

NATIONAL TRANSPORTATION CORRIDORS



Bi-Modal Road & Rail Development

Introduction

This paper outlines an alternative method for the distribution of transport infrastructure resources, with major social, economic and environmental advantages, benefits for road and rail users, and a high ultimate return to the exchequer.

Historical Situation

Government transport funding has been until recently substantially concentrated on road development, with six times more money spent on this infrastructure than on rail and public transport modes¹. In extreme cases such as the proposed Dublin – Navan – Kells M3 scheme, the proposed infrastructure spend is currently weighted in favour of the road mode by as much as 1000:1².

Road projects, as administered by the National Roads Authority (NRA) under the aegis of the Department of Transport, have come in for heavy criticism for what is felt are their unnecessarily elaborate nature, with attendant environmental and other consequences³. Looking at the evidence it could be argued that road development is in fact pursuing a logical course, but only if it were the case that no other forms of transport existed. Much of road-building strategy has appeared to operate in isolation to other transport systems⁴, and as shall be demonstrated, has been based on a narrow model of car ownership.

Roads Emphasis

Government policy has been largely shaped and influenced by the interests of business and the market, and by the need to satisfy the perceived infrastructural requirements for Foreign Direct Investment (FDI)⁵. Road transport is seen as not just beneficial for the transport of freight, but also impacts personally on business people and other individuals. It could be said that people have a “personal stake” in road transport that is not always made apparent with rail or other modes. The celebration of individual freedom in driving, the appeal of car advertising and the promotion of a car-based lifestyle is symptomatic of how road dominance is almost unconscious, despite the now well-known drawbacks of untrammelled car and lorry use. Additionally, business and the public has viewed the rail mode in a generally negative way because of a history of under-investment which has meant poor timetabling, unreliability, discomfort and (with several notable exceptions) now-outmoded passenger and freight facilities.

Consequences

The acceptance of the “normality” of unsustainable car and lorry use, with no realistic alternatives made available, means that over-specified road projects have been seen as not only acceptable but highly desirable, always with the promise of relieving congestion and cutting journey times. In fact, it is now well-known that congestion cannot be eased by road-building, and that the cost-benefit of spending millions to save relatively little on journey times - which are often calculated assuming less than full capacity traffic loadings - has been questioned⁶. Further, the severe environmental

effects of such policy, notably in the context of the most recent climate change data, are only now beginning to become apparent, and their economic impact even more so. It's also worth noting that although harmful emissions output is reducing due to EU regulations, which impose increasingly stricter limits on pollution levels, what is frequently overlooked is the issue of vehicle *proliferation*, which tends to cancel out the benefits of reduced emissions per vehicle by way of increased volumes of vehicles, and indeed increased usage of same. Vehicle proliferation, together with significantly increased usage, is of course also the principal cause of congestion with its unsustainable demands for roadspace – factors which would be present even with zero-emissions.

Assumptions underlying Road-building Policy

The current road construction programme is partly based on a predicted model of car ownership that envisages numbers rising from 1.35 million in 2000 to 2.1 million in 2016, or an increase of approximately 56%⁷. In fact there are already 2 million cars on the road in 2004⁸. This increase is being facilitated by providing very substantial additional roadspace, and the NRA have been carrying this out to a high standard.

The model seems logical at first sight – but it was formulated before the introduction of the latest modal switch technologies (e.g. the UK Oyster card) and prior to the emergence of credible climate change data. It is also a passive model, in that it does not take into account external influences that could arrest or reduce car usage.

