

Luas Finglas

Environmental Impact Assessment Report 2024

**Appendix A4.5:
Park & Ride Option Paper (Stage 2)**

Luas Finglas Park & Ride Options Paper – Stage 2

LFIN-PKW-0002

December 2019

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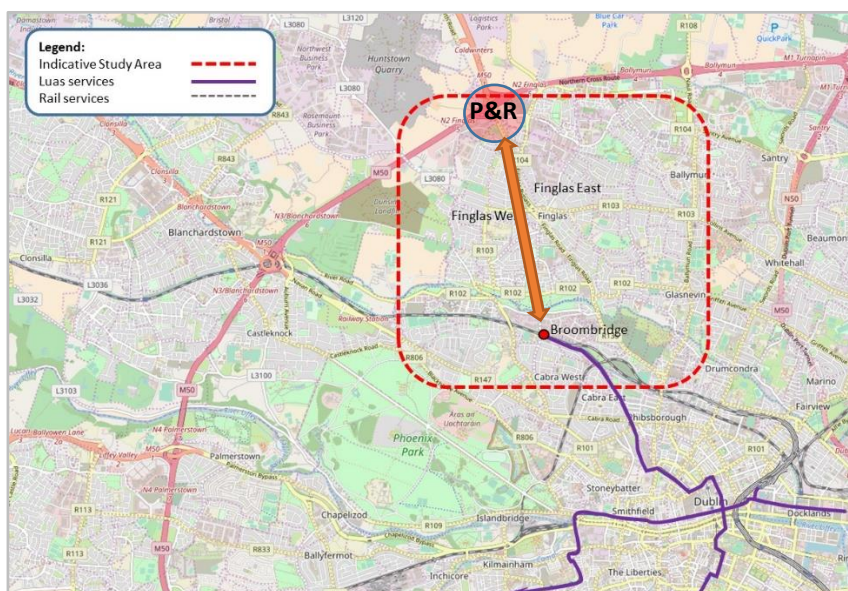
1 INTRODUCTION

Luas Finglas is a proposed extension of the Luas Green Line from the existing terminus at Broombridge to the area north of Finglas, in the vicinity of the N2/M50 interchange.

Various policy documents advocate the need for a Park & Ride (P&R) facility in the vicinity of the N2/M50 junction or the Finglas area. Indeed, the need for a P&R is mentioned specifically in the following documents:

- *Climate Action Plan 2019* – advocates for the need to set up a ‘Park and Ride Development Office’ and the need to put in place an ‘initial tranche of car park extensions at rail stations where required and for new strategic park and ride sites’;
- *Project Ireland 2040: National Development Plan 2018-2027* – also mentions the need for a strategic P&R within an overall P&R Programme at a number of rail, bus and Luas locations including Finglas;
- *NTA Transport Strategy for the Greater Dublin Area 2016-2035* – indicates a Luas service ‘with a strategic park and ride site at the N2/M50 junction’ at the northern terminus of the line;
- A supporting study to the *NTA Transport Strategy*, the *Park and Ride Report - Draft Transport Strategy for the Greater Dublin Area* produced by the NTA and Jacobs Engineering Ireland Ltd. in 2015, also explored the potential for a P&R in the area. In this report “a strategic P&R facility has been identified along the North Road (N2), Charlestown, to complement this future service (i.e. *Luas Finglas*)”.

Figure 1 Luas Finglas Study Area and P&R indicative location



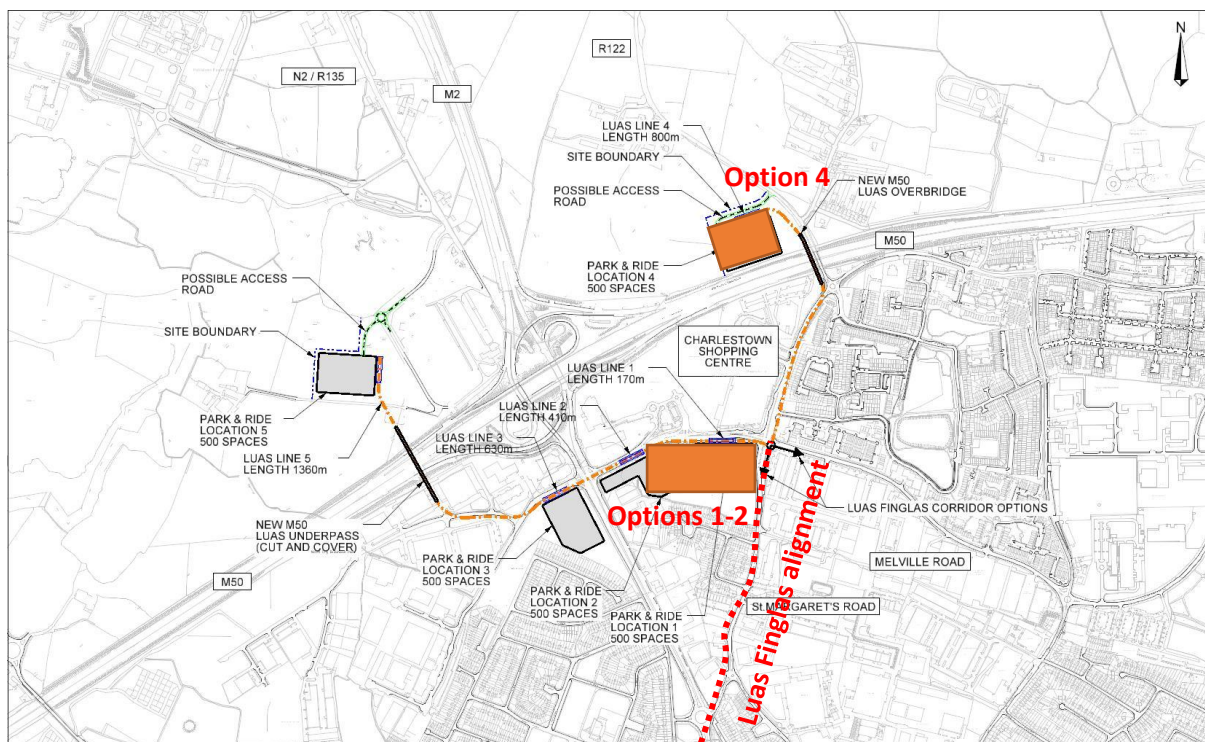
1.1 Background information and previous study phases

A “*Luas Finglas – Park and Ride Options Paper*” was produced in October 2018 by TII.

In that study, to be considered the Stage 1 of the P&R analysis, five initial possible locations were selected for the Luas Finglas P&R (see map below) and the study recommended that Options 1-2 (separately or combined) and Option 4 were to be brought forward for more detailed analysis.

Options 1-2 were to be preferred from a Luas and strategic road connections viewpoint (within the current road network scenario); while Option 4 emerged as more suitable in terms of land use and unconstrained development.

Figure 2 Luas Finglas P&R initial location options



The Stage 1 study also recommended that since Options 1-2 and 4 are located on the east side of the M50-N2 junction, the Luas Finglas alignment study could be progressed up to the common point located at the junction between St. Margaret's Road and Charlestown Place (indicated by a small circle with two arrows in the map above), after which point the P&R final location would dictate the last section of Luas Finglas alignment. This section will be common and thus invariant to all options.

1.2 Scope of this Report

This report forms the Stage 2 of the P&R selection study, and its scope is to further develop the analysis to bring the findings of the first report to a more detailed level of scrutiny in order to determine the optimum location for the Luas Finglas P&R, in terms of addressing the objectives outlined below.

Environmental (natural and cultural heritage) criteria are not within the scope of this report and are initially dealt with within the ‘*Luas Finglas Options Selection Report Stage 2*’ (Dec.2019), and will be dealt with separately as part of the Luas Finglas EIAR (Environmental Impact Assessment Report).

1.3 Main Objectives of the P&R and Assessment Criteria

The main objectives of the Luas Finglas P&R will be in line with the *Common Appraisal Framework for Transport Projects and Programmes (CAF) 2016* guidelines for options assessment:

1. Economy (including cost and Luas runtime to city centre):
 - maximising catchment and minimising construction cost (including cost of land) and Luas runtime from the P&R to the city.
1. Safety and Security:
 - for motorists driving to, parking, walking to and waiting for a tram;
 - for trams and drivers waiting at the terminus.
2. Accessibility:
 - ease of access from the primary road network, particularly from the N2 north of the M50 and from both directions of the M50;
 - ease of pedestrian connectivity between the P&R and the Luas terminus.
3. Integration:
 - including compliance and compatibility with planning and zoning objectives;
 - integration with GDA transport policies and potential future serviceable catchment (e.g. potential residential or commercial development).

These will also be adopted as assessment criteria against which to score the remaining P&R options.

1.4 Expected P&R demand - P&R sizing

In September 2018, the NTA suggested an ultimate P&R capacity of over 1,000 spaces.

This has been reduced following more detailed benchmarking exercises against existing similar P&Rs on the Luas and Irish Rail networks, adjacent traffic flows analyses, NTA Eastern Regional Model (ERM) demand analyses and discussions with the NTA.

