



Tactran Freight Consolidation  
Feasibility Study  
Draft Feasibility Report







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# Executive Summary

This report presents the outcomes of a feasibility study to determine the potential for a freight consolidation centre(s) to serve retailers in Perth and or Dundee and also for a construction consolidation centre to serve the Dundee waterfront development.

In accordance with the Transport (Scotland) Act 2005, TACTRAN has prepared a Regional Transport Strategy (RTS) setting out a vision and objectives for improving the Region's transport infrastructure, services and facilities over a 15 year period. Through the RTS Delivery Plan a Regional Freight Quality Partnership (FQP) has been established, which is tasked with bringing forward cost effective packages of freight-related interventions across the region which meet the RTS objectives which were developed in response to the problems, opportunities, issues and constraints identified within the Tactran area. The FQP have identified that a Freight Consolidation Centre has the potential to meet the RTS objectives and this study aims to investigate this option further.

The principles of the Scottish Government's Scottish Transport Appraisal Guidance (STAG) have been adopted within this study which is evidence-based, objective-led and undertaken in consultation with stakeholders, retailers and other relevant parties. The key objectives in developing a Freight Consolidation Centre in the TACTRAN area are as follows:

- To address air quality issues and environmental targets in Perth and Dundee;
- To improve the environmental and operational efficiency of freight distribution in the region.

Transport Planning Objectives (TPOs) were then developed and refined through a combination of reviewing local, regional and national policy documents and also through consultation with strategic and local stakeholders including retailers, Tactran and the local Councils of Perth & Kinross and Dundee. The TPOs are defined as followed:

- Contribute to an improvement in Air Quality in the target area;
- Improve distribution efficiency and sustainability in the Tactran region;
- Reduce the number of delivery vehicles travelling in to the target area;
- Contribute to enhancing the retail environment of the target area;
- Reduce conflict between delivery vehicles, other road users and pedestrians;
- Provide an improved delivery service to retailers; and
- Provide the opportunity for value added services such as off-site storage and collection of waste and packaging material.

From a financial perspective the premise for any potential consolidation centre was defined at the inception meeting with Tactran that indicated that the consolidation centre should be:

- Self supporting financially and run on a commercial basis. Potential for some assistance with set-up costs;
- Retailer participation would be voluntary with no direct or inferred enforcement i.e. through increased access restrictions;

If the consolidation centre scenario was found not to be self supporting financially the level of subsidy required should be indicated.

## Freight Consolidation

Freight consolidation involves grouping 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. This principle can be transferred to an urban setting and thus make efficiency gains as outlined above. Urban freight consolidation therefore adds a link in the supply chain and sits on the interface between secondary and tertiary distribution. The process helps simplify the final leg of the journey to the target area by intercepting deliveries bound for the urban area at the periphery and transferring multiple loads on to fewer and fuller dedicated vehicles for onward delivery.

A best practice review of freight consolidation centres was carried out based on information obtained through desk top research on previous studies and consultation with operators and stakeholders of existing consolidation schemes. The information obtained is summarised in Chapter 3 and was used to help inform the development of feasibility study.

It is recognised that there are three key drivers for considering the use of a freight consolidation centre; these are based on problems associated with the retailers, the distribution supply chain and the local authority. Problems occurring could include:

- Local Authority: Delivery vehicles contributing to congestion and air quality problems, road safety issues, conflict with other road users.
- Retailers: Unable to store sufficient stock, issues getting goods in as and when required, staff time being used up taking care of deliveries;
- Distribution supply chain: Unable to reach the retailer at agreed time perhaps due to congestion, insufficient loading/unloading facilities, incurring PCNs;

The identification of problems related to the core groups above can help set the framework for a consolidation scheme and establish how it can address the issues identified.

## Study Context

The study context was set by undertaking a scoping exercise of Perth and Dundee identifying key information such as current retailing environment, provision on loading/unloading facilities, access restrictions and dominant supply chain routes. The findings showed the for both Perth and Dundee retailers do not appear to suffer any significant problems when receiving their deliveries, provision of loading/unloading is in general adequate and the access restrictions in place on the pedestrianised areas do not hinder deliveries to a point where they become problematic. The dominant supply chain routes were considered to be from the west and south of Perth and Dundee primarily concentrated on the A9, M90 and A90.

As stated in the objectives air quality concerns in Perth and Dundee are the key drivers for this study. Emphasis is being placed on improving air quality in urban areas at all levels of Government; in particular the European Commission (EC) will be imposing fines on the Scottish Government based on the failings to meet air quality targets. The level of fine that may be incurred is not yet known and it is yet to be determined whether the responsibility of payment of the fine will be devolved to the relevant Local Authorities or absorbed by the Scottish Government. However the potential for large fines to be incurred places a fiscal stimulus on the need to find solutions to local air quality problems and subsequently providing the necessary funding to implement Air Quality Action Plans (AQAPs) in order to mitigate and avoid incurring fines.

## Stakeholder Consultation

A key element of the study was consultation with a range of stakeholders, this included strategic bodies such as city centre managers and freight associations to surveying retailers to understand current delivery patterns and trends and identify suitability for participation in a freight consolidation scheme.

Strategic stakeholder consultation concluded that in general there was support for the consolidation concept and that benefits in terms of reducing delivery vehicle trips in to a defined target area could be achieved along with associated reductions in delivery mileage and vehicle emissions. Concerns were raised over the financial viability of such schemes and the ability to ensure retailer take up if participation was voluntary.

The results of the retailer consultation carried out are described in detail in Chapter 9 and confirmed a number of findings from the scoping exercise.

In terms of the types of retailers consulted, there appears to be a larger proportion of independent and smaller retailers in Perth, compared to Dundee, with the result that the proportion of deliveries made through an integrated supply chain in Perth is lower than Dundee. Instead, retailers in Perth are left much more in the hands of their suppliers in terms of how deliveries are organised, receiving a larger proportion of deliveries on a completely ad hoc basis. The duration of deliveries was comparable between the two cities, with most deliveries taking less than 15 minutes. In both locations there is a wide variety of delivery origins, with some retailers identifying origins towards Central and Southern England confirming the likely delivery routes as the M90, A9 and A90 for both cities with a number of suppliers servicing both cities starting with Perth.

In terms of suitability, typical delivery sizes appear to be small (part-load) which is where freight consolidation could provide a significant benefit in terms of reducing the number of delivery trips. Because of this, in both cases approximately 90% of delivery vehicles deliver goods to premises other than the store surveyed, suggesting consolidation already occurs to some degree in the form of either an integrated, dedicated supply chain for that retailer or through the use of a courier or other logistics operator. In both locations access for delivery vehicles (congestion, restrictions poor servicing access / provision or conflict with other road users) wasn't considered to be a problem. This suggests that what could be a potentially significant driver of uptake of a consolidation centre from an (retail / distribution) industry perspective would not actually be particularly strong under current circumstances in Perth or Dundee.

## Retail Consolidation

The next stage of the study involved developing suitable Freight Consolidation Centre (FCC) scenarios based on the findings from the consultation phase, previous experience of the project team and discussions with Tactran. Bearing in the mind the objectives as set out above, the analysis of retailer survey results, local knowledge of existing distribution facilities and following conversations with logistics operators DHL and Clipper Logistics three locations were identified and five principal consolidation scenarios were developed as shown in the table below.

Scenario Number	Location	Serving	Approx distance and drive time to target area	Delivery route to target area
S1	Perth – Harbour	Perth	1.5 miles 5-10 mins	A912 Edinburgh Road
S2	Perth – Inveralmond	Perth	3.1 miles 10 – 15 mins	A912 Dunkeld Road

S3	Dundee – Dryburgh Industrial Estate	Dundee	3.8 miles 15 – 20 mins	A923 Coupar Angus Road – Lochee Road
S4	Perth – Harbour	Perth and Dundee	Perth 1.5 miles 5 – 10 mins Dundee – 23 miles 40 – 45 mins	Perth – A912 Edinburgh Road Dundee – A90/A85 Riverside Drive
S5	Perth – Inveralmond	Perth and Dundee	Perth 3.1 miles 10 – 15 mins Dundee 28 miles 50 – 55 mins	Perth – A912 Dunkeld Road Dundee – A90/A85 Riverside Drive

The scenarios developed considered options for serving Perth and Dundee separately and also together. They then considered different levels of retailer take up and also different vehicle types – diesel and electric. The outcomes from the worked scenarios showed that in terms of delivery vehicle trips and emissions it is estimated that significant reductions could be achieved. Scenario 4d Perth Harbour and 5d Perth Inveralmond serving Perth and Dundee together provided the best returns with both scenarios showing daily savings of 20 delivery vehicle movements for Perth and 22 for Dundee. Over the course of year this equates to over 15,000 delivery vehicle movements and over 75000 urban delivery vehicle miles being saved. This in turn equates to the emissions savings estimated in the tables below.

#### Scenario 4d: Perth Harbour serving Perth and Dundee

Scenario 4d 20% / 15%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change
CO <sub>2</sub> (T)	2681	2168	-513	-19.1	2962	2458	-504	-17.0
NO <sub>x</sub> (kg)	12986	10500	-2486	-19.1	14480	11865	-2615	-18.1
PM <sub>10</sub> (kg)	573	464	-109	-19.0	619	510.8	-108.2	-17.5

#### Scenario 5d: Perth Inveralmond serving Perth and Dundee

Scenario 5d 20% / 15%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change
CO <sub>2</sub> (T)	2681	2168	-513	-19.1	2962	2458	-504	-17.0
NO <sub>x</sub> (kg)	12986	10500	-2486	-19.1	14480	11865	-2615	-18.1
PM <sub>10</sub> (kg)	573	464	-109	-19.0	619	510.8	-108.2	-17.5

For scenario 4d Perth Harbour the issues arise when the practicalities of the location are taken in to account, whilst theoretically the location is shown to work well from a transport operations perspective there are concerns over lorry routing and access to the harbour area to and from the strategic road network. There is also an apparent lack of existing distribution facilities; none were identified during the consultation exercise.

The voluntary participation by retailers in an FCC scheme is considered a barrier with inertia towards changing existing delivery practices expected. On this basis, take up would appear unlikely except at low levels and some form of stronger incentive would need to be introduced in order to drive take up as part of a wider action plan or low emission strategy for heavy duty vehicles. This could include some or all of:

- Tighter delivery restrictions (by time, route or vehicle size);

- Derogation of restrictions for certain delivery vehicles (e.g. electric vehicles or other chosen categories);
- Promotion of a voluntary fleet recognition scheme similar to ECO Stars;
- Requirements for delivery and servicing plans to be lodged as part of the planning process;
- Reduced business rates for those retailers who participate in the consolidation scheme.

The cost scenarios developed showed a wide range of annual operating costs from £124,500 to £689,500 depending on the scenario in question. Scenario S2 Inveralmond industrial estate to the North of Perth on the A9 was identified as best performing option in terms of cost effectiveness. Of particular relevance to this outcome was the existence of a current distribution facility operated by DHL and through discussions with DHL it was identified that there was the potential to incorporate a consolidation delivery service for both Perth and Dundee within its existing operation.

On this basis the outcome from the study is that scenario 5d Perth Inveralmond serving Perth and Dundee is the preferred option.

The potential for a commercially viable self financing scheme is considered highly unlikely at least in the short to medium term given the conditions in which it would operate. Therefore a subsidy would be required for the full costs to enable the FCC scheme to be set up. On this basis it may be a sensible option to consider a trial scheme to allow retailers to try the service (free of charge) and for the benefits to be monitored and evaluated to see if the objectives are being achieved. It would also be important to understand who the stakeholders are who would benefit from the scheme and therefore who should contribute to the cost of the FCC.

Based on the findings and conclusions of the study it has been possible to put together an outline FCC scheme proposal. The proposal considers a number of criteria and gives recommendations for what a scheme may look like.

Using the outline scheme proposal an attempt has been made to broadly assess the outline FCC scheme against the five key STAG criteria and the sub criteria. The assessment indicates that the FCC would provide benefits against a number of STAG criteria and sub criteria. In particular those relating to global and local air quality and also transport economic efficiency.

Item	Retail Consolidation Scheme Proposal
<b>Target Area</b>	The FCC should focus primarily on the core city centre retailing areas of Perth and Dundee as this provides the highest concentration of retailers and allows for the highest benefits to be achieved. However retailers outside of this area should necessarily be excluded if they were to express an interest in the scheme. It may also be appropriate to consider widening the scope of the FCC to look at non-retail businesses such as offices and whether the deliveries they receive such as office consumables could also be consolidated.
<b>Location and Facility Type</b>	Theoretically from the locations identified an FCC at Perth Harbour or Dundee Dryburgh work best in terms of transport operations. However a more practical solution is that of Perth Inveralmond, as DHL currently operate a distribution facility for Argos Ltd on the site and therefore offers the opportunity to combine freight consolidation with other distribution activities, which is considered key for any potential scheme due to the reduced operating costs of a shared scheme.
<b>Retailers and Products</b>	Based on the findings from the retailer survey and previous experience, it is recommended that an FCC scheme should look to target those retailers that receive a large number of small consignments or part loads, most likely to be small to medium sized retailers. In the early stages of a consolidation scheme it is also recommended that products being consolidated are not temperature sensitive i.e. chilled or frozen, do not require specialist handling equipment i.e. kegs or gas canisters and are not extremely high value. This will help keep costs down and if a longer term scheme emerges the operation can be developed to incorporate their needs.
<b>Additional Services</b>	Any FCC scheme should look to provide additional services to retailers such as the collection and recycling of waste and packaging material, provision of off-site storage space for use by retailers and pre-retailing services. Offering additional services can provide a revenue stream to help cross subsidise the scheme.
<b>Vehicles</b>	Road freight vehicles should be used to carry out consolidation deliveries to retailers. As a minimum low emission Euro IV engine standard should be used. Electric vehicles should be considered as a realistic option due to their enhanced environmental credentials and improving market availability.
<b>Costs/Finance</b>	An FCC scheme, in particular a trial, should look to be free of charge to retailers, at least in the initial stages and will therefore require subsidy. This would enable retailers to try the service and also for the benefits to be monitored and evaluated to see if objectives are being met. The risk and benefits of the scheme should be shared amongst all of the key stakeholders including the operator where Key Performance Indicators could be used to ensure maximum performance is achieved.
<b>Compulsory/Voluntary</b>	As specified, participation by retailers in an FCC scheme would be on a voluntary basis with no direct or inferred enforcement. On this basis it is expected that take up by retailers is likely to be between 7.5 and 20% as shown in the worked scenarios.
<b>Incentives/Restrictions</b>	Due to the voluntary nature of the FCC and in order to help encourage retailer take up it is suggested that complementary measures such as increased access restrictions, or reduced business rates for participating retailers are investigated to understand the potential for implementation.
<b>Operation</b>	To maximise attractiveness and provide flexibility the FCC should look to operate 24 hours a day, seven days a week, this is particularly important for inbound deliveries to the FCC. This type of operation and the associated cost could be more easily accommodated through combining freight consolidation with other distribution operations.
<b>Marketing/Promotion</b>	Marketing and promotion of the scheme would be crucial to its success. A voluntary scheme would need to clearly demonstrate the benefits for retailers including potential cost savings. A dedicated retail recruitment manager may be necessary to ensure sufficient participation levels are reached.

## Construction Consolidation

The Dundee Waterfront proposals are still in the development stage with developers and main contractors yet to be appointed. It was originally proposed to hold a construction consolidation workshop in order to establish the level of understanding of the concept and the opportunities to implement a scheme for the Dundee Waterfront development and or other identified developments. However through discussions with key strategic stakeholders and Tactran it was agreed that it was not the right time to hold such a workshop due to the likely limited participation and benefit achievable, also bearing in mind the resources required to set up and run the workshop.

It was agreed that the construction consolidation element of the study should therefore look to maximise telephone consultation with key stakeholders including developers and contractors where possible and provide an insight in to how to integrate construction consolidation in to future developments through the planning process and give an indication as to what benefits could be achieved through the process.

Consultation with developers and contractors revealed a varying degree of understanding of the construction consolidation concept and how it could be implemented. A potential vicious circle exists between developers and contractors with each one believing that it is up to other party to take responsibility to stipulate and drive forward the use of a consolidation centre.

As a result of this it is seen as imperative that Dundee City Council takes the lead on this initiative and use their position as developer for the re-development of the City Council offices and swimming pool development and seeks to negotiate use of construction consolidation as a change to the planning consent. This could then lay the foundation for future use of a construction consolidation centre as part of the Dundee Waterfront Development.

The example provided showed that for a 35,000m<sup>2</sup> development with a build period of 18-24 months a reduction in construction vehicle movements of between 1500 – 4500 could be achieved with associated reductions in pollutant emissions.

## Action Plan

Following discussions with Tactran, Perth and Kinross Council and Dundee City Council the recommendation to conduct a trial consolidation scheme was put forward as part of a wider package of measures that would address not only emissions from goods vehicles delivering to Perth and Dundee, but also emissions from HGV through traffic and local bus fleets. On the basis of the findings from the option generation exercise the preferred location was identified as Inveralmond industrial estate.

Implementing a trial consolidation scheme for a period of 6-12 months from the Inveralmond industrial estate would allow the following to be achieved:

- Understand the suitability of the Inveralmond site for consolidation operations for both Perth and Dundee;
- Allow retailers in Perth and Dundee to sample and experience the benefits of consolidation deliveries without incurring a charge;
- Allow the impacts a consolidation scheme to be recorded, monitored and evaluated against Transport Planning Objectives and Key Performance Indicators. This is likely to include vehicle trip reduction, vehicle mileage reduction, pollutant emissions savings linked to Air Quality and retailer satisfaction. An assessment of the impact of the of the trial scheme will be assessed in conjunction with the impacts of other elements of the air quality action plan;

- Assess the potential for an on-going scheme based on retailer demand for consolidated deliveries via a voluntary arrangement and willingness to pay for the service;
- Identify what complementary measures may be required to help encourage retailer participation in an on-going scheme.

A ten point Action Plan has been developed outlining the steps to be taken to move towards implementing a trial consolidation scheme for Perth and Dundee. Based on the action plan below it is envisaged that a trial freight consolidation centre scheme could be set up and running in an approximate 12-18 months timescale.



Action No.	Action	Requirements	Responsibility	Timescale Short/ Medium/ Long <sup>1</sup>	Budget
1.	Raise awareness of findings of the feasibility study, generate interest in a potential trial consolidation scheme.	Presentations to stakeholders, via local workshop; plus information in local press, town centre manager communications and possible leaflet drop etc.	Tactran, JMP/TTR	Short	£5k
2.	Define operating structure for the trial scheme i.e. warehousing space, vehicles, staff, loading/unloading equipment and subsidiary items. Also the potential to provide value added services.	Liaise with DHL. Carry out site visit to Inveralmond distribution depot. Detailed technical discussions and specifications	Tactran, PKC, DCC, JMP/TTR	Short	£6k
3.	Define Key Performance Indicators (KPI's) for a potential scheme operator.	Confirm TPOs and set AQ / TPO KPI targets in discussion with public and private partners.	Tactran, PKC, DCC, JMP/TTR	Short/Medium	£3k
4.	Agree a monitoring and evaluation framework for the trial scheme against Transport Planning Objectives and KPI's.	Develop monitoring and evaluation strategy, following on from item 3.	Tactran, PKC, DCC, JMP/TTR	Short/Medium	£3k
5.	Investigate potential complementary measures to assist in the development and uptake of an on-going scheme.	AQAP actually does this already to a degree. What is needed is an FQP-led freight strategy to develop the issues highlighted in the AQAP and show the package of support measures needed	Tactran, PKC, DCC, JMP/TTR, City Centre Management	Short/Medium	£20k

6.	Define a charging structure for a potential on-going consolidation scheme once the trial period ends.	Liaise with DHL, as this will depend on the level of operator incentivisation in the contract, which links to the extent of the supporting measures.	Tactran, PKC, DCC, JMP/TTR	Medium	£3k
7.	Identify funding opportunities to assist with scheme set up and operating costs.	Search EU calls for proposals.	JMP/TTR	Medium	£3k to identify appropriate programmes, timescales etc. If appropriate opportunity is identified then there would be a subsequent cost for bid preparation
8.	Develop comprehensive implementation schedule, risk register and ongoing marketing & recruitment strategy	Develop implementation schedule / i.e. formal project plan.	Tactran, PKC, DCC, JMP/TTR	Medium	£3k for implementation schedule £3k for formal marketing & recruitment strategy
9.	Produce a brief for tendering the consolidation service.	Develop brief.	Tactran, PKC, DCC, JMP/TTR	Medium	£4k
10.	Produce a three year business plan for an on-going consolidation scheme based on cost and revenue projections and therefore subsidy requirement.	Liaise with DHL and produce business plan.	Tactran, PKC, DCC, JMP/TTR	Long	£4k
				<b>TOTAL</b>	£57k, including AQ-driven freight strategy development at item 5 plus any subsequent bid preparation cost at item 7



# 1 Introduction

1.2 Tayside and Central Scotland Transport Partnership (Tactran) have commissioned JMP Consultants Ltd and TTR Ltd to undertake a freight consolidation feasibility study. The focus on the study is to determine the potential for a freight consolidation centre(s) to serve retailers in Perth and or Dundee and also for a construction consolidation centre to serve the Dundee waterfront development.

## Background, Aims and Objectives

1.3 In accordance with the Transport (Scotland) Act 2005, TACTRAN has prepared a Regional Transport Strategy (RTS) setting out a vision and objectives for improving the Region's transport infrastructure, services and facilities over a 15 year period. As outlined in the RTS Delivery Plan a Regional Freight Quality Partnership (FQP) has been established to achieve a mutual understanding of stakeholder positions and problems by sharing issues of concern and identifying possible courses of action to resolve them; to identify new opportunities and proposals for freight enhancement within the region; and to contribute to development and delivery of freight initiatives contained within the RTS.

1.4 Within the RTS Delivery Plan the FQP is tasked with bringing forward cost effective packages of freight-related interventions across the region which meet the RTS objectives which were developed in response to the problems, opportunities, issues and constraints identified within the Tactran area. The FQP have identified that a Freight Consolidation Centre has the potential to meet the RTS objectives and this study aims to investigate this option further.

1.5 The principles of the Scottish Government's Scottish Transport Appraisal Guidance (STAG) have been adopted within this study which is evidence-based, objective-led and undertaken in consultation with stakeholders, retailers and other relevant parties. The key objectives in developing a Freight Consolidation Centre in the TACTRAN area are as follows:

- To address air quality issues and environmental targets in Perth and Dundee;
- To improve the environmental and operational efficiency of freight distribution in the region.

1.6 Perth & Kinross Council's Air Quality Action Plan, adopted in August 2009, includes an intervention to develop a freight consolidation scheme for Perth to address HGV related pollution affecting Perth city centre. The FQP agreed to support a feasibility study into retail based freight consolidation centre for Perth and, also following consultation with Dundee City Council, to consider a retail and/or construction based consolidation centre for Dundee. It is anticipated that other benefits could be generated in terms of reducing congestion, traffic noise levels and visual intrusion caused by delivery and servicing vehicles.

1.7 The study will, through undertaking detailed industry stakeholder consultation of the retail and logistics sectors, determine whether sufficient demand exists to use a consolidation centre or centres covering Perth and Dundee to replace or restructure their current logistics operations. The stakeholder consultation exercise will seek to determine what the outline specification of such a centre or centres would be, provide an estimate of the capital and revenue costs of such operations and determine if sufficient demand has been established.

1.8 The potential for a construction consolidation centre for the Dundee waterfront development area will also be examined. This includes various elements aimed at regenerating the area of Dundee fronting the River Tay between the Discovery Centre and the Tay Road Bridge landfall over the period to 2031.

## 2 The Consolidation Concept

### Freight Consolidation

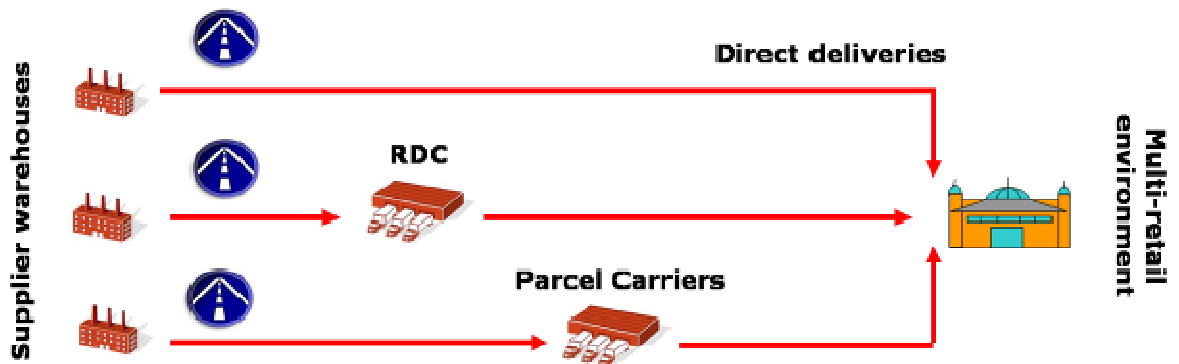
- 2.1 The term freight consolidation can be used to describe a number of different types of activity that can occur through the course of a distribution supply chain. Consolidation is an activity that larger retailing companies, pallet networks and parcel companies have been using for some time in order to reduce mileage on the road network and improve efficiencies in their supply chains.
- 2.2 Freight consolidation involves grouping 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.

### Urban Freight Consolidation

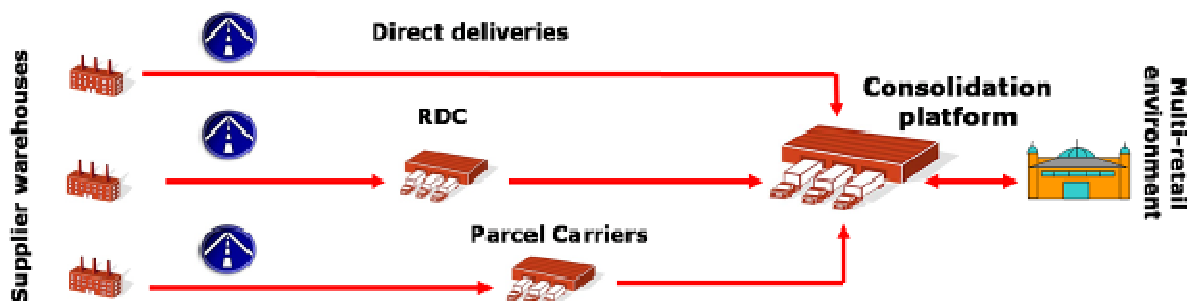
- 2.3 This principle can be transferred to an urban setting and thus make efficiency gains as outlined above. Urban freight consolidation therefore adds a link in the supply chain and sits on the interface between secondary and tertiary distribution. The process helps simplify the final leg of the journey to the target area by intercepting deliveries bound for the urban area at the periphery and transferring multiple loads on to fewer and fuller dedicated vehicles for onward delivery. The 'before' and 'after' scenarios shown in Figure 2.1 help to explain the concept further.

**Figure 2.1 Consolidation Concept**

#### *Before Consolidation*



#### *After Consolidation*



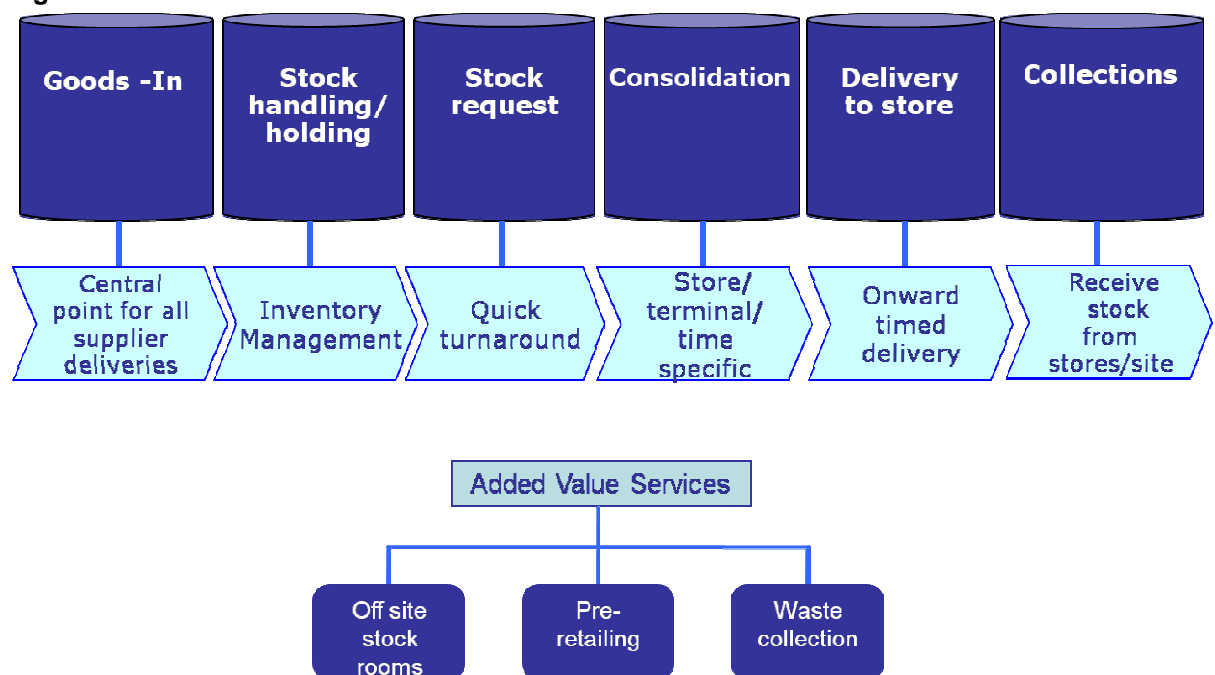
- 2.4 It is important to distinguish between a Freight Consolidation Centre (FCC) and some of the other terms that are used to describe what is thought to be the same process. The terms commonly

used such as 'Urban Distribution Centre' or 'Freight Platform' are not necessarily the same as they refer mainly to the transfer of loads, managing deliveries and vehicle types; they do not relate to the consolidation of part loads in order to reduce delivery vehicle trips and therefore they do not necessarily deliver the same benefits.

2.5 An Urban Freight Consolidation Centre can be defined further and as shown in the consolidation process diagram below can also integrate other activities and benefits that are not found in the traditional sense of freight consolidation. This therefore highlights the opportunities to add value to the consolidation process by offering additional, potentially revenue earning, services and advocates the use of environmentally friendly vehicles.

1.1 The process that occurs at a consolidation centre will be tailored to the needs of an individual scheme, Figure 2.2 below helps to indicate the activities that will occur and, unless the goods are requested to be held at the consolidation centre, the turnaround time from goods in to goods out for onward delivery to the final destination will transpire in a matter of hours.

**Figure 2.2 Consolidation Process**



2.6 Further to this a study undertaken by the University of Westminster in 2005 in to Freight Consolidation Centres helped to identify the types of locations and prevailing conditions where a consolidation centre is most likely to be appropriate and have the best chance of succeeding. The identified scenarios include:

- Specific and clearly defined geographical areas where there are delivery-related problems;
- Town centres that are undergoing a major retailing redevelopment;
- Historic town centres and districts that are suffering from delivery traffic congestion;
- New and large retail or commercial developments (both in and out of town);
- Major construction sites.

2.7 The interest in FCC's is primarily driven by the perception that they could provide significant benefits to both the urban environment and also the management of the supply chain within urban areas through a reduction in total delivery vehicle mileage.

2.8 However, there is a wider range of potential benefits which FCC's might also be able to offer. Potential value derived from the FCC operation could include:

- Lower emissions, improved air quality, less noise;
- Better managed local HGV journeys serving the urban environment (fewer delivery rounds in urban centres; ability to deliver to tight delivery slots; easier management of loading bays; dedicated, trained drivers with local knowledge of preferred routes; avoidance of peak period deliveries);
- Improved delivery service levels to retailers (better on time delivery rate; drivers with local knowledge delivering direct to customer stock room);
- Improved safety, i.e. fewer collisions, injuries (KSIs), reduced conflict with other road users and intrusion;
- Reduce the number of Penalty Charge Notices (PCNs) issued, through use of drivers with local knowledge of delivery facilities and parking / access restrictions;
- Reduce loss of goods (shrinkage) within the supply chain;
- Shared reverse logistics and home delivery facilities;
- Opportunity to disconnect longer distance strategic 'trunking' operations from urban delivery, so allowing trunking to be conducted at night when the highway network is more reliable;
- Overall reduction of operational costs for haulier and retailer (reduced delivery mileage and driving time within the urban area for trunking operations, shorter dwell times for unloading; possibility of increased retail floor space, due to decreased storage requirement);
- Opportunities for stock buffering (allowing delivery of smaller, more easily managed deliveries throughout the day, with priority goods loaded on the earlier delivery rounds), seasonal stock-holding at busy periods and provision of pre-retail / added value services;
- Opportunities to incorporate waste management functions through collection of packaging and waste materials i.e. cardboard and plastic for recycling depending on the availability of appropriate facilities;
- Life-cycle approach to incorporating consolidation within both construction and operational phases of a new building with potential for reduced delivery bay requirements and associated costs in new-buildings.

2.9 It is recognised that there are three key drivers for considering the use of an urban freight consolidation centre; these are based on problems associated with the retailers, the distribution supply chain and the local authority. Problems occurring could include:

- Local Authority: Delivery vehicles contributing to congestion and air quality problems, road safety issues, conflict with other road users.
- Retailers: Unable to store sufficient stock, issues getting goods in as and when required, staff time being used up taking care of deliveries;
- Distribution supply chain: Unable to reach the retailer at agreed time perhaps due to congestion, insufficient loading/unloading facilities, incurring PCNs;

2.10 The identification of problems related to the core groups above can help set the framework for a consolidation scheme and establish how it can address the issues identified.

### 3 Best Practice Review

3.1 A best practice review has been carried out based on information obtained through desk top research on previous studies and consultation with operators and stakeholders of existing consolidation schemes. As will be seen a significant volume of information exists regarding retail consolidation whereas relatively little is available for construction consolidation. Therefore a summary of the findings for retail consolidation is provided below and for construction consolidation a case study example for the London Construction Consolidation Centre is given to provide insight in to this form of consolidation. Summary tables for the known retail consolidation operations both in the UK and Europe and research studies that have taken place can be found in Appendix A.

#### Retail Consolidation

- 3.2 At present there appear to be eight operational retail freight consolidation centres in the UK. Three of these serve airports: Manchester Airport is served by a consolidation centre which is located in Bury, East Midlands Airport served by a consolidation centre at a local warehousing facility, and Heathrow Airport in London is served by a consolidation centre in Stockley Park. The other five are located in Brimsdown, Enfield (serving Regent Street), Bristol (serving Broadmead / Cabot Circus Shopping Centre), Greenhithe (serving Bluewater Shopping Centre in Kent), Sheffield (serving Meadowhall Shopping Centre) and Snetterton, Norfolk (serving Norwich City centre). All of these are located within 30km (19 miles) of their respective target servicing areas, and all have opened since 2000. Within Scotland freight consolidation studies are also being undertaken by the Strathclyde Transport Partnership (SPT) and South East Scotland Transport Partnership (SESTRAN).
- 3.3 A tender is currently being let for the continued operation of the Bristol Freight Consolidation Centre, with expanded operating focus to include Bath.
- 3.4 A summary of information regarding these retail freight consolidation centres can be found in table 1 in Appendix A. This information has been obtained from the University of Westminster Report, the feasibility study for the South London Freight Quality Partnership into freight consolidation, other unpublished research and by personal communication.
- 3.5 In addition to the UK experience, table 2 in Appendix A shows a summary of a selection of current operational retail freight consolidation centres in the European Union. Finally, in addition to these established UK and continental consolidation centres, several other freight consolidation studies, research initiatives and new implementation have been pursued since 2007, and a summary of these is shown in table 3 also in Appendix A.
- 3.6 In spite of differences in terms of the reason for origination of the operational freight consolidation centre, they are all operationally similar from a logistics point of view, with differences merely in the proximity of the consolidation centre relative to the target area that it serves and the extent of added value services that are offered.
- 3.7 One significant difference that sets the consolidation centre at Heathrow apart from other centres is that the airport's owner has been able to drive the process and to specify use of the consolidation centre as a condition of retailers leases as they have come up for renewal.
- 3.8 The reason behind this lies in the original reason that the Heathrow consolidation centre was set up. Over recent years, retail activity has increased dramatically at airports across the world, including Heathrow. This retail development has proved extremely welcome to travellers and provides a strong income stream to airport operator BAA. However, by the late 1990s vehicles



delivering the goods to be sold in the retail outlets began to have difficulty in making deliveries due to insufficient space allocated to delivery bays and it was becoming ever more difficult to find additional space at what is a very constrained site. The result was lengthy queues of goods vehicles waiting to access the delivery bays. This was compounded by vehicles that had completed their deliveries being blocked in by other vehicles that were still completing their deliveries, leading to lengthy delays at the delivery bays, an unpredictable delivery service for the retail outlets and goods vehicles queuing to access delivery areas causing congestion among the general traffic entering the terminal areas, with consequential impacts on local air quality.

- 3.9 The Heathrow consolidation centre was initially set up on a short term trial basis, but soon proved its worth in terms of local operations and was then let on a five year contract from 2001-2006, which has subsequently been renewed. During this period the number of retailers whose goods were directed through the consolidation centre increased significantly as leases were renewed and by spring 2008, with the opening of Terminal 5, the final few remaining retailers that were not currently using the Heathrow consolidation centre, and who were extremely reluctant to do so, were forced to do so.
- 3.10 There are certain parallels between the initiation of the Heathrow consolidation centre and that of the first urban freight consolidation centre set up in the UK. The initiation of the scheme in Bristol was driven by a combination of factors, particularly problems that were being experienced in delivery vehicles accessing the service bays at the Broadmead shopping centre in the town centre, leading to retailer dissatisfaction and congestion, as trucks and vans struggled to enter, complete their deliveries and clear the centre effectively, sometimes leaving stores short of stock as delivery windows were missed.
- 3.11 The result was a collaborative approach, driven by the City Council in partnership with the owners of Broadmead. Bristol City Council were able to use funding from the European Commission supported 'VIVALDI' project to part-fund the cost of contracting Exel Logistics (now DHL Exel Supply Chain) to set up and run the freight consolidation centre trial during the fixed life of the VIVALDI project and then to assess whether to keep the centre running.
- 3.12 The different project partners had different primary objectives for the freight consolidation scheme. For the City Council it was to reduce goods delivery traffic in the city centre, so reducing vehicle emissions and improving safety and the quality of life for those in the target area, whilst for the shopping centre management it was increasing delivery reliability with the same secondary objectives. Fortunately, in this case, these objectives were entirely complementary.
- 3.13 However, participation in the Bristol scheme has been entirely voluntary, and has required significant marketing and recruitment effort on behalf of all parties in order to increase participation to its current level of around 70 retailers.
- 3.14 The success of such a voluntary recruitment process is heavily dependent on the business case that can be made for using it within the supply chain of each potential participant and the local constraints that exist on making deliveries in the urban area. The urban freight consolidation centre that was set up to serve Norwich in 2007 has been notably unsuccessful in attracting retailers to participate. This appears to be for a number of contributing reasons, including:
- Delivery restrictions that, although limiting deliveries to particular times (largely before 10 am and after 6:30 pm) are not causing significant problems in terms of scheduling deliveries within retailer supply chains.
  - Urban traffic system that is not unusually difficult in its local layout or with tight weight restrictions.