Incorporating modal switch developments and climate change moderation measures (discussed below) leads to a new car ownership model. The current and new models are contrasted :

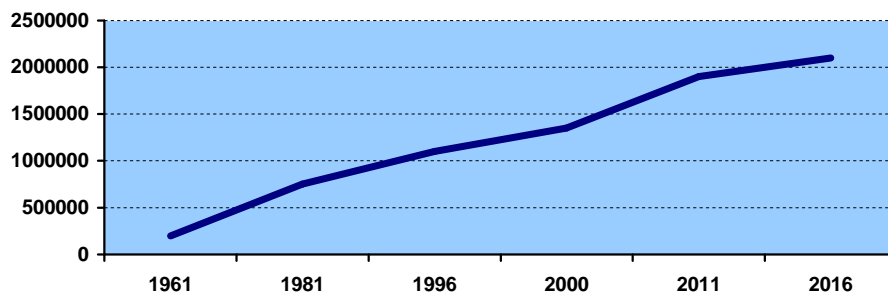


Fig 1 – Current model assumes continuous growth without external influences

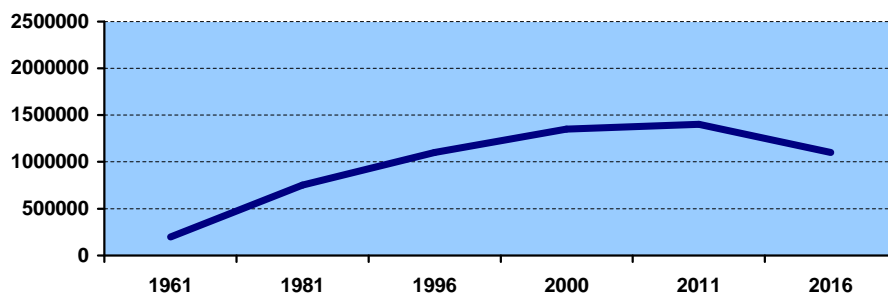


Fig 2 – New model showing ownership peak followed by decline due to external influences
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Climate Change Moderation (CCM)

Climate change, brought about primarily by the continued build-up of Carbon Dioxide (CO²) gas in the atmosphere, is already underway. The effects of this are difficult to predict, but it is generally held that continued polar icecap melting will lead to an increase in mean sea level and disrupt ocean currents. Coupled with changing weather patterns (increased number and strength of storms for example), the result could be widespread flooding and inundation of low-lying land areas. This in turn has serious social and economic implications, with potential population displacement, disruption to services, reduced industrial output, contraction of markets for goods and services, and so on. Ireland’s output of greenhouse gases is now almost double the limit set down by the Kyoto agreement, and emissions from the transport sector have increased by 130% since 1990 – the biggest increase of any sector of the Irish economy⁹.

Since the process has already begun, the task must be to reduce its extent and impact, and a package of measures known as Climate Change Moderation, or CCM, can be implemented. CCM measures include :

- Conversion of car / bus / rail vehicle engines to run on biofuel or hydrogen
- Initial use of diesel / electric hybrid engines
- Shift in energy sources from oil to wind, wave and solar power
- Air travel limitation
- Re-afforestation
- Allocation of land resources for biofuel production
- Changes in agricultural practices

A CCM transportation model is given below. A primary goal, apart from conversion of vehicles to run on biofuel, hydrogen, etc., is to moderate road schemes such that car use is reduced. This frees up land that can be used for tree-planting or for biofuel production (e.g. rapeseed crops), or other sustainable uses. An evolved road design approach with significant environmental benefits and equivalent levels of road safety to conventional motorways is detailed later.