The detailed analysis of P&R sizing is included in the '*Luas Finglas Options Selection Report Stage 2*'.

Within that report, a proposed alternative methodology for assessing the benefits of the P&R site has been developed in collaboration with Aecom and the NTA, due to the fact that the Eastern Regional Model (ERM) was currently under development and not available for use on this project, as yet. It is envisaged that the P&R module of the ERM will be used to inform the next stage of the process and fine tune the P&R dimensioning.

Three of the largest existing P&Rs with a similar function and strategic location to the proposed Finglas P&R are presented below as a reference (two for the Luas and one for Irish Rail commuter lines):

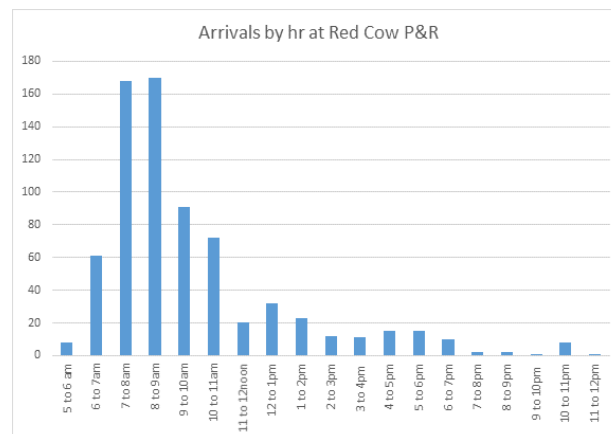
1. Red Cow is currently the largest Luas P&R, with 730 spaces, an average working day occupancy rate of 97% and a Luas journey time to city centre (Jervis) of 30minutes. This P&R is directly connected to Junction 9 of the M50, providing direct free-flow links from/to the M50 and N7, in both directions via a left in-left out junction off the N7 outbound (OB) lane and a bridge over the N7.

Figure 3 Red Cow Luas P&R – 730 spaces and direct free flow links to both N7 and M50 directions



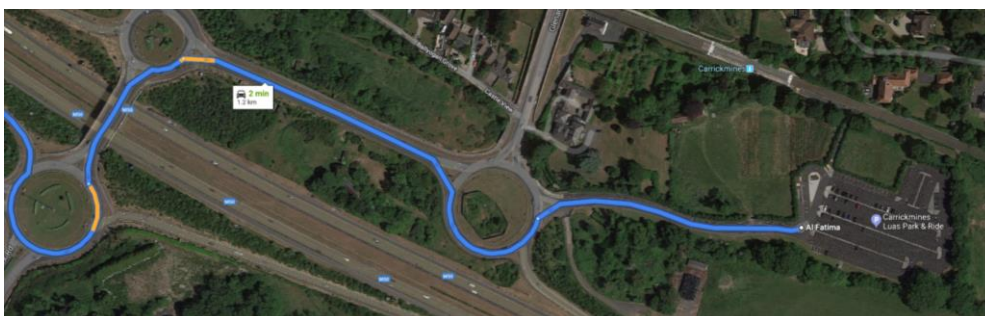
The profile of arrivals at the P&R in the morning is shown in the following graph, derived from a typical November 2019 weekday payments report at Red Cow (*Luas Automatic Fare Collection System (AFCS) and Park by Text system at the Red Cow P&R*).

Figure 4 Arrival profile by hour at Red Cow



- Carrickmines P&R has 350 spaces, an average working day occupancy rate of 77% and a Luas journey time to city centre (St. Stephen's Green) of 35minutes. This P&R is directly connected to Junction 15 of the M50, providing direct free-flow links from/to the M50 in both directions.

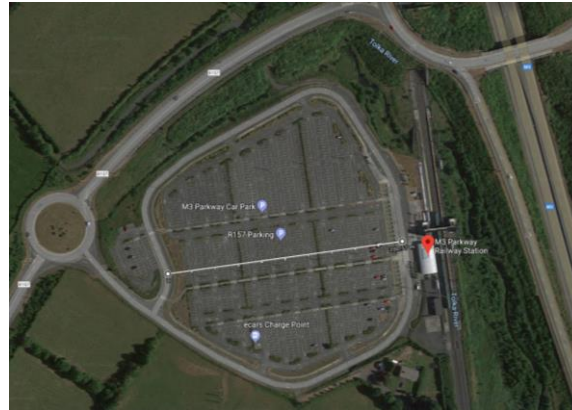
Figure 5 Carrickmines Luas P&R – 350 spaces and direct free flow links to both M50 directions



- M3 Parkway railway station, located on an Irish Rail commuter line, has a P&R with 1,200 spaces, train services to city centre (Docklands) approximately every 30minutes with 35 minutes travel

time. This P&R is directly connected to Junction 5 of the M3, providing direct free-flow links from/to the M3 in both directions and from/to the R157 (Dunboyne).

Figure 6 M3 Parkway Railway Station and P&R – 1,200 spaces and direct free flow links to M3 in both directions



It is expected that the Luas Finglas P&R will have a travel time to city centre (Parnell) of approximately 25 minutes, which is in line, or compares favourably with the P&Rs presented above.

The demand/sizing benchmarking assessment has been carried out in collaboration with Aecom utilising several datasets including:

- ERM select link analyses (Carrickmines and Red Cow) for P&R users origin distribution;
- TII TMU data for adjacent roads traffic flows;
- DCC SCATS-TII traffic counts in the Charlestown area;
- Luas Census;
- Existing Luas P&R occupancy; and
- NTA Luas Park & Ride pilot (2017).

ERM Select Link analysis was undertaken at Carrickmines and Red Cow to determine the distribution of passengers using the existing P&R sites (Model Run: ERM 2026 Do Minimum AM Peak). The results are shown in the table below and suggest a higher demand from either outside of the M50 or from the M50 corridor itself; with a significantly higher demand from outside the M50 where a radial road is in place (N7 for Red Cow).

Table 1 ERM Select Link distribution of passengers for P&R

	Carrickmines	Red Cow
Arriving along M50	31%	16%
Internal to M50	28%	-
External to M50	37%	78%
Other	4%	6%

TII TMU data for adjacent roads traffic flows and DCC SCATS counts have been used to benchmark the P&R spaces as a percentage of adjacent traffic. Both Red Cow and Carrickmines showed a very similar percentage of between 0.2 and 0.27% of the overall traffic flows.

Charlestown has a much lower traffic volume on the N2 than Red Cow has on the N7, see table below, with the N2 being approximately 40% of the N7. However, the traffic volume on the M50 is comparable and it is reasonable to expect that a significantly higher proportion of traffic will come from the M50 to the Luas Finglas P&R, than that in Red Cow.

Table 2 Example of benchmarking from TII recorded traffic flows on adjacent road network (P&R spaces as % of adjacent traffic flows)

	Recorded Av. Weekday Traffic Flows				Average Utilisation (no. of Spaces)	% of Adjacent vehicles per day using P&R Site
	M50	N7	N2	Total		
Carrickmines	70,050	-	-	70,050	285	0.20
Red Cow	144,725	110,375	-	255,100	670	0.27
Charlestown	149,600	-	44,650	194,250	527	0.27

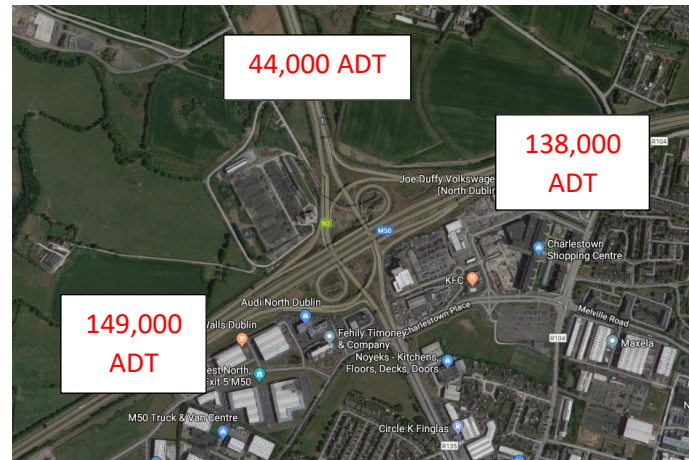
Based on the benchmark of adjacent roads traffic flows the average utilisation of the Luas Finglas P&R could be in the order of 530 cars.

Using a combination of: ERM data, in terms of modelled passengers boarding at Charlestown stop; the Luas Census data, existing Luas P&R occupancy; and the NTA Luas Park & Ride pilot (2017), the following exercise was carried out:

- The existing P&R Site at Red Cow was used as a proxy.
- Luas census 2015 showed 2,092 inbound passengers boarding at Red Cow on the Census day.
- Red Cow P&R (2015) car park showed a maximum utilisation of 656 vehicles meaning 31% of total daily passengers are P&R users (taking a conservative vehicle occupancy assumption of 1 person per vehicle).
- A run of the ERM model for an opening year 2026 with Luas Finglas in place, shows between 350 and 430 passengers boarding at Charlestown stop during the AM peak period (07.00am - 10.00am).
- Daily boardings are then calculated to be between ~1,200 and ~1,500 based on the Luas Census 2015 results, which show that 29% of boardings occur during the AM peak period (07.00am - 10.00am).
- Applying the Red Cow rate of 31% P&R users implies a demand for the Luas Finglas P&R site of between 375 and 470 cars.

