Introduction

The purpose of this document is to outline my vision for Ireland in 2040.

I write this document in the context of lessons learned from Irish planning and transport history, specifically, the history of the M50 Dublin orbital motorway and its hinterland.

Using this initial context and the lessons to be learned as a back drop I will outline my vision of Ireland in 2040 and beyond breaking it down into the following sections Planning, National Infrastructure, Regional Infrastructure and Miscellaneous

I am cognisant that what I envision may seem extraordinary for today's Ireland, however it is worth remembering that 30 short years ago, the M50 was an extraordinary project yet we didn't envision that today over 159,000 vehicles per day would use it. Let us learn from history and plan for 2040 with these lessons to the forefront of our imagination and designs.

Context M50 & Hinterland

Initially conceived in 1971 as part of the Dublin Transportation Study, the M50 was intended to be an orbital bypass of the city. Construction began in 1987 with work being carried out in sections. By the time the project was completed in 2005 the M50 was already at capacity and overwhelmed by a very different requirement, namely suburban commuters. Upgrades started in 2006 to expand and relieve congestion. How could this have happened?

Since the original plan was for a bypass to remove mainly HGV, regional and national traffic from Dublin city centre the expected volumes of traffic and the traffic density were not designed for. Junctions were not free flow and two lanes was considered enough to handle capacity. It was truly incomprehensible at that time that Dublin could grow to what we see today, the Celtic tiger wasn't even conceived. The M50 is now synonymous with congestion and upgrades. The very people the M50 was supposed to help are now the ones trapped in congestion for hours each day.

One of the major oversights with the M50 project was not even with the motorway itself but rather how it has been consumed by the urban sprawl of the city. Housing developments expanded unchecked outside the bypass. The inner city was in decline and areas such as Blanchardstown, Tallaght and the Kildare/Meath catchment area rapidly grew. Furthermore, large shopping and industrial complexes were built on the fringes of the motorway both adding to its congestion yet at the same time constricting its room for growth. These complexes proved to be a significant draw to the entire country, not just Dublin.

Another oversight was that no significant public transport links were provided to these housing estates, shopping centres and industrial parks.

Finally, Dublin become the primary driver of economic growth in Ireland during the lifetime of the M50. This has led to a heavy dependence on the region and its infrastructure.

These issues effectively side-lined the project's original purpose, a regional bypass. The M50 is now a vital artery to the financial and social fabric of the State; the motor vehicle the de facto blood cell.

Lessons Learned

Our current planning process is spread across a multitude of disjointed state organisations which has made our policies themselves fractured and ineffective. This is highly visible in the M50 project. The city and county councils were initially involved in planning and design however this was later transferred into the National Roads Authority. As construction progressed policies of urban expansion outside and around the motorway were made by differing councils without realising the full impact on the transport infrastructure. Each development in isolation was acceptable however no development exists in isolation and the cumulative impact of these overwhelmed the regions infrastructure.

Future planning is a difficult process. Nobody can predict the future or its technologies. However, by looking back through history the same patterns always repeat. Cities have been growing steadily for centuries and will continue to do so. This is simply human nature. The infrastructure of today's cities is almost always insufficient to meet this growth of the future. It is truly a rare case where infrastructure within a city is underwhelmed and expected to remain so. Yet as planners and engineers, many continue to plan to today's standards, not taking into consideration that most projects will outlast our lifetime by a large margin. Therefore it is better to err on the side of growth than on the side of caution in this circumstance. We need to plan big and expect growth.

The M50's purpose rather than its engineering details were designed between 1971 and 1987 however by the time it was complete this purpose was largely redundant in part due to the large amount of time between conception and completion. Additionally, building in sections may have arose from financial and other situations however in the long run this choice to build in sections has cost the country more than one can imagine, both financially and socially. The project would have had a much better opportunity to evolve to the changing needs of time had it been completed in a much shorter time span. It also would have returned dividends earlier and the growing over dependency on it may have been identified much earlier.