- A lack of enforcement of the existing restrictions which mean that moving traffic contraventions to access particular stores that are difficult to access legally were likely to go unpunished.
  - A lack of profile within the retail sector for the local service provider contracted to provide the service on behalf of the local authority.
- 3.15 The pattern that emerges is one where the priorities of the various potential stakeholders – local authority, local retail store and transport provider within the supply chain – are different. This has been explored in greater detail elsewhere. In the absence of compulsion to participate, or increased restriction that makes it difficult not to participate, the balance of priorities between stakeholders becomes a fundamental issue that needs to be resolved when setting up a consolidation centre, initially through strategic consultation and then subsequently in the context of the supply chain of each potential participant.
- 3.16 The situation can be approached from two positions. Much of the continental experience is based around facilities that would be defined as urban distribution centres according to the definition in paragraph 2.4. The reason for this is that it appears easier for continental local authorities to implement access restrictions, particularly based on weight restrictions, in their city centres. Within the context of the wider supply chain such restrictions mean that either the whole delivery chain needs to be performed by a smaller vehicle or the trunking element is performed by a vehicle that is not allowed to access the city centre, so requiring the insertion of an extra link in the chain.
- 3.17 There is evidence that a small number of continental cities are starting to introduce restrictions based on the environmental performance of delivery vehicles that would support an urban distribution centre. For example, this might allow electric delivery vehicles to operate at any time of the day, but restrict other vehicles to a very narrow time window of say one hour at a not particularly convenient time.
- 3.18 Clearly there is a risk that if such restrictions are introduced without the necessary consultation then unintended consequences might occur, for example:
- Transport operators choosing to operate the complete supply chain with smaller vehicles that are allowed to access the urban area, which would mean an increase in the number of vehicles on the primary highway network, with negative impacts in terms of energy use, emissions, pollution etc;
  - Deliveries continuing to be conducted using existing practices but concentrated in a much tighter time window, leading to an associated short term congestion / noise / emissions peak.
- 3.19 The alternative is that the business case for voluntary use of the freight consolidation centre is so compelling that businesses find it easy to do so. Possibly the best example of this is the centre associated with the Meadowhall Shopping Centre. The service model associated with this appears to be one of providing the maximum service offer to potential clients. In some ways, the approach to this is more akin to an off-site stockholding and retail service centre. Even though this centre is located very close to the shopping centre, so minimising the opportunity to reduce goods vehicle mileage, this approach does still offer the prospect of reducing the number of delivery vehicles and associated impacts at the point of delivery to the stores in the shopping centre. It is interesting to note that the operator of this centre states that it pays for itself – i.e. does not require an operating subsidy – which appears to set it apart from the other centres.
- 3.20 The detailed evaluations of the Heathrow and Bristol consolidation centres revealed delivery vehicle mileage reductions of 50-75%, depending on the stage of development of the scheme, time of year etc. These reductions in vehicle mileage would of course be associated with reductions in pollutant emissions. However, a note of caution needs to be expressed about the transferability of

these overall mileage reductions because, potentially, they present a best case scenario. The reasoning behind this is that, in the case of Bristol, the retailers within Broadmead were targeted for recruitment according to various criteria. In particular, retailers that were receiving relatively small consignments, which offered the biggest potential benefit for consolidation, were prioritised in the recruitment process.

- 3.21 In contrast, a theoretical example of the relatively small impact that could accrue from attempting to pass loads that are effectively already fully consolidated through an urban consolidation centre is provided by the 'Shared Conurbation Deliveries' section of the Efficient Consumer Response UK (ECR-UK) Collaborative Green Distribution Blue Book.
- 3.22 This study investigated the potential impact of consolidating the urban distribution operations of three well known retail groups, Boots the Chemist, Sainsbury's and Musgraves-Budgens-Londis, using the existing Boots distribution centre in Greenwich as the prospective consolidation centre. The scenario that was modelled covered their operations in central London because this is judged to be the most problematic area to conduct delivery operations due to congestion and a range of delivery restrictions. The result of this exercise was a reduction in trips of just 2% and delivery mileage of 2.5%.
- 3.23 Although a very different result to that obtained from the consolidation operations in Bristol and at Heathrow, this should not be particularly surprising because the nature of Boots / Sainsbury's / Musgraves-Budgens-Londis distribution operations is quite different to the majority of the traffic passing through the Bristol and Heathrow centres. The three supply chains involved in this exercise are all well managed and if not already fully consolidated for individual stores will have a drop density which is relatively tightly defined, due to the strong presence of these retailers throughout the study area, hence providing little opportunity for significant reduction in delivery vehicle mileage.
- 3.24 Hence it would appear that the potential for delivery vehicle mileage reduction depends heavily upon the nature of the delivery traffic passing through the consolidation centre. The data shows that, depending upon the nature of the deliveries intercepted, the range could be anywhere between 0 and 75%. The figures quoted by the University of Westminster of 30 to 45% lie mid way between these extremes and are probably indicative of the vehicle reductions found in practice from a mixed use scheme.
- 3.25 The most recent town centre freight consolidation project in the UK is the relatively new venture between the Crown Estate and Clipper Logistics to offer a similar service to Regent Street. The Regent Street consolidation centre is currently serving nine retail businesses on a voluntary basis, with plans to expand the number of participating retailers to 15 in the short term. Following a study conducted in conjunction with TfL early in 2009 the potential to incorporate deliveries to non-retail premises was also confirmed. It appears likely that an attempt to expand the focus to include stationery and water deliveries to such premises will be tried soon, although this is not confirmed.
- 3.26 A particular barrier to the recruitment process for the Regent Street consolidation centre is the close proximity of other stores within some of the retail chains targeted. In such circumstances it is likely that closely neighbouring stores would be served by the same delivery vehicle. Therefore the situation of one store being served by the consolidation centre and the neighbouring store continuing to receive deliveries in the traditional method would introduce complication to the supply chain without yielding benefits in terms of reduced delivery mileage or associated impacts.



## Construction Consolidation

- 3.27 The London Construction Consolidation Centre (LCCC), modelled on the BAA centre at Heathrow, is widely accepted as one of the most recent demonstrations of how lessons learned from other industries can improve the performance of the construction industry. The main purpose of the LCCC was to promote the efficient flow of construction materials through the supply chain to the actual point of use on projects. The Centre aimed to enhance construction sites performance and reduce the impact on environmental issues such as congestion, pollution and noise.
- 3.28 Construction goods, excluding steel frames, aggregates and major plant, were delivered to the LCCC in relative bulk. From there, materials were called off by the various trade contractors and formed into work packs for their immediate use on site, following a just-in-time approach. Goods were checked on arrival at the Centre for quality and condition, ensuring any problems were highlighted at an early stage. The Centre did not store goods in the conventional sense i.e. in the long term, but had the aim of a turnaround time of 7-10 days and deliveries to site were made using LPG fuelled goods vehicles.
- 3.29 Construction site productivity benefits from having a steady supply of materials delivered right to their point of use and keeping the skilled work force at their work stations. Site housekeeping issues (quality, H&S, waste and dirt generation) are greatly enhanced by the arrival and on- site storage of only those materials intended for immediate use and at the end of each shift, un-used materials and packaging can be returned to the centre for recycling or reuse.
- 3.30 With its mission to deliver materials to site in the safest and most efficient manner, an active partnership with the Trade Contractors and Project Managers, the LCCC significantly benefited the various projects it serviced and greatly contributed to the achievement of the programme certainty demanded by the clients.
- 3.31 Clients now view Materials Consolidation as an 'added insurance' in the delivery of their projects and openly recognise that leaving individual Trade Contractors to 'fend for themselves' is no longer the way forward.
- 3.32 Equally important, Materials Consolidation has a positive impact on good neighbour relations with the greatly reduced flow of vehicle movements and associated emissions in any given location and time. Partners during the set up and trial period of the LCCC include Wilson James, Bovis Lendlease, Stanhope, Transport for London, Metropolitan Police, Skanska and Structuretone.



### ***Key facts***

- 15% reduction of materials waste
- 95% of goods delivered, right first time (industry average 50%)
- Increased productivity of the site labour force of up to 30 minutes per day; which equates to 25 workers working a 10 hours shift on a site employing 500 operatives
- Recovery of re-usable materials (on one project of approximate value £200,000)
- 2 hour average reduction in supplier journey times by delivering to the LCCC rather than going direct to the site
- 68% reduction of the number of construction vehicles entering the City of London and delivering to the sites being served by the LCCC
- 75% reduction of CO<sub>2</sub> emissions
- 6,000sqm warehouse space; excellent links with the City of London, Stratford and Docklands
- Located on an excluded route on the London Lorry Control Scheme (London Lorry Ban) - all delivery vehicles used by the LCCC are LEZ compliant

### ***Main Benefits***

- Goods are consolidated so that multiple part-loads are combined into single shipments
- Substantial reduction in overall vehicle numbers delivering to a site
- Goods are delivered not just to a site entrance - but to specified locations as close as is practicable to the workface, by material handling operatives
- Availability of specialist's operatives that use an extensive range of vehicles and mechanical handling equipment necessary to complete distributions efficiently and without damage to materials
- Overall co-ordination of distributions (to avoid clashes)
- 'Walking' of intended access routes, arranging road closures, lifting plans, ensuring that order is created in the distribution process
- Trade contractors are left free to concentrate on their core tasks, without worrying about the co-ordination of and supply of goods to site
- Trade contractors are not diverted away from production to assist with material handling.

## 4 Study Context

- 4.1 This section provides the context for the study giving an overview of Perth and Dundee in terms of geographical location, economic background and identifying the key delivery routes and current on the ground conditions for making deliveries. It also defines the target areas for the study within the urban areas of Perth and Dundee. The information below was developed through a combination of local knowledge, on the ground observations and through consultation with Tactran and the City Centre Managers for both Perth and Dundee.
- 4.2 As stated in the objectives air quality concerns in Perth and Dundee are the key drivers for this study. Emphasis is being placed on improving air quality in urban areas at all levels of Government; in particular the European Commission (EC) will be imposing fines on the Scottish Government based on the failings to meet air quality targets. The level of fine that may be incurred is not yet known and it is yet to be determined whether the responsibility of payment of the fine will be devolved to the relevant Local Authorities or absorbed by the Scottish Government. However the potential for large fines to be incurred places a fiscal stimulus on the need to find solutions to local air quality problems and subsequently providing the necessary funding to implement Air Quality Action Plans (AQAPs) in order to mitigate and avoid incurring fines.

### Perth

- 4.3 Perth and Dundee are both important regional centres for the provision of goods and services and they enjoy significantly sized local catchments and extensive rural hinterlands.

#### Background

- 4.4 Perth's former traditional industries focussed on leather making, glass making, dye works and whisky distilling, which are however all now long redundant. Perth has also been a centre for agriculture for the surrounding rural region; up until recently the cattle auction mart and visitor centre was located on the western edge of Perth before closing in summer 2009. New industries have established themselves in Perth, notably major services such as finance, insurance and banking. Amongst the largest employers in Perth are Aviva (formerly Norwich Union) and Scottish and Southern Energy with large premises located on the edge of town. Hotels, catering and tourism also form a significant aspect of Perth's economy. Perth is also well known for car sales, with the 'Motor Mile', a strip of car showrooms, dominating the Dunkeld Road corridor.
- 4.5 Perth's long standing role as the principal market town for Perthshire has seen a revival in this status in recent years, with regular farmers, continental and gardeners markets being held in the city centre. Perth is also renowned for the number of independent specialist retailers but faces competition from other nearby larger cities, particularly Dundee and Stirling, in terms of larger, well known high street retailers.

#### City Centre

- 4.6 Perth city centre as shown in Figure 4.1 is the target area for the study and is compact with the principal shopping area focussed on the mainly pedestrianised High Street and St John's Shopping Centre, along with several (non-pedestrianised) streets surrounding the High Street. Premises on Perth's main shopping streets are largely dependent on front-door deliveries with associated time restrictions between 11am and 4pm. Bollards, installed in the last year to help enforce the pedestrianised area time restrictions have been a cause of concern for drivers of articulated vehicles proving difficult to negotiate and in some cases collisions have occurred. Road layout changes at the southern end of the High Street around Kirkgate and St John's Street have resulted

in difficulties in deliveries made to Argos, where deliveries can no longer be made to the side of the store and now have to be taken through the front customer entrance via the pedestrianised area. Two key retailers M&S and Boots are able to service their stores through back door facilities located on Mill Street thus avoiding use of the pedestrianised area.

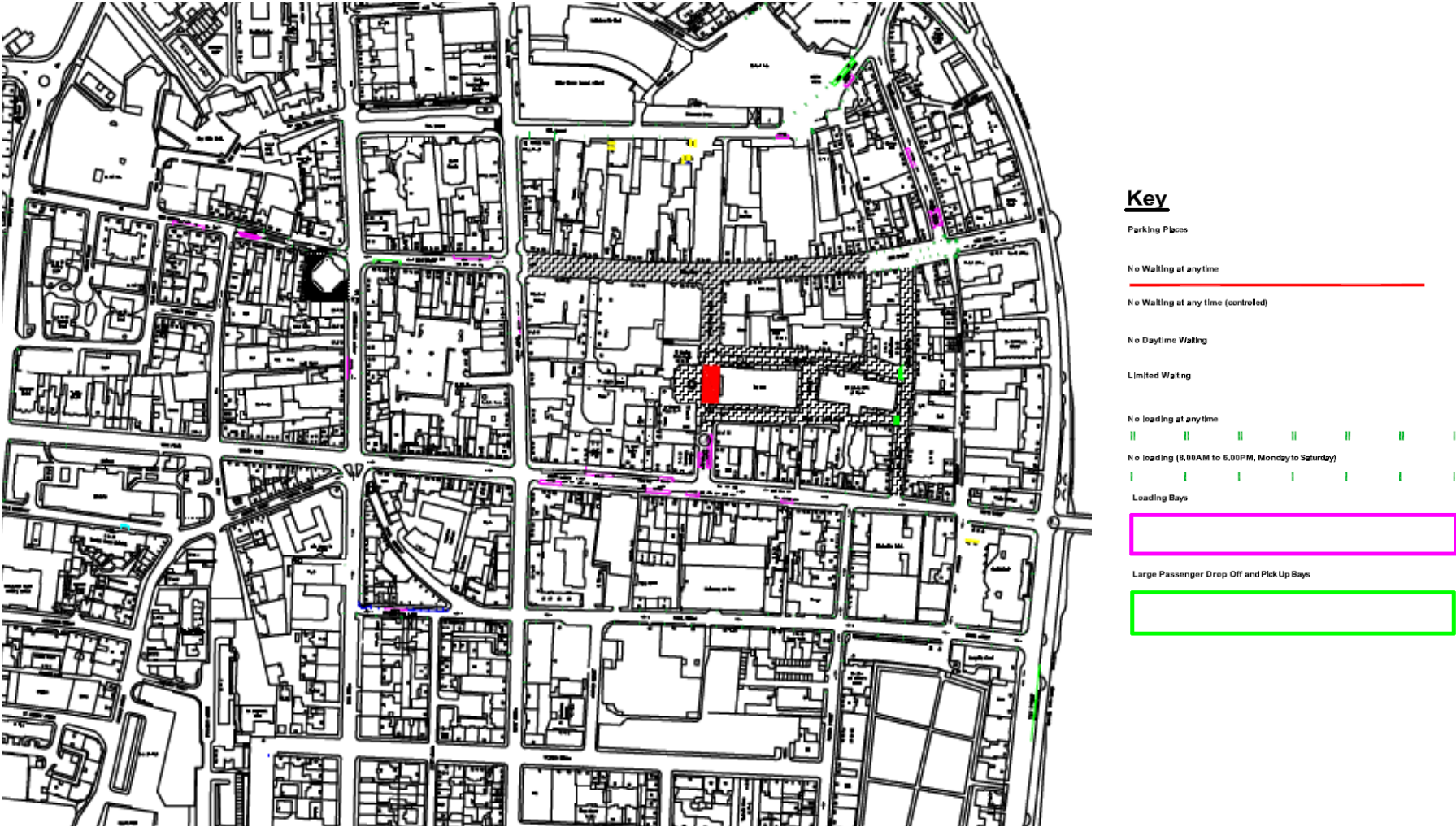
**Figure 4.1 Perth Study Area**



4.7 Outside of the pedestrianised area deliveries rely on the use of designated loading bays generally with a maximum waiting time of 30 minutes or rely on the use of the parking bays to make their kerbside deliveries. It was observed that a number of streets such as South Methven Street and South Street are wide enough to accommodate two lanes of traffic and also provide parking and loading bays without causing obstruction as shown in Figure 4.2.



Figure 4.2 Perth Loading Bay Provision



- 4.8 There are plans to further develop the High Street and Mill Street areas with additional retail floorspace; however these developments are currently on hold due to the recent economic climate. The High Street and surrounding streets are also set to benefit from town centre redevelopment funds; some £1 million is available from PKC with further investment from the Scottish Government. Plans are currently being drawn up to provide urban realm improvements; at present there are no plans to increase the delivery restrictions on the pedestrianised area as part of this scheme. Development plans for City Hall for independent retail units and restaurants have been stopped and have gone back out for consultation. Two further developments outside of central Perth namely Highland Gateway on the A9 North, a mixed use retail and leisure attraction park, and the former agricultural market to the west of Perth; set for redevelopment as a supermarket and leisure facilities, although yet to be consented, were considered causes of concern for city centre retail vitality.
- 4.9 Monthly retailer meetings are held providing a forum for discussion and resolution of retailer issues. In general delivery related issues are limited with retailer's attention focussed on the view that there are *"too many traffic lights within the central area"* and occasional instances of *"overzealous traffic wardens"*. Retailers also do not consider air quality to be an issue in their opinion.

#### **Outside City Centre**

- 4.10 St Catherine's Retail Park is a significant edge of town centre retail presence which acts as the main destination for the purchase of bulky goods (home furnishings, domestic appliances and DIY). There are proposals to expand the range of retailers that can be accommodated at the park (currently restricted under planning conditions) with associated refurbishment of the units and surrounding environment. At present St Catherine's is not fully occupied with a number of vacant premises.
- 4.11 Outwith the centre, businesses are based in a variety of locations, but are particularly focussed on the Crieff Road and Dunkeld Road corridors and at Inveralmond Industrial Estate, where there are plans for a major retail development. Large supermarkets on the main approaches to Perth (particularly on Crieff Road and Edinburgh Road) dominate the food shopping market.
- 4.12 Situated approximately one mile south from the city centre, Perth Harbour has retained its importance in Perth's economy with trade from Europe, Scandinavia and Baltic countries in traditional agricultural related cargoes as well as timber and chemicals. In 2007/08, the harbour handled 141,000<sup>1</sup> tonnes of commodities equating to £82.8m.

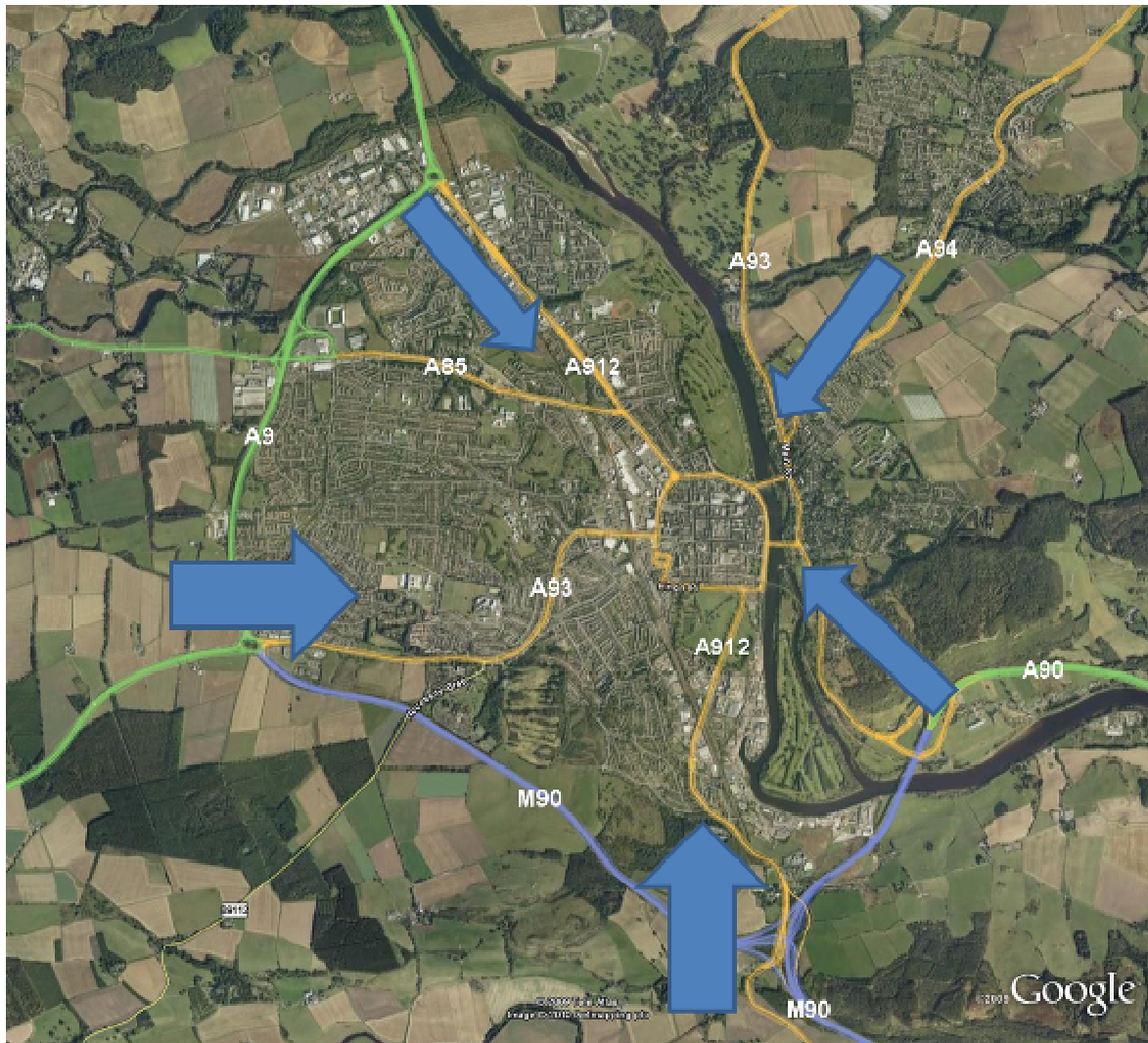
#### **Supply Chain**

- 4.13 Supply chain routes to/from Perth are considered to be more complex than those of Dundee. That Perth is at the junction of the two main routes north from the Central Belt (M90 from Edinburgh and A9 from Glasgow), which accounts for the majority of delivery vehicle movements for Perth and dissects catchment, as shown in Figure 4.3. However, Perth is also served to an extent by the A90 from Dundee, the A9 from the north and the A94 from Strathmore. As a result of the identified supply chain routes the final delivery routes into central Perth and the core retailing area are concentrated on the A912 Edinburgh Road and the A93 Glasgow Road. Lesser delivery routes are identified as the A85 Dundee Road and A912 Dunkeld Road linked to the Inveralmond industrial estate.

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<sup>1</sup> Source: Scottish Transport Statistics, 2009

Figure 4.3 Perth Supply Chain Routes



- 4.14 It should also be noted that Perth is acknowledged to suffer from significant through movements by goods vehicles. South Street is observed to act as a link between the A93 (A9/A90) for vehicles travelling in both directions. Due to the large quantity of independent retailers it is recognised that there is also a reliance on courier firms to deliver goods with delivery times determined by the supplier and the use of retailers own vehicles to pick up goods from wholesalers and cash and carry outlets.

## Dundee

### Background

- 4.15 Dundee is showing good signs of recovery from a period characterised by the loss of its traditional industries. This has left behind some significant issues of social exclusion. Recent investment has left a high quality retail environment in the centre, which is responding well to pressures from competing edge-of-town retail opportunities. Dundee is experiencing churn in its economy, having recently lost some of the major businesses that have grown there in the last decades, but appears to be very successful in developing parts of the service sector; particularly in tertiary education and IT-related activity. That the city has been successful in increasing retail footfall in recent years whilst traffic levels have stabilised is testament to the work done to promote sustainable transport; freight consolidation may be able to provide the next opportunity to take this further.

### Waterfront Area

- 4.16 The Dundee Waterfront proposals present an exciting opportunity for the city. By “extending the City Centre to the Tay”, the changes will make use of Dundee’s main underutilised asset (the Waterfront itself) and create significant new retail, employment and service sector opportunities. As yet the majority of the development detail is not yet known with developers and main contractors yet to be appointed, this is in part due to economic downturn. One confirmed development is that of an outpost museum for the V&A with a design competition currently underway. Road layout changes associated with the development of the waterfront are currently taking place with the reconstruction of the Tay Road Bridge ramps into a more compact design channelling traffic in to and out of the city centre and connecting more effectively with the local road network.

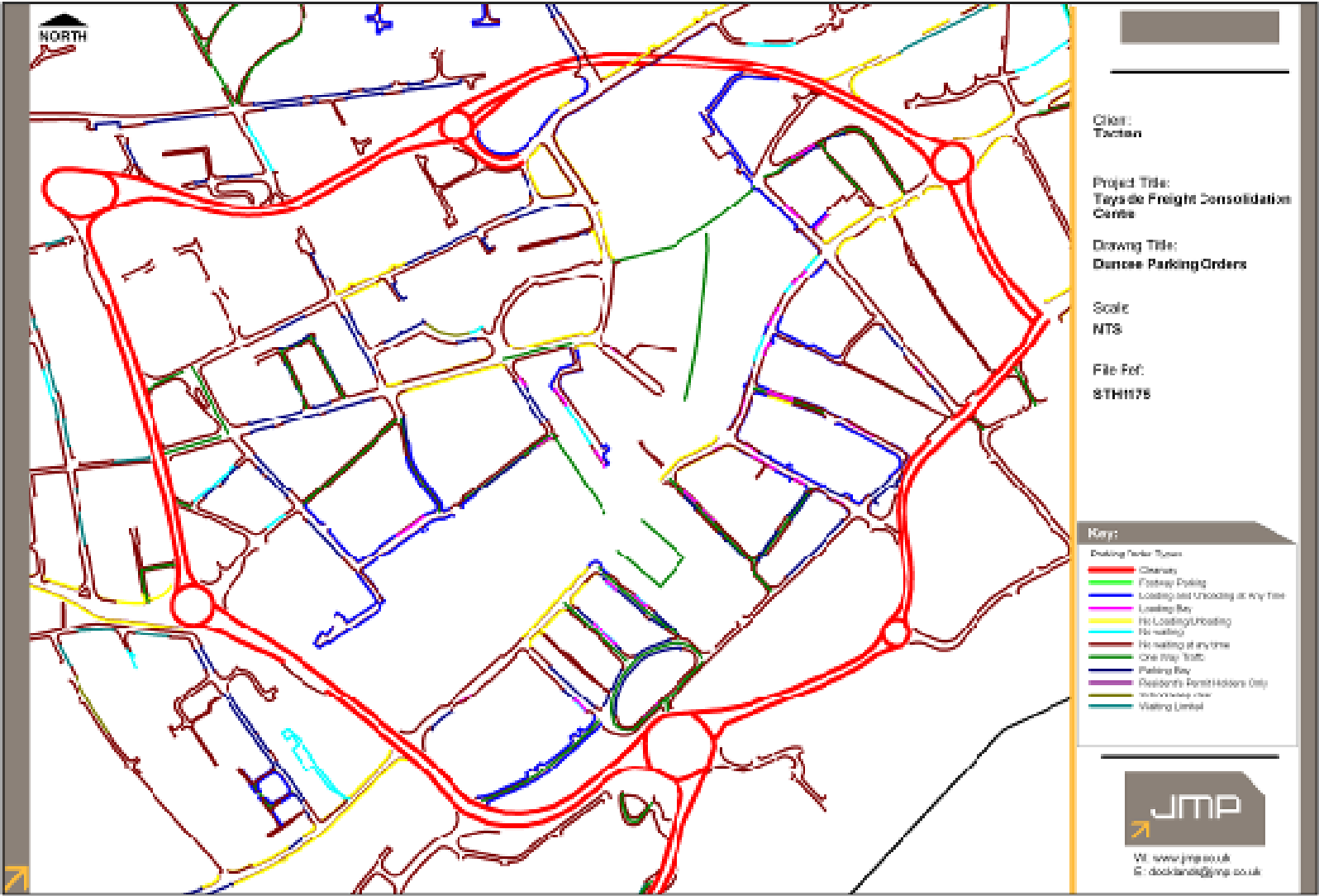
### City Centre

- 4.17 In Dundee city centre (as shown in Figure 4.4) retail businesses are clustered around High Street, Murraygate and Nethergate in conjunction with the shopping centres of Overgate, Wellgate and the older Forum Centre. Those on the main pedestrianised streets are dependent on front-door deliveries with time restrictions, as in Perth, in place from 11am until 4pm. Businesses in other streets and in the Wellgate and Overgate Centres have more flexibility with timings due to dedicated off-street delivery areas. Figure 4.5 helps to illustrate the parking, loading and waiting restrictions in place in central Dundee.

**Figure 4.4 Dundee Study Area**



Figure 4.5 Dundee Parking Orders



- 4.18 Delivery problems are known to exist for premises on Murrygate who are unable to use back door facilities due to adjoining with Seagate and are therefore forced to use the customer entrance via the pedestrianised area. This has caused some issues with expensive paving being subjected to articulated vehicle weights for deliveries to larger retailers. Access issues are also identified for High Street where it is known that a small number of deliveries vehicles are illegally exiting the area via Crichton Street (a one way street) rather than using Reform Street, this is thought to occur due to Reform Street being pedestrianised and therefore being slower to exit from and occasionally being blocked by other vehicles.
- 4.19 Plans to extend the Overgate Centre adding an extra 50% of retail floor space are currently on hold until market conditions improve. Other significant scheduled developments within the urban area include the redevelopment of the main City Council offices.
- 4.20 As with Perth a retailer forum operates in Dundee and concerns over receiving deliveries are not often raised. Complaints are only generally received when roadwork's or events hinder scheduled deliveries. In an average week no particular delivery issues are apparent. Parking restrictions and delivery drivers being fined can be a problem in some areas within the City Centre. The retailers perception is that air quality within the central area of Dundee is not issue and that is an issue of concern for the Local Authority. This is evidenced by the implementation of the Air Quality Management Area covering the whole of Dundee.

#### **Outside City Centre**

- 4.21 Outwith the centre, Dundee businesses are based in a variety of locations, but particular concentrations of those generating freight movements are close to the Kingsway.
- 4.22 Dundee port situated to the east of the central urban area is a 'Forest Product Specialist' and an Offshore Oil and Gas Support Facility and also serves a growing 'Cruise Ship' market. In 2008 the port handled some 975,0002 tonnes of commodities, which is slightly less than previous years. Plans are being considered for the development of a tri-modal freight terminal at the Port in order to facilitate growth in the future.

#### **Supply Chain**

- 4.23 As shown in Figure 4.6 Freight supply routes to/from Dundee are dominated by the A90 from Perth, as the main route to the Central Belt and beyond. However, there are three main supplementary routes; the A90 from Aberdeen, A92 from Arbroath and the A92 Tay Road Bridge. With supply routes dominated by deliveries from the West the key delivery routes from the A90 in to the city centre are focussed on the A85 Riverside Drive and the A923 Coupar Angus Road – Logie Road – Lochee Road. Less significant city centre delivery routes are shown as the A929 Forfar Road and A92 Brought Ferry Road.

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<sup>2</sup> Source: Scottish Transport Statistics, 2009

Figure 4.6 Dundee Supply Chain Routes



## 5 Policy Review and Strategic Fit

- 5.1 This section provides a review of relevant policy and strategy documents to assess how the freight consolidation concept fits with the aims and objectives of local, regional and national documents and also how potential consolidation centres link with proposals for other logistics facilities. Synergies and conflicts will therefore be identified and will help set the framework for the on-going study. The review will also feed in to the process of setting appropriate aims and objectives for a potential consolidation centre(s) to serve Perth and Dundee, ensuring they align with the overarching policy and strategy documents.
- 1.2 The policy review will cover the following documents all or in part, these documents were identified in the study proposal, and in conjunction with the client deemed fit for purpose at the inception meeting.
- Scottish Strategic Freight Scoping Study, June 2006
  - Scottish Freight Action Plan, 2006
  - Freight in Scotland Report, June 2009
  - Scottish Multi-Modal Freight Locations Study, June 2009
  - Tactran Regional Transport Strategy 2008 - 2023
  - Perth Local Transport Strategy, 2000
  - Dundee Local Transport Strategy, 2000
  - Perth and Kinross Air Quality Action Plan, August 2009
  - Draft Dundee Air Quality Action Plan, November 2009

### National Policy

#### *Scottish Strategic Freight Scoping Study*

- 5.2 The importance of freight transport is recognised in Scottish Strategic Freight Scoping Study (SSFSS) and sets the guiding principles for the study as can be seen by the text taken from the report below.
- 5.3 *‘Efficient freight transport is essential to the economy and the quality of life in Scotland. Economic growth generates new demand for freight transport. Goods have to be moved easily, reliably, efficiently to meet business needs, while minimising the impact on safety, on other transport users, and on the environment’.*
- 5.4 The purpose of the study, carried out in 2006, was to understand the opportunities, constraints and key issues for freight in Scotland and through review and analysis build up a baseline to help understand the trends of freight growth. Consultation with a wide range of stakeholders was undertaken, ascertaining their views on the current freight transport system, future trends, the real issues they faced, and the key objectives for a Freight Strategy for Scotland. This then led to a number of priority options being put forward for consideration in drawing up the Scottish Freight Action Plan, which the is next document to be considered.
- 5.5 It should be noted that much of the freight data in the SSFSS has been superseded by the data available in the Freight in Scotland Report. This will be utilised as part of the review in preference to the SSFSS data.

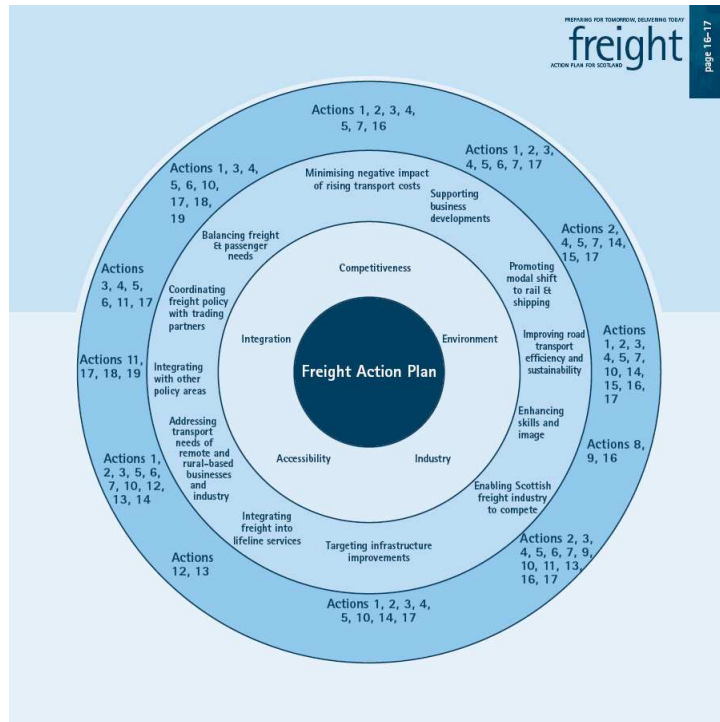


- 5.6 Current and future trends are identified in the study including the focus on promoting modal shift from road to rail and water wherever practicable and how this is likely remain driven by the movement of bulk goods and will depend upon the availability of appropriate infrastructure and services and their relative costs compared to road freight.
- 5.7 Other key trends concentrating on logistics and supply chains include; the wider sourcing of suppliers and distribution of finished products, the desire to centralise inventory, the growth of hub-and-spoke networks, the shift to just-in-time deliveries and collaborative initiatives to improve vehicle utilisation. Urban consolidation is specifically mentioned in a break out box example as a way of improving deliveries in to urban centres, with schemes in Bristol and Heathrow cited as examples.
- 5.8 Future freight growth, over the next 25 years, is likely to be much lower than the past 25 years and take a different form. The total tonnes lifted, and the total tonne-kilometres transported in Scotland are expected to increase more slowly over time, when compared with the trends in GDP growth.
- 5.9 Opportunities and constraints are then considered and with regard to local urban deliveries the following was identified:
- A lack of understanding on freight and logistics issues amongst local planners and a lack of sympathy from enforcement authorities for practical delivery problems in urban areas. On the other hand, the local authorities feel they lack powers to control freight movement.
  - Efficiency of urban retail deliveries seems to have been impaired by poor shop design and this is an issue for land use planning. Sharing of loading bays between delivery and 'blue badge' vehicles for the disabled also appears to create problems.
  - Local consolidation in freight delivery already occurs in Scotland. UK examples of urban freight consolidation suggest such centres work best when they are focused on particular types of delivery in areas with an aim to solve particular problems.
  - The most beneficial measure for urban freight deliveries is in fact getting people out of cars and onto public transport.
- 5.10 The study concluded by identifying 'Objectives, options and priorities' which would form the basis of a national freight strategy. The key policy areas that were identified through consultation were defined as:
- Reducing negative impacts of freight to **the environment**
  - Enhancing **competitiveness** of Scotland internationally and within the UK
  - Supporting the development of the **freight industry** in Scotland
  - Maintaining and improving accessibility to **rural and remote areas**
  - **Coordination** with wider policies and industry initiatives
- 5.11 In terms of developing an action plan twelve objectives were then set out based on the key policy areas and a greater number of sub-objectives were then put forward for consideration. The objectives underpin the five overarching policy goals of the Scottish Transport Appraisal Guidance (STAG) and these objectives will now be considered as part of the Scottish Freight Action Plan review.
- Scottish Freight Action Plan***
- 5.12 As previously stated the SSFSS fed into the development of the Scottish Freight Action Plan (SFAP), which in turn has been developed to help achieve the aims and objects of the 20 year National Transport Strategy (NTS), whose objectives are to; improve journey times and

connections, reduce emissions and a transport system that is high quality, accessible and affordable to use.

- 5.13 The vision for the SFAP is defined as *'Working in partnership with business and industry, our vision is for Scotland to be a place where the movement of freight through the entire supply chain is efficient and sustainable, on a transport infrastructure that is integrated and flexible - thus allowing Scotland's businesses to compete and grow in a global economy.'* The consolidation concept can be seen to broadly support all of the guiding principles behind the SFAP and the wider NTS and the objectives for a consolidation centre to serve Perth and Dundee would look to reflect this.

**Figure 5.1 Scottish Freight Action Plan**



The objectives and actions contained within the SFAP are laid out as shown in Figure 5.1. The objective of *Improving road transport efficiency and sustainability* is a key theme of freight consolidation and therefore fits with the SFAP. This is demonstrated further by Action Seven within the document which advocates that *business and the freight industry should collaborate to identify opportunities to develop consolidation centres, benefit from trade imbalances, and develop networks such as ELUPEG to consolidate loads and reduce empty running.* As can be seen in the diagram Action Seven is also supportive to a number of other

objectives within the SFAP, which help ensure that the consolidation study is contributing to the overarching strategy and framework being set at a national level.

