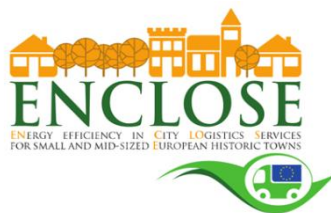


Sustainable Urban Logistics Plan for Dundee



October 2014



Co-funded by the Intelligent Energy Europe Programme of the European Union

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Sustainable Urban Logistics Plan for Dundee - Draft

1. Setting the Scene

1.1 Need for the SULP

This Draft Sustainable Urban Logistics Plan (SULP) for Dundee has been developed as part of the Intelligent Energy Europe funded Energy Efficiency in City Logistics Services for Small and Mid-Sized European Historic Towns (ENCLOSE) Project. The goal of the ENCLOSE Project is to raise awareness of the challenges of energy efficient and sustainable urban logistics in European small and medium size historic towns and the opportunities to achieve significant improvements and benefits by implementing suitable and effective measures, schemes and framework approaches.

Measures have already been implemented addressing freight and logistics in Dundee. These have been aimed at resolving traffic flow and safety issues, and specific environmental concerns, principally air quality. The SULP aims to build on current initiatives to extend objectives to achieving more energy efficient logistics and consequent reductions in freight-related carbon emissions. The SULP will also provide a framework for consideration by other urban areas in the Tayside and Central Scotland Region.

1.2 National, Regional and Local Strategies

Development of this SULP has been informed by the following national, regional and local legislation and policies.

National legislation and policies

Scottish Government Freight Action Plan
Climate Change (Scotland) Act 2009 - carbon reduction targets
Environment Act 1995 - Government Air Quality Strategy and Air Quality (Scotland) Regulations 2000, derived from EU Directives
Scottish Government Transportation Noise Action Plan

Regional policies

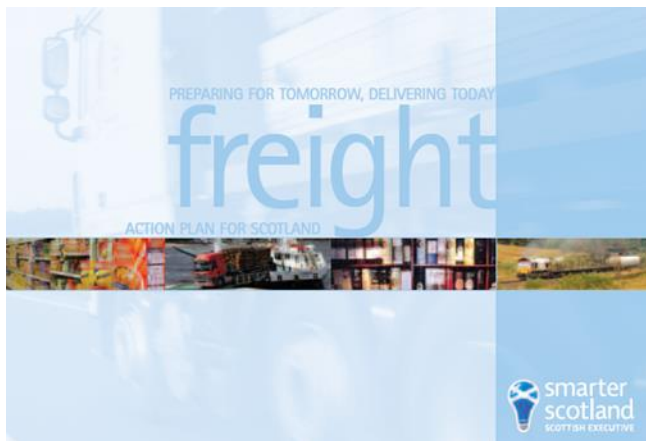
Tactran Regional Transport Strategy
Tactran Regional Freight Action Plan

Local policies

Dundee Air Quality Action Plan
Sustainability Policy for Dundee City Council
Climate Change Framework 2008-2015 and Action Plan 2008-2011
Local Transport Strategy

The Dundee Single Outcome Agreement (SOA) includes Outcome 10 “Our people will live in a low carbon, sustainable city”. This includes Intermediate Outcomes of:

- Dundee mitigates and adapts to the effects of climate change for the transition to a low carbon economy; and
- Dundee has a clean, healthy and safe environment with improved air, land and water quality.



**SINGLE OUTCOME
AGREEMENT FOR
DUNDEE
2013-2017**



2. Background and Key Issues

2.1 City Context

Dundee is the fourth largest city in Scotland with a population of 147,800 inhabitants, based on the most recent population estimates for mid-2012. It is situated on the northern shore of the River Tay estuary. The city is almost entirely urban and suburban in character and is a hub for major routes in the east of Scotland. A line of hills bisects Dundee; consequently there are gradients on many of the major roads linking the city centre with the outer suburbs. Road congestion occurs in the peak periods, particularly at key road junctions across the city. Dundee is located on the main east coast railway line connecting Edinburgh with Aberdeen and has a modern deep-water port and large harbour area downstream from the city centre.

The city of Dundee has evolved from an industrial and manufacturing centre into a modern city with a focus on bio-science, digital media, education, retail and culture and can be considered as a global leader in life sciences.