The growth of the pattern of motor vehicle dependency and the subsequent lack of investment in cohesive sustainable public transport infrastructure to protect the motorway network is a common mistake the world over. In the general long term case, wider roads have the effect of increasing traffic congestion. In the short-term people see an upgraded road network as being faster, more personal, convenient and comfortable than public transport. Due to this people switch modes to private motor vehicles. Ironically this leads to the congestion of the road network but also to a reduction in funding in public transport

infrastructure. This leads to a reduction in service and thus a reduction in users who now switch to other transport modes. A cycle is thus created where the function of the road network and the public transport network are both seriously inhibited. The argument of road versus rail is a flawed concept. Rather it is a symbiosis of one supporting the other and vice versa. In the case of the M50 a lack of significantly attractive alternatives for commuters to travel, from their residence, to their destination resulted in over subscription to the car.

Failing to identifying the need for people to travel from their residence to work, school, college and social destinations results in a dispersal of our developments in a manner that is unsustainable. Accommodation was located without concern for means of access to attractive public transport. Property development, for the most part, is concerned with building houses not thinking of the aftermath, the long-term lives of the people who lived there and the city or region in which they lived. This mindset needs to be changed through education.

Planning

Dept. of Planning and Engineering

Had the planning and development of the M50 and its surrounding region been encapsulated within one body, with one overarching objective of an integrated city then this urban sprawl and transport chaos would almost certainly not have happened to this level.

To expand on this, if we build any infrastructure from a hospital or power cables to housing estates, railways or roads we need to have a single cohesive Department of Planning. This Department must have a central authority over all planning in the State with the singular objective of building towards a sustainable and viable Ireland.

This is not to remove the input of County Councillors or citizens into this process but rather to take these local views and integrate them with regional and national policies into an overall implementable plan. This Department should shape our communities with public input and have the authority to coordinate and direct the planning and provision, via other state agencies, of the following services: transport, housing, energy & communication, water, environment, health, waste collection, schools, policing and parks & recreation. All of these services are explicitly involved with planning any sustainable future for Ireland. A cohesive and transparent coordination and planning body is therefore the foundation stone to Ireland 2040.

In conjunction with this I propose the integration of engineering services into one body in order to retain talent and allow for efficiency of scale in a small country. Bodies like Irish Rail Infrastructure manager, The Office of Public Works, Irish Water infrastructure department, National Transport Authority, some County Council services and Transport infrastructure Ireland should be amalgamated under a single Department of Engineering to provide a comprehensive body of engineering and project management knowledge. This would create a continuous flow of major infrastructure projects so talented engineers would be encouraged to remain, be challenged and learn within the public service rather than moving to private or foreign public companies. A body like this can leverage efficiencies of scale, reduce administration, improve coordination across all projects, procure materials in bulk and maintenance contracts at a cheaper rate. It would also reduce our financial dependency on costly consulting services. If it was to come under the same ministry as the aforementioned Department of Planning, it would allow deep rooted coordination in our systems.

Rebalancing Ireland

One of the issues with the M50 project is that the surrounding region became and remains the primary driver of economic and social activity in Ireland. Cork, Limerick, Galway and Waterford need to rebalance the growth of Dublin by providing opportunities and services that attract the best of talent and compete as a region with Dublin. This can be achieved by making them centres for specific industries such as pharma, biomedical etc. and via the IDA working with the planning body to create viable opportunities for companies in these locations. As these are relatively small cities it allows us to control their growth and not simply leave it in the hands of private property developers as was done in Dublin. I would use the Nordic model where public transport is built first and then submissions for development are gained in a controlled planned manner. It immediately introduces new businesses/residents to public transport as opposed to having to convert them from cars at a later time, which is well documented to be a very challenging task. Long term area plans in the duration of 20 years should be created with forecasted numbers of accommodation units to be built per year. This allows planning for schools, primary health care facilities, recreation areas, Garda stations, infrastructure and community services to cater for growth before building accommodation units rather than after. It would reduce the risk of housing shortages and overcrowding in our various institutions, improve the quality and quantity of services provided to citizens and transform our financial approach to planning which is currently short term and isolated rather than long term and integrated. If we approached the redevelopment of Limerick, Cork, Galway and Waterford in this way we would eliminate the issues we currently have in Dublin for generations to come.