**Freight in Scotland Report**

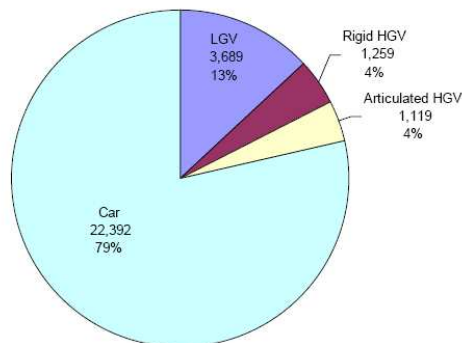
- 5.14 In response to the publication of the SFAP specifically Action 17; *The Scottish government and Enterprise Bodies will work with other public sector bodies and industry to develop freight information that can be used to inform future freight policy and services.* The Scottish Government commissioned the Freight in Scotland Report as part of the Freight Statistics Project. The report brings together existing information on the freight industry in Scotland, it discusses each of the modes in turn, presenting trends, describing the issues and identifying gaps in data availability.

- 5.15 Some of the key statistics of freight lifted, moved and length of haul are provided below:

- Total freight lifted in Scotland in 2006 was 245 million tonnes, 71% by road, 5% by rail, 13% by water and 11% by pipeline;
- From 1996 to 2006 the volume of freight transported by rail has more than doubled;
- In total 37,589 million tonne kilometres of freight were moved within, to and from Scotland in 2006, a decline from the peak in 1998 of 53,459 million tonne kilometres.

- Taking into account the distance that freight is moved affects the choice of transport mode. In 2006 road accounted for 38% of freight moved, rail 10%, water 37% and pipeline 15%. This is only the second year since 1996 where road has accounted for more tonne kilometres than water in Scotland.

**Figure 5.2 Goods Vehicle KMs in Scotland**



Million vehicle kilometres  
Source: Department for Transport, 2008b

Figure 5.2 shows that goods vehicles account for approximately 20% of the total 28,458 million vehicle kilometres on Scottish main roads. In 2007, there were 12% more rigid HGV vehicle kilometres than articulated HGVs. Of the goods vehicle kilometres, 3,689 million are LGVs which is 60% of the total goods vehicle kilometres (carried by both LGVs and HGVs).

The National Atmospheric Emissions Inventory (NAEI) shows that for Scotland the GHG (or CO<sub>2</sub> equivalent) emissions created by road transport have increased gradually, with an overall increase of 15% from 1990 to 2006. HGVs are the second

largest contributor to carbon dioxide emissions in road transport (21.1% of the total road transport), with LGV coming third (16.3%). The volume of GHG emissions generated by HGVs has broadly been stable since 1995; but has increased for LGVs by 64% mainly due to the rapid growth in the usage of LGVs relative to other vehicle types. These figures indicate that road transport is increasing its share of transport emissions and that freight vehicles are contributing to this in particular due to the rise in use of LGVs.

- 5.16 In terms of emissions linked to air quality, a key driver for the consolidation study. The national data will need to be considered in the context of local emissions trends for Perth and Dundee, which are looked at later in this section. In terms of a consolidation centre a key benefit from such a scheme can be a reduction in delivery vehicle trips with associated reductions in emissions, which can be further improved by the use of electric vehicles.

#### *Scottish Multi-Modal Freight Locations Study*

- 5.17 As a result of the publication of national policy documents such as the NTS and SFAP the Scottish Multi-Modal Freight Locations Study (SMMFLS) was undertaken. To meet the objectives of national policy, multi-modal freight facilities can be sited at strategic locations to aid interchange and have an important role to play whether they are local terminals, regional distribution centres or international connections. As such they should be encouraged in the planning process, in accordance with Government policy. They can be provided in relatively small numbers, strategically located throughout the country, to serve major urban conurbations as well as rural areas and are key to providing sustainable growth in freight.
- 5.18 The study analysed current and future trends in freight and disaggregated this data by each Regional Transport Partnership (RTP) region the results of which for Tactran are summarised below in Figure 5.3.

**Figure 5.3 Tactran Freight Tonnage by Mode**

TACTRAN	Total Tonnes (x1000)	Tonnage by Mode			
		Road	Water	Air	Rail
2007 Base	26,617	24,567	1,621	0	429
2020 Low Growth	33,677	31,271	1,744	0	662
2020 High Growth	36,972	34,315	1,802	0	855

5.19 Key points to note for the Tactran region include:

- Total freight is projected to increase by 27% for the low growth scenario and 39% for the high growth scenario. These are higher values than the forecast increases in freight tonnes for Scotland as a whole, although they are starting from a modest base level;
- Road freight tonnage is about 8% of the national total, which lies in the middle of the various RTP areas (only HITRANS and SWestrans are lower);
- The area also moves less freight by water than any other RTP area, and less by rail than any other RTP area other than ZetTrans; and
- Those commodities experiencing a significant growth in freight are retail, minerals and other/miscellaneous

**Figure 5.4 Tactran Freight Modal Shares**

TACTRAN	Modal Shares			
	Road	Water	Air	Rail
2007 Base	92%	6%	0%	2%
2020 Low Growth	93%	5%	0%	2%
2020 High Growth	93%	5%	0%	2%

5.20 The Figure 5.4 shows that road freight in TACTRAN has the highest modal share and this is set to increase slightly, although the overall tonnage is relatively low and while freight carried by water and rail are low compared to other RTPs, they are expected to experience modest grow in overall tonnage terms.

5.21 A total of 16 potential multi-modal locations were identified through detailed consultation with stakeholders with Dundee being included as a regional gateway for Tactran. Each site was then assessed in terms of capacity to handle future growth in demand for freight, economic impact and STAG based appraisal. Dundee was seen to require minor investment (<£2million), have a Business Cost Ratio of 4.1 and have either positive or neutral impact on STAG objectives. Dundee was therefore seen as one of eight locations that was financially viable as a port related development that could be implemented through private sector with indirect assistance from the Government through the planning process.

5.22 This outcome will be borne in mind during the freight consolidation feasibility study, in particular due to the potential for consolidation to be integrated with other distribution functions and also the recognition that retail commodities are experiencing significant growth.

## Regional Policy

### *Tactran Regional Transport Strategy 2008 – 2023*

- 5.23 The Tayside and Central Scotland Transport Partnership (Tactran) was established in 2005 as part of the Transport (Scotland) Act 2005, which created seven regional transport partnerships across Scotland. The Tactran Regional Transport Strategy (RTS) sets out a vision and strategy that aims to deliver:

*“A transport system, shaped by engagement with its citizens, which helps deliver prosperity and connects communities across the region and beyond, which is socially inclusive and environmentally sustainable and which promotes the health and well-being of all.”*

- 5.24 The strategy seeks to fulfil this vision through a balanced and integrated approach which supports the themes of; delivering economic prosperity; connecting communities and being socially inclusive and delivering environmental sustainability, health and well-being. Within this a key priority is to work with road haulage, rail freight and port operators to develop more efficient and sustainable movement of goods. This fits with wider national policy objectives and also with the concept of freight consolidation.
- 5.25 The RTS identifies trends and issues in particular emphasising that there are currently no rail terminals within the region to serve the needs of freight and that delays and reliability problems are affecting strategic transport links such as trunk roads and other key links.
- 5.26 Within the strategy there is a commitment to improve environmental sustainability and promote health and well being by ensuring that improvements in the movement of passengers and goods are sustainable, including maximising the use of public transport and rail and water-borne freight.
- 5.27 Eighteen specific objectives are then identified and given a weighting against the overarching objectives providing a total score for each; objective 2 focuses on the efficiency of freight movements, as shown in Figure 5.5, and is the top weighted objective overall. This confirms that freight consolidation with its potential to provide efficiency gains and improve environmental performance is coherent with the Tactran RTS.

**Figure 5.5 Tactran RTS Objectives**

Specific Objectives	Overarching Objectives						Objective Weighting
	Economy	Environment	Health & Well-being	Safety & Security	Accessibility	Integration	
1 To ensure that transport infrastructure and services in the region help deliver economic growth, particularly in key business and employment sectors	20	2	1				23
2 To improve the efficiency, reliability and integration of the movement of goods and people	23	3	3	4	13	9	55
3 To address issues of peripherality associated with the Tactran area	18				4	5	27

## Local Policy

### *Perth and Kinross Local Transport Strategy*

5.28 The Perth and Kinross Local Transport Strategy (LTS) recognises that in order to maintain the vitality of the city centre retail outlets will require deliveries to be made by goods vehicles. However there is a concern regarding the size and volume of HGVs accessing the city centre and also those vehicles travelling through Perth via South Street to access the A94. This was confirmed through the public consultation exercise which showed support for a reduction in the number of HGVs travelling through the city centre and in particular a ban on HGVs on South Street. This led to two proposals by the Council as shown below:

- *Proposal 16: The Council will investigate the practicalities of banning HGVs from South Street in Perth;*
- *Proposal 17: The Council through its membership of the Perth Partnership will investigate alternative ways of servicing premises rather than by individual HGVs.*

5.29 Freight consolidation can be seen as a way of achieving proposal 17 through streamlining deliveries to retailers by grouping individual loads for individual premises on to fewer and fuller dedicated vehicles for onward delivery.

### *Dundee Local Transport Strategy*

5.30 This Dundee Local Transport Strategy (LTS) is a statement with regard to the future of transportation within the Dundee area. It reflects the policies and objectives contained within the Structure & Local Plans for the area and aims to link closely to current land use and planning practice.

5.31 Dundee's relatively central location in Scotland and strong transport facilities makes it a logical place for distribution activities. This presents a challenge to seek methods to accommodate and encourage these opportunities whilst at the same time ensuring it does not come with an unacceptable cost in terms of community, economy or environment. Key aims to be considered for the city include:

- Investigating methods for rail freight to play a full part in sustainable distribution;
- To encourage distribution development in connection with sea and inland waterways;
- To maintain the road network in a manner which enables wide accessibility to freight vehicles whilst ensuring that such vehicles use the most acceptable routes through the urban area thus reducing noise & disturbance to Dundee's communities;
- To encourage and develop the role of Dundee Airport in expanding air freight opportunities;
- To encourage methods to improve efficiency in the freight distribution system;

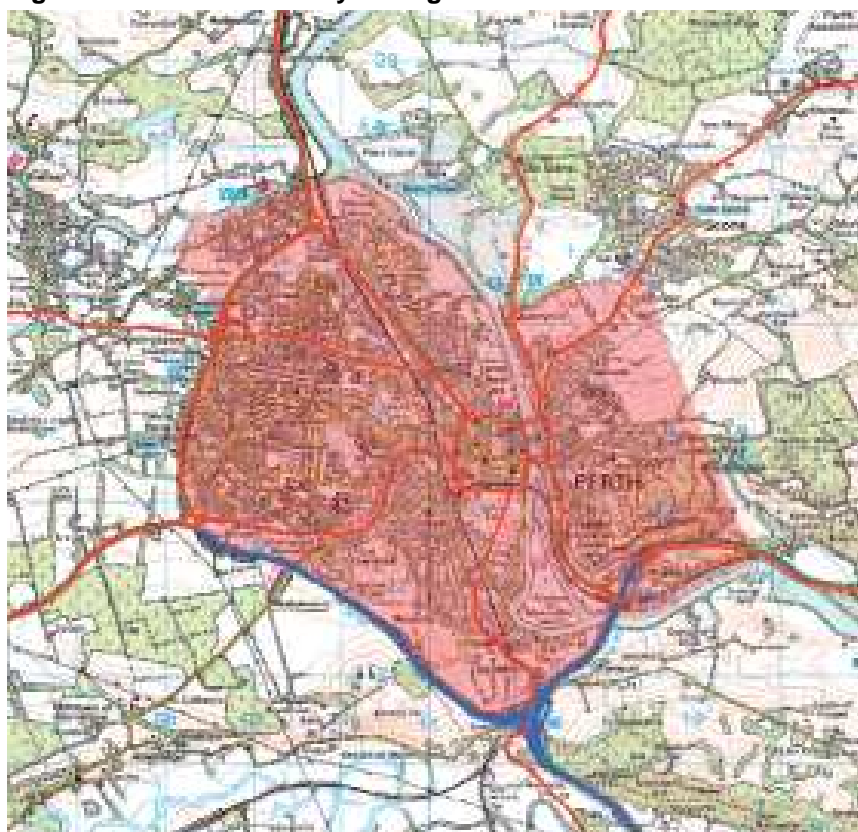
5.32 Points 3 and 5, in particular 5, can be seen to support the freight consolidation concept and its potential to help achieve the goals of the LTS. There is also a commitment to work with the freight industry and relevant stakeholders, through a mechanism such as an FQP. This form of public/private sector cooperation is fundamental to the freight consolidation feasibility study and also the prospects of achieving the implementation of a scheme.

### *Perth and Kinross Air Quality Action Plan*

5.33 In line with Local Air Quality Management (LAQM) in Scotland objectives and the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297) Perth and Kinross Council has produced an Air

Quality Action Plan (AQAP) which sets out the strategy for the area designated as an Air Quality Management Area (AQMA) on 5<sup>th</sup> May 2006 as shown in Figure 5.6. The aim of the plan is to outline measures to reduce emissions of nitrogen di-oxide and fine particulate material. The AQMA was designated as a result of air quality investigations, which predicted that the national objective for nitrogen dioxide would not be achieved at a number of locations, in Perth over 80% is said to come from road vehicles. The situation for particulates is different with the greatest proportion coming from background sources (approx 79%), although the traffic component at the worst locations is much more significant. At the worst hotspots a reduction in nitrogen dioxide and particulates by around 33% is required.

**Figure 5.6 Perth Air Quality Management Area**



5.34 The baseline for the AQAP was set as 2005 and subsequent monitoring to establish the baseline was undertaken the results of which are shown in Figure 5.7. The maps and graphs show the locations and sources of NO<sub>2</sub> and PM<sub>10</sub> emissions and as can be seen the area in question is broadly the same as target area for the freight consolidation study. As is shown in the graphs freight vehicles (when stationary) were seen to be contributing some 33% (of 67%) and 9% (of 17%) respectively. The results led to the suggestion that the focus for local efforts to reduce emissions should in particular look at; *'reducing the impacts of heavy duty vehicles (HDVs) including buses, coaches and HGVs particularly their impacts when stationary.'* This in turn led to freight specific measures being included in the AQAP as shown below:

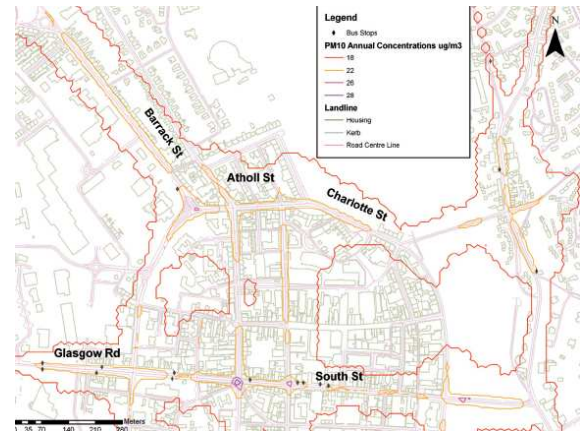
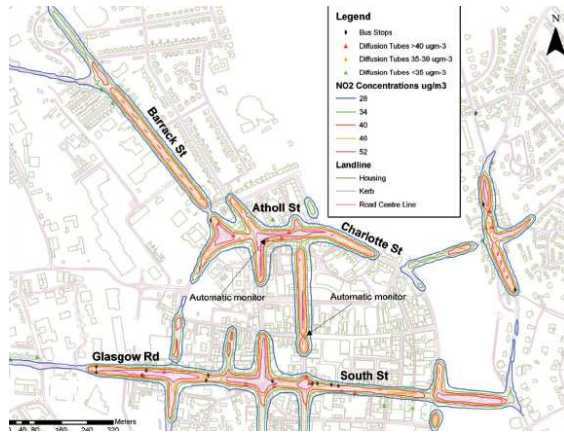
- Establish a TACTRAN wide Freight Quality Partnership, in liaison with freight interests and Councils drawing upon established guidance, to help deliver cost-effective packages of freight related interventions across the region;
- Development of a freight consolidation scheme or commercial delivery strategy.

5.35 Freight consolidation is considered as a measure due to its potential to result in a reduction in delivery and servicing vehicle traffic and therefore emissions. The Bristol freight consolidation scheme is again cited as a good example.

**Figure 5.7 Perth Air Quality Maps and Source Apportionment Data**

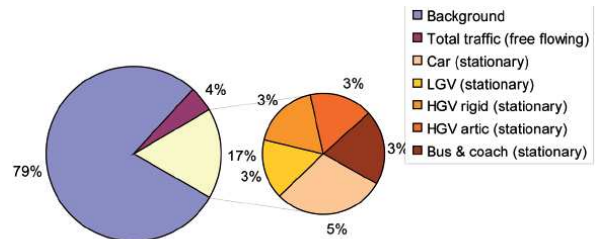
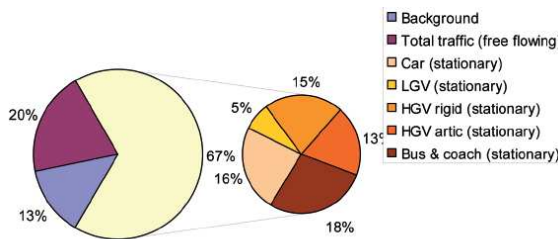
**Predicted Annual Mean NO<sub>2</sub> concentrations in Perth, 2005**

**Predicted Annual Mean PM<sub>10</sub> concentrations in Perth, 2005**



**Source Apportionment Results NOx**

**Source Apportionment Results PM<sub>10</sub>**



**Draft Dundee Air Quality Action Plan**

5.36 Also in line air quality objectives Dundee City Council undertook first and second round assessments of air quality in Dundee City. The assessment concluded that there were likely to be exceedance of the annual mean objective for NO<sub>2</sub> as a result of traffic sources in Dundee in the following areas:

- Seagate
- Nethergate / Marketgait Junction
- Dock Street
- Commercial Street
- Victoria Road / Hilltown/ Meadowside Junction
- Lochee Road / Rankine Street Junction
- Lochee Road / Dudhope Junction
- Logie Street / Loons Road Junction

5.37 It should be noted that Lochee Road and Logie Street were identified as suffering from an exceedance of NO<sub>2</sub>, which could be linked to its strategic position as a supply chain route and bus route.



5.38 Following the detailed modelling of NO<sub>2</sub> and PM<sub>10</sub> concentrations in Dundee in 2005, the whole of Dundee was declared as an AQMA (as shown in Figure 5.8) for NO<sub>2</sub> in July 2006. For PM<sub>10</sub> the assessment showed that the only monitored PM<sub>10</sub> concentrations predicted to exceed the annual mean objective (2010) are in Union Street. However, it was suggested that this result will have been adversely influenced by major construction projects in the vicinity and may not truly represent ambient concentrations present at this location.

Figure 5.8 Dundee AQMA

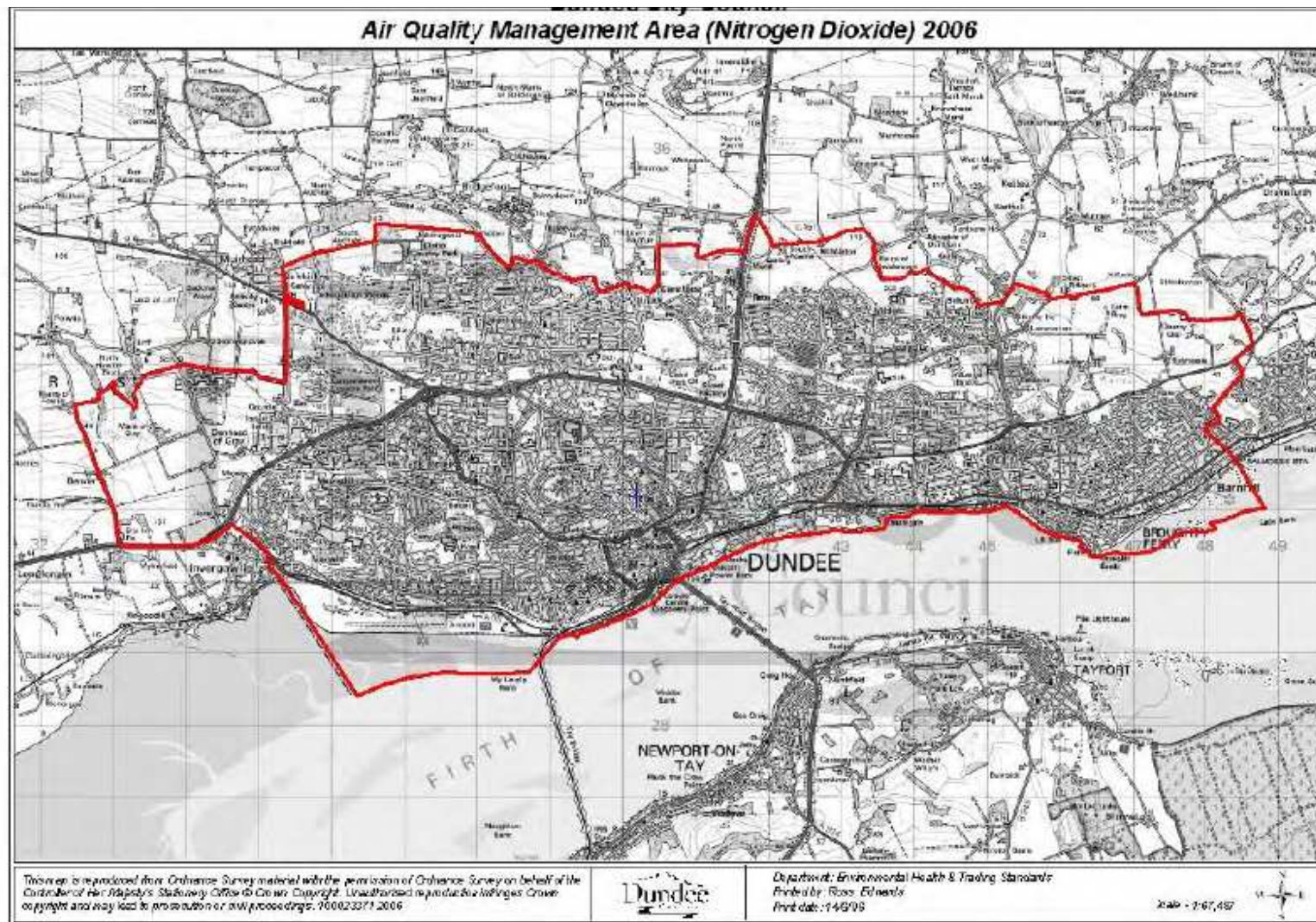
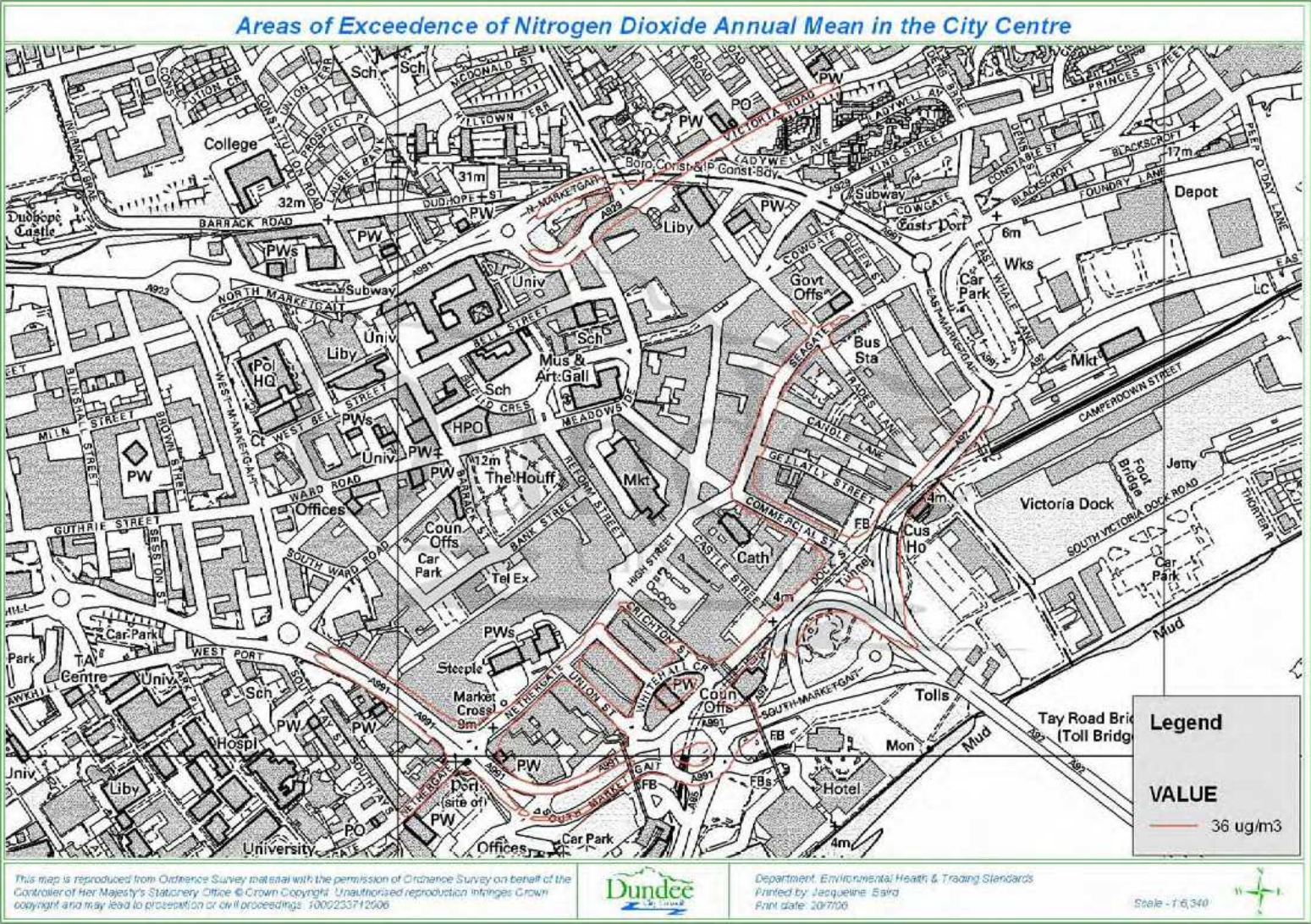


Figure 5.9 Dundee Air Quality Exceedance Locations

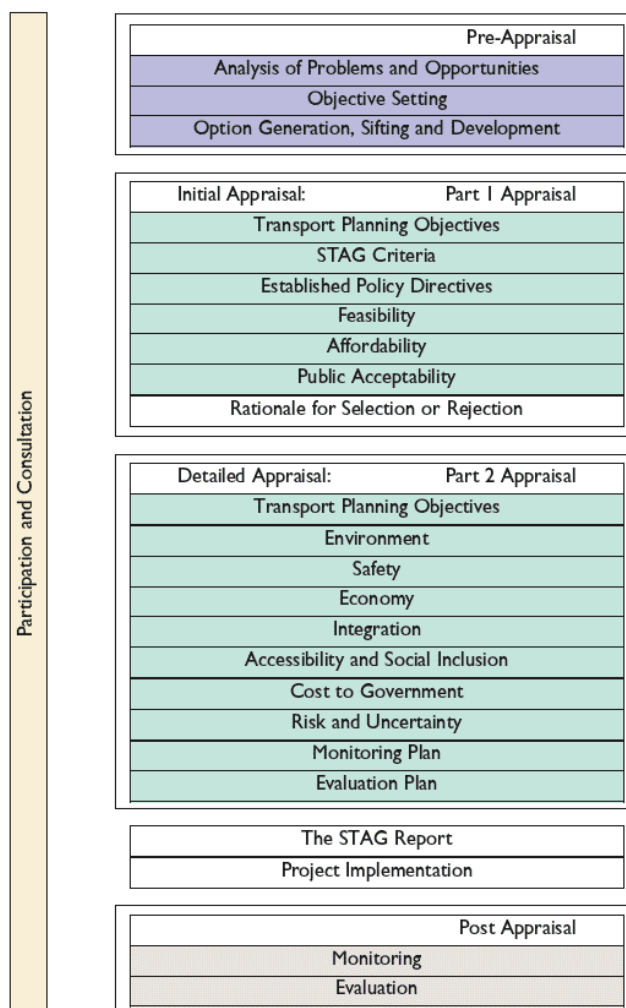


- 5.39 The areas where air quality problems arise, as with Perth, are broadly consistent with the target area for the freight consolidation feasibility study and therefore it can be seen to advocate the case for such a scheme from an environmental perspective.
- 5.40 In terms of source apportionment of oxides of nitrogen (NOx), road traffic emissions of NOx are identified as the main contribution to total NOx concentrations accounting for 74-91% of the total NOx concentrations at receptors. Heavy-duty vehicles (HDVs) were seen to contribute around 38 - 77% of the road traffic emissions, which is considered disproportionately high given their proportion within the vehicle fleet in the AQMA. Light duty vehicles (LDVs) contribute 11 - 44% to the total NOx.
- 5.41 Source apportionment of PM<sub>10</sub>, indicates background sources of PM<sub>10</sub> make a significant contribution to total PM<sub>10</sub> concentrations accounting for 28-59% of the total PM<sub>10</sub> concentrations at receptors. Road traffic contributes 41% to 72% of the total PM<sub>10</sub> concentration at receptors. Light duty vehicles (LDVs) contribute around 7 – 24% and heavy-duty vehicles (HDVs) contribute around 11 - 36% to the total PM<sub>10</sub> concentrations at receptors.
- 5.42 The Draft Dundee AQAP specifies a number of proposals designed to help meet air quality objectives as specified by the national regulations. Within the proposals measure M7: Measures targeting Heavy Goods Vehicles specifically identifies this feasibility study and the potential benefits of freight consolidation. In particular reference is made to the investigation of a tri-modal interchange in the Dundee Port area, accessed via Broughty Ferry Road, which could incorporate a freight consolidation facility. This is part of a wider strategy for the Port of Dundee to facilitate further development of the Port, through improvements to road links, and potential for development a tri-modal rail head. A site of 25 hectares adjacent to the deep water terminal has been identified to accommodate this use. The port area site will be taken into consideration for developing freight consolidation scenarios.

## 6 Scottish Transport Appraisal Guidance

- 1.3 Transport Scotland's Scottish Transport Appraisal Guidance (STAG) outlines an objective-led framework for identifying potential transport interventions based on evidenced problems. The guidance encourages informed decision-making from consultation of evidence and the consideration of a number of possible solutions. Only options borne of the STAG process have the potential for support or funding from the Government. As such, compliance with the STAG process is fundamental to an effective transport solution.
- 1.4 Figure 6.1 shows the four phases of the STAG process; Pre-Appraisal; Part 1 Appraisal; Part 2 Appraisal; and Post Appraisal. The rationale for this study is developed within the Regional Transport Strategy and AQAPs for Perth and Dundee where a Freight Consolidation Centre was identified as an option capable of meeting the objectives of the RTS which was developed in response to the problems, opportunities, issues and constraints identified within the Tactran area. The RTS itself was developed using STAG principles and this feasibility study has been commissioned to determine whether this RTS option has potential going forward.
- 1.5 The methodology for this study, as outlined within Chapter 7, adopts the principles of the STAG process and is evidence-based and objective-led. Engagement with relevant stakeholders is a key component of STAG and this principle has been adopted within this study where extensive consultation with stakeholders and retailers has been undertaken.

**Figure 6.1 The STAG Process**



## Objective Setting

6.1 This section examines the process through which the objectives for the study have been developed against which each proposed option will be assessed. This includes the development of local Transport Planning Objectives (TPOs), the local objectives adopted for the purposes of this study. The TPOs should express the outcomes sought for the study and will describe how problems will be alleviated.

### STAG Criteria

1.6 The STAG guidance states that the STAG criteria capture all, or the great majority of, the impacts of a transport option, and hence provide a strategic framework which can be used in developing and setting TPOs. The STAG Criteria are:

- Environment;
- Safety;
- Economy;
- Integration; and
- Accessibility and Social Inclusion.

### Established Policy Directives

6.2 The study assessment process will be undertaken within the context of previously established policy directives and, therefore, due consideration must be given to these during the objective setting process. This has been undertaken in Chapter 5 Policy Review and Strategic Fit.

### Transport Planning Objectives

1.7 The Transport Planning Objectives (TPOs) for the study were developed in response to:

- the problems and opportunities identified;
- consultation with key stakeholders;
- a review of the STAG criteria; and
- a review of relevant established policy directive aims, objectives and outcomes.

6.3 Through this process the TPOs for the study have been established as follows:

- Contribute to an improvement in Air Quality in the target area;
- Improve distribution efficiency and sustainability in the Tactran region;
- Reduce the number of delivery vehicles travelling in to the target area;
- Contribute to enhancing the retail environment of the target area;
- Reduce conflict between delivery vehicles, other road users and pedestrians;
- Provide an improved delivery service to retailers; and
- Provide the opportunity for value added services such as off-site storage and collection of waste and packaging material.

6.4 These TPOs were developed and refined through a combination of reviewing local, regional and national policy documents and also through consultation with strategic and local stakeholders

including retailers, Tactran and the local Councils of Perth & Kinross and Dundee. Details and findings from the consultation can be seen in Chapters 8 & 9.

### Transport Planning Objectives Fit with STAG Criteria and Established Policy Directive Objectives

1.8 The tables below show the linkages between the TPOs and the STAG criteria and established policy directives. As the STAG Guidance suggests, this is to show the relationship between them, if any.

#### Table Key

Strong Linkages	✓✓
Weak Linkages	✓
No Impact	○

**Table 6.1 Linkages between established Policy Directives and TPOs**

<b>TPOs \ Policy Directives</b>	Improve the environmental and operational efficiency of freight distribution in the region	Address air quality issues and environmental targets in Perth and Dundee
Improve distribution efficiency and sustainability in the Tactran region	✓✓	✓
Reduce the number of delivery vehicles travelling in to the target area	✓✓	✓
Contribute to an improvement in Air Quality in the target area	✓✓	✓✓
Contribute to enhancing the retail environment of the target area	○	✓
Reduce conflict between delivery vehicles, other road users and pedestrians	✓	○
Provide an improved delivery service to retailers	✓✓	○
Provide the opportunity for value added services such as off-site storage and collection of waste and packaging material	✓✓	○

**Table 6.2 Linkages between STAG criteria and TPOs**

TPOs	STAG criteria				
	Environment	Safety	Economy	Integration	Accessibility & Social Inclusion
Improve distribution efficiency and sustainability in the Tactran region	✓✓	✓	✓✓	○	○
Reduce the number of delivery vehicles travelling in to the target area	✓✓	✓✓	✓	○	○
Contribute to an improvement in Air Quality in the target area	✓✓	○	○	○	✓
Contribute to enhancing the retail environment of the target area	✓	✓	✓✓	✓	✓
Reduce conflict between delivery vehicles, other road users and pedestrians	○	✓✓	○	✓	✓✓
Provide an improved delivery service to retailers	○	○	✓	○	○
Provide the opportunity for value added services such as off-site storage and collection of waste and packaging material	✓	○	✓	○	○

1.9 In summary, it is noted that there are no conflicts between the TPO's and the STAG criteria and established policy directive objectives.



## 7 Methodology

7.1 The process diagram in Figure 7.1 indicates the stages and tasks undertaken by the project team to carry out the study and understand the feasibility for both retail and construction consolidation in Perth and Dundee.

Figure 7.1 Tactran Freight Consolidation Centre Methodology



## 8 Strategic Stakeholder Consultation

- 8.1 The development of a consolidation centre for Perth and Dundee is an important sustainable distribution initiative which impacts on current operational practice. It was therefore deemed important to undertake consultation, during the initial study phase, with selected strategic bodies and other interested parties to understand the various organisations' policies relating to consolidation centres, as well as their views on the potential benefits and possible drawbacks associated with their use.
- 8.2 During the initial stage of this feasibility study, a series of consultation discussions were undertaken with a selection of strategic bodies and other interested parties, including:
- Perth & Kinross Council (PKC)
  - Dundee City Council (DCC)
  - Perth City Centre Management
  - Dundee City Centre Management
  - Road Haulage Association (RHA)
  - Freight Transport Association (FTA)
  - Association of Town Centre Management (ATCM)
  - Scottish Retail Consortium (SRC)
- 8.3 Consultation discussions were structured using the guiding questions below:
- What is the organisation's overall view of the consolidation concept?
  - What are seen as the main benefits of retail consolidation centres?
  - Are there any potential drawbacks perceived relating to retail consolidation centres?
  - What mitigation measures could be used to overcome these drawbacks?
  - What should be the financial arrangements for establishing and managing consolidation centres?
- 8.4 In general, all of the strategic bodies consulted were supportive of the consolidation centre principle, with the environmental benefits deemed to be a key factor. It was expressed during these strategic stakeholder discussions that the concept of one consolidation centre vehicle accessing an urban area to make ten deliveries, rather than ten vehicles accessing that area to make one drop each, makes both sound environmental and logistical sense. Fast turn round of larger vehicles and hence better utilisation were also considered benefits and use of more environmentally friendly vehicles e.g. electric to enhance environmental performance was also cited.
- 8.5 From an operational perspective some of the potential negatives of freight consolidation were considered to be; loss of control and possible risks with double handling, which could reflect on items such as insurance rates for Goods in Transit risk. Also, given that many deliveries are Just In Time (JIT) from manufacturer to outlet double handling could add time into delivery. This would require a very slick distribution operation for goods in and out. Any delays in this process negate the purpose of a consolidation centre.

- 8.6 There was also concern that the consolidation centre concept is often misunderstood by local authorities and is not, in fact, a new concept. Consolidation centres have existed for many years in freight operations, particularly in parcel and pallet networks.
- 8.7 The key issue raised by all strategic bodies, concerned who will actually pay for the formation and ongoing management of the consolidation centre and for the services it offers.
- 8.8 If the use of the consolidation centre is voluntary but results in additional costs without very explicit benefits for its users, then there is a risk that it may never become commercially viable and will operate purely as an environmental initiative. If that is the case, then certain strategic stakeholders felt the relevant local authority should be expected to pay, as it will derive the most significant benefits from the operation in terms of local environmental improvements.
- 8.9 Balanced sustainability of consolidation centres was a specific issue for some strategic stakeholders. It was felt that, for measures such as consolidation centres to be truly sustainable, there needs to be an equal share of balance between environmental, economic and social benefits. If there is an imbalance, for example, if environmental benefits outweigh economic benefits, then such a measure is unlikely to be commercially viable and will require subsidy to offset the economic benefit shortfall – in much the same way as freight transport by more sustainable modes (rail, water) may receive Government subsidy when its actual costs are greater than the direct road haulage equivalent, to encourage modal shift.
- 8.10 There was a concern that local authority subsidy for consolidation centres actually adds to the lack of business case clarity, clouding the key question of whether they are, fundamentally, a sound logistics solution or a local environmental initiative.
- 8.11 There was general agreement that clarity of costs is crucial and an acknowledgement that manufacturers, retailers and operators will only pay for consolidation centre use if they see clear economic benefits in so doing, or if the cost is no greater than is applicable to the current operational practice but leads to greater environmental/social benefits.
- 8.12 One strategic organisation suggested that ‘voluntary’ consolidation centres will struggle to survive due to the basic lack of clear business case. ‘Mandatory’ consolidation centres are, however, much more likely to succeed and to be accepted more quickly as ‘standard operating practice’. This would require clear evidence of the benefits to secure buy-in from all necessary parties.

