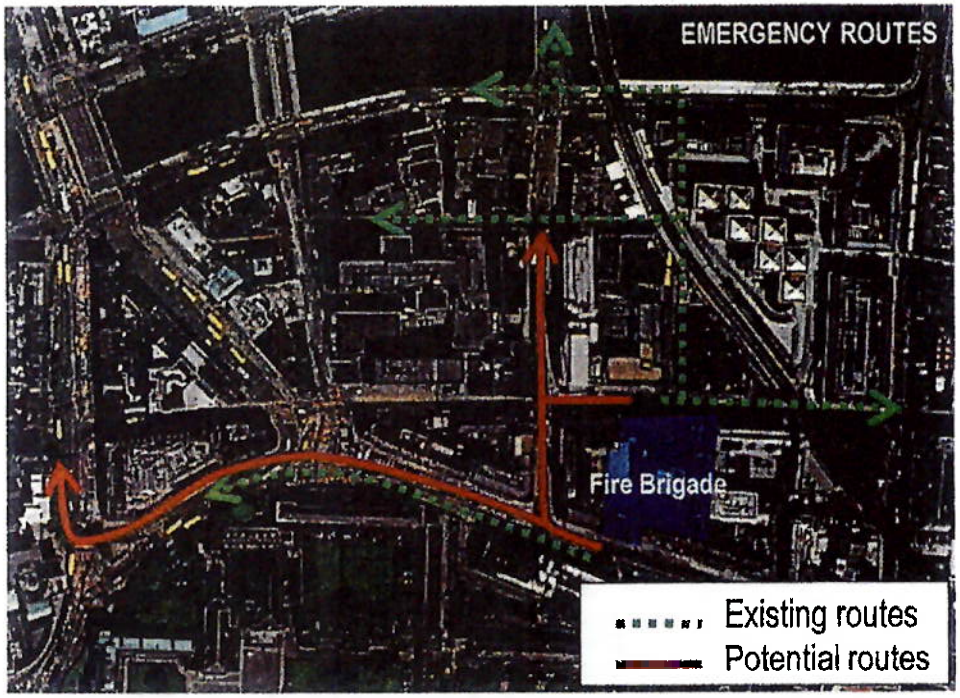
- Route From Luke St to Burgh Quay still open.
- Existing route via Poolbeg St. impacted due to the road closure.
- Existing route via Luke St. and the quays can be used to reach Hawkins St.
- Possible to use Tara St and turn left to Poolbeg St.

OPTION 3

- Eastbound emergency route impacted due to Townsend St. closure.
- Potential alternative route via Tara St. with Townsend St. as a two-way street temporarily or via Pearse St. and Westmoreland St.

OPTION 4

- Existing routes via Luke St. and Poolbeg St. impacted due to the road closures.
- Existing eastbound route impacted by Townsend St. lane reduction.
- Potential alternative routes via Tara St. and Pearse St.
- No impact on the eastbound route.



OPTIONS			
0	2	3	4
-3	-1	-2	-3

6. TRAFFIC AND TRANSPORT ASSESSMENT

North/Southbound pedestrian movements

OPTION 0

- Luke St. between Townsend St. and Poolbeg St. is closed to pedestrians during construction.
- Pedestrian flow can be accommodated on nearby streets.

OPTION 2

- No pedestrian movements from and to the quays at Tara St. will be possible due to the construction site.
- 616 pedestrians per AM peak hour pass through the proposed street closure.
- Alternative route via Corn Exchange Pl. and Poolbeg St. has narrow footpath.

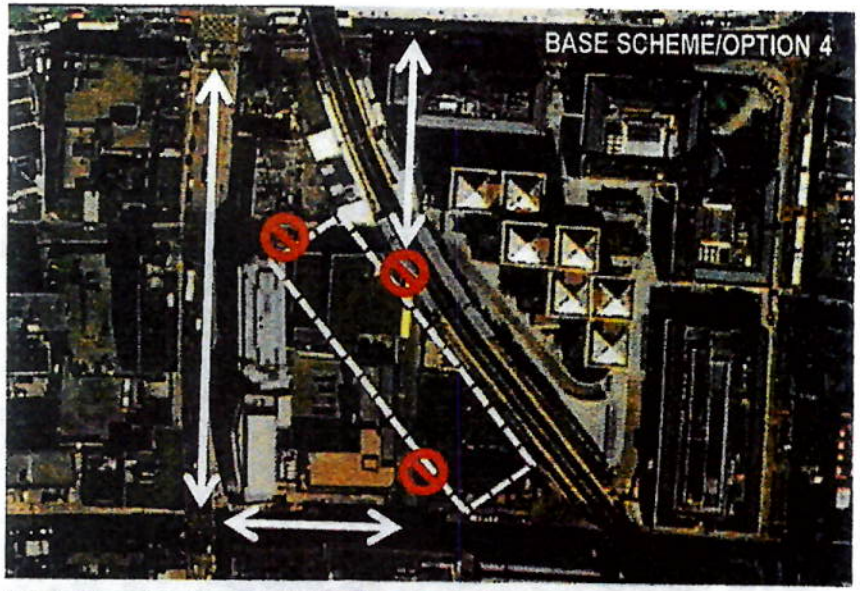
OPTION 3

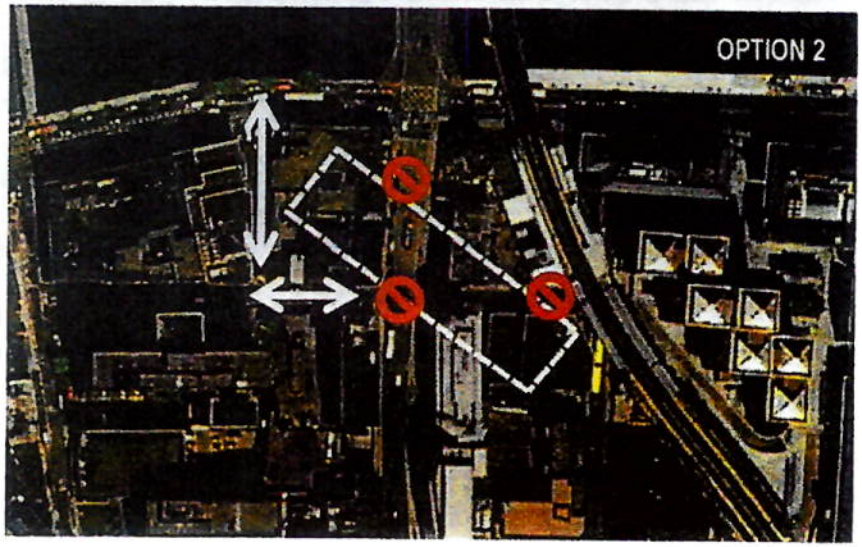
- No impacts on north and southbound pedestrian movements.

