CONSULTANCY SERVICES FOR THE DEVELOPMENT OF A SUSTAINABLE URBAN MOBILITY PLAN (SUMP) FOR THE GREATER URBAN AREA OF THE CITY OF LIMASSOL

FINAL SUMP REPORT

Karlsruhe, 13.06.2019

The project is co-financed by the Cohesion Fund of the European Union and the Republic of Cyprus
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Client:

Republic of Cyprus
Public Works Department, Ministry of Transport, Communication and Works

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In partnership with:
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TREDIT SA - Greece
ALA Planning Partnership - Cyprus

Karlsruhe, 13.06.2019

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<tbody>
<tr>
<td>ANPR</td>
<td>Automatic Number Plate Recognition Cameras</td>
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<td>AVL</td>
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<th>Short title</th>
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1 Introduction

The government of CYPRUS has taken up the idea of Sustainable Urban Mobility Plans (SUMP) and is going to undertake SUMPs for all urban agglomerations in CYPRUS. The situation in the country is generally characterised by a remarkably high use of cars, at the heavy expense of other more environmentally friendly modes of transport, and the subsequent numerous negative externalities that are caused by this great imbalance. This state of things also strongly characterizes the current transport system of the city of Limassol and is thus in urgent need for appropriate remediation and restructuring. The purpose of this project is to develop and provide a Sustainable Urban Mobility Plan for Limassol, on the basis of the internationally adopted SUMP principles, which have been and are being successfully applied in several European cities over the past few years. The Sustainable Urban Mobility Plan, in contrast to other past traditional transport master plan approaches, institutionalises both methodological and social aspects of transport planning under consideration of the common sense about existing deficiencies of transport systems in urban areas. A strong characteristic of a SUMP concerns the great efforts made and channelled to generate awareness, understanding and consensus amongst all involved/affected parties and in this respect, it seeks to promote the active involvement of citizens and stakeholders in the process of problem analysis, development of objectives and definition of solution options, which will ultimately influence to a great degree the success of the project.

The SUMP for the Limassol area has followed the same set of overall objectives as defined by the EU White Paper on Transport, the SUMP guidelines and the Terms of Reference (ToR):

- **Economic Efficiency**: Improve the efficiency and cost-effectiveness of the transport network in providing for the transportation of persons and goods.
- **Environmental Sustainability**: Minimise emissions and pollutants associated with transport.
- **Accessibility and Social Inclusion**: Ensure all citizens are offered transport options that enable access to key destinations and services.
- **Safety**: Ensure personal safety and security within the transport system.
- **Quality of Life**: Contribute to enhancing the attractiveness and quality of the urban environment and urban design for the benefits of citizens, the economy and society as a whole.

The project “Consultancy Services for the Development of a Sustainable Urban Mobility Plan (SUMP) for the Greater Urban Area of the City of Limassol” was commissioned by the Public Works Department of the Ministry of Transport of Cyprus co-financed by the EU Structural Fund – The Operational Programme Competitiveness and Sustainable Development 2014-2020. The project officially started on 13 March 2017 and was successfully concluded on 13 June 2019. The consortium that carried out the consulting services consisted of:

- PTV Transport Consult GmbH, Karlsruhe Germany
- PTV Planung Transport Verkehr AG, Karlsruhe, Germany
- TREDIT SA, Thessaloniki, Greece
- ALA Planning Partnership, Nicosia, Cyprus

The Scope of this report – the Final SUMP Report – is the summarising description of the whole process of development of the Sustainable Urban Mobility Plan; the analysis of current situation in terms of mobility and mobility impacts; the Projections of future development (socio-demographic, economic, spatial); the Derivation of current and future deficiencies and problems (according to objectives); Development of consistent solution strategies (under the framework of defined objectives and desired achievements); Derivation and definition of measures and projects (under the criteria of economic efficiency and environmental goals) in all fields of transport including, institutional and organizational ones; the Choice of measures and projects (based on assessment and appraisal).
1.1 Area of intervention

The Limassol SUMP project started on 13/03/2017 and was concluded on 13/06/2019, a total of 27 months. The Study Area included six municipalities and eleven communities (as shown in Table 1) that together make up the ‘greater’ urban area of Limassol. This Study Area covers a total area of 222.5 sq.km and has a population of around 205,000. Figure 1 is a map illustrating the Study Area, while Figure 2 displays the Limassol city centre area.

<table>
<thead>
<tr>
<th>Municipalities</th>
<th>Communities</th>
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<tbody>
<tr>
<td>• Municipality of Limassol</td>
<td>• Pano Polemidia</td>
<td>• Pyrgos</td>
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<tr>
<td>• Municipality of Mesa Yitonia</td>
<td>• Palodeia</td>
<td>• Tserkezois</td>
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<td>• Municipality of Kato Polemidia</td>
<td>• Mouttagiaka</td>
<td>• Trachoni</td>
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<td>• Municipality of Agios Athanasios</td>
<td>• Agios Tychonas</td>
<td>• Kolossi</td>
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<td>• Municipality of Yermasoyia</td>
<td>• Parekklisia</td>
<td>• Erimi</td>
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<td>• Municipality of Ypsonas</td>
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Table 1: The components of the study area

Figure 1: Map of the study area

Figure 2: The Limassol city centre
1.2 The SUMP stakeholder engagement groups

Three different categories of project committees were formulated, which are aligned with the three levels of participation: the Project Steering Committee, the Key Stakeholder Committee and the wider stakeholder group. Each one of the stakeholders was allocated to the three different categories of project committees as shown in Table 2 below. Each category has fully involved in the SUMP study implementation process having their specific contribution and influence in the step-by-step decisions.

<table>
<thead>
<tr>
<th>Project Steering Committee (PSC - 6 members)</th>
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<tbody>
<tr>
<td>• Ministry of Transport, Communications and Works (1)</td>
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<td>• Department of Public Works (2)</td>
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<td>• Department of Town Planning and Housing (1)</td>
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<td>• Directorate of Control, Ministry of Transport, Communications and Works (1)</td>
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<tr>
<td>• Municipality of Limassol (1)</td>
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<tr>
<th>Key Stakeholders Committee (KSC – 19 members)</th>
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<tr>
<td>• Municipality of Kato Polemidia</td>
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<td>• Municipality of Mesa Yitonia</td>
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<td>• Municipality of Agios Athanasios</td>
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<td>• Municipality of Yermasoyia</td>
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<tr>
<td>• Municipality of Ypsonas</td>
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<tr>
<td>• 11 Communities within the Study Area (2 representatives)</td>
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<tr>
<td>• Cyprus Police</td>
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<tr>
<td>• Cyprus University of Technology (ΤΕΠΑΚ)</td>
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<tr>
<td>• Department of Environment</td>
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<tr>
<td>• Ministry of Education and Culture</td>
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<tr>
<td>• Deputy Ministry of Tourism</td>
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<tr>
<td>• The Planning Board of Cyprus</td>
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<tr>
<td>• District Administration of Limassol</td>
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<tr>
<td>• Scientific and Technical Chamber of Cyprus (ΕΤΕΚ).</td>
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<tr>
<td>• Limassol Chamber of Commerce and Industry (ΕΒΕΛ)</td>
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<tr>
<td>• CyPOVEK (Cyprus Confederation of Professional Craftsmen and Shop-keepers) (ΠΟΒΕΚ)</td>
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<tr>
<td>• The Limassol Tourism Development and Promotion Company Ltd.</td>
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<td>• PWD District Engineer of Limassol</td>
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<tr>
<th>Wider Stakeholders and Citizens (indicatively referred a number of organizations)</th>
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<tbody>
<tr>
<td>• Presidents of Community Councils (Agiou Tichona, Koloshiou, Moutagiakas, Palodias, Pano Ptolemeidw, Parekliasis, Pirgou, Trachoniou, Asomatou, Tserkez Tsiftlik)</td>
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<tr>
<td>• The Ministry of Health</td>
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<tr>
<td>• The Department of Road Transport (Ministry of Transport, Communications and Works)</td>
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<tr>
<td>• Civil Engineering Department and Geo-Information Technologies (ΠΟΜΗΓΕ-ΤΕΠΑΚ)</td>
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<tr>
<td>• Scientific and Environmental Technology Department (ΤΕΠΑΚ)</td>
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<tr>
<td>• Cyprus Association of Civil Engineers (ΣΠΟΛΜΗΚ)</td>
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<tr>
<td>• Civil Engineering and Architecture Association</td>
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<tr>
<td>• Town Planning Association of Cyprus</td>
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<tr>
<td>• Cyprus Association of disabled people (ΚΥΣΟΑ)</td>
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<td>• Cypriot Organization of paraplegic people</td>
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<td>• Cypriot Organization of blind people</td>
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<td>• Cypriot Organization of deaf people</td>
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<tr>
<td>• Cyprus Cycling Federation</td>
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<td>• Limassol Cycling Club</td>
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<tr>
<td>• Public Transport Operator of Limassol (ΕΜΕΛ)</td>
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<td>• Aelos Travel - Tour services Cyprus</td>
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<td>• Travel &amp; Express</td>
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<tr>
<td>• Panayides P Coaches Ltd</td>
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<tr>
<td>• Petsides Tourist Coaches Ltd</td>
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<td>• Intercity buses of Cyprus</td>
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<td>• Intercity Buses of Cyprus</td>
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<tr>
<td>• The taxi drivers Association</td>
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<tr>
<td>• Port of Limassol</td>
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<tr>
<td>• Association of Cyprus Travel agents (ACTA)</td>
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<td>• Cypriot Association of International Transport</td>
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<tr>
<td>• MY MALL Limassol</td>
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<td>• Limassol marine</td>
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<tr>
<td>• The Department of Labour Inspection</td>
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<tr>
<td>• Cyprus International Institute for Environmental and Public Health</td>
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<tr>
<td>• Federation of Environmental Organisations of Cyprus</td>
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<tr>
<td>• Limassol Committee for Natural Environment</td>
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<tr>
<td>• Friends of the Earth</td>
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<tr>
<td>• School Unions of K. Polemidia, Limassol, Mesa Geitonia</td>
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<tr>
<td>• Kanali 6 Limassol</td>
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<tr>
<td>• Limassol Newspaper</td>
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<td>• Etc.</td>
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Table 2: The Stakeholders involved in the SUMP Limassol process
1.3 Project outcomes (Deliverables)

The whole process of developing the SUMP for Limassol was thoroughly documented in the accompanying deliverables; this Deliverable D14.1 being the summarising and concluding deliverable. The following table (Table 3) shows all the other project deliverables containing more details on the respective working steps and topics that are only described in summary in this report.

<table>
<thead>
<tr>
<th>WP</th>
<th>Working Package Description</th>
<th>Deliverables</th>
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| 1  | Plan stakeholder and citizen development | 1.1: Stakeholders and Citizens Involvement Plan  
|    |                             | 1.2: Website and Social Media Services Implementation |
| 2  | Review of existing relevant studies and data | 2.1: Review of existing land use, transport and re-  
|    |                             | 2.2: Critical Review of Transport Network and Previ-  
|    |                             | 2.3: Transport Modelling Plan |
| 3  | Data gathering collection | 3.1: Survey Datasets  
|    |                             | 3.2: Data Summary Report |
| 4  | Development of the transport model | 4.1: Transport Modelling Report  
|    |                             | 4.2: Transport Models  
|    |                             | 4.3: Model Manual |
| 5  | Analysis of problems and defining objectives | 5.1: Problem Analysis Report |
| 6  | Develop a common vision, set priorities and targets | 6.1: Vision Statement & Targets |
| 7  | Generation of future scenarios | 7.1: Scenario Development Report |
| 8  | Development of scenario models and evaluation | 8.1: Technical Modelling Report with Scenario Evaluation  
|    |                             | 8.2: Presentation to Stakeholders |
| 9  | Selection and appraisal of preferred scenario | 9.1: Strategic Environmental Impact Assessment  
|    |                             | 9.2: Scenario Appraisal Report (CBA) |
| 10 | Formulation of the SUMP | 10.1: Draft SUMP Report |
| 11 | Preparation of an implementation plan, monitoring and evaluation plan | 11.1: Implementation Plan |
| 12 | Preparation of a promotion and marketing strategy | 12.1: Promotion and Marketing Plan |
| 13 | Model Training Activities | 13.1: Training Activities |
| 14 | Production and adoption of the SUMP | 14.1: Final SUMP Report |

Table 3: The deliverables of the project SUMP Limassol
2 The Necessary Paradigm Change

The transport system of the City of Limassol is characterised by the predominant mode of transport i.e. the car. Hence, the society, the residents of Limassol are car-dependant. This finding is the result of comprehensive surveys, interviews and counts reported in Work Package 3 and of further analyses. The situation in Limassol is not different from other metropolitan areas or cities in Cyprus or the country as a whole. The residents of Cyprus as well as their long-term and short-stay visitors mainly rely on the car as preferred mode of transport.

The car is perceived as the only suitable mode providing flexible mobility, access and freedom to choose destinations, activities and time of travelling. Other modes of transport, namely the non-motorised modes walking and cycling as well as public transport currently have very low shares of the total number of trips: the modal share of trips by car is 91.8%, by bus only 1.8%, leaving 5.7% for walking and 0.7% of trips by cycling. Only captive riders use public transport, i.e. those who do not have access to a private car, walking is predominantly used for very short trips or for accessing the car, cycling does not really play a role in Limassol as in Cyprus as a whole, despite the favourable climatic and topological conditions. The attitudes of residents and visitors are car-oriented, other modes are perceived as less flexible and only for those, who cannot afford an own car and these attitudes and perceptions are of course reflected in the respective mobility behaviour. Everybody, every household will try to have private access to as many cars as possible, car ownership in Limassol as in Cyprus is very high and when available, then the car is used for almost every trip. The resulting car availability per household (H-H) is high, 2.5 cars per H-H as weighted average; indicatively 38%, 20.8% and 8.3% of the interviewed H-H possess 2, 3 and 4 passenger cars respectively. The overall car ownership index is high with 0.58 (i.e. 580 cars per 1,000 residents), almost all H-H dispose of at least one car (more than 95%).

This perception of the car as the preferred mode seems to be deep-seated in the Cypriot society and is already fixed and determined in the young generations, for example students. As soon as these have the possibility to use and get access to a car, also young people do so. For example, cycling does not seem to be an option for students to access their universities or schools as it is the case in many other European countries with far less favourable climatic conditions for cycling.

This is the transport behaviour that we face in Limassol that is reflected in the surveys, interviews and counts and which results in numerous issues.

Transport supply, provision of networks and services is similarly unilateral. The road networks in the Limassol metropolitan area are well-developed, reach every corner of the area, allow access by car to all destinations and at most destinations provide easy and cheap car-parking facilities. In case, parking facilities are not sufficient, car drivers park their cars illegally on pedestrian pavements, road shoulders etc., making movement for pedestrians difficult or impossible, certainly making it dangerous. Enforcement of traffic rules, particularly of parking is insufficient and fines etc., making movement for pedestrians at risk and providing discomfort to other road users.

Networks and services of other modes are far less developed and provide a far less comprehensive accessibility of the territory of Limassol’s metropolitan area. This is the case for public transport: the Limassol public transport system consists of buses only, operating on lines across the whole territory of the metropolitan area of Limassol. The general supply with public transport services is reasonable in the central areas of Limassol, most of the central area being covered by the catchment areas of 400m distance to the next bus stop. But already at the outskirts of the city, lines and services become insufficient with major service gaps, distances to next bus stop often at or above 1,000m, low service frequencies and altogether an insufficient spatial access of the territory to public transport. Frequencies are low, only lines 7, 17, 20, 21, 30 and the circle lines offer regular headways; all other lines do not have regular headways. Particularly outside peak hours, services are irregular, are consequently hard to remember for the occasional user and hardly allow for connecting services of different lines without long waiting times.

Service times are also not sufficient, services usually starting at 6:00am but ending too early in the afternoon/evening, between 18:00 and 20:00pm, and as mentioned, frequencies are too low and irregular and therefore not attractive for the non-captive users, i.e. those who have access to a car. Travel times and access times are far longer on public transport compared to the car. The access analysis showed a high level of accessibility of the whole territory by car (LOS A), whereas access by
bus was mainly LOS C, D or E. Only in some limited areas of the city centre could accessibility with LOS of A or B be provided also by public transport.

The result is a very low share of public transport (1.8% of the trips only), the limited number of services provided are mainly running with fewer than 5 passengers. For a Public Transport system to be attractive and to encourage people having access to a private car to use public transport, the services have to be comprehensive, continuous and interconnected, allowing the individual user to travel by public transport on the whole chain of trips of the average day. This very clearly is not the case in Limassol.

Pedestrian facilities are limited. The centre of Limassol’s old town provides some short sections of pedestrianised streets and other sections with sufficiently wide pedestrian pavements. Similarly, in most of the centres of the other municipalities, walking conditions in the very centre, close to the town hall are acceptable. On the major road corridors, in Limassol, most have pedestrian pavements but with a high curb. This is probably intended to prevent car drivers from parking there. Unfortunately, this is not efficient as cars are still parked on these pedestrian facilities, and the high curb makes it difficult for pedestrians to literally climb on the pedestrian pavement, even more so if the pedestrians are mobility impaired. Apart from these central roads, pedestrian facilities are very poor or non-existing, making it difficult or even dangerous to walk in Limassol. One could conclude that apart from the seafront for recreational purposes, pedestrian facilities in Limassol are acceptable only in the immediate centres, allowing car users to walk from a car park to their final destination, but walking is not seen as an option or alternative to the car for any longer distance and pedestrian facilities are not provided for any other sort of walking.

Cycling facilities are limited and scattered in various areas. There are a few cycle lanes along the coastline and through parks, but these cannot be considered as a continuous and comprehensive network and are mainly used for recreational cycling only on these specific sections. Consequently, there are hardly any cyclists using the bike for regular trips on their average day.

Obviously, the non-available or non-adequate infrastructure and services do not encourage other modes of transport than the car. Particularly young but also fewer young children are not allowed to walk or cycle alone to school or to other destinations as is the case in other European countries. This is perceived as being too dangerous, and unfortunately this is right. Traffic in Limassol is dangerous, particularly for children. Consequently, children have to be transported by car by their parents, and these “mama-taxis” contribute even more to dangerous situations, particularly in front of schools and other children’s’ destinations.

Therefore, a transport behaviour learned as child, regularly demonstrated and applied by the parents and all other adults, will influence the child’s perception and obviously also his or her future preferences, attitudes towards the different transport modes and finally, his or her mobility behaviour when grown-up.

This is a vicious circle, the population is relying on the car, is dependent of the car, uses the car wherever possible and reduces all other modes to very little modal shares in the range of a few percent only, e.g. as noted PT accounts for only around 2% of the trips. Other modes are marginalised in Limassol. The road space, the public urban space is not used by people but is perceived as being only destined for motorised vehicles. This is clearly different to many other European cities and the shares of the alternative modes are unreasonable and very low if compared to other cities of similar size in other European countries. The provided PT services are running more or less empty; hence authorities and operators do not see a need to improve service times, frequencies, quality of service, which in turn results in PT remaining as unattractive as it is today and consequently hardly attracting more passengers in the future. Similarly, walking and cycling: the population is not very enthusiastic about walking or cycling longer distances than from the car park to the door, the provided infrastructure also does not encourage to walk and cycle, the lack of safe infrastructure, the abandonment of sidewalks, the misuse of pedestrian facilities by parked vehicles, the lack of enforcement of traffic rules etc. all lead to less attractiveness of walking and cycling. The criticality for young people, for children has already been mentioned.

In addition, this vicious circle is nurtured by the public administration and local politics ever encouraging more use of the car, providing more capacities for moving and parking cars also in the sensible city centre and along the scenic coastline. Issues of car traffic affecting car traffic itself, like congestion in the city centre, or parking demand exceeding available parking facilities is only responded by wanting to provide still more car parking facilities in the centre, along the coastline and...
by wanting to expulse public transport even further out of the centre. It is quite obvious that this is not a solution but contributes further to the vicious circle of more car traffic in sensible areas, fewer trips attracted to other modes. It has been recognised all around the World, that “you cannot build your way out of congestion”. The solution can only be to limit car traffic, to provide more and more attractive alternatives to the car, to encourage residents and visitors to change their behaviour. But this has to start with the public servants, with decision makers and politicians, with their respective attitudes and behaviour.

Both, the attitudes, perception and the resulting mobility behaviour on one hand and the supply of network and services for the non-car modes on the other hand, are quite in contrast to the conditions and the development of many other comparable cities in other European Countries. Particularly the young generation in the more Northern countries has started adapting behaviour, relying less on the car, not owning cars any more but having multi-modal mobility patterns, walking, cycling, using public transport and using flexible access to cars if this is necessary through car-sharing, ride pooling, ride on demand etc. This seems to be an unknown trend in Limassol, but it has to come also to Limassol, for the city to remain attractive for residents and visitors and for the region to become sustainable.