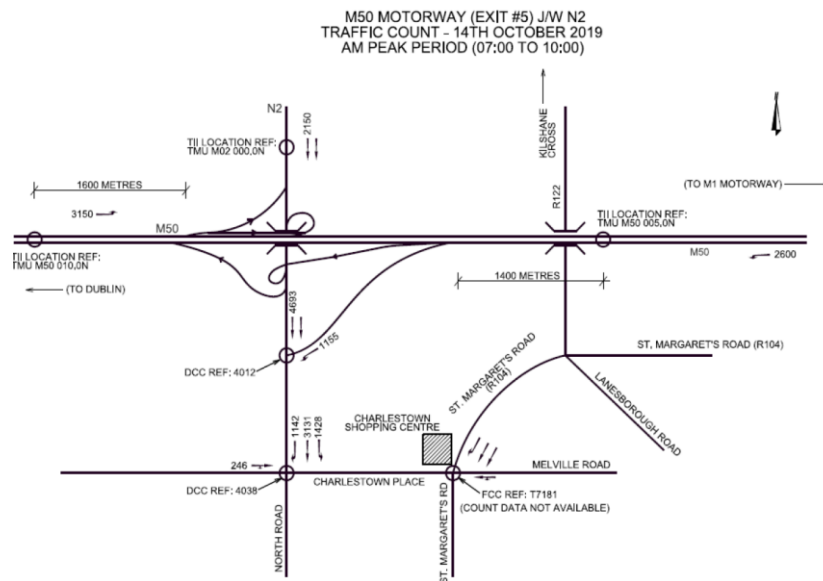
It is noted that this range is similar to the value obtained as percentage of overall traffic flows. However, these calculations are based on present day traffic volumes and congestion, while Luas Finglas line is expected to be operational in approximately 10-12 years (2031) by which time an increase in demand for Luas, a potential increase in traffic volumes and congestion will have to be factored in.

Figure 7 Luas Finglas P&R – Average Daily Traffic on M50 and N2 in Charlestown (data 2019)



To further inform the analysis current traffic data have been collected from all available relevant road junctions. Traffic counts were obtained in locations on the M50-N2 and in the city side of the M50 at Charlestown Place junction (3no TII C.L. and 2no DCC traffic signal controlled junctions-activations of the SCATS detector loops at each junction). These counts have been collected in the AM peak period (07.00am to 10.00 am) on Monday 14th October 2019 and while there is no classification by vehicle type, these counts are a good indication of traffic flows.

Figure 8 M50-N2 interchange and Charlestown Place junction – current traffic flows AM peak period (07.00am – 10.00am)



The total volume of vehicles coming from M50 northbound and southbound and N2 inbound to travel south on the R135 is approximately **5,700** during the AM peak period. The majority of those come from M50 northbound (approx. 2,500), just over 2,000 come from the N2 inbound, and 1,155 from the M50 southbound.

3,131 of these vehicles continue towards city centre after passing Charlestown Place.

Distributing these results pro-rata, the following flows can be extrapolated:

- 1,370 vehicles coming from M50 north-bound travel towards city centre,
- 634 vehicles coming from M50 south-bound travel towards city centre,

- 1,100 vehicles coming from N2 inbound travel towards city centre.

As an initial conclusion, the current target capacity of the Luas Finglas P&R has been set at around 600 spaces in the opening year (2031), expanding to 1,000 spaces in the medium term (10 years after opening), with the possibility to further expand it to 1,200 spaces in the future, if demand increases.

1.5 Compatibility with the Development Plan

Shortlisted options 1-2 and 4 are located in the Fingal South area and therefore subject to the Fingal County Council Development Plan.

The Fingal County Council Development Plan 2017-2023 zoning map is shown below:

Figure 9 Luas Finglas P&R – Screenshot extract from FCC Development Plan 2017-2023 Viewer



Zonings objectives 'GE- General Employment' and 'TC-Town and District Centre' are predominant. The zoning objectives are described as follows:

'GE- General Employment' (purple) – Option 4

Objective:

Provide opportunities for general enterprise and employment.

Vision:

Facilitate opportunities for compatible industry and general employment uses, logistics and Warehousing activity in a good quality physical environment. General Employment areas should be Highly accessible, well designed, permeable and legible.

'TC-Town and District Centre' (red/orange stripes) – Options 1-2

Objective:

Protect and enhance the special physical and social character of town and district centres and provide and/or improve urban facilities.

Vision:

Maintain and build on the accessibility, vitality and viability of the existing Urban Centres in the County. Develop and consolidate these Centres with an appropriate mix of commercial, recreational, cultural, leisure and residential uses, and to enhance and develop the urban fabric of these Centres in accordance with the principles of urban design, conservation and sustainable development. Retail provision will be in accordance with the County Retail Strategy, enhance and develop the existing urban fabric, emphasise urban conservation, and ensure priority for public transport, pedestrians and cyclists while minimising the impact of private car based traffic. In order to deliver this vision and to provide a

framework for sustainable development, Urban Centre Strategies will be prepared for centres in accordance with the Urban Fingal Chapter objectives.

It is noted that the TC zoning objective includes uses ‘Public Transport Station’ and ‘Carpark - Non-Ancillary’ to be permitted in principle.

However, neither zoning objective, explicitly mentions provision of a park and ride and it is neither listed under ‘Permitted in Principle’ nor under ‘Not Permitted’. The development plan indicates that uses which are neither ‘Permitted in Principle’ nor ‘Not Permitted’ will be assessed in terms of their contribution towards the achievement of the Zoning Objective and Vision and their compliance and consistency with the policies and objectives of the Development Plan.

The Fingal Development Plan also indicates a policy objective on Park and Ride facilities under Objective MT35 to ‘Promote and support the provision of Park and Ride facilities at suitable locations near high capacity public transport stations/stops.’

2 DESCRIPTION OF THE SHORTLISTED OPTIONS AND MAIN CRITERIA

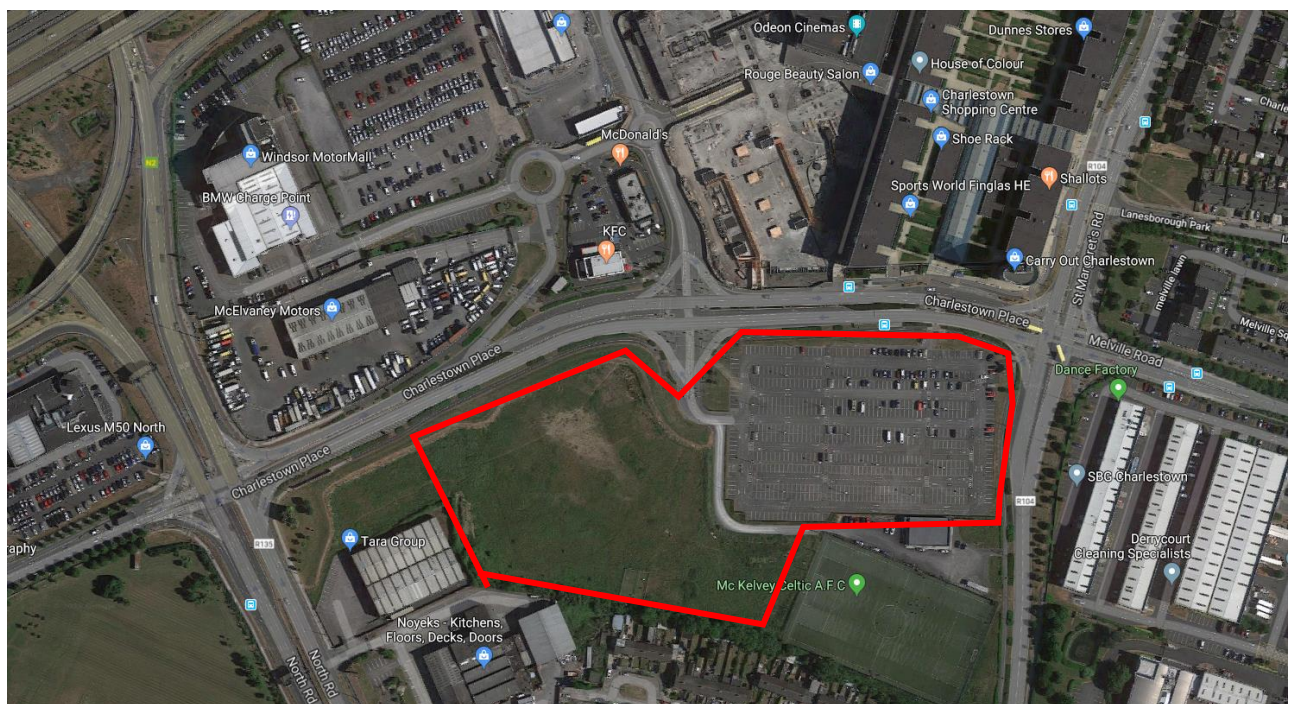
2.1 Options 1 and 2

Options 1 and 2 are located within the boundaries of the current Charlestown Shopping Centre overflow surface carpark and its adjacent green areas. The existing overflow car park has 567 spaces and provides good access from both the M50 and N2 via the M50 interchange, R135 North Road and Charlestown Place. It could be developed into a larger surface carpark occupying the surrounding lands up to 1,000 spaces indicatively, or into a multi-storey car park, providing up to 1,500 spaces on 3 to 4 levels under or over ground. However, this will be the subject of a more detailed analysis, should this option be considered further.