OPTION 4

- Luke St. between Townsend St. and Poolbeg St. is closed to pedestrians during construction.
- Pedestrian flow can be accommodated on nearby streets.

OPTIONS			
0	2	3	4
-1	-3	0	-1





6. TRAFFIC AND TRANSPORT ASSESSMENT

East/Westbound pedestrian movements

OPTION 0

- Poolbeg St. between Luke St. and Tara St. is a local access street with few pedestrians.
- Pedestrian flow can be accommodated on nearby streets.

OPTION 2

- Poolbeg St. between Luke St. and Tara St. is a local access street with few pedestrians.
- Free flow of pedestrians at the junction between Tara St. and the quays. This is 1025 pedestrians per AM peak hour crossing Tara St perpendicularly.

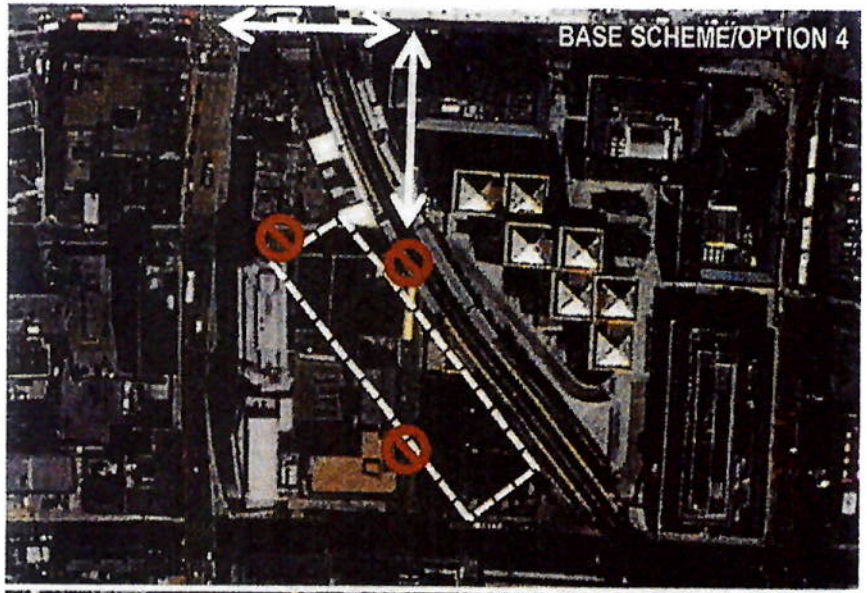
OPTION 3

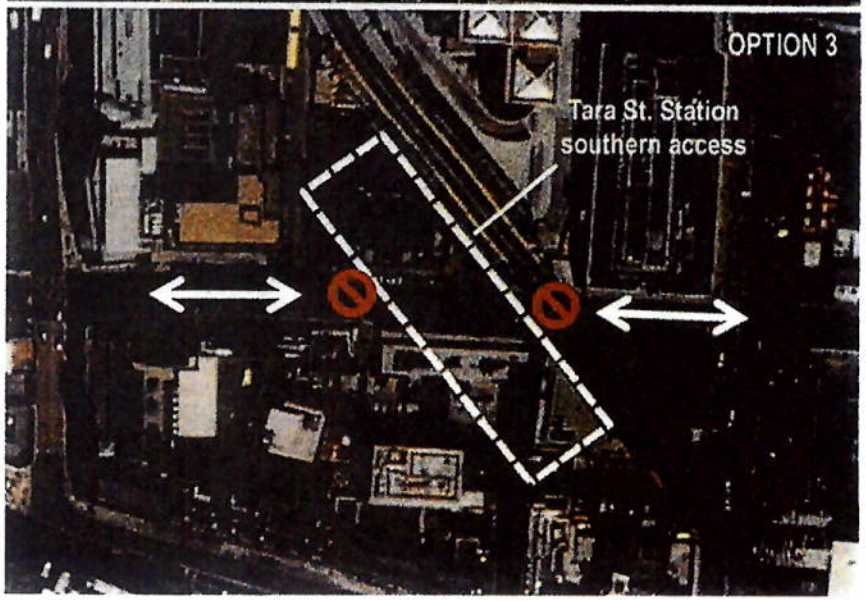
- No east and westbound movements towards the southern pedestrian access to Tara Street Railway station.
- Townsend St will require full closure at the construction location.
- 993 pedestrians per AM peak hour pass through the proposed street closure.

OPTION 4

- Poolbeg St. between Luke St. and Tara St. is a local access street with few pedestrians.
- Pedestrian flow can be accommodated on nearby streets.

OPTIONS			
Base Scheme	2	3	4
-1	0	-2	-1





6. TRAFFIC AND TRANSPORT ASSESSMENT

North/southbound cyclists movements

OPTION 0

- Luke St. between Townsend St. and Poolbeg St. is a local access street with few cyclists.
- Existing cycle stands at Luke St. need to be removed.
- Existing Dublin bike station In front of College Gate Building possibly affected.

OPTION 2

- No cyclist movements to the quays at Tara St. will be possible due to the construction site.
- 144 cyclists passing through Tara St in the AM Peak Hour.
- Diversion of general traffic to Poolbeg St. and Corn Exchange Pl. due to the road closure could compromise the flow of cyclists.
- Contra-flow cycle infrastructure provision will be required to minimise impacts on cyclist movements.

