Review and Audit of the NTA/Jacobs Metro to Knocklyon Feasibility Study (2021)

in conjunction with

MetroLink: Estuary through Dublin Airport and City Centre to Charlemont Scheme PBC

Presentation on Report

prepared by

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The Need for the Proposed Scheme

- While the **Jacobs Metro to Knocklyon Feasibility Study** does **not set out** explicitly a **test to determine** the **need for a Metro scheme** it is important to consider the **arguments** for it **against backdrop** of current and near term **demographic, economic and planning conditions** as well as the potential of alternatives.

- **Jacobs Metro to Knocklyon Feasibility Study** sets out the hierarchy **of planning policy documents** from national to local documents. These largely conclude **that buses are the solution** for the area and **dismiss Metro, BRT and light rail.**

- The **submission made by the NTA** to An Bord Pleanála **in support of the BusConnects network revamp** for the Templeogue/Rathfarnham – Dublin City Centre Corridor, **one of two that could be served by a Metro**, **argued the existing public transport** system **does not currently have sufficient capacity** to cater for large volumes of additional users.

- **TAA** believe that the **dismissals of alternatives including Metro** in many of these documents **were premature and this reflects these alternatives were not being adequately assessed.**

Proposed Scheme: Outline description and station options

The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021

Chapter 3 and Appendices B and C

Observations, Commentary and Issues

- **Errors identified in the calculations of population density** have been carried through in the selection and assessment of the preferred stations.
- It is unclear and unknown to use whether these errors have fed through to the modelling and forecasting of ridership of the Metro to Knocklyon scheme.
- It is evident in a qualitative assessment of the preferred locations it may well have created an impression of reduced ridership over what would be expected with **densities that** would be some **200% greater** than **presented in the document.**

Proposed Scheme: Outline description and station options

The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021

Chapter 3 and Appendices B and C

Observations, Commentary and Issues

Errors identified in the calculations of population density

Station location	Jacobs Original Estms (Error)	Jacobs Original Estms (Error)	**Jacobs Estms Corrected**
	'Population in 1km* catchment area' **actual is **0.6km** catchment area*	Population density Inhabitants per ha	**Population density Inhabitants per ha**
A2 Rathmines	14760	47	**148**
B1 Terenure	11997	39	**119**
C1 Rathfarnham	4969	16	**50**
D Ballyboden	4721	15	**47**
E Knocklyon	6402	21	**64**
F Ballycullen	6034	20	**60**

Proposed Scheme: Outline description and station options

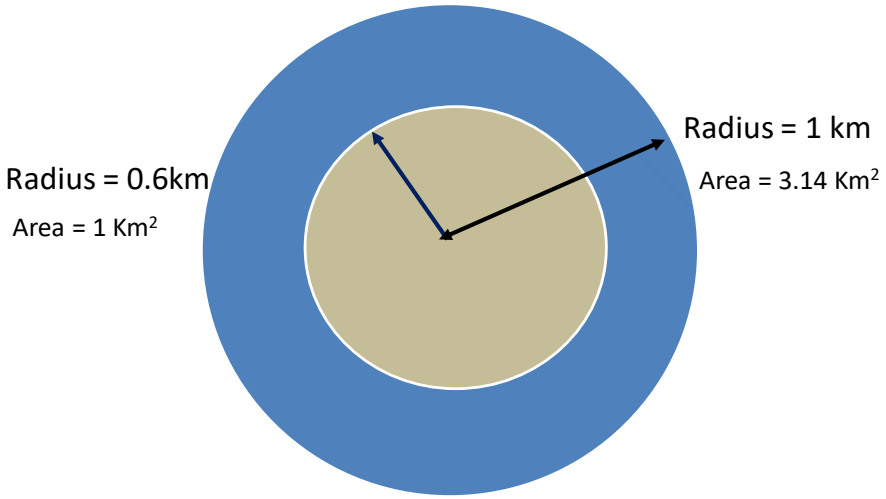
The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021

Chapter 3 and Appendices B and C

Observations, Commentary and Issues

Errors identified in the calculations of population density

Key Illustrative Definitions: 1km Catchment Area v Area = 1Km^2 v Radius = 1 km



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Proposed Scheme: Outline description and station options

Proposed Scheme: Outline description and station options

The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021 Appendix B

Observations, Commentary and Issues

TAA has undertaken its own **high level assessment of the market potential** for **each prospective location set out** in the **Jacobs Feasibility Study Report**. It encompasses consideration of the:

