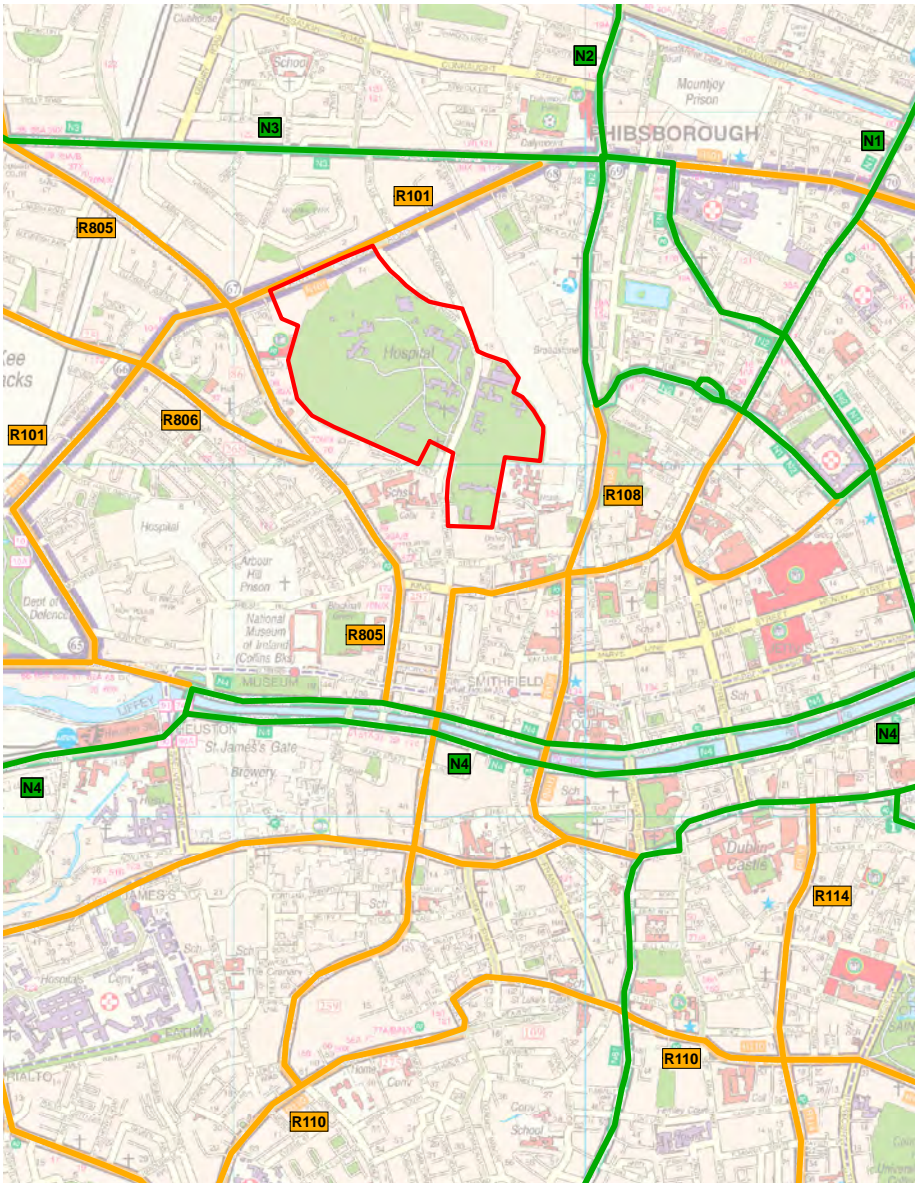


E_site access



Local Road Network



existing situation

Roads

The site is located between Phibsboro and the Phoenix Park with the North Circular Road to the north, Prussia Street to the west and Grangegorman Road Upper passing through the site to the east as shown in the map. The site is also bound by the Broadstone site to the north east and east and Kirwan St to the south. The site is located just outside the City Centre. The road network comprises a hierarchy of roads including national, primary, regional, local and other roads and includes the following (refer to map to left). Following is the list of roads in the vicinity of the site.

- N2 Phibsborough Road: This is a national primary road running from Dublin to the border with Northern Ireland. The N2 commences at a junction with the N1 along the Dorset Street Upper. The route runs via St. Mary's place, Phibsborough road, Berkeley road and Blessington Street.
- N3 Cabra Road: This is a national primary road running between Dublin, Cavan. The route connects in North Circular road (R101).
- North Circular Road (R101): This is a regional road and runs along Summerhill Parade, Dorset Street lower, Phibsborough Road, Cabra Street, Prussia Street/Old Cabra Road and Infirmary Road.
- Grangegorman Road: This is a local road connecting North Circular road to the north and Brunswick Street to the south. Upper Grangegorman road splits into upper Grangegorman and Rathdown down road as it approaches North Circular Road.
- Brunswick Street: This is a one-way local road and runs between Stoneybatter and Upper Church Street.
- Kirwan Street: This is a one-way local road connecting Manor Street and Upper Grangegorman Road.

Road capacities

A baseline traffic capacity appraisal of the road network surrounding the Grangegorman site has been carried out.

The main road links surrounding the Grangegorman site have been assessed using a method based upon notional maximum one-way hourly capacities. This method is recommended in the National Road Authority's Design Manual for Roads and Bridges (DMRB), which is a highly recognized roads and transport design guideline used in Ireland (and the UK).

Traffic carrying capacity is derived by calculating the theoretical number of cars that are able to pass by a certain point along a road without any constraints. The capacity of the road is then reduced by taking into consideration a number of factors such as the speed limit, the parking regime, the existence of side roads and driveways, the frequency of pedestrian crossings and the type of bus stops along a specific section of road. These factors affect the traffic throughput on the road and the road capacity is therefore derived by making adjustments to represent the affect that the above factors may have on road capacity.

The Old Cabra Road-Prussia Street-Stoneybatter and Phibsborough Road-Constitution Hill-Church Street corridors are the ones with generally the most

traffic capacity. The section of North Circular Road to the East of Phibsborough Road can be considered over capacity in the AM peak, and the same happens with Phibsborough Road North and South of North Circular Road, during the PM peak.

Capacity constraints at upstream junctions may reduce the normal traffic throughput which will mean less traffic along the downstream link. On the other hand, capacity constraints downstream will give rise to congestion along an upstream link that is not determined by the link capacity itself.

Junction Capacities

The operation of a road network is primarily determined by its junction capacities rather than road or link capacities. The above mentioned capacity appraisal focused on the performance of a number of relevant junctions in the vicinity of Grangegorman, including Hanlon's Corner, St. Peter's Church and Doyle's Corner junctions, as well as Constitution Hill/Western Way junction. Junction capacities have been assessed using computer modeling software available for the assessment of different types of junctions. Signal Controlled junctions have been assessed using TRANSYT while priority junctions were assessed using PICADY.

Hanlon's Corner

This is a four arm junction between North Circular Road, Prussia Street and Old Cabra Road, which is commonly known as Hanlon's Corner. This signal controlled junction is operated by a four stage signal plan.

During the evening the westbound approach to the junction operates close to capacity. This link accommodates all the movements in a single lane. No right of way is assigned to this right turn movement. Travelling through the junction on gaps only, this right turn movement seriously affects the performance of this link. All the other approaches operate within capacity during both the AM and PM.

St. Peter's Church and Doyle's Corner junctions

All the approaches to both the junctions currently operate within capacity during both the AM and PM peak hour periods. The traffic volumes through these junctions are considered to be low. This is as a result of vehicles being held up at junctions upstream and downstream of these junctions. If the capacity of the upstream and downstream junctions are improved, it is expected that the above junctions will experience congestion and queuing.

Constitution Hill / Western Way / Phibsborough Road junction

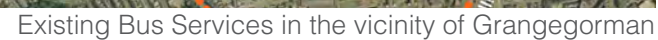
This is a high capacity three-arm junction operated by a three stage signal plan. All the approaches operate within capacity during both the AM and PM peak hour periods The straight and left turn movements on the Phibsborough Road approach to the junction shows signs of congestion during the AM peak hour.