### Summary

- 8.13 The consultation with strategic bodies and other interested parties revealed that, in general, there was policy-based support for the concept of freight consolidation, where it maximises efficiency and reduces environmental impact by reducing the number of delivery vehicles accessing and servicing urban areas
- 8.14 The key issue of ‘who pays’ for the service was raised by each organisation approached during the series of consultations and the issue of commercial viability without subsidy was highlighted by many.
- 8.15 Organisations felt that consolidation centres’ environmental credentials were clear but their economic business case was not sufficiently transparent. Some felt that public sector subsidy further affects this business case transparency.

## Logistic Companies Consultation

- 8.16 Discussions with DHL and Clipper Logistics were undertaken as part of the consultation process. As highlighted in the best practice review DHL and Clipper currently operate consolidation centres in Bristol and at Meadowhall Shopping Centre in Sheffield respectively. JMP and TTR have established contacts within both companies and were therefore able to utilise these existing links. Both companies expressed an interest in the potential for a consolidation centre to serve Perth and or Dundee and believed from an operational perspective it would be achievable. In terms of distribution facilities Clipper indicated that their base within Scotland is located at Bellshill, Glasgow. DHL have a number of distribution premises in Scotland including a depot on the Inveralmond industrial estate to the north of Perth used for Argos Ltd home delivery operations. DHL also confirmed that they currently serve of number of retailers in Perth and Dundee and that the delivery round can also include serving retailers in Arbroath and Aberdeen using the same vehicle. The information collated from this consultation has been used to inform the development of the FCC scenarios.

## 9 Retailer Survey Findings and Data Analysis

9.1 This section summarises the results of the consultation with retailers in Dundee and Perth. The purpose of the retailer consultation was to identify:

- Current delivery patterns and trends;
- Problems and issues faced by retailers receiving deliveries;
- Problems and issues faced by suppliers making deliveries; and
- Retailers suitability to participation in a consolidation scheme;

9.2 Prior to the retailer consultation taking place a number of steps were taken to ensure the consultation exercise was as successful as possible. Contact was made with the respective city centre managers for Perth and Dundee to confirm their support for the study and consultation exercise. They provided business contact databases, which were refined to correspond with the types of business (retailers) being targeted and also the confirmed target areas (central core retailing areas of Perth and Dundee). An introductory e-mail and flyer (as shown in Appendix B) for the consolidation feasibility study were produced and disseminated through the city centre managers to as many of the target retailers as possible dependant on the availability of e-mail addresses. Paper copies were also distributed where appropriate.

9.3 The preliminary work was especially important as the consultation period unavoidably coincided with the busy pre-Christmas retailing period (November – December 2009); where time pressures on retailers would potentially make consultation difficult. This was identified early on as a project risk and therefore it was agreed with Tactran at the inception meeting that the consultation would begin as soon as possible.

9.4 The consultation was carried out using a mixture of face to face surveying and telephone interviews based on the retailer survey form included as Appendix C. The retailer survey form used was adapted from the survey form used in previous freight consolidation scheme development processes in Bristol, South London and Covent Garden. The retailer consultation ended on December 11<sup>th</sup> 2009 and achieved an excellent response rate especially considering the timing of consultation period. Table 9.1 indicates the response rate achieved.

**Table 9.1 Retailer Consultation Results**

Location	Retailers in contact database	Retailers contacted	Retailers surveyed	Response rate
Perth	250	191	96	50%
Dundee	400	147	86	59%

9.5 The survey responses were then entered in to an SPSS database and analysed to provide feedback, which would then help set the framework for developing appropriate freight consolidation scenarios.

### Upstream Business Surveys

9.6 In addition to the retailer surveys a small number of upstream business surveys were also carried out. These took place after initial contact was made with retailers at store level in cases where it was recommended/required that contact be made with a regional or head office in order to obtain

relevant information. This also enabled the decision maker within the organization to be identified and to gauge the level of understanding of the consolidation concept. The results from the upstream business surveys have been combined with the results from retailer surveys in the following section.

## Perth Retailer Consultation

- 9.7 96 retailers in Perth were interviewed from a number of different locations, with the largest numbers of retailers surveyed located on the High Street, St John Centre and South Street.

**Table 9.2: Location of surveyed Perth retailers**

Location	Number of retailers	Location	Number of retailers
High Street	23	Hospital Street	2
St Johns Centre	17	Skinnergate	1
South Street	13	Athol Street	1
St John Street	8	Railway Station	1
George Street	7	Canal Crescent	1
North Methven Street	5	Charlotte Street	1
South Methven Street	4	Princess Street	1
Scott Street	4	Glasgow Road	1
Kinnoull Street	2	Leonard Street	1
Main Street	2	Crieff Road	1
		<b>Total</b>	<b>96</b>

- 9.8 Table 9.3 shows the types of retailers surveyed with the most common being Fashion/Clothing retailers (19%), Gifts and Cards/or Collectables retailers (9%), Shoe/or and Accessories retailers (6%) and Non food department retailers (4%).

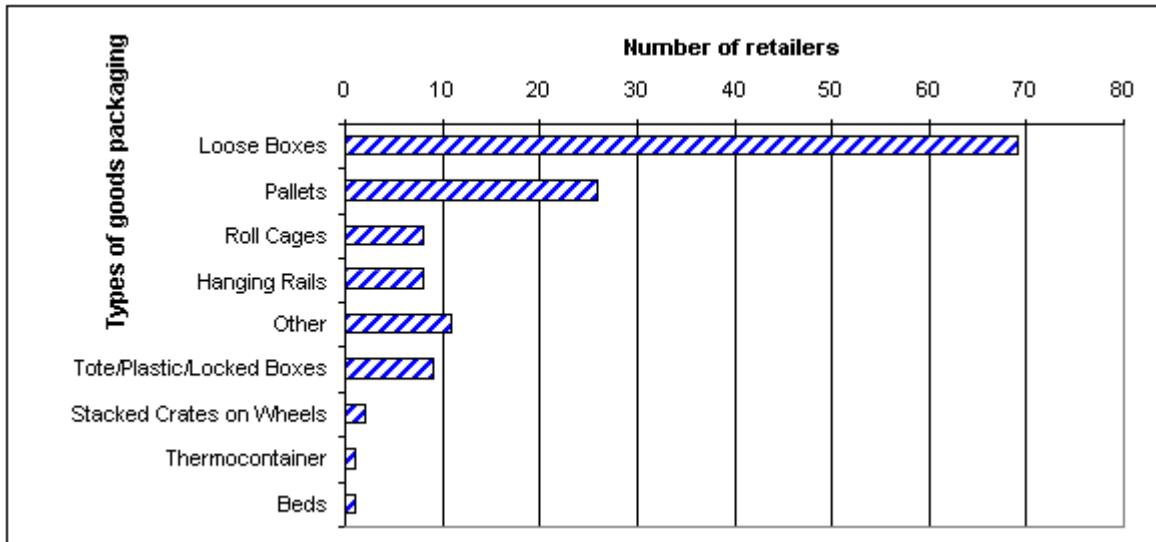
**Table 9.3: Types of Retailer Surveyed**

Type of Retail	Number of retailers	% of retailers	Type of Retail	Number of retailers	% of retailers
Fashion/Clothing Retail	18	19%	Homeware Retailer	3	3%
Gifts and cards and/or Collectables Retail	9	9%	Toys and Children's Entertainment Retail	2	2%
Shoe and/or Accessories Retail	6	6%	Health Foods and Supplements Retail	2	2%
Non Food Departmental Retail	4	4%	Shoe & watch repair shop	2	2%
Electrical Retail	4	4%	Photography shop/ photo retailer	2	2%
Jewellery Retail	4	4%	Food and Departmental Retail	1	1%
Arts and Crafts and Fabric Retail	4	4%	Underwear Retail	1	1%
Camping and Sport Retail	4	4%	School Clothing Retail	1	1%
Entertainment (CD, DVD, Book, Computer Game) Retail	3	3%	Pet Retail	1	1%
Mobile Phone and Camera Retail	3	3%	Gardening retail	1	1%
Beauty and/or Pharmaceutical Retail	3	3%	Calendar retailer operates at Xmas time	1	1%
Food Retail	3	3%	Sign writers	1	1%
Carpets Retail	3	3%	Bathroom supplies	1	1%
Florist	3	3%	<b>Total</b>	<b>96</b>	<b>100%</b>

### Survey Form Section 2 - Suitability Questions

- 9.9 Retailers were asked "Do the delivery vehicles delivering to your premises also carry goods for other premises?" Of the 96 retailers, 85 (89%) indicated that the delivery vehicles do carry goods for other premises with 10 retailers (10%) indicating to the contrary.
- 9.10 Four supporting comments were provided by retailers, with 3 retailers indicating that they also delivered for other stores within the same company, but not citing a particular location and 1 retailer indicating the location of the previous delivery.
- 9.11 Retailers were asked "How are the goods packed?" and were able to identify as many options as applicable. The most common types of packaging used are loose boxes (69 retailers - 72%), pallets (26 retailers - 27%), other type of handling units (11 retailers 11%) and 9 retailers (9%) cited tote/plastic/locked boxes. (Figure 9.1).

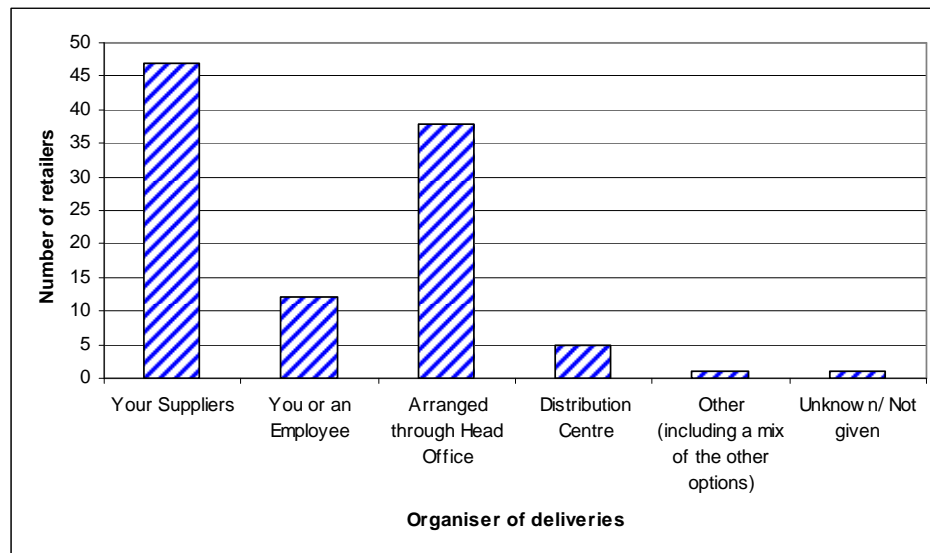
**Figure 9.1: “How are the goods packed?”**



9.12 It should be noted that other type of handling units included bags, carpet rolls, flat packed furniture, sacks, loose bunches of flowers, parcels/packages and recycling boxes.

9.13 Retailers were asked “Who is responsible for how your deliveries are organised?” and were able to identify as many options as applicable. The most common response was that the deliveries are arranged by suppliers (47 retailers - 49%), with 38 retailers (40%) citing that deliveries are arranged through the Head Office (Figure 9.2). 12 retailers (10%) indicated that deliveries are arranged by themselves or an employee and 5 (5%) stated that deliveries are arranged through their own Distribution Centre.

**Figure 9.2: “Who is responsible for how your deliveries are organised?”**

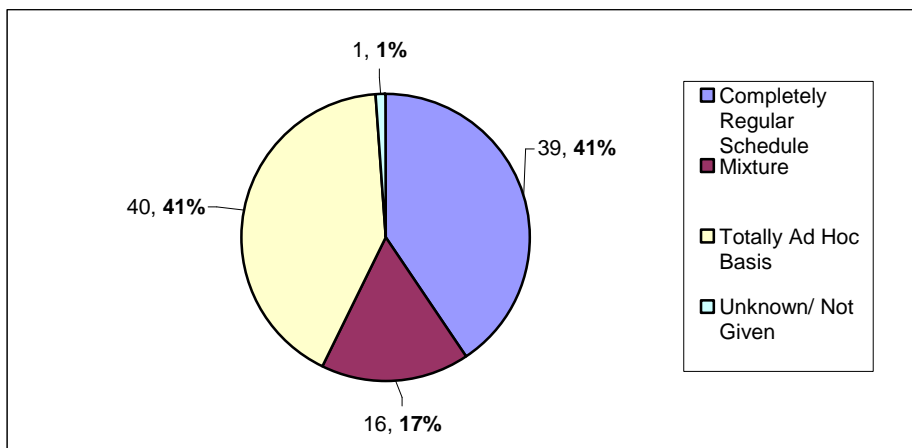


9.14 Retailers were asked “Who is responsible for sorting out inconsistencies in deliveries when they occur? For example, an inconsistency could be Damaged/Missing Goods or Paperwork Discrepancies” and were able to identify as many options as applicable. The most frequent responses were that inconsistencies were sorted out by the retailer or an employee, as cited by 81 retailers (84%) and/or arranged through Head Office, cited by 18 retailers (19%). Four retailers (4%) indicated that the inconsistencies in deliveries were resolved by suppliers.



9.15 Retailers were asked “In general are your deliveries made to a regular schedule?” The most common response was deliveries are totally on ad hoc basis, cited by 40 retailers (42%), with 39 retailers (41%) indicating that deliveries are made on a completely regular schedule. 16 retailers (17%) indicated that deliveries are made to a mixed deliveries schedule (Figure 9.3). A number of retailers provided supporting comments which fed into the information presented in section 1.2.4. However, 5 retailers said that the main deliveries are on a regular schedule and 1 retailer confirmed deliveries are carried out by couriers.

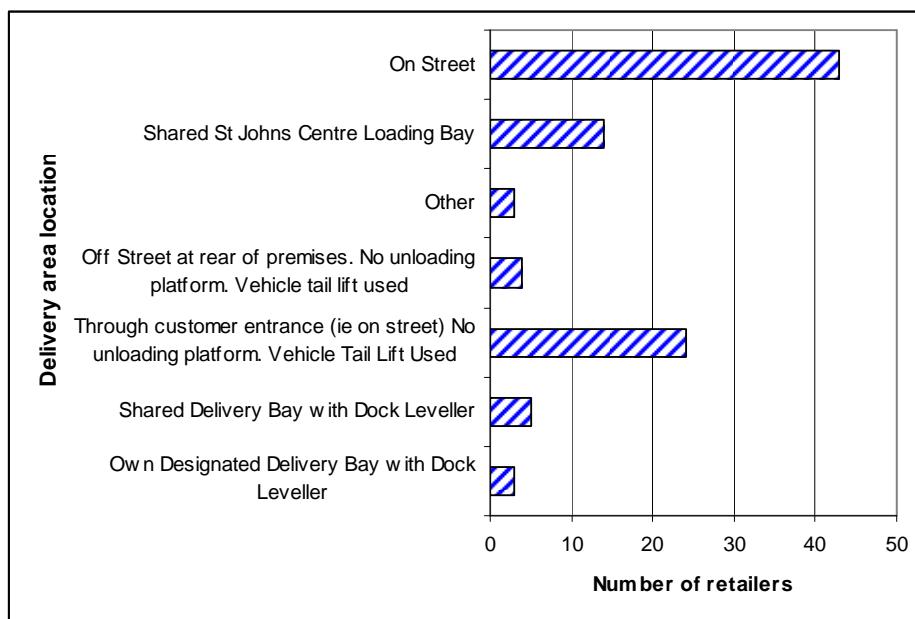
**Figure 9.3: “In general are your deliveries made to a regular schedule?”**



9.16 Retailers were asked “What is the location of your delivery area and what special features does it have?” The locations available for retailers to choose from were:

9.17 The most common delivery location was On Street cited by 43 retailers (45%), 24 retailers (25%) cited delivery areas included through the customer entrance while 14 retailers (15%) used the shared delivery bay within the St. John Shopping Centre. 5 retailers (5%) used a shared delivery bay with a dock leveller, 4 (4%) receive deliveries from an off street location at the rear of the premises, 3 (3%) have own designated delivery bay with 3 (3%) using other locations.

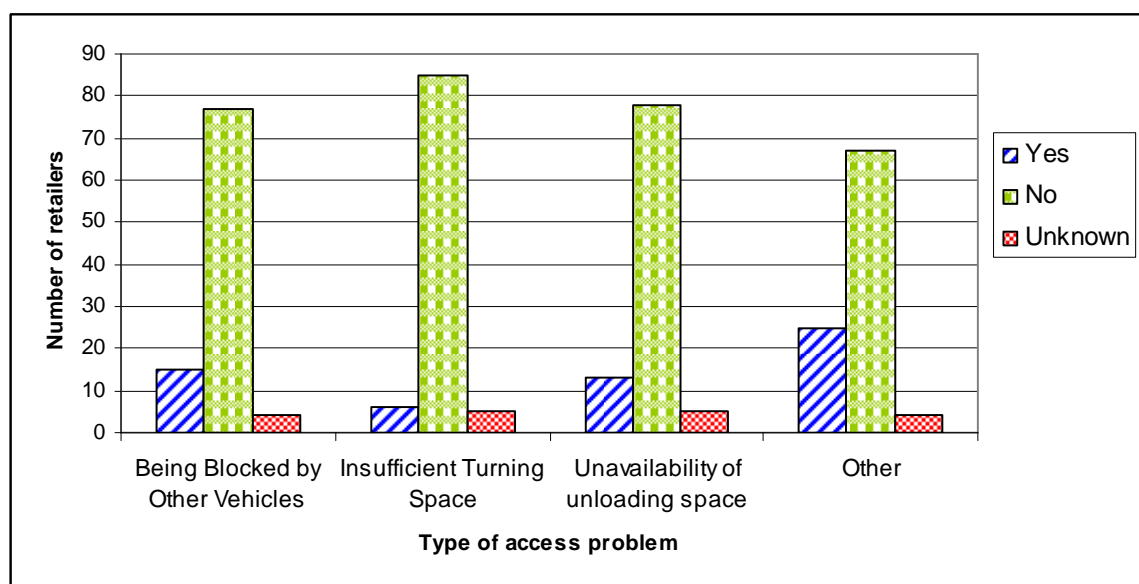
**Figure 9.4: “What is the location of your delivery area and what special features does it have?”**



9.18 Retailers were asked “How long on average do deliveries take at your premises?” The most frequent responses were that deliveries take 5 minutes or less to complete by 49 retailers (51%) and 6 and 15 minutes by 19 retailers (20%). 11 retailers indicated that average deliveries take between 16 and 31 minutes while 7 retailers (8%) have deliveries that take 31 minutes or more to complete. 8 retailers (8%) did not know how long the average delivery takes to complete. 2 retailers (1%) indicated multiple time durations (some last less than 5 minutes, others more than 31 minutes).

9.19 Retailers were asked “Do vehicles making deliveries to your premises suffer any access problems?” with regards to being blocked by other vehicles, insufficient turning space, unavailability of loading space and any other access problems. The most common problem, as cited by 25 retailers was “other”. However, with regards to being blocked by other vehicles and unavailability of unloading space, these were considered as a problem by only 15 and 14 retailers respectively (Figure 9.5). A number of supporting comments were provided by respondents, with the largest number of these being linked to being blocked by other vehicles.

**Figure 9.5: “Do vehicles making deliveries to your premises suffer any access problems?”**

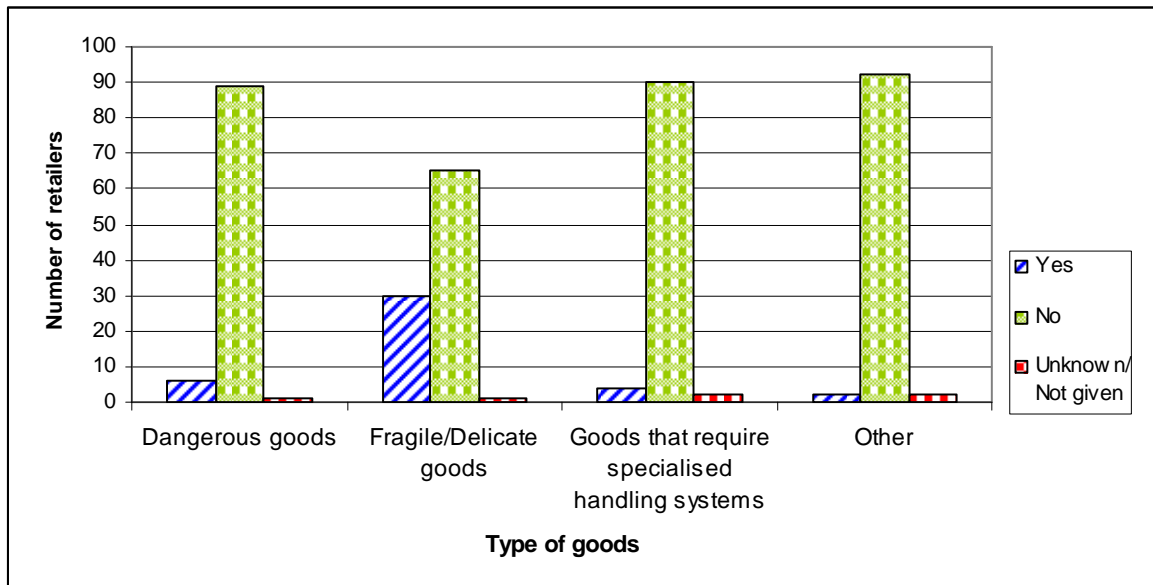


9.20 Retailers were asked “Where does the delivery driver deliver to?” with a number of retailers identifying more than one place. Unsurprisingly the most deliveries were made to the sales floor and the stock room, by 63 (67%) and 22 retailers (24%) respectively.

9.21 Retailers were asked whether they received a variety of goods that would require specialised handling and as regards:

- Goods that would require dangerous goods handling and certification, 7 retailers indicated that they receive such goods including Aerosols, Camping Gas Cylinders, Helium Gas Cylinders (Figure 9.6)

**Figure 9.6: “Do you receive goods that require specialised handling?”**



- Goods that must be handled and stored in non-ambient temperatures, 3 retailers indicated that they receive chilled goods, and 1 retailer receives frozen goods (pet shop - frozen food for pets) 6 retailers indicated that they receive both chilled and frozen goods.

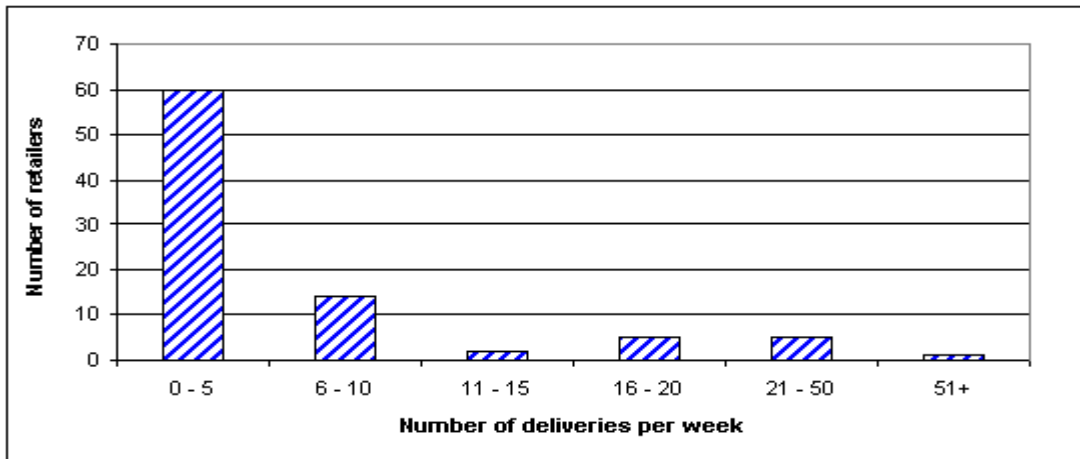
9.22 Goods that are classified as Fragile / Delicate and receive special handling as such, 30 retailers indicated that they receive such goods. Goods that require specialised handling systems, e.g. hanging clothing or kegs, 4 retailers indicated that they receive such goods, with examples including the use of hanging rails, specialised systems for controlled drugs needing to be signed for by pharmacists and the removal of chemicals associated with photography.

#### Section 4 the Delivery Schedule

9.23 Retailers were asked to identify how many deliveries per a week they receive and it should be noted that where a range of deliveries has been given e.g. 3 – 4 or 5 - 15, the upper value has been taken. It has also been assumed that where a retailer has given a value of X deliveries per day, the weekly figure has been assumed on the basis of a 5 day week e.g. Watson & Sons, 3 – 4 per day, 15 - 20 per week.

9.24 Figure 9.7 shows the number of deliveries received per week grouped in to intervals. The most common number of deliveries is between 0 and 5 per week, as cited by 60 retailers (60%). 14 retailers (15%) indicated that they receive between 6 and 10 deliveries per week while 10 retailers indicated that they receive between 16 and 20 deliveries per week (5 (5%)) and between 21 and 50 deliveries (5 (5%)).

**Figure 9.7: “Approximately how many weekly deliveries do you receive?”**



9.25 From the information given as an approximate value of the number of weekly deliveries received by retailers, the approximate total number of deliveries is **721.9, accounting for seasonal deliveries**. However, as mentioned previously, 12 retailers receive more than 15 deliveries per week, and these **12 retailers** (shown in Table 9.4) account for **400 deliveries** in total. As such an adjusted weekly figure from the information presented is **321.9 deliveries from 84 retailers**.

**Table 9.4: Supporting information for the largest number of weekly delivery retailers**

Retailer	Number of Weekly Deliveries	Retailer	Number of Weekly Deliveries
Debenhams	102	M&S	24
Clinton Cards	50	The Concorde Music Shop	20
Browns Pharmacy Healthcare	35	Watson and Sons	20
HMV	31	Simon Howie Butchers	20
PD Malloch	30	Bryan Steele Carpets	20
Campus Sports	30	Boots the Chemists	18

9.26 Where possible, further information was gathered regarding the days and times of deliveries. 46 retailers identified deliveries by day, with 8 retailers partially identifying deliveries by day. The breakdown of deliveries by day is shown in table 9.5. The day with the largest number of deliveries is Thursday, with 45% of all retailers receiving a delivery, with Tuesday being the second busiest day.

**Table 9.5: Breakdown of deliveries by day**

Day	Number of Retailers Receiving Deliveries	% of Retailers	Number of Deliveries
Monday	34	36%	81
Tuesday	41	43%	87
Wednesday	38	40%	89
Thursday	43	45%	91
Friday	35	37%	80

Saturday	12	13%	20
Sunday	3	3%	3
<b>Totals</b>	<b>54</b>	<b>56%</b>	<b>451</b>
Retailers All Deliveries By Day	46	48%	416.6
Partly Identified Deliveries Not Covered By Day	8	8%	59
Retailers not identifying by Day	42	44%	200.4
<b>Total</b>	<b>96</b>	<b>100%</b>	<b>676</b>

9.27 From the information gathered from the delivery schedules, there are **451 deliveries from 54 retailers**, including the partial information from the 8 retailers already mentioned. Including the information gathered from the weekly deliveries approximation for the retailers who did not identify by day, this would approximate the number of deliveries per a week at **676**.

9.28 Table 9.6 shows the breakdown of deliveries by day by time, with the majority of deliveries as identified by time with 33% occurring between 07:00 and 12:59. Those deliveries identified as “other” occur were recorded as occurring over a time period that is not able to be categorised e.g. AM or PM or between 10:00 and 17:00, which accounted for 53% of deliveries which had time slot information given.

**Table 9.6 Breakdown of deliveries by day by time**

	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Total	% of Deliveries by day
Number of retailers identifying deliveries	34	41	38	43	35	12	3	54	
Number of Deliveries By Day	81	87	89	91	80	20	3	451	
Number of Deliveries with time attached	76	83	76	80	73	12	2	402	89%
Time Intervals	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Total	% of Deliveries by time
23:00 - 6:59 (inc. Overnight)	5	6	5	8	4	3	0	31	8%
07:00 - 12:59	24	24	28	26	24	5	2	133	33%
13:00 - 15:59	5	4	4	5	4	1	0	23	6%
16:00 - 18:59	0	0	0	0	0	0	0	0	0%
19:00 - 22:59	0	0	0	0	0	0	0	0	0%
Other	42	49	39	41	41	3	0	215	53%
<b>Total</b>	<b>76</b>	<b>83</b>	<b>76</b>	<b>80</b>	<b>73</b>	<b>12</b>	<b>2</b>	<b>402</b>	

9.29 Retailers were asked whether there is a penalty for untimely delivery and of the 96 retailers asked this question, 1 (1%) indicated that there is a penalty, with 10 (10%) retailers not knowing, 80 (88%) indicating that there is no penalty and 1 (1%) indicating that for untimely deliveries by company vehicle drivers, there is a penalty issued within the company.

9.30 Retailers were asked to identify the origin of the deliveries that they receive and the 96 retailers identified one or more origin of deliveries. In total 26 different Scottish origins were cited with 38 English origins and 7 overseas (European and American) origins. The details are illustrated in table 9.7.

**Table 9.7: Origins of deliveries**

Origin of Delivery	Number Cited by Retailers	Origin of Delivery	Number Cited by Retailers
<b>Scottish Origins</b>	<b>26</b>	<b>English Origins</b>	<b>38</b>
Glasgow	7	England Unspecified	13
Scotland	2	Canterbury, Kent	1
Livingston	1	Leicester	1
Dundee	2	Manchester	3
Perth	2	Leeds	2
Edinburgh	3	Devon	1
Aberdeen	2	Nottingham	2
Grennock, Renfrewshire	0	Birmingham	1
Bellshill	2	Langham, Norfolk	1
Blairlinn	1	Wellingborough, Northamptonshire	1
Ayr	1	Yorkshire	1
Glenrothes	3	Littlehampton,	
<b>Continental and Other Origins</b>	<b>7</b>	Milton Keynes	2
Holland	1	Hertfordshire	1
Italy	1	Derby	1
France	1	Huddersfield	1
Germany	2	Lancashire	1
Denmark	1	Basingstoke, Hampshire	1
Other/USA	1	Peterborough	1
Holland	1	Kendal	1
<b>Other</b>	<b>54</b>	Bradford	1
Supplier identified	4	<b>Northern Ireland</b>	<b>1</b>
City Not Identified/Location Unknown	50		

9.31 Retailers were asked to identify the handling units used and the average and peak delivery size in those handling units, with retailers able to identify as many handling units as necessary. The most common handling units were loose boxes, as cited by 69 retailers, with 16 retailers indicating pallets and 10 stating Tote/Plastic/Lock Boxes.

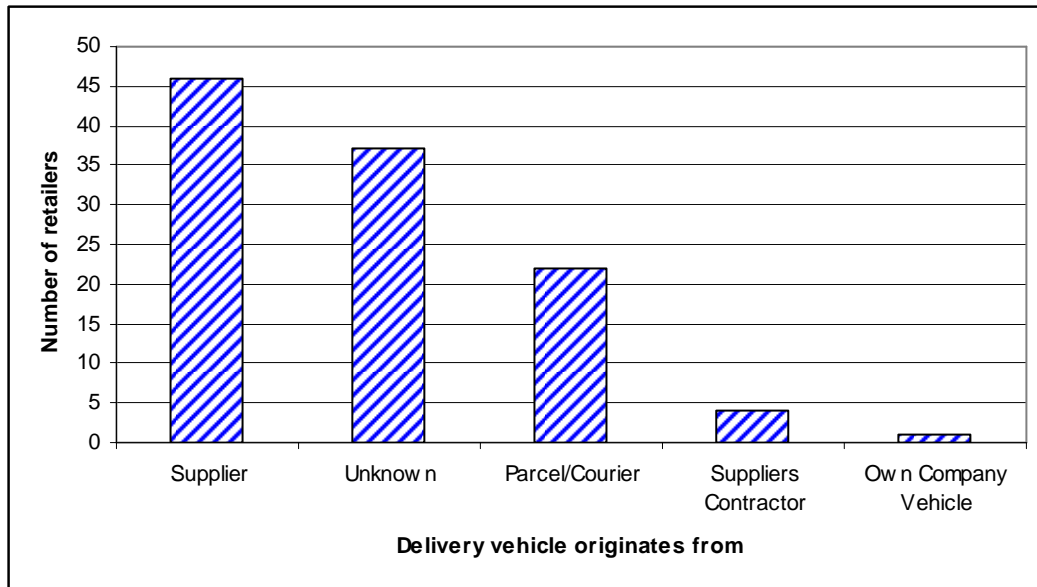
9.32 Average and peak delivery size data in handling units was obtained from retailers. The size of average deliveries were grouped in to ranges. The most common size of average deliveries in handling units were 0 – 5, 5 – 10 and 15 – 20. With regards to the peak delivery size, the most cited sizes were in the order of 0 – 5 and 5 – 10 units, as stated by 23 and 22 retailers respectively.

9.33 These figures suggest that there is quite a bit of variation in the size of deliveries in terms of delivery units representing the differences in sizes of the retailers interviewed from large department stores through to independent retailers

9.34 In a number of cases it was possible to ascertain where the delivery vehicle used originates from. 48% of retailers indicated that the delivery vehicle originates from the supplier, 38% of retailers did

not know where the delivery vehicle originates from, 23% of retailers indicated a courier/parcel company is used. 4% of retailers indicated that their delivery vehicle originates from the supplier's contractor and 1% have their own company vehicle delivering. Table 9.8 shows the courier companies identified by retailers.

**Figure 9.8: Delivery vehicle originates from**

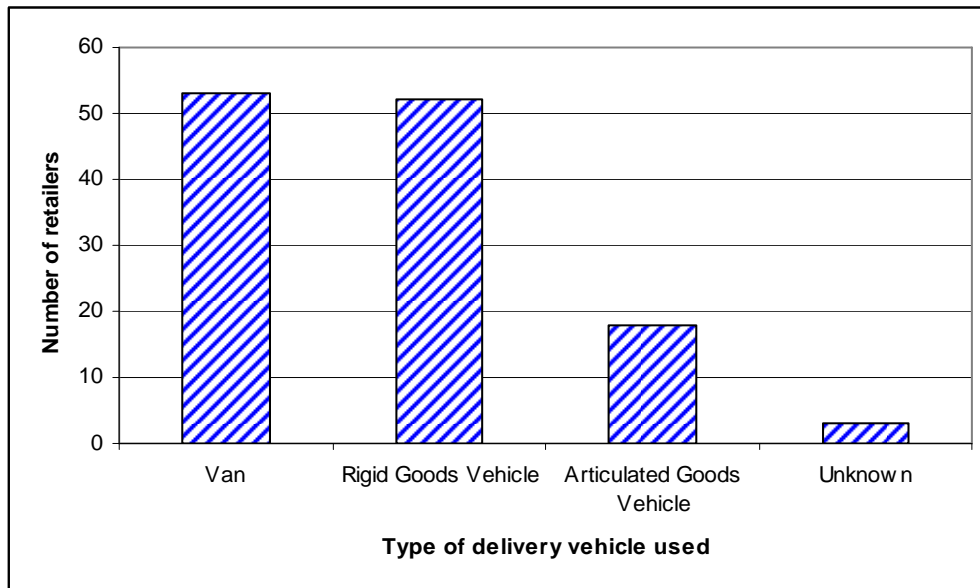


**Table 9.8: Courier / Logistics companies identified by retailers**

Courier / Logistics Company	Number of Retailers
DHL	8
TNT	5
UPS	5
City Link	3
FedEx	3
NYK Logistics	2
DPD	1
Tufnells	1
Parcel Force	1
Post Office	1
Night Freight	1

9.35 Retailers were asked to identify the vehicles used to make deliveries to their stores, and where applicable to identify as many as relevant. Of the 96 retailers, this information was not known by 3 of them. Of the remaining retailers, the most common types of delivery vehicles were vans by 53 retailers and rigid goods vehicles by 52 retailers. 18 retailers cited the use of Articulated Goods Vehicles when making deliveries to their stores (Figure 9.9).

**Figure 9.9: Types of delivery vehicles**

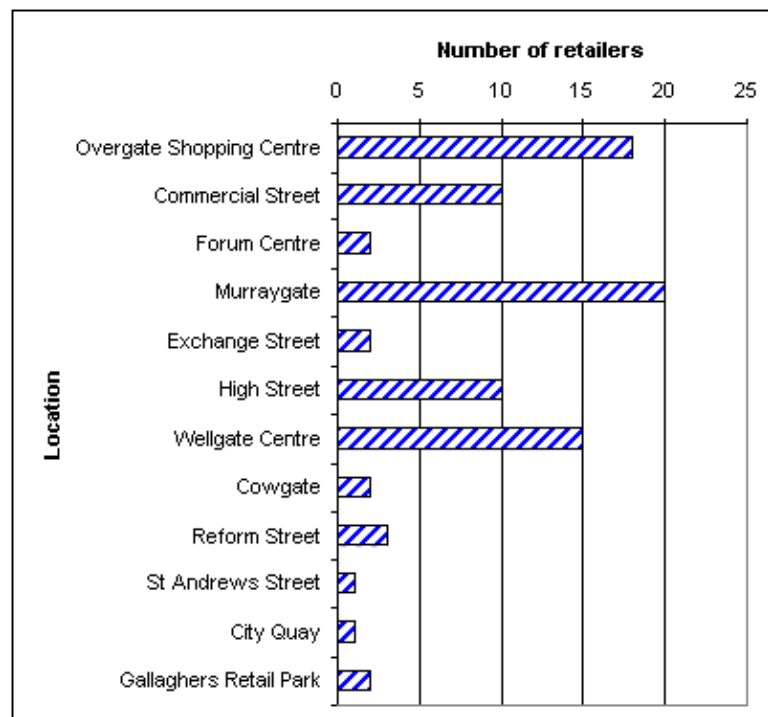


9.36 The retailers were also asked whether the vehicles used to make deliveries had a tail lift, and of these, 46 retailers indicated that the vehicle did.

### Dundee Retailer Consultation

9.37 86 retailers were interviewed from a number of different locations in Dundee, with the largest numbers of retailers surveyed located in Murraygate, the Wellgate and Overgate Shopping Centres, Commercial Street and High Street as shown in figure 9.10.

**Figure 9.10: Location of surveyed Dundee retailers**





9.38 Table 9.9 shows the types of retailers surveyed with the most common being Fashion/Clothing (28%), Mobile Phone and Cameras (8%) and Camping and Sports retailers (7%).