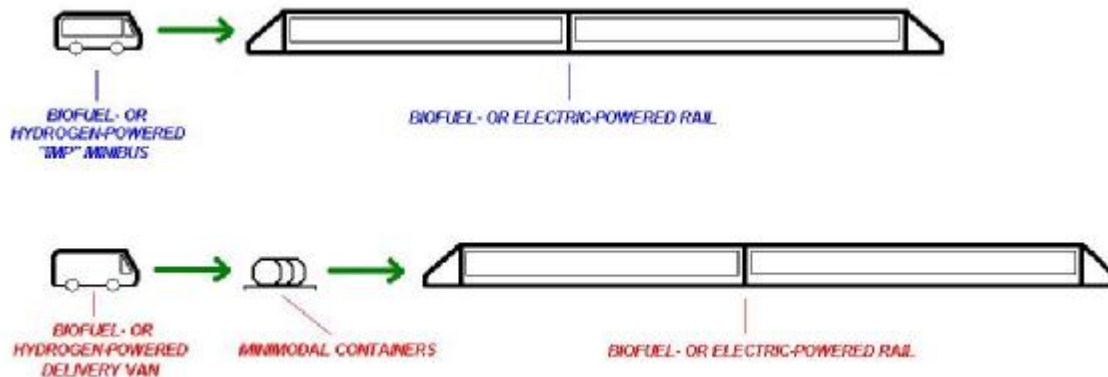


Fig 3 – Passenger and Freight CMM transportation using available or nearly-available technologies

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Modal Switch Technologies

A key driver of car and lorry dominance has been convenience. These provide “door-to-door” travel capability, whereas other modes have lagged far behind in this regard. Principle barriers to door-to-door travel by say, bus and rail, have been as follows;

- Segregated ticketing
- Inconvenient timetabling
- Need for cash and exact change
- Distant rail stations
- Lack of bus connections
- Lack of secure car or cycle parking
- Inconvenient pedestrian and cycle access

However, technologies have now progressed to provide the following solutions;

- Fully integrated and reliable ticketing using “Smartcards” (e.g. Oyster)
- Clockface and fixed-interval timetabling
- Cashless systems using pre-paid cards
- Feeder minibuses to stations, often running on “green” fuel sources
- Provision of secure parking facilities for both car and cycle modes
- Provision of cycle tracks and segregated walkways to transport centres

It can be seen that a cashless ticketing system, fully integrated across all modes, plus frequent minibuses serving rail links with regular-interval services, and clear unobstructed access at both ends, provide an almost seamless “door-to-door” transport system, thus offering a strong alternative to the car.

There are some other factors that need to be taken into account also;

- Car design emphasises attractiveness and desirability
- The mode promotes individualism and freedom

These are more difficult to apply in a group travel situation. However there are successful strategies available;

- Bus and train vehicles designed in a much less functional manner with a strong emphasis on aesthetic appeal
- The use of tactics to individualise the group travel experience. This can be done for example by using personalised collectible cards, just like early phone cards, and currently, mobile phone covers. Indeed one could introduce an integrated ticket product known as say, “MyCard” for example, with many different designs and perhaps even extended functions beyond travel.

On the freight side of rail, historic problems have been costs of physical labour and time delays involved in cargo handling and transshipment. As with passenger journeys, the articulated truck or small and medium heavy goods vehicle (HGV) have dominated the scene because of their ability to offer “door-to-door” service and convenience.

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Until recently, railfreight has had to confine itself to bulk or dangerous loads that cannot be moved economically or safely by road. Containerisation offered a way forward for many railways in the 1960s and 1970s, but this historically involved very heavy and costly freight handling equipment and large, dedicated freight yards.

Here again, new technology makes it possible for railfreight to once more offer a viable alternative to road freight, and makes the most of inherent advantages such as predictable journey times. Moreover, the reach of rail is extended by incorporating the road mode in a highly efficient and cost-effective manner.

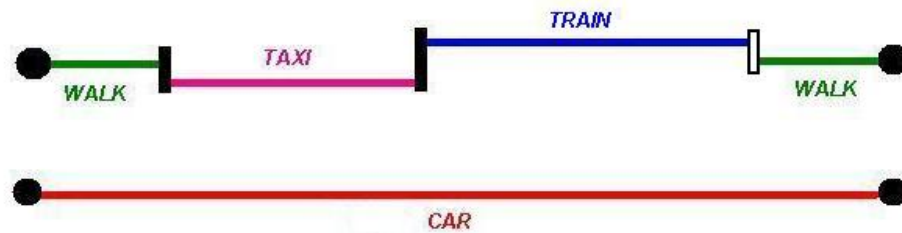
The two main railfreight innovations are :