- Area
- Station/Stop Options
- Location Details Jacobs Station Location Accessibility Rating
- Land Use Types - Trip Generator/ Trip Attractors
- Scale of Attractors
- Pop in 1km catchment area – NOTE this refers to a radius of 1km and an area of 3.14 Km2
- Pop Density Inhabitants per ha
- Potent Pax Numbers
- Overall Performance

Proposed Scheme: Outline description and station options

Proposed Scheme: Outline description and station options

The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021 Appendix B

Observations, Commentary and Issues

This assessment of **potential passenger demand performance** reflects not only the key consideration of the **trip generators**, including population in the station catchment area of station as reflected in population total and density, but also the **scale** of **trip attractors** including employment locations, offices, retail and recreational/leisure facilities.

The assessed performance of station locations tends to decline the further south distant from the city centre the station location chosen by the consultants.

The case for stations at Rathfarnham, Ballyboden , Knocklyon and Ballycullen tends to get weaker unless it is part of a route that serves a much larger station with strong attractors and trip generators.

In many cases much more attractive sites could be found for instance in the case of Rathmines Village near the Leisure Centre and Town Hall.

Proposed Scheme: Outline description and station options

Proposed Scheme: Outline description and station options

The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021 Appendix B

Observations, Commentary and Issues

We conclude in selecting many of the prospective station locations and sites **those chosen will undoubtedly generate relatively low passenger demand and contribute to a poor Benefit Cost Ratio.**

These sites are affected by small populations served, low density and relatively few trip producers and attractors, and affording poor local accessibility including poor bus connectivity.

We argue there are station options in south west Dublin situated on route Options C and D that could offer considerably greater potential passenger demand.

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Proposed Scheme: Option Costs

The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021

The SW Metro Options. The Jacobs feasibility study examines two options: A – Charlemont to Ballycullen with 6 new stations served by Metro trains running through, and Option B -St. Stephens Green to Ballycullen with 8 new stations operated as a separate line from the Main Metrolink Scheme.

The costs of options A and B are summarised in the Feasibility Report but not given in detail.

A **spreadsheet file was provided by the NTA with the build-up of costs. However, this appears to relate to Metro Alignments** in South and South West Dublin that **do not match the Feasibility Report Options.**

The spreadsheet appears to support the PowerPoint presentation of two SW Dublin Metro **options labelled I and II provided by the NTA**. Option II does not match option A.

Proposed Scheme: Option Costs

The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021

Comparing Costs - Metro Main Scheme and SW Dublin Options

The inconsistencies noted above make comparison more difficult. Added to this the "quantities" used in the costing of the main scheme are not available.

Despite repeated requests for this and other information and a polite response from the NTA stating significant amounts of relevant data and analyses do not exist these must have been used in the costing work but are not explicit.

Nevertheless we have come up with **another solution in the absence of adequate information** being made available to us by the NTA, we have been able to **compare the costs given in the Jacobs report** and in the **cost estimate spreadsheet for SW Dublin provided by the NTA**

Proposed Scheme: Option Costs

The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021

Comparing Costs - Metro Main Scheme and SW Dublin Options

Note: costs of PowerPoint option II are not detailed as they appear to have little relevance.

Cost Category	Jacobs Option A	Jacobs Option B	PowerPoint Option I	PowerPoint Option II
Tunnels and shafts	549.9	612.1	569.9	
U Stations	904.2	1266.5	904.2	
Trains	149.8	217.6	149.8	
Other costs	384.6	647.7	280.0	
Construction total	1988.5	2743.9	1903.9	1638.5
Indirect	285.4	393.7	273.3	
Land + property	189.9	269.0	186.7	
Total before Risk	2463.8	3406.6	2363.9	2034.2

Proposed Scheme: Option Costs

The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021

Comparing Costs - Metro Main Scheme and SW Dublin Options

Conclusions

The "Knocklyon" feasibility study analyses the capital costs of the projects.

It contains little supporting detailed information and we have not been able to source same. We have therefore **used the costing methodology employed in the Metrolink Preliminary Business Case to benchmark the "Knocklyon" scheme** costs and check for consistency with Metrolink in estimating costs.

We identify some **key differences in costing assumptions** applied to the "Knocklyon" compared to Metrolink and conclude if the latter's methodology were applied consistently the **cost of "Knocklyon" metro would be less than reported.**

MSWG have proposed the metro extends to Tallaght. This is very likely to increase the passenger loadings very substantially and provide opportunities for surface alignment.