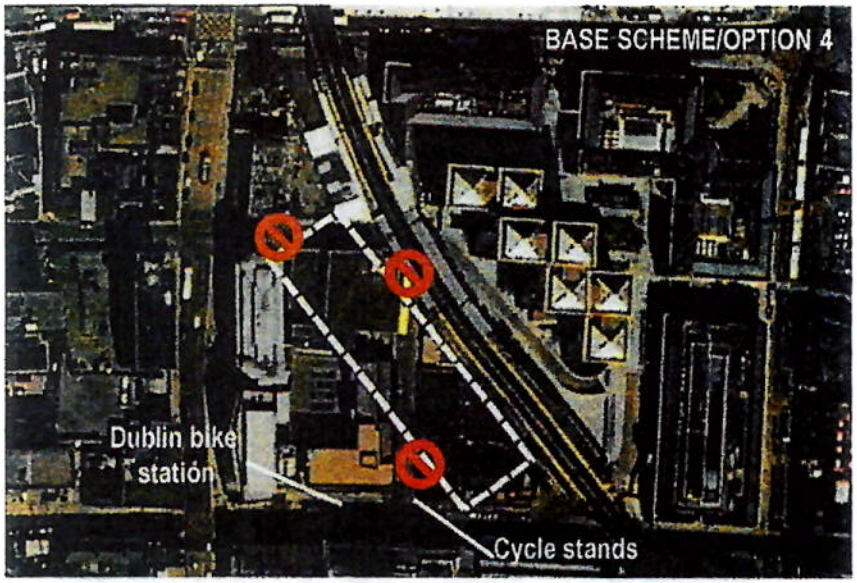
OPTION 3

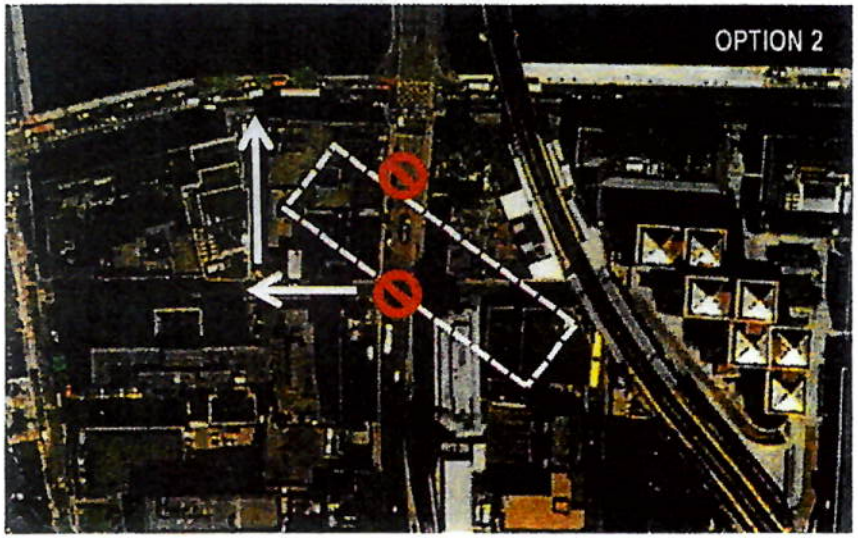
- No impacts on north and southbound cyclists movements.

OPTION 4

- Luke St. between Townsend St. and Poolbeg St. is a local access street with few cyclists.
- Existing cycle stands at Luke St. need to be removed.
- Existing Dublin bike station In front of College Gate Building possibly affected.

OPTIONS			
0	2	3	4
-1	-3	0	-1





6. TRAFFIC AND TRANSPORT ASSESSMENT

East/Westbound cyclist movements

OPTION 0

- Poolbeg St. between Luke St. and Tara St. is a local access street with few cyclists.
- Existing cycle stand at Luke St. need to be removed.
- Existing Dublin bike station In front of College Gate Building possibly affected.

OPTION 2

- Poolbeg St. is a local access streets with few cyclists.
- Nearby streets can accommodate the flow of cyclists.

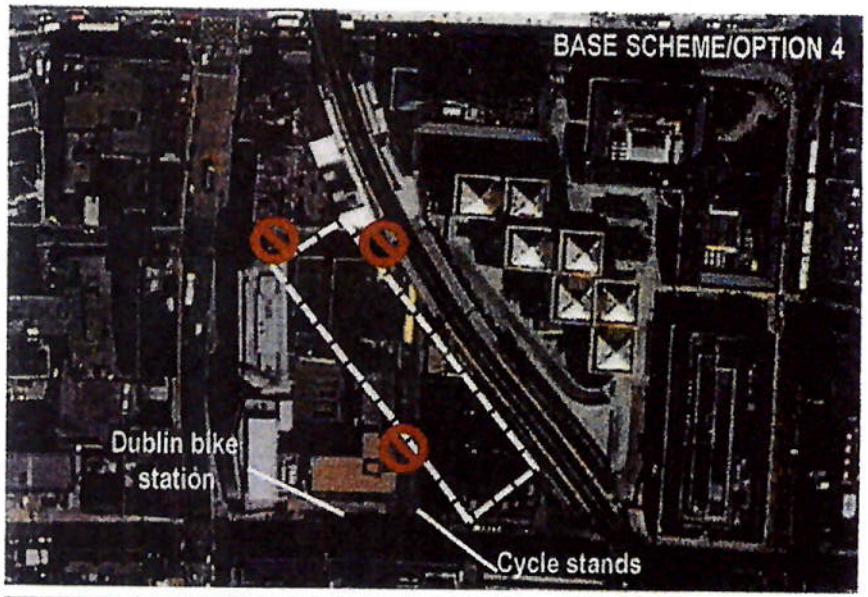
OPTION 3

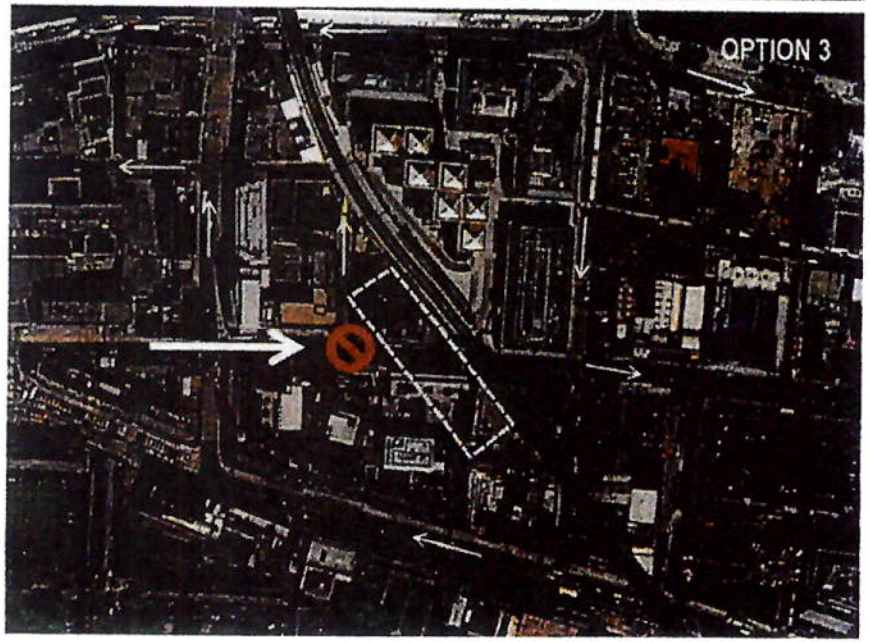
- 248 cyclists pass the proposed street closure.
- Contra-flow cycle infrastructure provision will be required to minimise impacts on cyclist movements.

OPTION 4

- Poolbeg St. between Luke St. and Tara St. is a local access street with few cyclists.
- Existing cycle stand at Luke St. need to be removed.
- Existing Dublin bike station In front of College Gate Building possibly affected.

OPTIONS			
0	2	3	4
-1	0	-3	-1





6. TRAFFIC AND TRANSPORT ASSESSMENT

Bus Routes

OPTION 0

- Number of bus routes to be impacted by street closures on Luke St. and Poolbeg St. is minimal.