- A new range of ISO demountable containers that can be handled by reach-stacking equipment (giant forklifts). These handle many varieties of load and can very easily be transferred to conventional articulated trucks with ISO flatbed trailers at the start and end of rail-based journeys (Fig. 2 above). Additionally, the reach-stackers do not require the same extent and specification of hard standing as previous ISO container handling equipment (i.e do not need large-scale freight yards) and the speed and ease of operations are greatly increased – a vital consideration given the “just-in-time” ordering systems used by business
- The MiniModal system – this uses smaller, standardised “mini containers” that can be stacked within a normal ISO container or in normal lorries, vans or rail wagons. MiniModal offers unparalleled flexibility, with loading and unloading possible from normal station platforms using small forklifts, or even directly from the trackside⁵. The low-cost nature of the system, as well as its speed, convenience and versatility, make it a strong option in the huge market for the transport of small- to medium-sized loads.

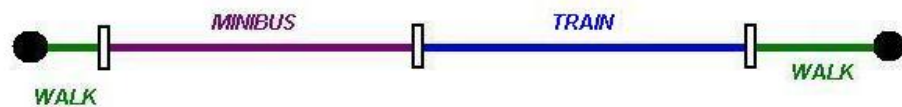
New freight tracking and management software, with built-in web access, can be used in railfreight with the same effectiveness and value to the customer as it has in air and road freight. Again, railfreight can benefit significantly from the same principles of customer convenience and transferability between modes as applied to the passenger side of rail operations.

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Fig 4 – “Smartcard” integrated ticketing makes “door-to-door” public transport realistic



Simple journey diagram contrasting the difference between non-integrated travel modes, and the car mode. The black boxes indicate modal shift with ticket purchase; the white box modal shift where ticket purchase is not required



The same journey but using non-car modes / integrated ticketing. In this case journey convenience is vastly increased.

Government Approaches

The existence of rail and other modes is acknowledged and supported by the Department of Transport, and this is very positive. The government’s enlightened decision to invest in rail in recent years in the national interest is most welcome, and it is sobering to think where the system may or may not be now had the investment programme not been initiated. Rail investment is also timely given the urgent need to implement CCM measures, and by the growing awareness of the critical role that the rail mode has to play in sustainable and balanced regional development¹⁰.

The government’s historical emphasis on road funding at the expense of other modes seems logical at first sight, given its strong links to the business community and other groups with an inherent disposition towards road transport as discussed above. (Some commentators have also expressed the view that revenues from VRT have reinforced car- and lorry-friendly policies¹¹).

What is in fact clear is that funding decisions have been made on the basis of a circular argument – that the public and business need more roads at the expense of rail / bus etc. because they largely use the road mode (hence the model described in Fig. 1 above); when in fact they largely use roads precisely **because** there has been lesser pro-rata investment in rail, bus and the other modes. NTCs break this cycle.

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Transportation Evolution - National Transportation Corridors

The rail network in Ireland fortunately remains in public ownership by way of the government and the Minister of Transport, thus creating a “safety net”. The government is in a position to give due consideration to all transport modes, and is not encumbered by the demands of private ownership (which must satisfy shareholders and not the public at large¹²).

In that regard, government can influence infrastructure funding in a highly positive manner, via suitable legislation, directives, statutory instruments, and so on. Simply put, it can be a balancing force against the power of vested interests, in the wider national good.

Hence one way of doing this is to redefine the scope of transport projects to which the government gives funding. Rather than viewing projects in isolation, and in dualistic terms (roads versus rail, etc.), the overall transport needs of a region or between regions can be considered in their totality. Splitting funding between modes in a defined region or corridor would reduce the need for over-specified motorway projects, whilst simultaneously enhancing rail along the same routes. This would lead to very positive environmental, social and economic benefits across the board, without reducing the overall effectiveness of transportation along those routes.