Other junctions

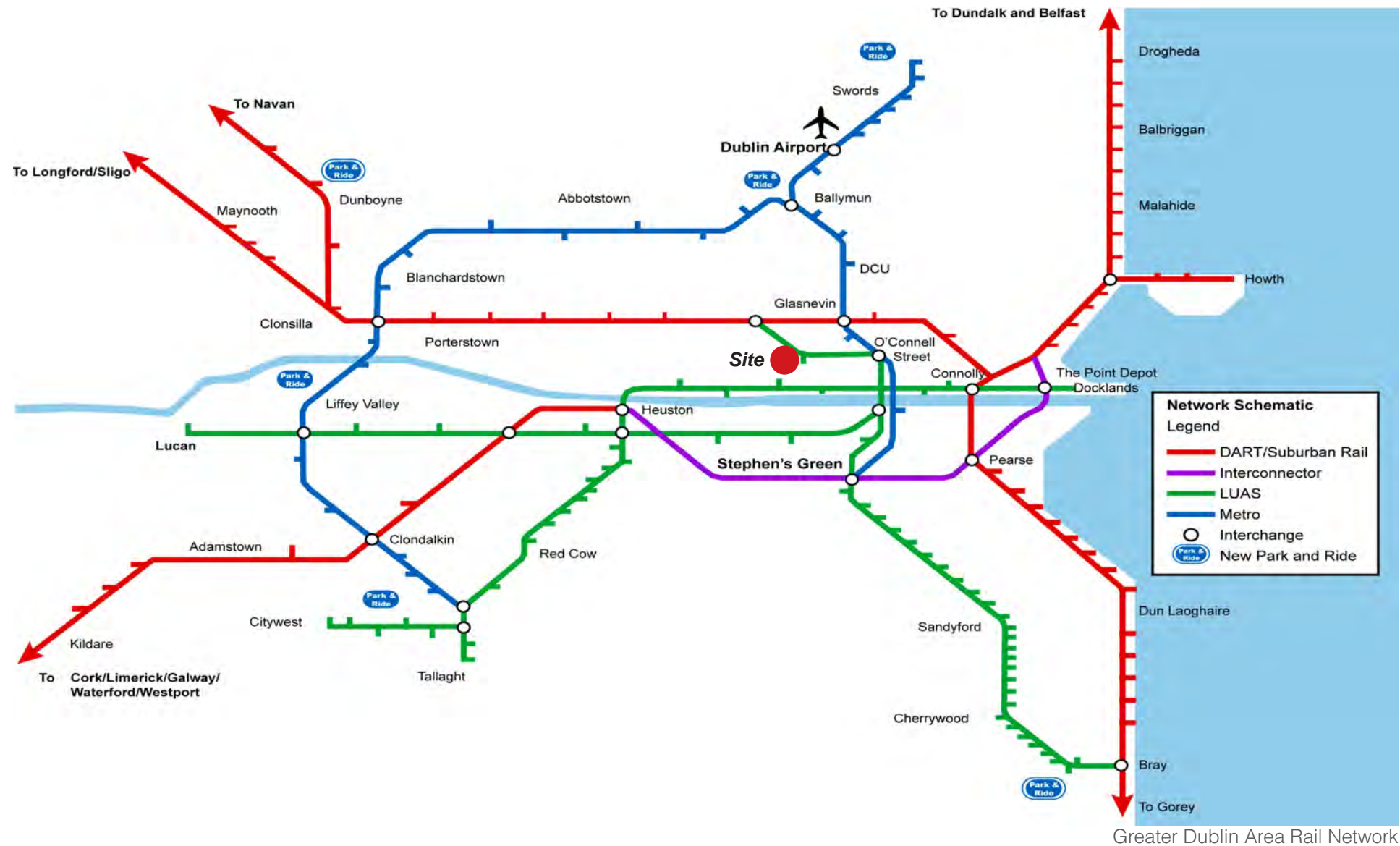
No capacity constraints were identified on the junctions along North Circular Road (NCR) with Grangegorman Road Upper, Rathdown Road and Charleville Road. Any capacity issue at these locations is likely to be caused by congestion along the main link (NCR), rather than the flows on the minor arms, which are generally low.

Junctions along Church Street and Blackhall Place, south of Grangegorman were found to perform well. It is expected that vehicle throughput at these junctions are also constrained by other upstream ad downstream junctions with limited capacity (Hanlon's Corner and Doyle's Corner in the AM peak; and the quays and crossings of the Liffey in the PM peak).

A modern, purple tram is shown from a low angle, moving along a track. The tram's front display shows 'B1 ROUTE' in yellow text. The tram has a sleek, aerodynamic design with large windows and a prominent windshield wiper. The ground is covered in snow, and the background features bare trees and a clear blue sky. The tram is positioned on the left side of the frame, moving towards the right.



The Luas Red and Green lines are not connected; however it is a 15 minute walk from the Abbey Street stop on the Red line to the St. Stephen's Green stop on the Green line. The Green line runs from St. Stephen's Green to Sandyford.



proposed public transport infrastructure

Transport 21

There are various different transport proposals planned in Transport 21 that will improve access to the site as shown in the accompanying diagramme to the left. Within the local vicinity of the site, Metro North and the Luas Line D will directly improve rail services providing high capacity public links to the site. Following is a brief outline of the Transport 21 Strategy infrastructure proposals:

Metro

Metro North will connect the town of Swords to Dublin City Centre (St. Stephen's Green) via Dublin Airport as shown in the map on page E-4. This major piece of transport infrastructure is due to be complete in 2013. Metro North will operate underground, surface and elevated tracks with 15 stops available between City Centre and the Airport, including two (Parnell Square and Mater) that are located within reasonable walking distance (approximately 1.4km and 2km, respectively) from the site. Assuming pedestrian connectivity from Constitution Hill and an access on North Circular Road, it is predicted that the site can be reached on foot in 14 minutes from Parnell Square station and 19 minutes from the Mater station.

Luas

Line BX

This line extension provides connection between the two existing Luas lines, thereby enhancing the connectivity to the City Centre for citywide commuters. A Railway Order submission for line BX is planned in 2009, according to the RPA.

Line D

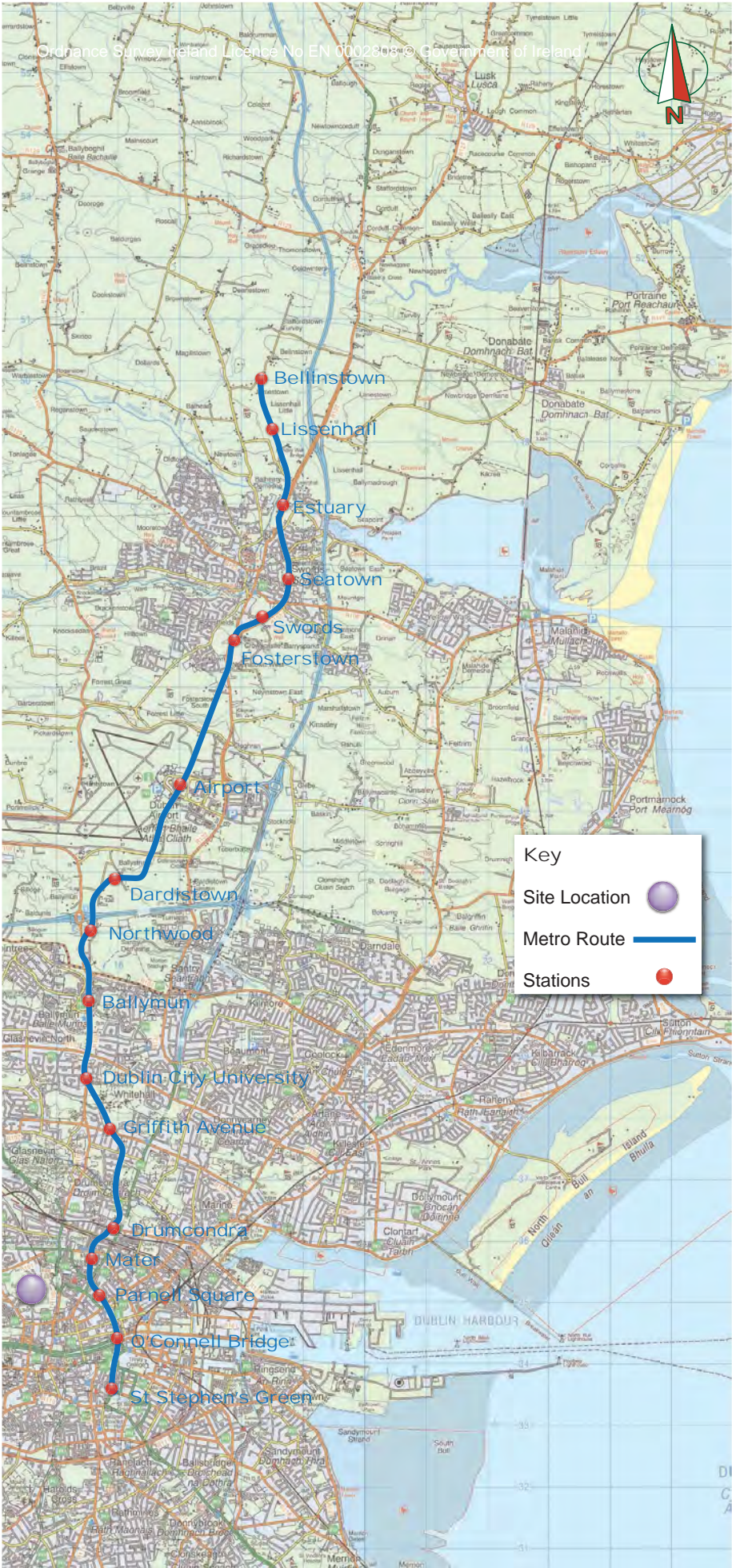
This extension of line BX towards Liffey Junction via Broadstone is still in design stage. This Line will directly serve Grangegorman and is considered to be the single most important public transport infrastructure to serve the site in the future. The improved connectivity of the site brought about by a Luas stations in its immediate vicinity will enable a substantial share of trips to be accommodated by the Luas. This line is expected to have two stations within the immediate catchment of the Grangegorman Campus: one adjacent to the Broadstone building; and another further north, either at the northern side of the present Bus Eireann depot, or in the vicinity of North Circular Road. Both, but especially the former, will provide the development with an excellent level of accessibility by Luas.

Luas Green Line and Red Line extensions

The extensions of the Green and Red lines to Bray (the line to Cherrywood is currently under construction) and Saggart will significantly increase that catchments that will avail of a direct connection to the city centre, and with line D, to Grangegorman itself.

Line F

Luas line F connects the City Centre and Lucan providing an alternative rail access into the City Centre from the western suburbs. It has to be noted that this line will provide a connection to line BX and D, as well as to Metro West. This project is scheduled for completion in 2013.