OPTION 2

- Severe impact to bus routes passing through Tara St.
- Alternative route via Poolbeg St. and Corn Exchange Pl.

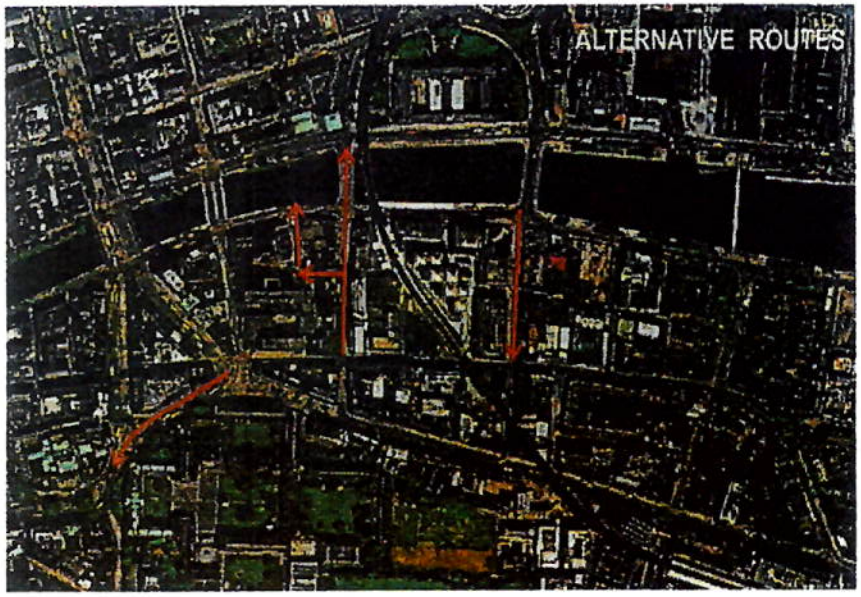
OPTION 3

- Significant impact to bus routes passing through Townsend St.
- Alternative route via College Green or Tara St./Custom House Quay Gyratory/ R802 Moss St.

OPTION 4

- Number of bus routes to be impacted by street closures on Luke St. and Poolbeg St. is minimal.

Option	Number of routes impacted
Option 0	3
Option 2	49
Option 3	36
Option 4	3



OPTIONS			
0	2	3	4
-1	-3	-2	-1

6. TRAFFIC AND TRANSPORT ASSESSMENT

Relocation/removal of bus stops

OPTION 0

- Bus stop on Poolbeg Street needs to be re-located.
- Two 'set down only' stops on Luke St. need to be re-located or removed.
- 3 bus stops in total are impacted.

OPTION 2

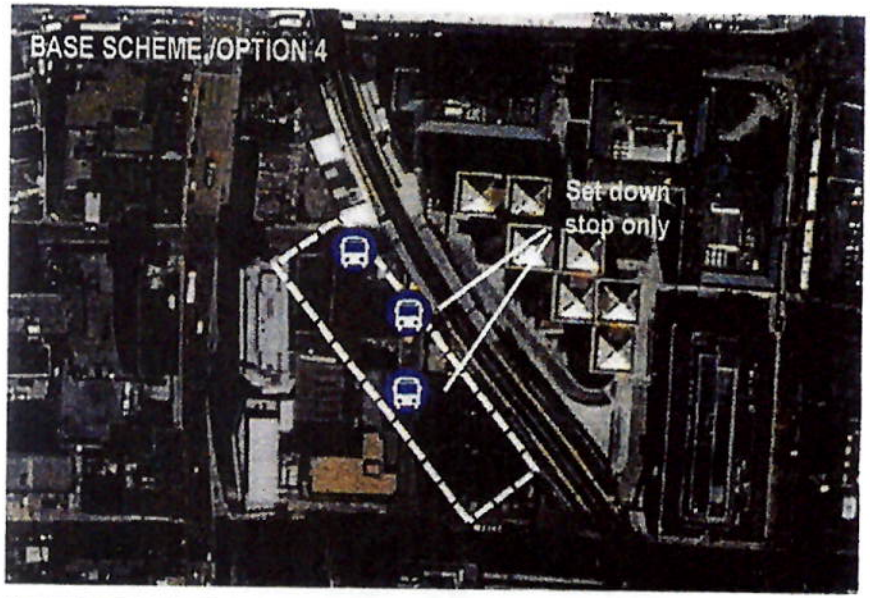
- 1 Bus stop on Poolbeg Street needs to be re-located.

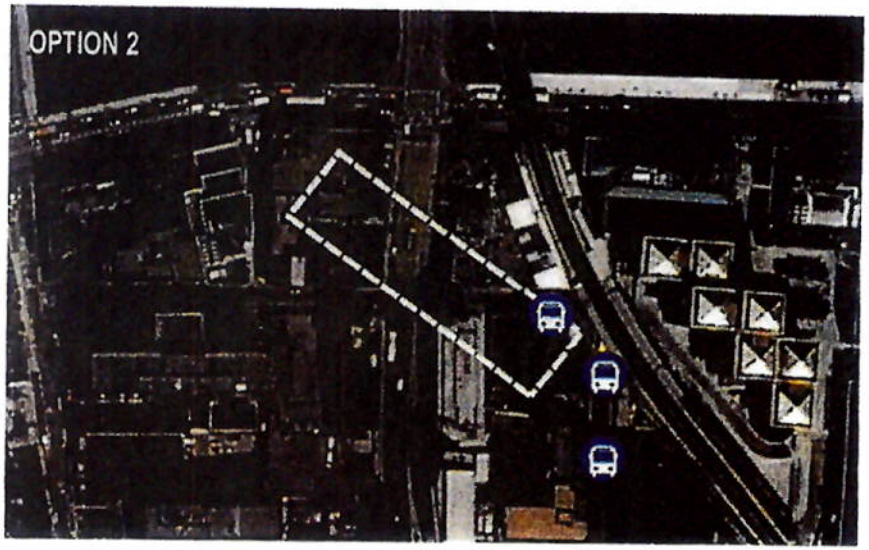
OPTION 3

- No bus stops need to be re-located or removed.

OPTION 4

- Bus stop on Poolbeg Street needs to be re-located.
- Two 'set down only' stops on Luke St. need to be re-located or removed.
- 3 bus stops in total are impacted.





OPTIONS			
0	2	3	4
-2	-1	0	-2

6. TRAFFIC AND TRANSPORT ASSESSMENT

Pedestrian access to DART station

OPTION 0

- No impacts on either access to the railway station.