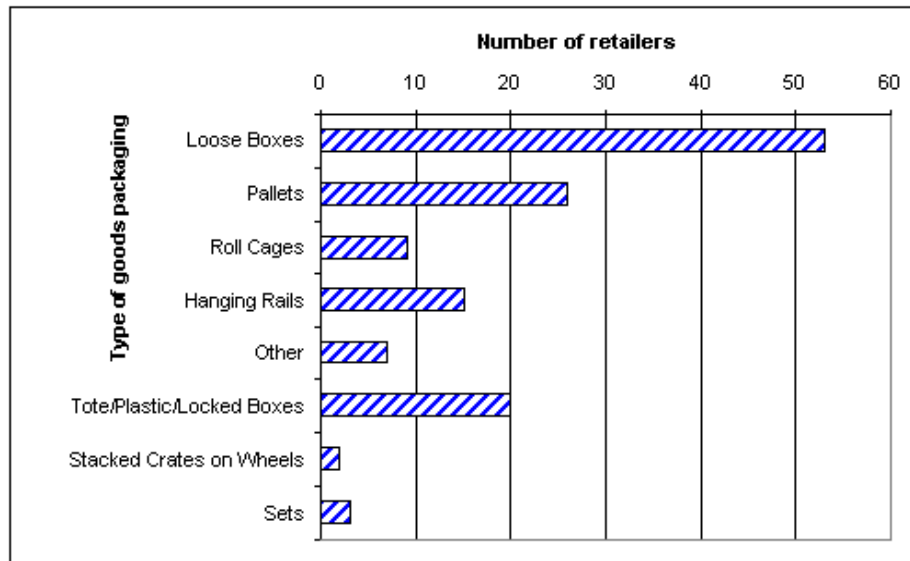
**Table 9.9: Types of retail surveyed**

Type of Retail	Number of retailers	% of retailers	Type of Retail	Number of retailers	% of retailers
Fashion/Clothing Retail	24	28%	Arts and Crafts and Fabric Retail	3	3%
Mobile Phone and Cameras Retail	7	8%	Food and Departmental Retail	2	2%
Camping and Sport Retail	6	7%	Electricals Retail	2	2%
Entertainment (CD, DVD, Book, Computer Game) Retail	5	6%	Health Foods and Supplements Retail	2	2%
Toys and Children's Entertainment Retail	5	6%	Jewellery Retail	2	2%
Shoes and/or Accessories Retail	5	6%	Underwear Retail	2	2%
Gifts and cards and/or Collectables Retail	5	6%	Food Retail	2	2%
Beauty and/or Pharmaceutical Retail	5	6%	Shoe and Watch Repairs Retail	1	1%
Opticians	4	5%	School Clothing Retail	1	1%
Non Food Departmental Retail	3	3%			
<b>Total</b>	<b>86</b>	<b>100%</b>			

**Survey Form Section 2 - Suitability Questions**

- 9.39 Retailers were asked “Do the delivery vehicles delivering to your premises also carry goods for other premises?” Of the 86 retailers, 79 (92%) indicated that the delivery vehicles do carry goods for other premises, with only 5 retailers (6%) indicating to the contrary.
- 9.40 22 supporting comments were provided by retailers, with 9 retailers indicating that they also delivered for other stores within the same company, but not citing a particular location and 1 retailer indicating other retailers, but not specifying which stores.
- 9.41 Retailers were asked “How are the goods packed?” (Figure 9.11) and were able to identify as many options as applicable. The most common types of packaging used are loose boxes (53 retailers - 62%), pallets (26 retailers - 30%) and tote/plastic/locked boxes (20 retailers - 23%). A description of each type of delivery unit can be found in Appendix D.

**Figure 9.11: “How are the goods packed?”**

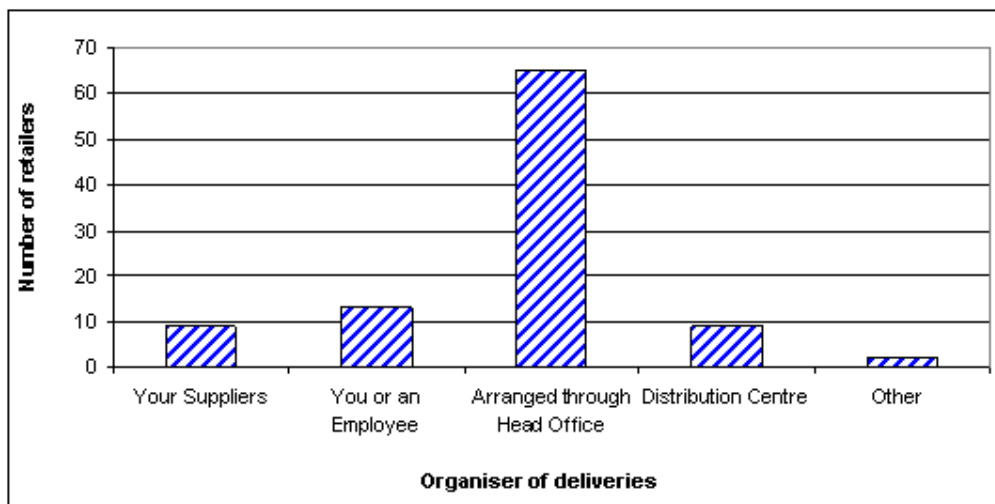


9.42 It should be noted that a number of other responses were received to this question including bags, carpet, rolls of material, insulated loose boxes and garments, with sets (of garments) being cited by 3 retailers (2 Fashion/Clothing and 1 Non Food Department in TJ Hughes).

**Section Three – Organisation of your delivery system**

9.43 Retailers were asked “Who is responsible for how your deliveries are organised?” and were able to identify as many options as applicable. The most cited response was that the deliveries are arranged through Head Office (65 retailers - 76%), with 13 retailers (15%) indicating that deliveries are arranged by themselves or an employee (Figure 9.12). The 2 retailers who cited “Other” indicated that deliveries are arranged through the Warehouse or by Couriers.

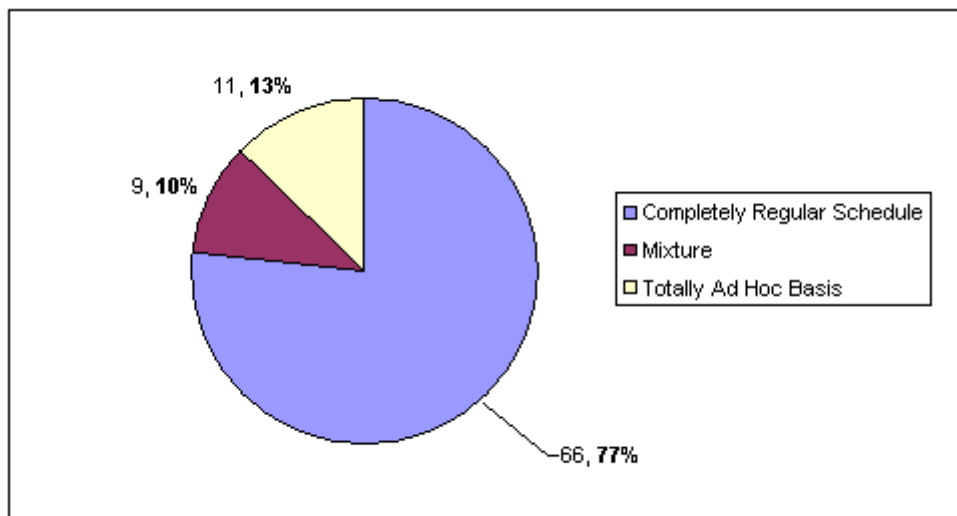
**Figure 9.12: “Who is responsible for how your deliveries are organised?”**



9.44 Retailers were asked “Who is responsible for sorting out inconsistencies in deliveries when they occur? For example, an inconsistency could be Damaged/Missing Goods or Paperwork Discrepancies” and were able to identify as many options as applicable. The most common responses were that inconsistencies were sorted out by the retailer or an employee, as stated by 75 retailers (83%) and/or arranged through Head Office, cited by 30 retailers (35%).

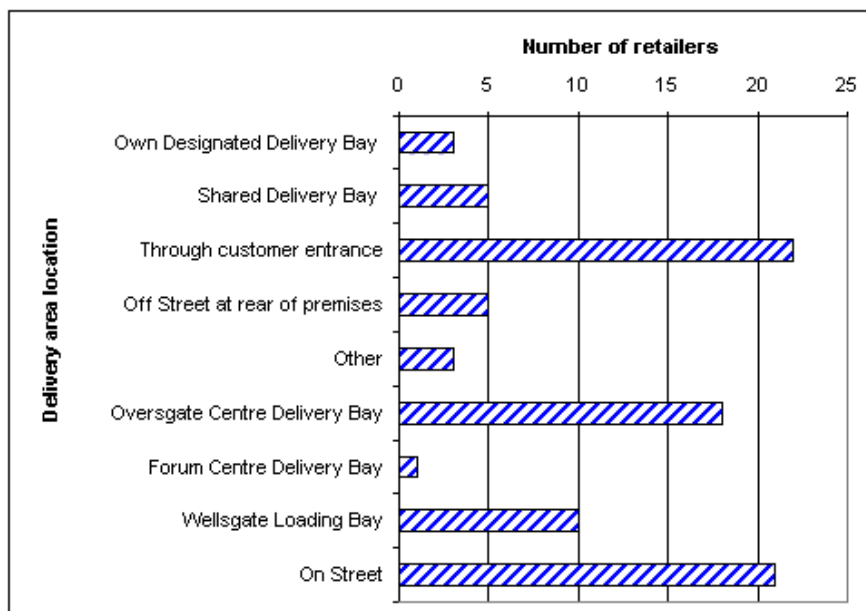
9.45 Retailers were then asked “In general are your deliveries made to a regular schedule?” The most frequent response was deliveries are made to a completely regular schedule (66 retailers - 77%), with 11 retailers (13%) indicating that deliveries are on a totally ad hoc basis. 9 retailers (10%) indicated that deliveries are made to a mixed deliveries schedule (Figure 9.13).

**Figure 9.13: “In general are your deliveries made to a regular schedule?”**



9.46 Retailers were asked “What is the location of your delivery area and what special features does it have?” The most common delivery areas included through the customer entrance (22 retailers - 26%), on street (21 retailers - 24%) and the Oversgate Shopping Centre Delivery Bay by 18 retailers (21%). This latter figure is unsurprising given the high number of retailers consulted within the Shopping Centre itself.

**Figure 9.14: “What is the location of your delivery area and what special features does it have?”**

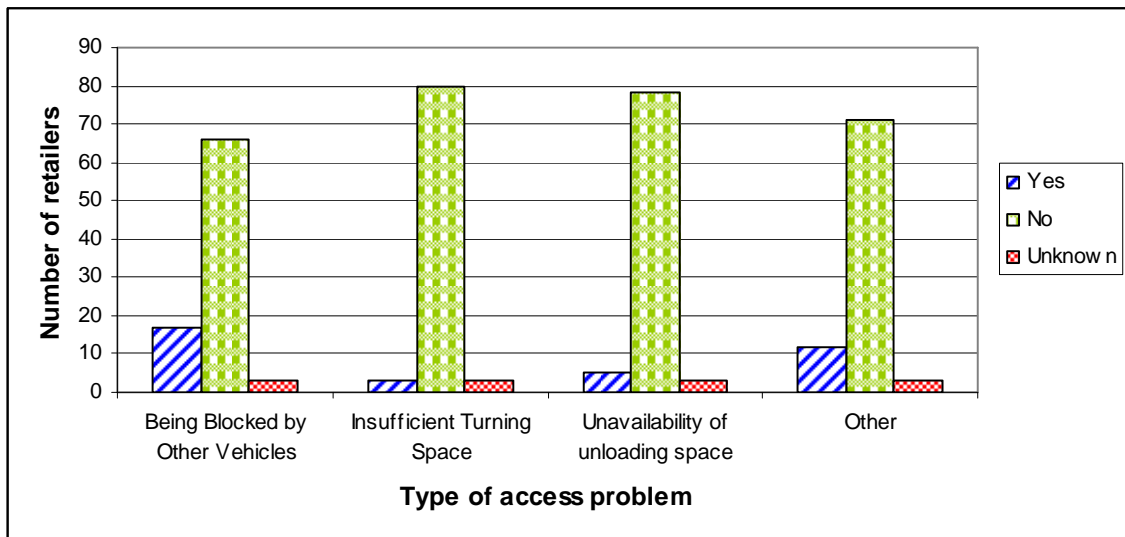


9.47 Retailers were asked “How long on average do deliveries take at your premises?” The most frequent responses were that deliveries take 6 – 15 minutes by 28 retailers (33%) or 5 minutes or

less by 24 retailers (28%). The 4 retailers who indicated other selected multiple time durations suggesting that the length of delivery is dependent upon the quantity being delivered.

9.48 Retailers were asked “Do vehicles making deliveries to your premises suffer any access problems?” with regard to being blocked by other vehicles, insufficient turning space, unavailability of loading space and any other access problems. The most common problem cited by retailers was being blocked by other vehicles, as stated by 17 retailers. However, with regard to insufficient turning space or unavailability of loading space, this was only a problem for 3 and 5 retailers respectively (Figure 9.15).

**Figure 9.15: “Do vehicles making deliveries to your premises suffer any access problems?”**

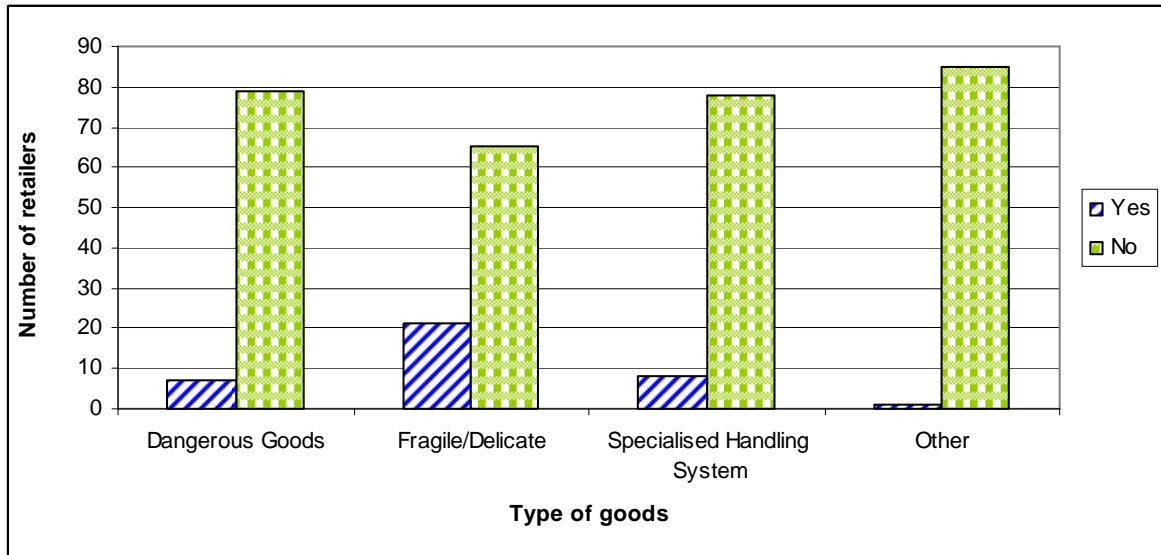


9.49 Retailers were asked “Where does the delivery driver deliver to?” with a number of retailers identifying more than one place. Unsurprisingly the most common locations where deliveries are made to were the stock room and the sales floor, by 36 and 35 retailers respectively. In a number of cases (4) in the supporting comments received, it was indicated that staff unload goods from the lorry and/or assist with the delivery.

9.50 Retailers were asked whether they received a variety of goods that would require specialised handling and as regards:

- Goods that would require dangerous goods handling and certification, 7 retailers indicated that they receive such goods including Aerosols, Camping Gas Cylinders, Helium Gas Cylinders (Figure 9.16)
- Goods that must be handled and stored in non-ambient temperatures, 6 retailers indicated that they receive chilled goods and 2 retailers (Tesco and Marks and Spencer’s) indicated that they receive both chilled and frozen goods.

**Figure 9.16 “Do you receive goods that require specialised handling”**

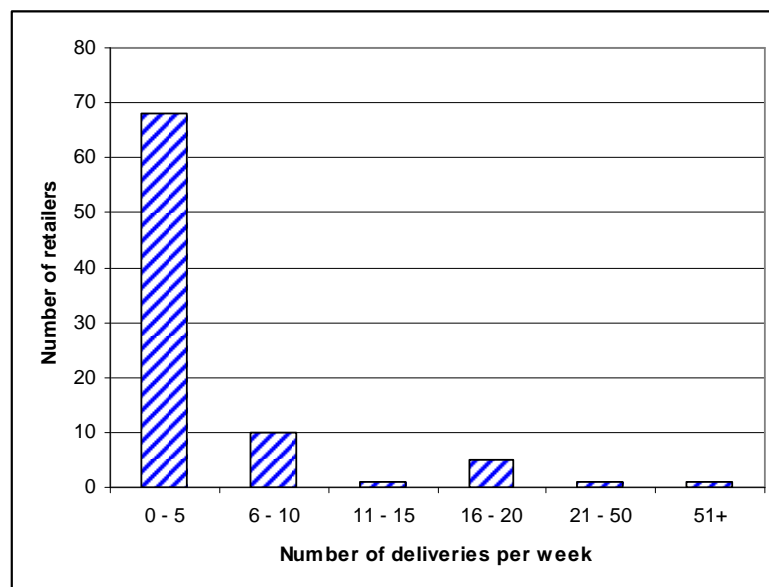


**Section 4 the Delivery Schedule**

9.51 Retailers were asked to identify how many deliveries per a week they receive and it should be noted that where a range of deliveries has been given e.g. 3 – 4, the upper value has been taken. It has also been assumed that where a retailer has given a value of X deliveries per day, the weekly figure has been assumed on the basis of a 5 day week e.g. Tesco 15 – 20 per day, 75 – 100 per week.

9.52 Figure 9.17 shows the number of deliveries received per week grouped in to intervals. The most common number of deliveries is between 0 and 5 per week, as stated by 68 retailers (79%). 7 retailers (8%) indicated that they receive more than 16 deliveries per week and these are summarised in Table 9.10.

**Figure 9.17 “Approximately how many weekly deliveries do you receive?”**



**Table 9.10: Supporting information for the largest number of weekly delivery retailers**

Retailer	Number of Deliveries	Supporting Info
Marks and Spencer	18	6 textile, 12 food
The Health Store	20	
Optical Express	15 - 20	
Burns and Harris	5 – 20	
Victoria Carpets	Up to 20	
HMV	31	
Tesco Metro	75 - 100	Approximate from 15 – 20

9.53 From these figures the approximate number of weekly deliveries is **493.5 per week**, although it should be recognised that excluding 6 of the 7 retailers with more than 15 deliveries per a week, the figure for **80 retailers is 282.5**, with the 0.5 representing a retailer who receives 1 delivery per a fortnight.

9.54 Where possible, further information was gathered regarding the days and times of deliveries. 70 retailers identified deliveries by day, with 2 retailers partially identifying deliveries by day. The breakdown of deliveries by day is shown in table 9.11. The day with the largest number of deliveries is Thursday, with 56% of all retailers receiving a delivery, with Tuesday being the second busiest day.

**Table 9.11: Breakdown of deliveries by day**

Day	Number of Retailers Receiving Deliveries	% of Retailers	Number of Deliveries
Monday	40	47%	49
Tuesday	41	48%	51
Wednesday	40	47%	49
Thursday	48	56%	56
Friday	42	49%	49
Saturday	9	10%	12
Sunday	1	1%	2
<b>Retailers identifying by day</b>			
	72	84%	268
<b>Retailers not identifying by Day</b>			
	14	16%	221
<b>Total</b>	<b>86</b>	<b>100%</b>	<b>489</b>

9.55 From the information gathered from the delivery schedules, there are **268 deliveries from 72 retailers**, including the partial information from the 2 retailers already mentioned. Including the information gathered from the weekly deliveries approximation for the retailers who did not identify by day, this would approximate the number of deliveries per a week at **489**.

9.56 Table 9.12 shows the breakdown of deliveries by day by time, with the majority of deliveries identified by time occurring between the hours of 07:00 and 13:00 (63%).

**Table 9.12 Breakdown of deliveries by day by time**

	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Total	% of Deliveries by day
Number of retailers identifying deliveries	40	41	40	48	42	9	1	72	
Number of Deliveries By Day	49	51	49	56	49	12	2	268	
Number of Deliveries with time attached	35	33	38	39	36	10	2	193	<b>72%</b>
Time Intervals	Mon	Tue	Wed	Thur	Fri	Sat	Sun	Total	% of Deliveries by time
23:00 - 6:59 (inc. Overnight)	2	2	3	2	2	2	0	13	<b>7%</b>
07:00 - 12:59	24	20	25	23	23	6	1	122	<b>63%</b>
13:00 - 15:59	1	4	1	4	2	0	0	12	<b>6%</b>
16:00 - 18:59	2	2	2	2	2	1	1	12	<b>6%</b>
19:00 - 22:59	0	0	0	0	0	0	0	0	<b>0%</b>
Other	6	5	7	8	7	1	0	34	<b>18%</b>
<b>Total</b>	<b>35</b>	<b>33</b>	<b>38</b>	<b>39</b>	<b>36</b>	<b>10</b>	<b>2</b>	<b>193</b>	<b>100%</b>

- 9.57 At this point it should be noted that 23 retailers who were consulted by telephone interview completed only the short delivery schedule and regarding subsequent questions, the majority of answers relate to 63 retailers only.
- 9.58 Retailers were asked whether there is a penalty for untimely delivery and of the 63 retailers asked this question, 13 (21%) indicated that there is a penalty, with 2 (3%) retailers not knowing and 48 (77%) indicating that there is no penalty.
- 9.59 Retailers were asked to identify the origin of the deliveries that they receive and of the 63 retailers, 58 identified one or more locations with 4 identifying the routes that their deliveries take. In total, 35 different Scottish origins were cited with 28 English origins and 2 European origins. The routes identified by 4 retailers are located under the sub heading "other" in table 9.13.

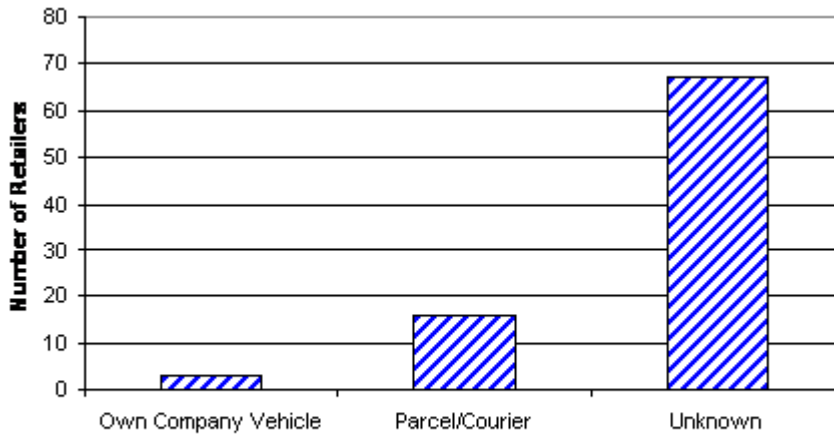
**Table 9.13: Origins of deliveries**

Origin of Delivery	Number of Origins Cited by Retailers	Origin of Delivery	Number of Origins Cited by Retailers
<b>Scottish Origins</b>	<b>35</b>	<b>English Origins</b>	<b>28</b>
Glasgow	16	England Unspecified	6
Cumbernauld, Glasgow	1	Northern England	1
Livingston	3	Liverpool/Merseyside	2
Dundee	3	Leicester	2
Perth	3	Manchester	2
Edinburgh	3	Leeds	2
Aberdeen	2	Poole, Dorset	1
Grennock, Renfrewshire	1	Rugby, Warwickshire	1
Dunfermline	1	Nottingham	1
Stirling	1	Wednesbury, Birmingham	1
Glenrothes	1	Weymouth, Dorset	1
<b>Continental Origins</b>	<b>2</b>	Langham, Norfolk	1
Europe	1	Surrey	1
Spain	1	Thurrock, Essex	1
<b>Other</b>	<b>6</b>	Bury, Lancashire	1
Burton on Trent to Glasgow Warehouse, then Aberdeen and Dundee	1	Wellingborough, Northamptonshire	1
Cardiff via Bell Hill Birmingham and Glasgow	1	Wakefield, Yorkshire	1
Corby to Burton on Trent then on to Mossend	1	Littlehampton, West Sussex	1
Daventry via Glasgow	1	London	1
Unspecified	2		

- 9.60 Retailers were asked to identify the handling units used and the average and peak delivery size in those handling units, with retailers able to identify as many handling units as necessary. The most common handling units were loose boxes (35 retailers), pallets (15 retailers) and Tote/Plastic/Lock Boxes (13 retailers).
- 9.61 Average and peak delivery size data in handling units was obtained from retailers. The size of average and peak deliveries were grouped in to ranges. Average delivery sizes in handling units were 0 – 5, 5 – 10 and 15 – 20 with 0 – 5 most prevalent amongst loose boxes and pallets. With regard to the peak delivery size, the most common sizes were in the order of 0 – 5 and 20 – 30 units, as cited by 17 and 14 retailers respectively. .
- 9.62 These figures suggest that there is quite a bit of variation in the size of deliveries in terms of delivery units representing the differences in sizes of the retailers interviewed from large department stores through to independent retailers.
- 9.63 In a number of cases it was possible to ascertain where the delivery vehicle originates from. With regard to 3 retailers, it is a company owned vehicle that is used, 16 retailers indicating couriers are used, with some retailers citing more than one courier company. Table 9.14 shows the courier companies identified by retailers.



**Figure 9.18: Delivery vehicle originates from**



**Where does the vehicle making the delivery originate from?**

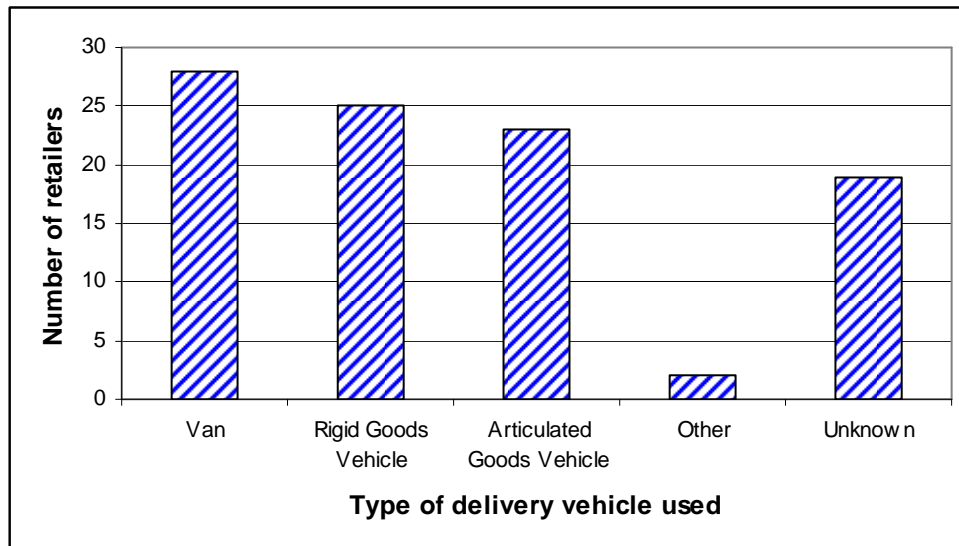
9.64

**Table 9.14: Courier companies identified by retailers**

Courier Identified	Number of Retailers
DHL	4
TNT	2
UPS	3
City Link	1
Pallet ways	1
DPD	2
Freight Liner	1
Parcel Force	1

9.65 Retailers were asked to identify the vehicles used to make deliveries to their stores, and where applicable to identify as many as relevant. Of the 86 retailers, this information was not known by 18 of them. Of the remaining retailers, the most common types of delivery vehicles were vans by 28 retailers and rigid goods vehicles by 25 retailers. 23 retailers stated the use of Articulated Goods Vehicles when making deliveries to their stores (Figure 9.18).

**Figure 9.19: Types of delivery vehicles**



9.66 63 of the retailers were also asked whether the vehicles used to make deliveries had a tail lift on, and of the 63, 42 retailers indicated that the vehicle did.

## Conclusions

9.67 The findings of the consultation with retailers identified a number of distinct differences in the retail offer between Perth and Dundee that influence the nature of goods deliveries in the two cities.

9.68 In terms of the types of retailers consulted, there appears to be a larger proportion of independent and smaller retailers in Perth, compared to Dundee, with the result that the proportion of deliveries made through an integrated supply chain in Perth is lower than Dundee. Instead, retailers in Perth are left much more in the hands of their suppliers in terms of how deliveries are organised, receiving a larger proportion of deliveries on a completely ad hoc basis (40% in Perth compared to 13% in Dundee). This view is supported by the information provided on responsibility for organising deliveries, with 76% of retailers in Dundee stating that the organisation of deliveries being done by Head Office, as compared to the case of Perth where the most common responsibility was with suppliers in, as cited by 49% of retailers, with Head Office taking responsibility in only 40% of cases.

9.69 The duration of deliveries was comparable between the two cities, with most deliveries taking less than 15 minutes. In both locations there is a wide variety of delivery origins, with some retailers identifying origins towards Central and Southern England. However the delivery origins were concentrated to the West and South of Perth and Dundee confirming the likely delivery routes as the M90, A9 and A90 for both cities with a number of suppliers servicing both cities starting with Perth.

9.70 In terms of suitability, typical delivery sizes appear to be small (part-load) which is where freight consolidation could provide a significant benefit in terms of reducing the number of delivery trips. Because of this, in both cases approximately 90% of delivery vehicles deliver goods to premises other than the store surveyed, suggesting consolidation already occurs to some degree in the form of either an integrated, dedicated supply chain for that retailer or through the use of a courier or other logistics operator. This type of multiple drop delivery round is used for deliveries that are only big enough to form a part load on an HGV in order to provide efficiency within a given supply chain,

but does result in multiple delivery rounds being conducted within each town by separate logistics providers / couriers (in a free market).

9.71 In both locations the most common number of deliveries to each retail premises was in the range 0 – 5 per week, although it should be noted that in both locations there were a few retailers within the survey sample who receive a significantly larger number of deliveries, and these have been specifically identified in each case. In both locations access for delivery vehicles (congestion, restrictions poor servicing access / provision or conflict with other road users) wasn't considered to be a problem. This suggests that what could be a potentially significant driver of uptake of a consolidation centre from an (retail / distribution) industry perspective would not actually be particularly strong under current circumstances in Perth or Dundee.

9.72 In previous study work we identified some specific businesses for which urban freight consolidation offered the potential to save money and increase efficiency in comparison with their existing practices. When the characteristics of these businesses are considered it is immediately apparent that they have certain similar characteristics, including:

- A national presence with distribution from a single national distribution centre
- Relatively small store size and volume throughput
- Several stores in the area
- Multi-drop delivery rounds

9.73 Having reviewed the retailer lists for Perth and Dundee, the following businesses are examples of the type of retailer that might be most suited to freight consolidation:

- The Health Store
- The Body Shop
- Lush Cosmetics
- Past Times
- Carphone Warehouse
- Thorntons
- Claire's Accessories
- Early Learning Centre
- Accessorize
- Shoe Zone
- Timpson
- Optical Express
- Jane Norman

## 10 Retail Consolidation

### Retail Consolidation Scenarios – Option Generation and Sifting

- 10.1 The next stage of the study involved developing suitable Freight Consolidation Centre (FCC) scenarios based on the findings from the consultation phase, previous experience of the project team and discussions with Tactran.
- 10.2 The consolidation centre scenarios were based on the key objectives for developing a freight consolidation centre in the Tactran region, these being:
- To improve the environmental and operational efficiency of freight distribution in the region;
  - To address air quality issues and environmental targets in Perth and Dundee.
- 10.3 Following the policy review a sub-set of Transport Planning Objectives (TPOs) were developed for a potential consolidation centre to serve retailers in Perth and or Dundee as listed below:
- Improve distribution efficiency and sustainability in the Tactran region;
  - Reduce the number of delivery vehicles travelling in to the target area;
  - Contribute to an improvement in Air Quality in the target area;
  - Contribute to enhancing the retail environment of the target area;
  - Reduce conflict between delivery vehicles, other road users and pedestrians;
  - Provide an improved delivery service to retailers;
  - Provide the opportunity for value added services such as off-site storage and collection of waste and packaging material.
- 10.4 From a financial perspective the premise for any potential consolidation centre was defined at the inception meeting with Tactran that indicated that the consolidation centre should be:
- Self supporting financially and run on a commercial basis. Potential for some assistance with set-up costs;
  - Retailer participation would be voluntary with no direct or inferred enforcement i.e. through increased access restrictions;
- 10.5 If the consolidation centre scenario was found not to be self supporting financially the level of subsidy required should be indicated.
- 10.6 The specification also identified that the consolidation scenarios should assess the potential for separate consolidation centres to serve Perth and Dundee and also the potential for a consolidation centre to jointly serve both Perth and Dundee simultaneously.

### Consolidation Centre Locations

- 10.7 Although not specified in the brief the identification of potential locations for a freight consolidation centre is considered an integral part of the process of assessing the feasibility and quantifying the likely impacts to provide the necessary evidence base. Bearing in the mind the objectives as set out above, the analysis of retailer survey results, local knowledge of existing distribution facilities and following conversations with logistics operators DHL and Clipper Logistics three locations were

identified and five principal consolidation scenarios were developed as shown in Figure 10.1 and Table 10.1.

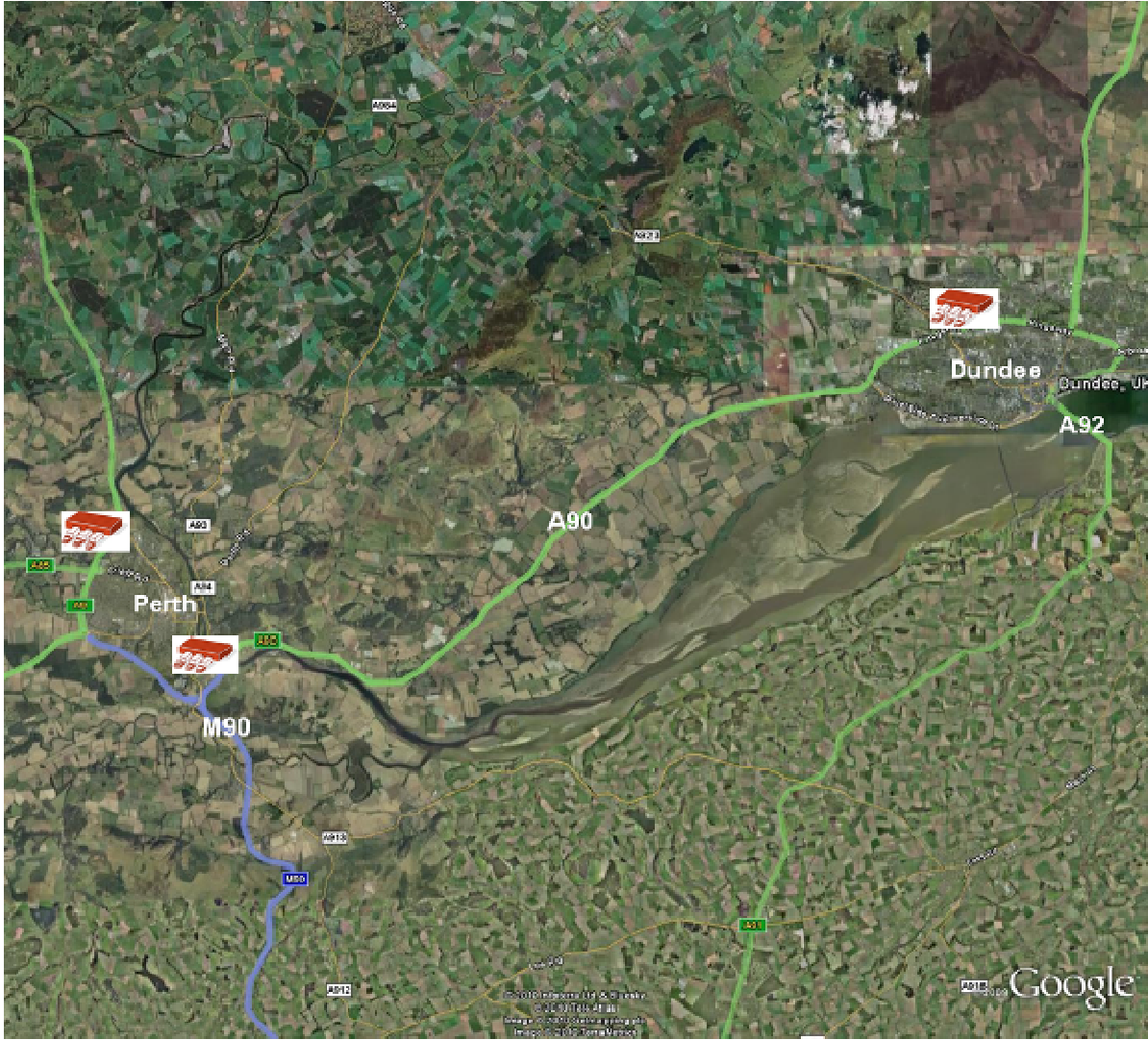
10.8 The key guiding principles for the selection of consolidation scenario locations included:

- The identification through the retailer survey that the dominant delivery route to Perth and Dundee is from the west and south using the A9, M90 and A90;
- The consolidation centre should be located on the periphery of the city to intercept vehicles before they enter the urban area;
- The consolidation centre should be located on an existing industrial estate, in particular where existing distribution facilities are in operation;
- The consolidation centre should be located in close proximity to an appropriate delivery route in to the target area; and
- The consolidation centre location should have the potential to serve both Perth and Dundee.

10.9 As shown two locations in Perth have been chosen along with one in Dundee. Due to the dominant delivery route from the west the Perth locations were considered appropriate to potentially serve both Perth and Dundee. This was confirmed by discussions with DHL who indicated that they would consider it feasible to serve both Perth and Dundee from their existing facility at Inveralmond. The Dryburgh industrial estate on the periphery of Dundee was also selected as a suitable location for serving retailers in Dundee. Further detail on the location selection is provided in Table 10.1.

10.10 The Port area of Dundee was also identified as a potential location in particular through the Dundee AQAP and the proposal for a tri-modal freight terminal. However because of its location to the east of the city centre it does not lend itself well to intercepting deliveries and would involve a considerable amount of extra mileage for delivery vehicles from the west having to route around Dundee or potentially through Dundee to reach the consolidation centre. On this basis it was discounted from the scenarios. The same argument could be made for Inveralmond in Perth, but it was felt that the impact was not as significant and the presence of the existing DHL distribution facility potentially provides a strong economic case for its inclusion.

Figure 10.1: Freight Consolidation Centre Scenario Locations



**Table 10.1: Freight Consolidation Centre Scenarios**

Scenario Number	Location	Serving	Approx distance and drive time to target area	Delivery route to target area	Comments
S1	Perth – Harbour	Perth	1.5 miles 5-10 mins	A912 Edinburgh Road	Existing industrial area. Harbour area considered a potential growth area. Keen to encourage potential for water and rail freight connections. Convenient drop off point for M90.
S2	Perth – Inveralmond	Perth	3.1 miles 10 – 15 mins	A912 Dunkeld Road	Existing industrial estate with distribution facilities including DHL Argos home delivery depot. Potential to combine with existing distribution operation. Increases journeys on M90/A9 to reach facility.
S3	Dundee – Dryburgh Industrial Estate	Dundee	3.8 miles 15 – 20 mins	A923 Coupar Angus Road – Lochee Road	Existing industrial estate with distribution facilities including a Tesco Regional Distribution Centre. Good access from A90. Some potential for increased trips on the A90 to reach facility.
S4	Perth – Harbour	Perth and Dundee	Perth 1.5 miles 5 – 10 mins Dundee – 23 miles 40 – 45 mins	Perth – A912 Edinburgh Road Dundee – A90/A85 Riverside Drive	Existing industrial area. Harbour area considered a potential growth area. Keen to encourage potential for water and rail freight connections. Convenient drop off point for M90.
S5	Perth – Inveralmond	Perth and Dundee	Perth 3.1 miles 10 – 15 mins Dundee 28 miles 50 – 55 mins	Perth – A912 Dunkeld Road Dundee – A90/A85 Riverside Drive	Existing industrial estate with distribution facilities including DHL Argos home delivery depot. Potential to combine with existing distribution operation. Increases journeys on M90/A9 to reach facility.