Other Rail Improvements

Rail Interconnector

The Interconnector is due for completion in 2015 is a planned link connecting the existing Northern Line to the lines running out from Heuston Station. It is envisaged that this public transport system would eliminate the existing city centre capacity constraints owing to its higher capacity and more frequent services.

Kildare Line upgrade

This project involves quadrupling of critical section of track between Cherry Orchard and Hazelhatch on the Heuston-Kildare line, along with ancillary works such as signalling and station developments. A key objective is to accommodate a peak hour service pattern of four commuter, four regional and four intercity services. Heuston Station lies approximately 20 minutes walking from Grangegorman.

Navan Rail Line

The project is carried out in two phases. Phase 1 involves reopening 7.5km of railway line running off the Maynooth line, at Clonsilla, to the M3 interchange at Pace, near Dunboyne scheduled for completion in 2010. Phase 2 provides connection to Navan and projected to complete by 2015. With Luas Line D in place and the proposed interchange between these two rail lines at Broombridge, Grangegorman would benefit from the increased catchment provided by the Navan line.

Bus Improvements

Quality Bus Network

The QBN Office carries out a permanent assessment of the needs for improvement to the QBC network and the existing QBCs are being upgraded on a regular basis throughout the city. With regards to sections of the QBN that are relevant to Grangegorman, the QBN Office has revealed that work on QBC along Old Cabra Road is to start before the Summer of 2008 and that further bus priority improvements along Manor Street and Stoneybatter are also planned.

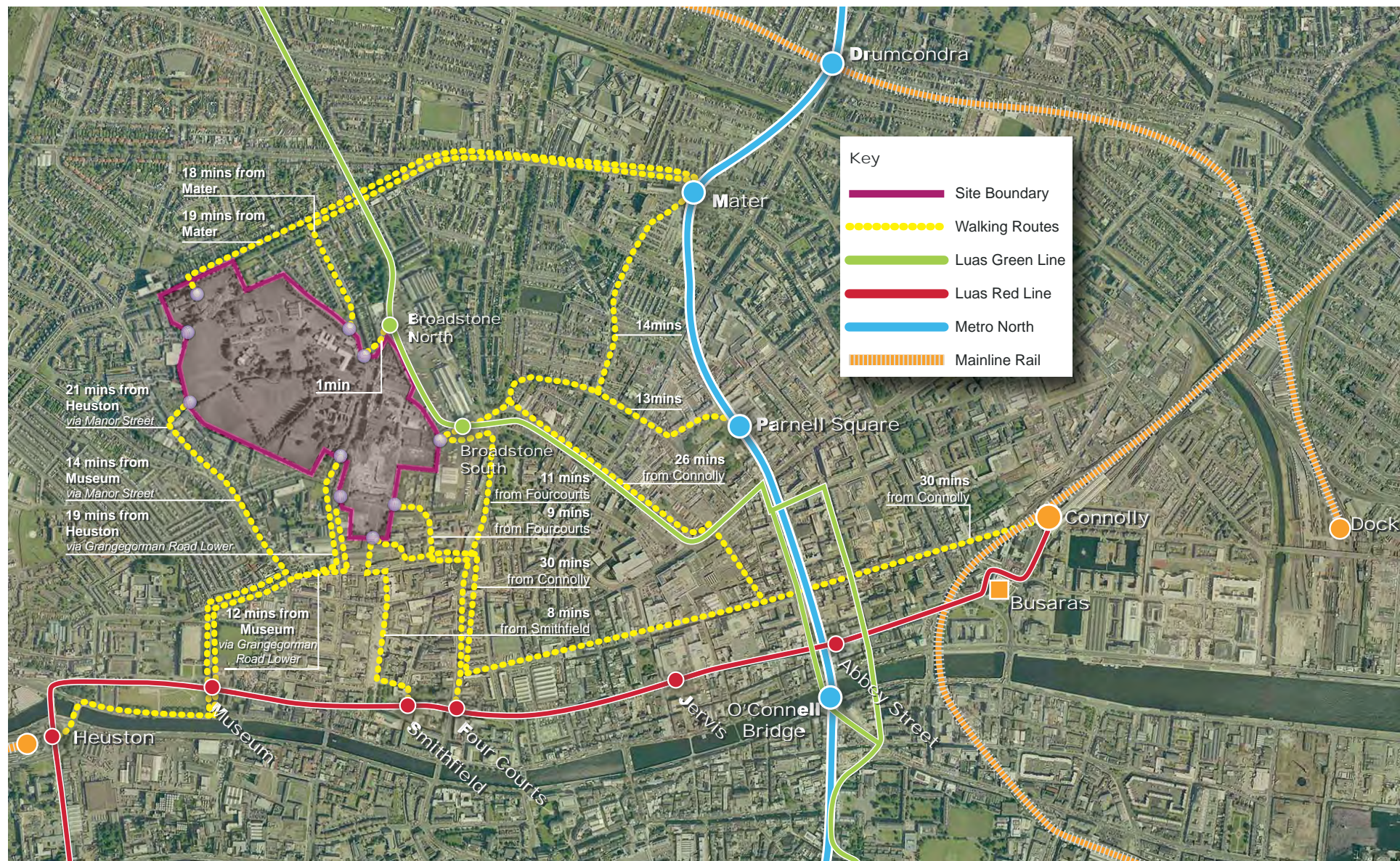
Traffic Management in Greater Dublin Area (GDA)

This provision includes the construction of QBCs, cycle paths, improved pedestrian facilities and traffic management support systems under Transport 21 program. Capital funding for traffic management measures in the GDA is provided through the DTO Traffic Management Grants, in support of its overall transportation strategy. Projected completion is 2015.

Other Bus Improvements

Development of Bus Services in GDA (Dublin Bus): This program is part of Transport 21 and is aimed at expanding the bus network in the Dublin area. Also a target of 60% is set to achieve as an increase in passenger carrying capacity through new and replacement bus acquisition by the year 2015.

New services are introduced under Transport 21 program to enhance Bus Eireann services to customers on city and commuter services. A total of 235 vehicles are to be procured in 2007 and 2008 as part of this program. Bus Eireann intends to improve its present interurban services to Dublin, including substantial frequency and quality enhancements of services along the N2 and N3 corridors.



Walking distances to the site

walking and bicycling environment

Pedestrian network

The majority of the road network in the vicinity of the site is provided with adequate pedestrian facilities, including signalised pedestrian crossings across the main roads, such as Constitution Hill, North Circular Road and Prussia Street.

However, the present site's accessibility on foot is limited by its impermeable layout, with only access to the external walking network via Grangegorman Road.

Grangegorman is, at present, cut off from Dublin City Centre by the Broadstone site and a number of adjacent properties such as the Haven House Hostel, off North Brunswick Street. To the west, the site's wall forms an effective barrier to connections toward the Stoneybatter and Hanlon's Corner areas.

Site Accessibility on Foot

The diagramme to the left shows how accessible the Grangegorman site will be by showing walking distances to existing and future transport stations and stops as well as other important facilities within the vicinity. Various walking routes are shown from Grangegorman. The Luas stops on the Red line to the south of Grangegorman are all within 15 minutes walking distance from Grangegorman via a number of walking routes. Heuston Station, one of Dublin's most important stations where may rail services terminates is approximately 20 minutes walk from Grangegorman, while Connolly Station (another important station of Dublin) is within 30 minutes walking distance.

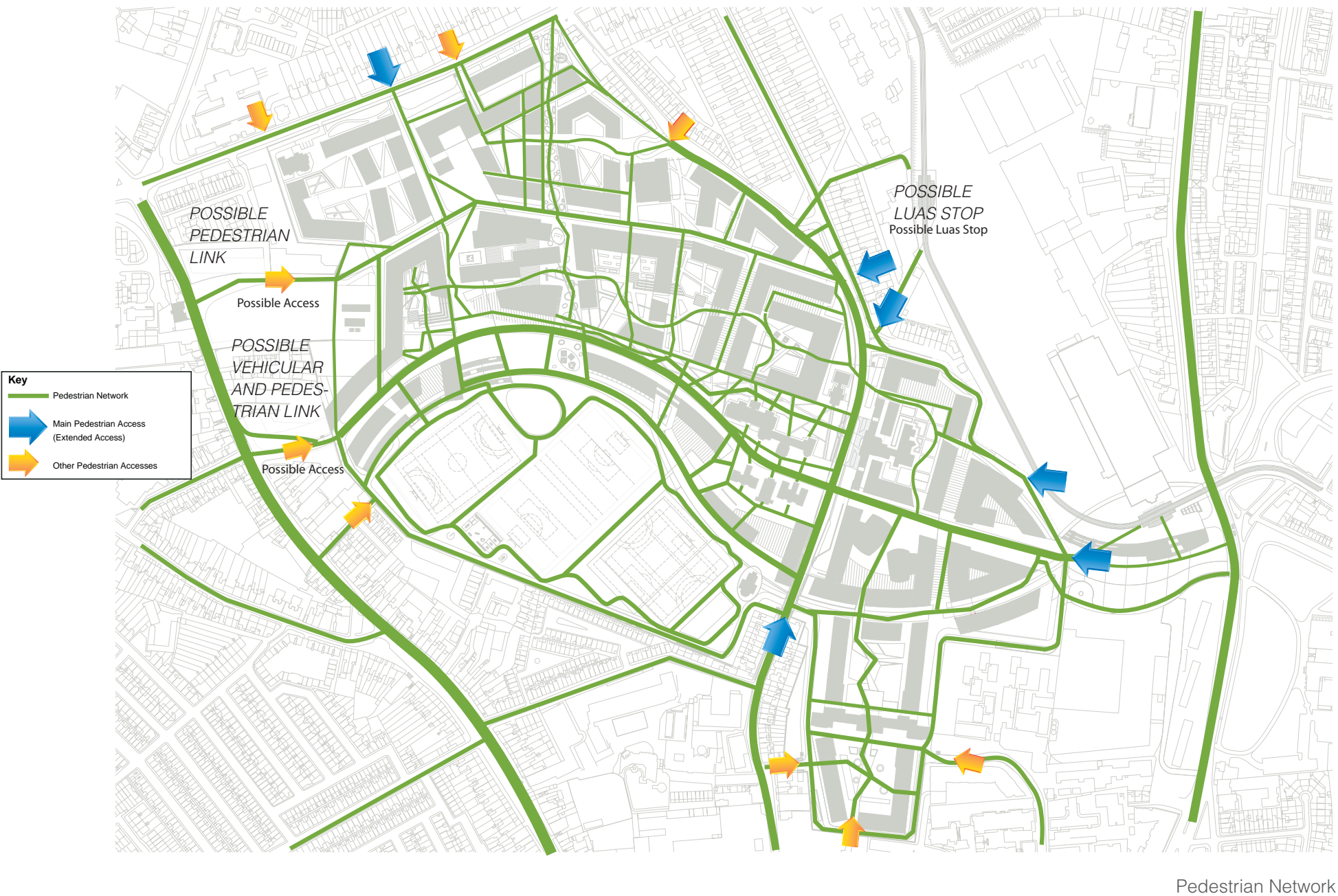
New stations planned on the Metro North Line including the Mater and Parnell Square Stations will be located within 15 minutes walking distance from the site. Also, the Broadstone North and South Stations on the proposed Luas Line D will be located adjacent, on the door step of the Campus.