Air quality is a significant issue in Dundee with identified hotspots where the EU Limit Values are being exceeded for both nitrogen dioxide (NO₂) and particulates (PM10). The main source of air pollution is from road traffic emissions, with additional emissions from industrial sources. An Air Quality Management Area (AQMA), covering the entire city (see Figure 1), was declared in 2006 following a review and assessment of air quality. An Air Quality Action Plan (AQAP) has been developed to set out the measures that the City Council intends to introduce to minimise the effects of air pollution on human health.

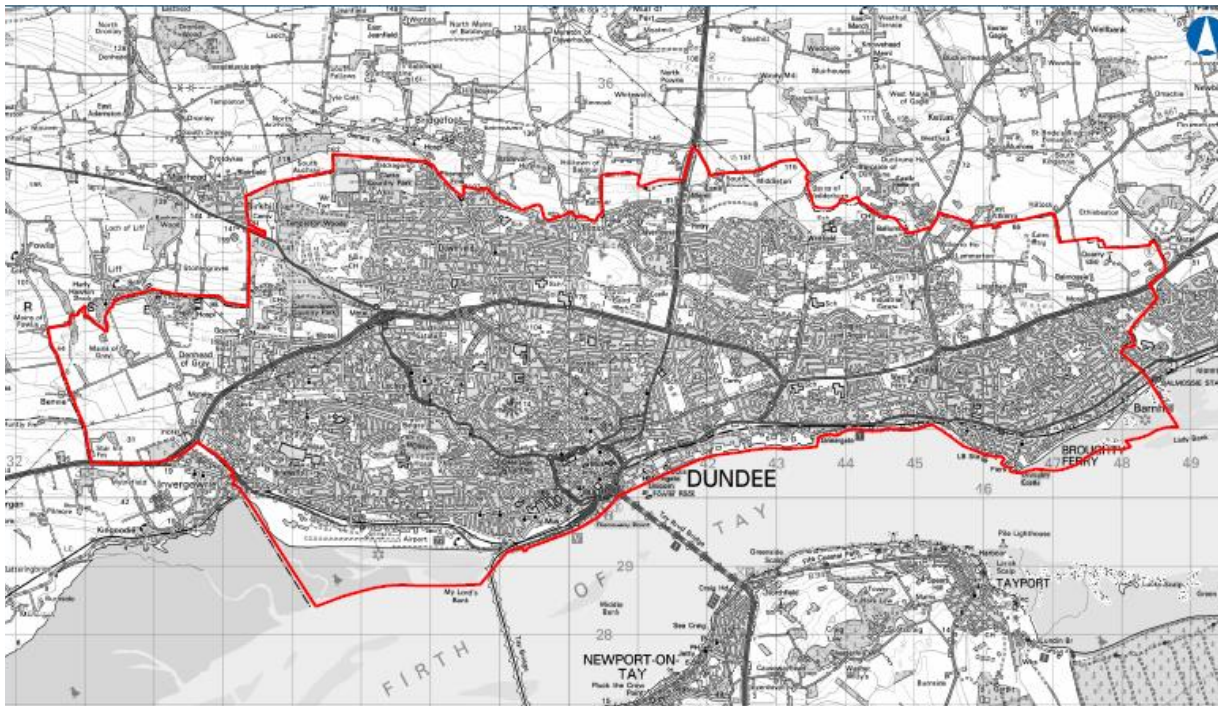


Figure 1 Dundee - designated AQMA area

Dundee is one of the local authority areas which together make up the Tayside and Central Scotland Transport Partnership (Tactran). Tactran's role is to bring together the local authorities and the key stakeholders to take a strategic approach to transport planning and delivery in the region. A

Regional Transport Strategy (RTS) has been developed which sets out a Vision and Objectives over a 10-15 year period for meeting the transport needs of people and businesses throughout the region. One of the RTS objectives is to improve the efficiency, reliability and integration of the movement of goods and people.

2.2 Logistics Related Issues in Dundee

An Awareness Raising Event was held in Dundee on 27 June 2013 as part of the ENCLOSE project. Discussion at this event concluded that existing infrastructure and regulations form the basis for good logistics operations. There are no significant problems caused only by, or impacting on, freight movements. In particular, there are no major congestion problems in Dundee which impact unduly on hauliers' operational effectiveness; furthermore, previous research has not uncovered any common complaints from hauliers or traders. The inner ring road, with only limited opportunity for vehicle movement within it, is considered to be fit for purpose, providing a good balance of ready access to the city centre whilst retaining an attractive urban environment.