## Operational Structure

- 10.11 To fully develop the consolidation scenarios into working examples it was necessary to determine a number of other factors such as likely retailer participation and vehicles to be used at the consolidation centre.

### Retailer Take Up

- 10.12 This element was determined largely by the premise that retailer participation would be voluntary and the identification through the retailer survey that Perth and Dundee retailers and suppliers suffer little if any delivery related problems. Based on previous experience of existing consolidation operations and known levels of retailer interest/participation rates, figures of 10 and 20% were considered to be realistic estimates of eventual retailer take up for scenarios S1, S2 and S3 serving Perth and Dundee separately. For scenarios S4 and S5 serving Perth and Dundee combined the take up figures were reduced slightly for Dundee to between 7.5 – 15%. This is due to the likelihood that some suppliers for Dundee are locally based and would not divert to a consolidation centre in Perth, so reducing the appropriate target audience.
- 10.13 Based on the retailer contact databases used in the study (Perth 250 retailers, Dundee 400 retailers) this translates to retailer participation rates of between approximately 25 - 50 retailers in Perth and 30 – 80 retailers in Dundee.
- 10.14 This is comparable to the voluntary Bristol scheme where some 350 retailers are located in the core retailing area (prior to re-development) and 70 retailers participate in the scheme. However this is in the context of the existence of much greater delivery problems and the use of a dedicated retail recruitment manager during the set-up and initial phases of the scheme.

### Consolidation Vehicles

- 10.15 The choice of vehicle type for use as part of the consolidation scenarios was largely guided by the objectives of the scheme to improve air quality in Perth and Dundee. However there was also a need to be strategic and practical in terms of being able to provide an improved delivery service to retailers. On this basis it was decided that the scenarios should consider the use of both standard Euro IV diesel engine vehicles and also electrically powered vehicles.
- 10.16 The use of both vehicle types in the consolidation scenarios helps in terms of quantifying and comparing the likely emissions reductions achievable and therefore air quality impact. There is also the potential to consider the financial implications of diesel and electric vehicles based on their life cycle and operational costs.
- 10.17 Combining the chosen consolidation centre locations, the retailer take up estimates and the consolidation vehicle types provided a final list of 20 consolidation scenario combinations as shown in Table 10.2. These scenarios were then taken forward to the next stage of estimating the likely traffic and emissions impacts.



**Table 10.2 Freight Consolidation Centre Scenario Combinations**

Scenario Number	Serving	Location	Level of uptake	Vehicle type
S1a	Perth	Perth Harbour	10% of deliveries	Euro 4 diesel
S1b	Perth	Perth Harbour	10% of deliveries	Electric
S1c	Perth	Perth Harbour	20% of deliveries	Euro 4 diesel
S1d	Perth	Perth Harbour	20% of deliveries	Electric
S2a	Perth	Perth - Inveralmond	10% of deliveries	Euro 4 diesel
S2b	Perth	Perth - Inveralmond	10% of deliveries	Electric
S2c	Perth	Perth - Inveralmond	20% of deliveries	Euro 4 diesel
S2d	Perth	Perth - Inveralmond	20% of deliveries	Electric
S3a	Dundee	Dundee - Dryburgh	10% of deliveries	Euro 4 diesel
S3b	Dundee	Dundee - Dryburgh	10% of deliveries	Electric
S3c	Dundee	Dundee - Dryburgh	20% of deliveries	Euro 4 diesel
S3d	Dundee	Dundee - Dryburgh	20% of deliveries	Electric
S4a	Perth & Dundee	Perth Harbour	Perth : 10% of deliveries; Dundee: 7.5% of deliveries	Euro 4 diesel
S4b	Perth & Dundee	Perth Harbour	Perth : 10% of deliveries; Dundee: 7.5% of deliveries	Electric
S4c	Perth & Dundee	Perth Harbour	Perth : 20% of deliveries; Dundee: 15% of deliveries	Euro 4 diesel
S4d	Perth & Dundee	Perth Harbour	Perth : 20% of deliveries; Dundee: 15% of deliveries	Electric
S5a	Perth & Dundee	Perth - Inveralmond	Perth : 10% of deliveries; Dundee: 7.5% of deliveries	Euro 4 diesel
S5b	Perth & Dundee	Perth - Inveralmond	Perth : 10% of deliveries; Dundee: 7.5% of deliveries	Electric
S5c	Perth & Dundee	Perth - Inveralmond	Perth : 20% of deliveries; Dundee: 15% of deliveries	Euro 4 diesel
S5d	Perth & Dundee	Perth - Inveralmond	Perth : 20% of deliveries; Dundee: 15% of deliveries	Electric

## Traffic and Emissions Impact

10.18 In order to provide estimates on the potential impacts of the consolidation scenarios in terms of traffic and emissions reductions the following methodology and process has been applied.

- Stage 1: Use survey results to establish the average number of deliveries per retail outlet in each of Perth and Dundee: Perth - 5.5 deliveries per store per week; Dundee - 4.5 deliveries per store per week;
- Stage 2: Scale up average number of deliveries per retail outlet to total number of target premises identified in each city (Perth – 250 retailers, Dundee – 400 retailers);
- Stage 3: Use survey results to disaggregate overall number of deliveries made by each broad vehicle type: Perth primarily van & rigid goods; Dundee relatively equal split, but with a significant proportion unknown;
- Stage 4: Allow for multiple drop rounds within each city which means that the number of deliveries is greater than the number of vehicle rounds. (This is likely to impact more upon the number of vehicle movements for smaller vehicles, with multiple, relatively small consignments within a small area, rather than larger vehicles such as artics, for which the multiple drops will often be in different towns.);
- Stage 5: Estimate distance currently travelled by delivery vehicles for each vehicle type within the study area. For Perth this means within the area bounded by the M90, A9 and River Tay; for Dundee this means within the area bounded by the A90, A92 and River Tay;

10.19 Stages 1-5 provided baseline delivery vehicle movements per day for Perth and Dundee based on the retailer contact databases as shown in Table 10.3.

**Table 10.3: Baseline delivery vehicle trips per day**

Location	Vehicle Type		
	Artic/Large Rigid	Rigid	Van
Perth	20	50	50
Dundee	65	55	40

- Stage 6: Use knowledge of overall vehicle parc<sup>3</sup> to disaggregate delivery mileage made by each vehicle type according to vehicle age and hence vehicle technology / emissions category (Euro 2/3/4);
- Stage 7: Calculate current delivery vehicle mileages in each city;
- Stage 8: Use uptake scenario values to estimate number of vehicle trips diverted from current delivery pattern to use the FCC;
- Stage 9: Scale down the delivery mileage of the vehicles unaffected by the implementation of the FCC;
- Stage 10: Calculate the disaggregated delivery mileage (by each vehicle type) for the vehicles using the FCC to access and return from the consolidation centre within the study area;
- Stage 11: Estimate the number, type and size of consignments to be delivered via the FCC;

<sup>3</sup> Relates to the vehicle population and is usually expressed in terms of the number of vehicles on the road within a given geographical area.

- Stage 12: Estimate the FCC requirement in terms of vehicles and trips per day for each combination of uptake and vehicle type;
- Stage 13: Estimate the FCC vehicle delivery mileage at each site for each combination of uptake and vehicle type.

10.20 As can be seen from the methodology and process applied the outcomes are based on a number of assumptions and therefore the figures generated should be considered broad estimates of what the impact of a consolidation centre to serve Perth and or Dundee could be in terms of reducing delivery vehicle trips and associated emissions. To clearly understand the actual impacts would require a trial consolidation scheme to be implemented, which would allow real life data to be recorded, monitored and evaluated.

## Delivery Vehicle Trips Impact

10.21 Table 10.4 provides a summary of the daily delivery trip data calculated for each of the FCC scenarios. The table compiles the following daily delivery trip data estimates:

- Number of delivery vehicles (by type) that would NOT use the FCC;
- Number of delivery vehicles (by type) that would deliver in to the FCC;
- Number of delivery vehicles that would deliver in to Perth and Dundee from the FCC;
- Daily reduction in vehicles from use of the FCC displayed in absolute figures and as a percentage reduction in trips against the baseline.

10.22 As shown in the final column of the table the daily trip reduction figures show that a high percentage of consolidation is estimated for the relatively small number of retailers participating in the scheme on a voluntary basis, with the associated daily reduction in delivery vehicle trips, peaking at 88% in some scenarios.

10.23 These figures are broadly comparable with the Bristol scheme which was achieving a reduction of between 75-80% equating to 4-5 to 1 reduction in delivery vehicle trips for participating retailers. This should be viewed in the context that the retailers participating in the consolidation scheme are generally those who receive a high frequency of small consignments or part loads, which when put through a consolidation centre result in a high level of consolidation being achieved and thus a large reduction in delivery vehicle trips. As shown in the best practice review when delivery vehicles with fuller loads participate in a consolidation scheme the consolidation level drops and the vehicle trip reduction is not as great.

10.24 Scenarios based on serving Perth and Dundee separately perform equally as well as those based on serving both together and unsurprisingly the better results are achieved with the greater levels of retailer up take.

10.25 The electric vehicle when compared to the diesel is shown to require extra trips and in some cases an additional vehicle is required to undertake the same level of operation as a diesel engine vehicle due to the slightly lower pay load.

10.26 In general all of the scenarios perform well in terms of consolidating loads and trip reduction for participating retailers and therefore it is likely to be other issues such as the practicalities of the consolidation centre location, economic factors and perception of the scheme and potential risks of participation that determine whether a consolidation scheme for Perth and or Dundee is feasible.

**Table 10.4 FCC Scenarios Daily Delivery Vehicle Trips**

Scenario Number	Serving	Location	Level of uptake	Vehicle type	Daily delivery vehicles not using FCC			Daily delivery vehicles delivering to FCC			Daily delivery vehicle trips from FCC	Daily reduction in vehicle trips
					Artic/Large Rigid	Rigid	Van	Artic/ Large Rigid	Rigid	Van		
S1a	Perth	Perth Harbour	10% of retailers	Euro 4 diesel	18	45	45	2	5	5	1 vehicle 2 rounds	10 (83%)
S1b	Perth	Perth Harbour	10% of retailers	Electric	18	45	45	2	5	5	1 vehicle 2 rounds	10 (83%)
S1c	Perth	Perth Harbour	20% of retailers	Euro 4 diesel	16	40	40	4	10	10	1 vehicle 3 rounds	21 (88%)
S1d	Perth	Perth Harbour	20% of retailers	Electric	16	40	40	4	10	10	1 vehicle 4 rounds	20 (83%)
S2a	Perth	Perth - Inveralmond	10% of retailers	Euro 4 diesel	18	45	45	2	5	5	1 vehicle 2 rounds	10 (83%)
S2b	Perth	Perth - Inveralmond	10% of retailers	Electric	18	45	45	2	5	5	1 vehicle 2 rounds	10 (83%)
S2c	Perth	Perth - Inveralmond	20% of retailers	Euro 4 diesel	16	40	40	4	10	10	1 vehicle 3 rounds	21 (88%)
S2d	Perth	Perth - Inveralmond	20% of retailers	Electric	16	40	40	4	10	10	1 vehicle 4 rounds	20 (83%)
S3a	Dundee	Dundee - Dryburgh	10% of retailers	Euro 4 diesel	58.5	49.5	36	6.5	5.5	4	1 vehicle 2 rounds	14 (88%)
S3b	Dundee	Dundee - Dryburgh	10% of retailers	Electric	58.5	49.5	36	6.5	5.5	4	1 vehicle 3 rounds	13 (81%)
S3c	Dundee	Dundee - Dryburgh	20% of retailers	Euro 4 diesel	52	44	32	13	11	8	1 vehicle 4 rounds	28 (88%)
S3d	Dundee	Dundee - Dryburgh	20% of retailers	Electric	52	44	32	13	11	8	2 vehicles 3 rounds each	26 (81%)
S4a	Perth & Dundee	Perth Harbour	Perth : 10% of retailers Dundee: 7.5% of retailers	Euro 4 diesel	Perth 18 Dundee 58.5	Perth 45 Dundee 49.5	Perth 45 Dundee 38	Perth 2 Dundee 6.5	Perth 5 Dundee 5.5	Perth 5 Dundee 2	Perth 1 vehicle 2 rounds Dundee 1 vehicle 2 rounds	10 (83%) 12 (86%)
S4b	Perth & Dundee	Perth Harbour	Perth : 10% of retailers Dundee: 7.5% of retailers	Electric	Perth 18 Dundee 58.5	Perth 45 Dundee 49.5	Perth 45 Dundee 38	Perth 2 Dundee 6.5	Perth 5 Dundee 5.5	Perth 5 Dundee 2	Perth 1 vehicle 2 rounds Dundee 1 vehicle 3 rounds <sup>4</sup>	10 (83%) 11 (79%)
S4c	Perth & Dundee	Perth Harbour	Perth : 20% of retailers Dundee: 15% of retailers	Euro 4 diesel	Perth 16 Dundee 52	Perth 40 Dundee 44	Perth 40 Dundee 36	Perth 4 Dundee 13	Perth 10 Dundee 11	Perth 10 Dundee 4	Perth 1 vehicle 3 rounds Dundee 1 vehicle 4 rounds <sup>4</sup>	21 (88%) 24 (86%)
S4d	Perth & Dundee	Perth Harbour	Perth : 20% of retailers Dundee: 15% of retailers	Electric	Perth 16 Dundee 52	Perth 40 Dundee 44	Perth 40 Dundee 36	Perth 4 Dundee 13	Perth 10 Dundee 11	Perth 10 Dundee 4	Perth 1 vehicle 4 rounds Dundee 2 vehicles 3 rounds	20 (83%) 22 (79%)
S5a	Perth & Dundee	Perth - Inveralmond	Perth : 10% of retailers Dundee: 7.5% of retailers	Euro 4 diesel	Perth 18 Dundee 58.5	Perth 45 Dundee 49.5	Perth 45 Dundee 38	Perth 2 Dundee 6.5	Perth 5 Dundee 5.5	Perth 5 Dundee 2	Perth 1 vehicle 2 rounds Dundee 1 vehicle 2 rounds	10 (83%) 12 (86%)
S5b	Perth & Dundee	Perth - Inveralmond	Perth : 10% of retailers Dundee: 7.5% of retailers	Electric	Perth 18 Dundee 58.5	Perth 45 Dundee 49.5	Perth 45 Dundee 38	Perth 2 Dundee 6.5	Perth 5 Dundee 5.5	Perth 5 Dundee 2	Perth 1 vehicle 2 rounds Dundee 1 vehicle 3 rounds <sup>4</sup>	10 (83%) 11 (79%)
S5c	Perth & Dundee	Perth - Inveralmond	Perth : 20% of retailers Dundee: 15% of retailers	Euro 4 diesel	Perth 16 Dundee 52	Perth 40 Dundee 44	Perth 40 Dundee 36	Perth 4 Dundee 13	Perth 10 Dundee 11	Perth 10 Dundee 4	Perth 1 vehicle 3 rounds Dundee 1 vehicle 4 rounds <sup>4</sup>	21 (88%) 24 (86%)
S5d	Perth & Dundee	Perth - Inveralmond	Perth : 20% of retailers Dundee: 15% of retailers	Electric	Perth 16 Dundee 52	Perth 40 Dundee 44	Perth 40 Dundee 36	Perth 4 Dundee 13	Perth 10 Dundee 11	Perth 10 Dundee 4	Perth 1 vehicle 4 rounds Dundee 2 vehicles 3 rounds	20 (83%) 22 (79%)

<sup>4</sup> Indicates one of the Dundee vehicle rounds would be combined with one of Perth rounds. However for robustness a separate delivery round for Dundee has been counted and therefore the vehicle trip reduction figures shown are slightly underestimated.

## Traffic Impact

10.27 The next stage of analysis involved attempting to quantify the impact of the FCC in the wider context of Perth and Dundee. The focus for the analysis was the urban areas of Perth and Dundee bounded by their respective outer ring roads.

10.28 Traffic flow and turning count data was obtained from the respective Councils and analysed to give an average daily traffic flow total. This was then disaggregated by vehicle type using vehicle classification figures from turning counts. The tables below show the total traffic flow for the urban areas of Perth and Dundee by vehicle type. For Dundee the data obtained was for 2008 and for Perth 2003.

**Table 10.5 Weekday Traffic Flow Data Perth and Dundee**

Dundee	Count	Percentage	Perth	Count	Percentage
Car	116839	72.2%	Car	89960	81.1%
Light	16409	10.1%	Light	12192	11.0%
Bus	19004	11.7%	Bus	2559	2.3%
OGV1	5983	3.7%	OGV1	4352	3.9%
OGV2	1408	0.9%	OGV2	788	0.7%
P/c	924	0.6%	P/c	497	0.4%
M/c	1232	0.8%	M/c	574	0.5%
Total	161798	100.0%	Total	110922	100.0%

10.29 The classifications of goods vehicle types are defined as:

- LGV – Light Goods Vehicles – including vans
- OGV1 – Other Goods Vehicle 1 – rigid lorries >3.5 tonnes up to 3 axles
- OGV2 – Other Goods Vehicle 2 – rigid and articulated lorries 4 axles or more

10.30 As you would expect the flows are greater for Dundee, but the traffic composition differs a little between the two, most notable is the higher proportion of cars in Perth and the higher level of buses recorded in Dundee. The proportions for goods vehicle are relatively similar. Considering the size of Perth the high number of goods vehicles counted could be attributed in part to the high level of through traffic experienced particularly along South Street.

10.31 The traffic flow data for LGV, OGV1 and OGV2 was then growthed to 2009 levels using NRTF growth rates as shown below to provide up to date flow data. (TEMPRO and NTM rates were not available for either goods vehicles or Scotland hence the use of NRTF)

	Dundee	Perth
LGV	16409	13614
OGV1	5983	4524
OGV2	1408	891

10.32 The data from the FCC scenarios has then been applied to the traffic flow data for good vehicles to provide estimates of the potential goods vehicle reductions that could be achieved in the urban areas of Perth and Dundee. A reduction in urban delivery mileage has also been estimated.

**Table 10.6 FCC Scenarios Traffic Impact**

Scenario Number	Serving	Daily vehicle trip reduction			Daily vehicle movements with FCC			Percentage reduction			Daily reduction in urban delivery mileage	Annual reduction in urban delivery mileage
		OGV2	OGV1	LGV	OGV2	OGV1	LGV	OGV2	OGV1	LGV		
S1a	Perth	2	3	5	889	4521	13609	0.22%	0.07%	0.04%	30	10950
S1b	Perth	2	3	5	889	4521	13609	0.22%	0.07%	0.04%	30	10950
S1c	Perth	4	7	10	887	4517	13604	0.45%	0.15%	0.07%	63	22995
S1d	Perth	4	6	10	887	4518	13604	0.45%	0.13%	0.07%	60	21900
S2a	Perth	2	3	5	889	4521	13609	0.22%	0.07%	0.04%	62	22630
S2b	Perth	2	3	5	889	4521	13609	0.22%	0.07%	0.04%	62	22630
S2c	Perth	4	7	10	887	4517	13604	0.45%	0.15%	0.07%	130.2	47523
S2d	Perth	4	6	10	887	4518	13604	0.45%	0.13%	0.07%	124	45260
S3a	Dundee	6.5	3.5	4	1401	5979	16405	0.46%	0.06%	0.02%	106.4	38836
S3b	Dundee	6.5	2.5	4	1401	5980	16405	0.46%	0.04%	0.02%	98.8	36062
S3c	Dundee	13	7	8	1395	5976	16401	0.92%	0.12%	0.05%	212.8	77672
S3d	Dundee	13	5	8	1395	5978	16401	0.92%	0.08%	0.05%	197.6	72124
S4a	Perth	2	3	5	889	4521	13609	0.22%	0.07%	0.04%	30	10950
	Dundee	6.5	3.5	2	1401	5979	16407	0.46%	0.06%	0.01%	103.2	37668
S4b	Perth	2	3	5	889	4521	13609	0.22%	0.07%	0.04%	30	10950
	Dundee	6.5	2.5	2	1401	5980	16407	0.46%	0.04%	0.01%	94.6	34529
S4c	Perth	4	7	10	887	4517	13604	0.45%	0.15%	0.07%	63	22995
	Dundee	13	7	4	1395	5976	16405	0.92%	0.12%	0.02%	206.4	75336
S4d	Perth	4	6	10	887	4518	13604	0.45%	0.13%	0.07%	60	21900
	Dundee	13	5	4	1395	5978	16405	0.92%	0.08%	0.02%	189.2	69058
S5a	Perth	2	3	5	889	4521	13609	0.22%	0.07%	0.04%	62	22630
	Dundee	6.5	3.5	2	1401	5979	16407	0.46%	0.06%	0.01%	103.2	37668
S5b	Perth	2	3	5	889	4521	13609	0.22%	0.07%	0.04%	62	22630
	Dundee	6.5	2.5	2	1401	5980	16407	0.46%	0.04%	0.01%	94.6	34529
S5c	Perth	4	7	10	887	4517	13604	0.45%	0.15%	0.07%	130.2	47523
	Dundee	13	7	4	1395	5976	16405	0.92%	0.12%	0.02%	206.4	75336
S5d	Perth	4	6	10	887	4518	13604	0.45%	0.13%	0.07%	124	45260
	Dundee	13	5	4	1395	5978	16405	0.92%	0.08%	0.02%	189.2	69058

- 10.33 As can be seen the reductions achieved for all goods vehicle classes in Perth and Dundee are small ranging for 0 – 1%. The reduction figures need to be taken in the context that the traffic flow data used covers the whole of the Perth and Dundee urban area and includes through traffic and all trip purposes for goods vehicles therefore incorporating all deliveries to all premises as well as servicing. Therefore although small the reductions are realistic in terms of the FCCs impact in the wider context of Perth and Dundee. The urban delivery mileage figures were determined based on FCC scenario locations and looks to omit delivery vehicle mileage on the strategic road network and look at the leg of the journey made in the urban area and indicate what savings could be made. As expected the biggest savings are made where the FCC is located further away from the target area.
- 10.34 It should again be noted that these figures give broad estimates of potential reductions and savings and a trial consolidation scheme would be needed in order to ascertain real life data.

## Emissions Impact

- 10.35 Utilising the delivery vehicle trip data for each of the scenarios it was then possible to apply vehicle emissions figures to provide estimates of likely changes in major pollutants through the introduction of an FCC.
- 10.36 The delivery vehicle pollutant emissions data was calculated using the European Environment Agency (EEA) COPERT 4 emissions database<sup>5</sup>.
- 10.37 The tables below provide annual emissions figures for a 'without FCC' and a 'with FCC' dataset and document the changes anticipated in emissions for CO<sub>2</sub> (tonnes), NOx (Kgs) and PM<sub>10</sub> (Kgs). The emissions data is provided for both point of use (tail pipe emissions) and life cycle, which incorporates tail pipe emissions along with emissions associated with the production and supply of fuel. This is considered useful when comparing the Euro IV diesel engine against an electric vehicle, with the electric vehicles emissions performance showing up best at point of use, but reducing slightly when the life cycle is taken in to consideration.

**Table 10.7 Scenario 1: Perth Harbour serving Perth**

Scenario 1a 10%	Annual Emissions							
	Without FCC	With FCC – point of use			Without FCC	With FCC – life cycle		
		Euro IV	Difference	% change		Euro IV	Difference	% change
CO <sub>2</sub> (T)	222.4	209.6	-12.8	-5.8	245.8	231.7	-14.1	-5.7
NOx (kg)	1122	1049	-73	-6.5	1246	1166	-80	-6.4
PM <sub>10</sub> (kg)	65.9	61	-4.9	-7.4	69.6	64.5	-5.1	-7.3
Scenario 1b 10%	Without FCC	With FCC – point of use			Without FCC	With FCC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change
	CO <sub>2</sub> (T)	222.4	204.7	-17.7	-8.0	245.8	228.5	-17.3
NOx (kg)	1122	1033	-89	-7.9	1246	1153	-93	-7.5
PM <sub>10</sub> (kg)	65.9	60.6	-5.3	-8.0	69.6	64.5	-5.1	-7.3
Scenario 1c 20%	Without FCC	With FCC – point of use			Without FCC	With FCC – life cycle		
		Euro IV	Difference	% change		Euro IV	Difference	% change
	CO <sub>2</sub> (T)	222.4	193.5	-28.9	-13.0	245.8	213.8	-32
NOx (kg)	1122	964	-158	-14.1	1246	1072	-174	-14.0

<sup>5</sup> COPERT 4 is an MS Windows software program aiming at the calculation of air pollutant emissions from road transport. COPERT has been developed for use from the National Experts to estimate emissions from road transport to be included in official annual national inventories.

PM <sub>10</sub> (kg)	65.9	55.6	-10.3	-15.6	69.6	58.9	-10.7	-15.4
Scenario 1d 20%	Without FCC	With FCC – point of use			Without FCC	With FCC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change
CO <sub>2</sub> (T)	222.4	186.9	-35.5	-16.0	245.8	211.2	-34.6	-14.1
NO <sub>x</sub> (kg)	1122	944	-178	-15.9	1246	1060	-186	-14.9
PM <sub>10</sub> (kg)	65.9	55.3	-10.6	-16.1	69.6	59.3	-10.3	-14.8

10.38 For Scenario 1 Perth Harbour the figures demonstrate a clear reduction in pollutant emissions peaking as expected with the greater retailer take up scenarios and the use of an electric vehicle. The shorter distance between Perth Harbour and the city centre (approx 1.5 miles) means the savings appear less impressive than some of the other scenarios. However this should not necessarily count against this location.

**Table 10.8 Scenario 2: Perth Inveralmond serving Perth**

Scenario	Annual Emissions							
	Without CC	With CC – point of use			Without CC	With CC – life cycle		
2a 10%		Euro IV	Difference	% change		Euro IV	Difference	% change
CO <sub>2</sub> (T)	222.4	233.5	11.1	5.0	245.8	258	12.2	5.0
NO <sub>x</sub> (kg)	1122	1120	-2	-0.2	1246	1250	4	0.3
PM <sub>10</sub> (kg)	65.9	63.9	-2	-3.0	69.6	67.9	-1.7	-2.4
Scenario 2b 10%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change
CO <sub>2</sub> (T)	222.4	226.8	4.4	2.0	245.8	254.2	8.4	3.4
NO <sub>x</sub> (kg)	1122	1099	-23	-2.0	1246	1234	-12	-1.0
PM <sub>10</sub> (kg)	65.9	63.4	-2.5	-3.8	69.6	67.8	-1.8	-2.6
Scenario 2c 20%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Euro IV	Difference	% change		Euro IV	Difference	% change
CO <sub>2</sub> (T)	222.4	247.5	25.1	11.3	245.8	273.4	27.6	11.2
NO <sub>x</sub> (kg)	1122	1159	37	3.3	1246	1296	50	4.0
PM <sub>10</sub> (kg)	65.9	65.2	-0.7	-1.1	69.6	69.4	-0.2	-0.3
Scenario 2d 20%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change
CO <sub>2</sub> (T)	222.4	238.1	15.7	7.1	245.8	270.3	24.5	10.0
NO <sub>x</sub> (kg)	1122	1131	9	0.8	1246	1281	35	2.8
PM <sub>10</sub> (kg)	65.9	64.5	-1.4	-2.1	69.6	69.7	0.1	0.1

10.39 The data generated for Scenario 2 Perth Inveralmond indicates that pollutant emissions are likely to increase in most cases for CO<sub>2</sub> and NO<sub>x</sub>, whereas small decreases are expected in PM<sub>10</sub>. This is due to the location of Inveralmond to the north of Perth with delivery traffic having to divert around the M90/A9 to reach the consolidation facility. However the additional emissions would be occurring on the strategic road network rather than the urban road network where the benefits of the FCC could still be applied.



**Table 10.9 Scenario 3: Dundee Dryburgh Industrial Estate serving Dundee**

Scenario	Annual Emissions							
	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Euro IV	Difference	% change		Euro IV	Difference	% change
Scenario 3a 10%								
CO <sub>2</sub> (T)	817.7	769.7	-48	-5.9	903.6	850.5	-53.1	-5.9
NO <sub>x</sub> (kg)	4438	4161	-277	-6.2	4894	4590	-304	-6.2
PM <sub>10</sub> (kg)	220.6	205.8	-14.8	-6.7	234.5	218.9	-15.6	-6.7
Scenario 3b 10%								
Without CC								
With CC – point of use								
Electric								
Without CC								
With CC – life cycle								
Electric								
CO <sub>2</sub> (T)	817.7	760.9	-56.8	-6.9	903.6	847	-56.6	-6.3
NO <sub>x</sub> (kg)	4438	4131	-307	-6.9	4894	4571	-323	-6.6
PM <sub>10</sub> (kg)	220.6	205.2	-15.4	-7.0	234.5	219.1	-15.4	-6.6
Scenario 3c 20%								
Without CC								
With CC – point of use								
Euro IV								
Without CC								
With CC – life cycle								
Euro IV								
CO <sub>2</sub> (T)	817.7	721.6	-96.1	-11.8	903.6	797.4	-106.2	-11.8
NO <sub>x</sub> (kg)	4438	3883	-555	-12.5	4894	4285	-609	-12.4
PM <sub>10</sub> (kg)	220.6	191.1	-29.5	-13.4	234.5	203.3	-31.2	-13.3
Scenario 3d 20%								
Without CC								
With CC – point of use								
Electric								
Without CC								
With CC – life cycle								
Electric								
CO <sub>2</sub> (T)	817.7	704.1	-113.6	-13.9	903.6	790.5	-113.1	-12.5
NO <sub>x</sub> (kg)	4438	3825	-613	-13.8	4894	4248	-646	-13.2
PM <sub>10</sub> (kg)	220.6	189.7	-30.9	-14.0	234.5	203.7	-30.8	-13.1

10.40 Scenario 3 Dundee Dryburgh provides some impressive emission pollutant reduction figures again with the greater take up scenarios and electric vehicle performing best. This is largely due to its position in close proximity to existing supply routes on the A90. The delivery route from the FCC to the city centre would be the A923 Coupar Argus Road – Lochee Road – Logie Road, which is particular concern in terms of Air Quality. However the FCC should provide an overall reduction in delivery vehicle trips along this route and the use of an electric vehicle would provide zero emissions at point of use.

**Table 10.10 Scenario 4: Perth Harbour serving Perth and Dundee**

Scenario	Annual Emissions							
	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Euro IV	Difference	% change		Euro IV	Difference	% change
Scenario 4a 10% / 7.5%								
CO <sub>2</sub> (T)	2681	2454	-227	-8.5	2962	2712	-250	-8.4
NO <sub>x</sub> (kg)	12986	11821	-1165	-9.0	14480	13189	-1291	-8.9
PM <sub>10</sub> (kg)	573	520.6	-52.4	-9.1	619	562	-57	-9.2
Scenario 4b 10% / 7.5%								
Without CC								
With CC – point of use								
Electric								
Without CC								
With CC – life cycle								
Electric								
CO <sub>2</sub> (T)	2681	2425	-256	-9.5	2962	2710	-252	-8.5
NO <sub>x</sub> (kg)	12986	11743	-1243	-9.6	14480	13173	-1307	-9.0
PM <sub>10</sub> (kg)	573	518.7	-54.3	-9.5	619	565	-54	-8.7
Scenario 4c 20% / 15%								
Without CC								
With CC – point of use								
Euro IV								
Without CC								
With CC – life cycle								
Euro IV								
CO <sub>2</sub> (T)	2681	2226	-455	-17.0	2962	2459	-503	-17.0
NO <sub>x</sub> (kg)	12986	10653	-2333	-18.0	14480	11893	-2587	-17.9
PM <sub>10</sub> (kg)	573	467.6	-105.4	-18.4	619	505.4	-113.6	-18.4

Scenario 4d 20% / 15%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change
CO <sub>2</sub> (T)	2681	2168	-513	-19.1	2962	2458	-504	-17.0
NO <sub>x</sub> (kg)	12986	10500	-2486	-19.1	14480	11865	-2615	-18.1
PM <sub>10</sub> (kg)	573	464	-109	-19.0	619	510.8	-108.2	-17.5

**Table 10.11 Scenario 5: Perth Inveralmond serving Perth and Dundee**

Scenario 5a 10% / 7.5%	Annual Emissions							
	Without CC	With CC – point of use			Without CC	With CC – life cycle		
Euro IV		Difference	% change	Euro IV		Difference	% change	
CO <sub>2</sub> (T)	2681	2454	-227	-8.5	2962	2712	-250	-8.4
NO <sub>x</sub> (kg)	12986	11821	-1165	-9.0	14480	13189	-1291	-8.9
PM <sub>10</sub> (kg)	573	520.6	-52.4	-9.1	619	562	-57	-9.2
Scenario 5b 10% / 7.5%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Euro IV	Difference	% change		Euro IV	Difference	% change
CO <sub>2</sub> (T)	2681	2425	-256	-9.5	2962	2710	-252	-8.5
NO <sub>x</sub> (kg)	12986	11743	-1243	-9.6	14480	13173	-1307	-9.0
PM <sub>10</sub> (kg)	573	518.7	-54.3	-9.5	619	565	-54	-8.7
Scenario 5c 20% / 15%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Euro IV	Difference	% change		Euro IV	Difference	% change
CO <sub>2</sub> (T)	2681	2226	-455	-17.0	2962	2459	-503	-17.0
NO <sub>x</sub> (kg)	12986	10653	-2333	-18.0	14480	11893	-2587	-17.9
PM <sub>10</sub> (kg)	573	467.6	-105.4	-18.4	619	505.4	-113.6	-18.4
Scenario 5d 20% / 15%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Euro IV	Difference	% change		Euro IV	Difference	% change
CO <sub>2</sub> (T)	2681	2168	-513	-19.1	2962	2458	-504	-17.0
NO <sub>x</sub> (kg)	12986	10500	-2486	-19.1	14480	11865	-2615	-18.1
PM <sub>10</sub> (kg)	573	464	-109	-19.0	619	510.8	-108.2	-17.5

10.41 Scenarios 4 & 5 give combined figures for pollutant emissions reductions to serve Perth and Dundee jointly for one FCC. As shown by the figures the estimated reductions are large and significantly greater than those achieved by serving Perth and Dundee separately. However this is in part due to the large emissions savings achieved on the strategic road network (A90) by serving Dundee retailers from a location in Perth. This is particularly relevant for Scenario 5 where the benefits of serving Dundee from this location appear to cancel out the negative effects of delivery vehicles diverting to the FCC in Inveralmond via the M90/A9. It would also perhaps be relevant to employ a routing a strategy for Inveralmond ensuring FCC vehicles use the A9/M90/A90 route to Dundee rather than diverting through Perth. Other issues to consider include whether vehicles delivering in to an FCC at Perth would then continue on to Dundee to make deliveries elsewhere in the urban area or another town (Arbroath, Aberdeen). However this is likely only to apply to a small group of suppliers who perform larger delivery rounds to chain stores in the region as identified through the retailer survey.

10.42 On the basis of the findings Scenarios 1, 3, 4 & 5 have all demonstrated reductions in pollutant emissions through the use of an FCC. Scenario 2 showed an increase in some emissions caused by its location and the need for delivery vehicles to divert around Perth to reach the FCC. Scenarios 4 & 5 which served Perth and Dundee jointly provided the best reductions overall and as would be expected a larger take up by retailers and the use of electric vehicles provides the

opportunity for further emission savings. Given the results of the exercise it would appear that serving Perth and Dundee in the locality of Perth Harbour (S4) or Perth Inveralmond (S5) or serving just Perth from Perth Harbour (S1) and Dundee from Dryburgh (S3) offer the best opportunity to achieve the objectives of reducing emissions and improving air quality set for the FCC.

## Air Quality Impact

- 10.43 The emissions impact data provided in the previous section indicates the likely pollutant emissions reductions achievable on an annual basis by implementing an FCC. The calculations made give figures in tonnes and kilograms and are therefore measures of weight. To quantify the impact in terms of air quality requires this data to be combined with emissions from other sources, converted into volumetric data through dispersion modelling along with a number of other steps to apportion the data to different locations taking in to account vehicle routes and classification. This process has not been undertaken as part of this study as the focus was on identifying the impact in terms of likely emissions reductions through the introduction of an FCC. However this process could be taken forward utilising the data produced and applying it to the relevant air quality models.
- 10.44 As shown in Chapter 5 Policy Review and Strategic Fit the Air Quality Action Plans (AQAPs) for Perth and Dundee have established a base case for concentrations of NO<sub>x</sub> and PM<sub>10</sub> and the source apportionment work showed that HGVs and LGVs are considered to be disproportionately accountable for pollutant emissions given their mix within the vehicle fleet.
- 10.45 Based on the FCC scenarios developed, the likely delivery routes affected (positively) through the introduction of an FCC and the target areas for the study when cross referenced with the key points of known or expected exceedance of air quality targets in Perth and Dundee it is anticipated that the greatest impact in terms of air quality improvements could be seen at the following locations:
- Perth – York Place, South Street, Scott Street, North Methven Street, Kinnoull Street and Atholl Street;
  - Dundee – Seagate, Nethergate / Marketgait Junction, Commercial Street, Lochee Road and Logie Street.
- 10.46 It is acknowledged that the FCC will need to be one measure in a package of measures to help improve air quality in Perth and Dundee. However it is anticipated that a successful FCC scheme would make a valuable contribution, providing significant reductions in pollutant emissions through a reduction in delivery vehicle trips and urban delivery mileage.

## Waste Management and Recycling

- 10.47 The operating structure for a consolidation scheme to serve Perth and or Dundee is also envisaged to be capable of incorporating waste management and recycling functions. This would most likely involve the waste and packaging material associated with retailer's deliveries being collected and taken away as part of the delivery service. This has proved successful in the Bristol consolidation scheme where some 22 tonnes of cardboard and plastic has been recycled to date. It also helps improve vehicle utilisation and enhances the environmental credentials of the consolidation concept.
- 10.48 There is an opportunity to provide this added value service free of charge, attach an additional premium or build it in to an overall charging structure. This will largely depend on any costs associated with providing the service including installing or using on-site recycling equipment such

as a bailer, or additional vehicle mileage for disposal of materials at an appropriate recycling centre.

- 10.49 The Bristol scheme is known to benefit from recycling facilities being available on-site at the consolidation centre and the costs associated with this are built in to the overall rental charge for the industrial estate. Therefore the service is offered free of charge to retailers to enhance their experience of using the consolidation scheme.
- 10.50 The operating costs provided below do not take in to account the potential for offering a waste and packing collection service as it is expected, that at least to begin with, the service would be free of charge or would not be offered depending on the availability of the necessary facilities.