Cycle facilities

Cycle infrastructure within the vicinity of Grangegorman is as good as any other within Dublin. Cycle lanes are provided on strategic routes such as on North Kings Street and there are also a shared bus/cycle lane on Constitution Hill and portions of North Circular Rd.

Cycle infrastructure is constantly being improved within Dublin. Dublin City Council are implementing the Dublin City Strategic Cycle Network programme aimed at providing an extensive and integrated cycle route network for the City.





signed to a standard that will discourage speeding and through-movements. Limited traffic and on-street car parking are considered as elements that, if correctly managed, will enhance the quality of some of the spaces throughout the Campus by adding to the activity mix at street level.

Provided with a dense network of pedestrian links, the district can be easily traversed in a 15-minute walk. Green boulevards dominate the internal circulation and are designed to allow articulated paths for both pedestrians and cyclists, which will provide quality circulation environments in all seasons.

The location of attractors and generators of walking journeys, as well as landmarks within the Campus has been considered so as to provide a coherent, legible and permeable movement pattern that will enable the desired maximum activity and quality of the public realm.

Most importantly, the Masterplan will include in-Campus accommodation for approximately 1,500 students, which will greatly maximize the share of walking journeys generated by the development's population. Cycle journeys are also encouraged by design, as the required cycle parking facilities will be available in tandem with a good quality cycling environment within the Campus. The different cycle parking needs are catered for in the Masterplan, ranging from cycle parking for student residential accommodation to pockets of convenience on-street cycle parking.

The DIT, HSE and the commercial elements of the Masterplan will avail of secure staff cycle parking and shower/changing facilities, mainly accommodated within the underground car parking areas.

Rather than providing a number of new transport links to serve the new population on site, the main aim of the Masterplan is to enable the seamless connection to the existing and future transportation networks, taking full advantage of Grangegorman's sustainable city centre location.

Connections to the south and the east are considered to be vital because they will provide access to the city centre, but also to Luas and bus networks, as well as to Metro North and the commuter rail services at Heuston and Connolly stations.

The Masterplan's emphasis is on the design of quality linkages from the site to the established city grid and to the high quality public realm within the site.

masterplan transportation elements

Transport Strategy

Sustainable travel enabled by location
The development is proposed to occupy possibly the largest underdeveloped site within Dublin City Centre. Its location close to the city centre provides the passive conditions for the maximisation of sustainable travel patterns. The benefits are twofold:

- It provides density of uses, especially residential within walking and cycling distance from Grangegorman. This will enable these modes to assume greater importance with regards to trips in and out of the development.
- It provides proximity to the most of the public transport network, which are concentrated in the city centre. This will enable the maximisation of the bus, Luas and rail mode shares.

Sustainable travel enabled by design

The Masterplan has been designed with a strong focus on pedestrian movements, which guarantees the conditions for walking trips to be encouraged. The design entails a number of restrictions to traffic movements, such as a system of traffic cells, which will contribute to the creation of excellent quality pedestrian and cycling environments throughout the Campus.

A limited quantum of car parking is to be provided within the Campus, as a further measure to guarantee the minimum impact of traffic on the internal public realm, as well as on the adjacent road network. A provision of car parking in the region of 1,150 spaces is seen as insignificant in the context of an overall population of over 25,000 and a variety of uses ranging from primary health care to higher education, and including offices, retail and a primary school.

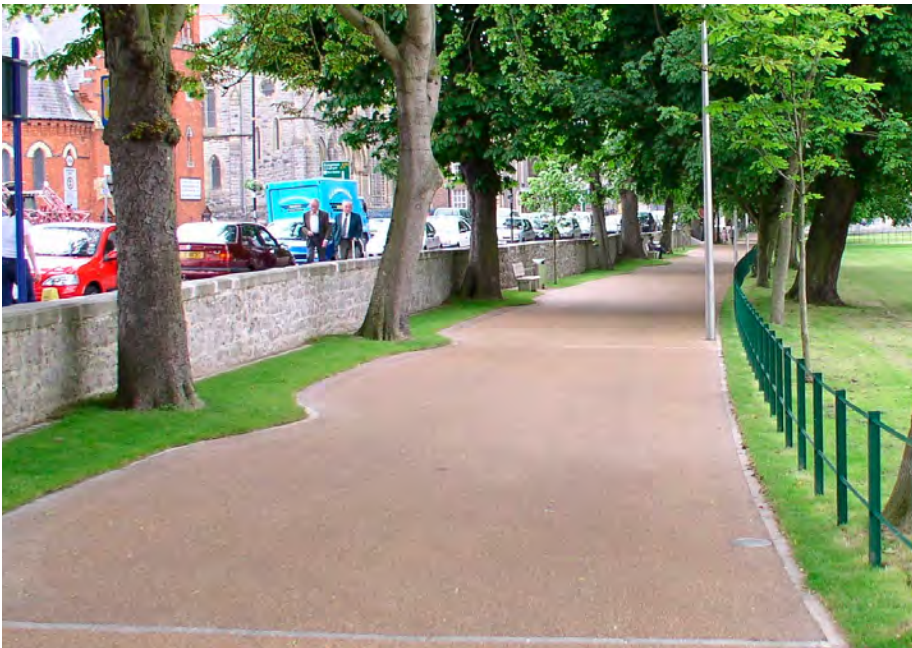
The internal roads where traffic is allowed for convenience purposes are de-

Public transport strategy

The most relevant improvement to the public transport networks that is to be provided as part of the Masterplan is a bus terminating facility that, at an interim stage will be provided within the site boundary. It is envisaged that a location that can suitably cater for the overall Grangegorman/Broadstone area is decided upon at a later stage in the masterplanning process.

The location that is proposed to accommodate the bus terminus is at the eastern edge of the site, adjacent to the existing Dublin Bus depot and garage. Access is proposed to be made from Constitution Hill, taking advantage of the existing vehicular access to both Broadstone depot facilities (Dublin Bus to the south and Bus Eireann to the north).

The access off Constitution Hill is envisaged to cater for: a) access to Dublin Bus depot; b) access to bus terminus (for Dublin Bus and possibly Bus Eireann); c) vehicular access to the eastern part of the Grangegorman Campus; and d) access to Bus Eireann depot. This is envisaged to work in conjunction with a wide pedestrian boulevard that will provide a connection across Broadstone from Constitution Hill.



The provision of a bus terminus as part of the Masterplan will greatly enhance the capacity and flexibility of the existing bus network, which already serves the periphery of the site with considerable levels of service.

Luas Line D is an extension of the existing Luas Green Line that will include two stations in the Broadstone area adjacent to Grangegorman and when completed will provide the development with a direct high capacity connection with the city centre.

The details of the multi-modal link via Broadstone, including the connections to the interim and ultimate bus termini are outside the remit of the Masterplanning team. However, a concept for the achievement of seamless and high quality connections between the stations and the core of the Campus has been put forward by the Masterplan.

The conjunction of existing and future bus provision with the new Luas line, will create the conditions for the eastern access (via Broadstone) to become the main Gateway to the district.

non-motorised transport modes

Pedestrian and Cycling Networks

The Masterplan is being designed with a strong focus on the provision of a dense and attractive pedestrian and cycle network. This is considered to be one of the most important elements of the proposals, as it will enable: a) the necessary conditions to encourage high levels of pedestrian and cycle journeys to and from the Campus; and b) the desired quality of the public realm that will ensure its attractiveness and therefore, will contribute towards longer dwell times, hence minimising the impact of peak travel.