The discussion identified that there is misuse of loading bays by other vehicle users, namely indiscriminate parking by shoppers/city centre visitors, local business owners and taxi drivers. It was noted that some delivery drivers have been observed to ignore loading regulations by unloading their deliveries outwith defined bays.

It was noted also that freight operations contribute to localised air pollution, albeit the contribution to pollution from HGVs and LGVs is low in comparison with that from buses (as the number of freight vehicles at most of the hotspot locations is relatively small). Despite this, with specific pollution hotspots in the central area it was considered that freight operations should form part of the measures to improve air quality.

A summary of the ENCLOSE Awareness Raising Event is available at:

<http://www.dundee.gov.uk/citydevelopment/freight>

2.3 Air Quality Action Plan (AQAP), Noise Action Plan and City Council Freight Initiatives

Dundee City Council published its AQAP in January 2011. The key objective is to address air quality issues and environmental targets in Dundee. Air quality exceedances, measured at air quality monitoring stations, are focussed on the main radial routes, Broughty Ferry Road and Lochee Road and at four locations in the central area.

Freight related measures within the AQAP are:

- Freight Quality Partnership
- Freight Retail Consolidation Centre
- improve emissions from Council Fleet.

The Scottish Government published the Dundee Agglomeration Noise Action Plan in July 2014, this forms part of the Scottish Government's Transportation Noise Action Plan. It identifies a number of Candidate Noise Management Areas (CNMA) where a range of direct and indirect actions can be

considered to address road related noise. The CNMAs are on roads generally with heavy traffic flows, inevitably including significant numbers of commercial vehicles, and large numbers of people potentially affected by traffic noise, these are: along the A823 corridor in Lochee and the Blackness area; A929 King Street/Princes Street/Forfar Road corridor; Hawkhill; Meadowside and Seagate in the central area; Inner Ring Road (Marketgait); and A92 Broughty Ferry Road.

The Council is considering other actions and issues relating to freight in addition to those in the AQAP, though no definite plans have been formulated at this stage, these are:

- traffic management for freight
- electric vehicles.

The Council has constructed an improved access to the Port of Dundee including interventions that will support road freight movements and its connections to the Trunk Road network.

2.4 Tactran Freight Initiatives

Tactran established a Freight Quality Partnership (FQP) in 2008. This brings together at a regional level stakeholders with an interest in freight movements, comprising both public and private sector organisations. A key role for the FQP is to contribute to the development and delivery of freight initiatives.

Tactran has investigated the feasibility of a freight consolidation centre to serve both Dundee and the neighbouring city of Perth, approximately 30 kilometres to the west, and a road/rail freight facility based at the port of Dundee. Freight information has been included in the Tactran's travel and transport information website www.tactranconnect.com.

2.5 Mobility Approach and Regulation in the Central Area

The central area comprises the city centre within the 1960-80s constructed Inner Ring Road (see Figure 2). This includes the Dundee Central Conservation Area which contains the historic heart of the city and provides protection for an area of significant historic and architectural interest and is



the main retail and commercial centre for Dundee. The shops are divided between two purpose-built shopping centres developed from the 1970s, the Overgate and Wellgate Centres, and those occupying older properties in Murraygate, Seagate, High Street, Nethergate, Commercial Street and Reform Street. There are approximately 400 retailers in the city centre. A number of streets are pedestrianised particularly those in the main shopping streets of Murraygate, High Street, Commercial Street and Reform Street. There are also a number of office buildings within the central area including the

headquarters of Dundee City Council and Tayside Police. The main buildings of Abertay University are also included in this area.