We have identified an Option C and Option D both terminating at Tallaght. Both represent extensions of Option A specified in the feasibility report. **We estimate that Option C could be delivered for €2.76 billion and option D could be delivered for €2.52 billion**. These exclude allowance for optimism bias/risk.

Proposed Scheme: Option Costs

Proposed Scheme: Option Costs

The NTA/Jacobs Metro to Knocklyon Feasibility Study, 2021

Comparing Costs - Metro Main Scheme and SW Dublin Options

Metro Extension Charlemont – Tallaght. We have identified two potential alignments to serve Tallaght.

Metro to Knocklyon Capital Costs Options A – D and I and II

Source	Jacobs Option A	Jacobs Option B	PowerPoint Option I	PowerPoint Option II	TAA Option C	TAA Option D
Total €bn before allowance for Risk	2463.8	3406.6	2363.9	2034.2	2760.0	2220.0 – 2520.0

Costs are undiscounted at € 2019 Q4 prices (millions) and exclude allowance for risk/optimism bias and VAT.

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Projected Demand for Travel by Metro in the City Centre to Knocklyon Corridor: Assessment of the projections and the forecasting tools employed in the Jacobs Feasibility Study Report

Conclusions 1

The "Knocklyon" feasibility study examined potential traffic demand.

We note the significant differences between the forecasts for the Metro to Knocklyon and Metrolink.

Our initial review of these suggests **this divergence** in passenger projections between the medium/longer term forecasts for ridership of Metrolink and the Knocklyon scheme is to a significant extent related to **as yet unfulfilled projections of population and development** in the **Metrolink corridor** towards the northern outskirts of Dublin and the uncertainty surrounding their outturn levels.

Additionally, the Jacobs Feasibility Study report demonstrates Metrolink passenger carryings are **dominated by the city centre and Dublin Airport**. The latter reflects **highly optimistic projections of Metrolink passengers travelling to/from Dublin Airport**, given the geographical pattern of access trips to/from the airport and the cap on airport passenger numbers in place at Dublin Airport.

Projected Demand for Travel by Metro in the City Centre to Knocklyon Corridor: Assessment of the projections and the forecasting tools employed in the Jacobs Feasibility Study Report

Conclusions 2

There will be **considerable uncertainty surrounding projections for passengers travelling to/from Dublin Airport** not only because of the volatility of air travel in the current and anticipated regulatory environment surrounding air travel against the backdrop of climate change, but also question marks over the appropriateness of the ERM system for airport access travel.

We also note the JASPERS observations with regard to Metrolink in its Guidance Note May 2022.

JASPERS stresses 'there remain a number of **uncertainties regarding the demand forecasting**. The long term response to COVID, the impacts of DART+ and BusConnects, optimistic airport demand forecasts with overestimated peak loadings, in addition to the ambitious long term population and demographic forecasting beyond 2040 all suggest some limited overestimation of the demand forecasts'.

MPAG in its consideration of the JASPERS Guidance Note calls for ' (Para 3.7) **Further clarity on how the demand modelling is aligned with the population and employment projections of the National Planning Framework.** Further detail is required on **how the regional population and employment projections are distributed at a local level**'.

Economic Appraisal of the City Centre to Knocklyon Metro and the methodological implications for the efficacy of a Metro to serve South West Dublin. scheme options: A Review of the findings

Conclusions 1

The "Knocklyon" feasibility study includes an economic appraisal that is partial.

The range of economic impacts included in the Metro to Knocklyon Feasibility Study is significantly less than that assessed for the economic appraisal set out in the Metrolink PBC.
It excludes estimates for:

- Transport reliability and quality.
- Wider economic benefits including agglomeration and employment benefits.
- Safety benefits
- Air quality benefits
- Noise and vibration benefits attributable to reduced use of road vehicles
- Accessibility benefits
- Land use integration

The rationale for this is unclear or absent.

The principal implication of this divergence from the practice for the Metrolink PBC is to **reduce quite significantly the BCR** for the Metro to Knocklyon scheme compared to a situation where the Metrolink Estuary to Charlemont Preliminary Business Case (PBC) practice had been applied.

TAA Transport Analysis and Advocacy Ltd

Economic Appraisal of the City Centre to Knocklyon Metro and the methodological implications for the efficacy of a Metro to serve South West Dublin. scheme options: A Review of the findings

Conclusions 2

It is estimated that the Metro to Knocklyon scheme's BCR would be increased by between 0.2 and 0.4 based if **Reference Case Forecasting(RCF)** to adjust for risk / optimism bias in the Jacobs study had been replaced by application of a **Quantified Risk Assessment (QRA)** as in the case of the economic appraisal for Metrolink.

