

TRANSPORT & CONNECTIVITY

SUPPORTING TECHNICAL NOTE

Project	Dundee City Centre Strategic Investment Plan (DCCSIP)
Report Title	Transport & Connectivity – Supporting Tech Note
Date	19/05/2022
Prepared by	Momentum Transport Consultancy
Prepared for	Dundee City Council

1. Introduction & Aspirations

- 1.1 In recent decades, Dundee city centre has undergone radical and transformative change. Long-term strategic planning and investment has led to the creation of high-quality public realm, extensive pedestrianisation, esteemed public art, and the delivery of major assets including the Overgate shopping centre, new Council Headquarters, a new train station terminal, new parks through Slessor Gardens and Waterfront Place, and the V&A Dundee. The recent announcement to further explore the development of an Eden Project to the east of the city centre reinforces the ambition and desire for major change within the city.
- 1.2 Dundee serves as a regional centre and major source of employment for north Fife, Angus and east Perth & Kinross. The Tayplan Travel to Work Area Analysis report published in March 2016 highlights that of those people travelling to work in the Tayplan region, the largest share are travelling to Dundee City. Dundee Central Area is the single most significant destination for travel to work and prior to the pandemic, nearly 25,000 travel to work there. This is around 15% of all those who travel to work somewhere in the Tayplan area. The greatest number of journeys originate from within Dundee itself, but around 8,500 city centre commuters arrive from neighbouring local authorities. Of these cross boundary commutes, about 4,500 journeys originate in Angus and around 2,000 journeys start from both Fife and Perth & Kinross. Around one quarter of all city centre workers arrive on foot or bike, one quarter arrive by public transport and the rest by car – either as a driver or passenger. The private car is the dominant mode of travel for regional commuting and accounts for 84% of cross boundary journeys.
- 1.3 There is still much to be done to improve the city centre on multiple levels, as well as transport, while also grappling with the changing role of urban centres. Out of centre retail and the growth of digital and online services continues to challenge the role of town and city centres. Covid19 has accelerated this change and brought about its own uncertainties which challenge the way we access and use urban centres.
- 1.4 To best prepare for, support and guide future development and investment opportunities over the next three decades (2020-2050), a City Centre Strategic Development Plan is being developed. Dundee will continue to adapt and respond to every challenge by developing new approaches to reinvent itself. The next stage of the city centre's journey will be led by people – to encourage more people to live in the city centre, more people to work in the city centre and more people to travel sustainably to the city centre via active travel (walking, cycling, wheeling) and clean public transport.

- 1.5 The outcomes of the 'Our Future City Centre' consultation in 2021 identified an appetite to increase pedestrianisation and improve the accessibility of the city centre for alternative modes of transport (including walking, cycling and public transport) whilst acknowledging that vehicles will continue to play a role in the city centre's economic growth.
- 1.6 Improved connectivity will strengthen the city centres role as a local and regional centre.
- 1.7 This note supports the Connectivity Theme ambitions and strategic outcomes and should be treated as an addendum to the Dundee Future Investment Plan report by Stellan-Brand Architecture & Design on behalf of Dundee City Council.

2. Inner City Ring Road

- 2.1 The Dundee City Centre Strategic Investment Plan (DCCSIP) is concerned with the land both in and around the city centre boundary, as defined by the Local Development Plan 2019. This boundary is largely defined by the inner ring road (A991 Marketgait). This road facilitates traffic movements around the city centre and connects crucial arterial routes including the A923 Lochee Road, Tay Road Bridge, A92 Trunk Road, A85 Riverside Drive.
- 2.2 Dundee city centre has many assets with a vibrant retail and cultural core. However, at present, the inner ring road despite facilitating key movements for traffic, causes severance for surrounding communities and active travel, reduces attractiveness, and constrains the city centre.
- 2.3 The Dundee City Council 'Our Future City Centre: Strategic Investment Plan 2020-2050: Consultation Outcomes Report' highlighted the following issues and aspirations related to the inner city ring road:
 - 2.4 The inner city ring road is seen as a major barrier to active travel and creates severance.
 - 2.5 Surrounding neighbourhoods need to be better connected to the city centre with improved pedestrian and cycle routes across the inner city ring road, including segregated cycle infrastructure.
 - 2.6 Support for continuing restricted car access into the city centre through the four quarters and use of the inner ring road.
 - 2.7 Tayside and Central Regional Transport Partnership (TACTRAN) noted that a reduction in vehicles on the inner ring road would allow more placemaking and pedestrianisation to occur.
 - 2.8 Successful urban centres have more fluid boundaries and therefore future planning should consider softening this boundary to improve connectivity with the communities and key amenities surrounding the inner ring road and strengthening key active travel routes into and through the city centre's core.
 - 2.9 This can be achieved by a series of short and medium/long term actions which can be phased throughout the 30-year lifetime of the Plan.

SHORT TERM ACTIONS

- 2.10 There are possible improvements that could be made to a number of junctions along the inner ring road to deliver connectivity improvements in the short term that would not significantly affect the wider road network. These changes could unlock significantly improved connectivity and would require more detailed analysis to assess their impact on the wider road network. This would include LinSig (assessment and design of traffic signal junctions) modelling at a minimum to understand the effects that improvements may have on junctions in terms of their capacities and queuing and to reconfigure traffic signals.



Station Crossing

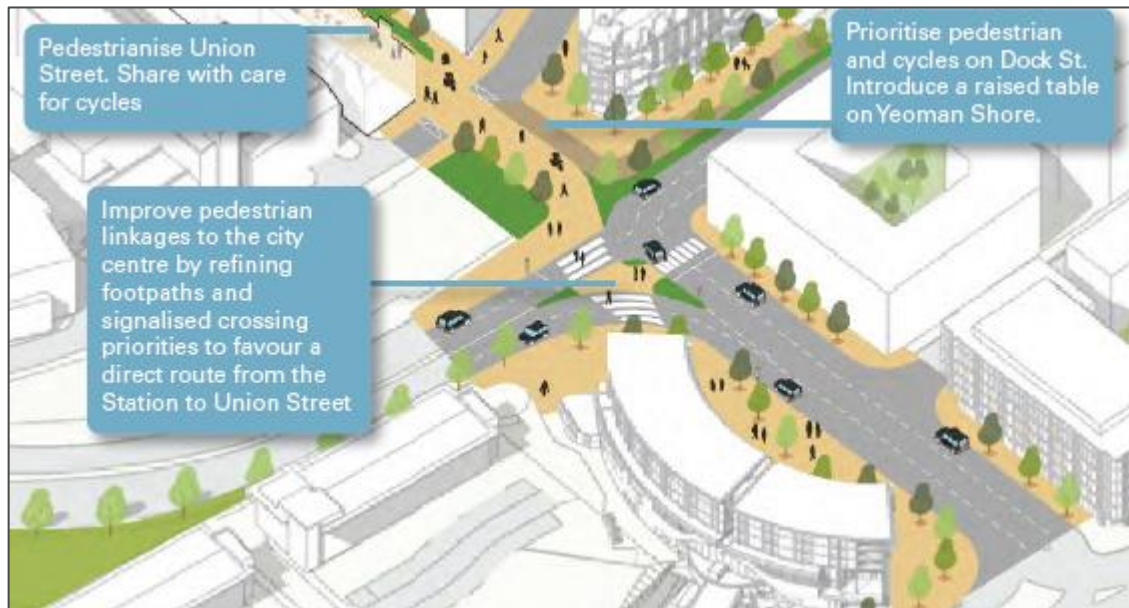


Figure 1: Station Crossing proposed improvements

2.11 The existing pedestrian link between the city centre and Dundee station currently has conflict points between pedestrians and multiple traffic lanes. Focused improvements around the station area would make this link safer and more inviting and welcoming for pedestrians. These could include:

- Refining of pedestrian crossings and footway spaces to parallel crossings and shared-use space to allow for safe movement of both cyclists and pedestrians. Currently, the pedestrian crossing from the station into the town centre is a two-stage crossing. With improvements and reallocation of road space to narrow the junction, this could become a single-stage crossing to facilitate a safer and faster pedestrian and cyclist connection into the city centre.
- Conversion of Dock Street into vehicle-free shared-use space. An extension of this into Union Street would collectively serve as a pedestrianised link into the city centre from the station. This would however mean that the existing northbound bus stop on Dock Street serving the X90 service which connects Dundee to Edinburgh Airport would need to be relocated. Possible relocation could be to enter along Yeoman Shore, along Whitehall Crescent and up into Crichton Street to stop then exit back onto W Marketgait via Nethergate. Potential changes to road network/bus network are further discussed in Chapter 6.
- A raised table on Dock Street at its junction with Yeoman Shore as a physical traffic calming measure to enforce low speeds at the pedestrian conflict area.

Nethergate Crossing

2.12 The Nethergate junction with West Marketgait (A991) lacks pedestrian priority. Currently, the pedestrian crossing over the A991 is a two-stage crossing both north and south of the junction. Additionally, pedestrians wishing to cross from to/from the Overgate to Meadowside St Paul's Church have to use the signalised pedestrian crossing east of the Mecca Bingo to do so safely. Focused improvements to this crossing should aim to make it more pedestrian prioritised and cyclist friendly. These could include:

- Responsive traffic lights could be installed at the Nethergate and A991 junction to support bus priority movements. This was suggested by Xplore Dundee in the CCSIP Consultation Outcomes Report.

- Wider pedestrian crossings on all four arms of the junction to facilitate shared crossing for both pedestrians and cyclists.
- Clearly demarcated dedicated cycle lane on approach to junction with Simultaneous Green design to give cyclists (and pedestrians) their own green phase during which they may travel in all directions at once, including diagonally, following their own desire line across the junction. While cyclists are crossing, all motor vehicles are held behind red lights. When motor vehicles are moving, all cyclists are held behind red (with the exception of often being able to make a safe right turn).
- Removal of barriers to facilitate pedestrians crossing using desire lines if a Simultaneous Green junction was to be implemented.
- Change of surfacing at junction to indicated to motorists that pedestrians and cyclists have priority.

2.13 The priority for this junction should be to facilitate a safe east-west cycle connection.

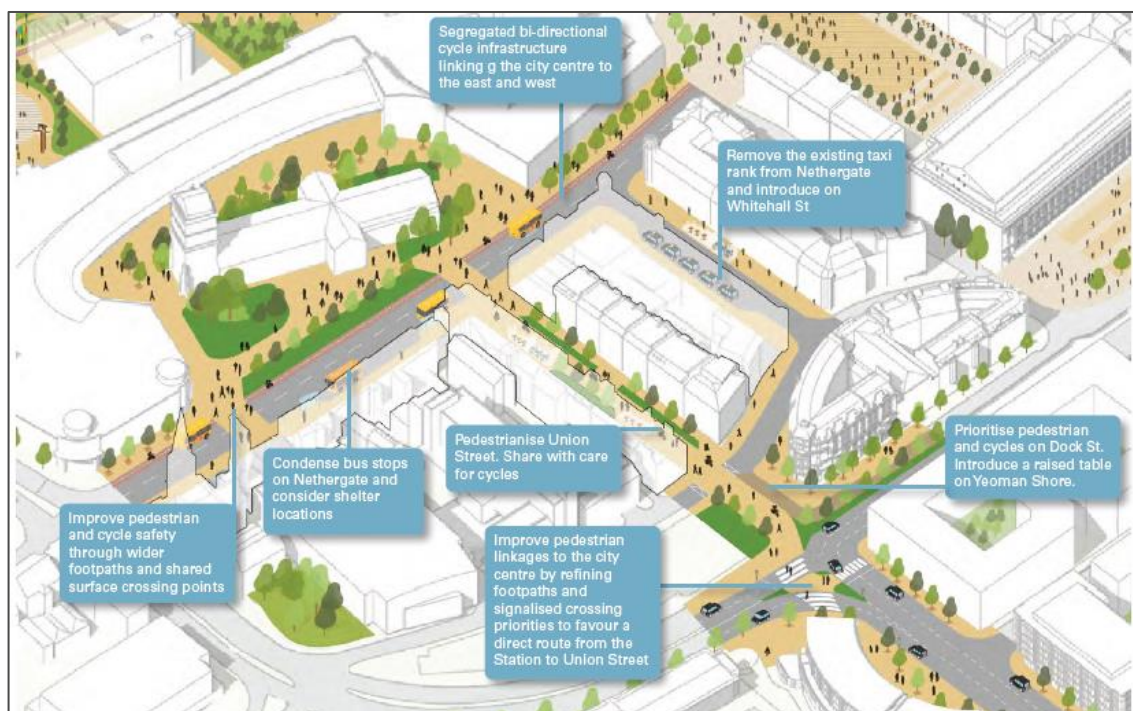


Figure 2: Nethergate Crossing proposed improvements

King Street Crossing

- 2.14 The existing pedestrian crossing layout at the junction of King Street and East Marketgait can encourage unsafe crossing patterns. The crossing facilities are protected using a series of railings to deter pedestrians away from desire lines which can have a counter-productive effect on safety. It has been observed that pedestrians are walking round the barriers on King Street on the northern side and crossing where there is no dedicated pedestrian crossing. There is very limited road signage to encourage cycling.
- 2.15 Modest improvements to the junction layout such as Advanced Stop Lines and additional road markings at carriageway surface level could help deliver better connectivity/safety to encourage active travel. Widening of footways/islands would also allow for more inclusive layout for more vulnerable pedestrians. Providing a Simultaneous Green crossing stage here would also facilitate pedestrians and cyclists to cross via desired lines.