Of course, today’s car dependency in Limassol results in numerous problems and criticalities need to be properly addressed, that can be categorised in the main fields of:

- **Road safety:** the number of accidents caused by motorised vehicles, the high number of accidents, the high number of fatalities and seriously injured (e.g. 17 deaths among which 8 pedestrians and 3 motorcyclists and 1 cyclists and around 150 serious injured accidents in 2017), the large number of accident accumulation zones along major corridors and at major junctions around the city centre is one side of the coin. The perceived lack of safety, the danger caused by traffic is the other side. These two aspects of road safety have impacts on the behaviour, reducing the freedom to move for children, discouraging adults and children from using bicycles for daily activities and making walking a rather unpleasant experience.

- **Accessibility:** accessibility means the possibility of all groups of the population to participate in social life, to be able to reach destinations, to be able to go to work, school, education sites, to reach shopping facilities, leisure facilities and to meet with friends, family, and acquaintances. In Limassol, accessibility is good for those with access to a private car. Accessibility in Limassol is limited for those with no direct access to the car: larger supermarkets at the outskirts, only accessible by car at the detriment of the smaller local shops, where everybody can walk to, offices and work places moving to remote areas not served by public transport etc. Of course, as a result of this, most households dispose of private cars and household members use it for each and every trip. However, there is a part of the population without direct access, the younger than 18, the older who cannot drive anymore, the unable or simply those who cannot afford a car or another car in the household. Accessibility for those social groups is difficult and becomes more and more difficult, they are excluded from social life, public transport services are rather being reduced than improved, local shopping facilities disappearing, walking and cycling being dangerous.

- **Quality of life:** quality of life consists of numerous aspects, economic wealth, safety and security, public urban space for people to use, to linger, to sit and talk, clean air, lack of unnecessary noise, pleasant environment without visual intrusion from exorbitant road infrastructure or a vast quantity of parked cars along both sides of all roads and streets, no impediments or barriers for free movement of people etc. In Limassol, today many of these components of quality of life for Limassol’s residents and its visitors are being impeded by excessive car traffic, road safety, and availability of public urban space for people, clean air and lack of noise are out at danger by moving and by parked vehicles in every corner of the city.

- **Environmental sustainability:** Sustainability has three components, environmental, social and economic sustainability. The environmental sustainability is mainly related to the natural environment, the emission of greenhouse gases (mainly CO2), the emission of pollutants, the emission of noise, energy consumption and the use of non-renewable resources (mainly fossil fuels). Cyprus has commitments towards the European Union to reduce the CO2 emissions by 24% by the year 2030 compared to 2005 levels. In Limassol, environmental sustainability is clearly put at danger by the uncontrolled and massive motorised traffic, the enormous fleet of cars compared to the number of residents and the age and quality of engines. CO2 emissions from transport grow and do not diminish. On top of this, the current transport system of Limassol also limits the social environment (see above) and the built environment in the city.
Economic efficiency: Economic efficiency on one hand relates to the costs and economic efforts necessary for the social processes to be carried out, like people engaging in different activities over the day (education, work, shopping, leisure), distribution of goods to the residents and visitors, administrative processes etc. On the other hand, economic efficiency relates to how the current system allows for economic development, for growth and increase of wealth for the city and for all groups of the population. For the former, the necessary costs are comparatively high, as individual mobility is mainly provided by private individual vehicles, normally carrying only one passenger, losing time in congestion and in the search of parking facilities. For the latter, the potential economic development of Limassol is limited as capacity for the private motorised transport has been reached and capacities cannot easily be expanded further; the city risks to lose its attractiveness for further economic development through settlement of new companies and through attracting more tourists and visitors. Companies need good access to their premises for employees and customers, which in Limassol is limited as only the car can be used for access. Tourists are seeking clean air, an unnoisy environment and unhindered access to the attractions, mainly the seaside. This is currently not on offer in Limassol.

Innovation: Innovation in transport is the development of new services and supply and the related change of demand, like car sharing, bike sharing, Mobility as a Service, car-pooling, electric vehicles, autonomous driving to name just a few that are currently evolving all around the world. Limassol has nothing of that, no car-sharing, no relevant charging infrastructure for electric vehicles, no shared space.

All these issues and problems can already be experienced in Limassol today. If nothing will be changed, then these issues will aggravate and will become worse, accidents and lack of safety, congestion, time lost, emission of pollutants, noise etc., as the population will increase, mobility will increase, but the space for traffic is limited.

The outputs of the traffic model for 2030 show that if related policies focused only on road network development then the traffic conditions will become worse i.e. delays, vehicle kilometres and vehicle hours in the whole study area will be increased by 44%, 18% and 25%, respectively, with serious impacts on safety, environment (noise and pollution) and the quality of life in the city.

Change is necessary. But it is not some individual measures here and there, some strategies of curing the disease. It has to be a complete change of paradigm, a comprehensive and fundamental change, starting with local politicians, public administrations and public servants, starting to change priorities in transport development and resulting in changing the attitudes, the perception and the travel behaviour of Limassol’s residents and visitors.

What is necessary is an integrated urban mobility plan, taking all influencing factors of mobility into consideration, land-use development, economic development, development of awareness, attitudes, acceptance of sustainability issues and actions, personal and individual actions, i.e. changing of one’s own mobility behaviour. Many of the latter points are related to marketing, to promotion of a sustainable way of moving and behaving. But a lot is related to providing the alternatives, physical alternative in form of modal networks and services for public transport, for walking and cycling safely and comfortably.

And this change has to start with decision-makers, planners. They have to act first, adapt their own behaviour and adapt the planning and development routines. Only then can this paradigm change also be accepted by other residents and visitors in Limassol.

Sustainable development in these action areas is complemented by a promotion and marketing strategy, starting with decision-makers, planners, authorities, service providers, other stakeholders and the general public. Strategies and measures for the 10 action areas are described later in sections 5-14 of this report.
3 The Vision

3.1 The Vision of a Sustainable Transport System for Limassol

The Vision has been defined by the Key Stakeholder Committee, taking on board the results of the public consultation events. The decisive meeting of the Key Stakeholder Committee took place on 22 January 2019 whereas the public consultation event took place on 23 January 2019. These interactive discussions were accompanied by online questionnaires (please refer to Deliverable D6.1 “Visions Statement and Targets” for more details).

The overall objective in the development of a Sustainable Urban Mobility Plan (SUMP) for the City and Greater Urban Area of Limassol is the desire and the need to improve mobility and quality of life for the citizens and visitors of Limassol and the region, allowing a future development of the area to be economically, environmentally and socially sustainable.

The development of a SUMP is not a just another traditional planning project, carried out by administration, planning institutions and some experts in setting up a plan. The development of a SUMP is a process, involving administrations, planning institutions but also all other relevant stakeholders, influencing or being affected by the development of the transport system and demand for mobility, operators, services providers, special interest groups and the population itself. The strength of a SUMP is not the plan in itself but is a plan that has been developed in a process involving all stakeholders, is a plan being understood and accepted by all or the majority of stakeholders, is a plan being accepted as their own plan, ownership of the plan being with the stakeholders and not some planning experts. Only if this is the case, will the plan be effective, will it really be implemented by planning institutions, will operations and services really be changed by the operators and service providers, and most importantly, will the general public really have an awareness for the objectives of the plan, acceptance and will the population finally take action, i.e. will residents and visitors change their mobility behaviour in accordance with a sustainable development.

Consequently, in developing the plan, stakeholder and citizen involvement was planned from the beginning of the project and was envisaged to accompany the whole process of SUMP development. Apart from analysing current conditions, setting up analysis and planning tools, the most important basis for the SUMP is the development of a common Vision for the future development of mobility in the City of Limassol and its Greater Urban Area, a Vision of how transport should develop, a Vision of how transport and mobility can contribute to a sustainable future for the area. This Vision is a significant qualitative description for the future the city desires. However, a vision statement is not enough. What needs to be achieved is the definition of specific objectives, which indicate the kind of changes the city needs. These changes must also be measurable, thus the selection of the appropriate objectives in correlation with the respective indicators that focus on selected areas, is deemed necessary.

Both, the Vision itself, but also the more specific objectives were not defined by some experts but were developed by stakeholders and the residents of Limassol. Although the development of vision and objectives was based on the EU White Paper on Transport and the supporting SUMP Guidance, stakeholders and residents were intensively involved in a five-step methodology. Stakeholders and citizens identified current deficiencies and developed requirements for the future of Limassol’s mobility. These expectations can be summarised under the following statements:

1. The city needs a transport system, which will satisfy the increased travel demand
2. Residents and visitors should adopt new behavioural models
3. The city should adopt policies restricting the use of private vehicle
4. The city should adopt a new town planning model for densities’ and land uses’ management or propose solutions for achieving and managing high densities
5. The city should adopt solutions regarding the travel demand for work purposes (daily peaks)
6. The city should acquire an adjustable mobility system, adopting measures for the seasonal peak management
7. The city should adopt a mobility system accessible for specific target groups i.e. the elderly people and people with disabilities
8. The city should focus on the infrastructure of sustainable transport modes
9. The city should focus on the gateways’ management
On one hand, according to stakeholders and citizens of Limassol, the deficiencies of today's transport system in Limassol and its projected future development relate to:

- Accessibility of destinations by the different transport modes and for all groups of the population, including those with no direct access to a private car;
- Emissions of greenhouse gases (CO2), emission of pollutants (NOx, CO, particulates etc.), emission of noise by transport operation;
- Road network performance- the lack thereof leading to congestion, travel time losses, reduced economic efficiency;
- Public Transport Quality and Operation- spatial and temporal service quality, capability to reach all destinations with PT, PT being a real alternative to the car as it has comparative travel time, costs, comfort;
- Road Safety- the absence of accidents, slight and serious injuries and fatalities on the roads of Limassol but also the feeling and perception of safety on Limassol’s road network, allowing people to use the roads also for walking and cycling without fearing of getting killed, including the independence of the younger generation;
- Parking- sufficient parking to allow for those trips still carried out by car to park the vehicle safely and properly without impeding other road users or putting other road users at danger or discomfort other road users or make it impossible to pass, e.g. for wheelchairs, adults with prams or children. This does not mean that more car parks are needed in sensitive areas, but the car parks have to be more adequate. This coupled with strong enforcement will in fact reduce the number of cars that can park in central areas. This includes provision of parking at sensible locations, e.g. at P&R locations at the ring road outside the city centre; and it includes enforcement of the traffic rules to prevent drivers from obstructing others;
- Pedestrian Network Quality- comprehensive network of pedestrian facilities including pedestrian areas, shared space areas, wide and comfortable green and unobstructed pedestrian pavements that can really be used by all groups of the population, including the mobility impaired with generally lower curbs and lowered curbs at access points, pedestrian crossings and junctions; enforcement of vehicle parking; enforcement of correct pedestrian behaviour;
- Bicycle Network Quality- comprehensive and continuous network of safe and comfortable links to reach every part of the Limassol territory by bike, including bicycle only highways (motorised traffic not allowed), bicycle roads (where cars are allowed at low speed), bicycle lanes along all major corridors and reduced and enforced speed limits on all other roads.

On the other hand, Limassol’s SUMP should be guided by the following High-Level Objectives:

- **Road Safety**: the High-Level Objective is to reduce the number of accidents, the severity of accidents and particularly reduce the accidents involving children and the young generation; furthermore, the Vision will be to increase the perception of safety on Limassol’s road network
- **Operative Objectives** are: reduction of major accident locations, the accident black spots, increase the safety measures for the most vulnerable road users, pedestrians and cyclists, particularly on the main destinations of children and the young, i.e. in front of schools and Universities
- **Accessibility and Social Inclusion**: the High-Level Objective is to increase the accessibility of all destinations in the territory of Limassol by other modes than the car, providing comparative travel times, comfort and costs for the whole daily mobility; this includes the development of the public transport system both in time (service times and frequencies), as well as in space (bus stops and hubs in the central areas and at the destinations not just close to them), regular time tables and improved connectivity between different lines, but also services on demand for areas and times of low demand; it includes the development of more and safer pedestrian facilities and a continuous and comprehensive network of safe bicycle routes; equal provision of free and accessible public space for pedestrians, cyclists and motorised vehicles; direct and unobstructed access to major destination for pedestrians, particularly the coastal front.
- **Operative Objectives** are: increase Public Transport service time, introduce services on demand to provide complete PT supply over the day, increase Public Transport spatial network coverage, equal allocation of road space to pedestrians, cyclists and motorised traffic and as a result increase the shares of Public Transport and non-motorised modes
Quality of Life: the High-Level Objective is to reduce the negative impacts and the influence of motorised traffic on the Urban life, by providing more car-free areas (pedestrianisation), areas with low car impact (shared space, traffic calming); better spatial mixing of activities through the provision of destinations like shops, leisure facilities closer to where people live and work in order to reduce trip distances, provision of more public space for non-traffic use like parks and green areas, improvement of the coastal front and the direct access to it by walking and cycling and by public transport; proper monitoring and organisation of public transport operation, enforcement of traffic rules, creation of “environmental zones”

Operative Objectives are: increase infrastructure for sustainable transport modes, reduction of congestion in the city centre, increase of traffic-free public spaces in the city

Environmental Sustainability: the High-Level Objective is to have clean air and acceptable noise levels inside the city, where people live, work and linger, the city of Limassol not contributing to Greenhouse Gas emissions more than the European average, to minimise the energy consumption from transport in Limassol and the use of non-renewable resources

Operative Objectives are: reduction of CO₂ emissions and emission of pollutants, reduction of noise levels, increase of the number of electric vehicles and non-motorised modes

Economic Efficiency: the High-Level Objective is to provide access to all destinations in Limassol without unnecessary time losses through congestion, by providing alternative modes of transport (public transport and non-motorised transport), including work places, shopping and leisure facilities, better integration of economic activities with land-use/ spatial planning

Operative Objectives are: reduced congestions without building more roads, shorter trips

Innovation: the High-Level Objective is for Limassol to become an engine for innovations, like electric vehicles, new innovative forms of transport and mobility

Operative Objectives are: reduction of the share old technology vehicles, increase the share of electric vehicles for private and public transport, increase of car sharing, ride pooling and multi-modal trips through Mobility as a Service; increase the network with smart technology, including e-charging facilities, ITS, infrastructure management and monitoring.

Each of these high-level objectives was associated with a number of qualifying statements. These expectations were further discussed, were ranked by level of importance by the Key Stakeholders, finally identifying the most relevant expectations for the future development of a sustainable transport system in Limassol. Some of the most relevant expectations included:

- Reduction of road accidents
- Reduction of accidents involving pedestrians and cyclists
- Reduction of accidents involving students
- Wider pedestrianisation of the city centre, parking limitations and parking spaces creation
- Enhancement of the Public Transport System services
- Reduction of the (irrational) use of private vehicles
- Easy and quick access to all the city’s land uses
- Proper monitoring and organisation of the Public Transport system
- Improvement of daily trips (travel time reduce)
- Respect for all citizens’ particularities and equal provision of free and accessible space
- Development of a Public Transport system on Demand and increase of service frequency and coverage to support the public transport demand
- Provision of public space to citizens - Creation of open spaces for citizens and promotion of the cultural heritage
- Creation of the necessary conditions and infrastructures in order to encourage short and medium distance trips by alternative transport modes
- Use of new technologies in order to improve citizens’ mobility
Based on the highest rated expectations and taking into account the Key stakeholders’ opinions, the vision statement was formed as follows in English and Greek, respectively:

"Lemesos to be an accessible, safe, functional and friendly city for its residents and visitors, with attractive, green and quiet neighbourhoods, a lively city centre, numerous spacious and magnificent open public spaces, a beacon of sustainable and smart mobility, facilitating an abundance of economic, business, educational, recreational and cultural opportunities."

"Η Λεμεσός να γίνει μια προσβάσιμη, ασφαλής, λειτουργική και φιλική πόλη για τους κατοίκους και τους επισκέπτες της, με ελκυστικές, πράσινες και ήσυχες γειτονιές, ζωντανό αστικό κέντρο, πολυάριθμους, ευρύχωρους και δαμάσκους ανοιχτούς δημόσιους χώρους και υπόδειγμα βιώσιμης και έξυπνης κινητικότητας, δημιουργώντας μια πληθώρα οικονομικών, επιχειρηματικών, εκπαιδευτικών, ψυχαγωγικών και πολιτιστικών ευκαιριών."

### 3.2 High-level Objectives and Targets for 2030

The identification of objectives is achieved by defining the social, environmental and economic improvements required, focusing on what needs to be "reduced", "increased" or "maintained". The objectives are in fact the SUMP’s ultimate goal/ vision - Objectives at a strategic level, while the respective measures are the means to achieve them -Objectives at an operational level (please see Annex I, Table A-I 1 for more details).

The objectives at a strategic level are the prioritised expectations (as the specialisation of the High-Level Objectives in Limassol’s case resulted in the formulation of the vision statement), while the operational objectives constitute a first “demarcation” of the alternative measures that may lead both to the achievement of high-level goals and the overcoming of problems and issues in the existing transport system of Limassol.

For the quantification of operational objectives, for the development of strategies, measures and respective implementation plans, it is necessary to define a number of SMART indicators. Targets for these indicators constitute the final step for assessing planning performance and for evaluating the success of the SUMP. In this process, indicative targets were defined for the horizon 2030.

The relevant Table of Annex I (Table A-I 1) depicts the Objectives’ description, both the High-Level Objectives, as well as the Operational Objectives, the specific SMART indicators that have been defined for each of these objectives and Indicative Targets for the horizon year 2030. The proposed indicators are in effect based on the Applied Framework for evaluation activities (Deliverable D6.1 and D10.1, CIVITAS PLUS II).

It has to be noted that despite the defined strategy and measures already being very ambitious, still not all of the indicative targets will be met, according to the forecast calculations of the transport model. In fact, in some instances, even more efforts are needed, requiring even more change in the political willingness of local authorities and individual behaviour of residents and visitors.
4 The Approach

The development of the Sustainable Urban Mobility Plan for Limassol followed the approved European Guidelines. The following figure (Figure 3) depicts the Planning Cycle for a Sustainable Urban Mobility Plan as suggested by ELTIS.

**PLANNING CYCLE FOR A SUSTAINABLE URBAN MOBILITY PLAN**

The development is in fact a process, a holistic, integrated and participatory process, involving decision-makers, authorities, operators, service providers, all other relevant stakeholders and citizens in all relevant steps of the procedure. This process is based on comprehensive tools such as a transport model and a variety of assessment methods, Multi-Criteria Analysis and Cost-Benefit Analysis.

The four major parts of this process are covered and were intensively worked through in the development process. The following 4 subsections describe the main points that were of particular importance in developing the SUMP for Limassol.

4.1 Phase 1: Preparing Well

This preparatory Phase consisted of five main parts:

**A Stakeholder and Citizen Involvement Plan**

The development of the stakeholder and citizen involvement plan consisted of a number of tasks, starting with the identification of specific target groups. The results of this first task were the definition of the Core Stakeholders and of the Wider Key Stakeholders. In the task of Key Stakeholder Involvement Plan, a Key Stakeholder Committee was established with 19 members. The “Wider Stakeholders” have been identified, were recorded, contacted and invited to the Public Participation Events. Six meetings of the Key Stakeholders Committee with the Steering Committee and the Consultants carried out and five Public Participation events took place and documented for the
relevant steps of the SUMP process. Additionally, separate meetings were organised with specific target groups such as the Association for Disabled People, the Green Party, the “Movement of Architects for Limassol”, the shopkeepers of Anexartisias street, the Association of Residents and Friends of the Historical Centre of Limassol, and with individual citizens or other groups, who requested to meet the Coordinator and/or the Consultants of the project. Finally, stakeholders and the general public were informed about the project, its progress, the strategies and measures via the project’s website (http://sump4cyprus.org/), several social media channels, local radio stations and local and national newspapers. Please refer to Deliverables D1.1 “Stakeholder and Citizen Involvement Plan” and D1.2 “Web-site and Social Media Services Implementation” for further details.

This ensured quality assurance of the entire process, that the interests of different actors were appropriately reflected in the plan, contributions to the definition of strategic goals and the consultation of key stakeholders for the fundamental decision points.

For the involvement of Wider Stakeholders, further to the five Public Consultation Meetings were carried out and documented, ensuring the participation of the population and the information to the population was complemented by the development of a website and publication of information on the project progress on various Social Media: Facebook, Twitter account, LinkedIn Profile, Google+ profile/circle. This enabled the population to be well informed about the project and also allowed feedback from the population concerning relevant aspects.