Figure 10 Luas Finglas P&R – Option 1 and 2 combined and access routes from M50 and N2



Figure 11 Luas Finglas P&R – Option 1 and 2 zoomed view of the area



In regards to land use, the current surface carpark is a temporary facility with its permission expiring in 2021; after which it is expected that the new Phase 2B of Charlestown residential/retail development would start construction.

For the construction of a P&R in this location, some form of legal agreement or a CPO could be put in place with the land owner prior to the construction of Charlestown development Phase 2B. This is subject to the level of progress of the Luas Finglas planning and design. This would ensure that both developments could not only co-exist but be of mutual benefit.

Based on initial analysis there are potential mutual benefits by adopting a combined approach to what could ultimately be a multi-use car park, serving both the residential/leisure/shopping centre and the transport interchange.

In line with Local Authority development plans and in consideration of the latest proposals of the BusConnects project, this site potentially offers an exceptional opportunity to provide an integrated, mixed-use interchange hub where people can interchange between various modes e.g. Luas, Bus, cycling, taxis and private car while being in close proximity to a primary Town Centre and high density residential area with services, shopping and employment, all co-located in a new urban quarter, with a high level landscape and traffic calmed environment.

It is also noted that the area south of this surface carpark is currently occupied by sporting fields; and in 2017 planning permission was granted for its upgrade to Multi-Use All Weather Surface Games area.

2.2 Economy

2.2.1 Cost

For the purpose of this analysis the cost includes:

- the cost of the Luas infrastructure up to the stop serving the P&R (neutral in this case as Charlestown is the terminus location and is common to both options);
- the cost of the land acquisition for the P&R;
- the cost for construction of the P&R; and
- the cost for provision of connections to and from the main road network.

In this option, the cost for Luas infrastructure and road connection would be negligible, unless an upgrade to the existing roads and junctions is required to cater for the additional traffic generated by the P&R.

The total cost in today's terms and excluding VAT has been estimated for the purpose of this comparative analysis and kept confidential.

2.2.2 Overall Luas Runtime

The overall Luas runtime to the north inner city centre (Dominick) is estimated at 24 minutes (12.5 minutes Charlestown - Broombridge + 11.5 minutes Broombridge - Dominick). This is based on the Option 2A runtime simulations carried out during the Stage 2 Options selection process (TII / Aecom).

2.2.3 Integration

2.2.3.1 Compliance/Compatibility with Planning/Zoning

The plan appears to be compatible with the zoning objectives outlined in the current FCC development plan. However, this is subject to further investigation and agreements with Fingal County Council (FCC).

The P&R would be located within “Town and District Centre” (TC) lands as designated by FCC; with the objective to protect and enhance the special physical and social character of town and district centres and provide and/or improve urban facilities.

The TC zoning objective includes and permits for uses ‘Public Transport Station’ and ‘Carpark - Non-Ancillary’ in principle. Therefore, the P&R land use would be consistent with the planning/zoning even though provision of a P&R is not mentioned explicitly and not listed as neither ‘Permitted in Principle’ nor ‘Not Permitted’.

The integration of the P&R with the new residential development phase is highly recommendable as this would ensure the most advantageous use of the available land and a high level of integration between the transport interchange and leisure/shopping/commercial uses.

2.2.3.2 Integration with GDA transport policies

A P&R at this location would be highly integrated with the GDA public transport policies, with existing and future cycle and pedestrian facilities and BusConnects routes as proposed in October 2019 (Spines E2, F1, F2, F3). Even considering a configuration of the bus network when Luas Finglas becomes operational; this would be one of the few locations in the city that would continue to be served by several spines and other bus routes, thereby presenting an exceptional opportunity to provide an integrated bus and Luas P&R.

2.2.3.3 Potential future Serviceable catchment

The area presents significant opportunities for future residential development as part of the Charlestown residential/mixed use high rise type development, called Phase 2B, of Charlestown residential/retail development. There is potential for several hundred new apartments to be built above the P&R. Subject to agreement with the land owner, this could be delivered as part of the development, in two or more storeys underground for example.

Even though there is high potential for local population growth, this is unlikely to generate catchment for the P&R. The growth in P&R utilisation is expected to be more in line with future growth in traffic volumes on the adjacent road network, increased traffic congestion towards the city centre and potential traffic management measures to discourage the use of private cars in the city centre area.

2.2.4 Accessibility

2.2.4.1 Ease of access from the primary road network

The maps and table below provide the distances, travel times and number of signal controlled junctions to get to/from the P&R from/to the four main directions: N2 inbound; N2 outbound; M50 northbound; and M50 southbound. The data has been collected from Google traffic simulations at peak and off-peak times in October 2019 (Monday and Tuesday).

Figure 12 From N2 IB to P&R (950m and 3 sets of lights, one of which left slip with permanent flashing amber) --source Google maps



Figure 13 From N2 OB to P&R (450m and 2 sets of lights) --source Google maps (off-peak travel times)

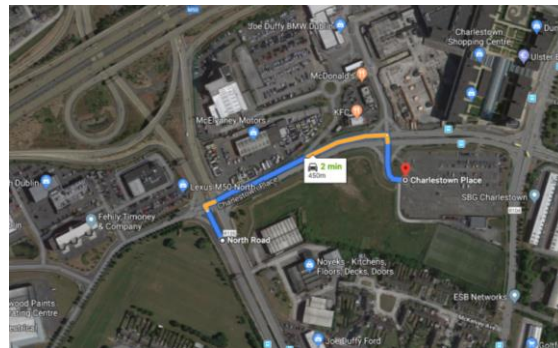


Figure 14 From M50 NB to P&R (900m and 3 sets of lights, one of which left slip with permanent flashing amber)--source Google maps



Figure 15 From M50 SB to P&R (900m and 3 sets of lights, one of which left slip with permanent flashing amber) --source Google maps

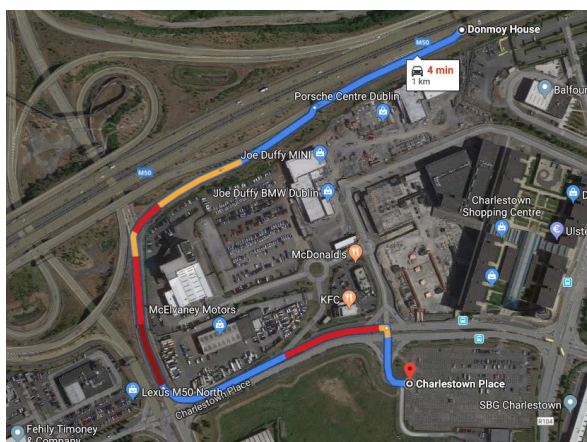


Table 3 Finglas P&R options 1-2 access from road network overview

Finglas P&R Options 1-2				
O/D	Length (m)	Number of signal controlled junctions	Estimated travel time off peak (min)	Estimated travel time peak (min)
From M50 SB to P&R	1,000m	2+left flashing	2'	3'
From M50 NB to P&R	1,600m	2+left flashing	2.5'	4'
From N2 IB to P&R	950m	2+left flashing	2'	4'
From N2 OB to P&R	450m	2	2'	3'
From P&R to M50 SB	1,000m	2	3.5'	5'
From P&R to M50 NB	1,300m	2	4'	6'
From P&R to N2 IB	350m	2	3'	5'
From P&R to N2 OB	900m	2	3.5'	5'

This option is relatively well connected with the three main routes (M50 SB, NB and N2 IB) with a travel time of between 2 and 4 minutes (average 2.8 minutes) to enter the P&R; and between 3 and 6 minutes (average 4.3 minutes) to exit the P&R.

Average travel distance to/from the 3 main directions would be 1,180m to enter the P&R and 1,066m to exit, slightly longer than Red Cow routes (in the range of 700 to 800m).

It clearly emerges that the capacity of Charlestown Place is critical, particularly in terms of leaving the P&R and travelling towards the M50 and N2 OB, where up to 6 minutes may be required due to the single lane dedicated to right turn movements towards M50 and N2 OB (right turning capacity of approx. 300 vehicles per hour).

As part of the scheme, it is recommended that a second right-turn lane be provided to double the right turn capacity at this junction. There appears to be space within the existing junction lay-out to do so.

Figure 16 Critical right turn movement at Charlestown Place junction, where an additional lane is recommended.