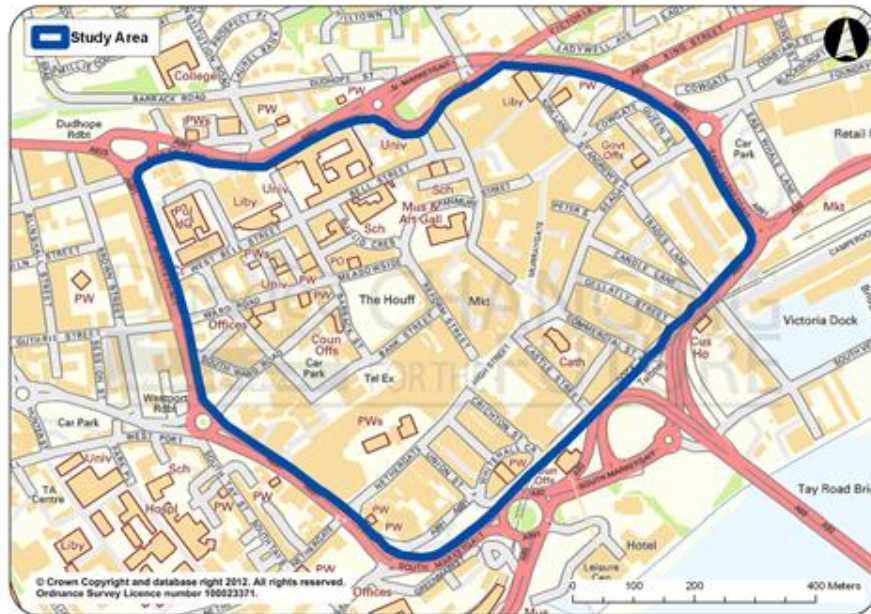


Figure 2 Dundee Central Area

All kerbside road space in the central area is regulated by means of Traffic Regulation Orders (TRO), drawn up by the City Council under the auspices of national legislation and is subject to enforcement by City Council-employed Parking Assistants. The TROs define the times that parking or loading/unloading are permitted or restricted and the types of vehicles that can park or load/unload there. These are backed up by traffic signs and lines to guide and inform motorists.

Through traffic movement is restricted in the central area which is divided into four traffic zones. Vehicles can access a group of streets, or zone, from a small number of access points on the Inner Ring Road. Movement between the zones is permitted only for buses.

The main retail streets are pedestrianised with restrictions on access for vehicles and are landscaped to restrict vehicle speeds and discourage general traffic use. In Murraygate for example, nineteenth century cobbles and tramlines have been exposed which also enhance the quality of the streetscape.

The retail businesses on the pedestrianised streets are dependent on front-door deliveries with time restrictions in place from 11.00 till 16.00. The Overgate and Wellgate Centres have off-street servicing areas which can be accessed without time restriction. Elsewhere in the central area designated loading bays provide kerbside access for retail and office properties.

Intelligent Transport Systems (ITS) have been applied in Dundee through Urban Traffic Management and Control (UTMC) which controls the city's traffic signals, including bus priority, variable message car park signs, CCTV and Real Time Bus Passenger Information ensuring the efficient movement of traffic and the provision of transport information within the city.

2.6. General Logistics Context

Specific Regulations for Commercial and Freight Vehicle Circulation

There are no specific regulations governing commercial and freight vehicle circulation in any area in Dundee other than to specific roads which are unsuitable due to low bridges, inadequate road width etc. Within the central area these vehicles are subject to the similar regulations outlined above that apply to all vehicles except buses. They do however, benefit from designated loading bays. These are lengths of kerbside space that are available only for vehicles loading and unloading, and are defined in TROs. Enforcement of the loading bays is provided by Dundee City Council employed Parking Attendants who issue Penalty Charge Notices (PCN) to vehicles contravening the regulations.



There are 36 loading bays in the central area which are highlighted in Appendix 1, or can be accessed at www.dundee.gov.uk/forms/parking.php.

Overview of Main Types of Logistics Flows

Classified traffic counts were undertaken in 2013 on the principal routes into or through Dundee (see Table 1). These show that on a weekday (Monday to Friday) the heaviest road freight movements are on the A90 through Dundee. This forms part of the main route connecting North-East Scotland with Central Scotland and the South. Light goods vehicle (LGV) flows on the main routes accessing the central area are generally about a half of the comparable flows on the A90 Kingsway, while the numbers of rigid vehicles are no more than 37% of those on the Kingsway; and articulated and drawbar vehicles are less than 19%.