This controlled rebalancing also alleviates the continued pressure in the greater Dublin area so we can resolve many of its current issues like housing shortages, urban sprawl, housing cost, poor transport infrastructure, social exclusion, lack of hospital space and many others.

Finally, this also makes Ireland far more economically attractive as with a larger focus we become more competitive with other bigger economies. Currently it is Dublin trying to compete post Brexit. Let's make Ireland competitive post Brexit.

Urban Regeneration with emphasis on quality of life

Currently our housing estates spread for miles in an uncoordinated disconnected manner that forces car usage for even the most minimal of journeys and has decimated the sense of community by removing any central locus in these estates. Meanwhile our inner cities are in decay from poor social cohesion, crime, lack of investment and general decline.

It is imperative that we halt this alarming trend and generate safer, healthier inner city environments with green zones and better infrastructure, community education and policing. We need to focus on quality building up rather than quantity building out; on providing significant green wedges within our inner cities. A perfect example of the type of architecture required to attract families and individuals back from the suburbs to a quality city life is the Agora Garden apartments in Taiwan. The 20 storey apartment project has a very large floor space per apartment to accommodate families, which includes a large planted garden area in each apartment, guaranteed levels of direct sunshine per day and a renewable energy system on site.

Another city excelling in ecological higher rise apartments is the traditionally low rise city of Copenhagen. Major projects like Bjarke Ingels' Mountain Dwellings have blended higher rise apartment blocks into low rise neighbourhoods. All this is an attempt at creating suburban dwelling in a high density urban area without losing the quality of build and from the experience of other cities it is proving to be majorly successful. I propose that we increase the height restriction for apartments in our cities and build them for quality rather than the shoe box quantity approach we now have. This current approach is not retaining our families and other individuals in the city but rather encouraging them to move to a suburban area and put further pressure on our infrastructure. This increased suburban quality living in a dense urban environment would also reduce the financial burden on the state for provision of infrastructure and services in the future, as these will not have to be provided over a larger and larger geographic area. This urban density also provides for a more effective use of public transport by centralising sufficient volumes of people near to these transport hubs.

National Infrastructure

By taking the approach of a rebalanced Ireland it generates a viable return on building significant public transport projects. Current trends of the motor vehicle being the primary mode of transport have had and will continue to have many negative consequences on our communities, national economic outlook and environment to name a few. We need to invest in public transport options for the future to maintain our economic progress; provide for a far more environmentally friendly future and relieve the growing burden on our road network.

Currently the railway focus is on a line to Cork with a spur to Limerick and on a mostly separate line to Galway. This however creates many issues most notably, being a small nation, this does not allow us to provide a high speed, high-quality service to all three cities, it is costly and inefficient and also further entrenches the centrality of Dublin as the nation's hub. It does not encourage public transport usage within the western region and widens the economic divide between east and west Ireland.

Instead I propose a dedicated high speed (300+ km/h) trunk electrified railway line between east and west Ireland. We would then link this to a similar high speed south to north line between Cork, Limerick and Galway. Both these lines would initially be twin track with electrification and land capacity immediately available for more if growth requires. They would also provide clearance for double decked trains so as to be future proofed to a significant capacity without the need for costly station or lateral track expansion.

To do this we would need to reserve the land for these lines now as trains cannot travel at high speed on existing lines or through existing stations nor would it be cost effective to try retrofit them for this. Countries like China, Japan, Spain, Germany, Taiwan, France and many more have been doing this, some for decades, so it is not new technology or ideas in any way. The average speed of trains has been steadily climbing in the last two decades and if we are not to be left behind we must plan to be on the same playing field as these countries as they progress their transport technologies.