Links to wider city networks

One of the main objectives of the Masterplan is to create a new neighbourhood for Dublin. One of the most important elements that will enable this will be the seamless integration of the proposed internal walking and cycling networks with the existing urban grid.

Permeability

In order to achieve the maximum integration with the existing urban grid surrounding the site, as well as the best possible access to the public transport networks, the site will be designed to provide the best possible permeability across its boundaries.

The pedestrian network plan depicts the proposed internal pedestrian network and its linkages with the wider urban grid. If this level of permeability is achieved by the Masterplan, the walk distances would be significantly optimised, resulting in a walking catchment diagram which is closer to an “as-the-crow-flies” catchment.

Legibility and Attractiveness

It is envisaged that the internal circulation networks are designed with a focus on providing legible routes throughout the Campus. Adequate signage is proposed to guide the different types of users using the various modes of transport. Suitable directional signage to and from the main destinations, including transport nodes outside the Campus will enhance the attractiveness of pedestrian and cycling journeys to and from the Campus.

Public art is an important aspect of legible and attractive public realm. It can provide important landmark features that help guiding pedestrian and cycling, but also vehicular circulation. The creation of visually attractive nodes throughout a pedestrian network is seen as a significant factor on the willingness of people to undertake journeys on foot.

Cycle Parking

Generous provision of cycle parking will be provided in the Masterplan. Cycle parking will be provided throughout the Campus, having regard to the likely requirements of the different groups of users. It is therefore proposed to provide:

- Cycle parking for student residences, which needs to be secure and possibly at a ratio of 1 space per every 3 bed spaces provided.
- An element of secure parking associated with underground car parking, to be used by cyclists requiring longer periods of parking. This element of cycle parking will be associated with facilities such as showers and lockers, as appropriate.
- On-street “banks” of cycle parking, possibly covered, located in visible locations near the highest attractors of trips (Library, Faculties, and Sports).
- An element of dispersed clusters (4 to 20 spaces) of on-street cycle parking, to maximise access to all buildings and facilities. These should be located in the vicinity of the main building entrances and visible from the main pedestrian thoroughfares.

Roads

Road Hierarchy

It is envisaged that the development will have an internal network of links serving different functions, with different character and typology. The function allocated to each link should determine its character and typology, but Masterplan aspirations in terms of character of certain areas will also have a bearing on the function which is allocated (e.g. certain sections of the network will have limited access for vehicles, resulting from an urban design focus, rather than a functional one). There will not be links within the internal network that will be primarily vehicular, and the terminology used in this description should not be read in the wider city context, where a “primary road” is often a high-carrying capacity link. The suggested widths for the different links are based upon guidance provided in ‘Manual for Streets’ (DfT 2007).

Primary Links

The existing Grangegorman Road, which bisects the site, as well as the accesses to car parking were considered as primary links in the context of the Grangegorman development

Function

These primary links cater for the majority of general traffic to and from the development. Grangegorman Road will be the only available through-route for external traffic and it is suggested it is traffic-calmed by means of a shared surface section opposite the clock tower building and the intersection with St. Brendan’s Way.

Character

Predominance of road use, although with generous separate pedestrian provision. Possibility of frontages close to the road, to enhance the urban feel of the link. Along Grangegorman Road, the link can be designed as a tree-lined boulevard, possibly with road width narrowed to 5.5m at the sections crossing St. Brendan’s Way and the Cultural Garden, which will be more pedestrian focused.

Typology

‘Traditional’ 5.5m kerb-to-kerb with parallel footways (minimum 3 metres wide). Normal or low kerbs, rather than flush surface. Clear distinction between uses and identification of pedestrian crossing points.



Secondary Links

These will include the east-west link to the north of St. Brendan’s Way, the access to the car park and set-down areas from Constitution Hill, as well as servicing and maintenance roads along the periphery of the site and along the Ha-Ha.

Function

Caters for limited traffic mainly related to servicing, maintenance, disabled access, and possibly taxi and ‘out-of-hours’ access. On-street car parking can be accommodated near the Grangegorman Road entries to the development.

Character

Predominantly pedestrian space shared with occasional vehicular traffic. Generally flush shared surfaces, but with clear delineation of carriageway space. Occasional variations to horizontal alignment to add to traffic calming effect.

Typology

Shared surfaces: Flush surface with clear delineation of carriageway space; 5.5m vehicular corridor; no need for footways as adjacent space is primarily pedestrian; horizontal deflections (e.g. chicane, pinch-points).

Access from Constitution Hill: surface with clear delineation of carriageway space; 5.5m vehicular corridor; no need for footway on northern side as adjacent space is primarily pedestrian; 3m wide pedestrian only ‘buffer’ on southern side

Maintenance roads: 5.5m wide with occasional widening (width variable) for loading/unloading or to allow for turning movements in and out of service areas. There is a possibility of accommodating ‘out-of-hours’ parallel car parking to serve playing pitches.

Tertiary Links

This category mainly applies to Saint Brendan’s Way and adjacent ‘driveable’ surfaces.

Function

Caters for limited traffic mainly related to servicing, maintenance, disabled access, and possibly taxi. Vehicular access to these links should aim to be limited to ‘out-of-hours’.

Character

Predominantly pedestrian space shared with very limited vehicular traffic. Flush shared surfaces, with no clear delineation of carriageway space.

Typology

Flush pedestrian space with no clear delineation of carriageway space; 5.5m unobstructed vehicular corridor defined by usage of planting, urban furniture, and if necessary, bollards.

Traffic Calming

Objectives

It is envisaged that the movement network is designed in a manner which prioritises pedestrians over motorised traffic. However, accessibility for cars, service vehicles, etc, will mean that, at a number of points within the site and times of the day, these will be in conflict with pedestrians.

The inevitable conflict between pedestrians and vehicular traffic will be mitigated at key locations by traffic calming measures that may range from junction treatment to the overall design of the link. It is desirable that traffic

calming forms part of the masterplanning design, rather than being retro-fitted after construction.

Available measures

Traffic cells

It is envisaged that all links throughout the development are designed in a way that will not preclude usage by all types of vehicles. However, a system of traffic cells is proposed to avoid the site being used by general city traffic. The only exception will be Grangegorman Road, which is at present a through route for general traffic. Traffic cells will be accessed from Constitution Hill, Grangegorman Road, North Circular Road and Prussia Street.

This is the most effective measure to discourage unnecessary vehicular traffic through the site, whilst enabling suitable access to all locations. The Masterplan aims to achieve a system whereby the traffic cells are of equal size and levels of usage are adequate to the immediate external road network.

Shared surfaces

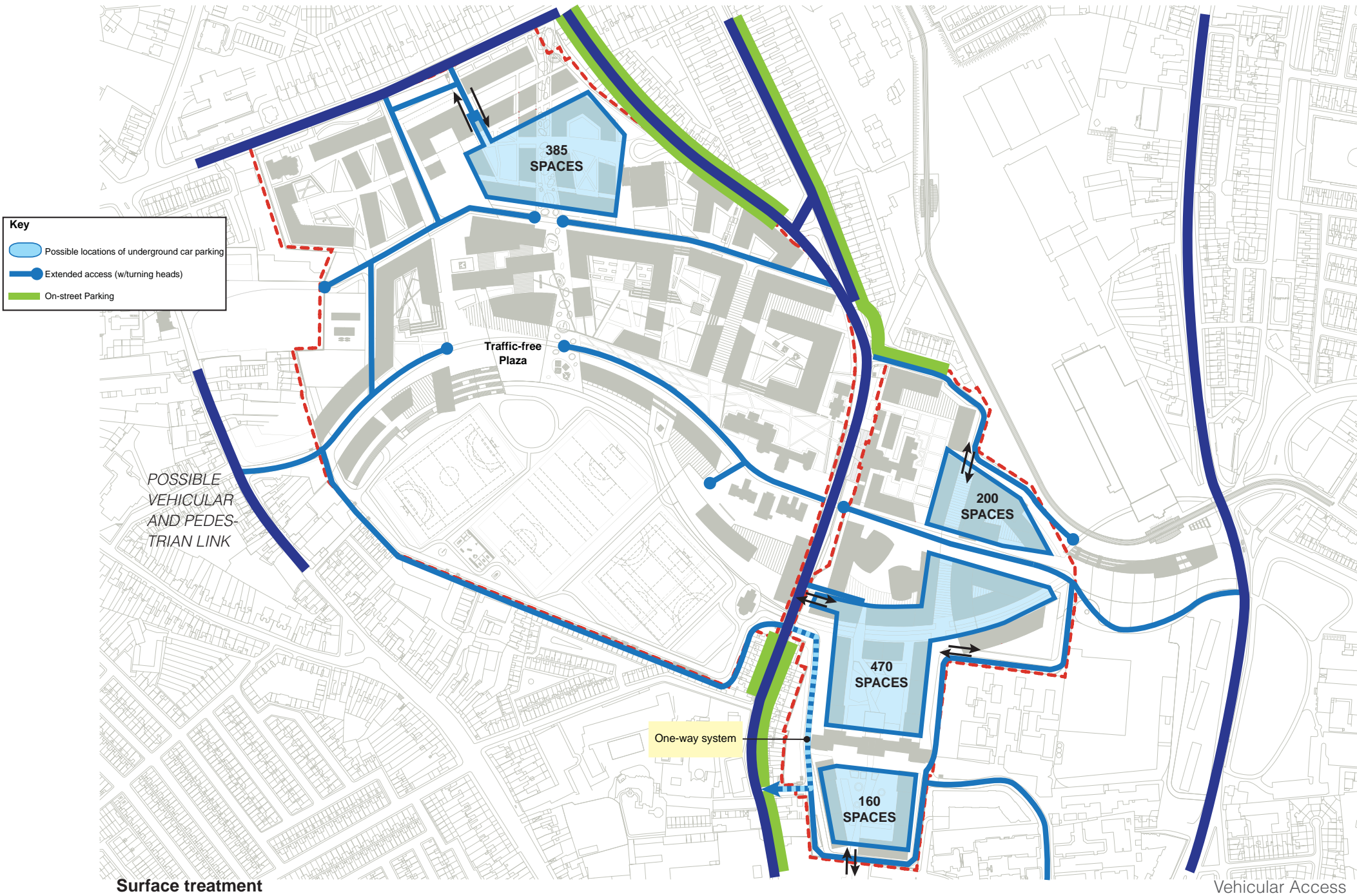
Shared surfaces are effective elements of traffic calming, as they enable the re-balance of priority towards pedestrians along roads or across sections of roads. There are different levels of integration between pedestrian and vehicular movement within shared surfaces. These range from areas with no distinction between car and pedestrian spaces, to streets where cars are kept separate from pedestrian-only spaces by means of physical barriers (generally bollards). A solution in between both of the above is the visual delimitation of car-only space by means of different materials and/or colours, often using the drainage channels as a subtle physical delineation.