Traffic counts were undertaken during September to December 2012 to determine the number of commercial vehicles entering the central area during a weekday (see Table 2). The total number of commercial vehicles entering and leaving the central area is 2,007. 83% of these vehicles are light vans (LGV). The peak time of movements is 08.30-10.30 when 449 vehicles entered the central area. This corresponds with the opening time for most shops until the start of restrictions on vehicle access to the pedestrianised streets. A steady flow of vehicles was evident for the rest of the day from 10.30 till the closing time of most shops at 17.30.

From surveys of retailers it is apparent that 92% of deliveries involve deliveries to more than one shop. Responsibility for organisation of deliveries is generally through company head offices, in the case of 76% of shops, while 15% are arranged by the retailers themselves or through an employee. The majority of retailers (77%) indicated that deliveries are made to a regular schedule, while 13% receive deliveries on an ad hoc basis and 10% on a mixture of regular and ad hoc. The main delivery areas used are split between through the customer entrance (26%), on street (24%) and delivery bays within the premises (33%).

3. Objectives

This Draft Sustainable Urban Logistics Plan aims to support Outcome 10 of the Dundee Single Outcome Agreement - "Our people will live in a low carbon, sustainable city".

The Plan's objectives are to achieve:

- more energy efficient logistics in Dundee;
- reductions in the adverse environmental impact of freight operations in Dundee; and
- the City Council showing leadership in reducing the environmental impact of the Council's fleet

4. The Plan

This Sulp outlines proposals to support energy-efficient and sustainable urban logistics. A programme has been developed that aligns with the time scales of the Dundee SOA, till 2017, and the Regional Transport Strategy, till 2023. The programme has been split into short term measures covering 2014 – 2017, medium term 2018 – 2023 and long term after 2023. The short term programme reflects the current position of financial constraint. Earlier implementation of the medium term programme may be possible as funding opportunities arise. Implementation of the medium term programme will be subject to review during the period 2018 – 2023. Full details of measures in the programme are given in a Feasibility Study which is available at:

<http://www.dundee.gov.uk/citydevelopment/freight>

At any time during the period of the Sulp the City Council will support emerging urban logistics initiatives with potential environmental benefits, subject to appropriate consideration of feasibility.

Short Term – 2014 - 2017

The short term programme aims to continue current initiatives.

In addition to traffic management controls, particularly in the central area, initiatives have been implemented specifically to promote sustainable urban logistics. These comprise:

- introduction of ECOStars environmental fleet recognition scheme for vans, lorries, buses, coaches and, possibly, taxis. The continuation of this scheme is dependent on future budgetary allocations which cannot be guaranteed at this time



- development of web-based information on lorry routing
- use of electric powered Dundee City Council vehicles.

The traffic management controls are supported by City Council enforcement of loading restrictions and, during the development of the Sulp, increased enforcement of these restrictions has been undertaken in the central area.

The Council will explore the feasibility of a Low Emission Zone for the central area.

The Council will disseminate the results of best practice in urban logistics identified in the ENCLOSE project and elsewhere, including the use of electric powered vehicles in the City Council's fleet, through the Tactran Freight Quality Partnership or directly to stakeholders within the city.



Case Study – Electric Vehicles

The Norwegian postal service, Norgen Post, in Norway's third city, Trondheim, has replaced diesel mail and parcel delivery vans with fully electric and electric hybrid vans and, for the city centre, electric trolleys. This has enabled Norgen Post to provide a fully CO₂-free postal service in the city centre and reduced the company's emissions in Trondheim by 70%.

Medium Term – 2018 - 2023

Carriage of Customer Purchases on Park & Ride Buses

Tactran, supported by Dundee City Council, has a Park & Ride Strategy which aims to develop and implement proposals for Park & Ride sites on the main approaches to Dundee, with priority being given to south of the Tay Bridge and on the A85 on the west side of Dundee. A lower priority has been attached to sites on the north of Dundee adjacent to the A90 and east of Dundee on the A92. The provision of Park & Ride would enable consideration of the carriage of heavier or bulky goods purchased in shops on Park & Ride buses which would operate primarily to and from the central area. At this stage it is not possible to determine the nature of operation of the Park & Ride services which could be operated commercially by a private sector bus operator or under contract to the City Council following a tender process.