The Review of Existing Relevant Studies and Data

All previous transport and land-use studies were reviewed, as well as environmental studies and other relevant studies and plans forming the current legal and planning framework for the development of Limassol. This included particularly:

- The Limassol Local Plan (LLP) of 2013 defining goals and general development strategy for Limassol and containing sections on transport policy, residential development and housing, building density, commercial, office, industrial development, environment etc.
- The Limassol Centre Area Scheme (LCAS), being an integrated plan covering in detail land-use and transport strategies and developments for the most important and complex part of the urban area.
- The Policy Statement for the Countryside (PSC) related to some of the peri-urban communities of the study area.

The review included the analysis of existing transport networks and existing transport strategic studies. Finally, the design of a transport model was planned at this stage.

Data Gathering and Collection

Data gathering consisted of collecting, evaluating and processing data about land use, socio-demographic and economic development, an inventory on current transport systems, walking network, cycling network, public transport network and supply, road network for motorised transport as well as data on traffic safety, freight and logistics and tourism.

Furthermore, an extensive programme of data collection and surveys was planned and carried out. This included the following surveys and counts in the Typical Season Period (2nd column) and some additional surveys in the Summer Season Period (3rd column) noted in Table 4:

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>Typical Season</th>
<th>Summer Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household Interview Surveys:</td>
<td>3,250 Interviews</td>
<td></td>
</tr>
<tr>
<td>Bus Occupancy Surveys</td>
<td>15 Locations (bus stops)</td>
<td>2 Locations</td>
</tr>
<tr>
<td>Origin-Destination Surveys (RSS)</td>
<td>20 Survey stations</td>
<td></td>
</tr>
<tr>
<td>Manual Classified Turning Counts</td>
<td>80 Junctions</td>
<td></td>
</tr>
<tr>
<td>Classified Link Counts</td>
<td>20 Locations</td>
<td></td>
</tr>
<tr>
<td>Automatic Traffic Counters</td>
<td>51 Sites</td>
<td>10 Sites</td>
</tr>
<tr>
<td>Bus Passengers Counts and Bus Services</td>
<td>11 Bus routes</td>
<td>2 Routes</td>
</tr>
<tr>
<td>Pedestrian Link Count</td>
<td>20 Locations</td>
<td>20 Locations</td>
</tr>
<tr>
<td>Car Journey Time Surveys</td>
<td>8 Routes</td>
<td>4 Routes</td>
</tr>
<tr>
<td>Parking Demand Survey</td>
<td>15 on-street road segments</td>
<td>5 Segments</td>
</tr>
<tr>
<td></td>
<td>20 Off-street locations</td>
<td>5 Locations</td>
</tr>
</tbody>
</table>

Table 4: Surveys conducted for SUMP Limassol

Surveys were carried out between 20 March and 31 May 2017 for typical Season and 17 July to 06 August 2017 for summer season.
Development of the Transport Model

An integrated and multi-modal macroscopic transport model for the Greater Urban Area of Limassol is the essential planning tool for analysis of current transport supply, transport demand and resulting traffic conditions in the area. More importantly, this model can and was used for the analysis of future exogenous developments, i.e. development of the population, of employment, of economy and wealth and other socio-demographic developments. Furthermore, the model becomes an important and crucial tool to analyse what happens if, i.e. defining different options (Scenarios) of potential future developments of the transport system and of land use development and analysing the impacts on transport demand, and traffic conditions on the different modes, on environmental, social and economic impacts. The model is the tool to determine the impacts quantitatively and hence serves for definition of scenarios, for quantification of impacts, assessment of effects, comparison of scenarios and selection of the preferred scenario. The transport model is one of the most important bases for the Multi-Criteria Analysis (Scenario Selection) and the Cost-Benefit Analysis (Preferred Scenario Assessment).

The transport model consists of the following components and steps:
- Base Year Model for passengers and for freight demand
  - Passenger demand model, differentiating different homogeneous user groups, different trip purposes, different transport modes:
    - Traffic generation
    - Traffic distribution
    - Modal split
    - Traffic assignment
  - Freight demand model
  - Generation of freight trips
  - Distribution of freight trips
  - Calculation od trip matrices, HGV and LGV matrices
  - Assignment
  - Model Calibration
  - Model Validation
- Forecast Model for 2030
  - Reference model: the reference forecast scenario is the business-as-usual or “do-something” scenario, intending to include only those measures and projects that are currently already underway or are planned with detailed design, implementation plan and an allocated budget.

The model results include transport demand matrices, volumes of vehicles, passengers, cyclists and pedestrians on links and lines, at junctions and stations, plus parameters like volume capacity ratios, generalised costs for private and public transport, passenger hours and kilometres per transport modes, emissions of greenhouse gases, pollutants and noise, accessibility indicators, public transport operating indicators, public transport coverage and others.

These results and parameters are available for all scenarios, i.e. for the base year scenario and for the forecast reference scenario for horizon 2030.

Analysis of Problems and Defining Objectives

The analysis of problems included analysis of data collected and surveyed; data from external sources and data produces by the transport model for the base year case. Surveys were evaluated in terms of current mobility patterns and trip characteristics, parking demand and supply, level of service on the different modal networks, and were complemented by comparison (benchmark), projections of mobility patterns until the year 2030, tourist mobility in Limassol and interdependencies between sectorial trends.

The detailed analyses of current conditions, bottlenecks and current issues included calculation of emissions on the network covering the whole study area, the evaluation of public transport (network and supply, institutional set-up and financial aspects), analyses of accessibility in Limassol with the different transport modes, particularly focussing on central locations and relevant relationships and
putting emphasis also on accessibility aspects for groups with impaired mobility. Furthermore, an extensive safety analysis was carried out consisting of network safety management and safety inspections of existing roads. A capacity analysis was carried out for the pedestrian network, for the bicycle network, for the road network including the determination and assessment of volume-capacity ratios. In addition, problems and issues reported by stakeholders were considered, Intelligent Transport Systems were evaluated and responsibilities for road maintenance and road safety determined.

Objectives were preliminary defined in terms of a holistic evaluation of identified problems and their interdependencies as well as the derivation of deficiencies and operative objectives as an input to phase 2.

4.2 Phase 2: Rational and Transparent Goal Setting

Phase 2 consisted of the following 4 activities:

Develop a Common Vision, Set Priorities and Targets

The findings from the activities in phase 1 were used to develop a common vision, set priorities and define targets for the horizon year 2030. As noted elsewhere in this report, it is important that the vision, the objectives, priorities and targets were not set or defined by the administration or group of experts, but were the result of an intensive participatory process, involving administration, institutions, operators, services providers and all stakeholders influencing or being influenced by the transport system, including special interest groups and the residents of Limassol. In a five-step participatory process, both the Key Stakeholders as well as the citizens of Limassol were invited to respond with questionnaires and contribute to the analysis of the current mobility situation in Limassol, to define requirements and expectations for the future development of the transport system and to rank these expectations in terms of priorities. The resulting priorities were then consolidated into a Common Vision statement.

Finally, SMART indicators were defined for each objective and each requirement/expectation. Based on the current conditions, targets were defined for all indicators that should be reached by the horizon year 2030. This allows assessing the implementation, verifying the achievements of the SUMP and fine-tuning strategies, measures and targets in the future.

Generation of Future Scenarios

Different scenarios were produced for the future horizon year 2030. The basis scenario is the reference scenario, “do-nothing” or “Business as Usual” scenario. This basic development scenario is the one without any special interventions from the SUMP process. This basic scenario includes all known and accepted developments of transport influencing factors, like population development, both in absolute numbers as well as in composition (locals, foreigners, age groups etc.), economic development including the development of touristic market and other influencing factors provided by authorities and statistical offices. Furthermore, this basic scenario includes all those developments and projects, that are currently already under construction, or are planned and have an approved financing and expected to be completed by 2030.

Additionally, different options were defined, where the SUMP would influence future development. The different options were defined for two dimensions, on one hand for urban policies, spatial and land use patterns having a high influence on the development of the transport sector, on the accessibility and mobility needs of the inhabitants of Limassol and on the potentials for a sustainable mobility with a decreasing dependence on cars. On the other hand, different transport mobility policies were defined including policies, projects, restrictions and incentives.

For the urban policy scenarios, the following 3 options were defined:

I. City Sprawl (Expected) – low mix of land uses, basically not influencing the existing trends
II. Targeted Development – directing growth to specific area in Limassol with development potential
III. Poly-Centric Development - mix of land uses in all the centres (Limassol and the other municipalities)
For transport and mobility policies, the following options were defined:

A. Improvement of Car Traffic conditions with the aim to reduce negative impacts
B. Further improvement of Car Accessibility with the aim of providing better access by car for all groups of the population
C. “The Carrots” – Improvement of alternative modes of transport, increasing their attractiveness and aiming at convincing users to switch away from the car
   1. Moderate
   2. Advanced
D. “The Sticks” – limiting or impeding car traffic with the aim of reducing the car traffic volumes particularly in sensitive areas.
   1. Moderate
   2. Advanced
E. Combination of “The Sticks” and “The Carrots”, again moderate and advanced.

This resulted in a matrix of 24 possible combinations, i.e. future development scenarios shown in Table 5.

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Urban Policy Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I. Expected (Urban Sprawl)</td>
</tr>
<tr>
<td>A. Improvement of car traffic</td>
<td></td>
</tr>
<tr>
<td>B. Further improvement of car accessibility</td>
<td></td>
</tr>
<tr>
<td>C. “The Carrots”</td>
<td></td>
</tr>
<tr>
<td>C.1 “The Carrots” – Moderate</td>
<td></td>
</tr>
<tr>
<td>C.2 “The Carrots” – Advanced</td>
<td></td>
</tr>
<tr>
<td>D. “The Sticks”</td>
<td></td>
</tr>
<tr>
<td>D.1 “The Sticks” – Moderate</td>
<td></td>
</tr>
<tr>
<td>D.2 “The Sticks” – Advanced</td>
<td></td>
</tr>
<tr>
<td>E. Combination of “the Sticks” and “the Carrots”</td>
<td></td>
</tr>
<tr>
<td>E.1 Combination - Moderate</td>
<td></td>
</tr>
<tr>
<td>E.2 Combination - Advanced</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: The scenario definition process

Out of these 24 possible scenarios, in the following process, the Stakeholders (the KSC and the SC) selected first a maximum of six scenarios for further analysis. This resulted in a substantially reduced matrix of options as shown in the table 6 below:

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Urban Policy Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I. Expected (Urban Sprawl)</td>
</tr>
<tr>
<td>A. Improvement of car traffic + Aktea road</td>
<td>X</td>
</tr>
<tr>
<td>E. Combination of “the Sticks” and “the Carrots”</td>
<td>X</td>
</tr>
<tr>
<td>E.1 Combination - Moderate + Aktea bus lane</td>
<td>X</td>
</tr>
<tr>
<td>E.2 Combination - Advanced + Aktea-BRT</td>
<td>X</td>
</tr>
</tbody>
</table>

Table 6: The final selected 6 scenarios

These final agreed scenarios formed the basis for the subsequent steps of the development of the Sustainable Urban Mobility Plan for Limassol.

**Development of Scenario Models and Evaluation**

The 6 resulting scenarios were defined in greater detail and were modelled with the transport model. This included the changes to the urban policy, i.e. spatial location of development of residents and workplaces, as well as the different transport mobility options, i.e. changes to transport networks, transport services, costs, travel times, parking possibilities etc.
The model results were calculated in terms of indicators for numerous aspects, e.g. mode shares, trip distances, average speed, volume/capacity ratios, level of service, public transport indicators, emissions of GHG and pollutants, emission of noise, were displayed in maps of volumes, passengers, LoS, impacts of individual measures and others. Scenarios were compared, and impacts reported.

The model results for the 6 scenarios formed the input for the Limassol SUMP Multi-Criteria Analysis (MCA) for Scenario Evaluation. The MCA approach enables the comparison of different options using criteria of different nature as it is the case for examining sustainability. In fact, each policy objective set in the Limassol SUMP corresponds to a main analysis criterion whereas the majority of the operational objectives define a sub-criterion in the MCA. Finally, the indicators used for measuring the various effects of the selected interventions in each SUMP scenario are also used for determining the score corresponding either to the effects of these interventions or to the targeted goals.

The MCA results, which rely on weight factors for each criterion and sub-criterion assigned by a panel coming from the nineteen members of the Key Stakeholders’ Committee, rank as first option Scenario 6 followed by Scenario 4.

In detail, the scores are:

- Scenario 0: 36
- Scenario 1: 38
- Scenario 2: 54
- Scenario 3: 55
- Scenario 4: 69
- Scenario 5: 52
- Scenario 6: 72

Their difference is small, just 3.0 percentage units. The next closest scenario is SC3, having a distance of approximately 14 percentage units from SC4. SC 1 is ranked last from the 6 scenarios, whereas the reference scenario is even lower in the overall rank.

Relating to the five high-level policy objectives scenario 6 ranked best in each of them:

- Economic Efficiency: scenario 4 and 6 are the best performing scenarios, particularly looking at vehicle kilometres and mode shares, travel speeds for PT.
- Environmental sustainability: scenarios 6 – along with 4 - perform by far best, particularly in terms of emissions, mode shares, travel distances, travel speeds for PT and bicycles.
- Accessibility and social inclusion: is again best achieved by scenarios 4 and 6 for the accessibility by other modes than the car, modal shares, travel distances, travel times in sustainable modes and number of PT passengers.
- Road safety: can be estimated to be improved most by scenarios 4 and 6, as here the car vehicle kilometres are the lowest and more passenger are travelling on the bus.
- Quality of life: is increased most by scenarios 4 and 6, with lowest noise levels in urban environments, lowest pollution levels and lowest vehicle kilometres.

**Selection and Appraisal of Preferred Scenario**

Based on the results of the previous steps, particularly the assessment of the scenarios with the transport model and the Multi-Criteria Analysis, the Steering Committee selected in majority the highest-ranking scenario 6 as the preferred scenario after the feedback provided by the Key Stakeholders Committee meeting took place on 22 January 2019 and by the Public Consultation Event on 23 January 2019. Scenario 6 combines the polycentric land use approach, where development is focussed in the municipalities of the Urban agglomeration, with the more advanced options of transport policy measures, i.e. “the Carrots” – Advanced and “the Sticks” - Advanced.

The preferred mobility scenario for Limassol included the most advanced and ambitious interventions for the target year 2030, comprised by a mix of carefully selected interventions such as:

- One-way schemes
- Extended pedestrianisations in the CBD area
- Bus-only road network to accommodate bus traffic to the CBT at Andrea Themistocleous street
- Traffic calming interventions and low speed zones (<30kph) for the residential area
- Re-organisation of the PT network at network level as well as the Quality of service level (frequencies, hours of operation)
The mix of all these measures, policies and interventions was modelled and evaluated through the macroscopic transport model (PTV VISUM) and the results were included in deliverables of the project. The model outcomes were found reasonable and a substantial step to the direction of changing citizens’ mobility behaviours by effectively reducing the private vehicle ridership from 91% to 78% while substantially enhancing PT ridership almost tripling it between 2017 - 2030. This alone has contributed to create an urban road network system that is more efficient and productive, therefore less crowded and congested during rush hours in the near future. Due to the nature of the SUMP study, the results cannot be attributed to each single intervention to allow direct comparisons in terms of traffic impact, but it is safe to say that the volume over capacity indications in most road network locations have shown adequate resilience to cope with the extensive pedestrianisations.

A Cost Benefit Analysis (CBA) was then carried out for the preferred scenario, aiming at the comparison of the expected social and economic benefits that will be produced from the adoption and implementation of the specific SUMP with the costs deemed necessary to implement all actions, interventions and investments for this purpose.

The final CBA results show that benefits outweigh costs; more specifically the Net Present Values is positive equal to approximately 669.24 million euros. The BCR takes a value of 3.07 which is well higher than the threshold value of 1.0. In case a 2% or 3% discount rate is used, the NPV and the BCR improve significantly. The Sensitivity Analysis results verify the CBA outcome that the specific SUMP scenario improves the wellbeing of the Limassol inhabitants. In all different tests, the CBR value remained well greater than 1.0 and the NPV was positive. Even in the worse-case scenario the BCR value took a value of 2.09. Finally, it should be mentioned that other positive effects of qualitative nature not appearing in the economic analysis calculations and results contribute to the sustainability of Limassol and to the city upgrade. Therefore, the overall recommendation, combining the economic analysis results and the other non-monetized effects, is definitely positive.

### 4.3 Phase 3: Elaborating the Plan

**Formulation of the Draft Sustainable Urban Mobility Plan**

This report is the documentation of the main step within Phase 3, the Formulation of the draft SUMP. It is based on the previous activities and aims at developing all SUMP elements according to the selected preferred scenario. The Plan elements include the following 10 areas of action:

1. City centre detailed traffic management
2. Public transport
3. Pedestrian measures
4. Cyclist measures
5. Parking
6. Freight logistics
7. Traffic safety
8. Needs of specific groups
10. Strategic Plans and Policies

These 10 areas of intervention are documented in the respective following sections of the report. To finalise the SUMP, the draft SUMP report will be complemented by activities in Phase 4, preparation of an Implementation Plan, Preparation of a Promotion and Marketing Plan, Model Training Activities, to be then completed in the Final SUMP report.

### 4.4 Phase 4: Implementing the Plan

Phase 4 is constituted by the following 4 activities, which are not finalised yet but are currently being processed in parallel to the production of this draft SUMP report.

**Strategic Environmental Assessment**

Strategic Environmental Assessment (SEA) is required for the consideration of environmental protection and sustainable development in decisions regarding Government plans and programmes.

The Directive has been transposed into Cypriot law with the Assessment of Environmental Impact of Certain Plans and/or Programs Law (No. 102 (I) 2005), which has been published in the Gazette on 29.7.2005.

The objective of the Strategic Environmental Assessment (SEA) is to identify and evaluate all direct and indirect impacts that would be brought about by the implementation Preferred Scenario of the Sustainable Urban Mobility Plan for Limassol and provide documented recommendations on the identification, adoption and implementation of measures to avoid or minimise such impacts.

**Preparation of an Implementation Plan, Monitoring and Evaluation Plan**

The task of the implementation plan is the listing of projects in a sequence of proposed realisation taking into account the priorities, the interdependencies and the financial capabilities. This includes:

- List of projects
- Short term projects: 0-5 years of implementation, high urgency, short duration of preparation, can be financed more or less immediately
- Medium term projects: 5-10 years of implementation
- Long term projects: more than 10 years of implementation
- Phasing and interdependencies: projects will be listed by order of realisation in case of interdependencies
- Financial plan: investment, maintenance, subsidies, potential for PPP

The monitoring and evaluation plan will be developed according to the “Applied framework for evaluation in CIVITAS PLUS II” (2013) guidelines yet considering the specific local conditions of Limassol.

**Preparation of a Promotion and Marketing Plan**

The preparation of a promotion and marketing plan first consists of some preliminary steps like research and analysis of the current situation, definition of objectives and strategy for promotion and marketing. Furthermore, the promotion and marketing plan aims at developing Key Messages for different audiences and to define optimum communication means and channels. Finally, in this task a strategic business and marketing plan will be formulated aiming at development of strategic business and marketing plan as well as the evaluation of the SUMP promotion and marketing programme.

**Model Training Activities**

Model training activities are necessary to allow the authorities in Cyprus and Limassol to use the developed transport model as a planning tool for future changes and developments. In order for the Ministry, the Municipality and potentially other stakeholders to be able to use the model, it was necessary:

- To provide the needed software licences for PTV VISUM and PTV VISSIM.
- To train the end users, with training on transport modelling in general, development and use of the transport model, details associated with preparing and running basis scenarios in PTV VISUM, details associated with preparing and running basic micro-simulation scenarios using PTV VISSIM, particular issues that arise following completion of the training.

The trainings were conducted in the weeks 4th of March to 8th of March and 18th of March to 22nd of March 2019.

**Production and Adoption of the Sustainable Urban Mobility Plan**

The final SUMP is the synthesis of all the deliverables noted earlier in Table 3 and the official participation processes followed through the Steering Committee, the Key Stakeholders Committee, the Public Consultations and other meetings organised.
5 City centre detailed traffic management

5.1 Introduction

5.1.1 Current status

The Greater Area of the city of Limassol (the Limassol Municipality and the 5 neighbouring municipalities), which is the study area of the project, crossed by a network of a total length of approximately 1,000 kilometres, dominated by road axes with one (1) traffic lane per direction (approximately 900 kilometres). At the same time, the length of the pedestrianized road axes is only 1.5 kilometres, which are located in the central area (historical centre) of the Municipality of Limassol. On the other hand, the existing footway and bicycle way infrastructure in the whole study area is 17 and 15 km, respectively.