Such a strategy would paradoxically benefit road users by freeing up space on main routes, thus making driving safer, more reliable and less stressful, and critically, would also free up internal NRA resources which could then be redirected into its secondary and tertiary road improvement programmes. This is preferable to the current situation where such resources are often procured additionally to the existing budget. Furthermore, reduced demand on road space would also cut oil consumption and would have benefits for Bus Éireann and private coach operators.

Notably, this idea has a broad framework in place already, via the National Spatial Strategy, which nominated National Transport Corridors between the various Gateways and Hubs defined in the report. Furthermore, the NRA’s own commendable response to the environmental impact of large-scale road-building – the “Two Plus One” design – is tailor-made for the NTC model. This has great advantages; principally, if coupled with a uniform speed limit of for example 55mph / 88kph it achieves the same efficiency as a wider motorway by removing the need to overtake (thus obviating the extra lanes needed)¹³. Overtaking lanes are still provided at regular intervals, and on alternating sides of the road. In this way, this type of construction becomes much less of an imposition on the environment through lower land consumption, disruption and disturbance, and crucially, is far cheaper to build. It has also been pointed out that a speed limit of 55mph / 88kph significantly cuts fuel consumption and increases engine efficiency, thus significantly reducing emissions. The lower speed also has implications for accident figures¹⁴.

In short, this “bi-modal” road / rail approach, using a “Two Plus One” road design with parallel rail development and integrated transport interchanges, generates both significant benefits as well as direct savings - a “win-win” situation.

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NTCs In Action – Case Study

An ideal candidate for an initial NTC would be a North-Western Corridor out of Dublin. At present transportation development along this corridor has been defined solely in terms of a €70 million motorway from Clonee to Kells. The enormous impact of this high-cost / relatively low-value project is already being resisted by community groups, environmentalists, etc. Apart from loss of land, community severance, unsustainable increases in vehicular emissions, and light and noise pollution, the current scheme will also severely curtail the area's unique heritage, and amenities such as the Hill of Tara, the Tara / Skryne Valley and Dalgan Park. Yet calls for the reopening of the railway from Clonsilla to Navan, with an extension to Kells, have been resisted due to the "excessive costs" involved¹⁵. Designating this corridor as an NTC would allow the NRA to upgrade the existing road to dual carriageway or "Two-Plus-One" standard, some of the projected traffic having been allocated to the railway line. This substantially reduces the loadings on the road, and thus reduces the required width and allows other land-intensive design features such as interchanges to be minimised in size or eliminated. A portion of the very significant cost savings arising from this would permit the NRA to concentrate resources on secondary and tertiary roads in the area of the Corridor.

Meanwhile Iarnród Éireann and, if applicable, the RPA¹⁶, would use the balance of the outlay in the re-opening of the Clonsilla-Clonee-Navan-Kells rail line. An important point to note here is the current diverse forms of rail technology available, which impact on investment levels. The Clonsilla-Navan section could be re-built to conventional "heavy rail" standard, for example¹⁷, whilst the Kells extension could be to light- or ultra-light rail standard¹⁸.

Another feature would be the enhancement of local bus services, cycling routes and pedestrian access within the corridor, and critically, the creation of Local Interchanges – integrated road / rail / bus / stations, with freight distribution facilities - in each of the towns along the route (Fig. 4). Thus all transportation modes would benefit from the €70 million investment, with the balanced approach yielding high value due to enhanced mobility and competitiveness, greatly reduced environmental costs, "soft benefits" such as increases in the region's attractiveness as a location to live and work, and so on. These gains would translate into a higher return on the investment in due course. A successful pilot NTC would be used as a model elsewhere.

Implementation

NTCs require not a new body, but rather structured co-ordination between existing bodies, as well as local communities, to ensure implementation.