The principal components of this proposal would be to provide carriage from shop units to the Park & Ride bus, provision of secure carrying space on the bus and a means allowing goods to be picked up at the Park & Ride site by the purchasers. Detailed consideration would need to be given as to responsibility for these functions which could be undertaken by the bus operator or a logistics company and the nature of the relationship with the City Council. Evaluation of the Den Bosch model will be reviewed ahead of the introduction of this action.

Consolidation Centre

The concept of consolidation is to group individual consignments or part-loads that are intended for the same destination at a logistics facility (consolidation centre) so that fewer and fuller loads are transported to the target destination. A consolidation centre warehouse ideally would be located on the western/northern fringe of Dundee to intercept road freight movements on the A90 from Perth which is the primary access route from distribution centres in the Central Belt, suppliers in central Scotland and England, and the UK's main sea ports. The consolidation process would provide for deliveries in the central area but also potentially other locations in the Dundee urban area, such as Dundee University and NHS Tayside medical facilities. It would be targeted at retailers that receive a large number of small consignments or part loads, most likely to be small to medium sized retailers. It would aim to provide additional services to users such as collection and recycling of waste and packaging material, provision of off-site storage space for use by retailers and pre-retailing services

In order to optimise the environmental benefits electric/low carbon fuel powered delivery vehicles would be used.



Case Study – Consolidation Centre

The Italian city of Lucca has established a consolidation service based on a purpose-built consolidation warehouse on the city's outskirts and a fleet of electric powered vans to combine deliveries to the historic city centre.

The scheme has reduced the impact of freight in the historic city centre by:

- ✓ Reduced total number of vehicles
- ✓ Improved distribution schemes: load optimisation (consolidation) and improvement of delivery routes
- ✓ Development of added-value innovative services
- ✓ Eco-friendly delivery vehicles

An operator would need to be identified either through a tender process to operate the consolidation centre and provide the delivery function or to offer the scheme for a local entrepreneur to develop as a business opportunity. At this stage it is envisaged that the operator would also be responsible for recruiting users.

It is proposed to review the results of a Perth pilot consolidation scheme before considering this proposal further, particularly with regard to effectiveness in reducing vehicle movements and longer term financial viability. It is unlikely, in the current financial situation that Dundee City Council could cover any shortfall in revenue from consolidation operations and, indeed, it is difficult to identify any suitable sources of funding to provide support for the establishment of a consolidation centre in Dundee.

Further development of web / app / Sat Nav based information for freight/logistics operators in Dundee

Tactran has already developed web-based information on lorry routing. There is potential for this to be developed further to be more interactive and provide a wider range of information for freight and logistics operators in Dundee. This information could include, for example, directional guidance to individual premises, availability of loading/unloading space on- or off-street and real time route guidance to minimise delays due to congestion or road works, etc. This information could be

provided by a number of means including websites, mobile phone apps or as input to commercial vehicle Sat Navs. This will require more detailed consideration at the appropriate time to take into account the general ICT advances and development of the UTMC system in Dundee.



Long Term – 2023 and beyond

Development of a freight railhead at the Port of Dundee

There are currently no rail freight facilities in the Tactran region and Dundee is one of the largest cities in the UK with no access to the national and international rail freight network. However freight trains from central Scotland pass through Dundee en route to various railheads in the Aberdeen area. A location for a freight railhead has been identified within the Dundee Port Estate adjacent to the Dundee - Aberdeen railway line. This



will require a new connection into the main railway line. An initial scheme could comprise a single siding with a rounding loop to enable the engine to run around the train and avoid “propelling” moves from the main line. A dedicated area would be needed for freight handling and container storage, with security, plus permanent diversion of internal port road traffic.

A private sector operator would have to be identified. This would enable the scheme to access Scottish Government Freight Facilities Grant to support the investment required.

A90 through/around Dundee

Transport Scotland’s Strategic Transport Projects Review and the RTS Delivery Plan include a project to implement improvements to the A90 Trunk road through/around Dundee. This would comprise either a new Northern Peripheral Bypass around Dundee or upgrades to the existing A90 Kingsway in Dundee such as improved roundabouts and junctions.



Either option would improve logistics operations within Dundee and for through road haulage movements particularly between central Scotland and the Aberdeen City Region. Further work is needed to establish the feasibility of either option.