In summary we believe the **BCR figure of 0.8** for the through running alignment from Knocklyon to Estuary represents a **significant underestimate of performance** of a Metro to serve South West Dublin compared to a situation where the costing approach and assumptions and valuation of the more comprehensive range of benefits applied in the Metrolink PBC, had been employed in this case.

The BCR would be further improved significantly where an alternative alignment to serve key parts of Tallaght had been selected by Jacobs in their demand forecasting and economic appraisal. In the case of the latter Option the **BCR could be in the range 1.6-2.2** even in the absence of the growth rates anticipated for Tallaght in its local development plan.

Key Issues and Findings arising from the Audit of the Report of NTA/Jacobs Metro to Knocklyon Feasibility Study, released in 2021

Conclusions 1

We conclude the Report of NTA/Jacobs Metro to Knocklyon Feasibility Study, as released in 2021 was not Quality Assured.

The approach to costing applied in the Report of the NTA/Jacobs Metro to Knocklyon Feasibility Study is not wholly consistent with that set out in the Metrolink Estuary to Charlemont Preliminary Business Case (PBC).

This is particularly due to the reliance on Reference Case Forecasting(RCF) to adjust for risk and optimism bias instead of application of a Quantified Risk Assessment (QRA).

The effect has been to inflate the risk costs attributable to the NTA/Jacobs Metro to Knocklyon scheme substantially compared to the costs of risk in project delivery had the QRA estimated risk allowance used in the case of the Metrolink scheme been applied in the Knocklyon scheme case.

The principal effect of this is that the **total costs** attributable to the Metro scheme in the Jacobs Metro to Knocklyon Feasibility Study **are typically significantly higher** than would be the case had the methodology and associated costing assumptions employed in the Metrolink Estuary to Charlemont Preliminary Business Case (PBC) been employed in this instance and in particular in relation to the economic appraisal of the scheme.

Key Issues and Findings arising from the Audit of the Report of NTA/Jacobs Metro to Knocklyon Feasibility Study, released in 2021

Conclusions 2

The principal implication of this divergence from the practice for the Metrolink PBC is to **reduce quite significantly the Benefit Cost Ratio (BCR)** reported in the NTA/Jacobs Metro to Knocklyon Feasibility Study report for the Knocklyon scheme compared to a situation where the Metrolink PBC practice had been applied.

The **range of economic impacts included** in the Metro to Knocklyon Feasibility Study **is significantly less** than that assessed for the economic appraisal set out in the Metrolink PBC.

The principal implication of this divergence from the practice for the Metrolink PBC is to **reduce quite significantly the BCR** for the Metro to Knocklyon scheme compared to a situation where the Metrolink PBC practice had been applied.

A metro scheme **adopting an alternative alignment** and with a **terminus in the vicinity of 'The Square' in Tallaght** would, in conjunction with application of costing and economic appraisal practice wholly consistent with that adopted for the Metrolink PBC, **could boost the BCR for such an option significantly.**

in summary we believe **the BCR figure of 0.8** for the through running alignment from Knocklyon to Estuary represents **a significant underestimate of performance** of a Metro to serve South West Dublin.

The BCR would be further improved significantly where **an alternative alignment to serve key parts of Tallaght** had been selected by Jacobs in their demand forecasting and economic appraisal. In the case of the latter Option **the BCR could be in the range 1.6-2.2.**

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The Metro to Knocklyon Feasibility Study: Recommendations arising from the Audit of the Report of NTA/Jacobs Metro to Knocklyon Feasibility Study

Recommendations

The NTA should commission an updated Metro to Knocklyon Feasibility Study, taking into account the findings of this Audit.

This could be undertaken by Jacobs but with guaranteed allowance for independent oversight, including from the MSWG, and strict adherence to the quality assurance requirements expected for such an important exercise with large financial implications for the State.

Any decisions to be made by An Bord Pleanála in its consideration of: NA29N.314724 MetroLink: Estuary through Swords, Dublin Airport, Ballymun, Glasnevin and City Centre to Charlemont, Co. Dublin, **that relate to the section of the scheme in the city centre and particularly St Stephen's Green and south from there**, should be placed on hold pending the outcome of such an exercise.

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