## Operating Costs

- 10.51 Expressed in simple terms, the cost of operating a stand alone consolidation centre would consist of fixed costs, associated with the assets required to offer the service such as the necessary warehouse space and the vehicles, and variable costs such as staff, fuel etc that will vary according to the throughput.
- 10.52 The space requirement for a basic, no frills consolidation centre would mirror the throughput. Throughput in the early stages of developing a scheme would be relatively small, when participation is low. The space requirement in the early stages would almost certainly be much smaller than that available in a stand alone warehouse equipped with the loading and unloading facilities and yard space required to receive goods from large, modern HGVs.
- 10.53 The operation of a stand alone consolidation centre would require a significant investment in fixed costs for the minimum size of suitable self contained unit available (minimum likely to be around 10,000 sq ft). Yet much of this space would remain unused until participation and hence throughput increased significantly or if there was significant uptake of added value services such as remote stock holding.
- 10.54 In contrast, by agreeing flexible terms for use of an existing freight distribution facility whereby warehouse costs (primarily space and staff time) are paid for according to the amount used, a more cost-effective solution could be found. In the early stages a nominal area of 2,000 -3,000 sq ft within an existing warehouse would easily suffice, with the opportunity to increase the space requirement as dictated by throughput and also by the take up of added value services such as waste management, off-site stock holding and pre-retailing.
- 10.55 Discussions as part of previous studies with distribution companies about the existing facilities available suggest that such a structure would be achievable. In the case of the Perth and Dundee area a specific site in the Inveralmond industrial area has been identified that meets this set of criteria – a site used by DHL for home delivery as part of a contract for Argos Ltd., which has formed the basis of Scenarios S2a-d and S5a-d.
- 10.56 The transportation cost element for a freight consolidation centre is dependent upon the approach that the scheme's promoter specified. If the promoter of the scheme wishes to have a dedicated, liveried, and potentially specially specified, vehicle for serving the area then the fixed transport costs would be similar whether the consolidation centre were to be based at a new, stand alone depot or an existing freight distribution facility. However, by also sharing space on existing vehicles further costs could be saved on the transport element.

- 10.57 The use of electric vehicles on this type of contract would be practical, although the lower payload would mean that the need for additional driver shifts and then additional vehicles would be reached at lower levels of overall throughput than for conventional, diesel vehicles.
- 10.58 Given that lead times for an electric vehicle could be several months, the use of space within an existing freight distribution facility might offer the opportunity to share space on vehicles that are already travelling into or at least close to the study area in the early stages of operation, so further minimising cost and maximising the environmental and traffic benefits by keeping the number of vehicles on the road to a minimum.
- 10.59 On the basis of sharing existing facilities in the manner explained above for a basic facility, a ballpark figure of £150,000 to £200,000 per annum has been suggested by one potential operator (through personal communication) as the likely cost.
- 10.60 Within that total figure, assuming the shared use scenario, the vast majority of the cost in year one would be associated with the staff cost required to engage with retailers to ensure recruitment was pursued actively in order to increase participation and throughput.
- 10.61 In subsequent years the balance between the recruitment and operating cost would be expected to shift towards the operating cost assuming successful recruitment leading to increased throughput and hence vehicle and staff costs.
- 10.62 In order to validate the cost figure quoted above TTR has used a model developed as part of previous feasibility research into freight consolidation in South London. The model includes costs associated with warehousing, staffing (both administrative and operational), fixed costs, office costs, vehicles, insurance, fuel and recruitment costs in the form of staff time to contact and explain the service to potential retail customers. This has been applied to calculate the operating cost element based on the 20 scenarios of location, uptake and vehicle type, for either or both a dedicated and a shared use facility. The results are shown in Table 10.12 below.

**Table 10.12 Consolidation Scenario Costs**

Scenario Number	Number Vehicles	Number Drivers	Total Annual Cost Shared Facility*	Total Annual Cost Dedicated Facility*
S1a	1	1		£280,500
S1b	1	1		£291,000
S1c	1	2		£304,000
S1d	1	2		£315,500
S2a	1	1	£124,500	
S2b	1	1	£136,000	
S2c	1	2	£171,000	
S2d	1	2	£182,500	
S3a	1	1	£124,500	£280,500
S3b	1	2	£145,500	£315,500
S3c	1	2	£171,000	£304,000
S3d	2	3	£256,500	£374,000
S4a	2	2		£559,000
S4b	2	2		£581,500
S4c	2	4		£608,000

S4d	3	5		£689,500
S5a	2	2	£249,000	
S5b	2	2	£271,500	
S5c	2	4	£342,000	
S5d	3	5	£439,000	

\* To nearest £500.

- 10.63 In addition to these operational costs there would be costs in the first year associated with recruitment, new systems and IT etc., which are more difficult to quantify without knowledge of a detailed location and system specification.
- 10.64 The cost of building a dedicated warehouse/industrial unit has also been calculated and this would be additional to the operating costs for dedicated facility indicated in Table 10.12. The cost for constructing a 10,000 sp.m warehouse has been estimated to be in the region of £420,000 – £600,000. This is based on informal discussions with industry agents and warehouse construction cost information obtained from the Scottish Borders website.<sup>6</sup>
- 10.65 The shared cost estimates assume that although the space is used in an existing warehouse, the vehicles, drivers and sales staff are used exclusively for the Perth and / or Dundee consolidation centre. Where possible internal resources such as fork-lifts and fork lift drivers would be shared. This leads to costs that are significantly lower than if stand alone premises were leased for such an operation, but inevitably with less flexibility in location.
- 10.66 In terms of cost per delivery, the cost scenarios result in a very wide range of values, with the following trends:
- Shared cost scenarios are much more cost effective (£9 - £19 per delivery) than stand alone operation (35-55% cheaper, depending on throughput)
  - The use of electric vehicles increases the total annual cost by between 5 and 10%
  - Increased throughput levels for each individual city scenario have a significant impact on cost per delivery
  - The likely throughput reduction for deliveries destined for Dundee (as a result of excluding some local deliveries) in locating a joint FCC in Perth, would mean that from an economic point of view there is little financial benefit in individual or joint operation.
- 10.67 Further growth of the scheme would not necessarily lead to increases in operational costs and a reducing cost per item as economies of scale become more significant. However, whether this is achievable will depend on the extent to which use of the FCC is encouraged locally (i.e. incentivised or driven by strict access restrictions).
- 10.68 The extent of on-going recruitment costs will depend upon the attractiveness of the scheme to potential users in comparison to continuing to use their pre-existing supply chain. This will depend, in part, on the degree to which the scheme's promoter is able to put in place other support measures that help the recruitment process. However, other non-compulsory schemes in the UK have tended to need either a part time or full time recruitment manager for a several years.

<sup>6</sup> <http://www.scotborders.gov.uk/life/planningandbuilding/buildingwarrantforms/19356.html>

### Estimated Shared Cost Breakdown

10.69 A more detailed cost breakdown for the initial year of promotion and operation for scenario 2a, the shared facility at Inveralmond, has been estimated based on the data within TTR's freight consolidation operational model. This suggests the following split of costs:

Cost category	Approximate Cost (£)
Marketing and promotion of, and recruitment to the first operational year of a trial scheme for Perth (scenario 2a)	52,000
Share of vehicle and fuel costs	18,000
Share of fixed facility costs (rental for warehouse & office space and use of other existing operating facilities e.g. fork lifts)	24,000
Staff costs: full time drivers and share of other staff from existing facility (warehouse staff, fork lift drivers, management time)	30,500
<b>Total</b>	<b>124,500</b>
<b>Optimism Bias at 14%</b>	<b>141,930</b>

It should also be noted that:

1. The marketing cost includes a significant amount of staff cost that might be associated with the cost of employing a manager for the consolidation centre, who has significant marketing responsibility or a full time sales & recruitment employee, who has little day to day input to the running of the centre. Either way this would be a significant additional expense compared to the existing facility;
2. Costs would vary as the throughput associated with the freight consolidation element, as compared to the existing site use, varied;
3. The exact breakdown would depend on the detailed negotiation between public sector scheme promoter and the operators of the existing facility, and the allocation of costs would need to be seen as indicative in that context.

### Optimism Bias

10.70 Optimism bias of 14% has been applied to the cost estimate for operating a consolidation scheme. An explanation of the optimum bias figure is provided below and a copy of the table used to generate the figure is provided in Appendix E.

10.71 There is a demonstrated, systematic, tendency for project appraisers to be overly optimistic. To redress this tendency it is recommended to make explicit, empirically based adjustments to the estimates of a project's costs, benefits, and duration. The adjustments should be based on data from past projects or similar projects elsewhere, and adjusted for the unique characteristics of the project in question.

10.72 The main aims of applying optimism bias are to:

- Make adjustments to the estimates of capital and operating costs, benefits values and time profiles; and
- Provide a better estimate of the likely capital costs and works' duration.

## Charging Structure

- 10.73 The issue of charging is likely to be a contentious issue, as organisations often cite cost as one of the key barriers to participation.
- 10.74 To date different approaches have been taken in the various consolidation centre trials. Much of this official detail remains commercially confidential.
- 10.75 In Bristol the freight consolidation centre was offered free of charge whilst the scheme formed part of the European VIVALDI project, as during this time Bristol City Council was able to reclaim a considerable portion of the set up and operating cost from the European Commission. However, once the fixed term of the European funding had lapsed, the operation of the consolidation centre, which by that stage had grown successfully to over 50 retail participants, became more of a significant ongoing burden to Bristol City Council. As a result the decision was taken to start charging participants for the service provided and the charges have slowly increased in order to reduce the subsidy offered by Bristol City Council.
- 10.76 In contrast, learning from the experiences in Bristol, the decision was taken by Norfolk County Council that participants to the Norwich freight consolidation scheme would not receive an introductory free period. This meant that no such expectation was developed within the potential client base and therefore no ongoing expectation was developed for a subsidy that Norfolk County Council felt unable to meet. However, this has been a barrier to recruitment of participants to the Norwich scheme leading to very low participation rates in a voluntary scheme with little in the way of city centre access restrictions to back it up.
- 10.77 Considering these two extreme cases, it would seem that a clearly defined and relatively short, say three months, free introductory trial would be beneficial to allow potential retailers to try out the benefits of a freight consolidation scheme. In order to participate in a freight consolidation scheme a retailer is going to have to change its delivery practices for a small number of its stores, which will inevitably cause it some disruption and incur cost. The proposed free introductory trial would go some way to offsetting this cost and mitigate some of the risk perceived by the retailer in changing its supply chain arrangements.
- 10.78 The method of charging also needs to be considered. Although the details of the charging structures for the Bristol and Heathrow freight consolidation centres remain commercially confidential, we understand that, particularly at Heathrow where security requires goods to be sealed, goods are delivered in roll cages and charges are based upon numbers of full or part full roll cages.
- 10.79 In contrast, evidence of the charging structures in current continental European consolidation centres suggest that charges are levied on a per item basis. Exact details vary, with weight being a determining factor in some cases and physical size being a determining factor in others. However, the charges appear to range between £2-5 for an individual box / parcel and £5-10 for a larger delivery unit such as a pallet.
- 10.80 When considering the nature of the goods being delivered into Perth and Dundee it would seem likely that the majority of the goods likely to pass through the consolidation centre would be packed in boxes, with a smaller number of pallets and other items. This suggests that a charging structure per delivery unit, with sliding scale of charges based on size (pallet, cage, tote, box etc) would be appropriate.
- 10.81 In terms of the level of charge required to recoup the full operating cost of a shared cost freight consolidation centre, then the charge level of £2 per box and £5 per pallet appears to be about



right to cover costs for the higher throughput scenarios. The charge of between £2 – 5 is a per unit charge has been calculated to be sufficient to offset the operating delivery charge of between £9 – 19 for the shared facility scenario as there will multiple units delivered per delivery made. These charge levels appear to be high in terms of the likelihood that they would present a significant barrier to retailer participation. (This observation is based solely on the authors' professional opinion, as no charging structure has yet been tested with the retailers in the Perth / Dundee area through any form of willingness to pay exercise, as there is no detailed scheme in place against which to consider these charges.)

- 10.82 The actual charges would need to be based on the expectation of the level of subsidy, if any, that the scheme's promoter is willing to offer to the consolidation centre during its initial year(s), in return to the potential benefits that will accrue to the residents and businesses based in the area. The charging structure would also need to be developed in terms of a consideration of how the scheme's promoter wishes to provide an incentive to the scheme operator to recruit more customers by sharing in the revenue raised.
- 10.83 The way in which the commercial agreement between the scheme's promoter and the operator of the consolidation centre is structured is another important element. It is recommended that consideration should be given to an agreement to underwrite a given fixed cost for the operation of the consolidation centre. Assuming that charges are levied for items delivered by the consolidation centre (whether after a free introductory trial or not), then the revenue should be shared in such a way that increased throughput benefits both the promoter, through reduced overall subsidy, and the operator by increasing their revenue and so providing them with an incentive to recruit more participants to the scheme. The details of this should be considered as part of the eventual business plan for the consolidation centre.

## Summary

- 10.84 The option generation and sifting exercise has indicated that several of the scenarios tested have the potential to serve as a location for operating a consolidation scheme to serve retailers in Perth and or Dundee.
- 10.85 Taking in to account the objectives of the study and those specifically for a consolidation scheme the two best performing scenarios in environmental terms can be considered to be Scenarios 4d & 5d both serving Perth and Dundee together 4d from Perth Harbour and 5d from Perth Inveralmond. Both scenarios performed best with the higher retailer take up and the use of electric vehicles for making deliveries but also have the highest economic costs. A summary of the environmental benefits in provided below:

### Scenario 4d: Perth Harbour serving Perth and Dundee

Scenario 4d 20% / 15%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change
CO <sub>2</sub> (T)	2681	2168	-513	-19.1	2962	2458	-504	-17.0
NO <sub>x</sub> (kg)	12986	10500	-2486	-19.1	14480	11865	-2615	-18.1
PM <sub>10</sub> (kg)	573	464	-109	-19.0	619	510.8	-108.2	-17.5

### Scenario 5d: Perth Inveralmond serving Perth and Dundee

Scenario 5d 20% / 15%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change

CO <sub>2</sub> (T)	2681	2168	-513	-19.1	2962	2458	-504	-17.0
NO <sub>x</sub> (kg)	12986	10500	-2486	-19.1	14480	11865	-2615	-18.1
PM <sub>10</sub> (kg)	573	464	-109	-19.0	619	510.8	-108.2	-17.5

- 10.86 For scenario 4d Perth Harbour the issues arise when the practicalities of the location are taken in to account, whilst theoretically the location is shown to work well from a transport operations perspective there are concerns over lorry routing and access to the harbour area to and from the strategic road network. There is also an apparent lack of existing distribution facilities; none were identified during the consultation exercise.
- 10.87 In contrast scenario 5d Perth Inveralmond can be seen as an improving option once the practicalities of the location are considered. As previously identified the location does require vehicles to divert around Perth to reach Inveralmond, therefore increasing delivery mileage on the strategic road network, but the objective of reducing environmental impact in the urban areas of Perth and Dundee can still be achieved. The major benefit of the Perth Inveralmond site is the existing DHL run Argos home delivery warehouse. This would allow a consolidation scheme to be combined with other distribution activities and as shown in the operating costs section this enables the costs of warehousing, vehicles and operatives to be shared thus reducing overall cost. DHL, as the operators of the warehouse, have the in house expertise and experience of running consolidation schemes in the UK as identified in the best practice review and as part of the consultation exercise expressed an interest in the potential for a scheme at Inveralmond believing it to be feasible.
- 10.88 On this basis the outcome from the option generation and sifting exercise is that scenario 5d Perth Inveralmond serving Perth and Dundee is the preferred option.

# 11 Construction Consolidation

- 11.1 As previously identified in section 4 Study Context the Dundee Waterfront proposals are still in the development stage with developers and main contractors yet to be appointed. It was originally proposed to hold a construction consolidation workshop with a range of stakeholders including developers and contractors in order to establish the level of understanding of the concept and the opportunities to implement a scheme for the Dundee Waterfront development and or other identified developments. However through discussions with key strategic stakeholders and Tactran is was agreed that it was not the right time to hold such a workshop due to the likely limited participation and benefit achievable, also bearing in mind the resources required to set up and run the workshop.
- 11.2 It was agreed that the construction consolidation element of the study should therefore look to maximise telephone consultation with key stakeholders including developers and contractors where possible and provide an insight into how to integrate construction consolidation into future developments through the planning process and give an indication as to what benefits could be achieved through the process.

## Introduction

- 11.3 There has recently been significant focus on the use of improved logistics techniques, including consolidation centres, within the construction sector to reduce the number of deliveries being made to construction sites with reduced impacts on the local environment and road network.
- 11.4 This was in part driven by the construction materials consolidation centre demonstration conducted in partnership between Bovis, Stanhope, Wilson James and Transport for London (TfL) with a warehouse located in South London to serve 4 central London construction sites. Headline results from the trial suggested:
- Vehicle trips to site for materials passing through the centre were reduced by approximately 70%
  - Journey time reductions of 2 hours for suppliers delivering to the consolidation centre
  - CO2 reduction of approximately 75%
  - Significant reduction in the typical 15% over-ordering of materials for construction sites
  - Reduced on-site waste and damages
  - Increased productivity of half an hour per person per day for workers on the sites served by the construction materials consolidation centre
  - Delivery reliability approximately 97% (compared with approximately 40% on a comparable control development), with knock-on improvements on site productivity
- 11.5 The decision to conduct the London construction materials consolidation trial was driven by TfL's desire to find ways to reduce congestion on London's roads. Freight vehicles offer a particular opportunity for this, as set out in the London Freight Plan, published by TfL in November 2007.
- 11.6 The use of construction materials consolidation as a standalone technique without the back-up of other techniques allowed some 'leakage' of deliveries that did not pass through the centre, particularly for trade subcontractors, so that the total reduction in delivery trips to site was approximately 40%. This leakage of deliveries to sites that were notionally participating in the

London trial emphasises the importance of instilling a change in behaviour and confidence throughout the supply chain for this approach to work, which is not an easy task.

- 11.7 Information from Constructing Excellence<sup>7</sup> suggests that the use of construction materials consolidation centres is just one of seven improved logistics techniques that could (and should) be incorporated within the practices of the construction sector as appropriate to each development site, which result in a complete supply chain management process:
- Logistics planning across full supply chain
  - Consolidation centre
  - Just-in-time delivery to the workplace
  - 4th party logistics
  - Logistics specialist on site
  - Demand smoothing
  - Integrated ICT system across full supply chain
- 11.8 These combine to reduce the risk of project overrun and once proven should help scheduling of shorter construction periods.
- 11.9 To achieve this there will need to be a change in the fundamental contractual arrangements that exist in the construction industry. The key contractual relationships are those between:
- the developer, as the overall commercial client, and the main construction contractor
  - the main contractor and the specialist trade contractors
  - the specialist trade contractors and their suppliers
  - the requirements imposed by the Local Authority as part of the development control process.
- 11.10 The business case has often been cited as the stumbling block for the introduction of improved logistics management techniques into the construction sector supply chain. However, it appears that there is a small number of main contractors who now recognise the need to change the traditional supply chain relationship in the construction sector and take ownership of the full supply chain including control (or at least tight management) of the movement of construction materials undertaken on behalf of their subcontractors and have identified a commercial benefit in doing so.
- 11.11 The decision to use innovative logistics processes (of which construction consolidation is an example) as part of the logistics chain to serve a particular development is taken between the main construction contractor and their client – the commercial property developer. In the vast majority of cases, where the developer has not come across the concept or not had the business case proven to them, there appears to be considerable scepticism that the investment required to set up a more controlled construction logistics process is anything other than an additional complication and associated cost, even though it is the developer, as the ultimate client, that would benefit if the identified cost savings could be passed on to them by the main contractor.
- 11.12 Hence, in practice, the actual barrier to improved logistics practices in general appears to be linked to the perception of commercial risk when faced with changing behaviour to what is considered a

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<sup>7</sup> Constructing Excellence is a cross-sector, cross-supply chain, member led organisation driving change and operating for the good of industry and its stakeholders. [www.constructingexcellence.org.uk](http://www.constructingexcellence.org.uk)

'new technique', compounded by the fact that it is difficult to capture the data necessary to prove the benefit. Because these are commercial transactions, those who are likely to succeed in a competitive situation are those who are experienced and able to factor these savings into their business model.

- 11.13 Of the seven techniques chosen a construction consolidation centre is one of the more costly options because it requires investment in a (semi-)permanent site away from the main construction site. Hence it is only likely to be worth considering for very large developments, or where there is a high density of developments in a relatively small area.
- 11.14 This can best be seen by considering the situation following the construction consolidation trial in London. There are now at least two commercial businesses (using differing business models) that are effectively offering a form of construction consolidation to the development market in London. Even though only a very small proportion of the total number of developments in London uses these services, the throughput generated is enough to sustain the businesses. In other cases the public sector has mandated, or is considering mandating, the use of construction consolidation for very large projects, such as the Olympic park. This latter case shows that the public sector can have a, potentially decisive, role in this process if it is minded to do so and can see the benefit of doing so.

## **Dundee Waterfront Development – Background & Consultation**

- 11.15 The Dundee Waterfront development aims to regenerate the area of Dundee fronting the River Tay over the period to 2031. This development will be conducted in a series of stages as the support infrastructure and finance allow, with initial works having already been undertaken.
- 11.16 Initial discussion with a member of Dundee City Council's Waterfront Development Team suggested that the only certain major civil engineering work currently in the pipeline is the Central Waterfront road infrastructure, the next phase for which is in the process of going out to tender.
- 11.17 While there are a number of other substantial developments with planning approval in and around the city centre these are currently on hold because of the recession (either due to difficulties in accessing capital or a worry about potential demand in the current financial climate). It is hoped that these developments will begin to progress shortly so that building works will be in progress in 3 to 5 years time for the first of the developments e.g. an 'outpost' museum site for the V&A and a replacement for the existing Hilton Hotel.
- 11.18 Because of this situation, in the majority of cases, (to the best of the City Council's knowledge) the developer has not yet got a contractor on board, and hence the detailed discussions about logistics planning have not yet been held. This provides an opportunity to introduce discussion of advanced logistics techniques to the development community before any irreversible decisions have been made.
- 11.19 In order to test awareness and receptiveness towards innovative construction logistics techniques such as freight consolidation telephone or e-mail consultation was undertaken with the (necessarily) relatively small number of developers for the sites that have currently been identified.
- 11.20 Dundee City Council's own city engineer's department have responsibility for much of the supporting infrastructure works for the Waterfront Development. Two contracts have already been completed. One is on site now, completion expected in July 2010. The next stage (bridgeworks) will hopefully commence in June 2010. There will then be various further stages after that. They have not been involved directly in any of the construction logistics to date – it has all been handled

by their contractor (AMCO). This type of infrastructure is not best suited to use of construction consolidation due to the bulky nature of much of the materials involved in the groundworks, and we understand that the majority of the bulk materials (tarmac and aggregates) have been sourced locally. However, they could see the potential for construction consolidation for the build / fit out stages of the developments.

- 11.21 Scottish Enterprise, who have responsibility for the proposed development of the old rail yards into a digital media park, appeared to have some prior knowledge of the concept of freight consolidation. Even so, they thought it unlikely that they would use a consolidation centre for their site, primarily because their role is higher level and they tend not to get involved in technical issues such as construction logistics. They will go out to the market, either directly or through a developer, through traditional tender, and although they would be interested if a developer's tender came back with integrated construction logistics or proposals to use a construction consolidation centre they did not anticipate promoting the idea themselves through the tender process.
- 11.22 Other contacts with Dundee City Council (Economic Development and Planning Teams) showed that current thinking is that construction logistics is considered to be an issue for the private sector developers rather than the Council, although in the view of the Head of Economic Development there might be potential for a construction materials consolidation centre in terms of throughput if the whole area was developed at the same time. It was established that, to date, Dundee City Council has never used any conditions regarding advanced construction logistics or use of a freight consolidation centre as part of a Planning Consent. However, site-related conditions have been used to manage traffic in and around locations that have very little space for queuing without causing serious disruption. This has been achieved by an insistence that lorries, carrying for example pre-cast concrete panels, are held in a location a couple of miles away and called in from the off-site vehicle holding location by radio / phone at appropriate times.
- 11.23 Discussions with several private sector developers showed that they were at best lukewarm to the idea, which was generally new to them and considered to be something that would be dealt with on their behalf by their main contractor.
- 11.24 In the cases of the forthcoming developments the only developer that indicated knowledge of construction consolidation was Lendlease who will be responsible for the redevelopment of the Overgate shopping centre. Although progress is not expected in the near future Lendlease indicated that their sister company Bovis LendLease (BLL) could be contacted for their opinion as a leading contractor in the Dundee area given they have been appointed contractor for the redevelopment of Dundee City Council's neighbouring offices. Contact was attempted with BLL, but was unsuccessful, although previous discussions with a particular project manager at BLL have indicated that they may not be one of the main contractors that are convinced about integrated logistics in the construction industry, preferring to leave it to their subcontractors to arrange logistics issues on an individual basis.
- 11.25 When it comes to existing developments it is more problematic to make changes to construction logistics arrangements that have already been agreed. The only response received from this group again referred us to their main contractor, who did not respond during the timeframe of the study.

## Construction Consolidation Scenario for Dundee

- 11.26 Data and information is based primarily on information collected and presented as part of the construction materials consolidation centre demonstration conducted in partnership between Bovis, Stanhope, Wilson James and TfL.

- 11.27 The normal pattern is that the peak in vehicle movements is associated with a short, initial period when excavation, piling and laying of solid foundations is underway. This is associated with a large number of large, rigid vehicles in the form of tipper trucks for removal of excavated material and then delivery of concrete for pouring, structural steel and aggregates. Such activity would not be suited to consolidation, but would be appropriate for management in terms of ensuring waste is minimised, processed close to site (if such a facility exists) and inbound materials are either sourced locally or delivered by rail to a nearby transshipment facility.
- 11.28 Subsequent to this, a smaller regular stream of deliveries would be expected consisting of structural materials, cladding, glass, and eventually internal fittings associated with final fit out. Responsibility for these deliveries varies depending upon the model being employed by the main contractors, but frequently responsibility rests with specialist sub-contractors within the envelope of an overall site booking system.
- 11.29 Data from the monitoring of the London construction materials consolidation centre suggests that almost all deliveries made to the consolidation centre were made by rigid goods vehicles or vans. The largest structural components, which would necessitate use of articulated goods vehicles, were generally delivered direct, except in cases of last minute change where goods were on the way and then the site did not need or want to receive them – for example in cases of high wind – in which case they were diverted to be held at the consolidation centre until such time as the site was in a position to receive them.
- 11.30 Data linked to this suggests that around 40% of vehicle movements to site did not pass through the construction materials consolidation centre, consisting both of these large structural materials and also very small consignments linked to independent contractors moving tools and fittings as part of the final stages of fit-out.
- 11.31 Based on the information available it seems that for a development of around 35,000 m<sup>2</sup> you might expect somewhere in the region of 10-15 vehicle movements per day during the construction and fit-out stages, many, but not all, of which might be suitable for consolidation. For such a development the construction stage would be expected to last in excess of 18 months, leading to the potential for somewhere in the range of 2250 – 6000 vehicle movements as a potential market for the construction materials consolidation centre.
- 11.32 Given that the London construction materials consolidation centre trial achieved a 65-75% reduction in vehicle movements to site for the traffic passing through the centre, this would lead to a potential reduction in the number of vehicles to site in the region of 1500 – 4500 over the construction period.
- 11.33 Over the course of the construction phase of the full development (18-24 months), the reduction in emissions would be:
- CO<sub>2</sub> 6.4 – 22.4 Tonnes
  - NO<sub>x</sub> 55.1 – 170.1 Kg
  - PM<sub>10</sub> 2.1 – 5.6 Kg
- 11.34 Given the peak activity for construction sites is associated with the early stage site preparation it might be worth considering an integrated approach that consists of a materials reclamation facility, a holding site for large structural deliveries direct to site and a construction materials consolidation centre. Such an approach will require more land than just a construction materials consolidation

centre, but is likely to provide for a better overall environmental outcome than focusing more narrowly on just the construction materials consolidation element.

- 11.35 The larger land requirement will also have an impact in terms of the investment required and would need to be driven by the likelihood of sufficient ongoing demand. The potential for this clearly exists in Dundee with specific developments such as the council office redevelopment, swimming pool & car park, Hilton Hotel, V&A Museum and longer term developments such as extension of Overgate Shopping Centre, broader waterfront developments and the digital media park, although demand would be dependent upon these developments being actively progressed rather than remaining tentative / on hold. The direct involvement of the City Council in two of the most committed developments provides an opportunity to progress this, so long as it is not too late for the main contractor to accommodate the concept within their plans.

## Dundee Construction Consolidation – Conclusion

- 11.36 The consultation conducted with developers (including parts of the City Council) and their contractors is typical of other similar consultations conducted elsewhere. On this basis, it appears unlikely that any local developer will formally instruct their main contractor to include integrated construction logistics as part of their technical planning. This means that without some form of direction from outside the commercial environment, the deployment of integrated construction logistics, and particularly construction materials consolidation, is only likely if the main contractor has previous experience of the concept and has managed to prove the economic benefit to its developer client.
- 11.37 Given this background it appears that the only opportunity to guarantee a solution that would minimise the traffic impacts of the waterfront and associated developments would be for the City Council to specify use of construction consolidation, or equivalent integrated construction logistics, as part of the development control process.
- 11.38 In previous consultations held elsewhere, public authorities have been reluctant to specify that developers should use a specific consolidation centre, suggesting that it could be construed as anti-competitive. Instead their preference has been to indicate that it would be acceptable to advise use of a consolidation centre operating to certain standards, together with an example of such an operation. This approach can work when there is such a facility in place, but if one does not already exist then this approach becomes more problematic.
- 11.39 The plans to develop Dundee City Council's own offices and the swimming pool development by Dundee City Council become critically important at this point. If Dundee City Council is convinced that there would be significant benefits (in terms of congestion and air quality) in following this course of action then the first stage would be for them, as the developer for their own site, to instruct their main contractor to use a construction consolidation centre and make it available to other developers as well on a shared cost basis so that synergies in the logistics processes of all sites can then be captured. If the main contractor is committed to this course of action then it should be possible for the costs of setting this up to be recouped through the efficiency savings and reductions in waste through the supply chain. The risk is that if the main contractor is not committed to the concept, then the commercial element of the logistics will not be managed in a way that will recoup the investment.



## 12 Conclusions and Recommendations

- 12.1 With the study complete this section provides a summary of the main findings for both retail and construction consolidation feasibility and gives recommendations on how to progress the potential for an FCC to serve Perth and Dundee.

### Retail Consolidation

- 12.2 Consultation with stakeholders showed an understanding of the consolidation concept and a positive attitude to the benefits that could be achieved from a transport perspective. Concern was raised over who would fund such as scheme given that the business case for existing consolidation operations has not proven to be self financing.
- 12.3 Retailer consultation highlighted that currently retailers and suppliers in Perth and Dundee experience very few problems in making and receiving deliveries and current access restrictions are understood and avoided. A level of consolidation appears to already exist in some supply chains, but a significant number of retailers particularly in Perth were seen to be receiving a large number of small consignments or part loads indicating that freight consolidation could be beneficial. The retailer consultation also confirmed the dominant supply chain routes as being to the west and south of Dundee and Perth, with some additional locally based suppliers.
- 12.4 The scenarios developed considered options for serving Perth and Dundee separately and also together. They then considered different levels of retailer take up and also different vehicle types – diesel and electric. The outcomes from the worked scenarios showed that in terms of delivery vehicle trips and emissions it is estimated that significant reductions could be achieved. Scenario 4d Perth Harbour and 5d Perth Inveralmond serving Perth and Dundee together provided the best returns with both scenarios showing daily savings of 20 delivery vehicle movements for Perth and 22 for Dundee. Over the course of year this equates to over 15,000 delivery vehicle movements and over 75000 urban delivery vehicle miles being saved. This in turn equates to the emissions savings estimated in the tables below.

#### Scenario 4d: Perth Harbour serving Perth and Dundee

Scenario 4d 20% / 15%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change
CO <sub>2</sub> (T)	2681	2168	-513	-19.1	2962	2458	-504	-17.0
NO <sub>x</sub> (kg)	12986	10500	-2486	-19.1	14480	11865	-2615	-18.1
PM <sub>10</sub> (kg)	573	464	-109	-19.0	619	510.8	-108.2	-17.5

#### Scenario 5d: Perth Inveralmond serving Perth and Dundee

Scenario 5d 20% / 15%	Without CC	With CC – point of use			Without CC	With CC – life cycle		
		Electric	Difference	% change		Electric	Difference	% change
CO <sub>2</sub> (T)	2681	2168	-513	-19.1	2962	2458	-504	-17.0
NO <sub>x</sub> (kg)	12986	10500	-2486	-19.1	14480	11865	-2615	-18.1
PM <sub>10</sub> (kg)	573	464	-109	-19.0	619	510.8	-108.2	-17.5

- 12.5 Further benefits not quantified as part of the study analysis but known to exist from anecdotal evidence from other FCC schemes include:

- Improved road safety through a reduction in conflict between delivery vehicles and other road users including pedestrians, cyclists and public transport vehicles;
- Improved city centre shopping environment particular relevant for Perth and Dundee given the use by delivery vehicles of the pedestrian areas in each city before 11am and after 4pm;
- Improved delivery service to retailers, greater flexibility in deliveries, goods delivered direct to stock room with no involvement from store staff required;
- Improved efficiency in delivery supply chains with suppliers able to drop off goods at a convenient location on the periphery of the city.

12.6 For scenario 4d Perth Harbour the issues arise when the practicalities of the location are taken in to account, whilst theoretically the location is shown to work well from a transport operations perspective there are concerns over lorry routing and access to the harbour area to and from the strategic road network. There is also an apparent lack of existing distribution facilities; none were identified during the consultation exercise.

12.7 The voluntary participation by retailers in an FCC scheme is considered a barrier with inertia towards changing existing delivery practices expected. On this basis, take up would appear unlikely except at low levels and some form of stronger incentive would need to be introduced in order to drive take up as part of a wider action plan or low emission strategy for heavy duty vehicles. This could include some or all of:

- Tighter delivery restrictions (by time, route or vehicle size);
- Derogation of restrictions for certain delivery vehicles (e.g. electric vehicles or other chosen categories);
- Promotion of a voluntary fleet recognition scheme similar to ECO Stars<sup>8</sup>;
- Requirements for delivery and servicing plans to be lodged as part of the planning process;
- Reduced business rates for those retailers who participate in the consolidation scheme.

12.8 The cost scenarios developed showed a wide range of annual operating costs from £124,500 to £689,500 depending on the scenario in question. Scenario S2 Inveralmond industrial estate to the North of Perth on the A9 was identified as best performing option in terms of cost effectiveness. Of particular relevance to this outcome was the existence of a current distribution facility operated by DHL and through discussions with DHL it was identified that there was the potential to incorporate a consolidation delivery service for both Perth and Dundee within its existing operation.

12.9 On the basis of the anticipated reduction in delivery vehicle movements and consequent environmental benefits the outcome from the study is that scenario 5d Perth Inveralmond serving Perth and Dundee is the preferred option.

12.10 The potential for a commercially viable self financing scheme is considered highly unlikely at least in the short to medium term given the conditions in which it would operate. Therefore a subsidy would be required for the full costs to enable the FCC scheme to be set up. On this basis it is considered a sensible option to pursue a trial scheme to allow retailers to try the service (free of

<sup>8</sup> [http://www.care4air.org/eco\\_stars\\_scheme.html](http://www.care4air.org/eco_stars_scheme.html)

charge) and for the benefits to be monitored and evaluated to see if the objectives are being achieved. It would also be important to understand who the stakeholders are who would benefit from the scheme and therefore who should contribute to the cost of the FCC. Depending on the final specification of the scheme the following beneficiaries have been identified who could potentially contribute financially to the scheme.

- Tactran;
- Perth & Kinross Council Departments – transport planning, air quality, city development, economic development;
- Dundee City Council Departments – transport planning, air quality, city development, economic development;
- Perth City Centre Management and Dundee City Centre Management;
- Owners of St John’s Centre Perth and Wellgate, Overgate and Forum Centre in Dundee.

12.11 It may also be possible to bid for funding through European Commission supported projects and the Scottish Governments Air Quality funding programme.

12.12 Based on the findings and conclusions of the study it has been possible to put together an outline FCC scheme proposal. The proposal considers a number of criteria and gives recommendations for what a scheme may look like in the table below.

**Table 12.1: FCC Scheme Outline Proposal**

Item	Retail Consolidation Scheme Proposal
<b>Target Area</b>	The FCC should focus primarily on the core city centre retailing areas of Perth and Dundee as this provides the highest concentration of retailers and allows for the highest benefits to be achieved. However retailers outside of this area should not necessarily be excluded if they were to express an interest in the scheme. It may also be appropriate to consider widening the scope of the FCC to look at non-retail businesses such as offices and whether the deliveries they receive such as office consumables could also be consolidated.
<b>Location and Facility Type</b>	Theoretically, from the locations identified an FCC at Perth Harbour and or Dundee Dryburgh work best in terms of transport operations. However a more practical solution is that of Perth Inveralmond, as DHL currently operates a distribution facility for Argos Ltd on the site and therefore offers the opportunity to combine freight consolidation with other distribution activities, which is considered key for any potential scheme due to the reduced operating costs of a shared scheme.
<b>Retailers and Products</b>	Based on the findings from the retailer survey and previous experience, it is recommended that an FCC scheme should look to target those retailers that receive a large number of small consignments or part loads, most likely to be small to medium sized retailers. In the early stages of a consolidation scheme it is also recommended that products being consolidated are not temperature sensitive i.e. chilled or frozen, do not require specialist handling equipment i.e. kegs or gas canisters and are not extremely high value. This will help keep costs down and if a longer term scheme emerges the operation can be developed to incorporate their needs.
<b>Additional Services</b>	Any FCC scheme should look to provide additional services to retailers such as the collection and recycling of waste and packaging material, provision of off-site storage space for use by retailers and pre-retailing services. Offering additional services can provide a revenue stream to help cross subsidise the scheme.
<b>Vehicles</b>	Road freight vehicles should be used to carry out consolidation deliveries to retailers. As a minimum low emission Euro IV engine standard should be used. Electric vehicles should be considered as a realistic option due to their enhanced environmental credentials and improving market availability.
<b>Costs/Finance</b>	An FCC scheme, in particular a trial, should look to be free of charge to retailers, at least in the initial stages and will therefore require subsidy. This would enable retailers to try the service and also for the benefits to be monitored and evaluated to see if objectives are being met. The risk and benefits of the scheme should be shared amongst all of the key stakeholders including the operator where Key Performance Indicators could be used to ensure maximum performance is achieved.
<b>Compulsory/ Voluntary</b>	As specified, participation by retailers in an FCC scheme would be on a voluntary basis with no direct or inferred enforcement. On this basis it is expected that take up by retailers is likely to be between 7.5 and 20% as shown in the worked scenarios.
<b>Incentives/ Restrictions</b>	Due to the voluntary nature of the FCC and in order to help encourage retailer take up it is suggested that complementary measures such as increased access restrictions, or reduced business rates for participating retailers are investigated to understand the potential for implementation.
<b>Operation</b>	To maximise attractiveness and provide flexibility the FCC should look to operate 24 hours a day, seven days a week, this is particularly important for inbound deliveries to the FCC. This type of operation and the associated cost could be more easily accommodated through combining freight consolidation with other distribution operations.
<b>Marketing/ Promotion</b>	Marketing and promotion of the scheme would be crucial to its success. A voluntary scheme would need to clearly demonstrate the benefits for retailers including potential cost savings. A dedicated retail recruitment manager may be necessary to ensure sufficient participation levels are reached.