5. Appraisal & Monitoring

5.1 Logistics Baseline

Classified traffic counts were undertaken in 2013 on the main routes into or through Dundee (see Table 1). The data are for a 12 hour weekday from 07.00 to 19.00. Comparable data are not available for the Tay Road Bridge which has been affected by ramps being under construction for the last 2 years and road works in the central waterfront area of the city. The locations surveyed are as follows:

- Broughty Ferry Road West at Greendykes Road
- Arbroath Road at east side of Scott Fyffe Roundabout
- A90 Forfar Road at Kingsway
- A90 Kingsway at West side of Forfar Road junction
- Coupar Angus Road at Lochee bypass, just north of Loons Road
- Riverside Drive at Tesco Access Roundabout,

Commercial vehicles were classified by three types, as follows:

LGV – light goods vehicles – comprising car derived vans and goods vehicles up to 3.5 tonnes Gross Vehicle Weight (GVW) (typically Ford Transit type vehicles)

OGV1 – 2 and 3 axle rigid vehicles over 3.5 tonnes GVW

OGV2 – 4 axle rigid and articulated and drawbar vehicles

TABLE 1 Commercial vehicle flows in Dundee - 2013

Road	Number of vehicles			
	LGV	OGV1	OGV2	Total
Dundee Road (Broughty Ferry)	2385	663	362	26824
Arbroath Road	2728	796	587	21203
Forfar Road	3317	1222	1611	24139
Kingsway	4875	1769	1934	33979
Coupar Angus Road	1509	387	60	12543
Riverside Drive	1376	379	224	17427

Traffic counts were undertaken during September to December 2012 to determine the number of commercial vehicles entering the central area during a weekday (Monday to Friday) (see Table 2).

The counts were made for 5 minute periods over a 12 hour day from 07.00 to 19.00. The breakdown aggregated by half-hourly periods is as follows.

TABLE 2 Commercial vehicles entering Dundee Central area - 2012

Time period	Number of vehicles			
	LGV	OGV1	OGV2	Total
0700-0730	34	5	1	40
0730-0800	63	18	3	84
0800-0830	78	19	1	98

0830-0900	88	28	2	118
0900-0930	85	21	1	107
0930-1000	94	21	0	115
1000-1030	84	24	1	109
1030-1100	75	18	2	95
1130-1200	80	20	0	100
1200-1230	87	10	1	98
1230-1300	77	17	0	94
1300-1330	68	10	0	78
1330-1400	74	11	0	85
1400-1430	71	15	4	90
1430-1500	76	13	0	89
1500-1530	90	12	0	102
1530-1600	66	15	2	83
1600-1630	76	16	0	92
1630-1700	69	11	2	82
1700-1730	73	5	2	80
1730-1800	54	2	0	56
1800-1830	45	5	0	50
1830-1900	35	3	0	38
Total	1666	319	22	2007

The total number of commercial vehicles entering and leaving the central area is 2,007. 83% of these vehicles are light vans (LGV). The peak time of movements is 08.30-10.30 when 449 vehicles entered the central area. This corresponds with the opening time for most shops until the start of restrictions on vehicle access to the pedestrianised streets. A steady flow of vehicles was evident for the rest of the day from 10.30 till the closing time of most shops at 17.30.



5.2 Air Quality

During 2012 four automatic air quality monitoring sites located in Dundee recorded air pollution levels in excess of the Air Quality Standards (Scotland) Regulations which put into effect the EU Air Quality Framework Directive, most of these were located in the central area (see Table 3). Nitrogen dioxide levels in Lochee Road, Meadowside, Whitehall Street and Seagate exceeded air quality standards while particulate levels exceeded the stricter Scottish 24 hour mean objective in Meadowside and Union Street. All of these locations have significant flows of buses as well as commercial vehicles.



