Guidance Note 1

Date:	**15 November 2021**
JASPERS assignment code:	2020 020 IÉ TRA RAL
Project title:	**Electrification and Upgrade of TEN-T Network in Greater Dublin Area (DART+)**
Subject:	*Project Review: Phase 3 (Preliminary Business Case)*
Country:	**Ireland**
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A.1. Purpose and Alignment

A.1.1. What is the purpose of the project?

The DART+ programme is an upgrade of the sub-urban and urban railway services in the fast growing commuting catchment area of Dublin with a plan to extend and electrify the DART rail network, thereby improving travel times and nearly doubling the current peak hour suburban/urban rail service into Dublin from 30 to over 50 trains per direction.

A.1.2. Is the problem the intervention is trying to solve clear?

Yes. The project aims to help meet the increasing mobility needs of the growing Dublin area population in a sustainable way in the context of broader National and Dublin Area strategic goals.

A.1.3. Does this align with PI 2040 and Climate Action Plan?

Yes. This alignment is achieved through rail electrification and mode-shift from car transport. As such, the project likely falls within the EU Taxonomy on Climate Investments. The project is included as an objective in Project Ireland 2040 and in the Climate Action Plan, 2019. Regarding PI 2040, the programme delivers on the goals of enhancing regional accessibility, encouraging compact growth, developing sustainable transport and transitioning to a low carbon society.

A.1.4. Have the policy and delivery assumptions been captured, challenged and agreed with all key stakeholders?

Yes. There appears to be relatively strong consensus on the project concept amongst key stakeholders. The project, being an upgrade of an existing system with large demand potential is considered a reasonable ”safe bet“ regarding policy impacts, the economic case and delivery risk.

A.1.5. Is the projects needs/demand analysis robust?

We have no reason to doubt the basis of the ERM model and forecast until 2058, which has been developed using best practice methods and for which the forecast passenger outputs are soundly validated against an already-operating DART and other rail commuting network. The model demographic development assumptions driving significant traffic growth are also in line with planning and reasonable expectations of population increase and development in Dublin and the GDA area until 2043, with some further limited growth beyond that year, flat-lining in 2058

The demand forecasts highlight a strong underlying potential for substantial passenger demand on the DART+ network, including newly proposed stations, in terms of existing demand, newly induced trips and potential for transfer from bus and car transport. Nevertheless, the overall potential for car-rail transfer will only be substantial with the introduction of strong supporting measures (either now or during the lifetime of the project), such as P+R expansion, integrated ticketing solution and coordination of bus services, as well as strong car restraint measures in the City Centre.

Our assessment of peak passenger demand per train, when considering the future DART+ TSS timetable, backs up the fleet purchase strategy of aiming towards 5 car electric trains after implementation and extension of trains towards 10 car in the

future depending on the development of demand and the desire for a high level of seated passengers.

A.1.6. How stable is the scope of the project?

The project has a reasonably well defined technical scope, with only more local issues expected in the further statutory planning of the project such as the location of Docklands station and the need for / objections to other new stops, stations and level crossing removal measures, which may emerge in the planning process. From an operational point of view, further fine tuning of the TSS timetable concept may be required to ensure a sufficient level of operational reliability, however this should not impact the technical concept.

A.2. Feasibility, Capability and Enabling Projects

A.2.1. Have reasonable alternatives been considered? Is there a clear best option? If there are several options that would meet the need, how was the robustness tested?

Yes. The main options for DART+ considered at a programme level revolve around the strategic decision on how to achieve an improvement in east-west connectivity through the city centre. This has considered for the future potential role for DART Underground compared to the development of the already existing Phoenix Park Tunnel (PPT).

Evidence provided in the previous DART Expansion Options Assessment makes a clear case that in terms of economic performance and affordability, the use of PPT provides the most cost-effective and affordable solution, delivering efficiently on the objectives. Nevertheless, it is considered that this does not necessarily create any strategic or socio-economic obstacles to the delivery of Dart Underground as a future next phase, which will bring an additional capacity uplift and further improve rail accessibility through the south city.

At the level of major elements of the plan such as the new depot, fleet technology choices (EMU / BEMU mix) and the relocation of Docklands station, extensive options analysis has taken place and has been demonstrated in the PBC and other available supporting documents. Both the depot decision and the fleet technology choices are sufficiently justified in our view. Only in the case of Docklands station do we have doubts over the quality of the decision-making basis for relocation to Spencer Dock and recommend that this is made subject to further consideration.

A.2.2. Does the preferred option represent value for money and a sufficient solution to the problem identified?

Yes. The preferred option is shown to have a BCR of 2.3 and delivers decisively on expanding the capacity and quality of the urban and sub-urban rail offer to meet growing population needs and sustainable transport goals, with significant reduction of CO2 due to electrification and mode shift to rail. The option remains economically viable in the face of a number of down-side scenarios of cost and demand development including their combinations.