MEDIUM/LONG TERM ACTIONS

- 2.16 Crossing busy junctions as a pedestrian or by bike can be a potentially complicated and dangerous experience. This is often a barrier for those pursuing more active forms of transport. Having to navigate a number of busy junctions can therefore make people opt for cars, in particular if the junctions were initially designed with a primary focus on motorised vehicles. There is potential for more transformative alterations to a number of junctions on the inner ring road. These changes could significantly unlock improved connectivity but would require more detailed analysis to assess their impact on the wider road network. This would include detailed traffic modelling which may include VISSIM (microsimulation), ARCADY (assessment of roundabout capacity and delay), LinSig and may include VISUM modelling to collectively analyse the impact on the wider road network if multiple junctions were re-designed.

West Port Roundabout

- 2.17 Roundabouts typically are less user friendly for non-motorised road users. In the case of the West Port Roundabout, large scale infrastructure prioritising vehicles over pedestrian connectivity resulting in circuitous and convoluted routes between the city centre and University campus. The associated pedestrian crossing facilities do not align with pedestrian desire lines. In addition, the connecting arms into the roundabout are of multiple traffic lanes, including two-stage crossings which lengthen pedestrian journey times. The surrounding footways are also narrow, and crossings are not aligned to provide logical active travel connections into the city centre.
- 2.18 A reconfiguration of the West Port Roundabout into a signalised junction, incorporating clearly delineated cycle infrastructure would unlock the potential to connect the Western areas of Blackness and the University to the city centre. A signalised junction would also significantly reduce the size of the junction. The gained space could be reallocated to provide bi-directional cycle lanes and improved public realm.



Figure 3: West Port Roundabout proposed improvements

- 2.19 It is important to note that there is currently a banned right turn manoeuvre from Nethergate eastbound onto West Marketgait towards Dundee Station. The current configuration is a left turn only from Nethergate, with vehicles using the West Port roundabout as a turn-around to approach West Marketgait southbound. If West Port roundabout were to be considered for re-design into a simpler signalised junction. To cater for this movement, Nethergate junction to the south should be carefully considered, along with any wider network impacts.
- 2.20 An alternative solution for the West Port Roundabout to maintain all movements would be to implement a 'Dutch Style' Roundabout which is discussed in Junction Typologies in the following section. This provides priority for pedestrians and cyclists whilst also providing the flexibility of catering for all vehicle movements.
- 2.21 Due to the large existing roundabout geometry, the surrounding arms are dominated by wide traffic islands. The central reserve island for example on West Marketgait is as wide as ten metres leading up the junction. This provides very limited public realm value. As part of the junction redesign, a removal of the central reserve, with a view of redistributing this space to widen the footways would transform the area. The additional footway space on West Marketgait could then be utilised to provide a segregated cycle lane, as part of a wider cycle network, connecting the West to the city centre as well as Dundee Station.
- 2.22 Leith Street in Edinburgh provides a good example of how busy city road networks can be reimagined to provide segregated cycle lanes and thus encourage a more pleasant means of active travel.



Figure 4: Leith Street, Edinburgh (before) 2017 (source: Google Street View)



Figure 5: Leith Street, Edinburgh (after) 2020 (source: Google Street View)

- 2.23 The Elephant and Castle junction in London is a great example of how cycle lanes can be integrated as part of a transformative junction redesign in a busy area. The design effectively reduced carriageway widths in return for a mix of public realm space, shorter crossing distances and segregated cycle lanes.

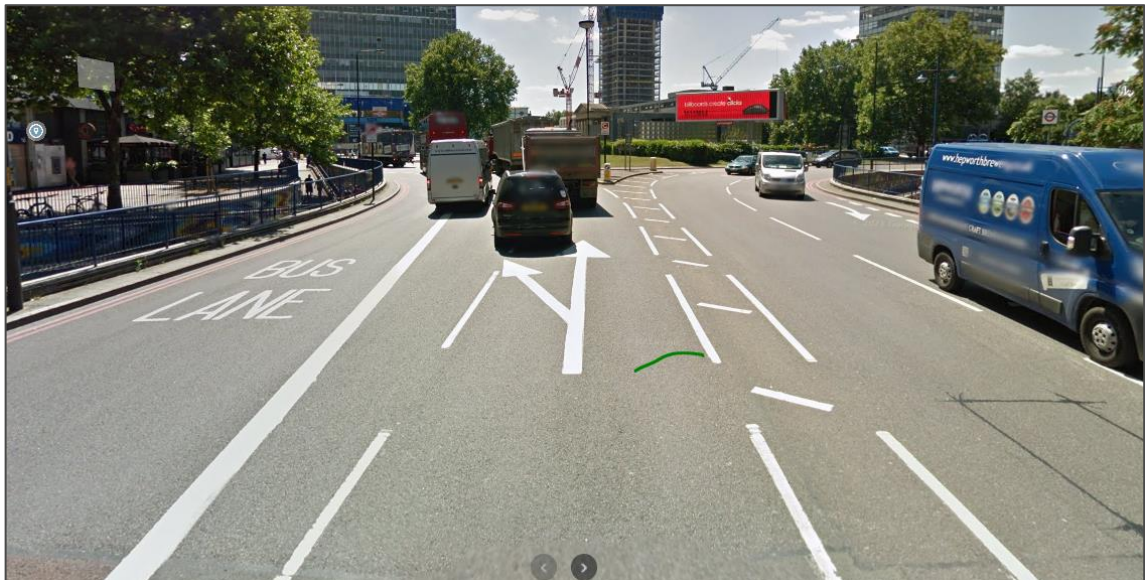


Figure 6: Elephant and Castle, London (before) 2014 (source: Google Street View)



Figure 7: Elephant and Castle, London (after) 2017 (source: Google Street View)

Dudhope Roundabout

- 2.24 The existing configuration of the Dudhope Roundabout is dominated by multiple traffic lanes and the large landscaped central island. This is inaccessible to the public, providing a lack of value in terms of usable space for pedestrians and public realm. There is poor and narrow pedestrian infrastructure surrounding the whole junction, further emphasising the disconnect between the University accommodation and Blackness to other areas in the city.
- 2.25 A redesign of the roundabout into a 3-arm signalised junction would transform the area. A realignment of the junction could allow for the landscaped central island and green central reservations on the eastern arms to be reallocated to a significant area of public realm space outside of the University accommodation and allow for much wider pavements. There is a great opportunity to incorporate active travel infrastructure, using the reallocated road space from narrowing the junction into potentially incorporating a dedicated cycle lane along Lochee Road to connect up into the northwest of the city and a green connection into Dudhope Park to create a healthier and safer environment for more people to walk and cycle.
- 2.26 Improvements to the Dudhope Roundabout should consider impacts to Marketgait to the south, including aligning with proposals of narrowing carriageway space in favour of any proposed active travel lanes.
- 2.27 Changes to the junction would also impact any future proposals to the Constitution Road and its junction with the inner ring road.

Constitution Road

- 2.28 A key potential connection to the north along Constitution Road is interrupted by the inner ring road requiring pedestrians and cyclists to use an underpass to access the city centre due to the significant level difference of the carriageway. The existing underpass is shared with vehicles using the Bell Street car park. Busy car park entrances and exits can be very stressful environments for more vulnerable road users.
- 2.29 In the short term, closing the underpass to vehicles in favour of an active travel passage with a dedicated cycle lane and adequate footway space would greatly enhance the connectivity



between the city centre and the north. Access and egress for vehicles would still be maintained via the North Marketgait A991. Adequate lighting should be provided for safety and any ramps shall consider accessibility requirements to be Equality Act compliant. There is an additional opportunity for placemaking in the area, encouraged through public realm design, greening and artwork to make the area more inviting.



Figure 8: Constitution Road proposed improvements (short term)

- 2.30 In the longer term, a new surface level pedestrian crossing could be implemented to continue Constitution Road which would significantly improve accessibility from residential neighbourhoods to the north. This would facilitate a strong north south connection for both pedestrians and cyclists to/from the city centre.
- 2.31 The junction would need to be reprofiled to address the existing level change for it to become an accessible level crossing for pedestrians and cyclists.
- 2.32 The junction would become a three-arm signalised junction with priority and crossings given to active travel. The stopping up of the underpass would allow the western extent of the junction to be allocated to public realm to create a new open space. The signalised junction would still allow access into Bell Street car park.



Figure 9: Constitution Road proposed improvements (long term)

East Port Roundabout (Seagate)

- 2.33 The existing East Port Roundabout is dominated by vehicular traffic and is a major barrier to pedestrian connectivity which will limit access to the Eden Project site to the east if no improvements are made. The existing roundabout arrangement serves as a significant barrier to pedestrian movement, limiting connectivity from the city centre to the east. A lack of pedestrian infrastructure along pedestrian desire lines encourages unsafe crossing patterns. The combination of wide carriageways and surrounding narrow footways significantly discourages active travel.
- 2.34 The multiple carriageway lanes, the central island as well as the surrounding traffic islands of the roundabout dominate the space, providing little public realm value. A significant reconfiguration of the junction to a 4-arm signalised junction would allow for a reallocation of carriageway space for user-friendly footway space. This would provide adequate public realm space around Olympia, embedding the facility with the surrounding streetscape and encouraging engagement with the leisure centre.
- 2.35 This would also open an opportunity for a bi-directional cycle lane east-west on Seagate as part of the signalisation. In addition, a reconfiguration of Seagate into westbound only from the inner ring road would significantly reduce vehicle flows (further discussed in Chapter 5). The gained carriageway space could be converted into wider footways and cycle lanes. In addition, this would also reduce the dominance of bus stop infrastructure along Seagate.
- 2.36 More widely, the existing underpass via Cowgate could be much better connected to Seagate with intuitive wayfinding. Any improvements to the roundabout should also consider how surrounding east-west connections can be improved, such as the King Street crossing further north.



2.37 With some modification, there is potential for this junction to be transformed into some form of CYCLOPS Junction (refer to Junction Typologies section below). These junctions facilitate safe pedestrian and cycle movement in all directions. This would therefore further enhance the east-west link. It is important to note however that this type of junction is best suited when integrated as part of a wider cycle network, ideally providing entry and departure cycle lanes in some form on all arms.



Figure 10: East Port Roundabout/Seagate proposed improvements

Ward Road Crossing

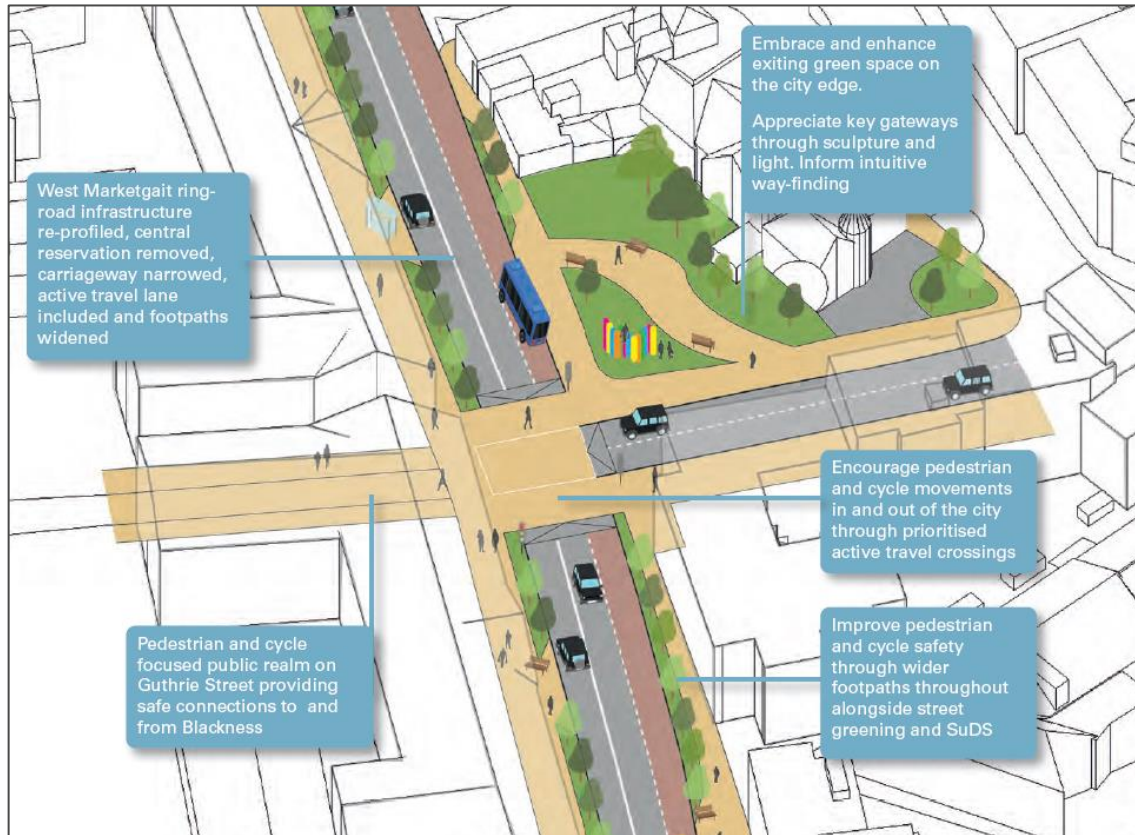


Figure 11: Ward Road Crossing proposed improvements

2.38 The existing arrangement of Guthrie Street/Ward Road and its junction with West Marketgait provides a severed east-west pedestrian link. Improvements to this area could enhance a key connection between the city centre and Blackness. Opportunities to improve this link could include:

- Conversion of Guthrie Street into shared use route and public realm space with parking area reinforced for access only.
- Removal of pedestrian guardrail at Guthrie Street in favour of less obtrusive bollards integrated with local public realm.
- Removal of central reserve and reduction in number of carriageway lanes on Marketgait in favour of widened footways and potential cycle lanes.