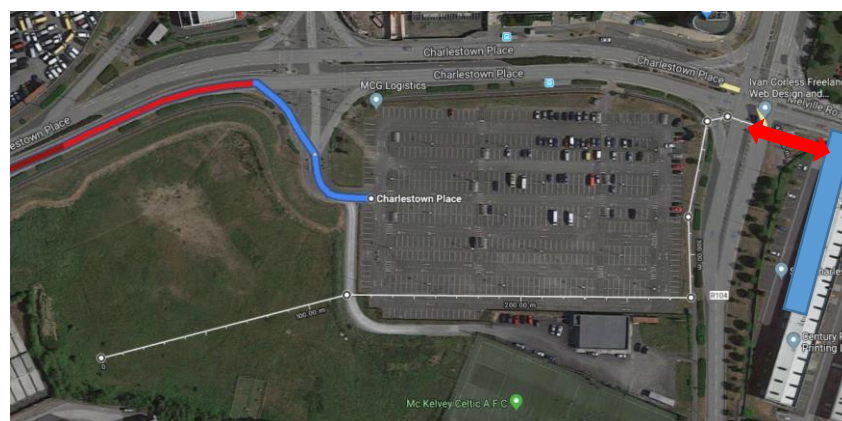
2.2.4.2 Ease of pedestrian connectivity of the P&R with Luas Finglas terminus

Pedestrian connectivity between the P&R and the Luas stop in Charlestown is acceptable. However, all P&R users would be required to cross St. Margaret's Road at the busy Charlestown junction and the least favourable parking spaces will be approximately 350m away from the Luas stop.

The integration of traffic calming measures into the design of the P&R and the wider regeneration of the current Jamestown Industrial Estate is advisable.

Pedestrian connectivity could be further improved and any major road crossing avoided by relocating the Luas terminus to the west side of St. Margaret's Road. However, this would create issues for the provision of tram stabling which is recommended at the terminus and the introduction of an additional Luas road crossing. This may also be problematic in relation to future catchment for the Jamestown Industrial Estate which is to be re-zoned to residential and mixed use.

Figure 17 Pedestrian connectivity between P&R and Luas terminus in Charlestown



2.2.5 Safety/Security

This location provides a high level of operational safety for both Luas and car users entering and exiting the facility. The high level of safety and security results from its integration with the town centre, its good integration with the urban road network, public transport, cycling and pedestrian facilities as well as the expected amount of footfall in the vicinity . The safety of the pedestrian crossing will be enhanced by traffic calming measures as mentioned above.

This location would also provide a secure Luas terminus.

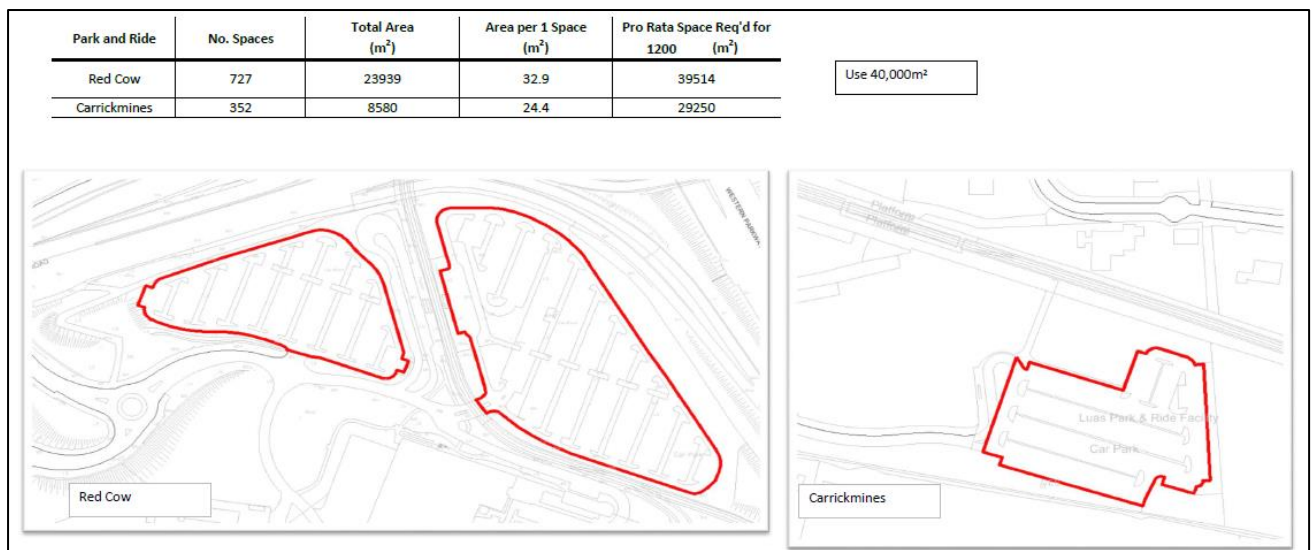
2.3 Option 4 – North East Quadrant

Option 4 is located within the north eastern quadrant of the M50-N2 junction. A significant portion of this area consists of currently unoccupied lands, generally zoned for industrial and employment creation.

Based on the land value in this area and relative pro-rata construction cost it initially appears that a surface P&R would be more suitable than a multi-story facility at this site.

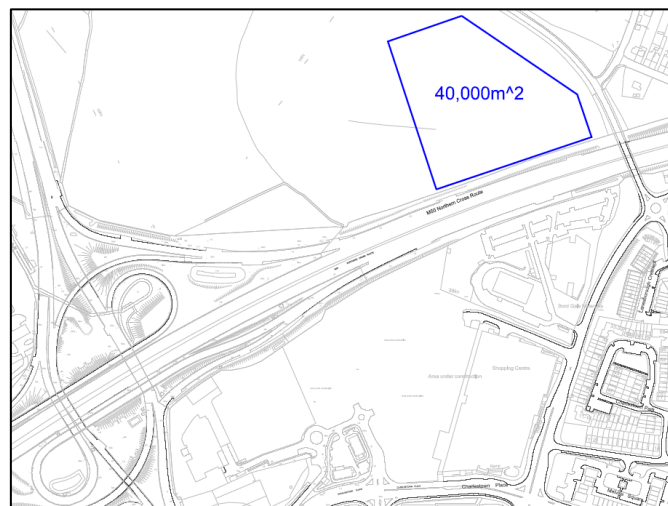
An initial benchmark analysis has been carried out comparing land use pro-rata per parking space of the Red Cow and Carrickmines P&Rs and applying this to a potential provision of 1,200 spaces (1,000 spaces plus 20%) as follows:

Figure 18 Pro-rata per parking space for existing at-grade Luas P&R, and calculation of total area for 1,200 spaces



The location indicated below has been selected for its proximity to St. Margaret's Road which would provide access to both the P&R and the Luas stop/terminus from the existing bridge over the M50. Other areas closer to the N2 could also be considered in the same quadrant at a later stage. This is subject to more detailed analysis of land availability.

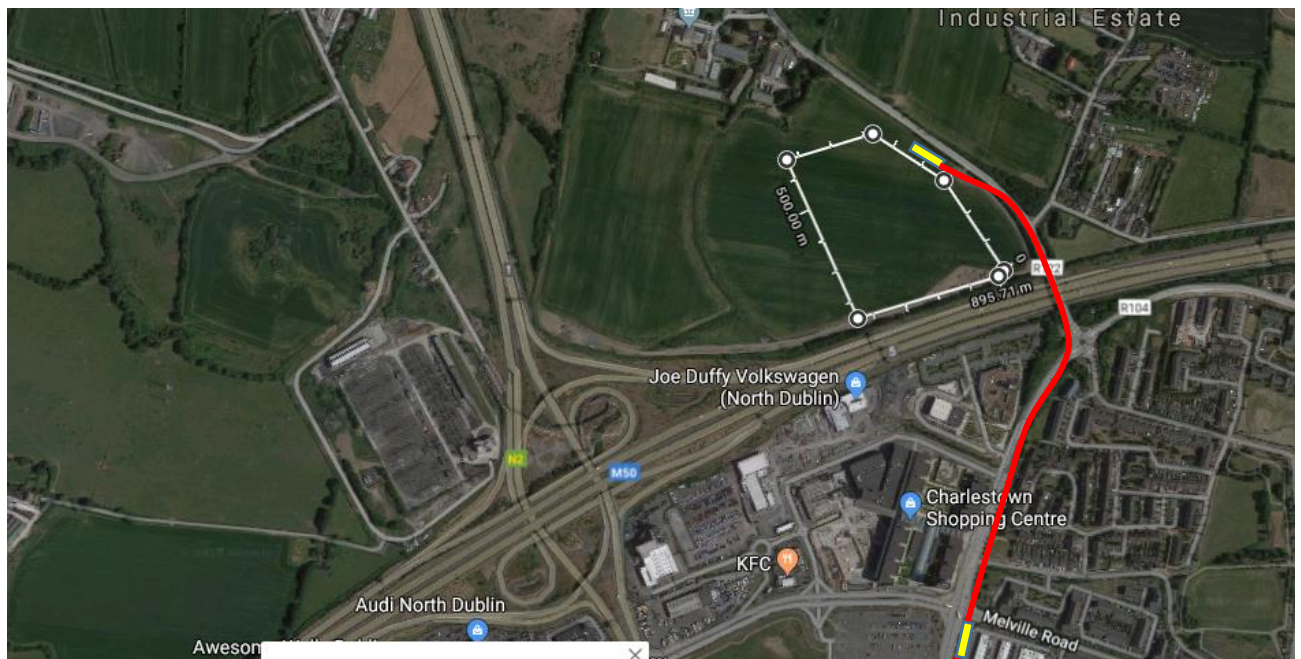
Figure 19 Initial land size for Option 4 extended to 1,200 spaces



This location has potential for future P&R expansions but it requires a longer Luas alignment of circa 850m and crossing the M50 either on the existing St. Margaret's Road bridge or a new dedicated Luas bridge (approximately 60m span, 12m wide).