A.2.3. *Have the constraints been assessed including legislation, policy issues, regulatory issues, environmental issues, and impact on the physical and technical environment?*

There are no evident gaps in the assessment of constraints, however environmental issues will need to be better described in any documentation for external funding once statutory environmental processes are complete.

A.2.4. *Is the delivery strategy feasible? Have the conditions and constraints within which this strategy is feasible been identified? Does the body have the skills and expertise to deliver the project?*

There are no evident feasibility issues in the delivery strategy. Although the Business Case presents a significant programme of rail investment, the technical content is affordable at the national level and well within the experience and competence of IÉ, to be supplemented by suitable external recruitment. The only area of real concern is the delivery of an operationally viable charging solution for the new battery electric trains, which will require close attention and may have the potential to impact on the short-term project concept if not fully understood at this early stage.

A.2.5. *Has there been an initial assessment of the market appetite, particularly for risk?*

This has not been assessed as part of the JASPERS Review, although we do not anticipate problems in this area for such standard rail investments

A.2.6. *Does the Sponsoring Agency have the capacity and capability to undertake the intervention proposed?*

Yes, see answer to A.2.4 regarding IÉ.

A.2.7. *Are there complementary or enabler projects identified to deliver the benefits of this project?*

The programme is a set of stand-alone investments that interacts with other operational systems such as MetroLink, Luas and bus services. Whilst higher impacts on car-rail mode shift can be achieved particularly with the introduction of extensive P+R and strong car demand management measures for the Dublin Area, we note that these have not been explicitly included in the scenario testing and are not included in any concrete way within the project.

A.2.8. *Has the project's funding priority as part of the Approving Authority's capital allocation been agreed?*

This has not been assessed as part of the JASPERS Review.

A.2.9. *Has due account been taken of lessons learned from similar projects?*

The identification and assessment of a whole range of programme risks in the PBC indicates lessons learned from previous experience in Ireland and across the world. Risk is also significantly reduced again by the fact that the project will be delivered/managed by a technically competent entity, which has the necessary in-house project management and technical expertise to scale-up and successfully run investment preparation and implementation.

A.3. Costs and Benefits

A.3.1. Are project costs including contingencies and benefits realistic?

The project benefits are driven by perceived time savings related largely to improved speeds resulting from electrification and reduced waiting time due to substantial increases in train frequency in the peak hours. This equates, according to the PBC, to a net present benefit for rail passengers over the 60 year project lifetime of €6.3 billion out of a total of €6.8 billion.

Based on our own estimates using data provided separately by NTA, yearly perceived time savings for public transport in 2043 are approx. 8 million perceived passengers hours per year, over 90 % of which are in the peak periods and 15 % of which accrue to business passengers. Half of these benefits are related to train speed increases and half to increases in service frequency and waiting for transfers. In the peak hours, this represents approx. 10 minutes of perceived time saving per rail passenger. This is all realistic considering the project interventions and plausibly in line with the calculated lifetime benefits.

The cost estimate is €2.26bn for infrastructure and €700m for rolling stock (for 325 electric train cars of which 65 are battery electric) inclusive of risk contingency, VAT and inflation escalation is based on feasibility working cost estimates. Based on our assessment of a technical breakdown of cost items provided by NTA/IE, it seems generally plausible considering the technical content and complexities of the programme in an urban environment. However, the level of detail in the PBC does not allow detailed assessment of the cost plausibility of all of the items, especially complex investments in stations and civil works.

Risk contingencies of between 23% and 43% have been applied to various components at the current stage of design, with an average 35% applied across all elements. It is noted that this is lower than the comparable level for MetroLink, where the risk premiums are heavily driven by tunnelling activities. According to AACE, at Class 4 (Feasibility), the maximum range of costs within an 80% confidence interval (P80) is usually +50%. The overall risk/contingency allocation of 35% would suggest a confidence of probably closer to P50 has been applied to the current Preliminary Business Case, which equates to a median actual cost outcome and can thus be considered realistic, although there is of course risk of cost escalation beyond this. This should be monitored closely as the project develops, with close oversight to avoid cost escalation during the design stage.

A.3.2. Have cost ranges been identified for different performance scenarios? Have these been benchmarked?

Procured fleet costs of €7.5m for a 200 seat capacity EMU trainset are somewhat higher than international benchmarks but in a reasonable range. The premium above EMU costs for battery electric trains is 25% and also in the range of expectations.

For infrastructure, benchmarking to a single unit cost / km is rather complex in this case as the investment includes a grouping of atypical elements including depot costs, electrification, quadruple tracking, signalling, level crossings, civil works and several new stations. The basic electrification costs have been benchmarked in the PBC indicating that they are in the normal range.