A raised junction profile between Ward Road and Guthrie Street prioritising active travel movements as well as serving as a physical traffic calming measure

JUNCTION TYPOLOGIES

2.39 There are a range of potential solutions that could balance the prioritisation of pedestrians, cyclists, and vehicles around the inner ring road of Dundee. The CYCLOPS junction and Dutch Style roundabout are two examples of potential junction types that can be transformative to how people move around the city. The CYCLOPS junction for example would be suited better for more compact, busy environments with a potential to incorporate a diagonal crossing, encouraging movement in all directions. The Dutch Style roundabout would improve an existing roundabout where the junction arms are poorly connected for walking and cycling. A more pedestrian focused



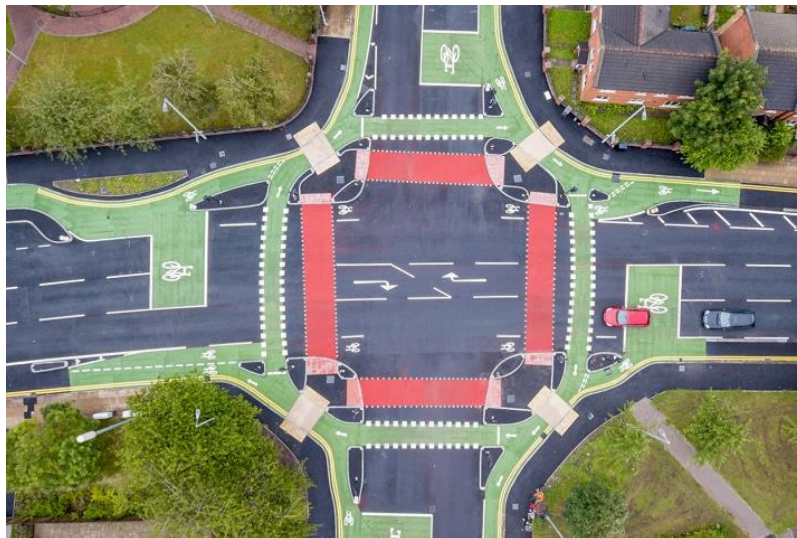
junction type is a diagonal crossing. A great example is Oxford Circus, one of the most congested spaces in the country in terms of consistent vehicular and pedestrian flow.

- 2.40 In choosing the appropriate junction design, several factors would need to be considered, such as road safety, junction capacity and the local topography. Segregated cycle lanes around a junction should also be connected to wider cycle routes on a strategic level. In any case, further modelling should be undertaken to assess the viability of any option.

CASE STUDY

CYCLOPS Junction - Manchester

The UK's first CYCLOPS (Cycle Optimised Protected Signals) cycling junction was launched in Manchester in 2020. The key feature to this signalised junction design is that it segregates cyclists from general traffic at junctions, offering an alternative route "around" the junction. It significantly minimises the risk of 'left hook' cycling incidents, where cyclists going ahead are struck by left turning vehicles. The key safety benefit to the design is that it allows for signalisation of all cycle/traffic conflicts to ensure separation of movements. Note there are also segregated pedestrian crossing facilities which can be ran simultaneously as a signal phase.



Other benefits include:

- Cyclist and pedestrian phases can run simultaneously
- Pedestrian crossing times are shorter and closer to desire lines, including the potential for diagonal pedestrian crossings
- Cyclists have protected right turn on a gentle radius, and can filter left without signal control
- Journey times for all modes navigating the junctions, including motor traffic, are not negatively affected.

Source: [Intelligent Transport \(2020\)](#)

CASE STUDY

Dutch Style Roundabout – Cambridge

The Fendon Road roundabout in Cambridge is the UK's first 'Dutch Style' roundabout. It was designed to improve the road safety of its predecessor, having seen 12 collisions between cyclists and cars between 2012 and 2017. Similar to the CYCLOPS junction arrangement, it navigates cyclists and pedestrians around the centre of the junction, albeit without traffic signals, instead with a series of priority parallel crossings on all arms. This therefore allows for smoother vehicle flows when bike and foot flow is lower. It also psychologically encourages lower speeds and driver awareness when approaching and leaving the roundabout.



Key benefits/features include:

- Cyclist and pedestrians have priority over oncoming vehicles
- Pedestrians have priority over approaching and leaving cyclists.
- Physical segregation of roundabout circulatory and cycle lane through landscaping.
- Journey times for all modes navigating the junctions, including motor traffic, are not negatively affected.

Source: [BBC News](#)



CASE STUDY

Diagonal Crossing – Oxford Circus

Inspired by previous crossings in Tokyo, The UK's first large scale diagonal crossing opened in 2009 in Oxford Circus, one of the country's most congested spaces. The diagonal crossing was combined with a significant footway widening measures on both Regent Street and Oxford Street. All pre-existing barriers and street clutter were removed to allow freedom of movement during an all-pedestrian signal phase. This scheme very quickly realised time cost savings that were calculated to be higher than the cost of works, effectively paying for itself in 6 months. This type of junction is particularly effective where existing or aspirational pedestrian desire lines warrant a diagonal movement.



Source: [Urban Design Group](#)

LONGER TERM – RATIONALISATION OF INNER RING ROAD

- 2.41 With aspirations for a transport modal shift toward more forms of active travel, a longer-term transformative approach would be to reassess the requirement for sections of the inner ring road.
- 2.42 The city centre boundary is largely defined by the ring road, which currently has a heavy emphasis on vehicular traffic movement. As a result, there is a sense of disconnect between the surrounding communities and the city centre, with the ring road being a physical barrier to further growth. There are significant topographical challenges with addressing the ring road to the north, with the vehicle underpass. However, West Marketgait could be transformed into a less vehicle-dominant multifunctional space, which would soften the boundary and open up opportunities to expand the city centre westwards to integrate the University and Blackness areas. Any active travel proposals would hugely benefit from this.
- 2.43 There could be scope to reduce the number of traffic lanes by half and remove central reservations on West Marketgait and dedicate the gained road space into either improved areas of public realm, wider pavements, bus priority lanes and cycle super highways. Building these high-quality routes is common practice in countries such as Holland and Denmark and this

approach is now beginning to be rolled out in the UK in areas such as Cambridge, Brighton London and Manchester with large increases in cycling levels as a result.

Benefits of active travel and public realm improvements

[The Pedestrian Pound](#), Living Streets (2018) report suggests that well planned improvements to public spaces can boost footfall, dwelling times in the town centre, and bring benefits to local businesses. If more space is given for walking and cycling and less to cars, the absence of customers arriving by car would be more than compensated by people arriving on foot or by bike.

The report concludes that:

- Walking and cycling projects can increase retail sales by 30% or more. As part of the Town Centre Living Initiative (TCLI)¹, improvements to the public realm were seen as key to tackle commercial vacancy.
- Those arriving by foot or cycle tend to spend more than those arriving by motorised transport. If more space is given for walking and cycling and less to cars, the absence of customers arriving by car is more than compensated by people arriving on foot or by bike.
- Good urban design and quality green spaces can increase property prices and rents by up to 20%
 - Walking projects can increase land values by up to 30%

CASE STUDIES

Sheffield

*In Sheffield, the creation of a new open space and public space, the 'Peace Gardens', led to a 35% increase in shopping visits and net increase in spending of £4.2m.
(The Pedestrian Pound Report, Living Streets, 2018)*

Coventry

A New Civic Square was developed in Coventry, which included a pedestrianisation of the area and the rationalisation of the street furniture. The improvement led to a 25% increase on footfall on Saturdays.

(Economic Benefits of the Reallocation of Street Space, Ryder Alliance publication, 2020)

Altrincham

In Altrincham, public realm improvements throughout the city led to a footfall increase of 22% and reduced retail vacancy by 22%.

(Economic Benefits of the Reallocation of Street Space, Ryder Alliance publication, 2020)

Shoreditch

In June 2017, a temporary 'parklet' in Shoreditch, East London – which turned a space normally occupied by two cars into seating for 14 people and 8 cycle parking spaces –

increased the adjacent shops takings by 20%.

(Hackney Council, 2017)



3. City Quarters and Traffic Circulation

- 3.1 The draft Sustainable Urban Logistics Plan for Dundee (2014) notes that the city centre is divided into four traffic zones and through traffic is restricted except for buses. Access into each zone is via several access points on the Inner Ring Road.
- 3.2 Dundee could develop this traffic circulation system further by streamlining the number of access points for private traffic to one or two for city centre quarter (Figure 15), creating circular access routes which promote the use of existing surface car parking / multi storey car parks.
- 3.3 A reduction in car dominance in the city centre would also support greater levels of active travel, particularly if cycle paths and pedestrian routes into, and through, the city and its' traffic zones were strengthened. It would also support the introduction of the Low Emission Zone.
- 3.4 With this being said, there is a balance to strike between traffic restraint and pedestrian priority. If not carefully planned, pedestrianisation can have disadvantages such as concerns about personal security at night, especially where the pedestrian zone consists only of shops. Effective law enforcement and maintenance is essential in areas where there may be a reduction in through traffic in the future.
- 3.5 As stated in the Tayplan Travel to Work Area Analysis report, the majority of those travelling to Dundee central area (includes the city centre and universities) originate from within the Dundee core area (Council area, Muirhead, Birkhill, Monifieth, Newport, Tayport, Wormit, Invergowrie), with the Dundee City Council area representing the majority. Of those originating here, car/van drivers/passengers are the single most significant mode used. This highlights that the majority of people are travelling into the centre by vehicle. To reduce this dominance and encourage more active travel uptake, a traffic circulation system should be implemented.
- 3.6 Access points for each zone and the key car parks could be via Kirk Lane, Seagate and Gellatly Street, Yeaman Shore and Argyllgait, as indicated in Figure 12 below.
- 3.7 To adhere to the traffic circulation show in the figure, entry and exit from Dock Street to the car park in front of the Carid Hall would need to be blocked and allowed only from Castle Street.
- 3.8 Access to the Wellgate Centre Car Park is based on the existing conditions, however the site is marked for development so this is subject to change.
- 3.9 Journey times for private vehicles within the city centre may be impacted if such a system were implemented. However, this must be considered in relation to the benefits that would be gained, such as reduced bus journey times and air pollution, increased road safety and provisions for active travel. While the economic benefits of public realm improvements have been proven, as demonstrated in [The Pedestrian Pound report \(2018\)](#), the circular vehicular routes will still enable access for those that need it (access to central disabled spaces) and to support the local economy.
- 3.10 The focus of strengthening the traffic circulation system in Dundee would be to reduce private car journeys and reallocate road space to encourage active travel into and around the city centre. Reduced entry and exits for private vehicles would promote the use of the existing surface and multi storey car parks and prioritise active travel, public transport, taxis and servicing and deliveries.
- 3.11 Short term measures to implement such a scheme could be:
 - Temporary enforcement of closed roads via measures such as signage and movable planters to assess and monitor potential for permanent measures.

- Review of existing signage to communicate car park locations, capacity, and occupancy levels in each quarter.

3.12 Medium to longer term measures could be:

- Reallocation of on-street parking to active travel infrastructure (wider pavements, cycle lanes).
- Enforcement via Automatic Number Plate Recognition (ANPR) cameras in areas of non-compliance. ANPR captures vehicle number plates and can be used to penalise those not registered as exempt from road restrictions.
- Enhancement of the public realm (parkettes, seating, planting).
- To encourage efficiencies in deliveries and servicing, areas with timed access for loading could be extended or a pre-booking system trialled for loading bays.