Productive community involvement could be achieved through the holding of Workshops in various locations along the route of the NTC. This approach has worked very successfully in other projects¹⁹ and could be a worthwhile step forward from the current, sometimes adversarial, "public consultation" approach²⁰.

The rail development component of NTCs can be carried out under a framework administered by Iarnród Éireann. Some instances would require network extension,

NTCs at a glance

- ü The threat posed by climate change is creating a powerful new economic context for rail development, augmenting existing factors such as reduction in traffic congestion and balanced regional growth**
- ü NTCs embed the concept of “bi-modal” road and rail development within a defined Corridor (National Transportation Corridor)**
- ü New modal switch technologies such as Smartcard integrated ticketing and MiniModal cargo handling, with local connections to stations, permit “door-to-door” passenger and freight movements, radically boosting ridership and re-introducing large-scale freight to the railways**
- ü An NTC can use an efficient, environmentally-friendly and safe road design such as “Two Plus One” in tandem with parallel rail development, providing all the advantages of a motorway without the heavy financial and environmental costs**
- ü Most NTCs could include existing rail routes, with some instances of re-opening under the NEXT framework**
- ü The parallel rail route absorbs some of the road passenger and freight traffic, facilitating the reduced road design and freeing up space on main routes**
- ü Crucially, NTCs free up resources for secondary and tertiary road improvements**
- ü NTCs provide much greater value to society and the economy through their balanced approach, as opposed to traditional large-scale motorway-only development. They cost less to build, and they cut oil consumption and emissions by reducing car use**
- ü Local Interchanges, at key sites along the NTC, provide physical integration between road, rail, bus, cycle and pedestrian modes, for both passenger journeys and freight flows**

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References

- ¹ Eamon Ryan TD; 2003;
- ² Based on proposed road investment of €670 million compared to €70,000 for feasibility study into re-opening Clonsilla to Dunboyne section of Clonsilla – Navan - Kells rail link;
- ³ Sunday Independent 20/7/2003; Martin Fitzpatrick – “No economic justification for Waterford’s €1.3Bn motorway”;
- ⁴ Platform11 Press Release - “Jurassic Park : Ireland’s Primitive Approach to Integrated Transport”;
- ⁵ Source : Author;
- ⁶ UK SACTRA (Standing Advisory Committee on Trunk Road Assessment) Report of 1994;
- ⁷ National Spatial Strategy (NSS), 2003;
- ⁸ Do.;
- ⁹ Irish Times 5/8/2004 “Output of ‘greenhouse gas’ is double Kyoto target”;
- ¹⁰ Regional and County Plans;
- ¹¹ Source : Author;
- ¹² Christian Wolmar “Broken Rails” Aurum Press 2001;
- ¹² “Two-plus-One” is an innovative road design developed by the NRA that features two lanes in one direction and one lane in the other, alternating over several sections of a particular route. This significantly reduces the environmental impact of the road development without unduly sacrificing its effectiveness;
- ¹³ Irish Independent 1/6/2004 “Speed and Road Safety”;
- ¹⁴ Do.;
- ¹⁵ Strategic Rail Review (SRR), Booz Allen Hamilton, 2003;
- ¹⁶ Where such a route is developed as a Light Rail scheme;
- ¹⁷ Meaning a 5ft 3ins gauge line as part of the Iarnród Éireann network;
- ¹⁸ “Ultra Light Rail” or ULR is a new low-cost LRT technology using self-propelled vehicles and specially-designed trackwork. It is said to cost approx. 10% of conventional light rail schemes;
- ¹⁹ Spencer Dock Development Scheme, 2003;
- ²⁰ Oral hearings, etc. into projects are often reported to be confrontational, etc.;
- ²¹ Contained in separate paper; currently at draft stage.