## Construction Consolidation

- 12.13 Consultation with developers and contractors revealed a varying degree of understanding of the construction consolidation concept and how it could be implemented. A potential vicious circle exists between developers and contractors with each one believing that it is up to other party to take responsibility to stipulate and drive forward the use of a consolidation centre.
- 12.14 As a result of this it is seen as imperative that Dundee City Council takes the lead on this initiative and use their position as developer for the re-development of the City Council offices and swimming pool development and seeks to negotiate use of construction consolidation as a change to the planning consent. This could then lay the foundation for future use of a construction consolidation centre as part of the Dundee Waterfront Development.
- 12.15 The example provided showed that for a 35,000m<sup>2</sup> development with a build period of 18-24 months a reduction in construction vehicle movements of between 1500 – 4500 could be achieved with associated reductions in pollutant emissions.

## STAG Assessment

- 12.16 On the basis of the outline scheme proposal an attempt has been made to broadly assess the outline FCC scheme against the five key STAG criteria and the sub criteria.

**Table 12.2 STAG criteria and sub criteria**

STAG Criteria	STAG Sub Criteria
Environment	Noise and vibration
	Global air quality – CO <sub>2</sub>
	Local air quality – PM <sub>10</sub> and NOx
	Water quality, drainage and flood defences
	Geological features
	Biodiversity and habitats
	Visual amenity
	Agriculture and soils
	Cultural heritage
	Landscape
Safety	Accidents
	Security
Economy	Transport Economic Efficiency
	Wider Economic Benefits
	Economic Activity and Location Impacts
Integration	Transport Integration
	Transport and Land-Use Integration
	Policy Integration
Accessibility and Social Inclusion	Public Transport Network Coverage
	Local Accessibility
	People group
	Geographic location

- 12.17 For the purpose of the assessment Scenario S5d has been used to provide the quantified impact.
- 12.18 The table indicates that the FCC would provide benefits against a number of STAG criteria and sub criteria. In particular those relating to global and local air quality and also transport economic efficiency.

**Table 12.3 STAG Appraisal of Consolidation Scenario S5d**

STAG Criteria	STAG Sub Criteria	Qualitative Impact	Quantitative Impact	Assessment
Environment	Noise and vibration	Reduction in noise and vibration due to reduced LGV and HGV movements in the urban area	Daily reduction of 14 HGV and 10 LGV movements in urban area of Perth and 24 HGV and 4 LGV in Dundee	Slight beneficial
	Global air quality – CO <sub>2</sub>	Reduction in CO <sub>2</sub> due to reduced LGV and HGV movements in the urban area	Daily reduction of 14 HGV and 10 LGV movements in Perth and 24 HGV and 4 LGV in Dundee results in a (combined) CO <sub>2</sub> reduction of 513 tonnes per annum	Beneficial
	Local air quality – PM <sub>10</sub> and NO <sub>2</sub>	Reduction in PM <sub>10</sub> and NOx due to reduced LGV and HGV movements in the urban area	Daily reduction of 14 HGV and 10 LGV movements in Perth and 24 HGV and 4 LGV in Dundee results in a (combined) NOx reduction of 2486Kgs and 109Kgs PM <sub>10</sub> s per annum	Beneficial
	Water quality, drainage and flood defense	No significant impact	No significant impact	Neutral
	Geological features	No significant impact	No significant impact	Neutral
	Biodiversity and habitats	No significant impact	No significant impact	Neutral
	Visual amenity	Reduction in the number of delivery vehicles and related traffic congestion helping to improve visual amenity	Non-quantifiable	Slight Beneficial
	Agriculture and soils	No significant impact	No significant impact	Neutral
	Cultural heritage	Reduction in noise and vibration and improved air quality helping to maintain culture heritage	Non-quantifiable	Slight Beneficial
Landscape	No significant impact	No significant impact	Neutral	
Safety	Accidents	A reduction in the number of accidents due to reduced LGV and HGV movements in the urban area	Non-quantifiable	Slight Beneficial
	Security	No significant impact	No significant impact	Neutral
Economy	Transport Economic Efficiency	Improved transport economic efficiency due to reduced LGV and HGV movements in the urban area	Daily reduction of 14 HGV and 10 LGV movements in urban area of Perth and 24 HGV and 4 LGV in Dundee	Beneficial
	Wider Economic Benefits	Improved economic efficiency and competitiveness due reduction in LGV and HGV movements and associated negative impacts	Non-quantifiable	Slight beneficial
	Economic Activity and Location Impacts	Improved city centre retailing environment and competitiveness due to reduction in LGV and HGV movements and associated negative impacts	Non-quantifiable	Slight beneficial
Integration	Transport Integration	No significant impact	No significant impact	Neutral
	Transport and Land-Use Integration	No significant impact	No significant impact	Neutral
	Policy Integration	A reduction in LGV and HGV movements will contribute to objectives of local AQAPs, LTPs, and Tactran RTS	Non-quantifiable	Slight beneficial
Accessibility and Social Inclusion	Public Transport Network Coverage	No significant impact	No significant impact	Neutral
	Local Accessibility	Potential reduction in severance and increase in walking and cycling due to reduced LGV and HGV movements in the urban area	Non-quantifiable	Slight beneficial
	People group	No significant impact	No significant impact	Neutral
	Geographic location	Potential improvement in city centre vitality and attractiveness as a destination due to reduced LGV and HGV movements in urban area	Non-quantifiable	Slight beneficial

## 13 Action Plan

- 1.10 Following discussions with Tactran, Perth and Kinross Council and Dundee City Council the recommendation to conduct a trial consolidation scheme was put forward as part of a wider package of measures that would address not only emissions from goods vehicles delivering to Perth and Dundee, but also emissions from HGV through traffic and local bus fleets. On the basis of the findings from the option generation exercise the preferred location was identified as Inveralmond industrial estate.
- 1.11 Implementing a trial consolidation scheme for a period of 6-12 months from the Inveralmond industrial estate would allow the following to be achieved:
- Understand the suitability of the Inveralmond site for consolidation operations for both Perth and Dundee;
  - Allow retailers in Perth and Dundee to sample and experience the benefits of consolidation deliveries without incurring a charge;
  - Allow the impacts of a consolidation scheme to be recorded, monitored and evaluated against Transport Planning Objectives and Key Performance Indicators. This is likely to include vehicle trip reduction, vehicle mileage reduction, pollutant emissions savings linked to Air Quality and retailer satisfaction. An assessment of the impact of the trial scheme will be assessed in conjunction with the impacts of other elements of the Air Quality Action Plan;
  - Assess the potential for an on-going scheme based on retailer demand for consolidated deliveries via a voluntary arrangement and willingness to pay for the service;
  - Identify what complementary measures may be required to help encourage retailer participation in an on-going scheme.
- 13.1 A ten point Action Plan has been developed outlining the steps to be taken to move towards implementing a trial consolidation scheme for Perth and Dundee. Based on the action plan below it is envisaged that a trial freight consolidation centre scheme could be set up and running in an approximate 12-18 months timescale.

## Tactran Freight Consolidation Centre Trial Action Plan

Action No.	Action	Requirements	Responsibility	Timescale Short/ Medium/ Long <sup>1</sup>	Budget
1.	Raise awareness of findings of the feasibility study, generate interest in a potential trial consolidation scheme.	Presentations to stakeholders, via local workshop; plus information in local press, town centre manager communications and possible leaflet drop etc.	Tactran, JMP/TTR	Short	£5k
2.	Define operating structure for the trial scheme i.e. warehousing space, vehicles, staff, loading/unloading equipment and subsidiary items. Also the potential to provide value added services.	Liaise with DHL. Carry out site visit to Inveralmond distribution depot. Detailed technical discussions and specifications	Tactran, PKC, DCC, JMP/TTR	Short	£6k
3.	Define Key Performance Indicators (KPI's) for a potential scheme operator.	Confirm TPOs and set AQ / TPO KPI targets in discussion with public and private partners.	Tactran, PKC, DCC, JMP/TTR	Short/Medium	£3k
4.	Agree a monitoring and evaluation framework for the trial scheme against Transport Planning Objectives and KPI's.	Develop monitoring and evaluation strategy, following on from item 3.	Tactran, PKC, DCC, JMP/TTR	Short/Medium	£3k
5.	Investigate potential complementary measures to assist in the development and uptake of an on-going scheme.	AQAP actually does this already to a degree. What is needed is an FQP-led freight strategy to develop the issues highlighted in the AQAP and show the package of support measures needed	Tactran, PKC, DCC, JMP/TTR, City Centre Management	Short/Medium	£20k



6.	Define a charging structure for a potential on-going consolidation scheme once the trial period ends.	Liaise with DHL, as this will depend on the level of operator incentivisation in the contract, which links to the extent of the supporting measures.	Tactran, PKC, DCC, JMP/TTR	Medium	£3k
7.	Identify funding opportunities to assist with scheme set up and operating costs.	Search EU calls for proposals.	JMP/TTR	Medium	£3k to identify appropriate programmes, timescales etc. If appropriate opportunity is identified then there would be a subsequent cost for bid preparation
8.	Develop comprehensive implementation schedule, risk register and ongoing marketing & recruitment strategy	Develop implementation schedule / i.e. formal project plan.	Tactran, PKC, DCC, JMP/TTR	Medium	£3k for implementation schedule £3k for formal marketing & recruitment strategy
9.	Produce a brief for tendering the consolidation service.	Develop brief.	Tactran, PKC, DCC, JMP/TTR	Medium	£4k
10.	Produce a three year business plan for an on-going consolidation scheme based on cost and revenue projections and therefore subsidy requirement.	Liaise with DHL and produce business plan.	Tactran, PKC, DCC, JMP/TTR	Long	£4k
				<b>TOTAL</b>	£57k, including AQ-driven freight strategy development at item 5 plus any subsequent bid preparation cost at item 7

<sup>1</sup> Timescales: Short term is defined as 0-6 months, medium 6-12 months, long >12 month



## Best Practice Review Summary Tables



## Retail Consolidation Best Practice Review Summary Tables

Table 1 UK operational retail freight consolidation centres

Locations	Operator	Target Servicing Area	Distance to Target Servicing Area (km)	Start	Lessons Learnt / Other Information
Snetterton, Norfolk	Foulgers	Norwich	30	2007	This consolidation centre was funded by Norfolk County Council through the CIVITAS SMILE European Project. It is not compulsory for retailers to use the centre, and approximately 2 retailers use the centre for deliveries. Further use of the centre has been limited with retailers on the high street feeling that they were not the decision makers with regards to deliveries. Additionally, it was felt that there was a lack of incentive to use the Centre (Mayes, G, 2008).
Bury	Christian Salvesen	Manchester Airport	Approx. 33	2005	This consolidation centre has been brought about by the need for more security screening of goods entering the airport and was driven as privately funded commercial venture. Initially, the centre was based on a trial with 6 key retailers but since August 2006, the centre handles approximately 70% of the total airside product being delivered. These products include frozen, chilled and ambient goods (Bala, C, 2007).
Bristol	DHL Exel	Broadmead Shopping Centre	16	2004	This consolidation centre was part funded by the EU VIVALDI project, with a 6 month free trial used to recruit retailers to demonstrate the benefits. As of November 2009 55 retailers were using the centre, which has dropped from 70 due to the loss of retailers from the Arcadia group as a result of the recession. DHL continue to operate the scheme including the use of an electric vehicle. The service is currently being retendered to incorporate the servicing of retailers in Bath, where the Local Authority has received funding from Europe to introduce the concept. (Minihane, E, 2009)
Greenhithe, Kent	Tibbett and Britten Plc (now part of DHL Exel)	Bluewater Shopping Centre	Approx. 3	2002	This consolidation centre was set up as a privately funded commercial venture to serve the Bluewater Shopping Centre. The scheme is voluntary for Bluewater retailers, but is not known how many are serviced by the centre (Browne, M, et al, 2005).
Sheffield	Clipper	Meadowhall	N/A, (Located on	2002	This consolidation centre was also set up as a privately funded

Locations	Operator	Target Servicing Area	Distance to Target Servicing Area (km)	Start	Lessons Learnt / Other Information
	Logistics	Shopping Centre	the perimeter of the Retail Park)		commercial venture to serve Meadow Hall Shopping Centre. Some 111 outlets out of 230 are being voluntarily serviced from the centre. The centre also serves some retailers in central Sheffield particularly for inter-branch transfers. When recruiting businesses to use the centre, flexibility was crucial, with some businesses only choosing to use the centre at peak trading (Steers, P, 2007) (Supply Chain Manager, 2007) (Hope, V, 2009)
Stockley Park, London	DHL Exel	BAA Heathrow Airport, all 5 Terminals	2.5 (to T4)	2000	Heathrow Airport Limited (HAL) has recently extended its contract with DHL for the operation of the Heathrow Consolidation Centre (HCC) until October 2012, which involves the consolidation of deliveries to all the 323 retail and catering outlets, pubs and restaurants within the airport. Retailers deliver inbound goods to the facility, where DHL cross-docks merchandise, manages a booking system and security screening process and delivers to both landside and airside stores. By consolidating 700 in-bound deliveries a week into 300 outbound, the centre achieves significant environmental and operational benefits. In 2008, a total of 218,000km were saved from the consolidated deliveries on the DHL fleet, including an electric vehicle, which amounted to 158 tonnes fewer carbon emissions and a significant reduction in congestion.
			16km (round trip to Terminals 1 – 4)		
East Midlands Airport	DHL Exel	East Midlands Airport	Unknown	2009	This consolidation centre has only recently opened along similar lines to Manchester Airport. Further information is not available at this point.
Regent Street, London	Clipper Logistics	Regent Street, London (Crown Estate property)		2009	Has proved difficult to recruit participants in this area due to the proximity of Regent Street stores to other stores within the same retail group that are currently serviced by the same vehicles. i.e. target area is too restrictive for retailers to consider changing distribution arrangements and benefits would not accrue as existing delivery schedules would need to be maintained.

**Table 2 European operational retail freight consolidation centres (Browne et al, 2005)**

Location/Country	Operator	Target Servicing Area	Distance to Target Servicing Area (km)	Start	Lessons Learnt/ Other Information
Clermont-Ferrand, France	Co-operative between 17 freight transport operators to form the Clean Deliveries in Clermont Ferrand association		Close to City Centre	Autumn 2007	The association of operators who run the centre received public funding for a number of years initially, with the aim of the centre to be self sufficient by the 4th year of operation. The deliveries from the centre are made by natural gas and bio-fuelled delivery vehicles.
Padova, Italy (known as CityPorto Padova)	Logistic Division of Interporto di Padova	Padova City Centre	6	2004	Similarly to Clermont-Ferrand, the centre was originally set up through public grants, with the aim for the centre to be self sustaining by the end on 2008. The centre has been successful in reducing the number of vehicle trips, pollutants and the average distance per delivery round. The deliveries from the centre are made using a fleet of Liquid Natural Gas delivery vehicles.
Ferrara, Italy (also known as EcoPorto)	CoopSer	Ferrara	2	2002	The consolidation centre was funded as private commercial venture, and 15 transport operators use the centre for deliveries. Use of the centre is voluntary for businesses and deliveries from the centre are carried out using 50 methane powered delivery vehicles. Delivery restrictions in Ferrara allow longer access times for environmentally friendly delivery vehicles, and reduced entry tariffs.
Siena, Italy	Urban Logistics Company	Siena	Just Outside the City Walls	2002	The consolidation centres were both funded through the EU ALIFE project. It is not compulsory for businesses to use the centre but the centre is used by Transport Operators who chose not to enter the Limited Traffic Zone. Within this zone, goods vehicles can only access at specific times in the morning and afternoon. Deliveries from the centre are made by natural gas and electric delivery vehicles, which similarly to Ferrara, are exempt from time restrictions.
La Rochelle, France	Transport Genty	La Rochelle City Centre	1	2001	The consolidation centre operator costs were initially provided by the EU ELCIDIS project, with the city also providing a subsidy in 2002. It is unknown as to whether the subsidy is currently in place. Whilst the scheme is voluntary for businesses, the access restrictions prevent deliveries by trucks over 3.5 tonnes, except between 06:00 and 07:30. Similarly to other European centre, deliveries from the centre are made

Location/Country	Operator	Target Servicing Area	Distance to Target Servicing Area (km)	Start	Lessons Learnt/ Other Information
					by electric vehicles.
Regensburg, Germany (also known as the Reglog scheme)	Unknown	Regensburg	Unknown	1998	The consolidation centre was established to address the difficulties in making deliveries in the 1km <sup>2</sup> historic centre of Regensburg. Originally, the scheme was devised by BMW before being passed to Regensburg GVZ (multi modal site operator) in 2000. Use of the centre for businesses is voluntary and 6 forwarding businesses were involved as of 2005. The decision was taken not to include parcel companies because there is already a high existing level of consolidation already.
Amsterdam, The Netherlands	Unknown	Amsterdam	Various	1996	This project was funded by Chamber of Commerce and municipality with 9 logistics centres operating around the periphery of Amsterdam. Vehicles not meeting certain criteria, including being at least 80% loaded for delivery or collections are directed to the centre.
Kassel, Germany	Neutral Operator appointed by a co-operative of forwarding companies.	Kassel Central Business District	Unknown	1994	The Kassel consolidation centre was set up to serve the CBD of the city, with forwarding companies who were responsible for 3% of retail deliveries voluntarily channelling their deliveries through the centre. However, the transport cost savings resulting from the consolidation were less than the additional handling costs making the economics marginal. In addition, large retailers and parcel carriers were reluctant to participate for competition reasons and wanting to protect their own logistics operations.

The above table does not include extensive retail freight consolidation centres operated in Germany under the City Logistik Scheme, which was established in 1995 in 20 cities including Aachen, Bremen, Cologne, Dusseldorf, Essen, Frankfurt, Kassel, Nuremburg and Stuttgart. The scheme set out to establish co-operation amongst transport, logistics, forwarding and spedition companies to consolidate their retail suppliers and have them delivered by a neutral carrier into urban areas (Browne, M et al, 2005). Recent information suggested that almost all of these have now ceased to operate due to financial pressures.



**Table 3 Recent Freight Consolidation Centre Research Studies**

<b>Date</b>	<b>Organisation</b>	<b>Actions and findings</b>
February 2010	Newcastle City Council	A tender was granted to WSP, who were commissioned to undertake a feasibility study for a freight consolidation centre for Eldon Square Shopping Centre, which is currently being re-developed. The study has been part funded by Capital Shopping Centre and was published in late 2009. The findings from the study are not publicly available at this time. (Tyne and Wear FQP, 2010).
December 2007	The City of Fano, Italy	The Università degli Studi di Roma Tre carried out a stated preference survey in the Italian City of Fano in the summer of 2006. Approximately 86 businesses were surveyed within the Limited Traffic Zone (LTZ), with 6 transport Operators also being surveyed. The LTZ is subject to a year long access restriction with some vehicles only available between 16:30 and 19:00 subject to permits being applied for and granted. The conclusions of the study were that if the costings were based on a charge of 3 Euros per delivery and a 2 day consignment time, “a UFCC would attract a share of 13% share of goods deliveries to the city centre.” In addition, the paper also commented the introduction of more stringent traffic regulations could increase such share to 25 – 27%, and if the service was provided at zero cost via full public subsidy, this would raise the share to 29%. Joint implementation of various policies might further increase that share up to 50% (Marcucci, E, et al, 2007).”
October 2009	Birmingham City Council	Birmingham City Council have been investigating the idea of a freight consolidation centre since the early 1990’s, with a proposal for a Feasibility Study to “Define the Commercial Opportunities for Collaborative Urban Distribution Centre(s) in Birmingham” published in 1993 by the Centre for Exploitation of Science and Technology <sup>32</sup> . Since then, Birmingham City Council commissioned WS Atkins in September 2007 to undertake a Feasibility Study into an Urban Freight Consolidation Centre (UFCC) to serve Birmingham city centre, which was completed by the Autumn 2008. Following this, Birmingham City Council are currently seeking approval to develop a Full Business Case to proceed with the project. (Birmingham City Council)
December 2009	Strathclyde Partnership for Transport	A tender was invited for a feasibility study into a multi-sector, potentially multi-modal consolidation centre for Glasgow City Centre, taking into account potential demand for developments associated with forthcoming Commonwealth Games. The feasibility study was let in February 2008 but proved to be inconclusive due to a lack of successful engagement with stakeholders and a lack of evidence about the ultimate benefits. As a result, the study has been extended for a further consultation phase and is currently on-going. There are currently no project outputs available for public citation. (SPT, 2010)
Summer 2008	Southampton City Council	Southampton City Council investigated the setting up of an urban freight consolidation in 2007 and 2008. However, after research into the concept and operational centres, the Council decided that a freight consolidation scheme would not be feasible for Southampton (Southampton City Council, 2008).
February 2010	Bath and North East Somerset Council	Bath and North East Somerset Council received £3.14 million in EU funding, as part of CIVITAS Plus project in June 2008 to improve transport in Bath, and part of this has been earmarked for the joint operation of a pilot transshipment depot, with Bristol City Council. Initial survey work started in early 2009 and joint procurement began in Autumn 2009. However after complications with the tendering process, the procurement has been started again in early 2010 an 18

Date	Organisation	Actions and findings
		month trial is expected once a preferred supplier has been selected. (E. Minihane, 2010).
October 2008	Crown Estates	Clipper Logistics were awarded a contract in June 2008, to run a consolidation centre for stores on Bond Street, Oxford Street and Regent Street as part of a 2 year trial. This will be funded via an annual subsidy towards part of the cost, and the awarding of the project has been based upon the premise that it will be operated from an existing Clipper distribution complex at Brimsdown. From Brimsdown, Clipper already delivers into central London mainly working for clothing retail clients. The use of the centre will not be restricted to retail stores, but will include restaurants and also other businesses, the latter being likely to be the focus of a study into servicing requirements funded by TfL. Investigations are ongoing into a number of possible electric vehicles for use in central London, which would be beneficial for use on night-time deliveries (Clipper, 2008).
March 2010	DHL Exel	DHL Exel Supply chain has recently bid to operate a freight consolidation centre for a location in the Westminster area. That tender exercise is still being concluded by the client. (DHL Exel)
December 2008	Norfolk County Council	<p>The funding for the Norwich consolidation centre from the European Commission finished at the end of January 2009, but Norfolk County Council agreed to provide an undisclosed level of co-financing for the following 12 months in order to test how the scheme can develop. Priority use of bus lanes by consolidation centre vehicles are now in operation after fears over cycle safety had been overcome. There are also plans by the Council to extend delivery restrictions in the city centre from the current 10am – 5pm to 8am – 6pm, except for consolidation centre vehicles. The aim of this is remove trucks from the peak traffic periods in the city (Norfolk County Council, 2008).</p> <p>Following consultation with the Development Manager for the centre, the uptake amongst businesses has been poor and the economic downturn has led to a reduction in the number of retailers using the NFCC – of the 4 companies who had signed up to use the centre, 1 has gone into administration and another no longer has a store in Norfolk. As a result of the poor level of uptake, the Centre is being marketed to non-retailers but this has also had limited success, partly because there is a lack of compulsion to use the centre (Mayes, G, 2008).</p>
Feb 2009	Italian City of Lucca, Tuscany	In 2008, the Italian city of Lucca received funding from the EU LIFE project to develop a model for a more environmentally friendly goods-distribution process. This has been successfully implemented with a goods transport hub in operation outside of the city centre area where delivery vehicles (typically diesel) deliver to. These are then transferred to electric delivery vehicles to be delivered to the city centre. Goods which need to leave the city centre are brought out to the consolidation centre on the return leg. The centre and hub have led to a reduction by 48-85% of the number of polluting vehicles with large reductions in the emissions of the most harmful pollutants and noise (EU LIFE, 2009).
2009	London Borough of Camden, on behalf of the Clear Zones Partnership	The reason for studying the application of a retail freight consolidation centre in the specific context of the Covent Garden area is that previous studies and appraisals of established consolidation centres have suggested many potential benefits to these schemes. Observations and interviews suggested that there is considerable conflict between private vehicles and commercial vehicles in the study area. However, consultation with retailers and those involved in goods distribution to the area suggest that it is being achieved to the point that retail premises are able to function,

Date	Organisation	Actions and findings
		although this appears to be at a risk in terms of illegal operation, and to the detriment of the local population and environment. The client will need to make a strategic decision about whether or not to become the driving force behind bringing a freight consolidation centre into existence or possibly linking up with other local initiatives.



## Appendix B

### Introductory Retailer Flyer

## Perth & Dundee Retail Freight Consolidation Centre Feasibility Study

Tayside and Central Scotland Transport Partnership (TACTRAN) has commissioned a feasibility study into setting up a retail freight consolidation scheme which might include one or more freight consolidation centres to serve Perth and Dundee. The study, supported by Perth and Kinross Council, Dundee City Council, Perth City Centre Management, Dundee City Centre Management, will establish the current situation, the improvements to freight movements by the introduction of a consolidation centre, the impacts which a consolidation centre might have on the area and the most suitable solutions in terms of potential benefits to all stakeholders.



Previous studies of established consolidation centres have confirmed many benefits to these schemes. The main benefits are identified as:

- Reduction in the number of delivery vehicles operating in the area;
- Reduction in emissions that are harmful to health;
- Reduced conflict between vehicles in loading areas and delivery bays;
- Reduced conflict between delivery vehicles and other road users and pedestrians;
- Improved delivery service to retailers; and
- More pedestrian friendly zones and a more pleasant shopping experience.

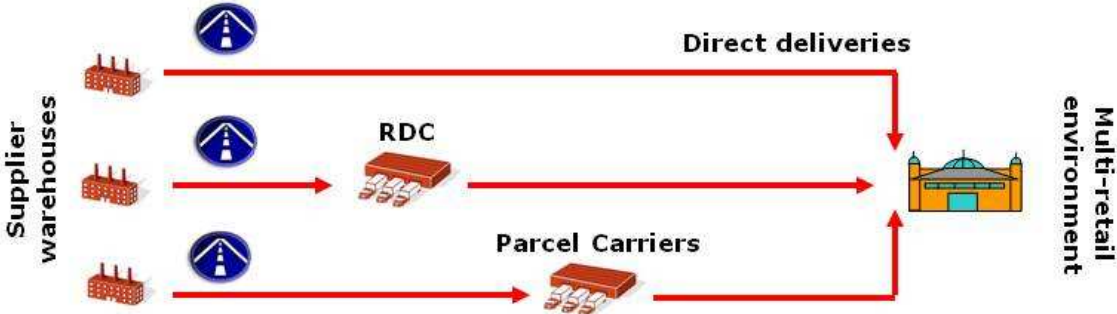
It is envisaged that the scheme can benefit smaller stores, market stalls and independent retailers, together with those larger stores which are not part of supply chains in which deliveries are already highly consolidated at distribution centres for delivery to the Perth and Dundee area.

If you require further information on any aspect of this scheme please contact Gail Cain on 01738 475728 or Tim Hapgood on 0207 536 8074.

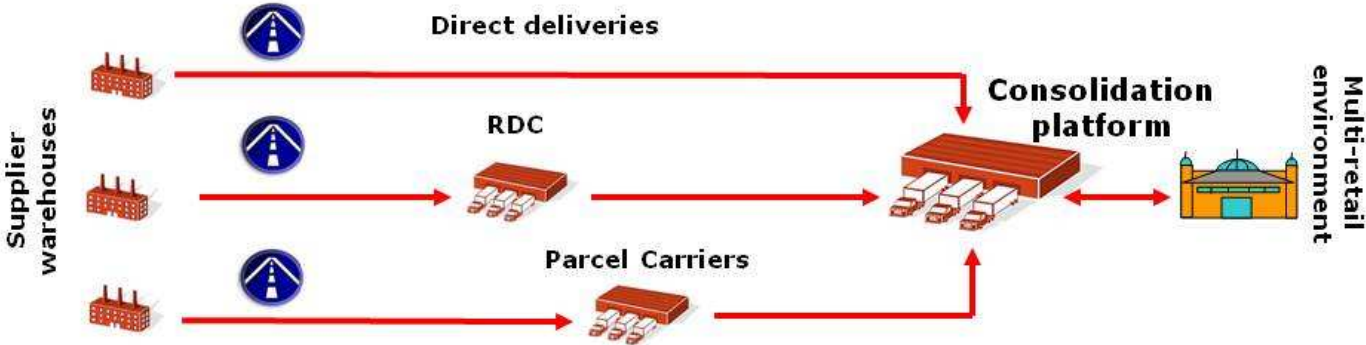


### How a Consolidation Centre Scheme Works

**Before:** Supplier deliveries are made direct into the target area unmanaged, contributing to problems such as congestion, pollution and conflict between road users.



**After:** Supplier deliveries are made to a consolidation centre, where deliveries are grouped onto fewer and fuller dedicated vehicles for onward delivery.



Misconception that consolidation complicates deliveries, when it actually simplifies and improves delivery service.





## Appendix C

### Retailer Survey Form

# Retailer Survey Form

## Section 1: Contact Details

<b>Store / Service Provider / Social Venue</b>	<b>Name</b>	
	<b>Address</b>	
	<b>Post Code</b>	
<b>Type of Shop</b> (i.e. Book, Department) <b>or</b>  <b>Type of Service Provided</b> (i.e. Hairdressing, Banking) <b>or</b>  <b>Type of Social Venue</b> (i.e. Pub, Restaurant, Cinema) Please be as detailed as possible.		

<b>Contact Person</b>	
<b>Job Title</b>	
<b>Direct Telephone Number (and Email Address where possible)</b>	

## Section 2: Suitability Questions

### Question 1

Do the delivery vehicles delivering to your premises also carry goods for other premises?	
Yes	No

### Question 2

How are the goods packed? (Tick all that apply)				
Loose Boxes	Pallets	Roll Cages	Hanging Rails	Other

### Question 3

Approximately how many deliveries do you receive per week?	
--	--

### Section 3: Organisation of Your Delivery System

#### Question 1

<b>Who is responsible for how your deliveries are organised?</b>				
Your Suppliers	You or an Employee	Arranged through Head Office	Distribution Centre	Other (including a mix of the other options)
If 'Other' please give details. Try to get contact details for all options if possible:				

#### Question 2

<b>Who is responsible for sorting out inconsistencies in deliveries when they occur? For Example an inconsistency could be Damaged/Missing Goods or Paperwork Discrepancies.</b>				
Your Suppliers	You or an Employee	Arranged through Head Office	Distribution Centre	Other (including a mix of the other options)
If 'Other' please give details. Try to get contact details for all options if possible:				

#### Question 3

<b>In general are your deliveries made to a regular schedule?</b>		
Completely- regular schedule	Mixture	Totally ad hoc basis
If 'Mixture' or 'Ad Hoc' please give details, commenting on any variations between suppliers:		

**Question 4**

<b>What is the location of your delivery area and what special features does it have?</b>				
Own Designated Delivery Bay with Dock Leveller	Shared Delivery Bay with Dock Leveller	Through the customer entrance (i.e. on-street) No unloading platform, vehicle tail lift used.	Off Street at rear of premises. No unloading platform, vehicle tail lift used.	Other
Please give details:				
<ul style="list-style-type: none"> <li>• Please get detailed description</li> <li>• Please indicate clearly whether the vehicle is able to park up so that it is not causing an obstruction.</li> </ul>				

**Question 5**

<b>How long on average do deliveries take at your premises?</b>			
5 minutes or less	6 to 15 minutes	16 to 30 minutes	31 minutes or more

**Question 6**

<b>Do vehicles making deliveries to your premises suffer any access problems?</b>	
<b>a. Being blocked by other vehicles?</b>	
Yes -	No -
<b>b. Insufficient turning space?</b>	
Yes -	No -
<b>c. Unavailability of unloading space?</b>	
Yes -	No -
<b>d. Any other access problems?</b>	
Yes -	No -
If 'Yes' please give details:	

**Question 7**

<b>Where does the delivery driver deliver to?</b>				
Service Area	Loading Bay	Sales Floor	Stock Room	Other
Please give details:				

**Question 8**

**Do you receive any goods that require special handling?**

Please give details:

**a. Do you receive any goods that require dangerous goods handling and certification? For example Gas Canisters or Chemicals**

Yes -

No -

If 'Yes' please give details:

**b. Do you receive goods that must be handled and stored in non-ambient temperatures?**

Yes - chilled

Yes - frozen

No

If 'Yes' please give details:

**c. Do you receive goods that are classified as Fragile / Delicate and receive special handling as such?**

Yes -

No -

If 'Yes' please give details:

**d. Do you receive goods that require specialised handling systems? For example hanging clothing or kegs.**

Yes -

No -

If 'Yes' please give details:

**e. Do you receive any other type of goods that require special handling?**

Yes -

No -

If 'Yes' please give details:



**Section 4: Delivery of goods received in a typical week.**

If you receive a delivery from the same supplier multiple times per week please fill in one line for each delivery.

Day of the Week	Delivery Window	Penalty for untimely delivery (Y/N)	Origin of Delivery e.g.: Own Warehouse, Suppliers' Warehouse etc.  <i>Capture Location &amp; type</i>	Handling Unit  e.g. Pallet, Roll Cage, Clothes Rack, Boxes, Loose, thermotainers. etc or mixture	Average size of delivery in Handling Units	Peak size of delivery in handling units.  <i>Give details weeks or months where peak occurs and if there a change of vehicle to cover these peaks</i>	Vehicle Type				Does the delivery vehicle have a tail lift?		Does the delivery vehicle have goods for premises other than yours?	
							Artic' Truck	Rigid Truck	Van	Other (specify)	Yes	No	Yes	No
Mon	0600 - 0700	No	Name of Example Supplier & location	Roll Cages	8	18 roll cages (Wk 47-52 and wk 28-32) Vehicle goes from van to 3.5t.		X			Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No

Mon	0600 - 0700	No	Name of Example Supplier & location	Roll Cages	8	18 roll cages (Wk 47-52 and wk 28-32) Vehicle goes from van to 3.5t.		X			Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No
											Yes	No	Yes	No



**Section 4: Delivery of goods received in a typical week. Only use this form if you unable to get inform to complete the more detailed option.**

Regular Deliveries	Number per day							Vehicle type(s)
	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	
Own Vehicle								
Supplier's Vehicle								
Supplier's Contract								
Parcel / Courier								

Ad-hoc Deliveries	Typical Number per day							Vehicle type(s)
	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	
Own Vehicle								
Supplier's Vehicle								
Supplier's Contract								
Parcel / Courier								

Additional Comments or Notes



## Appendix D

### Delivery Unit Types

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Job No	Report No	Issue no	Report Name
STH 1175	1	1	Tactran Freight Consolidation Feasibility Study

# Delivery Unit Types

Delivery Unit	Picture	
Loose boxes		
Plastic totes		
Pallets		
Roll Cages		
Hanging rail		

## Appendix E

### Optimism Bias Table

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Job No	Report No	Issue no	Report Name
STH 1175	1	1	Tactran Freight Consolidation Feasibility Study

# Optimism Bias Table

MMD Optimism Bias Estimator: Civil Engineering Projects																	
<input type="checkbox"/> Standard Civil Engineering <input checked="" type="checkbox"/> Non Standard Civil Engineering <input type="checkbox"/> Both Standard & Non-Standard																	
Upper Bound Optimism Bias		<table border="1"> <tr> <th colspan="2">Non-Standard Civil Engineering</th> </tr> <tr> <td>25</td> <td>66</td> </tr> </table>		Non-Standard Civil Engineering		25	66	<table border="1"> <tr> <th colspan="2">Standard Civil Engineering</th> </tr> <tr> <td>20</td> <td>44</td> </tr> </table>		Standard Civil Engineering		20	44				
Non-Standard Civil Engineering																	
25	66																
Standard Civil Engineering																	
20	44																
Freight Consolidation Centre		<table border="1"> <tr> <th>Works Duration</th> <th>Capital Expture</th> </tr> <tr> <td></td> <td></td> </tr> </table>		Works Duration	Capital Expture			<table border="1"> <tr> <th>Works Duration</th> <th>Capital Expture</th> </tr> <tr> <td></td> <td></td> </tr> </table>		Works Duration	Capital Expture						
Works Duration	Capital Expture																
Works Duration	Capital Expture																
Risk Area Contribution		Non-Standard Civil En'g		Standard Civil Engineering													
<p><i>Procurement</i></p> <p><b>Mitigation of OB *</b></p> <input checked="" type="checkbox"/> Complexity of Contract Structure <span style="float:right">50%</span> <input checked="" type="checkbox"/> Late Contractor Involvement in Design <span style="float:right">100%</span> <input checked="" type="checkbox"/> Poor Contractor Capabilities <span style="float:right">100%</span> <input checked="" type="checkbox"/> Government Guidelines <span style="float:right">100%</span> <input checked="" type="checkbox"/> Dispute & Claims Occurred <span style="float:right">100%</span> <input checked="" type="checkbox"/> Information Management <span style="float:right">100%</span> <input type="checkbox"/> Other <span style="float:right"></span>																	
<p><i>Project Specific</i></p> <input checked="" type="checkbox"/> Design Complexity <span style="float:right">75%</span> <input checked="" type="checkbox"/> Degree of Innovation <span style="float:right">75%</span> <input checked="" type="checkbox"/> Environmental Impact <span style="float:right">0%</span> <input type="checkbox"/> Other <span style="float:right"></span>																	
<p><i>Client Specification</i></p> <input checked="" type="checkbox"/> Inadequacy of the Business Case <span style="float:right">75%</span> <input checked="" type="checkbox"/> Large No. of Stakeholders <span style="float:right">0%</span> <input checked="" type="checkbox"/> Funding Availability <span style="float:right">100%</span> <input checked="" type="checkbox"/> Project Management Team <span style="float:right">100%</span> <input checked="" type="checkbox"/> Poor Project Intelligence <span style="float:right">100%</span> <input type="checkbox"/> Other <span style="float:right"></span>																	
<p><i>Environment</i></p> <input checked="" type="checkbox"/> Public Relations <span style="float:right">100%</span> <input checked="" type="checkbox"/> Site Characteristics <span style="float:right">100%</span> <input checked="" type="checkbox"/> Permits / Consents / Approvals <span style="float:right">50%</span> <input type="checkbox"/> Other <span style="float:right"></span>																	
<p><i>External Influences</i></p> <input checked="" type="checkbox"/> Political <span style="float:right">100%</span> <input checked="" type="checkbox"/> Economic <span style="float:right">50%</span> <input checked="" type="checkbox"/> Legislation / Regulations <span style="float:right">100%</span> <input checked="" type="checkbox"/> Technology <span style="float:right">75%</span> <input type="checkbox"/> Other <span style="float:right"></span>																	
		<table border="1"> <tr> <th colspan="2">Non-Standard Civil En'g</th> </tr> <tr> <td>Duration</td> <td>Capex</td> </tr> <tr> <td>5%</td> <td>14%</td> </tr> </table>		Non-Standard Civil En'g		Duration	Capex	5%	14%	<table border="1"> <tr> <th colspan="2">Standard Civil En'g</th> </tr> <tr> <td>Duration</td> <td>Capex</td> </tr> <tr> <td></td> <td></td> </tr> </table>		Standard Civil En'g		Duration	Capex		
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\* At 100% the OB has been fully Mitigated, at 0%, or if unselected, all OB remains Unmitigated