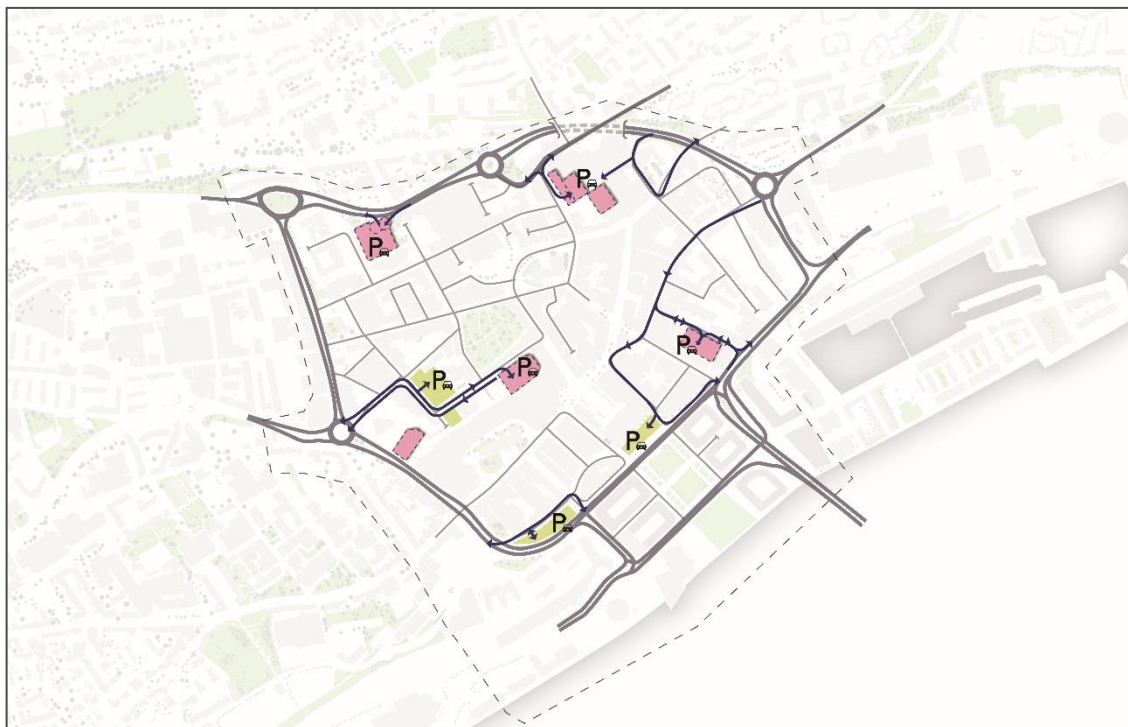


Figure 12: Proposed city centre vehicle circulation system



CASE STUDY

Ghent, Belgium

Ghent introduced a circulation plan in 2017 to reduce traffic and short car journeys and improve liveability and accessibility in the city centre. This divided the city into 6 sections and a pedestrian zone, with movement between sectors restricted to the inner ring road.

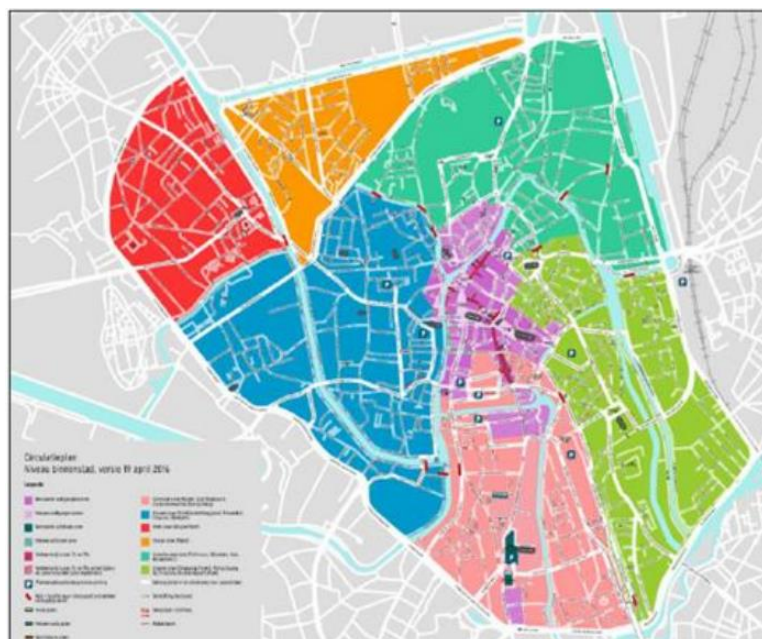
The circulation plan is enforced by temporary physically altered streets, road markings and signs. A permit and ANPR system are also in use. Permits are free and required for entry into restricted sectors via fixed access routes. A permit does not automatically grant access to all restricted areas. For example, suppliers across the city have to request a permit for each area and deliveries are restricted to 18:00- 11:00. Public transport, taxis, emergency services and refuse collection vehicles do not need a permit and can drive through closed streets.

Street parking in the restricted traffic area is prohibited.

The circulation plan has created space for improved cycling infrastructure and safe crossings. The changes have been:

- Cyclists crossing the inner ring road increased 20% from 2016 to 2018 (City of Ghent, 2018).
- The city reached its target cycling modal share of 35% in 2019, 13 years earlier than planned (Reid, 2020).
- There has been a decrease in motorised traffic by 13% in peak hours, and in freight traffic by 22% (City of Ghent, 2018).
 - Motor vehicles have fallen from 55% of trips in Ghent to 27% (Reid, 2020).
- Reported road accidents have decreased by 35-40% since 2015 -2018 (City of Ghent, 2018).
 - NO₂ has dropped by 20% since 2017 (Reid, 2020).
- Economic benefits, such as a 17% increase in restaurant and bar start-ups and a reduction in shop vacancies (Reid, 2020).

The circulation plan cost £3.4 million to implement, which is relatively low cost for such significant benefits.



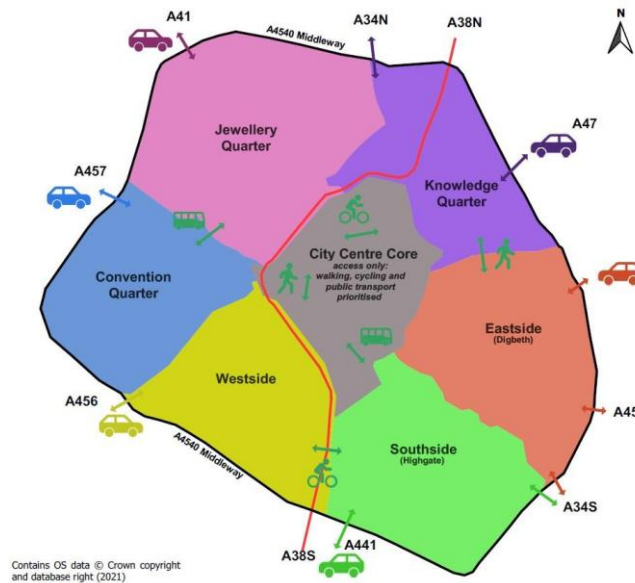
Source: [City of Ghent \(2018\)](#) [The Guardian \(2020\)](#)

CASE STUDY

Birmingham, UK

To help deliver a transformation of the city centre, Birmingham City Council is dividing the centre into seven segments as part of a 'traffic cells initiative'. This seeks to reduce the dominance of cars, improve walking and cycling infrastructure, and prioritise public transport. Additionally, it will enable the introduction of cross city buses, new public open spaces and better management of access, servicing and deliveries.

The segments are the city core and its six peripheral segments bounded by the A4540 Ring Road, as shown in below.



Each segment will only allow vehicular access from the A4540 Ring Road, with movement between segments only possible by public transport and active travel. Private vehicles will have to return to the A4540 to continue their journeys.

The traffic cell initiative began to be implemented via the Emergency Active Travel Fund in 2020. This took a phased approach with quick, temporary changes to the street first, followed by using street space differently. The final stage involves making changes permanent.

Temporary traffic management measures, such as barriers, road markings and signs, have been used. However, the Transport Plan outlined enforcement by physical measures such as bus gates and road closures.

The short-term objective from the emergency travel fund implementation was to create more space for walking and cycling by reducing the volume of through-traffic on minor roads. The longer-term objectives for future projects post 2020/21, are to remove all through-traffic within the city centre creating opportunities for road space reallocation. This is outlined to include carriageway realignment, new junctions and other permanent changes, as well as continuing to consider different options for the central section of the A38 through the city centre.

To support servicing and loading, measures such as reallocating current parking spaces to managed loading, or timed deliveries during off-peak hours may be implemented.

Source: [Birmingham's City Centre Segments](#)



4. Freight Consolidation

- 4.1 To reduce the number of delivery vehicles entering the city centre and to create more efficient use of street space, Dundee could trial a consolidation and last mile delivery service for city centre businesses. This would also support improvements in air quality and road safety.
- 4.2 The TACTRAN Regional Transport Strategy 2015-2036 Refresh highlights implementing more efficient and environmentally friendly urban logistics, including consideration of logistic service centres in the region's main cities and towns.
- 4.3 TACTRAN conducted a Freight Consolidation Feasibility Study for retailers in Dundee and Perth in 2010. This identified Dryburgh Industrial Estate as a potential retail consolidation site to serve Dundee. The site is 3.8 miles from Dundee city centre and is conveniently located for the A90, which is one of the key supply chain routes into the city along with the A9 and M90.
- 4.4 If the Dryburgh site was taken forward as a consolidation site, or any other feasible site of similar distance to the city centre, a series of micro-consolidation centres could be established around the periphery of the inner ring road if suitable sites were located. With micro-consolidation centres, the consolidation of goods is much closer to the delivery point, which would be the city centre. They tend to serve smaller areas and handle small and lightweight goods often delivered by couriers. Zero emissions last mile solutions such as cargo bikes and small electric vans can be used to provide additional environmental benefits. The size and topography of Dundee city centre is suitable for this, particularly the use of e-cargo bikes.
- 4.5 However, Dundee City Council could seek to find an appropriate site to establish a consolidation centre that is closer to the city centre. Suitable sites for a consolidation centre or micro-consolidation centres may be within sites of existing surface car parking, multi storey car parks, development sites which are yet to find a use.
- 4.6 The benefits of freight consolidation include reducing emissions and air and noise pollution, improving the streetscape, reducing conflicts involving delivery vehicles and creating efficiencies in deliveries for businesses. These all support the creation of thriving shopping environments.

CASE STUDY

Bath, UK

The city suffers from traffic congestion, which contributes to poor air quality, noise levels, and an unattractive physical environment. HGVs disproportionately contribute to these negative impacts.

An urban freight consolidation scheme was set up to reduce the number of deliveries made to city centre businesses. Goods are consolidated at a conveniently located facility before being delivered at pre-arranged times by electric vehicle.

The consolidation centre was operated by DHL, with support from Bath & North East Somerset Council. The service was offered to city centre businesses at no charge for the first 15 months, and then £9 per cage and £12 per pallet.

The scheme also partnered with Bristol City Council to serve both cities.

There was an average 76% reduction in deliveries to the 19 participating businesses in Bath from January 2011 to April 2012.

The use of electric vehicles reduced energy consumption by 55.7% and pollutant emissions, such as CO₂ by 10,179.74 kg and NO_x by 330.86kg.

Participants were supportive of the scheme, with 81% very likely to recommend the service to other businesses. Deliveries were made on time and no damages were experienced.

Funding consolidation schemes without on-going subsidies from local authorities remains a challenge.

Both councils also considered enabling the electric consolidation vehicles use of public transport priority measures to create green corridors, which would also reduce delivery times and improve efficiencies.

Bath proposed restricting vehicle access, including delivery vehicles, to parts of the main shopping area between 10:00 – 18:00. The consolidation centre electric vehicles would be exempt, which would hope to act as a catalyst for businesses joining the scheme.

Source: [CIVITAS Renaissance Case Study: Freight Consolidation in Bath](#)



CASE STUDY

Stadsleveransen (The City Delivery), Gothenburg, Sweden

Gothenburg introduced a consolidation and last mile delivery service for businesses in the city centre. It seeks to minimise congestion and its associated environmental impacts and “create a traffic system which contributes to a pleasant, competitive and safe inner city”.

It consolidates deliveries for 500 shops and businesses and delivers via cargo bikes and electric vehicles. Over 500 packages are delivered per day on average.

It is funded by fees from private transport companies and advertising sales.

Source: [The Guardian \(2015\)](#), and [City of Gothenburg \(2017\)](#)

CASE STUDY

Regent Street Delivery Consolidation Scheme, London, UK

To improve the shopping environment of London’s West End, a delivery consolidation scheme has been set up amongst retailers in the area. The consolidation centre is located outside of the congestion zone and enables deliveries to different businesses to be consolidated, reducing vehicle movements to participating stores by up to 85%.

Additional benefits to businesses include less storage space required within stores as deliveries can be made when needed, and improved company low carbon credentials. Meanwhile, the street environment for shoppers has been improved with less noise, congestion and pollution.