The concept of a shared surface is that drivers will recognise that they are circulating through a pedestrian area with clear indication of the limits of their circulation space, and therefore will adopt lower speeds. It is important that these spaces are well used by pedestrians, so that their priority is reinforced.

Within the Grangegorman development, it is envisaged that the whole of St. Brendan’s Way could be a shared surface, including the section where it crosses Grangegorman Road. The level of integration applied will vary along its length, with the Library plaza, the area between the Student Centre and the section opposite the Performing Arts Centre being the most suitable to have the least segregation between the modes, perhaps with no clear demarcations at all. The remaining sections should include some type of visual delineation of the vehicular space, but built-to-purpose physical obstaclesuch as bollards should be avoided, so as to reinforce the “non-road” character of the space.

Ivy Avenue and the section of Grangegorman Road opposite the Clock Tower building and across St. Brendan’s Way should be shared surfaces with clear demarcation of the vehicular space. It is envisaged that the numbers of motorised vehicles (including service/deliveries vehicles) will be higher than along St. Brendan’s Way, despite the fact that pedestrians are still likely to dominate, especially during busy periods. However, it is not proposed that some type of kerbing will be in place and that the material used for the carriageway should be suitable for pedestrian circulation, if not the same as the paving of the pedestrian-only fringes.

Due to its location at the interface between HSE, DIT and community uses, the area to the north of the DCC Community Library has the potential to become a very attractive plaza. It is suggested that higher levels of space integration are applied. This can be achieved by the usage of the same type of surfacing material throughout the plaza (limited to the north by the cafeteria building and to the south by the Community Library), with only subtle delineation of vehicular circulation space, perhaps by drainage channels.



Surface treatment

The choice of surfacing materials can have a traffic calming influence but can often be unattractive or even inadequate for pedestrian and cycle usage. The solutions proposed will have regard for these constraints.

Vertical and horizontal deflections

Commonly, traffic calming is achieved by the implementation of vertical deflections on the carriageways such as speed ramps or speed tables. In situations where these may have a negative impact on the circulation of buses, speed cushions are implemented.

Apart from speed tables, which can have a positive effect in providing for improved pedestrian facilities across a road or junction, vertical deflections are generally afterthoughts and/or implemented to mitigate an existing vehicular speed issue to discourage rat-running.

The Masterplan for Grangegorman considers that the majority of the internal road network should be flush (and in most cases integrated) with the pedestrian space, forming something like a site-wide raised table. Therefore, the

vertical deflections would occur as a feature at the following points of access:

- off North Circular Road;
- off Prussia Street;
- on Grangegorman Road north of the Clock Tower;
- on Grangegorman Road south of St. Brendan's Way; and
- off Constitution Hill.

Within the development, it is considered more suitable to apply horizontal deflections. These consist of changes in the carriageway alignment such as pinch-points, build-outs, chicanes that have the effect of changing the real or visual width of the vehicular circulation space, and therefore can have a significant traffic calming effect.

The difference between a build-out and a pinch-point is that the former is a narrowing of the vehicular circulation space on one side of the carriageway

only, normally associated with clear priority assignment. A pinch-point can have priority assigned, namely in the cases where it reduces the circulation space to allow only one vehicle to pass, but often doesn't.

These types of measures are suitable for points where pedestrian movements across the road are expected. The effect on pedestrian safety is threefold: a) it reduces traffic speed; b) it reduces the length of the pedestrian crossing; and c) it provides additional pedestrian reservoir on one or both sides of the carriageway, often "placing" pedestrians in the line of sight of vehicles.

As a general rule, the vehicular circulation spaces should not be wider than 6m, with 5.5m being a suitable width so as to allow two heavy vehicles to cross each other without having to stop. Taking these general widths as a benchmark, the vertical deflections should either maintain the width, in the case of chicanes, or reduce it towards a minimum of 3.7m, in the case of pinch-points or build-outs. 3.7 metres is the minimum width that allows for suitable circulation of emergency vehicles. Ivy Avenue, Grangegorman Road Upper and Lower and Rathdown Road are especially important areas for the adoption of these measures.

On-street car parking

Car parking can be used as an element of traffic calming, when correctly placed. Pockets of car parking (parallel, perpendicular or chevron), can work well with the horizontal deflections proposed above. The provision of on-street car-parking needs to be sympathetic to the pedestrian desire lines, in order to avoid acting as an obstacle to pedestrian movements. The Masterplan proposes in the long term the larger quantum of car parking to be accommodated in underground facilities. In the medium term, surface car parking will be provided on quadrangles not yet developed.

Buildings location and landscape design

The location of buildings, urban furniture and landscaping in relation to the circulation space can also be an effective element of traffic calming. A variety of forms, materials, uses, and relative distances from the carriageway should be sought so as to provide a discontinuous visual environment along the street. Visual lines that follow and enhance the vehicular circulation direction should be avoided, and conversely the pedestrian desire lines, especially those crossing or running adjacent to the vehicular space should be emphasised.