In the followings is summarised (as detailed in a previous chapter) the status of transport behaviour that is faced in Limassol, as it is reflected in the surveys, interviews and counts that conducted during the project life.

- The transport system of the City of Limassol is characterised by the predominant mode of transport, i.e. the car (approximately share 91.8%).
- Other modes of transport, namely the non-motorised modes walking and cycling, and public transport have very low shares of the total number of trips (5.7%, 0.7% and 1.8%, respectively).
- The attitudes of residents and visitors are car-oriented, other modes are perceived as less flexible and only for those who cannot afford an own car, while when the car is available, it is used for almost every trip. These attitudes and perceptions are of course reflected in the respective mobility behaviour. The car ownership index in Limassol as in Cyprus is very high (570 cars per 1,000 residents is estimated the value of the index for 2020, based on the trends identified by the relevant data of the last censuses).
- Transport supply, provision of networks and services is similarly unilateral.
  - The road networks in the Limassol metropolitan area are well-developed, reach every corner of the area, allow access by car to all destinations and at most destinations provide easy and cheap car-parking facilities.
  - Networks and services of other modes (walking and cycling) are far less developed and provide a far less comprehensive accessibility of the territory of Limassol metropolitan area.
  - The Limassol public transport system consists of buses only, operating on lines across the whole territory of the metropolitan area of Limassol. The general supply seems reasonable in the central areas of Limassol, but already in the outskirts of the city, lines and services get insufficient. Service times are not sufficient, frequencies are low and irregular and therefore not attractive for the non-captive users, i.e. those who have access to a car.
- The road space is not used by people but is perceived as being only destined for motorised vehicles.
- This vicious circle is nurtured by the public administration and local politics ever encouraging more use of the car, providing more capacities for moving and parking cars also in the city centre and along the scenic coastline.

The solution can only be to limit car traffic, to provide more and more attractive alternatives to the car, to encourage residents and visitors to change their behaviour.

5.1.2 Objectives for this area of intervention

In the above described environment, the provisions of the Limassol Local Plan (LLP) and Limassol Centre Area Scheme (LCAS) come to set specific policies/strategic objectives, which are summarized in the following table (Table 7):
The discouragement of the use of private vehicles for interurban movements, particularly within the Urban Centre and historical cores

- The substantial upgrade of the importance, role and effectiveness of public transport

- The creation of necessary conditions and infrastructure for the encouragement of interurban travel with environmentally friendly modes of transport, such as cycling and walking

- To coordination of the urban transport policy with the National Transport Strategy, the Public Transport Enhancement Programme, the outcomes of the Integrated Mobility / Transport-Land Use Plans for large urban centres, the Green Paper: Towards a new culture for urban mobility and generally with the European Transport Policy after 2010

- The organization of an effective primary, secondary and tertiary urban road network, in order to guarantee the comfortable and safe movement of people and goods between the different areas of the LLP and the wider region, as well as the creation of appropriate conditions for the more effective and efficient control of roadside development

- The more effective coordination of land use and transport infrastructure spatial policy, so that transport design constitutes an integral part of urban planning and vice versa

- The management of the increasing transport demand in areas where the primary road network has been completed, with the adoption of traffic management measures, with an emphasis on traffic calming measures

- The management of parking demand, especially in commercial area/ activity axes, primary roads and residential areas

- The design and implementation of the entire urban transport infrastructure network taking into account the movement of people with special needs

- The regeneration and sustainable development of the town centre to a unified, multi-functional space which shall be the town’s main commercial and services centre with a unique and symbolic character

- The creation of the necessary infrastructure to support alternative means of transport in the town centre in order to reduce traffic congestion and create the space for the reorganisation of the central spaces

- Essential improvement of the area’s accessibility giving emphasis to the easy access of pedestrians and buses and separating as much as possible the movement of pedestrians and vehicles

- Clear completion of the road hierarchy in such a way as to ensure the effective transferring of traffic to selected main axes

- Application of traffic management and calming measures which will ensure peripheral east-west road traffic, parking spaces, creation of pedestrianised areas and the protection of the residential character of some neighbourhoods

- Restructuring of the public transport network in such a way as to avoid conflicts with other transport means and serve the entire town centre

Table 7: Policies/ strategic objectives of Limassol Local Plan (LLP) and Limassol Centre Area Scheme (LCAS)

Main strategic objectives of LLP and LCAS: It is obvious that, the transport policy of both, LLP and LCAS, aims to significantly improve the conditions and increase the capabilities/ possibilities and options of movements with all available transport modes for the entire population, irrespective of their income group or age. The main objective of the Plans’ transport policy is to satisfy the movement needs without limiting the potential of future generations to address their needs based on their choices. This is in line with the modern European philosophy to achieve conditions of sustainable mobility in urban areas.
Despite the theoretical approach of the LLP and the CAS which promotes sustainable mobility, the relaxation policies for single housing and the continuous demand for expansion of development zones without a real demographic need has created a huge problem of dispersed and scattered development and strong car dependency which is opposite to all sustainability principles.

The general parking policy of the Development Plans does not promote sustainable mobility but maintains and strengthens the use of the private car. It has to be thoroughly reviewed because a balanced and integrated system has to be applied, which will include improved public transport, efficient parking pricing policy and enforcement.

The existing parking standards for developments promote the use of the private car and have to be evaluated and reviewed. Although the public transport objectives and principles of the LLP and the CAS, are compatible to the SUMP approach, the proposed implementation of policies and measures is ambivalent. Some of the proposed measures will in fact promote a sustainable development, reducing the need to travel by car and providing alternatives. However, some other measures seem to be counterproductive, such as upgrading the road network and providing more parking in the central urban areas which facilitate the use of the car.

The principles of sustainable mobility may only be successful through the implementation of an integrated and balanced transportation and land use policy restricting the use of the private car without affecting the financial viability of the city.

### 5.1.3 General approach – the principles

Moreover, both plans generally promote the application of traffic management measures in central areas and mainly the Urban Centre and the historical/traditional cores of the wider urban areas in order to improve the operation of the road network. In these areas, traffic calming measures also be proposed to be implemented, where necessary, to conserve/improve local physiognomy.

More specifically, the traffic management measures that constitute a strategic choice and can help improve environmental quality, upgrade the attractiveness of certain areas and readjust the emphasis given to the different transport modes, are listed in the following table (Table 8).

<table>
<thead>
<tr>
<th>Policies/ strategic objectives of Limassol Local Plan (LLP)</th>
<th>Policies/ strategic objectives of Limassol Centre Area Scheme (LCAS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• One-way road systems</td>
<td>• Creation of one-way road in the peripheral and basic internal road network, limiting the access to main roads</td>
</tr>
<tr>
<td>• Traffic calming measures in Limassol city centre as well as in other urban areas</td>
<td>• Creation of footpaths in compact areas</td>
</tr>
<tr>
<td>• Measures that discourage through traffic within purely residential areas</td>
<td>• Strict parking regulations</td>
</tr>
<tr>
<td>• Creation of bus lanes</td>
<td>• Creation of bus-lanes</td>
</tr>
<tr>
<td>• Traffic restrictions</td>
<td>• Correct and consistent means of movement and entry/exit signage in order to avoid unnecessary traffic and congestion (direction and street name signs, etc.).</td>
</tr>
<tr>
<td>• Pedestrianisation</td>
<td>• Traffic calming measures mainly in the eastern residential areas to reduce speed, give priority to pedestrians and bicycles and cater for the neighbourhood’s needs rather than that of incoming traffic</td>
</tr>
<tr>
<td>• Creation of cycle lanes</td>
<td></td>
</tr>
</tbody>
</table>

Table 8: Main traffic management measures proposed by Limassol Local Plan (LLP) and Limassol Centre Area Scheme (LCAS)

Traffic Management measures constitute a strategic choice and can help improve environmental quality, upgrade the attractiveness of certain areas and readjust the emphasis given to the different transport modes.

It is concluded that, the provisions of the existing LLP and CAS contain most of the modern sustainable mobility principles, and therefore have been considered in the design of the proposed SUMP measures and policies.
In addition to the above, and for the purpose of creating the road network hierarchy, the followings are proposed by each of the plans (see the Table 9).

<table>
<thead>
<tr>
<th>Policies/ strategic objectives of Limassol Local Plan (LLP)</th>
<th>Policies/ strategic objectives of Limassol Centre Area Scheme (LCAS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>→ Vertical Road which connects Limas-sol Port with the Limassol - Paphos Highway (this project has already been completed)</td>
<td>→ Improvement of the connection between the Coastal Avenue and Franklin Roosevelt Av. in such a way as to increase significantly the traffic capacity of this main road artery and upgrade the existing bifurcated road on each side of the urban land island which exists near the Marina. At a later stage and depending on demand alternative methods will be re-evaluated, including a direct underground road connection.</td>
</tr>
<tr>
<td>→ The connection of Franklin Rousvelt Avenue with the Coastal Avenue</td>
<td>→ Connection of Gian Simpelious and Filiou</td>
</tr>
<tr>
<td>→ Expansion of Agias Fylaxeos Avenue and parts of Archiepskopou Malariou III Avenue in Limassol</td>
<td>→ Zannetou streets so that they act as main exit roads from the centre</td>
</tr>
<tr>
<td>→ North Parallel Road of Limassol (it is expected that certain parts of it will be implemented)</td>
<td>→ Creation of the Castle bypass road</td>
</tr>
<tr>
<td>→ Improvement of part of the Touristic Coastal Road</td>
<td>→ Opening of Athinon Street and connection with Ellados Street</td>
</tr>
<tr>
<td>→ Expansion of the Germanosia Bypass Road</td>
<td>→ Connection of Haci Hasan Street with Mescit Street</td>
</tr>
<tr>
<td>→ Improvement of Archiepskopou Malariou III Avenue in Ypsonas</td>
<td>→ Connection of Giakou Potamiti Street (ex Romai Rolan) with Ifigenias Street through the area of the Tax Collection Office</td>
</tr>
<tr>
<td>Expansion – improvement of Agiou Athnasiou Avenue from the Nicosia - Limassol Highway up to the Coastal Avenue</td>
<td>→ Opening and completion of the road network in the Marina area (opening of Aktea Road which will terminate vertically on Franklin Roosevelt Av. and completion of the inner main road of the Marina)</td>
</tr>
<tr>
<td>Expansion – improvement of the Mouttagiaka Road from the Coastal Avenue until the Nicosia-Limassol Highway</td>
<td>→ Transferring of most traffic to primary roads created by upgrading the main peripheral road axes (Gladstone, Coastal Avenue etc.) and creation of good connection between Gladstone/ Navarinou streets and Makariou Av., which constitutes the main bypass road of Limassol’s central area</td>
</tr>
<tr>
<td>Expansion – improvement of the Main Road towards Agios Tychonas</td>
<td>→ Completion of the internal peripheral traffic around the commercial core by improving some basic secondary roads</td>
</tr>
<tr>
<td>Road which links the Nicosia-Limassol Highway with Parekklisia</td>
<td>→ Ensuring basic connections between the subareas of the town centre with the secondary road network (M. Alexandrou, Zinonos, Iriini / Enoseos, Cleopatras, Stasinou etc.)</td>
</tr>
<tr>
<td></td>
<td>→ Accommodating for the neighbourhood’s needs through a local road network, which will be appropriately configured and modified (one-way streets etc.)</td>
</tr>
</tbody>
</table>

Table 9: Road projects proposed by Limassol Local Plan (LLP) and Limassol Centre Area Scheme (LCAS)

5.2 Key strategies

Taking into account the above analysis, it is obvious that growth in the number and use of motor vehicles, especially cars, is the principal cause that the city of Limassol experiencing congestion, delays, noise, pollution as well as road safety and accessibility problems in its city centre as well as along arterial routes.
Traffic management measures of Limassol SUMP are intended to reduce the above-mentioned problems by reducing transport demand such that the use of private vehicles is reduced (e.g. measures to encourage a modal shift from private cars to public transport, walking and cycling; land-use planning measures which minimise distances between home, work, shops and leisure facilities and so reduce dependency on cars).

Limassol has traffic management measures in place already, but further measures are required in order to cope with future growth in traffic and fulfil the operational objectives of Limassol SUMP. There are many considerations which influence a city’s choice of traffic management measure(s):

(a) Economic considerations. Some measures require expensive engineering works to be undertaken and are beyond the resources available. For example, a metro may be the preferred way of improving a city’s public transport system in order to attract people out of their cars and onto public transport, but improved bus services may be the only option available on economic grounds. It is noted that, in the context of the development of the Limassol SUMP, besides identifying a series of measures and policies concerning the promotion of sustainable mobility, it was decided (in cooperation with the Contracting Authority) to include a series of development projects (reference scenario projects) to complement the implementation of the measures (see Chapter 5.3.5, below). However, some additional development projects (such as motorway crossing, tunnel, bypass road, etc.) were examined in the Scenario 1, as one of total 6 alternative scenarios. Scenario 1 is the only one of the 6 scenarios that focuses on improving traffic conditions for private vehicles (e.g. via ITS) and includes only road development projects (see Chapter 5.3.6, below). The remaining 5 scenarios focus on different urban development scenarios and on a series of measures to promote sustainable mobility. Comparative analysis of these 6 scenarios, with the help of the macroscopic traffic model developed, led to Scenario 1 ranking at the lowest scale (see Deliverable D8.1). This ranking of course has been done in terms of meeting the high-level objectives adopted for the SUMP (please see Chapter 3.2 of this report).

(b) Alternative goals. Traffic management measures, which have been implemented so far achieved different goals, than those related with sustainable mobility. Such measures have been for example, new road constructions to facilitate the traffic flows, in order to reduce congestion, improve mobility, reduce the number of motor vehicle accidents, reduce noise levels, etc.

(c) Attitudes of the public. Public support for individual measures varies greatly. For example, the introduction of an exclusive residents’ parking zone, for which residents pay a permit, may be welcomed by residents of one district within a city but rejected by another. Weak public support for an implemented measure can lessen its impact considerably. For example, around a central traffic restricted zone, it is likely, commuters seek to park as close to the restricted zone as possible (within the city centre) instead of switching to public transport for their journey.

(d) National constraints. Traffic management measures could be initiated at the local or municipal level but may require approval by the regional or national tier of Government (institutionalized Local Plan). Guidelines may be set down as to what measures are likely to be approved and those, which will not. For example, the increase of the operational costs of the car through the price of the fuel or other charges is a measure that requires approval by the Government.

(e) Traffic control and ITS as tools for optimising traffic flow and minimising junction delays (see paragraph 6.3.3).
The single traffic management measures or the combination of measures that be proposed by Limassol SUMP are outlined in the following sections. Some single measures, for example, may spread rather than reduce traffic congestion, shifting the congestion from one part of the city to another. For this reason, a combination of additional measures, need to be introduced at the same time to prevent this eventuality. Similarly, a traffic restraint measure, which deters or prevents commuters from using cars, needs to be complemented by measures to improve public transport, walking or cycling facilities. Rarely does it make sense for a single traffic management measure to be introduced on its own; rather a package of measures is needed. In general, the key strategies that dictate and complement the measures detailed below are as follows:

- Convert two-way streets to one-way streets
- Plan transportation networks for all modes of transport
- Speed Limits and Controls
  - Reduce speeds on some identified local streets
  - Implement design features on some streets to reduce speeds
  - Enhance traffic control signs and street markings
  - Increase penalties for speeding
- Stop Controls and Interchanges
  - Re-examine stop controls
  - Improve stop controls
- Education and Enforcement
  - Implement an education campaign
  - Increase enforcement.

### 5.3 The detailed description of measures

#### 5.3.1 Traffic restricted zone in the city centre

Area-wide bans or restrictions on traffic may be much localised (e.g. pedestrianised street) or cover a much wider area (e.g. historical or commercial district). Most city centres in Europe contain some pedestrianised streets, sometimes with buses and taxis allowed to travel along these streets.

Fully pedestrianised areas are difficult to achieve. The need for servicing for shops, accommodation of public transport, the accessibility needs of disabled people, residents and emergency vehicles mean that few areas can be solely for pedestrians.

The Limassol SUMP has therefore explored an alternative approach, which can improve the pedestrian environment whilst maintaining access for vehicles.

The extensive pedestrianisation of the core CBD (Central Business District) is proposed and detailed in Chapter 7 of D10.1 report, while determines these streets in the area that although have a variety of different functions – with most of them being shopping streets – serve as routes that eliminate the traffic through the core CBD. More specifically, it has been proposed that suitable alternative one-way routes to access within the city centre - it would not be practical to prevent vehicles using these roads – which are shown on the map below (Figure 4).

This system is complemented by the one-way traffic derationing of most of the city's main commercial streets, which are directed and/ or surround the core CBD (Environmental Zone – Area A). These road axes appear in bold blue and extend to the Traffic Calming Area, and more specifically in the B, C and D areas as depicted in Figure 5. These are Thessalonikis, Agias Filaxeos, Leontiou, Giltiz, Navarinou, 16th June 1943 and Gladstonos (between Thessalonikis and Agias Filaxeos) streets. Detailed maps can be found in Annex II, Figure A-II 1 and Figure A-II 2.
Figure 4: Implementation area of traffic management measures (Area A zoom)-pedestrianisations and one-way system
Moreover, a wide range of parking restrictions should be applied to deter the proportion of journeys made by private vehicles to the core CBD area (environmental zone; see also Figure 4 and 5). These will include increasing parking charges in the city centre, reducing the number of roadside and public parking spaces (and greater enforcement against illegal parking), restricting the building of new car
parks and restricting the parking space allowed for new or even existing businesses. However, a high proportion of parking spaces being private and non-residential often limit the effectiveness of parking management. The specific parking policy measures provided in the Limassol SUMP are presented in detail in the corresponding chapter of this very report (Chapter 9).

A negative aspect of restricting parking spaces or raising charges in the city centre concerns the increase of traffic in nearby streets as motorists seek parking spaces or less expensive ones. To be more effective, parking measures need to be combined with other measures, which encourage a shift from private cars to public transport, cycling and walking (see Chapter 9).

For a public transport service to attract car users, it must be convenient, accessible, comfortable, safe and efficient (e.g. reliable and with minimal waiting time). Improved facilities at public transport stops can help avoid congestion and delay during boarding stops. Cheap, even subsidized, fares help. Bus lanes are the most common means of enabling buses to operate reliably and at higher speeds than they would in congested traffic, and so cut journey times. Moreover, Park and Ride schemes offer secure and free (or inexpensive) parking at a site on the outskirts of the city from which frequent and fast public transport services operate to the city centre. In detail, the public transport system scheme and provisions of Limassol SUMP, are presented in the relevant chapter of this report.

5.3.2 Traffic calming schemes (calming areas) and area-wide speed limits (pure home zones)

Residential areas which are located in the wider area of the city centre (in the Calming Area Zone and Home Zone as they depicted in the above maps) and used by commuters as short cuts require traffic calming measures.

Further, traffic restraint measures taken in the city centre may lead to increased traffic seeking parking spaces in adjacent residential areas leading to worsening conditions in these areas unless deterrent measures are undertaken.

Traffic calming measures in residential areas include mini roundabouts, raised crosswalks, road narrowing (Chicanes), woonerfs (shared space) and speed humps in order to reduce traffic speeds to a lowered speed limit of 30 kph, as well as systems of one-way streets to avoid traffic through neighbourhoods. More details can be found in Annex II, Figure A-II 3 to Figure A-II 7.

The Limassol SUMP provides for the implementation of the above measures in specific areas of the wider central area of the city (Areas B, C and D on the Calming Area Zone, see maps above) and in the surrounding residential area located outside this (Home Zone, Area E).

Measures on Area B of the Calming Area Zone

Particularly, in Area B a system of one-way streets is provided to eliminate through-traffic (speed and volume) making neighbourhoods less noisy and dangerous. These interventions will be combined with the reconstruction of Misiaouli & Kavazoglou Street, which is ongoing. The reallocation of the available public space of this commercial street in favour of vulnerable road users (pedestrians and cyclists) is likely to cause diversion of traffic in adjacent neighbourhoods. A limited two-way street length (red line on the map above – Figure 5 of this document) surrounds the one-way system (Pallados, Souliou, Peiraios, Markoni, Asklipiou, Agion Panton streets). In the intersections of the two-way network, the measures of mini-roundabouts and raised crosswalks will be implemented.