Source: [Clipper Logistics \(2016\)](#)

FREIGHT AND SERVICING ACTION PLANS (FAP)

- 4.7 Several councils within the UK have developed or are in the process of developing freight and servicing action plans, such as Kent County Council, London as a whole, and individual boroughs including Camden. It is acknowledged that the freight industry plays an important role in the economy and to quality of life, however there are several negative impacts related to freight movements. FAPs therefore set out actions for supporting safe, clean and efficient freight operations.
- 4.8 FAPs have been developed to target areas of policy, such as climate change, safety and air quality.
- 4.9 A Freight and servicing action plan would support and build upon the measures within Dundee’s Air Quality Action Plan (2011), such as those outlined for heavy goods vehicles (HGVs). In addition, it would respond to Scotland’s Climate Change Act’s (2019) net zero by 2045 target. The Update to the Climate Change Plan 2018-2032: Securing a Green Recovery on a Path to

Net Zero notes that 25% of transport emissions in Scotland are related to freight and as such, decarbonising logistic networks are “central pillars to Scotland’s efforts to reach its emissions reduction targets”.

- 4.10 The Update to the Climate Change Plan 2018-2032 also highlights the importance of holistically developing comprehensive solutions to decarbonising freight. This is a key benefit of a FAP, which draws together a comprehensive range of measures to tackle freight-related challenges.
- 4.11 Dundee’s Draft Sustainable Urban Logistics Plan (2014) highlights that concerns around freight involve misuse of loading bays and air pollution. Research within the Plan outlines that 2,007 commercial vehicles enter the central area between 07:00 – 19:00, of which 83% are Light Good Vehicles (LGVs). The peak time period was 8:30 – 10:30, which corresponds with vehicle restriction timings on the pedestrianised streets.
- 4.12 A FAP for Dundee could therefore seek to reduce the total number of freight vehicles entering the city centre as well as seeking to consolidate and retime deliveries to avoid the peak morning hour, but still comply with the time restrictions on the pedestrianised zone.
- 4.13 Key aims of a FAP for Dundee should be to:
 - Facilitate a reduction in overall freight and servicing trips to businesses
 - Promote the use of cleaner, more environmentally friendly delivery practices
 - Explore a series of innovative freight and servicing solutions that are suitable for the businesses located within Dundee city centre
- 4.14 Implementing a consolidation centre or micro-consolidation centre into Dundee would be key to the development of a FAP for the city centre, both of which are longer term deliverables. There could be feasibility in linking any potential consolidation centre or FAP to the ambitions to turn Bell Street multi storey car park into a green travel hub that is a potential for an electric cargo bike depot.
- 4.15 In the short term, there are other methods of collaboration which businesses could be encouraged to undertake:
 - Collective procurement – refers to a group of businesses who jointly purchase goods and services from a number of carefully selected suppliers. For examples, the order of stationery for one organisation is combined with those of other businesses so deliveries arrive together, on a single vehicle. This may be appropriate when the businesses share a building or in the same area. A major benefit of collective procurement is that it increases buying power and usually results in lower prices.
 - Bunching orders – another simple solution that does not involve a major change in the way goods are bought. An agreement is made with suppliers regardless of the number of orders placed during a given time period and the supplier only makes the delivery on a given day or date. Individual orders are ‘bunched’ so they arrive together on a single vehicle. This reduces the overall number of trips needed and associated emissions.
 - Nominated carriers – where a delivery company is selected by the purchaser to deliver all their goods from suppliers. This solution is suitable for all types of organisations. Its effectiveness is increased if businesses located in a specific area work together and agree to use the same nominated carrier for all their deliveries and collections. It eliminates the issue of a large number of carriers duplicating each other’s paths with partially filled trucks or vans.
 - Upstream supply chain – the sharing of transport resources through collaboration between businesses can lead to a reduction in trips as well as financial and environmental savings.



4.16 Both short and longer term solutions for reducing freight would need to involve close engagement with local businesses and local communities to ensure engagement is effective and inclusive. As well as targeting local businesses, we would also suggest that engagement for any freight strategy includes groups such as the local Start Your Own Business network, Dundee Business Network, Women AHEAD, Dundee & Angus Chamber of Commerce and any other relevant groups.

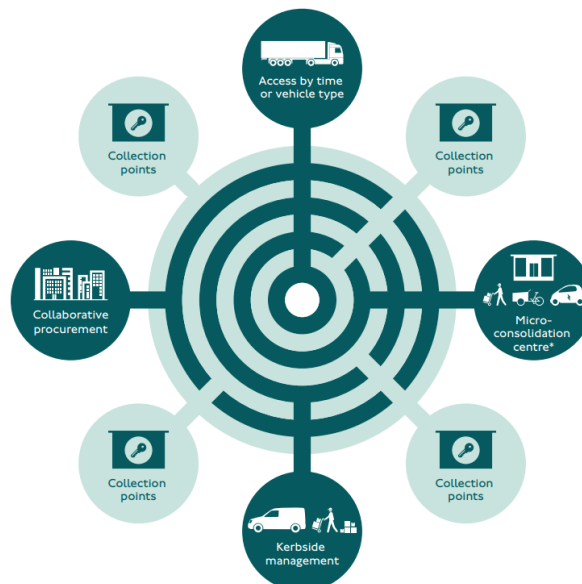
CASE STUDY

Freight and Servicing Action Plan, London, UK

London's FAP, developed by TfL, targets 4 priorities:

- **Safe freight** – this directly relates to achieving Vision Zero. Initiatives relate to safe vehicles (such as the Direct Vision Standard), safe speeds, safe streets and safe behaviours.
- **Clean freight** – reducing emissions by encouraging a switch to ultra low emission vehicles, adopting smarter delivering practices and freight consolidation.
- **Efficient freight** – reducing congestion through initiatives such as collective procurement, consolidation, cycle freight, and developing area freight action and servicing management plans and guidance.
- **Protecting land for freight** – by ensuring new developments adequately plan for freight by providing/retaining land and infrastructure for appropriate consolidation and loading. The integration of logistics activity with other land uses is also supported, for distribution centres and collection points.

Figure 13: Combining measures in Area freight management plans



These priorities are to support the Mayor's ambition to cut the number of lorries and vans entering central London in the morning peak by 10% by 2026, as well as the Mayor's modal shift targets of 80% by sustainable transport by 2041.

Source: [Transport for London \(2019\)](#)

CASE STUDY

Freight, Servicing and Deliveries (FSD) Strategy and Action Plan 2020-2040, City of Westminster

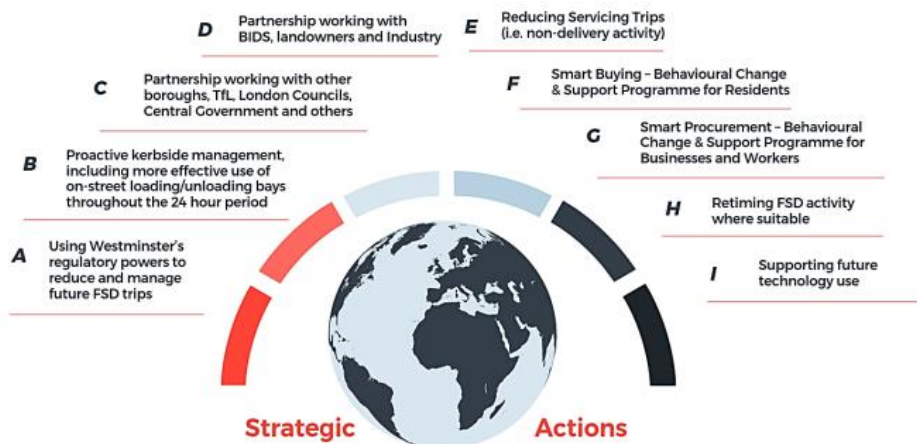
The City of Westminster's FSD Action Plan responds to two objectives regarding commitments to become a carbon neutral local authority by 2030 and to support the Mayor's Vision Zero road safety target.

As a result, the following targets have been proposed:

- Reducing FSD vehicles in Westminster by 80% by 2040. Without any action, Westminster will face a 36% increase by 2041 in these vehicles.
 - All trips made by FSD in Westminster will be zero emission by 2040.
 - To eradicate all FSD related KSI collisions by 2041.

Stakeholder engagement and research informed the FSD Strategy and Action Plan by identifying the themes of reducing, remodeling and retiming. From these themes 9 Strategic Actions were developed and 55 measures.

Figure 14: The 9 Strategic Actions



Source: [City of Westminster \(2021\)](#)

NEXT STEPS

- 4.17 To support the reduction of traffic in the city centre and to encourage efficiencies in deliveries and servicing, a delivery and servicing plan should be undertaken. Data would need to be collected to inform this plan. The Freight and Servicing Plan would provide a framework to improve the management of all delivery and servicing vehicles movements to and from the city centre. The plan would provide a summary of the proposed locations for loading and unloading, along with the hours of servicing.
- 4.18 Traffic surveys could be commissioned to capture vehicle volumes and vehicle types to identify congestion related to delivery and servicing vehicles accessing the city centre.
- 4.19 Studies could also be conducted on loading bay usage to identify timings and usage rates. This would inform areas in need of additional loading bay provision and bays which are under-utilised. Under-utilised loading bays could be reallocated to active travel infrastructure and public realm improvements.



- 4.20 Surveys/engagement with local businesses could be undertaken to understand interest in consolidation trials, such as cargo bike schemes.

5. City Centre Road Network

- 5.1 The existing city centre road network limits through traffic by designating certain streets as pedestrian and servicing only, and bus and/or taxi only. However, despite these beneficial measures a number of issues occur which negatively impact the connectivity and environment of the city centre. These include illegal manoeuvres at Murraygate and Commercial Street by private vehicles, U-turns by taxis on Nethergate and the dominance of bus stops in key areas of the city.
- 5.2 A high-level review of the road network has been undertaken to see what options are available to reduce private car access and consolidate bus infrastructure in the city centre in terms of routes and the number of stops, which currently consume space that could be reallocated to public realm.
- 5.3 Wider transport issues related to the existing bus corridors have also been reviewed, such as taxi rank locations and private vehicle access.
- 5.4 Consideration has been given to the 'Our Future City Centre' consultation report and notably the Xplore Dundee input.
- 5.5 The way people, bikes, buses, service vehicles and private cars access the city centre has been considered in terms of the four quarters.



Figure 15: Dundee four quarters map

SEAGATE/ SOUTHEAST QUARTER

- 5.6 The Seagate is currently two-way for both private vehicles and buses which result in it being busy and unattractive to pedestrians and cyclists. It is also dominated by multiple bus stops which eat into pavement space and at points makes them quite narrow.
- 5.7 Introducing a one-way system around the eastern side of the city centre could enable significant improvements to the pedestrian environment along Seagate. Along with modifications to East Port Roundabout, this could unlock a new and enhanced link from the city centre to the Eden Project.
- 5.8 From East Port Roundabout until Seagate Bus Station would be two-way, before becoming one-way westbound for all traffic connecting to Commercial Street which would also become southbound only.
- 5.9 The potential one-way configuration is shown below however alternative scenarios could also be possible. Further traffic modelling and analysis would be required to establish the feasibility of this proposed one-way system to understand the impacts it could have on signalised junctions within the city centre and on the inner ring road.



Figure 16: Seagate (Southeast quarter) proposed vehicle circulation

- 5.10 A one-way system would help to resolve issues regarding the dominance of bus stops and resulting narrow pavements along Seagate as there would be a reduction in the number of bus stops particularly along the north of Seagate where eastbound buses would be removed.
- 5.11 Furthermore, an improved street environment would be supported with reduced vehicle flows and associated noise and air pollution. Road space could be reallocated to wider pavements, a dedicated cycle lane/s and public realm improvements to create a greener link connecting the city centre with the Eden Project.



- 5.12 The existing eastbound bus services along Seagate would instead be redirected along the south of the inner ring road and could still gain access to the bus station via East Port roundabout. Regional bus services from the bus station would re-join the inner city ring road via the two-way section of Seagate.
- 5.13 Existing bus services that travel northbound up Commercial Street could instead travel northbound up Gellatly Street, turn left onto Seagate to adhere to the one-way westbound system and continue their route northbound on Commercial Street at Murraygate.
- 5.14 Buses travelling westbound from the bus station along Seagate would continue down Commercial Street and could either continue westbound along the existing bus gate on Dock Street or exit with other private traffic onto the A991 eastbound via the slip road on Dock Street. This slip road would need to be increased in length to accommodate buses and private traffic to exiting onto the A991.
- 5.15 Previous model testing using S-Paramics to develop a microsimulation model of the Seagate area was commissioned by the Council in 2016 and undertaken by SYSTRA. The key focus of the modelling was to try and improve air quality in the Seagate area between Trades Lane and Commercial Street. Three test models were developed:
- Option 1 – Full closure of Seagate, from Trades Lane to Commercial Street, with appropriate stopping up of Gellatly Street
 - Option 2: Westbound closure of Seagate from Trades Lane to Commercial Street
 - Option 3: Eastbound closure of Seagate from Trades Lane to Commercial Street with switching of Gellatly Street one way section from current northbound to southbound as per the JMP report SCT5164-3/1 recommendations
- 5.16 Option 3 was the preferred option however the model showed a significant increase in queuing at the Commercial Street/ Dock Street junction. Eastbound traffic on Dock Street queued back from Commercial Street.
- 5.17 Further modelling and analysis are needed to determine the suitability of restricting Seagate to westbound only with particular focus on reconfiguring the signal system where A991 converges with the A92 bridge traffic to determine whether another phase could be added for vehicles exiting Dock Street eastbound onto the A991. This could resolve the issue in queuing that was identified by the previous commissioned modelling report.