The key to this approach is aligning the trunk lines in such a way as to make the journey east to west (Dubliin to Limerick 175km), north to south (Cork to Galway 158km) short and straight. An possible example is Dublin to Portlaoise then straight to a greenfield site in outskirts of Limerick where we have grade separated junctions south to Cork, north to Galway and straight to Limerick. This minimises the amount of track required while maximising the cities captured and speed achieved. For the most part it is greenfield development so costs would be reduced and speeds increased. I would stress these are not

local commuting lines so we do not make the mistake of letting local urban development impact on national infrastructure.

Additionally, directly connecting these two high speed lines with Shannon, Cork and Dublin airports would open up all three to a vastly greater catchment area and with new low cost services opening from Ireland to North America we have an opportunity to create an aviation hub to rival bigger European economies. It also creates a greater return of investment from the railways as citizens, tourists and business people can all utilise the entire network directly from these airports.

To integrate the wider rural and regional areas of Ireland to this network of cities and airports I propose utilising the existing railway network to provide regular feeder services to connect with the highspeed line at major hubs. For example, by creating intermediate stations in Portlaoise and Mallow we can use the existing Tralee line to Mallow or Thurles line to Portlaoise to connect to high speed trains to Dublin, Galway, Cork, Belfast or Limerick. Wider examples of connectivity would require a more in-depth analysis of track alignments.

By investing in these two lines, 4 major cities have been linked up all within a maximum 1 hour 20 mins of each other centre to centre and a new, more balanced axis of Ireland has been created. This is a seismic shift in Irish policy which would have impacts far beyond transportation. It would deliver a message to those living outside of Dublin that they will no longer be left behind by the economic development. It would open up the western region to far more socioeconomic growth and would deliver the message that Ireland is a forward looking mature economy willing and able to compete with the rest of the world for the century to come.

Finally, since much of my proposals for the national railway infrastructure on the east coast of Ireland hinges on what projects are carried out in the Dublin region over the next few years I refer the reader to the Dublin Regional Infrastructure section.

Regional Infrastructure

Dublin Region

While it is my proposal to balance the national railway across the country I will give special focus to Dublin region as there are several infrastructure projects in the planning phase which I feel are both part of the regional and national infrastructure.

The first of these projects is Metro North. In my opinion, the Metro North is a majorly flawed project which like the M50 project will only become apparent in the future.

Firstly, Metro North forces more people into an already congested Dublin city centre to access rail travel to Dublin airport when, the majority of people using the airport don't live in that city centre area. This does not encourage a modal shift from cars to public transport for people coming or going to the airport from outside the city centre as any commute into the city centre would be slower and more cumbersome than travelling by car direct to the airport itself.

Secondly, even with the Dart Underground included the Metro North forces a change in Stephens Green from DART to Metro while carrying heavy luggage further slowing the journey, something not enticing to passengers. It also makes any Stephens Green station the bottleneck for the entire Dublin region on what is already a constricted site due to the pedestrianised shopping district and its city centre business location. It would make this location a construction site for years between Luas Cross City, Metro North, DART Underground and possibly Metro South (conversion of Green Luas line to Metro).

Finally, Metro North does not open up Dublin airport to the rest of Ireland and is another example where a piece of national infrastructure will be consumed by local commuting needs as is the case with the M50.

The second of these projects is DART Underground. I propose constructing the DART Underground on the current route from Inchicore to Dublin Docklands but also continuing via a tunnel to DCU, Dublin Airport, Swords, a park and ride facility on a greenfield site adjacent to the M1 to alleviate incoming northern vehicle traffic and then reconnect with the existing Belfast line south of Drogheda. This extension could directly extend from the existing DART Underground project route or rise at Dublin Docklands on to the existing DART line and drop again to a tunnel starting between Clontarf Rd and KIllester. This line would generate consistent bidirectional traffic throughout the day to DCU, the airport and the city centre as well as peak commuting and intercity traffic.