APPENDIX
SAMPLE NORTHWEST NTC (NTC3) CLONEE – KELLS EXPLANATORY DIAGRAMS

Diagram 1 – Current Proposal

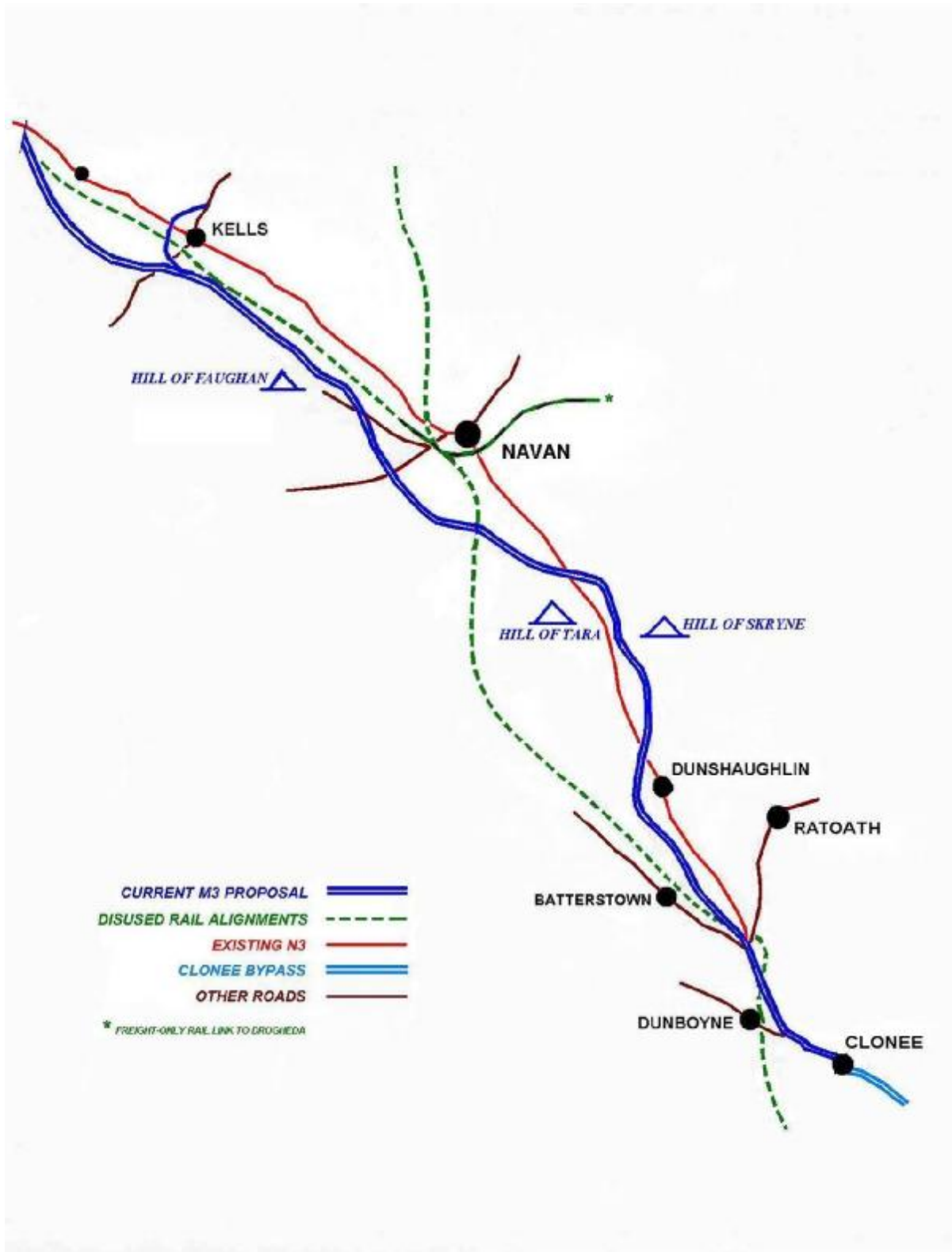