NETHERGATE / SOUTHWEST QUARTER

- 5.18 Nethergate is a key bus corridor in the Southwestern Quarter of the city centre. This creates a high density of buses with a doubling up of routes and stops, which leads to a congested and stressful environment for all users and contributes to the area having several key issues. One particular issue is the frequent u-turning manoeuvre from taxis on Nethergate.
- 5.19 Xplore Dundee's *Our Plan for Your New Network* (2020) report reviews their bus routes and services following the impact of the pandemic. It highlights the need to streamline routes to provide more efficient and quick services, which will simplify the network and make it easier to navigate. The report also supports bus priority measures and bus stop rationalisation to help shorten bus journey time and increase patronage.
- 5.20 In this technical note, it is recommended that bus routes and stops are rationalised and consolidated to Nethergate and Crichton Street, which would become bus priority corridors with two-way movement (loading bays would be retained). This would keep services within close

proximity to the pedestrian core and create an easily identifiable bus stop zone and reduce dominance of bus infrastructure in this part of the city.

- 5.21 Consolidation of bus stops would reduce the dominance of bus infrastructure and free up space which could be allocated to providing wider pavements, cycle infrastructure and public realm improvements.
- 5.22 Currently, Crichton Street is one way southbound and would need to be changed to two-way to facilitate movements of both north and southbound buses. Whitehall Street could then be reallocated for taxi and loading only. The taxi rank on Nethergate would be relocated to Whitehall Street which would resolve the taxi U-turn issue on Nethergate. To keep taxi movements efficient, a one-way access route could be implemented with entry at Yeaman Shore and exit via Nethergate.
- 5.23 The relocation of the taxi rank from Nethergate to Whitehall Street would free up space which could facilitate a bi-directional segregated cycle lane. This would not only encourage cycling as a safe form of active travel but would also enhance east-west connectivity through the city centre. Leith street in Edinburgh and Elephant and Castle in London mentioned previously are great examples of how segregated cycle lanes can be safely incorporated within busy city environments
- 5.24 The Nethergate and Crichton Street bus corridors would be implemented by extending the existing bus gate from Dock Street. ANPR would be used to enforce this route allowing bus, taxi, Blue Badge permits and cycle only, with allowance for local access and delivery and servicing at certain times. On-street parking would be rationalised, aside from loading bays and disabled parking bays. This would free up road space for potential cycle lanes, wider pavements, and further public realm improvements (parkettes).
- 5.25 A circular access route to this quarter for private vehicles would be via Yeaman Shore with entry and exit provided to the surface car park only. This would reduce the dominance of cars in the Southwest Quarter, allowing Nethergate to support and prioritise active travel and efficient bus operations.
- 5.26 Pay & Display parking outside the Mecca bingo should be removed to deter private vehicles parking/accessing Nethergate to support the long-term vision of reducing private vehicles in the city centre and promoting the use of car parks on the periphery of the city centre instead. The disabled bay should be retained and could be relocated next to the loading bay further to the east. Road space where the current Pay & Display car parking and disabled bay outside the Mecca Bingo could then be reallocated for wider footpaths and an additional pedestrian crossing on the eastern arm of the Nethergate junction with West Marketgait as this is currently lacking.
- 5.27 To continue the north/south pedestrian link from the city centre to the station, a shared use crossing facility across the Nethergate continuing on from Union Street could be implemented to facilitate safe crossing for pedestrians and cyclists and creating a direct link from the Overgate to the station.

NORTHWEST QUARTER

- 5.28 A number of bus services enter and exit the city centre via Victoria Road and use the streets in the northwest quarter as a gyratory.
- 5.29 Bus stops on Panmure Street could be consolidated further to reduce the number of bus stops. The dedicated bus stops could be moved into the carriageway and delivered via lay-bys which would reallocate more space for wider pavements outside the High School of Dundee and further improve the public realm in this area.



- 5.30 The existing taxi rank on Panmure Street could be relocated to Ward Road/Meadowside to eliminate U-turns on Panmure Street outside the High School. This was suggested by Xplore Dundee in the CCSIP Consultation Outcomes Report.
- 5.31 Private traffic could be further restricted on Panmure Street to allow for the priority of buses and active travel which is discussed further in the next section.
- 5.32 Panmure Street would require further enforcement with improved signage and ANPR to allow access for bus, taxi, cycle, local access and delivery and servicing only (at certain times). This could be further enforced with resurfacing to reflect a change in use and priority.

COMMERCIAL STREET/ MURRAYGATE – NORTHEAST QUARTER

- 5.33 To reduce U-turns and problematic reversing manoeuvres by private vehicles caused by the north-east quarter's lack of a circular route, the layout and extent of traffic restrictions around Commercial Street could be extended. Extending the pedestrian zone restrictions to the junction Panmure Street/Albert Square junction would give vehicle users alternative options without the need to turn in the middle of the road. The images below show existing pedestrian zone in red dashed line and proposed extension of this zone.



Figure 17: Existing and Proposed Road Layout at Commercial Street and Murraygate

- 5.34 A mini roundabout could be provided at the Panmure Street/Albert Square junction to allow vehicles heading southbound on Meadowside an opportunity to turn before entering restricted zones on Panmure Street and Commercial Street.
- 5.35 Automatic Number Plate Recognition (ANPR) and appropriate signage could also be installed to enforce traffic restrictions along Panmure Street and Commercial Street in this quarter. Access would still be granted for buses, taxis, cycles and local access and delivery and servicing at certain times.
- 5.36 As identified in the main report, there are both short- and longer-term improvements that could be made to Commercial Street to improve safety and permeability for pedestrians and cyclists and eliminating any illegal and dangerous vehicle manoeuvres.

- 5.37 The image below shows what potential improvements could be made in the short term.
- 5.38 With the removal of unnecessary private traffic through the extended pedestrian zone and ANPR enforcement, bus stop provision could be delivered through lay-by infrastructure on the carriageway which would relocate road space for the provision of wider pavements.
- 5.39 The existing shared surface across Commercial Street into Murraygate could be enhanced and extended along the full extent of the restricted area to clearly demarcate that this is an area of pedestrian priority.
- 5.40 This shared surface should be extended up to Albert Square and potentially down Commercial Street as far as the junction with the High Street and Seagate to extend the pedestrian zone southward to benefit businesses and public realm to the south of Commercial Street.

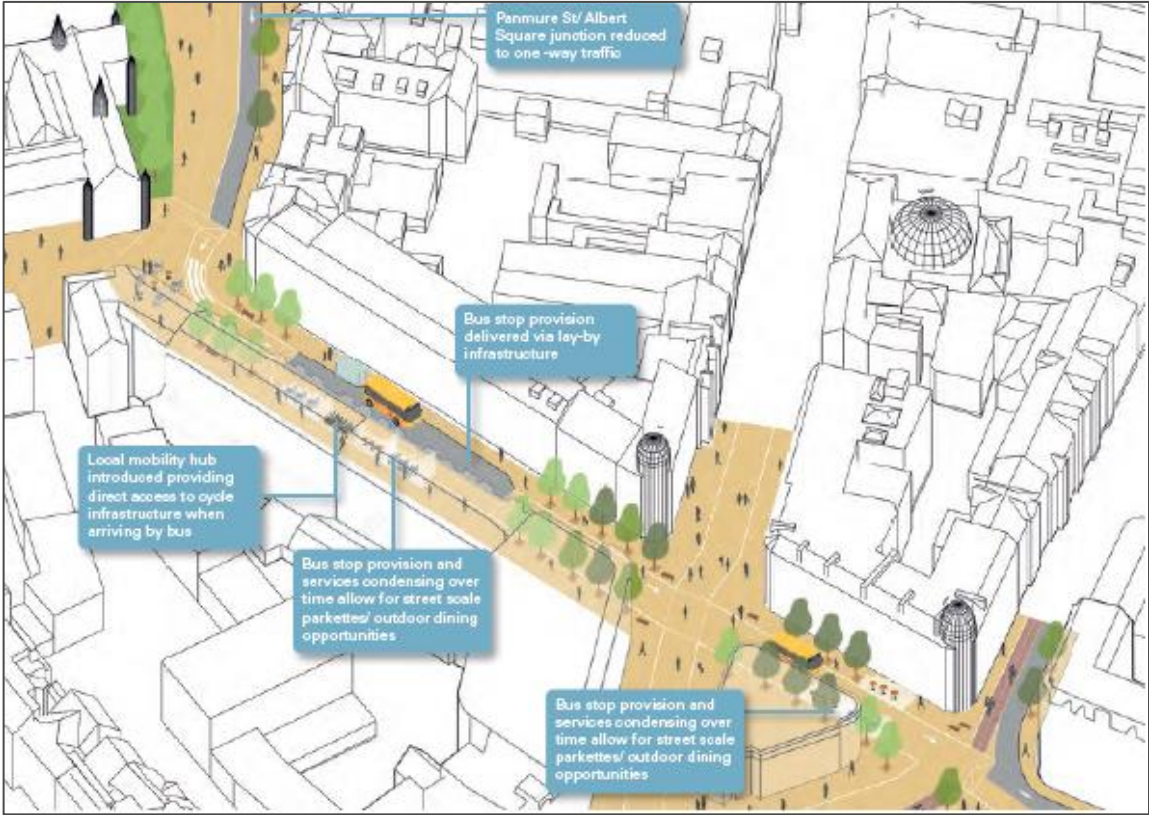


Figure 18: Commercial Street proposed improvements (short term)

- 5.41 In the longer term, Albert Square and Commercial Street could be reduced to one way traffic southbound to further reallocate space to facilitate wider pavements and improved public realm.
- 5.42 Bus stop provision could be further consolidated to reduce the number of bus stops along Commercial Street.

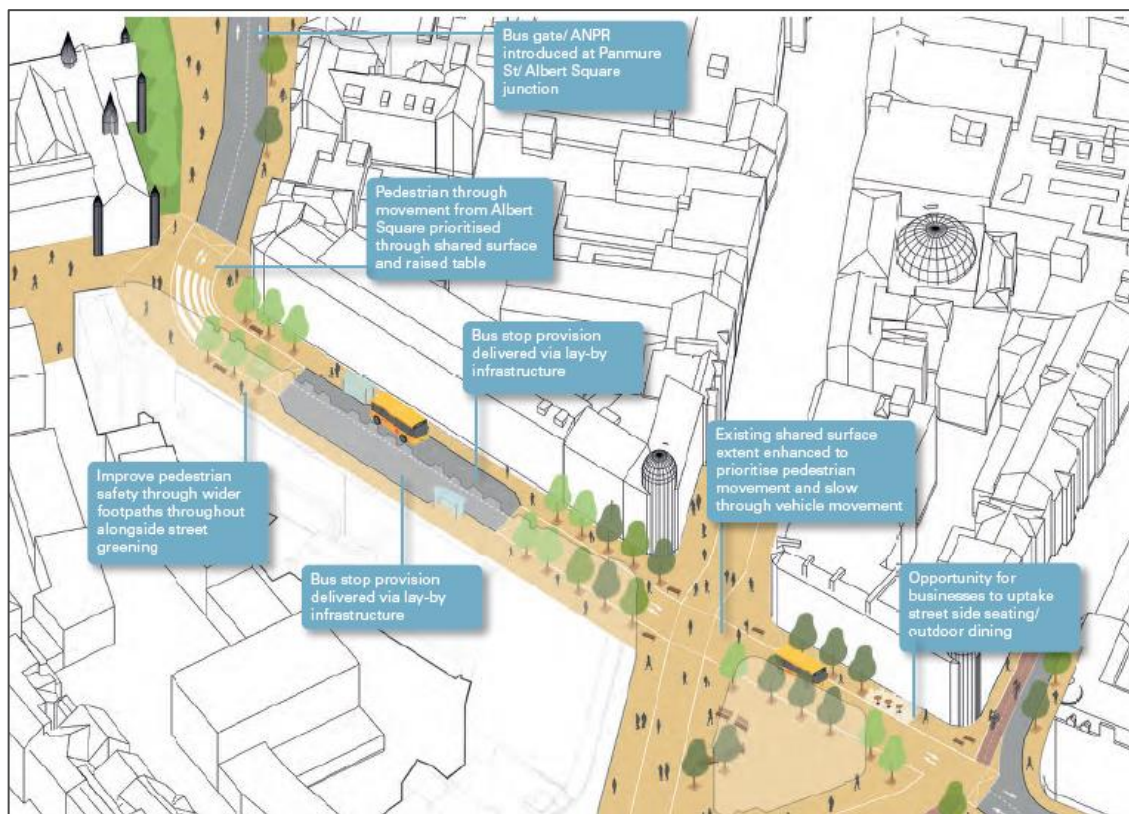


Figure 19: Commercial Street proposed improvements (long term)

6. Enforcement

- 6.1 There are currently issues with the enforcement of pedestrian zones and bus gates in the city centre, particularly along Commercial Street.
- 6.2 Along with the suggestion of extending the pedestrian zone along Commercial Street to prevent dangerous reversing manoeuvres, Automatic Number Plate Recognition (ANPR) cameras could be implemented to enforce restriction in the city centre.
- 6.3 In the longer term, should the city develop a circulatory system for each of the four quarters as suggested in Chapter 4, then ANPR cameras will be essential to enforce restrictions for private traffic.
- 6.4 ANPR cameras are more cost effective and reliable than rising bollards and require less maintenance.