The introduction of the new one-way system needs careful implementation as such schemes can have a severe impact on a wide area. Nearby, two-way roads can be adversely affected by diverted traffic and roads that are turned into one-way streets can experience increased vehicle speeds, particularly narrow streets where two-way traffic previously acted as a natural form of traffic calming. Signs and road markings should be kept to the minimum sufficient to inform road users. Moreover, chicanes and speed humps will be introduced in the one-way system (indicatively on the roads Plympiou Dios, Mouson, Nikolau Skoufa, Episkopou Meletiou, etc.).

South of Misiaouli & Kavazoglou Street, is provided the implementation of the woonerf/ shared space measure (green line on the map above) to protect certain school premises (Anti Filita, Erithrou Stavrou, Morphou, Likourgou, Versalion streets).
Measures on Area C of the Calming Area Zone

The same measure is to be implemented in Area C of the map surrounding the 2nd Limassol Technical School (Dimosthenous Mitsi, Stratigou Makrigianni streets). The images below (Figure 6 and 7) represent a view of implementation of the measure in the specific space. Additional interventions are not proposed in this area because a rather extensive one-way system already exists.

Figure 6: Woonerfs (shared space) surrounding the 2nd Limassol Technical School (1)

Figure 7: Woonerfs (shared space) surrounding the 2nd Limassol Technical School (2)

Measures on Area D of the Calming Area Zone

Area D is characterized by a more extensive implementation of the "woonerf/ shared space" measure (Iparchou, Vasili Michaelidi, Irakleiou, Golgon, Ioanni Kondylaki streets, etc.), as it is crossed by important commercial road axes which are converted into one-way streets, an intervention that will possibly spread the traffic to the secondary road network.

The aim of single surface schemes (shared space) is to create a better balance of priorities between drivers and pedestrians, to achieve slowing traffic down, changing priorities and ensuring accessibility for all. An inviting and accessible space based on the single surface concept could be created with delineation between areas designated for pedestrians only and areas where vehicles are permitted. Additionally, to eliminate the need for traditional signs and lines to control movement, the vehicle
route could be defined through the paved area by carefully placed street furniture, new trees and new street lighting.

**Measures on the Home Zone (Area E)**

Finally, in the residential Area E – Home Zone (of the map above), the measure of 30 kph zones, is provided. The cost and the time needed to create such zones is a comparative advantage over the choice of using traditional traffic calming zones.

In particular, a general 30 kph speed limit is to be introduced for the whole city street network of the area, except for priority streets where a 50 kph limit will be applied. Traffic calming schemes could only be introduced where there is a record of speed related car collisions resulting in injuries.

Regarding the special needs of children, a specific measure for the needs of primary-school pupils concerns the implementation of safe buffers around primary schools. Within a range of the school entrance, the ways to the school have to be made safe and adequate to the needs of children of ages 5 to 12 years old. Where feasible, the most efficient way to achieve this is through pedestrianisation around primary schools with a radius of 50 or 100 meters. In cases it might not be possible to pedestrianise street segments, alternatives are “No Parking areas” (more details in chapter 13.3.3 below).

### 5.3.3 The Coastal Avenue Scheme

The main principle of this project is a paradigm change towards sustainable mobility, a change of behaviour, a change of attitudes towards different modes of transport. This will become very obvious in the accessibility of the city centre.

One of the most beautiful assets of the city of Limassol is the seafront. Indeed, this is the major reason for visitors to come to Limassol. Today the seaside boulevard is a major road corridor, a 2x2 lane road for motorised traffic with vehicles often driving at speeds higher than the legal speed limit. This “urban motorway” physically separates the old town, the city centre from its major asset, from the seafront.

The first proposal therefore is to change the character of this boulevard completely, to slow down traffic, to reduce the traffic volumes, to reduce the negative impacts, to reduce the barrier effect between old town and seafront and to increase the space for non-motorised uses of the boulevard, walking, cycling. Traffic will be diverted to the ring roads and car drivers will be encouraged to use other modes for accessing or passing through the city centre.

The seafront boulevard will become the highlight, the show piece of the Sustainable Urban Mobility within Limassol and it will show to residents and visitors that Limassol is focusing on a new mobility behaviour. This will have a marketing effect, an effect on attitudes and behaviour.

The proposed boulevard is designed to have two adjacent bus lanes on the northern (city) side of the corridor; the remaining motorized traffic will be consolidated on two adjacent traffic lanes on the southern (coastal) side. This two-by-two solution

- guarantees unhindered bus services without obstructing cars while turning across the bus lanes or even stopping
- provides shorter and more convenient access for passengers to the attractions in the city environment
- allows easier and safer crossing of seaside boulevard since buses and remaining traffic are consolidated next to each other
- a central island strip between bus and traffic lanes provides space for bus stops, allows to rest for pedestrians while crossing the boulevard and can be partially planted between stops and crossings.

The following “before and after” pictures show how the seafront boulevard is proposed to be transformed in a more pleasant and less separating space with 2 bus lanes, only 2 lanes for remaining motorised traffic and more space for pedestrians and cyclists (see Figure 8, 9 and 10).
The aim of the redesign of the coastal boulevard is to reduce its separation effect between the urban area and the seafront, regaining space for people instead of moving or parking vehicles and increasing the attractiveness of the major asset of Limassol for people to walk, linger, cycle, meet. The main ideas to achieve this, are:

1. The central island is not meant to be a footway but a limitation to motorised vehicles that also provides space for pedestrians to pause while crossing the boulevard anywhere

2. There are dedicated bus stops to board/ alight buses. Between bus stops, the central island can be used for crossing; still, the central island is suggested to be partially also designed as planted island (as is now).

3. The two bus lanes are located next to each other to the north side of the boulevard. The main destinations of daily traffic are inside the urban centre. The proposed location of the bus lanes allows passengers of the buses to easily reach the bus stops and the origins/ destinations in the city centre, minimising the conflicts with motorised traffic and the number of lanes to cross.
Figure 9: Street conversion: Coastal Boulevard East of Crown Hotel
5.3.4 Improving road network capacity through ITS

The Public Works Department has invested during the last decades in a widely acknowledged Vehicle Actuated Traffic Signalization System called SCOOT (Split Cycle Offset Optimisation Technique). This legacy system, has a dedicated Control Room for traffic signal management and operations and is installed in 90 intersections in three cities, providing advanced functionalities for traffic-actuated traffic signals operation, and signal progression at arterial level. The system for all traffic signalized intersections is centrally monitored and managed by the PWD Control Room. However, the system is currently not in operation in the city of Limassol since the existing traffic controllers are old, while there is also need for some further maintenance and upgrading of telecommunication connections as well as an expansion of inductive loops on the pavement in order to allow real-time traffic detection and communication to the signal controllers.

MTCW is currently preparing a procurement project for a substantial renewal of traffic controllers in the city of Limassol, which can be considered as a major prerequisite for the actual and smooth
operation of the vehicle actuated traffic signalization system. Through this intervention the following actions will be offered:

- Optimizing traffic flows/ minimizing delays at junction/ arterial/ network level
- Collecting traffic data through detective loops in real time – create traffic profiles per road segment/type – get prepared for scenario-based strategies
- Accommodate traffic variations within a typical day (inbound/outbound traffic)
- Get early warnings for network disruptions
- Future possibilities for implementing complex operations (event management/ evacuation plans)
- Enable deployment of other important ITS such as the bus priority, red light enforcement

For detailed description of relevant information please consult Deliverable D10.1, chapter 14.3.4.

5.3.5 Interventions proposed for the five municipal authorities of the Greater Area of Limassol

The concept of extensive pedestrianisation proposed for the municipality of Limassol, has also to be applied to all other five municipalities, in order to be consistent with the concept of polycentric development for the target year 2030. The idea behind this is that residential growth will be focused in the various centres, however, these centres will also serve future work place development as well as developments of shopping and leisure facilities, resulting in short distances and reduced need to travel. This concept does not reduce the importance of the central municipality as the driving force for the future economic and social development of the metropolitan area.

The Consultant’s proposals in this direction were firstly presented in the framework of Deliverable D7.1 and in more detail in this report - in the corresponding chapter (Ch.7) for the pedestrian measures. It is worth noting that the area of intervention (CBD) proposed is based on relevant provisions of the LLP for the respective Municipalities but expanded as necessary for taking into consideration major attractions that should be served in each area, namely churches, school premises, Town Hall premises etc.

As a final step for preparing the traffic management measures for the five municipalities, the Consultant through its local office prepared and conducted face-to-face meetings with the Mayors and their technical teams in order to discuss their current or future plans for:

- Regeneration of historic centres
- Bicycle and pedestrian networks
- Public Transport level of services provided
- Public parking lots (seeking ways to duplicate Park&Ride concepts scaled to fit the small municipal road networks)
- Potential relocation of initially proposed Park and Ride Stations along A1

In general terms, these discussions have shown that the concept of Sustainable Mobility needs more time to be cultivated and promoted in municipalities.

All the interventions proposed by the Consultants are reflected on a series of maps¹ (Figures 11-15), which are accompanied by a brief description of the rationale that led to the specific proposals.

¹ Special uses (on maps) are defined in the majority of cases as parking spaces, except in one case (Municipality of Germasogeia), where a Kindergarten is also designated as a special use.
5.3.5.1 Municipality of Ypsonas

Aside from the proposals for pedestrian and traffic calming streets, the four parking locations suggested by the Municipality are found reasonable with the exception of the one located at Ypsonas Square, which apparently falls within a fully pedestrianised area and should either be transferred to another location or be granted access through the designation of mixed-use roads for Georgiou Griva Digeni street and Panagias Chrysopolitissis street.

Figure 11: Traffic Management measures for Ypsonas
5.3.5.2 Municipality of Mesa Geitonia

According to the Municipality representatives, the regeneration of the historic centre has been completed mainly based on conventional traffic engineering tools such as the one-way street network. For the same area, the Consultant’s view is that placing the pedestrian at the forefront of design priorities is necessary especially in smaller communities where distances are shorter and traffic conditions are less problematic. The only public parking lot anticipated between Ag. Fanouriou street and K. Mati street can have full access from I. Prodromou street which has not been proposed for pedestrianisation.

Figure 12: Traffic Management Measures for Mesa Geitonia
5.3.5.3 Municipality of Agios Athanasios

The proposed pedestrianisation scheme can serve the new sustainability principles proposed by the SUMP. With regards to the public parking lots:

- Town Hall parking – (approx. 100 spots) / Parking at Katsaras / Parking at Varnali have full car access
- Parking at Minoos street is situated within the pedestrianised area but car access might be offered through mixed used road segments, if this is delineated as crucial by a dedicated traffic and parking study conducted in the near future.

Figure 13: Traffic Management measures for Agios Athanasios
5.3.5.4 Municipality of Germasogeia

Car access to the parking lot adjacent to the new Town Hall (part of Ag. Paraskevis street from Dardanelion street to Sardeon street). The parking that serves the school premises is not recommended, while the free parking along Patron street (approx. 100 parking spots) may be served from its west side through a mixed-use pedestrian road beginning from Agias Christinis street up to the entrance point of the parking lot.

5.3.5.5 Municipality of Kato Polemidia

The proposed pedestrianisation scheme has taken into consideration:
An extensive one-way street plan recently implemented by the Municipality that has to be modified in order to be consistent with the sustainability principles proposed by the SUMP. The public Parking lot on Agias Anastasias street next to Panagias Evagelistrias church, which is situated within a pedestrianised area, however, due to its special serving purpose exceptional access for certain hours of the day could be granted.

Figure 15: Traffic Management Measures for Kato Polemidia
5.3.6 Road development projects included in the Reference Scenario for 2030

In the first steps of the transport model development, the Reference Scenario was created, representing the future of the city by year 2030, without any special interventions from the SUMP process. This basic scenario includes all those road developments and projects, that were currently already under construction, were planned and/or had an approved financing in all cases expected to be completed by the target year. This extended set of projects roughly estimated in a 124 million Euro in budget are to be included in the final implementation plan of the SUMP, although these projects are neither proposed by the SUMP, nor their implementation is deemed necessary in order to deploy the programme. Thus, taking into account the given basic characteristics of these projects (deemed as of higher priority being in proximity to the areas of SUMP interventions) provided by the PWD, they are suggested for each case, a cross section with the perspective of sustainable mobility. In any case, the projects uncompleted yet need to be designed based on the principles of sustainable mobility favouring walking, cycling and public transport.

<table>
<thead>
<tr>
<th>Proj. No.</th>
<th>Title of project</th>
<th>Road level hierarchy</th>
<th>Effective width (sidewalks + road)</th>
<th>Bicycle network proposed by SUMP</th>
<th>Bus lines along the section</th>
<th>Indicative cross-section based on functional classification provided by PWD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Improvement of Agh. Filaxeos Avenue in Limassol (3 sub-sections):</td>
<td>- Secondary arterial (with median)</td>
<td>~ 20.0 m.</td>
<td>N</td>
<td>Y</td>
<td>![Image](2.50 3.00 3.00 3.00 3.00 2.50 2.50 19.50)</td>
</tr>
<tr>
<td></td>
<td>- Sp. Kyprianou (former Makedonias Avenue) - Arch. Makariou Avenue</td>
<td>- Main collector</td>
<td>~ 18.0 m.</td>
<td>Y</td>
<td>Y</td>
<td>![Image](2.50 3.00 3.10 3.10 3.00 3.10 3.10 3.00)</td>
</tr>
<tr>
<td></td>
<td>- Makariou III Avenue - End of Phase A in Thessalonikis street</td>
<td>- Main collector</td>
<td>15.0 - 18.0 m.</td>
<td>Y</td>
<td>Y</td>
<td>![Image](2.50 3.00 3.10 3.10 3.00 3.10 3.10 3.00)</td>
</tr>
<tr>
<td>6</td>
<td>Vertical road to Limassol port - Parallel road to Limassol port (currently under construction)</td>
<td>Secondary arterial</td>
<td>30.5 m.</td>
<td>Y</td>
<td>Y</td>
<td>![Image](3.00 3.20 3.20 3.40 3.20 3.20 3.20 3.00 2.50)</td>
</tr>
<tr>
<td>10</td>
<td>Pafou Street</td>
<td>Primary arterial (no median)</td>
<td>21.0 - 23.0 m.</td>
<td>Y</td>
<td>Y</td>
<td>![Image](2.80 3.30 3.10 3.00 3.40 3.20 3.20 3.00 3.20)</td>
</tr>
<tr>
<td>49</td>
<td>Upgrading of Agh. Athanasious - Jumbo Street</td>
<td>Secondary arterial (with median) / Local collector</td>
<td>~ 25 m.</td>
<td>Y</td>
<td>Y</td>
<td>![Image](3.00 3.20 3.20 3.40 3.20 3.20 3.00 3.00 2.50)</td>
</tr>
<tr>
<td>48</td>
<td>Kolonakiou str - upgrade</td>
<td>Secondary arterial</td>
<td>~ 21.0 m.</td>
<td>Y</td>
<td>Y</td>
<td>![Image](2.50 3.00 3.00 3.00 3.00 2.50 2.50 19.50)</td>
</tr>
<tr>
<td>50</td>
<td>Upgrading of Griva Digeni Street</td>
<td>Main collector</td>
<td>15.0 - 20.0 m.</td>
<td>Y</td>
<td>Y</td>
<td>![Image](2.50 3.00 3.00 3.00 3.00 2.50 2.50 16.50)</td>
</tr>
</tbody>
</table>

Table 10: Indicative cross-sections for road development projects (Reference scenario 2030)
5.3.7 The major development projects as assessed under Scenario 1

As mentioned above (see Chapter 5.2), a number of development projects were included and evaluated under Scenario 1, which was the only scenario that exclusively focused on improving traffic conditions for private vehicles (e.g. via ITS) and includes only road development projects.

Specific projects of these were the subject of particular reflection and extensive discussion between stakeholders and residents thus it is appropriate to briefly refer to the evaluation outputs through the traffic model.

It should be noted that the model results used for scenario evaluation reflect the impact of the mix of interventions, measures and policies, therefore the results cannot be attributed to each single intervention to allow direct comparisons in terms of traffic impact. For a more detailed evaluation of impacts, a microscopic traffic analysis is needed and has to be performed through a different software application accommodating design layout and details of the traffic network (PTV VISSIM).

5.3.7.1 Agias Filaxeos A1 crossing (underpass)

Figure 16: Average Weekday: volume capacity ratios

Although traffic conditions will improve at the junction itself, on the northern road axis, the v/c (volume/capacity) ratio will exceed 125%, while on the south axis it will range between 75-100%, indicating not an improvement in the overall or local traffic conditions.

5.3.7.2 Nikou & Despoinas Pattichi A1 crossing (underpass) – Kato Polemidia

Figure 17: Average Weekday: volume capacity ratios
Similarly, to the previous roundabout, although the traffic conditions will improve at the junction itself, on the southern road axis, the v/c ratio will exceed 125% while on the northern axis it will reach up to 75%, suggesting not an improvement in the overall or local traffic conditions.

5.3.7.3 Andrea Papandreou street (2W/2L per direction) according to the provisions of Limassol Local Plan (LLP)

The proposed road seems to attract an average daily traffic volume of around 5500 vehicles in both directions and instead significantly reduced the corresponding volume on residential roads from 1600 to 3700 vehicles, showing a positive impact.

5.3.7.4 Germasogeia Bypass Intersection (Northern Bypass) – Synergatismou Boulevard

The proposed road seems to attract an average daily traffic volume of 14,500 vehicles in both directions and instead reduces the corresponding volume on the A1 motorway and residential roads leading to it, from 4,500 to 5,500 vehicles, indicating a positive impact. This impact may not only be
due to the northern bypass, but also to other nearby projects included in the relevant scenario. The v/c ratio in the northern bypass is expected to be as high as 75%, while the corresponding ratio at Agia Filaxeos Street near to northern bypass will reach 125%, revealing a critical traffic condition.

5.3.7.5 Aktea Odos (2W/1L per direction)

Figure 20: Average Weekday: volume capacity ratios

Aktea Road with 1 lane per direction is not necessary as a road for private traffic from a capacity point of view. In particular, with Aktea road open for motorised traffic, the parallel avenue i.e. Franklin Roosevelt Ave., will operate with a LoS slightly above 60% at some of its sections and even for the preferred scenario (i.e. without permitted private traffic in Aktea), v/c ratio will not exceed 75% along almost all its length. As a result, Aktea can adequately accommodate the current and future demand for motorised private traffic. Further to the above, a pedestrian/cyclists’ street with bus lane would be sufficient for Aktea Road (see figure below) as a measure adopted in the preferred scenario.

Opening a new road for traffic will not attract a lot of long-distance traffic, still, it will provide more capacity and in the long run induce more car traffic that will then add to the existing volumes on the waterfront boulevard and other central corridors. In view of reducing car traffic in the centre, reducing congestion and providing more space for non-motorised uses, this is to be avoided and as said above, the additional capacity is not needed and not justified by current and future demand.

Figure 21: Aktea Odos near KEO winery
6 Public Transport

6.1 Introduction

Amongst some others, the following key objectives of the SUMP Limassol were defined by the stakeholders:

- The city needs a transport system, which will satisfy the increased travel demand
- Residents and visitors should adopt new behavioural models
- The city should adopt policies restricting the use of private vehicle
- The city should adopt solutions regarding the travel demand for work purposes (daily peaks)
- The city should adopt a mobility system accessible for specific target groups i.e. the elderly people and people with disabilities
- The city should focus on the infrastructure of sustainable transport modes

All of the above-mentioned objectives are comprehensively addressed by strengthening and improving the public transport system, aiming at significantly increasing the mode share of public transport (and the other environmentally friendly modes) thereby reducing private motorised transport.

6.1.1 Current Status

The general accessibility of public transport infrastructure (stops) is very good in central areas and still sufficient in remote areas. This is also confirmed by the household survey, where the majority of respondents’ state to have a bus stop near their homes (average 2 minutes, maximum 6 minutes). Nevertheless, currently only few (6) lines operate according to a timetable at all, offering a frequency of two bus services per hour or more at least in the afternoon peak hours. All other bus lines do not have regular headways. Beyond the central area, public transport supply is irregular, incomprehensible and in consequence not attractive for potential users compared to the private car.

For potential public transport users, non-harmonised and infrequent services are unattractive, since people do hardly remember irregular timetables with different departure and arrival times for each service. Moreover, regular headways offer the chance to co-ordinate timetables resulting in reliable transfer options and short transfer times at designated transfer point.