Finally, this option potentially offers a more direct connection from the N2 inbound thus eliminating the need for car users to navigate the congested M50 junction. This may increase the attractiveness of the P&R for car users traveling on the N2 inbound. Car users accessing the P&R from the M50 northbound and southbound would still have to negotiate the interchange resulting in a reduced benefit over the Options 1-2 for these potential patrons.

Figure 20 Option 4 P&R General Arrangement for more than 1,000 spaces, with a possible proposal for the Luas extension



For the purpose of this analysis it is assumed that the Luas will share a section of about 200m of road over the existing M50 bridge, approximately from the roundabout south of the M50 to the first road junction north of the M50, with general traffic. St. Margaret's roundabout would likely be upgraded to a signal controlled junction for this purpose. This assumption is based on the relatively low level of traffic currently using the bridge off-peak, and on the limited negative effects on Luas runtime from potential peak time congestion over this 200m long stretch and affecting only the services between the two last stops.

Figure 21 St. Margaret's Road bridge over the M50





2.3.1 Economy

2.3.1.1 Cost

The cost of this option has been derived from the combination of the following cost items:

- the cost for Luas infrastructure from Charlestown to the new terminus outside the M50,
- the cost for road connections (see next paragraph 2.2.2 for details) including a new bridge over the N2, a new left-in left-out junction off the N2 inbound lane, the upgrade of a section of the R135 and the construction of approximately 680m of new road,
- the cost for land take and construction of the P&R has been estimated for the purpose of this comparative analysis and kept confidential.

2.3.1.2 Overall Luas Runtime

The overall Luas runtime to the north inner city centre (Dominick) would be approx. 26.5 minutes (15 minutes Charlestown - Broombridge + 11.5 minutes Broombridge - Dominick). This is based on the Option 2A runtime simulations carried out during the Stage 2 Options selection process (TII / Aecom).

2.3.2 Integration

2.3.2.1 Compliance/Compatibility with Planning/Zoning

This option appears to be compatible with zoning objectives, however this is subject to further investigation and agreements with Fingal County Council.

The P&R would be located within an area zoned 'General Employment' set to '*Facilitate opportunities for compatible industry and general employment uses, logistics and Warehousing activity in a good quality physical environment. General Employment areas should be Highly accessible, well designed, permeable and legible*'.

The National Planning Framework encourages the removal of industrial and extensive uses to locations outside the M50. This is demonstrated by increased activity in terms of industrial/ logistics land uses forecast in this area, with Dublin Port currently preparing a planning application for an Inland Port to the north of the site.

2.3.2.2 Integration with GDA transport networks and policies

This area provides less opportunities for integration with the GDA transport networks and policies. The area is currently served by Dublin Bus routes 83, 83a and 40b along St. Margaret's Road (R122) only. None of the proposed BusConnects spine routes extend beyond the M50 to this area.

This location is less likely to serve as a combined Luas-Bus P&R, which is also related to the bottleneck represented by the crossing on the bridge over the M50.

2.3.2.3 Potential future serviceable catchment

There is significant opportunity for development of future employment facilities in the area resulting from the zoning by the Local Authority. However, this is unlikely to translate into significant future growth of the serviceable catchment for the P&R.

The P&R located in this quadrant could see its catchment increased by growing inbound traffic flows on the N2 which is currently one of the less trafficked radial roads into Dublin. The scattered and low density nature of residential settlements along the N2, Ashbourne for example, is unlikely to cause significant increase of N2 inbound traffic in the medium term. The potential for future increase of serviceable catchment in this location is therefore limited.

Just as for Options 1 and 2, the growth in P&R utilisation will likely be in line with traffic growth on the adjacent road network, increased traffic congestion towards the city centre, and potential traffic management and traffic calming measures to discourage the use of private cars in the city centre.

2.3.3 Accessibility

2.3.3.1 Ease of access from the primary road network

In terms of access, two different scenarios have been analysed:

1. Do minimum scenario - Existing road network with minor amendments.
2. Do something scenario – Construction of new junctions, slip lanes and overpasses to optimise road connectivity particularly from the N2 inbound.

Do minimum scenario

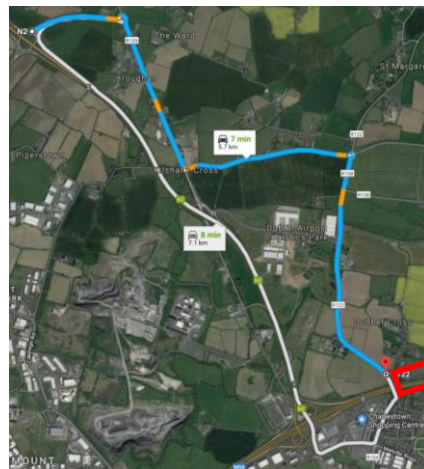
With no major interventions, the route connecting the P&R to the strategic road network by utilising the existing St. Margaret's bridge over the M50 is indicated on the map below. The route appears to be convoluted and indirect from the M50 in both directions and particularly from the N2 inbound, which would see cars travelling approximately 2km and negotiating six signal controlled junctions. Therefore this is not considered to be a suitable or attractive solution. This route would be longer than the route to P&R Options 1 and 2 and road users would still be required to pass through the M50 interchange. Therefore the higher cost associated with Option 4 is not justified.

Figure 22 Luas Finglas P&R – Option 4 and access routes from M50 and N2 via St. Margaret’s Road



A second potential route for car users travelling on the N2 inbound starts at junction 2, located approximately 4km north of the M50. This potential route could travel along the R135 and St. Margaret’s Road. This is also a very convoluted route with approximately 5.7km travel off the primary road network and several local junctions/roundabouts to negotiate.

Figure 23 Luas Finglas P&R – Option 4 and access routes N2 – Google routes and runtimes off-peak



None of those routes utilising the existing road network appears to provide an acceptable or attractive connection to P&R Option 4.

It is therefore concluded that P&R Option 4 would require a “do something” scenario to be implemented in order to provide improved road connectivity.

Do something scenario

Various combinations of new road connections have been simulated on the assumption that it would not be feasible to introduce new interchanges / junctions or direct slip lanes onto the M50 motorway.

One of the feasible and most cost effective solutions is represented in the map below. It provides good connectivity, particularly from/to the N2 inbound.

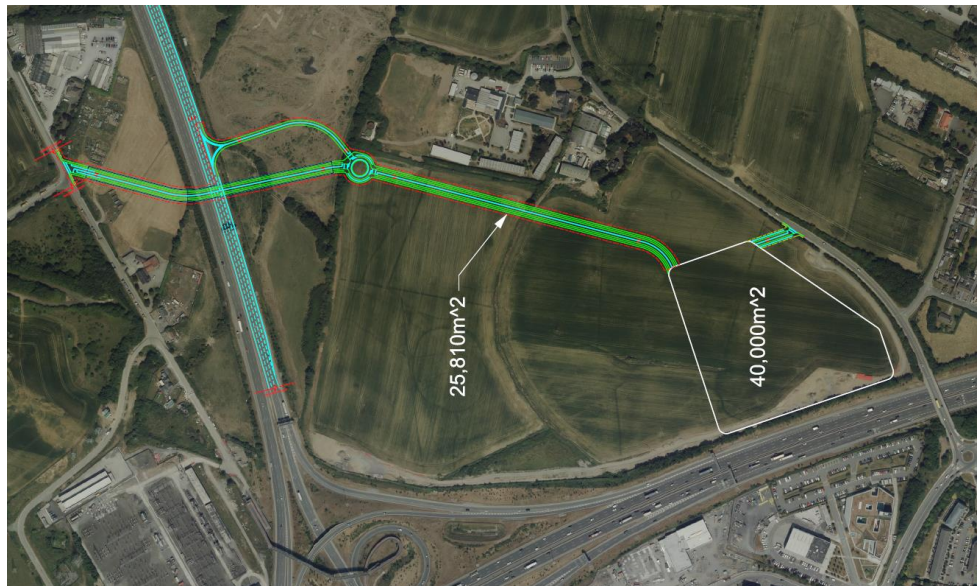
This solution includes:

- A new left-in/left-out junction arrangement and related entry/exit lanes off the existing N2 inbound, located approximately half way between N2 Junction 2 and the M50 junction – indicated in red in the following map. This would cater for N2 to P&R and P&R to both directions of the M50.
- A new two directional overpass (yellow) from the R135 over the N2 and approximately 600m of new road to cater for both directions of the M50 to P&R and P&R to N2 outbound - indicated in blue in the map below.
- Upgrade of approximately 2.9km of the R135 between the new overpass and the N2 Junction 2 – indicated as dotted line in the map below, including a potential local diversion around the overpass junction.