OPTION 2

- Free east/westbound movements in the junction between Tara St. and the quays can improve the pedestrian flow to and from the main entrance to the railway station.
- More vehicles will use Corn Exchange Pl. as a diversion so this may impact pedestrian movements at Burgh Quay/Corn Exchange Pl.
- North/South Pedestrian movements on Tara St. can divert to Luke St. or Corn Exchange Pl. to access DART

OPTION 3

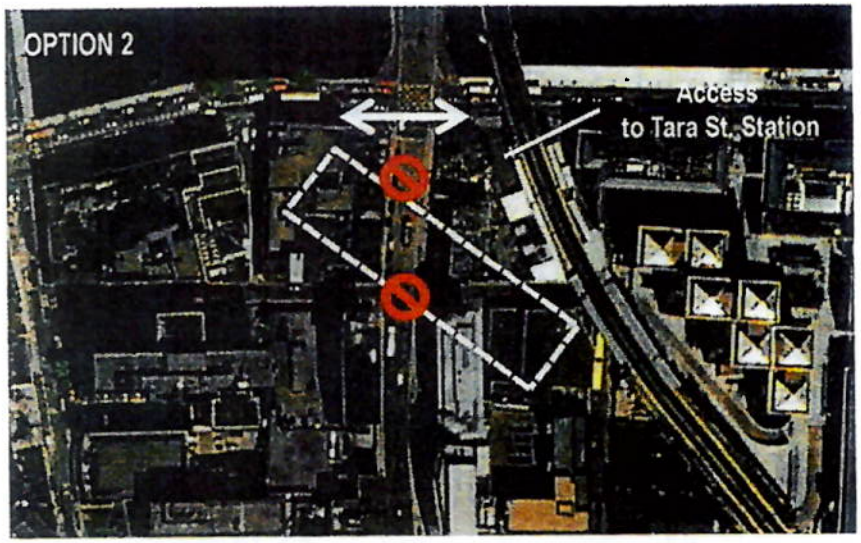
- No pedestrian access to the southern access of Tara St. station.
- Access opened Monday to Friday (except on bank holidays) from:

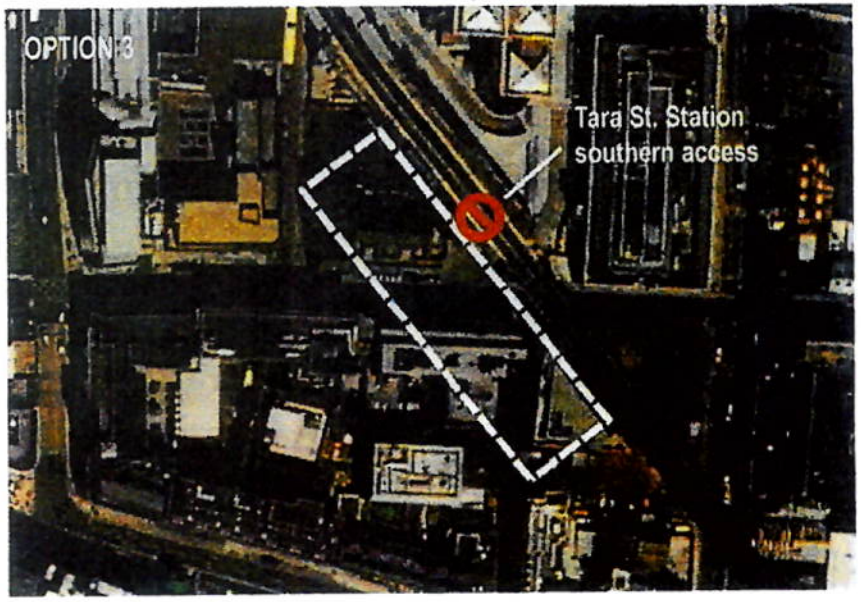
  07:00 to 10:00

  16:00 to 19:00

OPTION 4

- No impacts on either access to the railway station.





OPTIONS			
0	2	3	4
0	-1	-2	0

6. TRAFFIC AND TRANSPORT ASSESSMENT

Local access/car parking

OPTION 0

- Local access to Luke St. only via George's Quay.
- Existing on-street parking on Luke St. need to be removed.

OPTION 2

- Minimal impact on the local access and car parking.
- Journeys to Corn Exchange Pl. from the quays currently using Luke St. and Poolbeg St. must divert via Moss St / Pearse St / Tara St.

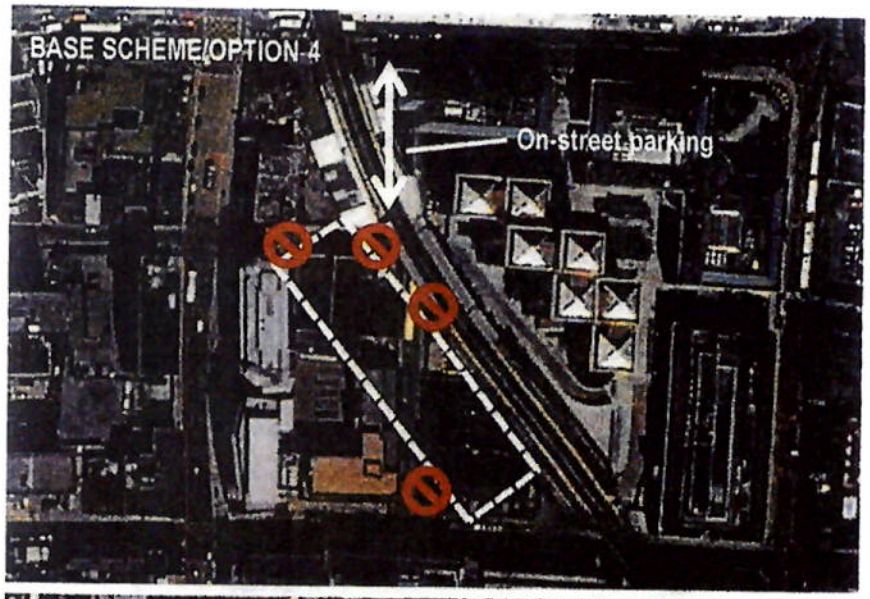
OPTION 3

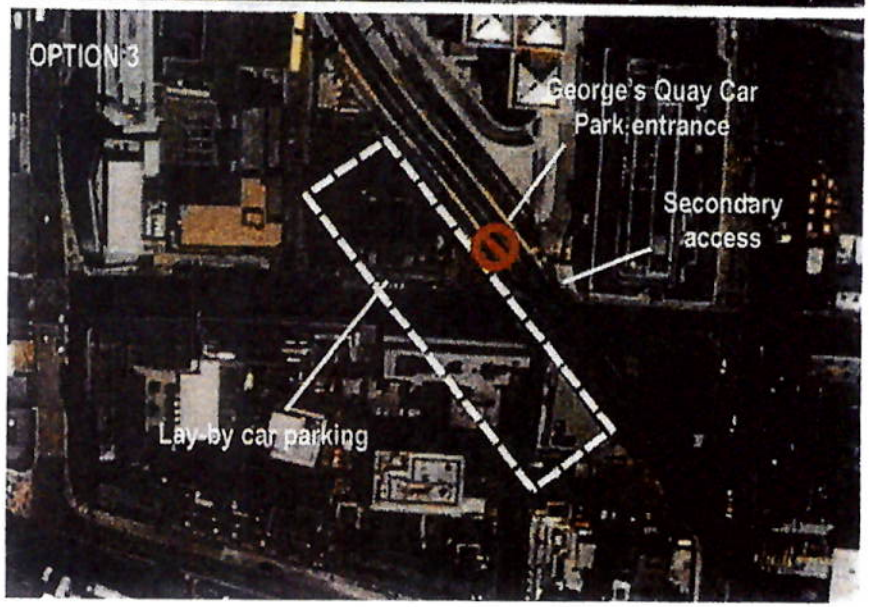
- Main entrance to George's Quay Office Car Parking is compromised by the construction site.
- Secondary gate beside the main entrance can be used as alternative access with 2-way access on Townsend St. east of construction site.
- Existing lay-by car parking compromised by the construction site.