Transfer options are rare and arbitrary within the bus network and are more or less restricted to:

- transfers between the ring line 20 and the crossing radial lines
- the Circle line and radial lines at Leontiou station

6.1.2 Objectives of Public Transport Measures

The main objectives of the development of the proposed public transport system is to establish a reliable, convenient and fast alternative to private motorized transport. This means to enhance the connectivity between local potentials within the centres as well as between the centres. The proposed system helps, to improve the accessibility of potentials with high reliability and punctuality. At low costs and with high safety standards, passengers will be able to conveniently reach their destinations either with direct services or making use of optimized transfer options. This primarily helps to:

- avoid unnecessary travel by motor vehicles, reducing noise and pollution, reducing environmental and social costs
- shift the trend of individual motorisation to safer, efficient and environmentally friendly transport modes, improving interconnectivity between public transport and walking/cycling
- improve infrastructure and management of transport services by adopting cleaner, efficient and safer technologies and practices.

Cyprus made a commitment to the EU to reduce CO₂ emissions by 24% until 2030 (compared to 2005). In order to reach this target, mode shares of 20% for public transport are envisaged. Taking into account the very low current shares of approximately 1.8%, a reasonable assumption is to reach 5% to 7% by 2025. However, in the light of the 10% PT share calculated for 2030 in this study, further efforts have to be made to reach the 20% target by 2040 latest.
6.2 Key Strategies

Public transport as mass transit is the most energy efficient form of travel and consequently helps to reduce emissions. Public transport uses rare urban space more efficient than private motorized traffic in both, space to travel and even more so: space for parking. Also, public transport plays an important social role, ensuring that all members of society are able to travel, not only those with driving license and car availability.

The general aim of public transport development in Limassol and the five municipalities, is to enhance the connectivity between local potentials within the centres as well as between the centres. The proposed system helps, to improve the accessibility of potentials with high reliability and punctuality. At low costs and with high safety standards, passengers will be able to conveniently reach their destinations either with direct services or making use of optimized transfer options.

The key strategies to effectively increase the mode share of public transport are:
- Implementation of hierarchical network system with primary, secondary and feeder lines
- Optimization of line routes and simplification and consolidation of bus lines
- Comprehensive upgrade of operation hours and frequencies
- Integration of school bus lines in regular services where feasible
- Establishment of central bus terminal at Themistokleous street
- Hierarchical system of bus stops
  - Interchange bus stops
  - Multimodal transport hubs
  - Standard bus stops
- Park & Ride facilities
- Bus prioritisation measures (exclusive bus lanes)
- Appropriate vehicles
- Pre-Trip passenger information
- ITS and ticketing technology

6.3 Detailed presentation of measures/ interventions provided in the preferred scenario

6.3.1 Network Hierarchy

For the future public transport network and supply, a system of network hierarchy is proposed. This system is defined with three levels:

- **Level 1: Primary Bus Lines**
  Primary Bus Lines servicing main urban development axes of high demand by connecting Limassol’s central business district with the sub-centres. Within the serviced corridors, they function as trunk lines for the complementary feeder network. Passenger demand on these lines is characterized as being “high” to “very high” compared to the other bus lines.
  The lines should have a direct routing, avoiding major detours to achieve short travel times. Their typical mode of operation is a conventional line service with defined bus stops and fixed timetables. On overlapping section with Secondary Bus Lines or Feeder Lines, the service can be upgraded to an express bus service stopping on selected bus stops only, whereas all intermediate bus stops are serviced by the complementing bus line. In order to provide sufficient capacity to cater for the passenger demand, standard buses (90 – 110 PAX per vehicle) are adequate on this level. Articulated buses (150 – 180 PAX per vehicle) could be appropriate for peak hour services along the coastal boulevard.

- **Level 2: Secondary Bus Lines**
  Secondary Bus Lines complement the main bus network together with the Primary Lines. They interconnect Limassol’s sub-centres to each other and service main ring roads. The lines also provide basic public transport services for high density areas located away from Primary Bus Lines.
While being connected to the Primary Bus Lines, they also function as a high-level feeder service for the Level 1 network.

Passenger demand on Secondary Bus Lines is classified as “medium” to “high”. As these lines servicing corridors complementary to the Level 1 lines, minor detours in the routing could be appropriate. Their typical mode of operation is a conventional line service with defined bus stops and fixed timetables. The typical vehicle is the standard bus (90 – 110 PAX per vehicle).

**Level 3: Feeder Lines**

Feeder Lines complement Limassol’s future bus network. They provide basic public transport service for all areas off the Primary/Secondary Line Network, especially low-density areas in the suburbs. In line with the low density in their service areas, passenger demand on Feeder Lines is rather low. The operational mode can be either a conventional bus service with stops at each bus stops along their route, or, if appropriate, an on-demand service (demand responsive = DRT), i.e. the bus stops only at bus stops requested by the passengers. The typical vehicle seize depends on the passenger volumes and range from minibuses (PAX) to standard bus (14 – 20 PAX per vehicle).

The following table presents an overview summing up the typical characteristics of the three levels of the network hierarchy.

<table>
<thead>
<tr>
<th>PT Network Level</th>
<th>1 Primary Bus Lines</th>
<th>2 Secondary Bus Lines</th>
<th>3 Feeder Lines / On Demand Services</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function</strong></td>
<td>Trunk line</td>
<td>Feeder service</td>
<td>Feeder service</td>
</tr>
<tr>
<td></td>
<td>Connecting CBD – sub-centres</td>
<td>Interconnecting sub-centres</td>
<td>Basic PT service for Low density areas</td>
</tr>
<tr>
<td></td>
<td>Servicing main urban development axes</td>
<td>Servicing main ring roads</td>
<td>All bus stops without Primary/Secondary Bus Line services</td>
</tr>
<tr>
<td><strong>Passenger Demand</strong></td>
<td>High to very high</td>
<td>Medium to high</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Line routing</strong></td>
<td>Direct routing</td>
<td>Corridor service</td>
<td>Area service</td>
</tr>
<tr>
<td></td>
<td>No detours</td>
<td>Servicing all stops</td>
<td>Servicing all stops with boarding/alighting passengers</td>
</tr>
<tr>
<td><strong>Mode of Operation</strong></td>
<td>Conventional</td>
<td>Conventional</td>
<td>Conventional or On Demand (if appropriate)</td>
</tr>
<tr>
<td><strong>Vehicles</strong></td>
<td>Standard bus</td>
<td>Standard bus</td>
<td>Standard bus</td>
</tr>
<tr>
<td></td>
<td>Articulated bus (if suitable)</td>
<td></td>
<td>Minibus</td>
</tr>
</tbody>
</table>

Table 11: Network hierarchy in PT, definition of level profiles

Since they operate as a feeder service, Level 3 bus lines have a short line length compared to Primary and Secondary Bus Lines, and passenger volumes are much lower, especially during off-peak hours. In case the passenger volumes fall below a specific threshold per trip (i.e. vehicle) and passenger demand is fluctuating day by day or there a service trips without passengers aboard, demand responsive transport systems (DRT) might be appropriate to ensure flexibility in operation. In DRT systems, passengers must order a bus service in advance and the bus stops only on request (call-a-bus). These on-demand services help to decrease public transport operation costs since they help to avoid services running without passengers. The decision whether a Level 3 bus line is appropriate for a DRT system or not depends (among other aspects) on the total passenger volumes of the line and its distribution during the operation hours. In addition, the total passenger volumes should not exceed 120 PAX per day and/or 8 PAX per vehicle as common thresholds. Usually, this decision cannot be made based on a transport model output but is rather a result of regular passenger counts/surveys following the implementation of the new services. However, DRT services as part of a subsidized public transport system (integrated PT tariffs apply) need to be distinguished from commercial “on-demand services” (e.g. uber).

For the assessment of a Bus Rapid Transit (BRT) for Limassol, please see Annex III, Chapter 2.
6.3.2 Bus Route Network

Since the current bus network in Limassol links all relevant origins and destinations within the city limits and beyond and broadly provides full area coverage, it proves to form a good basis for the future bus network development. The proposed improvements concern a moderate adaptation of existing bus lines to the network hierarchy, as in the following examples, e.g. line 30 (today) → line 1 (future), line 13 (today) → line 3 (future), line 18 (today) → line 7 (future) etc.

Both, the decrease in the number of bus lines and the re-routing aim at simplifying the bus network to achieve greater comprehensibility and adaptation to the urban development scenarios (e.g. new sub-centres). It includes:

- e.g. extending or shortening to sub-centres and to the new Central Bus Terminal (CBT),
- e.g. straightening of Primary Bus Lines to accelerate bus travel times.

The simplifying of the bus line network comes hand in hand with a simplification of the bus stop network, mainly to reduce stop times and to accelerate bus travel times respectively (see Ch. 6.3.6.1).

The proposed network concept introduces new bus lines on level 2 and 3 to service all the remaining bus stops which are not yet serviced by level 1 and level 2 lines:

- e.g. Secondary/Feeder Lines to cover remaining sections of re-routed bus lines,
- e.g. new Feeder Lines (level 3) that roughly match with current school bus services.

The proposed bus network comprises of the following bus lines (Table 12). The Primary, Secondary and Tertiary proposed future bus network for Limassol are illustrated in the Figures 22, 23 and 24 (see also Annex III, Figure A-III 1 to Figure A-III 3 for details in the city centre).

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Network Level</th>
<th>Direction</th>
<th>Routing</th>
</tr>
</thead>
<tbody>
<tr>
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<td>circle</td>
<td>Circle Line (Central Route in Limassol city centre)</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>radial</td>
<td>My Mall – Agios Tychnos/Meridien Hotel 1</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>radial</td>
<td>Central Bus Terminal – Moutagiake</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>radial</td>
<td>Central Bus Terminal – Germasogia</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>radial</td>
<td>Central Bus Terminal – Agios Athanasios</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>radial</td>
<td>Central Bus Terminal – Palodia</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>radial</td>
<td>Central Bus Terminal – Kato Polemida/General Hospital</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>radial</td>
<td>Central Bus Terminal – Ypsonas – Erimi</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>radial</td>
<td>Central Bus Terminal – Franklin Roosevelt – My Mall</td>
</tr>
<tr>
<td>90</td>
<td>1</td>
<td>radial</td>
<td>Tsiflikoydokia – Neapolis</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>radial</td>
<td>Trachoni – Enerios</td>
</tr>
<tr>
<td>22</td>
<td>2</td>
<td>radial</td>
<td>Central Bus Terminal – Aradnis</td>
</tr>
<tr>
<td>31</td>
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<td>radial</td>
<td>Central Bus Terminal – Vasilios Konstantinou – 1st Apriliou (E)</td>
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<tr>
<td>32</td>
<td>2</td>
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<td>Central Bus Terminal – Kosti Palamo – 1st Apriliou (W)</td>
</tr>
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<td>radial</td>
<td>Central Bus Terminal – Pano Polemida</td>
</tr>
<tr>
<td>50</td>
<td>2</td>
<td>radial</td>
<td>Central Bus Terminal – Vasilios Pavlou – My Mall</td>
</tr>
<tr>
<td>60</td>
<td>2</td>
<td>radial</td>
<td>Pano Polemida – Germasogia</td>
</tr>
<tr>
<td>90</td>
<td>2</td>
<td>radial</td>
<td>Ypsonas – Germasogia</td>
</tr>
<tr>
<td>103</td>
<td>3</td>
<td>tangential</td>
<td>Ypsonas – Dionisiou Solomou</td>
</tr>
<tr>
<td>101</td>
<td>3</td>
<td>tangential</td>
<td>Ermogenis – Erimi</td>
</tr>
<tr>
<td>102</td>
<td>3</td>
<td>tangential</td>
<td>Kolossi – Griva Digeni</td>
</tr>
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<td>104</td>
<td>3</td>
<td>tangential</td>
<td>Ypsonas – Ilia Venezi</td>
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<td>105</td>
<td>3</td>
<td>tangential</td>
<td>Ypsonas – Dionisiou Solomou</td>
</tr>
<tr>
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<td>3</td>
<td>tangential</td>
<td>1st Apriliou – Agios Athanasios</td>
</tr>
<tr>
<td>200</td>
<td>3</td>
<td>tangential</td>
<td>Trachoni – Trachoni</td>
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<td>3</td>
<td>tangential</td>
<td>1st Apriliou – Ilias</td>
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<td>3</td>
<td>tangential</td>
<td>1st Apriliou – school_new</td>
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<td>403</td>
<td>3</td>
<td>tangential</td>
<td>1st Apriliou – Pano Polemida</td>
</tr>
<tr>
<td>404</td>
<td>3</td>
<td>tangential</td>
<td>1st Apriliou – Kato Polemida</td>
</tr>
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<td>3</td>
<td>tangential</td>
<td>Kato Polemida – Agios Georgios Havouzas Church</td>
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<tr>
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<td>3</td>
<td>tangential</td>
<td>Pano Polemida – Nikeas</td>
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<tr>
<td>700</td>
<td>3</td>
<td>tangential</td>
<td>Eleutherias – Moutagiake</td>
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<td>3</td>
<td>tangential</td>
<td>Makariou III Ipsous – Ekalis</td>
</tr>
<tr>
<td>900</td>
<td>3</td>
<td>tangential</td>
<td>Petrompei Mavromichal – Apostolos Andreas Church</td>
</tr>
</tbody>
</table>

Table 12: Overview on proposed bus lines
Figure 22: Strategic map: Proposed future bus network for Limassol (Primary)
Figure 23: Strategic map: Proposed future bus network for Limassol (Secondary)
Figure 24: Strategic map: Proposed future bus network for Limassol (Tertiary)
6.3.3 Operation Hours and Frequencies

There are only few bus lines operating with regular frequencies in the current bus network and operation hours are broadly limited. Hence, a comprehensive upgrade of operation hours and frequencies will constitute a significant improvement in view of increasing the attractiveness of public transport in Limassol.

The proposed improvements comprise of (1) continuous operation hours from early morning (5:30 am) until midnight and (2) timetables with regular headways, frequencies of bus lines depend on the network level (passenger volumes) and the time of day.

A 20 min headway should be the minimum standard on all bus lines, to be increased up to a frequency of every 10 min during peak hours. This is an appropriate level of service for a city of the size of Limassol. Line 1, which is mainly connecting the hotel area at the eastern end of the coastal road to the city centre, should have an extended operation hour at night. The following tables (13-21) provide an overview on operation times and frequencies on an average workday.

<table>
<thead>
<tr>
<th>PT network Level</th>
<th>1 Primary Bus Lines</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekday</td>
<td>Monday – Friday</td>
<td></td>
</tr>
<tr>
<td>Operation Hours</td>
<td>5:30 - 06:45</td>
<td>06:45 - 09:00</td>
</tr>
<tr>
<td></td>
<td>09:00 - 13:00</td>
<td>13:00 - 15:00</td>
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<tr>
<td></td>
<td>15:00 - 17:00</td>
<td>17:00 - 19:00</td>
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<tr>
<td></td>
<td>19:00 - 22:00</td>
<td>22:00 - 24:00</td>
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<tr>
<td></td>
<td>00:00 - 1:30</td>
<td></td>
</tr>
<tr>
<td>Frequency every</td>
<td>20 min</td>
<td>10 min</td>
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<td></td>
<td>20 min</td>
<td></td>
</tr>
</tbody>
</table>

Table 13: Operation hours and frequencies in the proposed Primary Bus Line network

<table>
<thead>
<tr>
<th>PT network Level</th>
<th>2 Secondary Bus Lines</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Weekday</td>
<td>Monday – Friday</td>
<td></td>
</tr>
<tr>
<td>Operation Hours</td>
<td>5:30 - 06:45</td>
<td>06:45 - 09:00</td>
</tr>
<tr>
<td></td>
<td>09:00 - 13:00</td>
<td>13:00 - 15:00</td>
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<td></td>
<td>15:00 - 17:00</td>
<td>17:00 - 19:00</td>
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<tr>
<td></td>
<td>19:00 - 22:00</td>
<td>22:00 - 24:00</td>
</tr>
<tr>
<td></td>
<td>00:00 - 1:30</td>
<td></td>
</tr>
<tr>
<td>Frequency every</td>
<td>20 min</td>
<td>10 min</td>
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<td>20 min</td>
<td>10 min</td>
</tr>
<tr>
<td></td>
<td>20 min</td>
<td></td>
</tr>
</tbody>
</table>

Table 14: Operation hours and frequencies in the proposed Secondary Bus Line network

<table>
<thead>
<tr>
<th>PT network Level</th>
<th>3 Feeder Lines / On Demand Services</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekday</td>
<td>Monday – Friday</td>
<td></td>
</tr>
<tr>
<td>Operation Hours</td>
<td>5:30 - 06:45</td>
<td>06:45 - 09:00</td>
</tr>
<tr>
<td></td>
<td>09:00 - 13:00</td>
<td>13:00 - 15:00</td>
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<tr>
<td></td>
<td>15:00 - 17:00</td>
<td>17:00 - 19:00</td>
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<tr>
<td></td>
<td>19:00 - 22:00</td>
<td>22:00 - 24:00</td>
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<td></td>
<td>00:00 - 1:30</td>
<td></td>
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<tr>
<td>Frequency every</td>
<td>20 min</td>
<td>20 min</td>
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<td></td>
<td>20 min</td>
<td>20 min</td>
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<td>20 min</td>
<td>20 min</td>
</tr>
<tr>
<td></td>
<td>20 min</td>
<td></td>
</tr>
</tbody>
</table>

Table 15: Operation hours and frequencies in the proposed Tertiary Bus Line network
### Table 16: Operation hours and frequencies in the proposed Primary Bus Line network

<table>
<thead>
<tr>
<th>PT network Level</th>
<th>1 Primary Bus Lines</th>
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</thead>
<tbody>
<tr>
<td><strong>Weekday</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Bus Line 1</strong></td>
<td></td>
</tr>
<tr>
<td>Operation Hours</td>
<td>5:30 - 06:45</td>
</tr>
<tr>
<td>Frequency every …</td>
<td>20 min</td>
</tr>
<tr>
<td><strong>Saturday</strong></td>
<td></td>
</tr>
<tr>
<td>Operation Hours</td>
<td>00:00 - 1:30</td>
</tr>
<tr>
<td>Frequency every …</td>
<td>20 min</td>
</tr>
</tbody>
</table>

**Table 17: Operation hours and frequencies in the proposed Secondary Bus Line network**

<table>
<thead>
<tr>
<th>PT network Level</th>
<th>2 Secondary Bus Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weekday</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Bus Line 1</strong></td>
<td></td>
</tr>
<tr>
<td>Operation Hours</td>
<td>5:30 - 06:45</td>
</tr>
<tr>
<td>Frequency every …</td>
<td>20 min</td>
</tr>
<tr>
<td><strong>Sunday / Public Holiday</strong></td>
<td></td>
</tr>
<tr>
<td>Operation Hours</td>
<td>00:00 - 1:30</td>
</tr>
<tr>
<td>Frequency every …</td>
<td>20 min</td>
</tr>
</tbody>
</table>

**Table 18: Operation hours and frequencies in the proposed Tertiary Bus Line network**

<table>
<thead>
<tr>
<th>PT network Level</th>
<th>3 Feeder Lines / On Demand Services</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weekday</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Bus Line 1</strong></td>
<td></td>
</tr>
<tr>
<td>Operation Hours</td>
<td>5:30 - 06:45</td>
</tr>
<tr>
<td>Frequency every …</td>
<td>20 min</td>
</tr>
<tr>
<td><strong>Sunday / Public Holiday</strong></td>
<td></td>
</tr>
<tr>
<td>Operation Hours</td>
<td>00:00 - 1:30</td>
</tr>
<tr>
<td>Frequency every …</td>
<td>20 min</td>
</tr>
</tbody>
</table>

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Table 21: Operation hours and frequencies in the proposed Tertiary Bus Line network

The operation hours can be adapted on those bus lines (or sections of bus lines) having very low passenger volumes in the early morning or the late evening. However, this should be the result of a passenger survey after the implementation of the new services. Another option would be to switch level 2 or level 3 lines with low passenger volumes to a DRT service to avoid bus services running without passengers.

The proposed bus network and the operation concept (operation hours and frequencies) correspond to the ideal situation and are the recommendation for the development of the future public transport system. As mentioned before, this is necessary for a paradigm change of transport in Limassol and can be seen as a compromise between public transport funding and the aim to significantly improve the service.

However, should budget restrictions apply to the first years of operation, i.e. 2020 and following, then a reduction of the proposed service kilometres can be envisaged. This could be a reduction of frequencies from 10 to 20 minutes in off-peak periods and on lines with lower demand. But one has to be aware that this reduction of supply not only comes along with a reduction of costs for subsidies but also reduces the attractiveness of the PT system considerably and therefore puts the whole concept of the new SUMP mobility concept in question.