7. Car Parking

- 7.1 Dundee city centre provides three main types of parking: surface level car parks, multi storey car parks and on street car parking.
- 7.2 It is understood that there is an aspiration to maintain some on street car parking to support the economy however it is encouraged that in the longer term, on street car parking is rationalised significantly if not completely to remove private traffic in the city centre. This would promote the use of periphery surface car parks and multi storey car parks and encourage the use of walking and cycling to access the city centre.

- 7.3 Blue badge parking, loading and an allowance for resident parking should be maintained although residents should be encouraged to use existing surface and multi storey car parking.
- 7.4 An update of Central Dundee's Parking Strategy (2006) is required to align policy with up-to-date data. The existing Parking Strategy was notionally updated in 2018 however this did not make it to committee for approval. Once a comprehensive understanding of Dundee's parking provision is gained, a strategy can be developed to ensure car parking spaces in the city are assisting the delivery of Dundee City Council's ambitions.
- 7.5 As discussed in Chapter 4, an updated traffic circulatory system that reduces private car access into the city centre into one or two access per city quarter, should prioritise access to existing car parks.
- 7.6 To further encourage the use of multi-storey car parks and to reduce the demand for on-street parking, Dundee could review its car parking pricing strategy.
- 7.7 By setting higher prices for on-street parking in the city centre and lower pricing for multi-storey car parks and parking on the periphery, city centre street space can be better utilised for further blue badge parking, deliveries and servicing and space reallocation of road space to walking, cycling and public realm improvements. The existing pricing strategy already encourages the use of peripheral and multi storey car parks with on street parking limited to one hour at a cost of £3.10. Consideration could be given to increasing this price in line with potential decreases in cost to peripheral car parks and an overall reduction of on street parking spaces in the city centre.
- 7.8 Dundee's four quarters could also be used for a 'ParkSmart' concept similar to Nottingham (see case study below). Each quarter would have a symbol or colour, which would be used on directional signage and in maps to encourage visitors to park in the most appropriate quarter for their visit. Use of the multi-storey car parks could be prioritised to reduce the demand for on-street parking so this remains available for blue badge parking, deliveries and servicing, and active travel.
- 7.9 Clear directional signage and rationalised and consolidated parking in multi-storey car parks will help to reduce cars circulating looking for parking, which will help to reduce congestion and vehicle emissions. Mobile apps can also be used by motorists who are looking for a parking space. Apps such as Parkopedia utilises real time availability, pricing information and navigation options. Motorists should be encouraged to use these apps including Parkopedia, ParkMe and NCP Parking as the majority of them are free and do not require expensive infrastructure or contribute to street clutter.
- 7.10 The map below shows the existing on street car parking locations in the city centre.

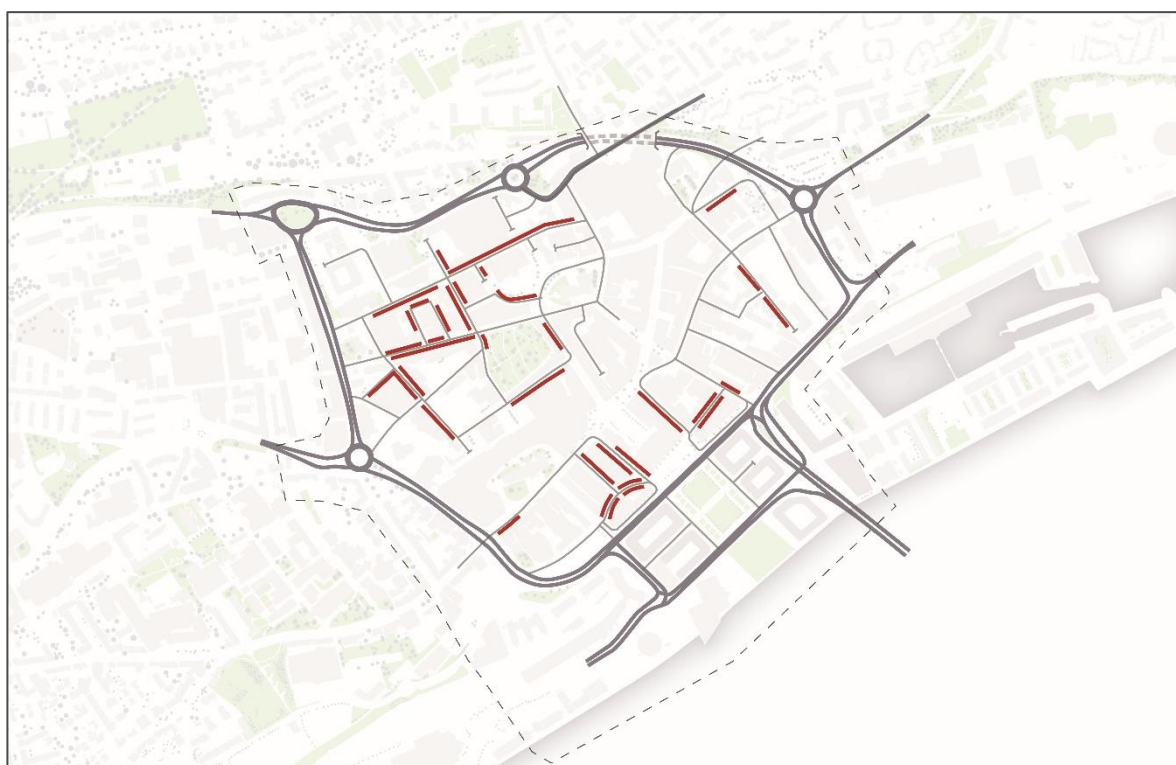


Figure 20: Proposed areas for on-street car parking reduction

- 7.11 In the short term, the Council should commission an update to the Central Dundee's Parking Strategy (2006) as mentioned above. Once up to date data has been collected and an analysis conducted to understand parking capacity and occupancy, the Council should consider what percentage of on street parking it wishes to retain which should be in line with policy and future aspirations.
- 7.12 The High School of Dundee is the only school located within the inner ring road. To transform the school run and encourage parents and students to travel to school more sustainably, a Park & Stride could be considered from Bell Street car park. It is understood that 20 minutes of free parking is already offered to High School parents however very few currently make use of this option and instead prefer to drive and drop off on Euclid Street. In the short term, a Walking Bus could be set up to encourage parents to park and drop off at Bell Street car park. A Walking Bus is where a group of children are escorted by adult volunteers in a group to school. In the longer term, soft measures such as planters and changes in traffic circulations as suggested in Chapter 5 could in time limit access to Euclid Street and surrounding roads to encourage parents to park and drop off in the Bell Street car park. This would reduce traffic during peak hours entering and exiting streets within the inner ring road. There are other methods which could further encourage active travel to the school and behaviour change such as the development of a [School Travel Plan](#) and becoming part of the [Active Schools Network](#).

CASE STUDY

Nottingham, UK

Nottingham City Council promote the 'ParkSmart' concept, with parking and directional signing split into five zones, each with their own identifying symbol. Drivers follow the symbol on the directional signage, which also ties in with the cities ITS. This 'ParkSmart' concept has been reviewed and approved by the UK's Department for Transport and provides a consistent and cost-effective way of simplifying car park wayfinding.



To reduce congestion in the city, parking pricing in Nottingham is also staggered with the highest prices assigned to the city centre and the price reducing towards the periphery. Nottingham also has a city-wide Intelligent Transport System (ITS) that provides real-time updates on parking availability at the main car parks.

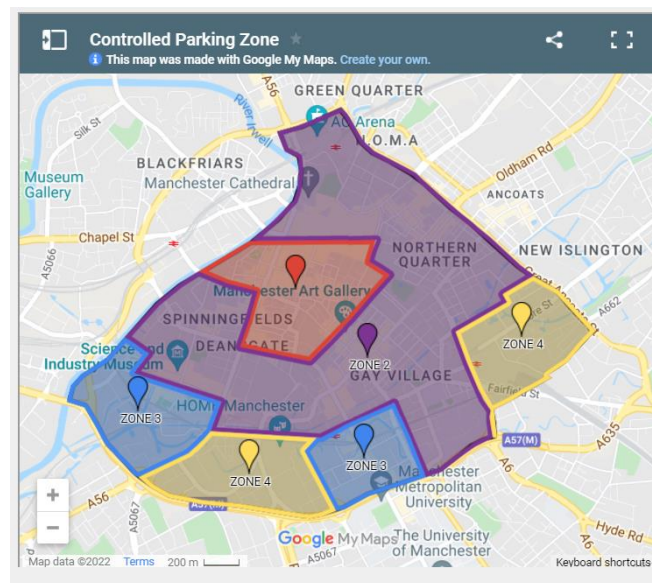
Source: [ParkSmart Overview](#) 2018, Nottingham City Council



CASE STUDY

Manchester, UK

Manchester zones on-street parking prices, with the city centre starting at £1.50 for 30 minutes, and then areas further from the city centre charging progressively less, with zone 2 £1.45, zone 3 £0.60 and zone 4 £0.50.



NEXT STEPS

- 7.13 To better understand the current utilisation of car parking in Dundee city centre a car parking occupancy survey should be undertaken which should include assessment of surface level car parks, on street car parking and multi storey car parks. This would give an understanding of peak times, levels of demand, occupancy rates and would enable comparison between different car park locations and allow the Council to understand to what extent they can rationalise parking.
- 7.14 A review of the car parking pricing across the city centre and periphery would be beneficial to understanding car park utilisation and costing. It is recognised that the city centre is transitioning post pandemic, with objectives for increased residential occupancy and employment targeted. Assessment of parking capacity would benefit from being commissioned after the Waterfront Development is complete, and changes in the city centre activity have stabilised post-pandemic.
- 7.15 Collection of this data would help to inform soft and hard measures to encourage the use of existing peripheral off-street parking spaces with a view to removing on-street parking or better utilising it for blue badge parking or deliveries and servicing.
- 7.16 Studies could also be carried out to assess the current availability of disabled parking in the city centre, including considerations of the number of parking spaces and their location. This could be completed by a condition survey around these parking spaces, to ensure that they provide a safe and accessible route to commodities in the city centre. This will ensure that more central parking is retained for those less mobile.

7.17 A study of electric vehicle charging infrastructure in Dundee city centre could be undertaken to ensure adequate provision is provided to support the uptake in electric vehicles (EVs). This could include an assessment of forecasted demand for electric vehicles in Dundee (such as electric cars, buses and e-bikes). The results could inform a city centre strategy to identify appropriate locations for future provision, while ensuring space and priority for active travel is not



compromised. This would be particularly useful given the proposal to develop the Bell Street Car Park into a sustainable mobility hub.

CASE STUDY

Brighton, UK

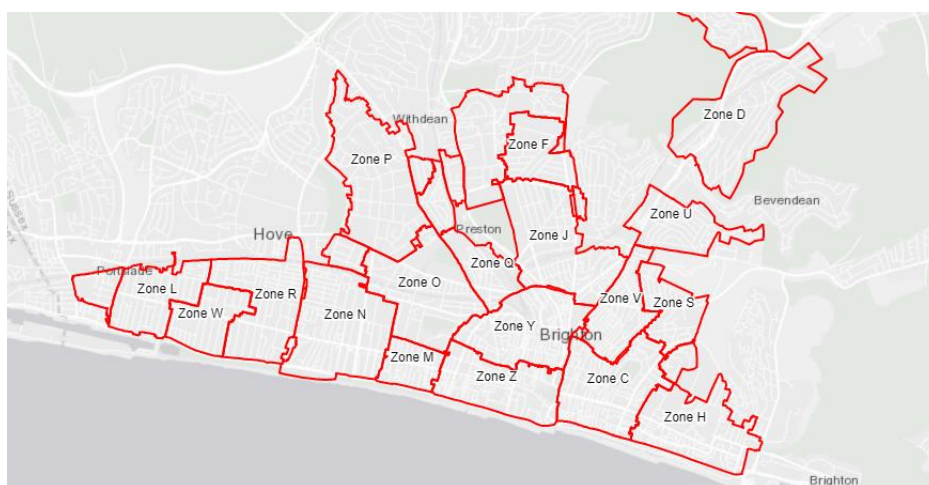
The cost and maximum time for Brighton's paid parking zones depends on the demand and available spaces. Long term pay and display parking is not available in the centre of Brighton. For example, Zone Z- south central Brighton, 1 hour is £4.30, 2 hours £7.40 and 4 hours £12.40. Whereas Zone F is £1.20 for 1 hour, £2.40 for 2 hours, £4.70 for 4 hours and £6.50 for 11 hours.