TABLE 3 Results of Air Quality monitoring - 2012

Pollutant	Concentration	Measured as	Results of monitoring - 2012					
			Air monitoring site					
			Broughty Ferry Road	Lochee Road	Meadowside	Seagate	Union Street	Whitehall Street
Nitrogen Dioxide	200 $\mu\text{g m}^{-3}$ not to be exceeded more than 18 times a year	1-hour mean	No data collected	38 exceedances	0 exceedances	0 exceedances	0 exceedances	0 exceedances
	40 $\mu\text{g m}^{-3}$ not to be exceeded	Annual hourly mean	No data collected	53	54	48	32	45
Particles (PM10)	50 $\mu\text{g m}^{-3}$ not to be exceeded more than 7 times a year	24 Hour mean	2 exceedances	3 exceedances	4 exceedances	0 exceedance	2 exceedances	No data collected
	18 $\mu\text{g m}^{-3}$ not to be exceeded	Annual hourly mean	14	16	19	14	15	No data collected

5.3 Appraisal of initiatives

Use of electric powered Dundee City Council vehicles

Dundee City Council has one of the largest vehicle fleets in the Tayside region with over 600 vehicles. The vast majority of these vehicles have either petrol or diesel engines which emit CO₂, NO₂ and PM10. Electric vehicles assist the Council in meeting its environmental objectives as they do not produce any harmful emissions. There are also reductions in CO₂ emissions from electric vehicles. Dundee City Council is a very compact area and electric vehicles are particularly useful to the Council as travel distances tend to be relatively low compared with other local authority areas.

The purchase price of electric vehicles is greater than for the equivalent petrol and diesel powered vehicles. Evidence to date suggests that over their lifetime electric vehicles are less costly as fuel and maintenance costs are proportionately lower.

A calculation has been made of CO₂ output for the existing fleet of 39 electric vehicles. Within Dundee as a whole it is calculated that the vehicles save 66.1 tonnes of CO₂ per annum and within the central area 0.6 tonnes of CO₂ per annum. Routing software is being tested to optimise routing away from the central area.

Carriage of Customer Purchases on Park & Ride Buses

It is not possible to gauge the cost of providing carriage of customer purchases on Park & Ride buses as the detailed operation of Park & Ride services is not known at this time. It is envisaged that the impact would be to reduce the need to drive in to the city centre to collect heavier and bulky goods from city centre stores. It could also have the potential to reduce the need for retailers to make deliveries of heavier and bulky goods from city centre stores to purchasers' home addresses with a net reduction in delivery vehicle mileage. Gauging the impact on delivery vehicle distances in the central area in the absence of a more detailed assessment is not possible.

Data to appraise this initiative may become available from the Den Bosch pilot which forms part of the ENCLOSE project

Consolidation Centre

The results of a feasibility study undertaken in 2010/11 provided an indicative cost of operation for a consolidation centre in Perth of between £120,000 and £345,000 per annum. This is based on assumptions of utilising existing logistics premises and a single electric delivery vehicle operating four delivery runs per day. The provision of a new-build warehouse would incur significant capital costs. These assumptions would apply equally to a Dundee consolidation centre.

The study modelled the impacts of a consolidation centre serving Dundee and concluded that, with a 20% retailer take-up rate, emissions reductions would be possible up to the following levels:

CO ₂	96.1 - 113.6 tonnes per annum (11.8 - 13.9% reduction)
NO _x	555 - 646 kg per annum (12.5 - 13.2% reduction)
PM10	29.5 - 31.2 kg per annum (13.3 - 13.4% reduction)

Further development of web / app / Sat Nav based information for freight/logistics operators in Dundee

It is not possible to gauge the cost of expanding the existing web-based information. Any impact should be positive in terms of reducing unnecessary vehicle mileage and enabling delivery vehicles to avoid congested road conditions, delays at road works, etc.

Development of a freight railhead at the Port of Dundee

Full data to determine the potential strength of business case for a railhead are not available. Potential benefits would be reduced flows of HGVs particularly along the western and central sections of the Kingsway, with consequent impact on air pollutants and CO₂ emissions.

The port operators are currently attempting to direct lorry flows away from the central area by concentrating on an eastern access onto Stannergate and thence the A92 and A90.

A90 through/around Dundee

Further work is needed to establish the feasibility of either option for improvements to the A90 through/around Dundee.

5.4 Monitoring

Monitoring will play a key role in ensuring that:

- the initiatives are meeting the Sulp Objectives
- the initiatives are achieving their intended outcomes
- the assumptions behind the Objectives remain relevant.

Monitoring will comprise a repeat of the traffic counts of commercial vehicles entering the central area to be undertaken at the end of the short term period in 2017 and again at the end of medium term period in 2023.

Monitoring of air quality will be undertaken on an annual basis using the existing air quality monitoring sites.



APPENDIX 1

Loading Bays within Dundee central area highlighted in red