OPTION 4

- Local access to Luke St. only via George's Quay.
- Existing on-street parking on Luke St. need to be removed.

OPTIONS			
0	2	3	4
-2	0	-1	-2





6. TRAFFIC AND TRANSPORT ASSESSMENT

Wider traffic

OPTION 0

- No wider impacts on traffic.
- Low local traffic impact, mostly related to localised diversions to/from car parks.
- Section of Townsend Street reduced to one lane has capacity to absorb the traffic.

OPTION 2

- 1668 vehicles using Tara Street in AM Peak. Wider traffic impacts extended to the east side of Tara St up to Samuel Beckett Bridge and Tom Clarke Bridge (EastLink). Local mitigation can take approximately 60% of traffic however diversions can seen in the wider area with 15% using Samul Beckett and 6% now using Tom Clarke Bridge.
- Volume of vehicles on Samuel Beckett Bridge increased 40%.

OPTION 3

- Cant be mitigated locally with influence extending as far east as Macken St.
- Increase of traffic flow on the north of the River Liffey with diversions from O'Connell Bridge to Talbot Memorial Bridge and Traffic using College Green.

OPTION 4

- No wider impacts on traffic.
- Low local traffic impact, mostly related to localised diversions to/from car parks.
- Section of Townsend Street reduced to one lane has capacity to absorb the traffic.

OPTIONS			
0	2	3	4
-1	-3	-2	-1

OPTION 2

OPTION 3

6. TRAFFIC AND TRANSPORT ASSESSMENT
Summary Table

	OPTIONS			
	0	2	3	4
Fire Brigade emergency routes	-3	-1	-2	-3
North/southbound pedestrian movements	-1	-3	0	-1
East/westbound pedestrian movements	-1	0	-2	-1
North/southbound cyclist movements	-1	-3	0	-1
East/westbound cyclist movements	-1	0	-3	-1
Bus routes	-1	-3	-2	-1
Relocation/removal of bus stops	-2	-1	0	-2
Pedestrian access to DART station	0	-1	-2	0
Local access/car parking	-2	0	-1	-2
Wider Traffic	-1	-3	-2	-1
Score	-13	-15	-14	-13

6. TRAFFIC AND TRANSPORT ASSESSMENT

Summary

- As can be seen from the summary table the Option 0 and Option 4 are least impactful with only localised traffic impacts experienced, mostly relating to local diversions for journeys starting/finishing in the vicinity of Tara Street.

- Option 3 has a wider impact with traffic diversions experienced on College Green and as far east as Macken St. with all traffic on Townsend St. requiring diversions.

- Option 2 is the worst option with wide reaching traffic diversions across the wider city, as far as the EastLink Bridge, due to the displacement of Tara St traffic, which is 3 times greater than Townsend St volumes.

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7 ENVIRONMENTAL ASSESSMENT

7. ENVIRONMENTAL ASSESSMENT

Noise and Vibration

OPTION 0

- Construction impacts due to above ground station excavation works. NSL's at Trinity Plaza apartments and office / commercial buildings. Depending on works area/ boundary, works could be screened / mitigated to apartments.
- Overall similar above ground noise impacts to other options. Will require controlled mitigation measures.

OPTION 2

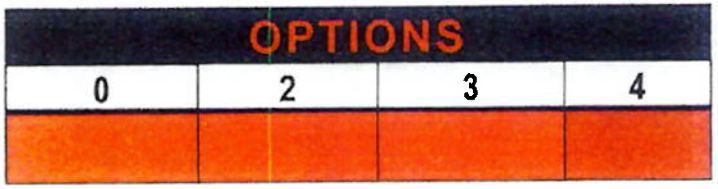
- Construction impacts due to above ground station excavation works. The closest sensitive buildings are office / commercial.
- Large areas of demolition and excavation in close proximity to adjacent buildings.
- Depending on works area/ boundary, works could be screened / mitigated. Similar impacts to other options, marginally less than Option 0 and Option 4.
- Vibration effects similar to Option 0 but location of them moved to receptors further north.

OPTION 3

- Construction impacts due to above ground station excavation works. Closest sensitive buildings are office / commercial with residents also in close proximity.
- Large areas of demolition and excavation in close proximity to adjacent buildings. Depending on works area/ boundary, works could be screened / mitigated.
- Similar impacts to other options, will require controlled mitigation measures.
- Vibration effects similar to Option 0 but location of them moved to receptors further south.

OPTION 4

- Construction impacts due to above ground shaft excavation works. Closest sensitive buildings are College Gate apartments which overlook work sites on two sides. Office / commercial buildings surround remainder of boundaries. Impacts to College Gate apartments during construction highest for this option. Will require controlled mitigation measures.
- Likely to be a very significant impact on occupants of College Gate building resulting from vibration due to blasting and structure-borne noise from SCL construction due to percussive breaking out of concrete. The effect would not be confined to night hours, but daytime as well, leading to a need for temporary rehousing of the residents.



7. ENVIRONMENTAL ASSESSMENT

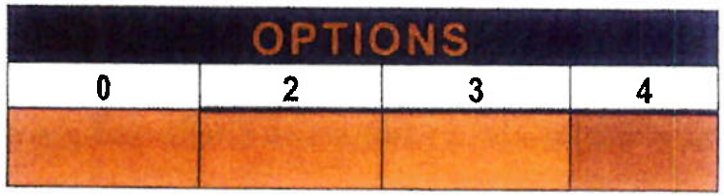
Air and Climate

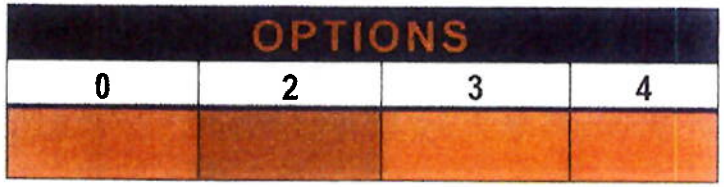
OPTIONS 0, 2 & 3

- Air quality impacts generally due to dust and emissions during construction. Potential impacts from dust during demolition in particular due to proximity to significant number of pedestrians nearby.
- Potential for impact from GHG emissions from construction traffic and embodied energy from construction materials.