Figure 24 Sketch for one of the possible “Do something” scenarios for road connectivity enhancement for P&R Option 4 (continuous lines for new road connections and N2 overpass, dotted lines for road improvement of the R135)



Figure 25 Conceptual design for road connectivity enhancement for P&R Option 4



The maps and table below provide the distances, travel times (peak and off-peak) and number of signal controlled junctions to get to/from the P&R from/to the four main directions (N2 inbound, N2 outbound, M50 northbound, M50 southbound). Data has been collected from Google traffic simulations at peak and off-peak times in October 2019 (Monday and Tuesday), with the exception of the new road sections, where an initial conceptual analysis has been adopted.

Figure 26 From N2 IB to P&R (700m and no s.c. junctions) --source Google map (off-peak travel times)



Figure 27 From N2 OB to P&R (2.6km and no s.c.junctions) --source Google map (off-peak travel times)

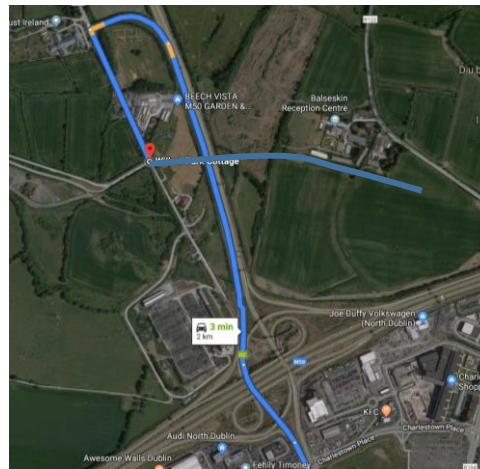


Figure 28 From M50 NB to P&R (2.7km and no s.c. junctions) -source Google map (off-peak travel times)

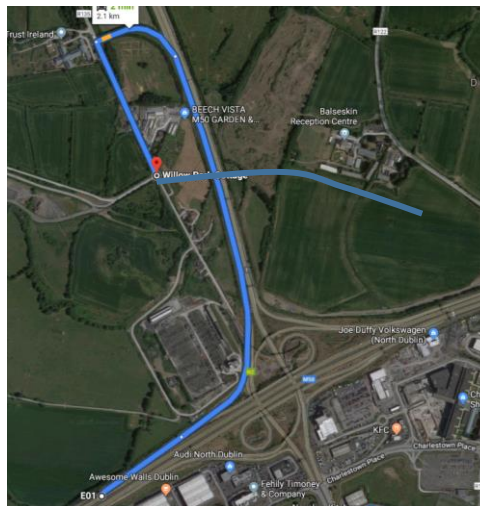


Figure 29 From M50 SB to P&R (3.1km and no s.c. junctions) --source Google map (off-peak travel times)

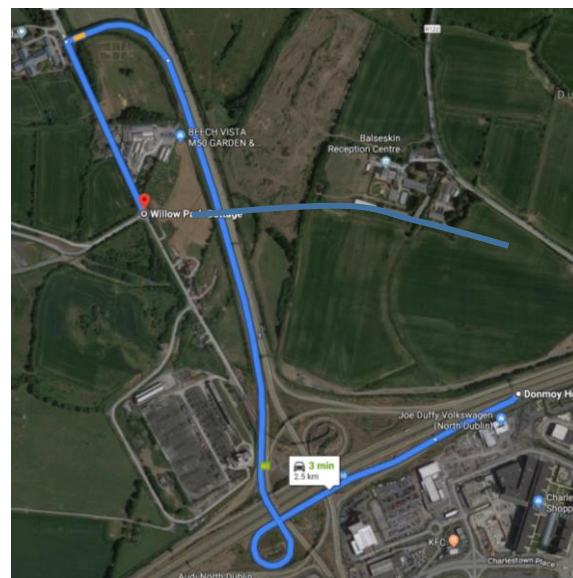


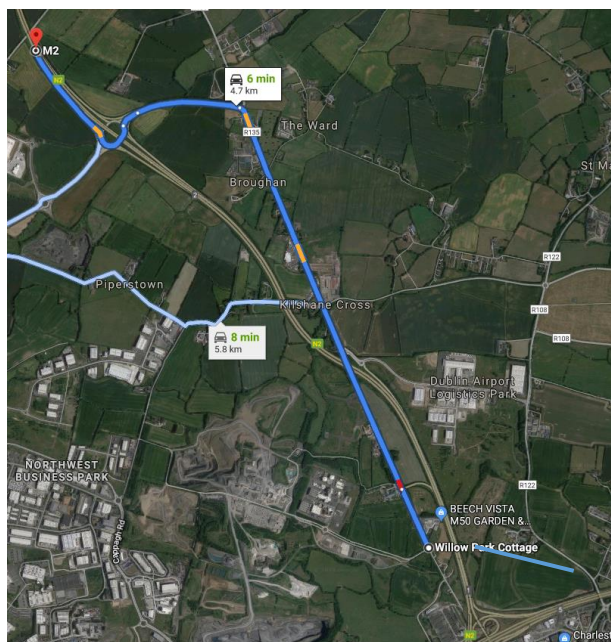
Table 4 Finglas P&R option 4 access from road network overview

Finglas P&R Option 4				
O/D	Length (m)	Number of signal controlled junctions	Estimated travel time off peak (min)	Estimated travel time peak (min)
From M50 SB to P&R	3,100m	0 (1*)	4'	4'
From M50 NB to P&R	2,700m	0 (1*)	3'	3'
From N2 IB to P&R	700m	0	45sec	45sec
From N2 OB to P&R	2,600m	0 (1*)	4'	4'
From P&R to M50 SB	1,800m	0 (1*)	2'	3'
From P&R to M50 NB	1,800m	0 (1*)	2'	2'
From P&R to N2 IB	600m	0	1'	1'
From P&R to N2 OB	5,300 (!) – 1,200m	0	6' (!) 3'	3'

(!) this route runs parallel to the N2 for 4.1km in the same direction until reaching the Junction 2, therefore the net distance is only 1,200m and the net travel time 3' (see following map).

(*) a new s.c. junction may be required at the T-junction with the R135 (off the slip lane from N2)

Figure 30 Route from P&R to N2 outbound (net distance 1,200m no s.c. junctions) --source Google map (off-peak travel times)



This provides good connectivity to the three main routes M50 southbound, M50 northbound and N2 inbound with travel times of between 45 seconds and 4 minutes (average 2.6 minutes) to enter the P&R and between 2 and 3 minutes (average 2.5 minutes) to exit the P&R. Average travel distance

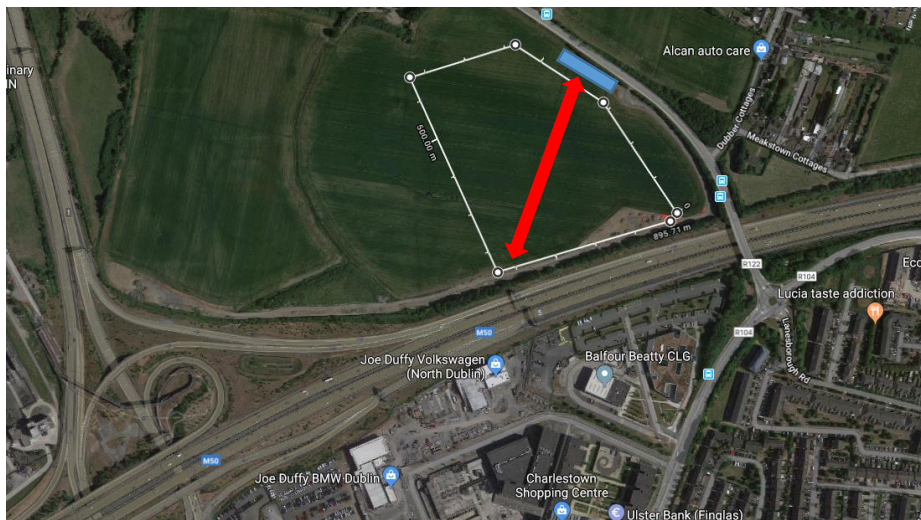
to/from the three main directions would be approximately 2,170m to enter the P&R and 1,600m to exit, significantly longer than the equivalent distances for the Red Cow P&R.

While this option provides very good connectivity from the N2 especially, to enter the P&R, relatively long travel distances to/from the M50 through the existing interchange are involved. The clear benefit of this option is the absence of signal controlled junctions (unless required for one T junction between the new N2 overpass and the R135).

2.3.3.2 Ease of pedestrian connectivity of the P&R with Luas Finglas terminus

Pedestrian connectivity between the Luas terminus and the P&R in this location is very good. There are no external road crossings and direct internal walking paths can be provided. Depending on the final P&R layout the least advantageous parking spaces will be located approximately 200-250m from the Luas stop.