Contrary to current belief that the DART Underground is over specified I believe it is under engineered for our future needs. I propose construction of a quad track electrified tunnel capable of carrying double deck and highspeed trains. This tunnel can then accommodate the following services: DART on the Kildare to Balbriggan route; shuttles services from Heuston Underground to Dublin airport; commuter trains to Drogheda Dundalk and Swords the 6th, 7th and 8th most populated towns in Ireland and high speed intercity services from Belfast to/from Dublin, Cork, Limerick or Galway. Four track is a vital investment in this tunnelled section as otherwise this becomes the bottleneck for the entire Dublin region with significant impacts on the national network. By quad tracking we also allow the future integration of the Luas Green line when it is converted to Metro. Finally, using this route instead of Metro North eliminates the need to construct quad track on the existing congested and populated northern DART line.

For city areas planned to be served by Metro North I propose a more viable approach would be construction of further on street Luas lines particularly linking to the Mater hospital and on to Drumcondra where it can link with the existing commuter services and proposed Maynooth/Kilcock DART service. It also can link with the Stephens Green underground station via Luas Cross City and from there to the rest of the country via the national trunk lines.

With the completion of these projects, two high-speed national trunk lines and an extended DART Underground, we would have a high-speed rail network that connects 5 major cities, 3 international airports and the three largest towns in Ireland. A network which is future proofed for a significant increase in capacity without the costly investment in further construction works. A network which provides enhanced commuter capability within the congested Dublin region and forms the basis of a Dublin underground system. This would be far more inclusive and an enormous benefit to people living in rural Ireland, urban Ireland outside of Dublin and in the Dublin region.

Further transport projects in the region would be the conversion of the green Luas line to Metro with the green Luas trams being reused to extend the Luas network in inner city areas. The realignment of bus routes to act as feeder services onto metro, tram and train lines would also be my preferred option. This approach prevents direct competition between these two modes which would impair the return of investment in public transport. This would also solve the significant issue of the last mile barrier to the rail sector for commuters.

Cork, Limerick, Galway Regional Infrastructure

Being smaller cities, Cork, Limerick and Galway have an ideal opportunity to implement public transport infrastructure on a much greater basis with a lower cost base than Dublin. To this end, I propose the immediate identification and protection of public transport routes for rail and trams within these cities.

Currently Limerick has the best network of usable and protected lines. The main Dublin line into the city centre runs adjacent to Crossagalla Business Park and on towards the M7 city bypass. The line running to Ennis passes through Moyross, Lower Park and Garryowen and adjacent to Childers Road Retail Park and Parkway Shopping Centre. The Adare line runs adjacent to the Raheen business park and several large existing housing estates as well as through Patrickswell and Adare and a line runs adjacent to the Crescent shopping centre. This is the essentials of a considerable commuting network should the investment in density be provided. I propose building two additional lines on to this to form a public transport network to be envied for a city of its size. Firstly, running a line from the current Ennis line to University of Limerick and Castletroy. Secondly running a line through Colbert station under the Shannon and through Greystones and Clareview before connecting with the Ennis line north of Limerick city. This provides a full loop of the northern half of the city and a more direct line to Shannon airport and Ennis without the need to reverse at Colbert station. We could then merge the Cork to Galway highspeed line with the Ennis line in the north and with the Adare line in the south giving city centre access to Galway and Cork. The area between Careys Road, Janesboro and the Childers Road is a vital area to protect now as this is the key junction to all the services and would also prove ideal to construct high density office blocks on top of railway lines radiating across the country. All developments should be channelled around these lines and not dispersed across the city. Finally, a word of caution on the M7 as should development continue outside its boundaries, as was done with the M50, we will be repeating the mistake of creating a national infrastructure project that is overwhelmed by local commuter needs.

For Galway, the immediate concern is to identify public transport routes to the north east and west of the city which are sprawling rapidly and gives Galway the traffic problems of a major city. On street Luas and the city parts of the old Clifden line should be investigated

immediately and routes protected. Also, stations on the existing Oranmore/Dublin, Athlone and Mullingar lines should be extended to encourage railway use and dependency.