Brighton also introduced a residential parking permit waiting list for two parking zones to manage local parking demands (excluding Blue Badge holders). The parking zones are allowed to provide 3000 permits, when one is returned or not renewed it, it is offered to the waiting list. In January 2020, around 40-50 permits were offered, in comparison to 174-265 people currently on the waiting list. Centre for London discuss capping permits, and targets could be set to reduce the number over time. They suggest incentives to entice low-car-use households to give up their car should accompany these measures. Centre for London note the risk of households holding on to a car they rarely use to maintain a permit they think they might need in the future, and how you introduce it without being unfair to existing or new residents.

Residential parking permits are not available to those with access to off-street parking.

Permit duration and cost vary depending on the zone and emission vehicle. For example, central zone Z is a high demand area, so permit duration is either 3 months or 12. Prices for 3 months are £26 for a low emission vehicle, £53 for standard emission vehicle, and £79 for a high emission vehicle.

Brighton also offers business permits if it can be shown the vehicle is essential for running the business. Only 2 permits are allowed per business and they won't be issued for commuting or loading and unloading goods. Business permit prices also depend on the emission vehicle and duration. For example, for 3 months, a low emission vehicle is £60, standard £120 and high emission £180.



Source: [Brighton & Hove City Council](#)

8. Cycling

- 8.1 There is an ambition to improve active travel routes and infrastructure for cycling to and from the city centre and there is lot of potential to encourage this. For a start, Dundee is a compact city. Much of the population live within a modest distance to shops and services and Dundee has been consistently shown to have the highest number of short journeys compared to other Scottish local authorities.
- 8.2 At the same time, there are a few small barriers that may be preventing uptake in active travel. This could be attributed to the topography of Dundee and that whilst much of Dundee's streets are relatively flat, there are parts of the city that are hilly. Coupled with the climate means that cycling will always be a challenge for some journeys. Road safety risks are also perceived to be high. Additionally, only 25.7% of households in Dundee have access to an adult bike.
- 8.3 Dundee has an e-bike scheme set up by Embark Dundee and Spanish firm Ride-On which was launched in 2020. The service will be completely deployed in Spring 2022. This scheme is the largest of its kind in Scotland.
- 8.4 [The Dundee Bike Life \(2019\)](#) report highlights that there is appetite for more cycling infrastructure in Dundee. 57% of Dundee residents agree that more cycling would make Dundee a better place to live and work. Currently 11% of residents cycle at least once a week and 31% of Dundee residents don't cycle but would like to, with better cycling infrastructure listed as a key measure to increase uptake. 79% think that more cycle tracks along roads, physically separated from traffic and pedestrians would make them cycle more and 72% support the building of these tracks even if it would mean less room for other road traffic.
- 8.5 To support the objectives and targets outlined in [Dundee Cycling Strategy](#), and specifically action RND1, Dundee needs to create a planned network of strategic high-quality continuous cycle paths and lanes in the city which should be segregated from motor traffic where possible. This is a long term action which could be supported further by the interventions proposed in this note – short and long term junction improvements, CYCLOPS junctions, rationalisation of the inner ring road, bus infrastructure consolidation, rationalisation of on street parking, reallocation of road space to public realm etc.
- 8.6 In the short term, other minor improvements should complement this strategic vision (as noted in [Walking & Cycling: the benefits for Dundee](#) report) and should aspire to provide:
- Wide, well-surfaced, drained, lit footways and footpaths
 - Well-surfaced, drained and lit cycle paths, segregated from traffic where possible and from pedestrians where appropriate
 - Good facilities for cyclists at destinations, including cycle parking appropriate for all types of cycles
 - Low traffic volumes and speeds, with effective, safe crossing points where active travel routes crossroads
- 8.7 In the short to medium term, the focus should be to deliver high quality cycle infrastructure to encourage people to cycle and walk for short distance journeys with focus given to areas where the highest levels of cycling are likely to be expected/achieved. This could start as a series of standalone routes through the city centre that would require detailed design. Funding could be sought from Sustrans Places for Everyone infrastructure fund that funded the Broughty Ferry to Monifieth Active Travel Route.



- 8.8 Any future aspirational cycle network should link with the NCN1 and NCN77 as shown in image below. NCN1 is a long distance route which connects Dover to the north of Scotland. NCN77 runs between Dundee and Pitlochry via Perth. These two cycle routes also make up part of Dundee's Green Circular route which links outlying communities, radial routes, parks and central areas of interest. A link connecting these two routes to the core of the city centre should be considered.
- 8.9 The map below also shows two key cycle routes that should be considered as a priority. A key north-south cycle route should be implemented from Constitution Road, down Barrack Street and connecting up to the existing cycle lane on Bank Street which would then connect up to the pedestrian zone of the city centre. Junction improvements to Constitution Road as discussed in Chapter 2 would better facilitate cycle connectivity. Consideration would need to be given to Barrack Street to allow for contraflow cycling. The removal/rationalisation of parking on Constitution Road and the top of Barrack Street would be beneficial to facilitating this aspirational cycle route. This north-south link should also connect via Union Street to the train station and onwards to NCN77 at the V&A.
- 8.10 A key east-west cycle route should be implemented connecting Perth Road and West Marketgait to East Marketgait and the Eden Project through the city centre. Junction improvements to the Nethergate/West Marketgait junction and Eastport Roundabout as discussed in Chapter 2 would better facilitate cycle connectivity and enhance safety and priority. The consolidation of bus infrastructure and relocation of the taxi rank on Nethergate would be discussed in Chapter 3 would be key to facilitating a safe, segregated cycle lane. Connectivity to the NCN cycle routes should be considered by extending the existing cycle lanes on Trades Lane to connect with the aspirational east-west cycle route along Seagate to the north and extending further south on W Victoria Dock Road.

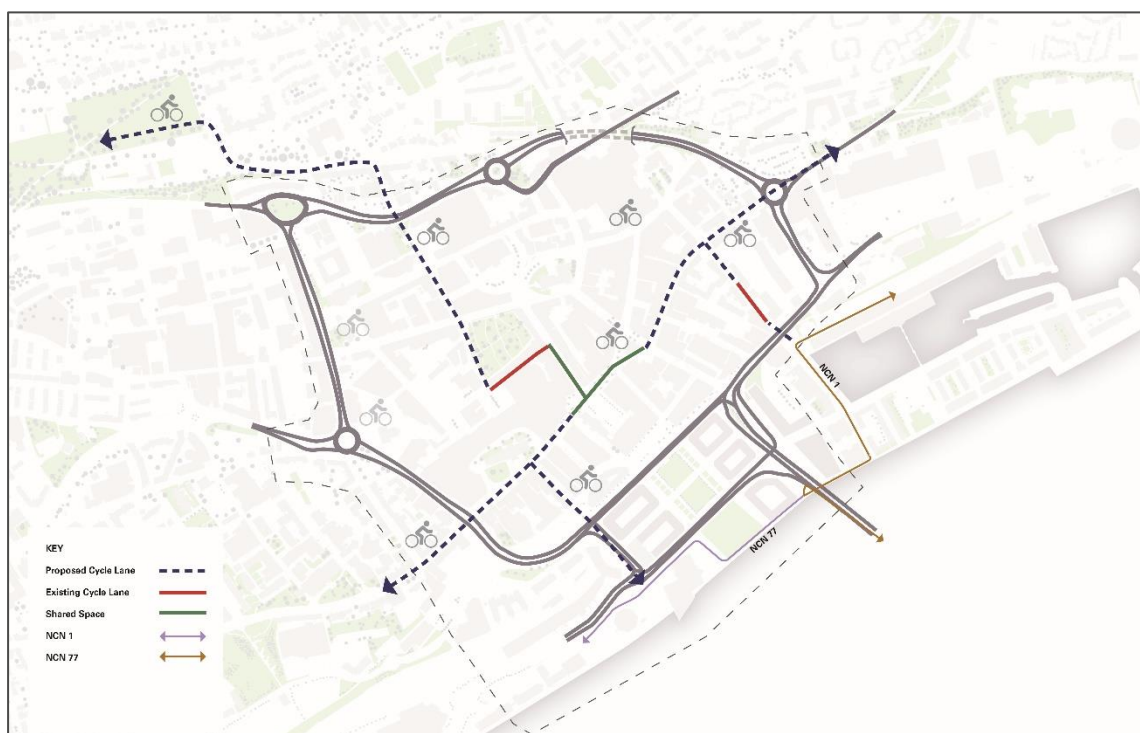


Figure 21: Proposed aspirational north/south and east/west cycle connections through city centre

- 8.11 Appropriate signage and markings would need to be implemented along the entirety of these routes.

- 8.12 The recently published [Walking & Cycling: the benefits for Dundee](#) report also highlights that having more people travelling actively will bring economic benefits to Dundee: improved retail performance, enhanced business and productivity and more tourism. Some examples of active travel benefits are highlighted at the end of Chapter 2.

9. Mobility Hubs

- 9.1 A mobility hub co-locates public, shared and active mobility modes together and provides public realm improvements. This supports sustainable travel by improving the access to, and the convenience of, such modes. The visibility of shared mobility and the reallocation of space from private cars are key factors in reducing car dominance.
- 9.2 Mobility hubs have many benefits including providing a more convenient, comfortable, and safer environment to access a range of sustainable mobility options. These can include bike shares (e-bikes, e-cargo bikes), car clubs, and electric vehicle charging for private use and for broader logistics uses. Secure bicycle parking, delivery and storage lockers, and journey planning displays are also possible.

CASE STUDY Bergen, Norway

The City of Bergen has been building its mobility hub network since 2018, across the city centre and surrounding residential areas.

The mobility hubs combine car and bike share services with the public transport network and bike parking facilities. Also included are electric vehicle charging points and digital pillars providing travel information.



Source: [CoMoUK Mobility Hub Guidance 2019/20](#)



CASE STUDY Bremen, Germany

The dominance of on-street car parking in Bremen was contributing to traffic congestion and access difficulties for emergency services. To tackle this and to reduce the space taken up by private cars, mobility hubs were implemented to offer alternative and more sustainable travel options.

In 2020, there were 10 large mobility hubs, and 33 small mobility hubs in residential areas. Locations link the tram and bus network along with shared mobility services and cycling infrastructure.

The impact of the mobility hubs has been:

- On average, each car club car in Bremen has replaced 16 private cars (seven vehicles no longer owned and nine vehicles not purchased).
- The kilometres travelled by car in a 'carsharing household' are more than 50% lower than the average household.
- Those who use a car club consider their travel options for every journey, resulting in users driving less and using sustainable modes more.
- A reduction in parking demand.
- Utilising car parking spaces to provide better access for people with disabilities, more pedestrian space, and public realm improvements.

Source : [CoMO UK](#)

- 9.3 Strategic mobility hubs in Dundee could help improve connectivity and sustainable travel choices in the city centre and across the wider area. Hubs could be particularly effective for increasing the visibility of active travel modes and networks across the city.
- 9.4 **Micro-mobility hubs** can include shared bicycle and e-cargo bikes alongside secure cycle parking, travel information and public realm improvements. These would be ideal to locate within the city centre to serve local residents, but also tourists to offer them an alternative and novel way of discovering the city, particularly to the Waterfront and to the Eden Project.
- 9.5 While e-scooters are not currently legal and included within transport policy in Scotland, it is important to consider how Dundee could future-proof itself and its mobility options, particularly as e-scooter trials are becoming more widespread nationally and internationally.
- 9.6 The proposal to develop the Bell Street Car Park into a new green travel hub could serve as a pilot, and link into micro-mobility hubs across the city centre. These micro-mobility hubs could be built around the existing Embark Dundee e-bike hire stations and other strategic locations. These could include by main bus stops, pedestrianised streets, Abertay University, Wellgate Centre, Dundee University, Blackness, Eden Project, Central Waterfront and Seagate Bus Station. The proposal for the Bell Street Hub incorporates secure cycle storage and e-bike hire, solar and battery storage and as a potential to serve as an electric cargo bike depot.
- 9.7 Larger mobility hubs on the periphery and in car parks could also include car club bays to improve convenience and to support a reduction in car ownership.


Project & Document Details

Project Name	Dundee City Centre Strategic Investment Plan
Project Number	M001030
Document Title	Transport & Connectivity – Supporting Tech Note

Document History

Issue	Status	Reason for Issue	Issued to
V.1	DRAFT	For Review	DCC
V.2	FINAL	For Submission	DCC

Issue Control

Issue	Date	Author	Contributors	Authorisation	
				Name	Signature
V.1	26/04/2022	KL, KH, AM	AM	WD	
V.2	19/05/2022	AM	AM	WD	