Figure 31 Pedestrian connectivity between P&R and Luas terminus



2.3.4 Safety/Security

This location provides a good level of operational safety for both Luas and car users entering and exiting the facility. However, it could be perceived as less secure given its remoteness from any residential/mixed use developments and the limited footfall in the vicinity. This may improve in the future, depending on the type of development in the area. Security perception for Luas drivers could also be perceived as an issue especially while the tram driver takes service from the terminus or the tram awaits for the departure time, particularly in the dark.

The M50 crossing on the existing road bridge where Luas is sharing its alignment with general traffic for about 200m presents an increased risk of collisions between general traffic and trams with the potential of tram derailment on the structure spanning the motorway. This will have to be mitigated against with severe containment barriers, subject to further bridge structural analysis.

3 ASSESSMENT OF THE OPTIONS

3.1 Multi Criteria Analysis Stage 2 (MCA2)

A multi-criteria analysis (MCA) was undertaken for this stage 2 to consolidate the quantifiable and non-quantifiable impacts of each option. The MCA2 provides a valuable tool in prioritising schemes for investment and supporting decision making.

The assessment is based on a five point scale, generally ranging from delivering significantly better results than the other option, to delivering significantly lower results than the other option.

For illustrative purposes, this five-point scale is colour coded as presented below, with the option showing significant advantages over the other graded “dark green”, significant disadvantages graded “red”, orange and light green being adopted for “some” advantages/disadvantages and yellow being used for comparable results of the two options.

Table 5 MCA Typical Scoring System

Significant disadvantages over the other option	Red
Some disadvantages over the other option	Orange
Comparable to the other option	Yellow
Some advantages over the other option	Light Green
Significant advantages over the other option	Dark Green

Results are shown in the table below:

Table 6 P&R Options 1-2 and 4 MCA2

Criteria		Options 1-2	Option 4
Economy	Cost	Between half and one third of Option 4	
	Overall Luas runtime	Approx. 24 minutes to Dominick	Approx. 26.5 minutes to Dominick (shared section on the M50 bridge plus 3 additional s.c. junctions and 850m longer route)
Integration	Compliance/Compatibility with Planning/Zoning	TC zoning. The TC zoning objective explicitly includes for uses "Public Transport Station" and "Carpark - Non-Ancillary" to be permitted in principle	GE zoning. While this type of zoning is to facilitate opportunities for compatible industry and general employment uses, logistics and Warehousing activity, it does not specifically mention car parks and Public Transport stations or interchanges.
	Integration with GDA transport policies	Well integrated with current and future public transport, secondary cycle network and pedestrian facilities. This location would offer strong opportunities for a combined Luas-Bus P&R.	Less integrated both with current and future PT provision and with the cycle network.
	Potential future Serviceable catchment	High potential for local population growth but limited potential of useful type of catchment for the P&R	Limited potential of future serviceable catchment
Accessibility	Ease of access from Primary Road Network	Average 2.8 and 4.3 minutes in and out from/to the 3 main directions. Distances are slightly longer than Red Cow.	Average 2.6 minutes in and out from/to the 3 main directions. Distances are longer than Red Cow.
	Ease of pedestrian connectivity	1 ped crossing, this could be improved with traffic calming along the St.Margaret's Road and/or moving the Luas stop into the P&R	Direct connectivity
Safety/Security		Well integrated site, possibly within a new mixed use development, no Luas operational risks to be mitigated	Security: currently isolated site adjacent to the M50, with limited potential for higher density of pedestrians/commuters/members of the public. Luas operational risks to be mitigated over the shared bridge.

3.2 Luas finglas "Option Selection Report Stage 2" by Aecom conclusions on P&R

In a separate high level assessment of the two locations by Aecom, within the "Option selection Report Stage 2", the following conclusions were presented. It is noted that these are mainly in line with the conclusions of the present study,

P&R Assessment criteria	Inside M50 (at Charlestown)	Outside M50 (north-west of the M50/N2 junction)	Assessment outcome
Access for traffic from M50 and N2	Simpler access to and from the P&R site from the M50 (both directions) and N2	Access from the M50 would be challenging, though the demand from the M50 may be low. Good connectivity	P&R located inside M50 may have better physical connectivity to the M50

	southbound, via Charlestown Place.	from the N2 southbound, however no existing infrastructure is in place to aid access onto the N2 northbound or traffic returning to the M50.	and N2 given the existing infrastructure.
Accessibility during congested periods	Significant levels of congestion are present throughout much of the day in the vicinity of Charlestown, notably at the junction of the N2/R135/Charlestown Place. This may hinder users access to the P&R site in the AM particularly, and similarly upon leaving the site in the PM.	Much improved access to P&R during periods of congestion, particularly in the AM and PM. Private vehicle users would be able to access P&R site without needing to pass the moderately congested M50/N2 junction.	A site outside the M50 would avoid significant congestion and maintain lower journey times accessing the site, particularly from the N2. Some potential P&R users, having already passed through the M50/N2 junction, may not be willing to use the P&R inside the M50.
Infrastructure required to accommodate P&R	A significant car park is already in place opposite Charlestown Shopping Centre and could accommodate the initial 600 required spaces. Redevelopment of an adjacent green-field site or developing multi-storey parking would be necessary to achieve 1000 spaces.	Complete construction would be required at this green-field site, including enabling infrastructure and road links. A bridge over the M50 for the Luas Finglas line would be necessary.	The site inside the M50 already has many elements required for the Luas Finglas P&R.
Development potential (commercial return)	Land values near Charlestown are comparatively high and a return may be expected where 'airspace' above the P&R car park is sold to developers	Lower land values might be expected north of the M50, though commercial return from external developers may be limited.	P&R located inside the M50, near Charlestown, has the potential for higher commercial return to TII.
Dublin Airport Interaction	No expected interaction between P&R and Dublin Airport	Located closer to Dublin Airport, though exiting terminals are located some distance away. Should future development take place at the west of the airport site this Luas stop would become more attractive as a destination for employees or onward travel.	Though limited direct interaction is expected with Dublin Airport, it is nonetheless assessed as a significant travel hub north of Dublin. A site outside the M50 would be preferable for connectivity. This assessment has no impact on Metrolink, as it serves the opposite side of the airfield.
Cost	Relatively high land cost compared to alternative,	Lower land cost, but very high cost for	Favourable, lower cost provision of a P&R site

		though comparatively less new infrastructure required.	required Luas bridge over the M50 serving the P&R site. (*)	by Charlestown, inside the M50.
Complexity of construction		An existing car-park is sited at Charlestown location, with only minor modifications anticipated. A second undeveloped area is available and undeveloped ('site 2') but may be prepared for P&R use with relatively little complexity.	A new Luas over-bridge would be required across the M50 adding some complexity. An at-grade P&R car park north of the M50 would be required although relatively simple to deliver.	P&R located inside M50 is preferred to avoid construction of a new bridge over the M50.

(*) The Luas bridge has not been adopted in the proposed scenario, as the Luas is proposed to share St.Margaret's Road existing bridge. Nonetheless the new road connections required by this scheme would be very costly as demonstrated within this report.

4 CONCLUSIONS AND RECOMMENDATIONS

The P&R location inside the M50 at Charlestown (Option 1-2) emerges as the preferred option for up to the size of approximately 1,000 car park spaces, after which the size could become constrained, at which time Option 4 shall be considered.

Option 1-2 scores better in terms of economy (cost and runtime to city centre), integration and safety, while it scores lower on accessibility. Possible low cost improvement measures to address Charlestown Place junction capacity as indicated in this report, particularly for users exiting the P&R, could mitigate the accessibility constraint.

Based on a joint analysis in consultation with Aecom, it is recommended that the P&R facility at Charlestown will provide 600 spaces at the opening year (2031). Two reasons are provided for this provision:

- This number represents a conservative provision of spaces (compared to the analysis undertaken), and the avoidance of a costly over-provision of spaces.
- Approximately 600 spaces are already provided at the site as a car park for the Charlestown Shopping Centre – the most economical use of the site would be to maintain the approximate number of spaces, with very minor reconfiguration of the site only. Where the 600 spaces may be under-utilised in the opening year, there would have been only very limited investment in their provision and configuration.

Beyond the opening year a provision is made for additional spaces as follows:

- Principally, an additional 400 spaces will be provided at the Charlestown site by Year 10 (2041).
- Optionally, and with the benefits of early years' data from Luas Finglas, an extension of the Luas Finglas line over the M50 may be investigated, with potential for a new P&R site accommodating many more new spaces developed north-west of the M50/N2 junction (Option 4). An additional 700 spaces would represent a site size similar to that of Red Cow, however, up to or beyond 1,000 (instead of or on top of the 600 at Charlestown) may, at that time, be considered a plausible scenario pending passenger and P&R uptake on Luas Finglas.

It is recommended that further investigations into Option 1-2 land-use, land ownership, potential development plans and Local Authority plans (Fingal County Council) for Charlestown area are carried out in coordination with the NTA, and that a full Environmental Impact Assessment for this option is carried out as part of the EIAR.