For Cork, as with Galway the immediate concern is identifying public transport routes within the city and channelling growth along these lines to make them viable. A link needs to be created to the airport via the city centre to complete the national infrastructure plan. Which may mean changing the site of Kent station. The city area sections of the former Bantry line need to be investigated for the possibility of on street Luas or even segregated Metro. Ballincollig needs to be connected to the city centre via rail and the southern portion of the city would benefit hugely from a Luas. As with other locations once as the routes are identified the city growth needs to be channelled into these corridors to make them viable.

Miscellaneous

I propose building the extended DART Underground, the east west trunk line and the Cork Galway line as turnkey projects by utilising funding from the European Ten-T railway fund and using international expertise in high speed railway construction. Use of funding from the EIB, world bank or others is also an approach which has been successfully utilised by other countries, such as China, to rapidly expand their high-speed rail network in a short period of time.

Provision of services on these lines should be open to competition from major international railway operators familiar with operating high speed services and the line should be built to allow operators use off the shelf technology and their own existing stock therefore reducing the investment from the state. This along with technical and market elements from the EU 4th Railway Package reduce the cost of certification of technology across EU states which is currently a significant barrier to a company's entry into the railway market in any country

Building the full length of the extended DART Underground by awarding a single contract for the entire length would reduce cost as the same tunnel boring machines (TBM) could be used for all the underground sections (subject to the geological constraints of the underground rock formations). If a decision is made to construct Metro South then these TBM’s could also realistically continue from the Stephens Green underground section towards the Luas Green line. This extensive tunnelling would provide the ability to amortise the capital investment in high cost equipment over several projects generating a greater return of investment from the machinery.

Extraction of spoil material and supply of raw materials for the project should utilise the existing rail network which would significantly reduce the impact on the city roads, residents and businesses during the construction phase and also reduce objections during the planning phase. The tunnelling spoil material could be reused as trunking for other rail and road projects reducing cost on other projects and the environmental impact of having to dispose it.

Another technique to generate greater return of investment is to use side by side development on all these infrastructure projects. In this the state purchases a wider land corridor and runs multiple services side by side. By running the water, electricity or communications supply pipelines adjacent to a trunk railway where land has already been purchased, levelled and prepared cuts land purchase and groundwork costs enormously by spreading it across multiple projects. For example, the Dublin water supply pipeline from Parteen Wier Limerick to Dublin, currently in planning, could effectively be run parallel to the

East West trunk line which would reduce the cost of ground works for both projects and also provide a permanent maintenance access route to both. Similarly, should the construction of the Cork to Galway motorway proceed it would be natural to run the Cork to Galway highspeed railway line in parallel to it and therefore again spread the land cost across both projects.

Buses remain the best means to reach into areas of rural Ireland and feed the major towns and thus the high-speed trunk lines for cross country travel. The key to this is integrated timing & transport hubs. A train and bus station should be in the same building. Buses should be timed to be at the train stations at a minimum 15 mins before an intercity service or 5 to 10 for a commuter service to allow customers sufficient time for comfortable modal interchange but not to add large downtime to the overall journey.

The lack of heavy industry and large scale mining of minerals or aggregates results in limited options for rail freight in Ireland. However, we have and should preserve direct rail connections to Dublin, Cork, Waterford, Rosslare and Foynes ports which would enable direct ship to train transfer and the possibility of truck shuttle services. I propose the introduction of planning regulations requiring rail transport for all future heavy industry and mining operations. Currently Ireland provides no financial support or incentives to move freight off road and onto rail which is an area of longer term concern and should be investigated.

Conclusion

We stand in a unique position in Ireland as some of these projects are in the early planning phase, we have a growing population, a recovering economy and geographically being a small country makes it ideal and relatively cheap to construct an entire highspeed network of public transport infrastructure in comparison to our European neighbours. Now is our chance to seize this opportunity and deliver a modern infrastructure to our future generations and ensure balanced lasting economic success. An efficient public transport network benefits every other area of our lives from housing provision, hospital access, social cohesion and employment access. It reduces environmental pollution and land use, preserves our countryside and supports tourism. It is imperative that we see the long-term benefits and not just the initial financial barriers or short term gains.