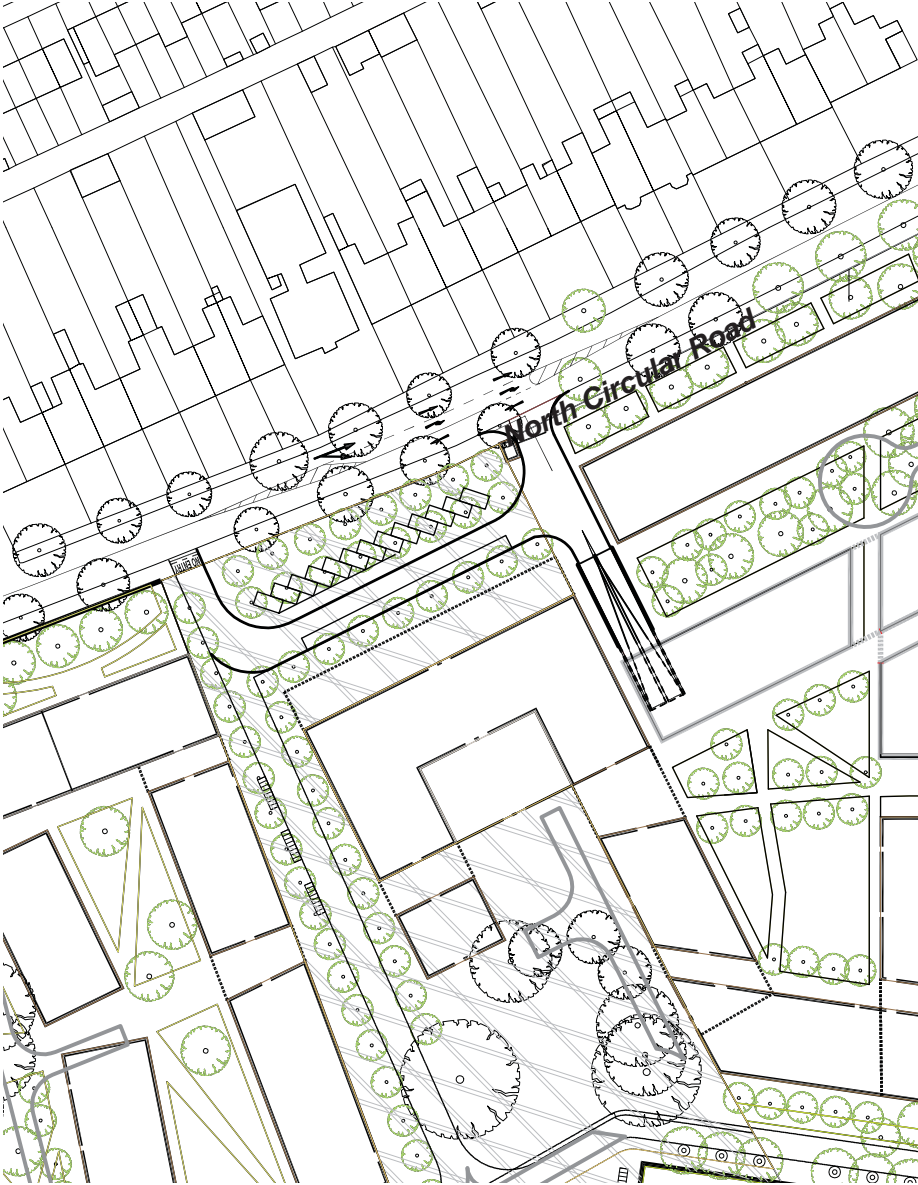
Car Parking

Proposed quantum of car parking

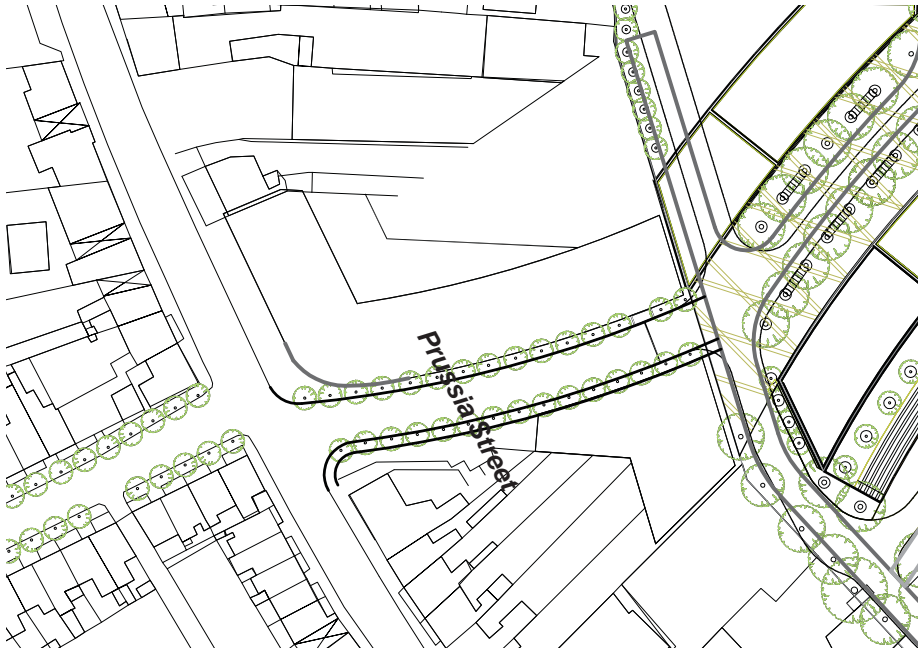
The quantum of car parking will take into consideration the impact of car trips on the adjacent road network, but specific issues to be taken into account with regards to the quantum of parking are related to the variety of uses and times when the car parking may be required. For example, provision needs to be made for usage of the Campus outside the normal working days, such as evenings and weekends, when the availability of public transport is lower.

In addition, the Masterplan will have regard for the need to avoid car parking overspill onto neighbouring residential areas. Keeping car parking numbers within the site to an unsustainable minimum could have such an effect.

It is therefore suggested that approximately 1,150 car parking spaces are provided within the site. This quantum is purely indicative at this stage and will be heavily influenced by the physical capacity to be accommodated within the present Masterplan proposals.



North Circular Road Access



Prussia Street Access

Proposed Location of Car Parking

The Masterplan proposes that the vast majority of car parking is accommodated underground, with direct access from the external road network and not via the campus itself. The potential locations proposed for underground car parking are the following:

- On the eastern side of the development, south of St. Brendan’s Way, with access from Constitution Hill and from Grangegorman Road. This would accommodate the largest concentration of car parking – approximately 450 spaces;
- On the northern side of the development, accessed off North Circular Road, with capacity for approximately 350 spaces;
- On the eastern side of the site, north of St. Brendan’s Way, with access off Grangegorman Road Upper, with capacity for approximately 200 spaces; and
- On the southern side of the site, under the Science and Technology Park, accessed from Morning Star Avenue, with capacity for approximately 150 spaces.
- In addition, it is proposed that a number of on-street car parking spaces are provided at locations throughout the site. These will be additional to the residential car parking already provided along Grangegorman Road and Rathdown Road, and is intended to provide a convenience dimension to the car access strategy, and will be able to include part of the disabled car parking requirements.

Car Parking Management

The management of on-street car parking, especially that within the site boundary will be a matter to be dealt with by the traffic management plan for the Campus. Due to the likely limitations to the quantum, it is important to ensure that the usage of the car parking is optimised, taking advantage of different uses that may complement each other (e.g. day-time university uses and evening-time sports or events).

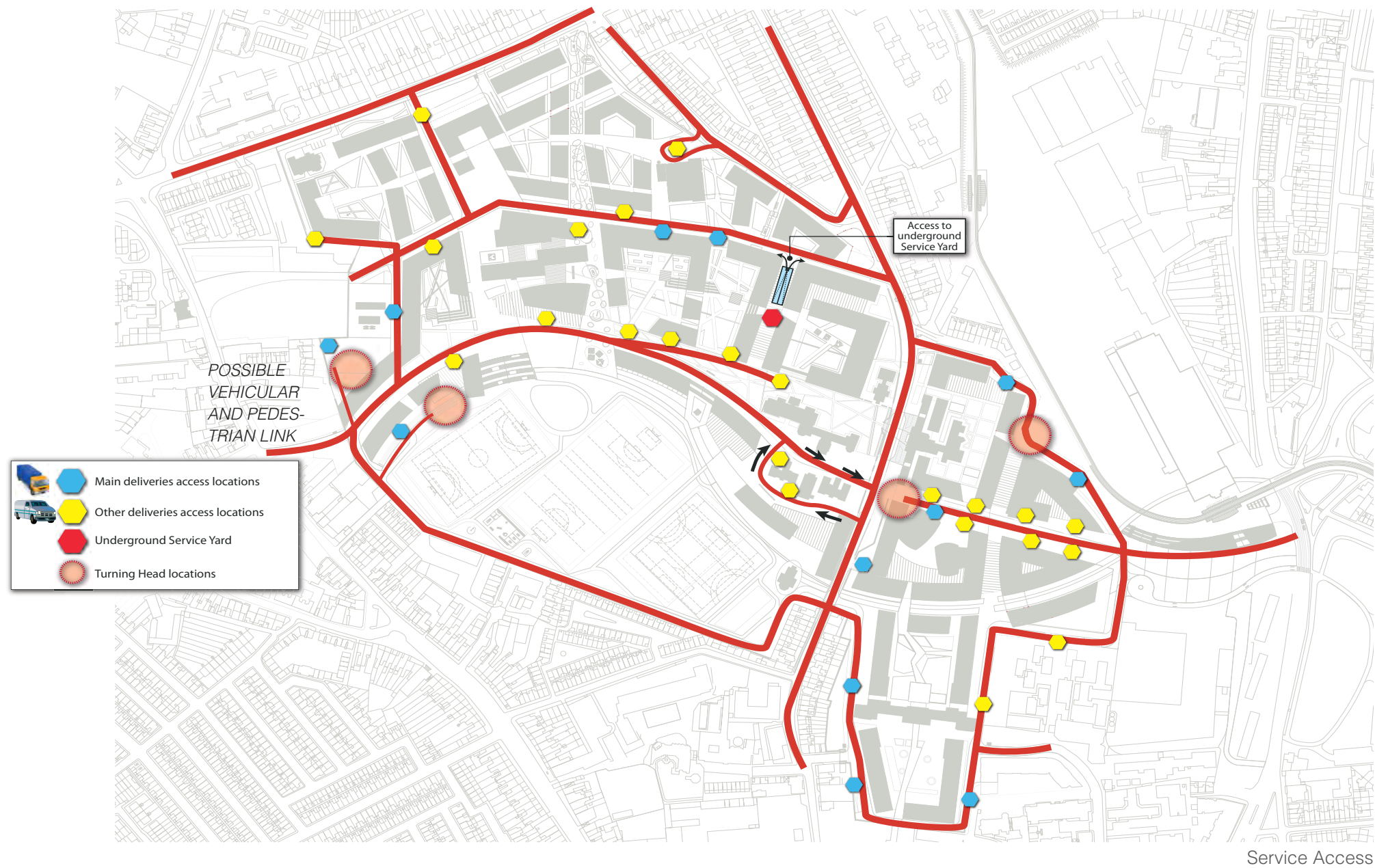
The on-street car parking provided may be restricted in usage or subject to a fare strategy that encourages short term usage. It is seen as beneficial to allow for parking by general users at least during times when the Campus may be less busy, such as evenings and weekends.

Vehicular Access Strategy

Access locations and layouts

The Masterplan proposes that vehicular access is limited to the existing through-route along Grangegorman Road and additional accesses from any (but not necessarily from all) of the following external roads:

- Constitution Hill (via Broadstone site)
- North Circular Road
- Rathdown Road
- Grangegorman Road Upper
- Grangegorman Road Lower
- Morning Star Avenue
- Prussia Street (to be explored)



The variety of options for vehicular access does not necessarily entail proposed new vehicular routes through the site. The concept is that, with the exception of Grangegorman Road, all the other points of access will lead to 'traffic cells', as can be seen in the vehicular access diagram.

Access off Constitution Hill

The master planning team is in discussions with CIE on a set of proposals for an eastern vehicular and pedestrian access to Grangegorman that would require a section of the present Broadstone depots. The proposal entails a phased implementation of what is intended to ultimately be the main entrance to the Grangegorman development. It is envisaged that vehicles would avail of a road integrated with a wider pedestrian boulevard. In the interim options presented in the Masterplan document, the access is shared with buses, but in the ultimate vision for this entrance, buses could be provided with a separate access to an underground or undercroft bus terminus beneath the redeveloped Broadstone.