6.3.4 School Bus Lines

The concept design of the future regular bus line network (see chapter 6.3.2) aims at covering and bundling as many trip purposes as possible, including education (pupils, students), since most of school and sites and sites of the Cyprus University of Technology (CUT) have bus stops with regular bus services in appropriate walking distance. The proposed operation hours and frequencies for the three levels of the regular bus services (see chapter 6.3.3) cater for needs of pupils and students to get to and from school/university. Additional services during the peak hours are mandatory. This concept is standard in many European cities with substantial bus services throughout the day and comparable with Limassol. As a result, pupils and students form a specific demand group, among other, in regular bus lines, and there is no need for extra bus school services which are expensive and would overlap with regular bus services.

Nevertheless, a small number of schools could not be integrated in the regular bus network, mainly due to their remote location or some specific origin-destination links are not suitably covered by regular bus lines. In these cases, designated school bus lines should complement Limassol’s bus services. Theses school buses focus on the transportation of pupils and students. The lines usually operate on weekdays and for only few hours in the morning and in the evening.

To cater the demand for these school locations, three lines were taken from the existing bus routes and introduced into the bus line concept:

- School bus line 0001: 1st Apriliou - Charalambou Evagorou
- School bus line 0002: Kolossi Primary School
- School bus line 0003: Petrompei Mavromichal

The school bus lines have 20 minutes headways which refers to services provided around school start and end times plus demand responsive services in the intermediate intervals. The 20 minutes headways reflect average number of services on demand. Timetables need to be aligned with starting/finishing times of classes.
Figure 25: Integration of school locations into the public transport network
Figure 25 above represents the school and university premises and the line routes of bus services. As can be seen, all premises are within walking distance to bus services and stops.

6.3.5 Bus Terminals

6.3.5.1 Central Bus Terminal (CBT)

Function

The Central Bus Terminal (CBT) will be located at Andrea Themistokleous St./Anexartisias St. in Limassol’s historic city centre. The location currently hosts several bus stops already, mainly for rural lines and is in walkable distances from the university, Limassol’s main shopping and district and the coastal road.

The following figure (Figure 26) shows the central bus terminal (CBT) at Themistokleous street and the walking distances to the most relevant attractions.

![Figure 26: Walking times from CBT to selected destinations (minutes at 4km/h)](image-url)

The CBT will be the terminus of 15 bus lines:

- Central Line
- Primary Lines 2 – 8, and
- Secondary Line (10, 21, 22, 31, 32, 40, 50).

All of these bus lines, apart from the Central Line, are radial lines terminating at the CBT. Hence, the volumes of passengers transferring between different bus lines will be rather limited, i.e. the CBT will not have the function of a transfer hub. However, it is an important gateway to public transport in Limassol given its specific location at the heart of the city centre providing access at a walking distance for a great number of public and private sector employees, the estimated 4,500 students of the Cyprus University of Technology (CUT), citizens visiting main destinations in the city centre, as well as many tourists visiting Limassol city centre.
From the figure above (Figure 27), it becomes obvious that access and egress roads to and from Themistokleous bus terminal need to be reserved for public transport to allow for free passage of buses. In the peak hours, up to 15 buses have to pass through the streets every 10 minutes. This holds true for both, access and egress roads, consequently, no private vehicles can be allowed in this part of the network.

Bus vehicles entering pedestrian zones are common throughout European cities (e.g. Münster (Westf.) (Germany), Warsaw (Poland) or Bologna (Italy)). Safety conflicts on Anexartisias St. between pedestrians or cyclists and buses can be minimised by setting a speed limit of 20 km/h for buses on the difficult sections of Anexartisias St.

**Capacity**

The required capacity of the CBT (i.e. the number of stop-points at the terminal) depends on how many bus vehicles stop simultaneously at the terminal during the peak hours. According to the line concept, 15 bus lines will service the CBT every 10 minutes. With respect to the timetable synchronisation of radial and tangential bus lines at transfer points (see chapter 6.3.6.2) and the proposed frequencies in timetables, up to 12 bus vehicles will occupy the CBT concurrently.

Hence, 12 bus bays are sufficient to cope with the proposed service concept in public transport. All bus bays are needed for passenger boarding and alighting with short changing times between the preceding and the following vehicle, i.e. bus drivers cannot have their rest times at the bus bay. It is therefore recommended to allow for another 2 to 3 bus bays, if the space is available, to increase operational flexibility.
An alternative solution to reduce the number of bus bays and to minimize the space requirements, to fewer than 12 bus bays, would be to reduce the number of buses lingering simultaneously at the CBT by limiting the stop time per vehicle to 3 minutes and spreading the stops times of all lines evenly over the 10 minutes interval. This measure, however, would certainly result in the partial loss of optimized transfer times between radial and tangential bus lines along the ring roads in Limassol. Thus, with less than 12 bus bays, the bus operator would lose in terms of bus operational flexibility.

**Bus Terminal Layout and Design**

The following pictures (Figures 29 and 30) display an optional solution for the layout and design of the future Central Bus Terminal.

![Figure 29: CBT: optional solution for the bus terminal layout and design](image)

The following figure (Figure 31) represents the functional design layout for the bus operation within the terminal as well as access to and departure from CBT (please take note that this preliminary design has no scale).
Figure 31: Functional layout plan CBT
The concept for the future bus route network presented above (see chapter 6.3.2) has the Central Bus Terminal (CBT) in the city centre at Andrea Themistokleous St./Anexartisias St. as the main bus terminal, where most of the Primary Lines (except Line 1) and some Secondary Bus Lines meet allowing a smooth transferring for bus passengers. The proposed CBT is a key element of the strategic bus concept and has the following advantages:

- Limassol is a relatively small city; a centrally located bus hub allowing passengers to change between most of The Primary Bus Lines and many Secondary Bus Lines is the most comprehensible and comfortable solution.
- The CBT allows passengers to transfer between two radial lines with a smooth one-stop-change. Changing between radial lines is also possible by avoiding the city centre and using the tangential lines 70 or 80. In some cases, this could be even slightly faster than travelling via the CBT. But it requires changing twice which is less comfortable. Even evaluations of the transport model proved that most passengers are changing between the lines at the CBT as then they have to change only once.

There are, however, strong concerns about the number of buses per hour directed towards the CBT during peak times (up to 12 buses every 10 mins), which is a flow of buses in the city centre with its relatively narrow streets and dense population. These buses will create noise and pollution within the pedestrian area affecting residents and visitors. Should these concerns prove true, then a deviation from the ideal plan is possible to reduce the traffic impacts by relocating some lines away from the CBT. In this case or also for a phased implementation of the concept, the terminus stops of two Primary Bus Lines and of two Secondary Bus Lines could be moved from the CBT to a stop point on the seafront boulevard opposite to Anexartisias St., which is actually a 6 to 7 mins walk from the CBT. The suggested lines to be relocated, are:

- Line no. 2 (Primary) Mouttagiaka – Limassol Centre (New stop at seaside boulevard)
- Line no. 8 (Primary) My Mall – Limassol Centre (New stop at seaside boulevard)
- Line 10 (Secondary) Ariadnis - Limassol Centre (New stop at seaside boulevard)
- Line 21/22 (Secondary) Agios Athanasios - Limassol Centre (New stop at seaside boulevard).

This solution comes along with other advantages, e.g.

- Bus passengers will have a shorter access to destinations along the coastal boulevard.
- The relocated bus lines can use the segregated bus corridor along the coast.
- The terminal stop on the coastal road (which is already proposed as an intermediate stop of Primary Bus Line 1) is located only in a short walking distances (approx. 300 meters) from the CBT, and it is proposed to be connected by an excellent pedestrian infrastructure.

A major disadvantage of this solution are more traffic related impacts on the coastal boulevard and the fact, that a turning infrastructure for buses is required in a high-price downtown location.

6.3.5.2 Multipurpose City Terminal close to Leontiou street

Currently, rural buses stop at the Old Hospital bus stop on Leontiou. In the short future, a new Bus Station close to Leontiou street is proposed and designated to be the central bus hub for rural bus services in Limassol. In addition, the terminal can be used as a modern facility where the citizens will be able to:

- charge their private or car-sharing electric vehicles/ or swap their exhausted batteries,
- fill their special vehicles with alternative fuels (e.g. biogas),
- access bike and or e-bike sharing services or charge their private bikes,
- get access to a small shopping mall

This Bus Station will be connected to Limassol’s Central Bus Terminal at Andrea Themistokleous St. by Primary Bus Line 6 and Secondary Bus Lines 40 and 50.

Intercity buses terminate at the new port, also to allow for convenient transfer to cruising ships. Also, Bus Lines 1 and 70 may serve tourists arrived in the port to reach the coastal avenue and interchange/transfer bus stops to travel in the whole city. In addition, a direct connection between some rural buses and intercity service is provided through interchange bus stops (see below). Alternatively, line 80 connects the rural buses and the intercity buses. Since Themistokleous terminal will not be accessible for intercity buses and tourist coaches, primary line 1 passing the new port will serve as direct connection to the central city areas.
6.3.5.3 Bus Depot and Maintenance Facilities

The operation of enhanced bus services in Limassol requires a large bus depot and state-of-the-art maintenance facilities to overhaul and clean the bus vehicles and to prepare them for the service. The respective facilities are space consuming and produce noise and other disturbing impacts resulting from maintenance work. Moreover, the bus vehicles produce traffic related impacts on the access roads to the depot site, particularly noise pollution and harmful emissions at least as long as the vehicle fleet is not fully electrified.

Therefore, the bus depot should be located outside of the city centre or other residential areas to avoid negative impacts on residential areas, preferably in an industrial area with short access to the bus route network, e.g. next to the Vertical Port Road. The future bus operator should be urged to propose an appropriate location in coordination with the municipality of Limassol.

6.3.6 Bus Stops

6.3.6.1 Bus Stop Locations

Simplifications of the current bus stop network were foreseen wherever there was a necessity for such an action, and it made sense. At present, there is an oversupply of bus stops in the city of Limassol, according to the recorded bus stops in the survey. Therefore, an abandoning or merging of current bus stops is proposed to achieve an average distance of 600 to 800 m between two subsequent bus stops, i.e. an access distance for public transport users of 300 to 400 m at the maximum (shorter distance in the city centre, longer distance in the suburbs). An average access distance of 400 m to the next available bus stop is a standard minimum value for cities of a comparable size and spatial structure to Limassol. In most cases, access distance will be much shorter.

Even with a reduced number of bus stops, a full area coverage in Limassol is guaranteed (see Figure 32 below).

![Figure 32: Area coverage of the proposed bus stop network (400 m stop catchment area)](image)

A reduced number of bus stops in the public transport network will reduce the number of vehicle stops, speed up travel times in public transport and make public transport in Limassol more attractive and competitive to private transport.

The design and the equipment of bus stops should support an easy, attractive and informative access to a high-quality public transport system. Hence, the following equipment is recommended:

- paved waiting space and paved and paved access walkways
- elevated curbs for a barrier-free vehicle access
- tactile guidance system to ensure inclusion of people with visually impairments
- bus shelter providing protection from rain and sun (at least on more heavily frequented bus stops)
- lights
- seats
- waste bins
- basic information on public transport (timetable, line map, fare info)
- screen with real time information (at least on more heavily frequented bus stops)

A project to implement appropriate stop infrastructure is already in the pipeline for implementation in 2020.

### 6.3.6.2 Interchange/Transfer Bus Stops

#### Stop Location

Since transport demand in Limassol is not always targeting the city centre, the need for cross-links is obvious, e.g. between suburbs or between suburbs and different core parts of Limassol. Most of the cross-links are not covered by direct bus lines. Hence, optimised transfers connections at the cross points of radial and tangential bus lines are required.

The strategic location of an optimum number of transfer stops and stations in the public transport network are defined in the following Figure 33 and Table 22. Interchange bus stops are located between radial lines (Primary Lines) and tangential line 70 (Secondary Lines). Ideally, the transfer times at these stops between bus lines range between 3 and 5 mins, at least for the main transfer passenger flows.

![Figure 33: Interchange/Transfer bus stops in the future public transport network](image)

<table>
<thead>
<tr>
<th>Radial line no.</th>
<th>Interchange/Transfer bus stop with tangential line 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 1/2</td>
<td>Griva Digeni IC (No. 72420)</td>
</tr>
<tr>
<td>Line 3</td>
<td><strong>No appropriate transfer bus stop available</strong></td>
</tr>
<tr>
<td>Line 4</td>
<td>Spyrou Kyprianou IC (No. 54000)</td>
</tr>
<tr>
<td>Line 5</td>
<td>Spyrou Kyprianou IC (No. 53995)</td>
</tr>
<tr>
<td>Line 6</td>
<td>Spirou Kyprianou IC (No. 14630)</td>
</tr>
<tr>
<td>Line 7</td>
<td>Paphou IC (No. 11309)</td>
</tr>
<tr>
<td>Line 8</td>
<td>Fraglinou Rousvelt IC (No. 11323)</td>
</tr>
</tbody>
</table>

Table 22: Interchange/Transfer stops between radial bus lines and tangential line 70
6.3.6.3 **Multimodal Transport Hubs**

Hubs aim at connecting local urban (and, if applicable, intercity buses and rural bus line) with local “last mile” transport services and private transport means (car, bike). Thus, multimodal transport hubs play an important role in an integrated urban transport system. They ensure transfer opportunities between:

- Primary Bus Lines
- Feeder Bus Lines
- Rural Bus Lines (Village Lines)
- Intercity Bus Lines (if servicing sub-centres)
- Commercial on-demand services (e.g. ridesharing and ride selling like uber, etc.)
- Car Sharing and Bike Sharing systems
- Taxis
- Private Car and Bike

Besides their function as a visible (!) transport infrastructure to promote multimodal traffic behaviour, other services could be included into the hub, and hubs could be equipped with, e.g.:

- Information on available transport options/alternatives and the respective terms of use;
- Transport related services aiming at reducing obstacles for users of “unconventional” transport means, e.g. maintenance service for bikes or charging stations for e-cars and e-bikes;
- Other services related to daily needs in order to avoid additional trips for the hub users, e.g. letter box, parcel box or kiosk with coffee and snacks.

Multimodal transport hubs should be implemented at the terminus of Primary Bus Lines (mostly in sub-centres to support last mile services in Limassol’s outskirts) and at the Central Bus Terminal at Andrea Themistokleous St./Anexartisias St. The following Figure 34 represents potential locations of multimodal transport hubs, following above mentioned concept.

![Figure 34: Multimodal transport hubs](image)

The required space and the dimensioning of the hubs mainly depend on transport services available at the site (e.g. number of bus lines, car or bike sharing service, etc.) and their respective requirements. The following Figure 35 shows a typical layout of a small multimodal transport hub.
Figure 35: Typical layout of a small multimodal transport hub

For more details on design and requirements on the layout, please see Annex III, Chapter 3.

6.3.7 Park & Ride

Park and Ride (P&R) facilities are parking facilities with public transport connections that allow commuters and other people heading to city centres to leave their vehicles and transfer to a bus, a rail system, or carpool for the remaining section of their journey. They facilitate the access to the public transport system from the road network. The vehicle is left at the parking lot during the stay in the city until the owner returns. Park and Ride facilities mainly address commuters. The facilities are usually located in the suburbs of large cities or metropolitan areas.

According to the LLP, five locations along the bypass motorway and Omonoias St. are considered as P&R facilities for Limassol (see figures in Annex III, Figure A-III 6).

The following Figure 36 represents the optimized locations of P&R facilities in context of lines serving those places as well as taking into consideration the availability of space after personal field visits.

Figure 36: P & R places and primary bus lines

The spots were assessed and evaluated by team members. As a result, the locations 3 to 5 were considered reasonable and they are (by visual standards) available (see Annex III, Figure A-III 6). In contrast, location 1 is considered not feasible due to availability and high land prizes (according to Department of Land and Surveys data from 2013). Therefore, an alternative location for P&R 1 near roundabout Pafou/Vertical road is proposed (please see Annex III, Figure A-III 6 for more details).
Location 2 was considered reasonable and available. Nevertheless, following discussions between the team and stakeholders, the primary line 6 serving the original location had to be re-routed. Therefore, the P&R site also had to be reallocated to an (by visual standards) available site near Despoinas & Nikou Patichi. The new location is included in the figure above (Figure 36).

The proposed indicative positions relate to the following street intersections (the numbering of stations is from west to east). All P&R stations are integrated into the public transport network with short walking distances to the next bus stop with Primary Line service.

To encourage multi modal behaviour and the usage of bus P&R facilities, flanking measures should be implemented, e. g.:

- Real time user information provision in the approach of P&R facility on the number of available free parking lots, the next departures times of public transport means, the approximate travel times by bus to the city centre (possibly in comparison to the real time on congested roads), fares and offers, etc.

- Special fares integrating the parking fee and the public transport fare for a return or a day ticket: for PT pass holders, parking is generally free on P&R sites; for others, the purchase of a return or day ticket grants free parking for the time between departure by bus and arrival.

As noted above, P&R is usually applied in suburbs of large cities of metropolitan areas. Having said this, it has to be noted, that the demand for P&R in Limassol cannot be determined exactly. The size of the city may not be sufficient to attract P&R with respect to geographical dimension (distances to be covered) and potential (number of residents and in turn: trips). Both, the trips from home to the respective P&R station as well as the following PT trip to the final destination (and vice versa) are not always justifying a transfer between the modes, even assuming optimal and convenient connections.

Having attractive services on all primary and secondary routes, a direct bus ride (or even one with transfer between different lines) within the study is probably preferred, unless the starting point is not within reasonable distance to attractive services at all.

Apart from local population, Cypriots and tourists from other parts of Cyprus approach the study area by private motorized transport from motorway A1 West (Paphos), B8 Giannou Kranidioti North (Troodos) and A1 East (Larnaca/ Nicosia). Therefore, it is proposed to implement P&R rather for long- and medium-distance trips although the demand is probably quite low. As a consequence, we suggest starting the implementation with the locations nearest roads towards major remote destinations, i.e. number 1 for Pafos (also Episkopi, Erimi, Kolossi), number 2 for the road towards Troodos and number 5 for Larnaca, Nikosia, Amochostos. While sufficient land should be reserved or even purchased, it seems advised to start implementation on smaller scales with the option to increase size according to (hopefully increasing) demand. It is estimated that a total of 50 parking places plus 20 bicycle stands would be the maximum capacity to be reached. The following Figure 37 represents a typical P&R place (one of five P&R in the city of Oberhausen).

Figure 37: Park and Ride layout, example from city of Oxford, UK
As can be seen, about 10% of reserved parking places are over-sized to allow disabled persons convenient access to their vehicles. Those reserved spaces for disabled as well as the stands for bicycles are located nearest to the bus stops.

### 6.3.8 Bus Prioritisation Measures

#### 6.3.8.1 Exclusive Bus Lanes

In order to reduce travel times in public transport and to provide more reliable bus services in Limassol, it is highly recommended to introduce bus prioritization measures. The following Table 23 and schematic maps (Figures 38 and 39) show where exclusive bus lanes should be implemented. Some of the bus lane schemes are combined with new pedestrian areas.

<table>
<thead>
<tr>
<th>exclusive bus lane</th>
<th>lane(s) for private vehicles</th>
<th>lane(s) for buses</th>
<th>Approximate Length</th>
<th>Effective Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Archiepiskopou Leontiou A’</td>
<td>1</td>
<td>1</td>
<td>16th June 1943 str.</td>
<td>10.0m</td>
</tr>
<tr>
<td>2 Thessalonikis str.</td>
<td>1</td>
<td>1</td>
<td>16th June 1943 str.</td>
<td>10.0m</td>
</tr>
<tr>
<td>3 Agias Zonis str.</td>
<td>1</td>
<td>1</td>
<td>16th June 1943 str.</td>
<td>10.0m</td>
</tr>
<tr>
<td>4 Vertical Port Rd.</td>
<td>1</td>
<td>1</td>
<td>16th June 1943 str.</td>
<td>10.0m</td>
</tr>
<tr>
<td>5 Aktea St.</td>
<td>1</td>
<td>1</td>
<td>16th June 1943 str.</td>
<td>10.0m</td>
</tr>
<tr>
<td>6 28th October Ave.</td>
<td>1</td>
<td>1</td>
<td>16th June 1943 str.</td>
<td>10.0m</td>
</tr>
<tr>
<td>7 Pedestrianisation of streets combined with public transport right of way in the following streets: Koumandarias, Genethliou Mitella, Saripolou, Giagkou Potamiti, Kitiou Kyprianou, Kanari, Georgiou Gennadiou, Andrea Themistokleous, Anexartisias, approximate length:</td>
<td>1</td>
<td>1</td>
<td>1400 m.</td>
<td>10.0m</td>
</tr>
</tbody>
</table>

For most cases above see indicative cross sections in Figures 40 to 42.