Our assessment based on data provided by NTA indicates pure construction costs of €1bn at 2019 prices prior to contingencies and without VAT across the 125km of track considered. This is breakable down to:

- 30.2% of costs for electrification related items at €2.8m per km across the 3 corridors involved. This is high for Europe but still in the reasonable range for an urban investment.
- 22.1% of costs related to station investments (new stations and expansion of existing ones), which seems to be proportionate to the various works considered.
- 13% for various civil engineering works, which again seems to be proportionate to the project context.
- 11.2% of costs related to depot expansion at Maynooth and on the North Coastal line, which are proportionate to the fleet expansion, with reserve for future increases.
- 10.2% of costs related to signalling including upgrade to ETCS level 1 at approx. €1m per km across the programme. This in in line with typical European benchmarks.
- 8.5% for permanent way, of which three quarters is attributable to the quadruple tracking of the 6 km between Park West and Heuston. The units costs for this are relatively high compared to European benchmarks at over €10m / km, but this may include other related works, which are not described in detail.
- 4.6 % provision for works on Bray to Graystones,

A.3.3. Has a funding model and/or expenditure trajectory been mapped out? Is the envisaged spend affordable?

This has not been assessed as part of the JASPERS Review.

A.3.4. What drives the cost, schedule, benefits, productivity and performance of the project?

The project benefits are driven by perceived time savings related largely to improved speeds resulting from electrification and reduced waiting time due to substantial increases in train frequency in the peak hours. This equates, according to the PBC, to a net present benefit for rail passengers over the 60 year project lifetime of €6.3 billion out of a total of €6.8 billion.

The cost estimate is €2.26bn for infrastructure and €700m for rolling stock. Infrastructure costs cover a range of technical items with over half the cost attributable to electrification and station investments. Civil works, depot investment, signalling upgrades and permanent way make up most of the remaining costs.

A.3.5. Has a benefits realisation strategy been considered?

Yes, there is a clear monitoring and evaluation plan defining KPIs to be evaluated ex-post 1 years and then 3-5 years after implementation, which should allow an understanding of whether expected outcomes and impacts are being achieved and if not why not. This should be a basis for the identification and definition of rectifying measures.

A.4. Stakeholders and Risk

A.4.1. How will the key stakeholders impact on the project?

This has not been assessed as part of the JASPERS Review.

A.4.2. Is a stakeholder management and communications plan in place? Has significant consultation taken place?

This has not been assessed as part of the JASPERS Review.

A.4.3. Have the risks for each option been evaluated and the risks for the preferred option been fully assessed?

Yes, for the strategic options, sensitivity analysis was carried out confirming the economic robustness of choosing bundle 6 without a DART+ Tunnel. In addition, the greater affordability of option 6 was considered in the decision making process.

For the preferred strategic option, risks have been assessed at the programme level. A standard risk assessment and management process exists at the level of the component projects with the use of a risk register and is described in the PBC, although specific project assessment is not documented in this programme level PBC.

A.4.4. Are the cost and time implications of managing the risks included in the cost and time estimate or treated as a separate risk allocation?

Cost risk is included in the core cost estimate, taking costs to a median cost outturn level. Further cost escalation up to less likely but plausible pessimistic levels has also been included in the sensitivity testing. This will be monitored at both a programme and project level.

Potential delays to implementation are assessed in programme risk analysis but not considered in the financial and economic assessment. With active programme level coordination of timing of works and purchase across the projects, this should not lead to significant socio-economic losses, however there may be implications for budgeting and inflation impacts, which need to be closely monitored at the programme and project levels.

A.4.5. Has a risk identification and management strategy been developed including assignment of responsibility for individual risks?

Yes. A programme specific risk assessment has been established with the PBC indicating that the roles and responsibilities of each stakeholder have been identified. This should cascade down to a similar system at the project level.

A.4.6. Has the project been stress tested? Have the 'worst case' implications been assessed?

Sensitivity Testing has been undertaken in relation to reasonable down-side extremes of cost, demand related to potential COVID impacts and complementary infrastructure development. Combinatorial scenarios of these have also been tested and the project remains economically robust.

A.4.7. Is the project breaking new ground?

No. From a fixed infrastructure point of view, the rail technologies applied are well familiar to IE. The main innovation is in the introduction of battery electric trains, where care will be needed in developing, testing and establishing a battery charging regime, which is workable within the desired timetable.

A.4.8. Should the project be broken down into smaller steps?

The subject of the PBC is a passenger rail investment programme for the Dublin area, and implementation will take place at a project level. The 5 distinct projects (4 corridors and rolling stock) are well defined and deliverable as stand-alone units, and as such no further disaggregation is warranted.

It is necessary however to bear in mind that the projects have operational interdependencies regarding the relative timing of implementation, especially with regard to rolling stock and its relation to depot facilities and electrification as well as capacity enhancement measures in the centre of the city, which are relevant to all the corridors. These interdependencies are assessed in the PBC and need to be monitored and managed closely at the programme level.