OPTION 4

- Potential for increased impact on sensitive receptors due to proximity of residents in College Gate Apartments.





Water

OPTION 0

- Some potential impacts from storm water run off during works. River Liffey in close proximity. Historic piped water course flows on far side of existing railway tracks.
- Potential impacts related to high water table in area given proximity to Liffey.
- Potential for impacts on groundwater during construction phase.

OPTION 2

- Some potential impacts from storm water run off during works. River Liffey in very close proximity. Approx. 20-25 meters from demolition zone. Historic River Stiene flows under Tara St before discharging into Liffey.
- Potential impacts related to high water table in area given proximity to Liffey.
- Potential for impacts on groundwater during construction phase.

OPTION 3

- Some potential impacts from storm water run off during works. River Liffey in close proximity. Historic piped water course flows on far side of existing railway tracks.
- Potential impacts related to high water table in area given proximity to Liffey.
- Potential for impacts on groundwater during construction phase.

OPTION 4

- Some potential impacts from storm water run off during works. River Liffey in close proximity but further away than other options. Historic piped water course flows on far side of existing railway tracks.
- Potential impacts related to high water table in area given proximity to Liffey.
- Potential for impacts on groundwater during construction phase.

7. ENVIRONMENTAL ASSESSMENT

Land Soil Geology

OPTIONS 0 & 4

- Potential impacts during construction related to excavated material needing to be removed to install station box.
- Top down excavation of access shafts and then removal of material from gallery construction. Old foundry located on eastern edge of works area.
- Potential for soil contamination

OPTION 2

- Potential impacts during construction related to excavated material needing to be removed to install station box.

OPTION 3

- Potential impacts during construction related to excavated material needing to be removed to install station box.

Biodiversity

OPTIONS 0,3 & 4

- Bat potential in abandoned/derelict Georgian buildings on corner Luke and Townsend St.

OPTION 2

- Increased potential for elevated impact on marine/estuarine habitats d/s on Liffey due to proximity to the river..

7. ENVIRONMENTAL ASSESSMENT

Archaeology and Cultural Heritage

OPTION 0

- Area of archaeological significance.

OPTION 2

- Area of archaeological significance. River Stiene flows under Tara Street. RMP windmill site at corner of Georges Quay and Tara St. Record of church corner Poolbeg and Townsend St.

OPTION 3

- Area of archaeological significance. River Stiene flows under Tara Street.

OPTION 4

- Area of archaeological significance.

Architectural Heritage

OPTION 0

- Two Georgian buildings to be demolished. Not RPS's.

OPTION 2

- Impacts from demolition on 7, 7a and 8 Poolbeg Street which are Recorded Protected Structures (RPS).

OPTION 3

- Works in close proximity to several RPS Structures that run from 32-37 Pearse Street.

OPTION 4

- Two Georgian buildings to be demolished. Not RPS's.

7. ENVIRONMENTAL ASSESSMENT

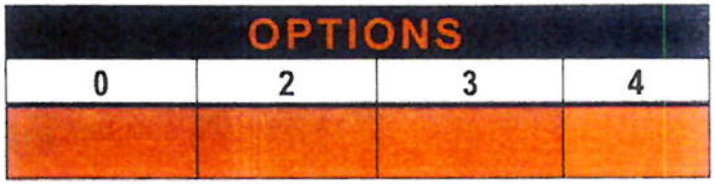
Landscape and Visual

OPTION 2, 3 and 0 (Base Scheme)

- Impacts relating to changes in urban landscape from demolition of a significant no. of buildings during construction.

OPTION 4

- Impacts relating to changes in urban landscape from demolition of a reduced no. of buildings during construction



Resource and Waste Management

OPTION 2, 3, 4 and 0 (Base Scheme)

- A significant volume of soil and rock will need to be removed from this location. Impacts relate to transporting this material from the location and where it can be located.
- Site is constrained/built up so options for reuse on site are limited.
- Volumes of material generated increase relative to demolitions required

Properties

OPTION 0

- Demolition of Ashford House, two Georgian buildings on corner Luke St and Poolbeg St and four townhouses at 25-31 Townsend St.

OPTION 2

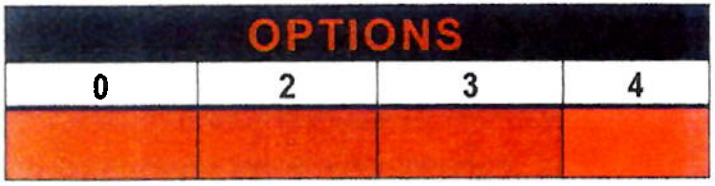
- Demolition of Ashford House and entire city block defined by Georges Quay, Corn Exchange, Poolbeg St and Tara St. Potential for new developments as part of surface works post construction.

OPTION 3

- Demolition of 30-31 Pearse Street and 155 Townsend St. Development at 157-164 Townsend St will be impacted as station box will need to be incorporated into design of new development there. Tara St Station will require refurbishment as part of the metro-rail transfer route for passengers.

OPTION 4

- Demolition of Ashford House, two Georgian buildings on corner Luke and Poolbeg Streets and four townhouses at 25-31 Townsend St. Avoiding demolition of College Gate Apartments.



7. ENVIRONMENTAL ASSESSMENT

Socio-Economic

OPTION 0

- Impacts on businesses resulting from relocation of Ashford House office tenants due to demolition of building.
- Permeant Impacts on the Markievicz sports & fitness due to demolition.
- Potential benefits due to rebuild or creation of public space post construction. This could make the area more attractive and increase foot traffic.

OPTION 2

- Potential impacts on 2-16 Tara Street development yet to be constructed to incorporate station box.
- Tara and Poolbeg Streets closed resulting in loss of foot traffic to nearby buildings.
- Relocation of several businesses due to demolition work. Impacts on businesses resulting from relocation of Ashford House office tenants.
- Potential benefits due to rebuild or creation of public space post construction. This could make the area more attractive and increase foot traffic.

OPTION 3

- Potential impacts on 157-164 Townsend Street development yet to be constructed to incorporate station box.
- Tara St and Spring Garden Lane closed resulting in loss of foot traffic to nearby buildings.
- Shops east of 33 Pearse Street will be affected by demolition works during construction. Foot traffic may potentially increase during operational phase.

OPTION 4

- Impacts on businesses resulting from relocation of Ashford House office tenants due to demolition of building.
- Temporary Impacts on the Markievicz sports & fitness centre during construction.
- Potential benefits due to rebuild or creation of public space post construction. This could make the area more attractive and increase foot traffic.