Access off North Circular Road

The feasibility of this access has been assessed and a design of an option that includes a right-turning lane on North Circular Road is shown. The main

constraint seems to be the presence of trees along North Circular Road, which may hinder the visibility splays depicted in the drawing. There is residents' parking on the northern side of North Circular Road that would need to be relocated.

Access off Prussia Street

This access has been designed to accommodate limited amount of traffic. It is envisaged that a share of the servicing traffic would utilise this gate into Grangegorman, as well as general traffic accessing a traffic cell. The preliminary proposals entail a 6.0 meter wide carriageway, with adjacent footpaths on either side with a minimum of 2.0 meters in width. It would be desirable to achieve greater pedestrian width on at least one of the sides of the carriageway, in order to maximise the function of the access as a main pedestrian gate into the Campus.

Accesses off Rathdown Road and Grangegorman Road

These roads will provide frontage to a considerable part of the development, and therefore will be provided with a number of accesses to the internal Masterplan road network. The access to the Laundry Building will be accommodated from Rathdown Road, as will the primary school drop-off. The new internal route Ivy Avenue, will connect with Grangegorman upper. A minor access road south of Marne Villas will provide access to underground facilities if required. On Grangegorman Road Lower there will be limited traffic accesses to the eastern and western sides of the site, as well as an alternative access to the main car park south of St. Brendan's Way.

Access off Morning Star Avenue

Morning Star Avenue is at present a cul-de-sac off Brunswick Street that terminates at the site boundary. The proposal is to allow alternative vehicular access to the southern sector of the Masterplan. It is likely that this access allows for service access, as well as access to a limited amount of car parking. In addition, Morning Star Avenue would provide an additional alternative for pedestrian and cycle journeys to and from the south.

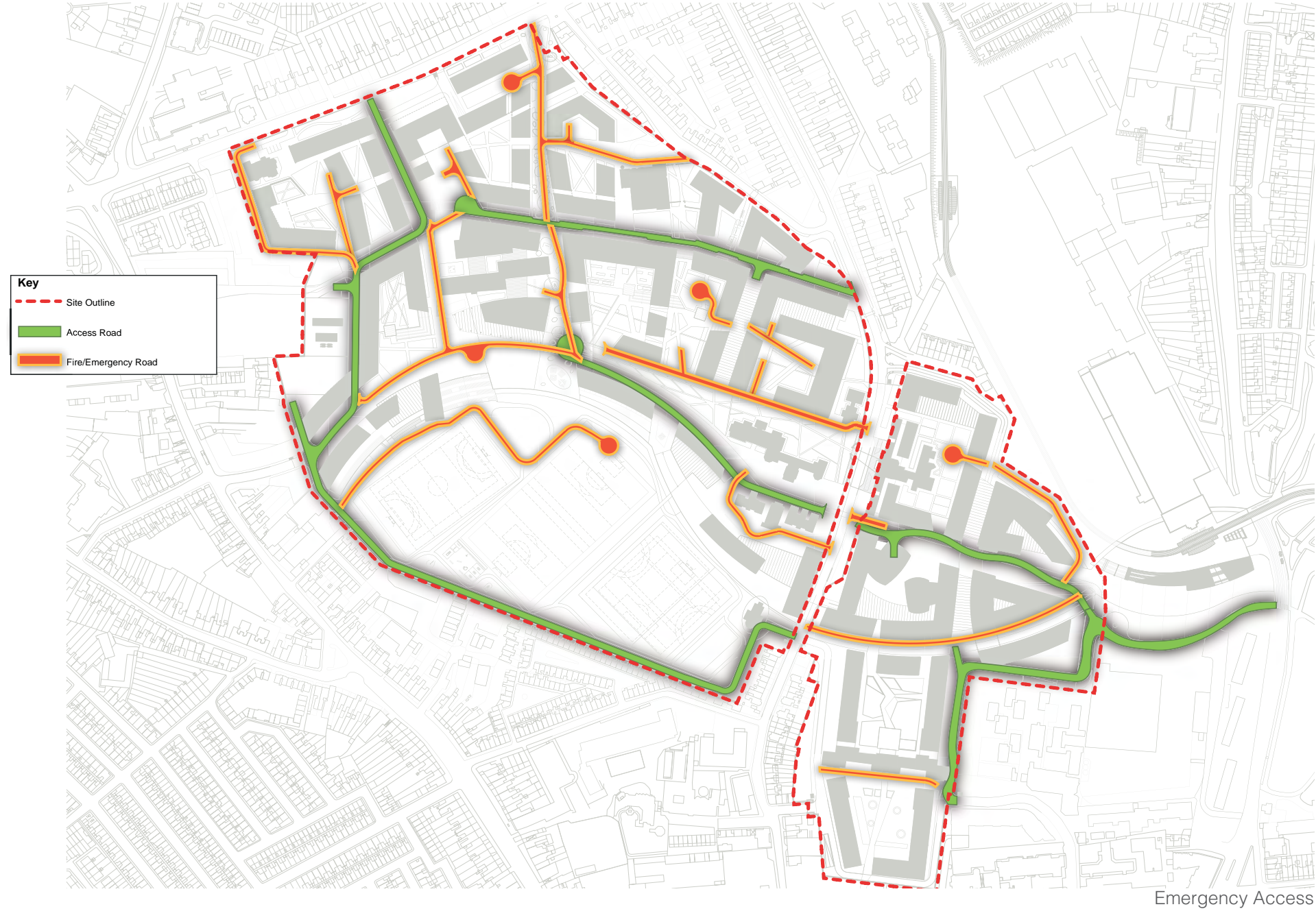
Car access

As mentioned before, the vehicular circulation patterns within the site will be determined by a series of traffic cells. The traffic cells will be designed in a manner that will prevent general city traffic using Campus roads as through routes. The only exception being Grangegorman Road, which is presently a through route for general traffic and is proposed to continue its role, but with design changes which, will discourage movements and/or speed. Traffic cells will be accessed from Constitution Hill, Grangegorman Road, North Circular Road and Prussia Street.

Service access

As described before, all links within the development are designed to suitably accommodate the movements of all the necessary vehicles, including those of articulated trucks.

Although a system of permanent traffic cells is desirable to avoid through-movements, it may be justified that occasional movements between the traffic cells occur, especially if the overall length of service journeys is to be optimised. It is also possible that the design for the turning movements of heavy vehicles at the head of each traffic cell results in an impact to the landscaping and quality of the public realm that could be avoided with the allowance of through connections.



Taxi access

As with general traffic, it is proposed that taxis avail of access to all points within the development, albeit constrained by the layout of the traffic cells.

Emergency access

Emergency access is provided in accordance with the appropriate regulations. The majority of the linear spaces, both streets and landscaped areas, are designed to accommodate occasional emergency movements, enabling the highest level of vehicular penetration.

The requirements relating to fire appliance access is governed by the building height and volume and is based on a percentage of the perimeter of a building being accessible by a fire tender for small to medium sized buildings. Within the scheme at the master planning stage an assessment has been carried out to determine the minimum requirements as recommended by the relevant guidance (Regulation B5 of Technical Guidance Document B of Building Regulations 2006).

A significant amount of frontage is available via the normal traffic circulation routes throughout the overall site resulting in the majority of buildings being adequately served without the need for additional routes. Buildings which, due to their location, layout, division or level, cannot be reached by fire fighting vehicles have been provided with internal fire-fighting mains which allow fire-fighters to fight fires inside the building. This is particularly relevant for buildings surrounding a courtyard and those along the “green fingers”. Routes identified to be accessible by a fire tender will be designed to:

- be negotiable by fire fighting vehicles
- be free from permanent obstructions at all times (with the exception of removable bollards, etc)
- have a minimum width of 3.7 m
- have a minimum carrying capacity of 16.25 tonnes; and
- have a minimum clearance height of 4 m

Trip Patterns

DIT
Universities tend to have trip patterns that do not impact significantly on the normal peak periods. The AM peak generation has generally a flatter profile than normal commuting patterns, as it is extended from 8.00 (staff trips mainly) to 10.00 or even 11.00. In the evening, the peak departure of students tends to occur before the normal network peak.

The provision of facilities such as sports and entertainment on Campus, will contribute to the extension of the period when trips to and from the Campus are likely to occur, and consequently will minimise the impact of these on the road and public transport networks.

HSE
More so than academic uses, trips generated by health uses do not often impact on the transportation networks, as they generally occur outside the network peaks. In this circumstance, the uses proposed for Grangegorman have a significant component of residential care and shift patterns.

Other uses

Commercial
The majority of trips generated by the commercial element of the development will have a direct impact on the normal morning and evening peak periods.

Primary school
The primary school will generate a number of peak trips, especially during the morning peak. Journeys to and from school tend to have a significant impact on the local traffic, and therefore should be mitigated by means of encouragement to use sustainable modes of transport.

Crèche
The crèche is meant to cater for children of DIT students and staff, and therefore is not likely to generate additional trips.

Community Library
This facility is likely to generate a limited amount of trips mainly after the morning peak period and from local origins, and therefore is not expected to have a noticeable impact.

Sports and entertainment
These uses will provide activity before and after normal peak times, hence contributing to a flatter overall profile of trips in and out of the Campus. These are seen as important factors in the mitigation of peak trip impact.