Table 23: Overview on proposed exclusive bus lanes
Figure 38: Locations of proposed exclusive bus lanes

Figure 39: Locations of proposed exclusive bus lanes (zoom on the city centre)
Figure 40: Cross section: bus-only road

Figure 41: Cross section: two-way road with bus lanes 2 directions

Figure 42: Cross section: one-way road with separate bus lanes 2 directions
As specified in the implementation plan, the bus lanes in general and on the coastal avenue in particular will be implemented and converted in several phases. All bus lanes will be marked on the road and appropriate signage will be installed. The exclusivity of bus lanes applies all day and night. Where appropriate in terms of width, bus lanes will be opened for cyclists (see section 4). In case private and commercial motorized traffic is obstructing bus operation on (selected) road sections also in the northern parts of Limassol, an extension of dedicated bus lanes should be envisaged.

The exclusive bus lanes according to the proposed implementation plan are to be realised in 2022-2023 and 2026-2027 (Please see sections 2.6 and 2.7 as well as Appendix B of D.1.1-1).

6.3.9 Vehicles

Type of vehicles
Bus operators aim at achieving a balance between the provision of sufficient transport capacity to cater for the passenger demand on the one hand side, and their operation costs on the other hand side, mainly influenced by the driver costs. This aim can be reached by a vehicle fleet comprising of a mix of vehicle types with different capacities.
It is therefore recommended for Limassol to gradually set up a vehicle fleet comprising of the following vehicle types:

- **Articulated buses** have a capacity of 150 – 180 PAX per vehicle. They are suitable for bus lines with a high passenger demand, i.e. could be appropriate for peak hour services of bus line 1 along the coastal road depending on passenger volumes at long term.

- **Standard buses** have a capacity of 90 – 110 PAX per vehicle. Theses vehicle can be characterized as “all-around”, serving a wide range of passenger demand levels in an efficient way. Standard buses will form the core supply of the vehicle fleet.

- **Minibuses** usually have a capacity of 14 – 20 PAX per vehicle. They are suitable for low demand services, e.g. demand responsive transport (DRT) and are flexible enough to service small lanes in the city centre as well as narrow and winding streets in Limassol’s outskirts, where standard buses would be too large and not flexible enough.

A major aim of this SUMP is to support sustainable and environmentally friendly transport in Limassol. It is therefore highly recommended to gradually replace the existing Diesel-powered bus fleet with buses using alternative drive technologies (biofuel, gas, electric or hydrogen powered or hybrid technology).

**Fleet Size**

The required number of vehicles to provide the proposed public transport services depends, amongst others, on the operational concept of the bus operator (i.e. how flexible bus vehicles can switch from line to line to achieve an optimal turn-around) and the drive technology (e.g. the length of the period per day electric buses are occupied for recharging). Assuming that the vehicles are assigned to a specific bus line and ignoring the needed time for recharging, a **fleet of 164 bus vehicles** is required in order to operate the public transport concept and cater for the expected demand during peak hours. An optimised fleet operation concept allowing for a maximum flexibility in terms of vehicle deployment can help to reduce the required number of vehicles up to 10 percent.

**Requirements on the Vehicle Equipment and Comfort**

The bus fleet should only encompass vehicles which possess an attractive state-of-the-art equipment and comfort, allow for fast and comfortable passenger access and egress, and are accessible to persons with disabilities. This includes the following minimum equipment and characteristics:

- **Intermodal Transport Control System** corresponding with the PT Telematics project (ITCS: enables vehicle tracking and tracing, driver guidance, operation control and monitoring) and devices (ticket printer/reader, displays, mobile radio/communication network)

- **Consistent and easy-to-understand on-trip passenger information system:**
  - Outside displays on the vehicle front over and over the front door: line number, terminus, important intermediate stops
  - In-vehicle screens/displays: line number, terminus, next and following stops, additional real time information (e.g. status of service, delay, temporary interruption, detours, suspension etc.)
  - Audio system with bilingual stop announcement
  - Bus network plan
  - Basic tariff information

- 2 – 3 wide doors (depending on vehicle size/capacity) for fast and smooth passenger access and egress, thereof at least one door completely barrier-free

- Multi-purpose space (for luggage, strollers, walking frames, wheelchairs, bikes, etc.)

- Low-floor access

- Upholstered seats

- Stop call buttons

- Air-conditioning

- Wi-fi (as an additional incentive for the passengers)

All bus vehicles should follow the “Limassol Public Transport” corporate design features, both internally and externally.
6.3.10 Pre-trip Passenger Information

With printed timetables and web-site services (http://limassolbuses.com) and the web-site ‘www.cyprusbybus.com’ with countrywide information on public transport and electronic trip planner (also available as mobile app), up-to-date solutions for the pre-trip passenger information are already available.

Regarding the electronic trip planner (website/mobile app), it is suggested to offer users an option of an address-based trip planning instead of selecting bus stops from a scroll-down list like right now. On one hand, the actual planner requires the knowledge of the correct names of bus stops, which are presumably widely unknown particularly to the non-regular user. On the other hand, many potential public transport users know the address of their starting point (or they are being localised automatically by the GPS feature in their smartphone) and where they want to go.

The roll-out of “PT-Telematics-project” is under way for providing the necessary prerequisites for real time services. In terms of passenger information (pre-trip and/or on-trip), the system includes:

- Web and mobile applications (the latter called Cyprus buses) for all public transport services in Cyprus providing trip planning and estimated time of arrival at bus stops. The application is directly accessible and via adequate links, which will be installed at all operators’ and the Ministry’s websites;
- SMS application and smartphone application for receiving real time information on bus arrival on the move;
- Integration with existing front and back LED displays and voice announcement systems within buses and bus stations;
- Installation of 30 LED displays at major bus stations & central locations subject to further expansions in the years to come.

The pre-trip service of real time information on bus services would allow bus users to early organise alternative transport options if the virtual connection is delayed or cancelled.

6.3.11 Technology

The on-going countrywide PT Telematics project aims at endowing both buses and bus stops with vending and validating machines and allows the introduction of electronic ticketing options (travel cards) and web and mobile app-based ticket services. The use of digital technology (e.g. based on a special debit card or on mobile apps) delivers numerous advantages for both bus passengers and operators:

- Mobile apps or travel cards (with charging option at vending machines) allow bus passengers to purchase bus tickets regardless of conventional “analogue” distribution channels and opening or service hours. As a side effect, digital service eases stress from bus drivers, allowing them to focus more on their actual driving tasks.
- When public transport users can conveniently check in and check out in a bus, they produce individual data. These data provide important information to bus operators and support them in the optimisation of their services (transport planning) and operation procedures, e.g. with data on occupancy of vehicles or specific mobility patterns of the passengers (length of in-vehicle stay, transfers between bus lines, typical activity pattern etc.).
- E-ticketing makes the boarding of buses faster since bus drivers do not need to sell tickets. Both passengers and drivers do not have to handle with change anymore. As a result, stop times will be reduced, buses will become faster and travel times shorter. Bus passengers benefit from an earlier arrival at their destination, whereas bus operators are potentially able to optimise the number of vehicles required per line making the whole PT system more efficient.

The choice of the correct ticket for the best price is an access barrier for many public transport users, especially for occasional users. Currently, they need to consider soundly in advance for which and for how many trips they will use public transport before deciding on a specific ticket/tariff, which they do not know if it is really the appropriate one or not. The introduction of an electronic ticketing system offers the chance to lower this barrier since it will be possible for bus operators to offer a „Pay As You Go“ option. The optimal fare from the tariff scheme (best price) is automatically calculated depending on their trips undertaken within a specific time interval. The passengers’ travel card, smartphone app or bank account are automatically charged with this ‘best price’ fare.
7 Pedestrian Measures

7.1 Introduction

Walking is the most natural as well as the most social form of mobility. It is available to almost everyone at any time, is free of charge, saves resources, does not cause emissions and requires comparatively little space. In addition, walking is good for your health.

The great importance and the clear advantages of pedestrian traffic are clearly disproportionate to the reality in Limassol. In most parts of the city’s network, only leftover areas are designated to pedestrians in contrast to the sufficient or even generously dimensioned roadway space. A convenient and safe footway network with high amenity values is, with few exceptions, rarely found in Limassol city but also in most of the municipality centres. This is particularly worrisome in the light of demographic development, having an increasing share of active elderly population with potentially more disabilities.

The integrated pedestrian network plan aims to:

- Improvement of safe pedestrian infrastructure
  - Provide adequate and wide pedestrian pavements along all urban roads
  - Extend share of pedestrian areas
- Pedestrianisation of commercial streets
- Reduction of road capacities

7.1.1 Current Status

An assessment was conducted on selected network elements in Limassol and five municipality centres to analyse the quality of the pedestrian network. The assessment was based on a set of performance indicators of the walking network’s components and was conducted on some major corridors, as well as on selected sections in Limassol city centre and the five municipalities. Quality criteria for the assessment comprised of:

- Existence of separate (raised) sidewalk
- Sufficient width (minimum 1.5 metres)
- Accessibility of sidewalk (height of curb, ramps)
- Existence of obstacles (e.g. trees, pillars and traffic signs or other installations) that limit the effective width
- Parked vehicles (beyond short term)
- Quality of surface (paved/cobbled, damaged)
- Road traffic (low/medium/high volumes, effective speeds)

Based on the indicators listed above, six respective Levels of Service were defined:

<table>
<thead>
<tr>
<th>Level</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>safe and wide, good surface</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>safe, wide, deficient</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>no facilities, convenient</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>separate, narrow, deficient</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>no facilities</td>
</tr>
<tr>
<td>F</td>
<td>6</td>
<td>no facilities, dangerous</td>
</tr>
</tbody>
</table>

Figure 44: Walking network: Levels of Service

The detailed results of the pedestrian network assessment are described in detail in Deliverable D5.1 Problem Analysis Report, section 3.5.1.

In general, it can be said that the infrastructure for pedestrians is - with some exceptions - rather inconvenient, poor and partly even unsafe. Apart from the waterfront park, some designated and renovated sidewalks and some more or less isolated Pedestrianised areas, walking infrastructure is
underdeveloped and does not cater for walking to be constituted as a convenient and safe mode of transport.

In Limassol city and in the municipalities, good examples can be found for pedestrianised areas. Some of them are open in the morning hours for loading and unloading. However, they generally lack consistency with respect to connectivity. Furthermore, where pedestrianised areas are intersected by streets, the entrances are very often blocked by illegally parked vehicles, also at night-time.

Some sidewalks along streets are designed in an appealing way with good surface. Nevertheless, sometimes street furniture and trees significantly hinder walking along those roads.

When sidewalks are not protected from vehicle parking (e.g. by bollards) they are usually blocked by vehicles. If they are protected by bollards, quite often the resulting width is very low. The majority of streets though either do not have sidewalks at all or the sidewalks are in an insufficient or even dangerous condition.

The seaside park with good facilities for walking (and cycling and other recreational activities) is separated from the city centre by the 4-lane Spyrou / Christodoulou / 28th of October Avenue with rather high levels of traffic crossing at high speeds. Although there are a number of signalized crossings and a footbridge (with an elevator, mostly not in operation), the road is considered as a serious obstacle.

7.1.2 Objectives of Pedestrian measures

The overall objective of this key aspect is to provide pedestrian infrastructure that can be used conveniently and independently by people with different resources and competencies. The share of walking as competing mode of transport needs to be increased significantly. Specific main targets for the concept were defined to be:

- High Technical and Social Safety standards: pedestrians are the most vulnerable road users, therefore conflicts with other road users need to be minimized, ideally by separating pedestrians from (mainly motorized) traffic. Appealing design, avoiding underpasses or bridges and lighting increase social safety and sense of security.
- Direct connections with minimized detours: walking is quite detour sensitive, therefore origins and destinations for pedestrians should be kept as short and direct as possible (e.g. with respect to crossing roads or intersections). Appropriate signposting helps to reduce searching and detours.
- Appropriate dimensioning: pedestrians need to be able to walk comfortably (possible even in pairs) without conflicts with other pedestrians, cyclists or other obstacles. This includes walking with buggies/walking frames/wheelchairs or with some luggage.
- Minimization of obstacles: trees/tree pits, street furniture, high curbs are hindering all pedestrians and even more so affecting persons with limited mobility. Therefore, besides appropriate dimensioning, arrangement or if necessary, prevention of potential obstacles is crucial.
- Attractive design: appealing design makes walking not only socially safer but also more attractive as a competing mode for short-distance trips. Moreover, consistency of appealing design has a highly positive impact on both, short- and medium-distance trips.
- Requirements of persons with disabilities: apart from the physical accessibility, consistent design and appropriate guidance measures support traveling of persons with limited mobility also in context of interchange between walking and public transport.

7.2 Key Strategies

Walking is the most natural as well as the most social form of mobility. It is available to almost everyone at any time, is free of charge, saves resources, does not cause emissions and requires comparatively little space. In addition, walking is good for your health. Walking does not only serve to cover distances but also comprises aspects of communication and abidance in public streets and places.

It is of utmost importance, to provide pedestrian infrastructure that can be used conveniently and independently by people with different resources and competencies. The share of walking as competing mode of transport needs to be increased significantly.
The key strategies to enhance the extend, safety and quality of pedestrian infrastructure are:

- Adequate and wide pedestrian pavements along all urban roads
  - Sufficiently dimensioned and safe pedestrian infrastructure needs to be implemented successively along all relevant urban roads, convenient usability has to be guaranteed if necessary, with strict law enforcement
- Extension of pedestrian areas in Limassol and the Municipalities
  - The existing pedestrianised areas mainly in the city centre and the core areas of the 5 municipalities need to be extended, seamless and safe walking within the pedestrianised areas has to be guaranteed
- Pedestrianisation of commercial streets with high pedestrian traffic flows
  - Anexartisias street will be converted from a commercial two-way traffic street into a pedestrian zone with buses operating in one direction
- Administrative and policy measures
  - A number of measures to help creating, promoting and maintaining convenient pedestrian infrastructure aims to support the plan to get Limassol pedestrian friendly

### 7.3 Detailed presentation of measures/ interventions provided in the preferred scenario

With respect to pedestrian measures, the preferred scenario of SUMP Limassol is (amongst others) including:

- Improved safe pedestrian infrastructure (based on design criteria and standards)
- Adequate and wide pedestrian pavements along all urban roads
- Extension of pedestrianised areas in Limassol and the Municipalities
- Pedestrianisation of commercial streets with high pedestrian traffic flows
- Reduction of road capacities to main areas to/from and passing the city centre

The extension of pedestrian areas in Limassol and in the municipalities is described above in detail in section 5.3, the figures in that section clearly show the proposed situation.

#### 7.3.1 Adequate and wide pedestrian pavements along all urban roads

Sufficiently dimensioned and safe pedestrian infrastructure needs to be implemented successively along all relevant urban roads. The Streetscape Manual produced in the context of the Integrated Nicosia Mobility Plan describes standards for ‘Footway Zones’.

![Streetscape Manual: possible segmentation of footways](image)

The zones are described in the manual as follows (see Figure 45):

- **Edge Zone**: This area is immediately adjacent to the kerb (edge of the carriageway) and provides space between vehicles and pedestrians. This area provides a safety buffer against the opening and closing of vehicle doors.
- **Furnishing and Planting Zone**: The Furnishing & Planting Zone functions as a space to contain street furnishings, trees and other objects. Decorative or special footway materials may be used to delineate this zone. This zone provides an essential comfort “buffer”.
- **Clear Zone**: The Clear Zone functions as the pedestrians’ unobstructed pathway within the footway”. The Clear Zone is essential to safely allow for pedestrian movement, especially for those

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with disabilities. Where a footway is 2 metres or less in width, the Clear Zone will be the only zone permitted.

**Marketing Zone:** This area is directly adjacent to the building and/or property line. Offering a location for outdoor dining, footway displays and/or landscaping is the main purpose of this zone.

The German FGSV research council published a study³ ‘Empfehlungen für Fußgängerverkehrsanlagen’ (recommendation on pedestrian facilities), which presents minimum requirements for footways depending on road characteristics.

<table>
<thead>
<tr>
<th>Road characteristics</th>
<th>Footway width [m]</th>
<th>Land use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential street</td>
<td>2.1</td>
<td>Loose housing construction</td>
</tr>
<tr>
<td>Urban city street</td>
<td>2.5</td>
<td>Residential use, contiguous development</td>
</tr>
<tr>
<td>Urban city street,</td>
<td>3.3</td>
<td>Mixed residential / commercial use, contiguous development</td>
</tr>
<tr>
<td>Urban city street with frequent public transport services</td>
<td>4</td>
<td>Mixed residential / commercial use, contiguous development</td>
</tr>
</tbody>
</table>

Table 24: Footway requirements

The proposed widths correspond very well to recommendations from the aforementioned Streetscape Manual: for residential roads, minimum/preferred widths are 1.5/3.0 meters, for (primary) main roads 2.2/ 4.75 meters are suggested.

The following Figure 46 represents an exemplary standard footway cross section in an urban street with mixed use that is designed following the FGSV and Streetscape Manual principles. A selection of the above-mentioned detailed design suggestions with respective requirements were implemented (see Annex IV, Figure A-IV 1 to Figure A-IV 3 for more examples).

In some cases, the footway is already in place and prevention of (illegal) parking achieves the target. If necessary, bollards may be used to permanently prevent parking, but the bollards themselves should not become the new obstacles. In addition, removing or optimizing location of obstacles such as street furniture, traffic signs/ signposting, billboards, rubbish bins etc. can help to provide adequate walking infrastructure without major constructional effort.

Apart from mere existence and minimum width of sidewalk, the pavement obviously needs to be in an appropriate state so as to allow for safe passage also with walking sticks or frames. Tactile pavers

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³ Forschungsgesellschaft für Straßen- und Verkehrswesen (FGSV), Köln
complement the comfort for visually impaired people and should be implemented at least in the vicinity of crossings or PT platforms.

### 7.3.2 Extension of pedestrian areas in Limassol and the Municipalities

In SUMP Limassol preferred scenario, pedestrianised areas are foreseen for the entire environmental zone with the exception of some one-way schemes to allow for accessibility of motorized private and commercial traffic.

To guarantee seamless and safe walking within the pedestrianised areas, some (one-way) roads and in case of the coastal area the 2-lane Coastal Road and the bus lanes have to be crossed safely and conveniently. In the preferred scenario, all roads mentioned above have a speed limit of 30kph or less.

All one-way roads within the environmental zone have traffic volumes of less than 200 vehicles per direction in the peak hour. Given also the speed limit of max. 30 kph, no facilities for crossing the streets are necessary. Nevertheless, zebra-crossings can be introduced to increase social safety.

The Coastal Road reaches traffic volumes of approximately 800 vehicles per direction in the peak hour. According to the German guideline mentioned above, this is a combination where either a sufficiently wide island and/ or raised crossings or a signalized crossing can be implemented. A combined option would be alternating simple and signalized crossings. The latter would create sufficient discontinuity between the platoons to allow for safe crossing at the non-signalized crossings.

Figure 4 in section 5.3.1 shows a map with the pedestrianised area in the Limassol environmental zone in the city centre.

As that Figure 48 below shows, the majority of the streets within the core city centre is pedestrianised. Moreover, the pedestrian streets provide access to the most important attractions (PoI, see section 8.3) on foot. In general, pedestrianised streets will be signed with traffic sign ‘No motor vehicles’ (see Figure 47). Auxiliary signs will be used to define exceptions such as ‘Residents only’. In general, access to private off-street parking will be permitted while on-street parking in pedestrianised streets is prohibited apart from parking places for handicapped persons. Where needed, time-restricted permissions will be imposed for freight and delivery vehicles.

Figure 47: No motor vehicles: Pedestrianised street, open for bicycles and Residents only (UK)

Similarly to the Limassol city centre, pedestrianised areas were developed for the municipalities as well. Detailed solutions for the municipalities are presented in section 5.3.5.

Apart from the footways along all urban roads and the pedestrianised streets, signposted recreational walkways will complement the network for pedestrians and more sportive oriented hikers. The medium-distance scenic walkways will connect the city of Limassol with some of the municipalities, the touristic areas in the north-east and a number of cultural/ historic sites. Since the recreational walkways are running mostly in parallel with cycle routes, activities can be combined where desired.
Figure 48: Street conversion: Athanasiou Diakou Street
7.3.3 Pedestrianisation of commercial streets with great pedestrian traffic flows

The most important example is a fully pedestrianised commercial street i.e. Anexartisias shown in Figures 49-51.

Figure 49: Anexartisias street with bus lane