7. ENVIRONMENTAL ASSESSMENT

Environmental Summary

OPTION 0: Base scheme

- Potential for significant impacts on the visual amenity and urban setting of the area due to the demolition of a significant no. of buildings. Potential for significant socio-economic impacts due to the demolition of buildings and construction phase disruption. Increased waste and materials generation due to the building demolitions.
- College Gate apartments proposed to be acquired and demolished.

OPTION 2: Station moved northwards under Tara Street and new CIE development.

- Requires all buildings in footprint to be acquired including the demolition of Ashford House and entire city block defined by Georges Quay, Corn Exchange, Poolbeg St and Tara St. Potential for significant impacts on the visual amenity and urban setting of the area due to the demolition of a significant no. of buildings. Potential for significant socio-economic impacts due to the demolition of buildings and construction phase disruption. Increased waste and materials generation due to the building demolitions.
- Potential for increased impacts on the River Liffey.
- Potential for direct impact on areas of archaeological potential and on sites of architectural merit

OPTION 3: Station moved southwards

- Impacts from building demolition of 33 Pearse St, 31 and 155 Townsend Street and 22 Luke Street. Potential for significant impacts on the visual amenity and urban setting of the area due to the demolition of a significant no. of buildings. Potential for significant socio-economic impacts due to the demolition of buildings and construction phase disruption. Increased waste and materials generation due to the building demolitions.
- Traffic impacts related to closing Townsend St and Spring Garden Lane during construction.
- Permeant impact on Markievicz Centre.

OPTION 4: Excavated station at concept design location

- Impacts from building demolition of Ashford House, two derelict Georgian buildings and four townhouses.
- Designed to allow College Gate apartments to be retained however likely to be very significant structure borne noise impacts during construction due to percusive breaking of concrete which would likely require rehousing of residents. Impacts on air quality during the construction phase on residents of College Gate.
- Construction Phase impact on Markievicz Centre.
- Poolbeg and Luke St closed during construction.

7. ENVIRONMENTAL ASSESSMENT

Summary Table

	OPTIONS			
	0	2	3	4
Noise and Vibration				
Air and Climate				
Water				
Land Soil Geology				
Biodiversity				
Archaeology and Cultural Heritage				
Arhitectural Heritage				
Landscape and Visual				
Resource and Waste				
Properties				
Socio-Economic				
Score				

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8 PLANNING ASSESSMENT

8. PLANNING ASSESSMENT

Planning Review

All Tara Street options are located within zoning objectives Zoe Z5 – City Centre.

No specific provision for public transport infrastructure in either Permitted in Principle or Open for Consideration but such use is consistent with the overall objectives of the plan.

All options are within the George's Quay LAP area and within designated Zone of Archaeological Interest.

OPTION 0

- Loss of community infrastructure – leisure centre (limited ability to reinstate).
- Creates public realm opportunity.

OPTION 2

- George's Street LAP identifies potential for up to 22 storey development, potential constraint from Metro construction (noting previous refusals for such development in the past).
- Potential to integrate to Tara Street existing access.

OPTION 3

- Impact on permitted development 8,813sqm (PDCC Ref. 4485/17).

OPTION 4

- Creates public realm opportunity:
  - An element of public space / plaza would be appropriate for a city centre station area and would provide some congregation space in this part of the city which is not over-endowed with public amenities, but there would need to be a worked through response as to the appropriate design, e.g.
    - Extent and orientation
    - Maximising daylight
    - How and when would the space be used
    - How can the space be defined, e.g. development opportunities to address the public space
    - Consideration of the effect on the building line on Tara Street and Townsend Street

    (this would need to discussed with the city council)
- Alternatively this site provides a high density development opportunity due to city centre site; transport interchange; consistency with planning policy and existing pattern of development along streets..
- Connection to Dart station will move to south, and this is subject to agreement with Irish Rail.

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9 ALTERNATIVES COMPARISON

4. ALTERNATIVES – PRELIMINARY STUDY

Comparison

EXISTING COLLEGE GATE PILED FOUNDATION INFORMATION NOT YET AVAILABLE, ASSESSMENT ASSUMES NO INTERFERENCE OF PILES WITH MINED TUNNEL

	OPTIONS				
	Base Scheme (0)	1	2	3	4
Alignment	All parameters within normal values	Too sharp radius to reach O'Connell Street station	Exceptional parameters	All parameters within normal values	All parameters within normal values
Demolition of Buildings	College Gate building, Ashford House office building, 2 derelict Georgian buildings and 4 townhouses	The Brokerage apartments, the Long Stone Pub, an apartments block and several 3 stories buildings at Poolbeg St.	Ashford House office building, entire city-block between Tara St. and Corn Exchange Pl.	2 derelict Georgian buildings and 4 townhouses, office buildings at Spring Garden Line	Ashford House office building, 2 derelict Georgian buildings and 4 townhouses
Interference with ongoing developments	None	Yes, Hawkins development	Yes, Tara Station development	Yes, Townsend St. 157-164	None
Metro - Rail Transfer	Using both existing accesses	Long transfer to main access. Pedestrian tunnel may be required.	Only with current main access	Only with current south access (requires refurbishment and changes in operation)	Using both existing accesses
Urban Integration	New Public realm improving integration of all station pop-ups	Requires coordination to integrate station pop-ups with new developments	Requires coordination to integrate station pop-ups with new developments	New Public realm improving integration of all station pop-ups	New Public realm improving integration of all station pop-ups
Traffic impacts	Poolbeg St. and Luke St. closed during construction. Townsend St. affected. Significant impacts on Fire Brigade Emergency Routes	Townsend St. and Poolbeg St. closed during construction. Significant impacts not assessed	Tara St. and Poolbeg St. closed during construction. Significant impacts on North/ South pedestrian movements, North South Cycle movements, bus routes and wider traffic	Townsend St. and Spring Garden Lane closed during construction. Significant impact on East/ West cycle movements	Poolbeg St. and Luke St. closed during construction. Townsend St. affected. Significant impacts on Fire Brigade Emergency Routes
Utilities	Potential for localised diversions	Potential for localised diversions	Major diversions required	Major diversions required	Potential for localised diversions
Environment & Planning	Visual, Socio-Economic, waste impacts, loss of community infrastructure.	Not assessed due to inherent geometrical alignment constraints	Visual, Socio-Economic,water, waste impacts. Potential archaeological impacts. Development impacts.	Visual, Socio-Economic, waste impacts, development impacts.	Noise, air quality impacts. Public realm/ high density development opportunities.
Cost	€149M excluding risk	Not Costed	Not Costed	Not Costed	€150M excluding risk. Increased risks compared to Option 0
Recommendation	1	5	4	3	2

2.2