Diagram 2 – NTC Scheme

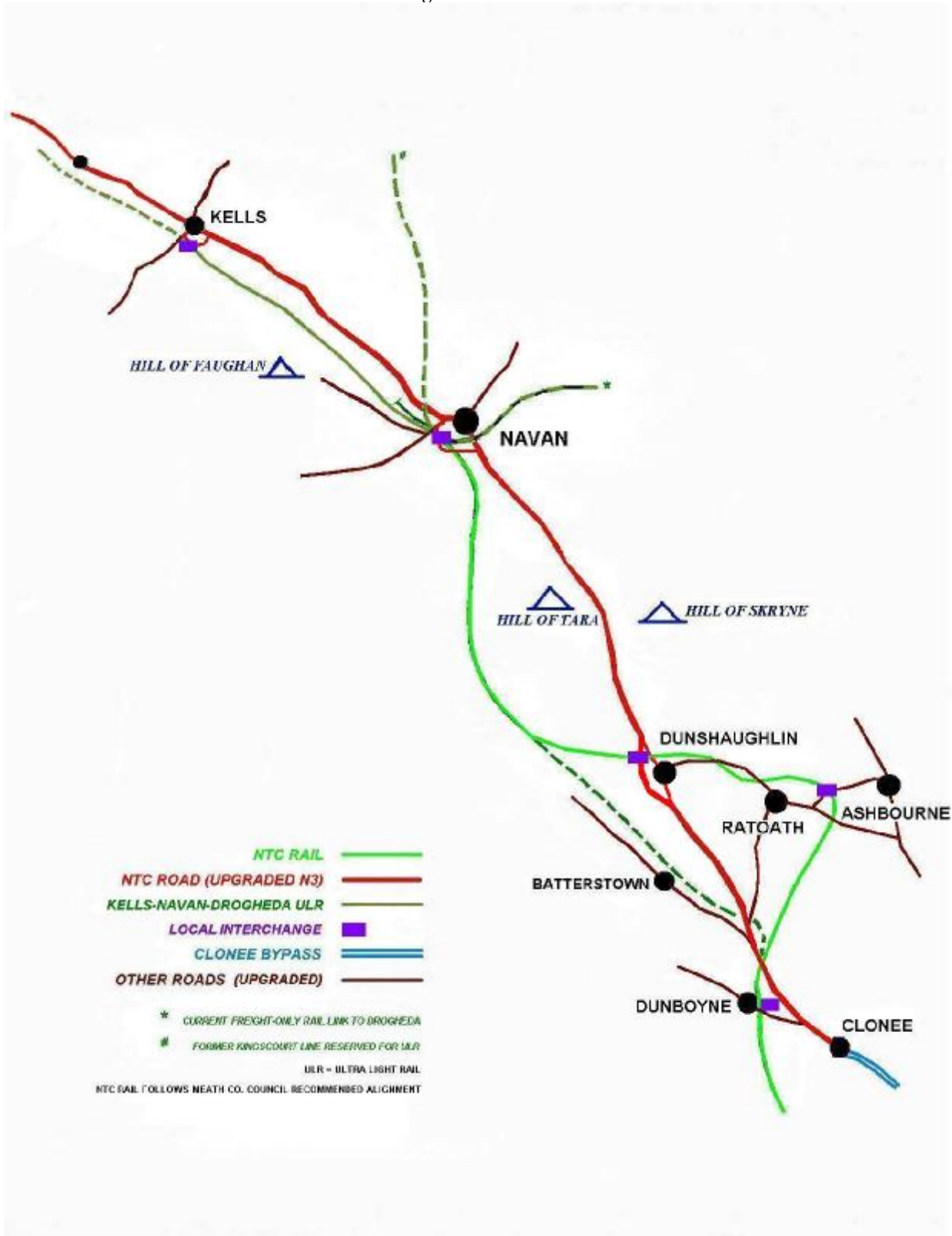


Diagram 3 – Generic Local Interchange Layout

