

Logistics land use - A buffer between harbour areas and urban neighbourhoods?

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1 ABSTRACT

The Port of Hamburg, being the second largest harbour in Europe, is directly adjacent to the urban neighbourhood Wilhelmsburg. On the border between the industrial harbour area and the housing areas, logistics and other commercial land uses are situated. According to the draft of the spatial development vision for the city of Hamburg, this area is also proposed for further logistics development, because a high demand for space for new logistics and distribution facilities (e.g. warehouses, distribution centers, transfer depots, truck depots, container storage) is expected. During the (re-)location of logistics companies, a strong opposition of residents can usually be observed. Logistics land uses are often perceived as space consuming, noisy and traffic intensive.

This raises the question, if and how logistics land use can serve as a buffer between industrial harbour areas and housing areas. To answer this question, information on land consumption and traffic generation of logistics land use is necessary, because besides noise and emissions these factors determine how compatible they are with other forms of land use, particularly housing. However, there is very limited literature on how characteristics and size of logistics facilities relate to their trip generation.

Aiming at a deeper insight into the characteristics and trip generation of logistics land uses, two surveys were recently conducted in the Hamburg region. A company survey was carried out in order to observe which services are offered by logistics companies, what patterns of land use they show, how many truck trips they generate and how the trips are performed (mode, time of the day, etc.). The second was a traffic count within two areas with a concentration of logistics companies. As a result of these surveys, general trip generation rates could be calculated and different types of logistics land use could be identified and described.

The paper presents some general characteristics of logistics facilities and selected results of the empirical work relevant for this study. It introduces the local situation of the case study Hamburg Wilhelmsburg and discusses the compatibility of logistics and residential land use.

2 CHARACTERISTICS OF LOGISTICS LAND USE

The following general remarks on the relationship between harbour and city at the beginning of this chapter are meant to clearly set the scope of this study. With the growth of containerisation and increasing vessel-sizes, harbours grew away from the city and left partly unused docks and warehouses. In many port cities such areas have been transformed into attractive urban waterfronts with urban land uses, that is residential, mixed, retail, business, office or recreational land uses (Schubert 2001, Meyer 1999). In Hamburg, too, such a development project, the so called "Hafencity" is on its way. Such areas usually are not located directly adjacent to still operating bulk goods or container terminals, only a function as passenger ferry terminal is sometimes maintained. However, the area under consideration in this study (see Figure1) is a different case. It is directly adjacent to the south east central area of the Port of Hamburg that actually hosts a mixture of small and medium-sized industries, companies of the logistics and food sector, oil industry, liquid cargo handling, warehousing and a major brownfield. With the restructuring of the central harbour area, a further demand of container handling capacity alongside the Reiherstieg channel is expected (Hamburg Port Authority 2005). This implies that there will be harbour operations in direct proximity to urban areas of Wilhelmsburg in the future. The large scale waterfront transformations mentioned above cannot serve as best practice here in terms of compatible land use. This is reflected in the port development plan and the spatial development vision for Hamburg by proposing to further develop this interface for logistics facilities, that are meant to function as a buffer between the harbour areas and the residential areas of Wilhelmsburg.

In order to assess this concept, an understanding of the functions and characteristics of logistics facilities is necessary. Therefore this chapter describes general processes performed at logistics facilities and general location factors of logistics facilities and presents selected results of two surveys carried out in the Hamburg region.

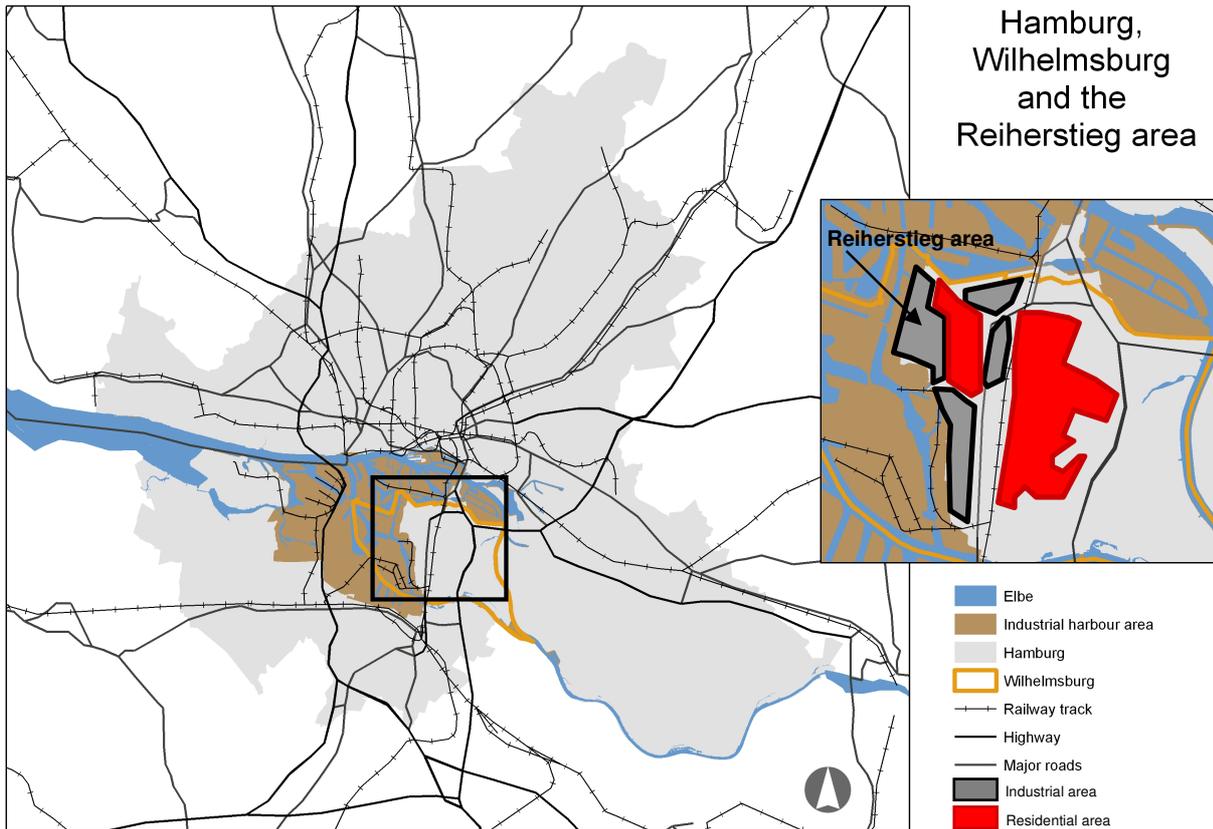


Fig. 1: Location of the Port of Hamburg, Wilhelmsburg and the Reiherstieg area

2.1 General description of logistics facilities

Among the core processes of logistics are transportation, storage, handling, order picking of goods and products, and the management of necessary information and communication processes. Besides, logistics service providers can undertake further processes of the value adding chain, which can be subsumed as value added services. These are, for example, the processing, packaging, handling or subassembly of goods (see Figure 2).

According to the scope of business activities of logistics companies, the following are derived as the most important considerations for site selection (Clausen et al. 2005:11, Landesinitiative Logistik NRW 2005:43) :

- Connection to motorways/highways, no restrictions for trucks and night-drive permission
- Existing zoning (preferably industrial land use), dimensions of available land and site layout, construction and design regulations, possibility of 24-Hour-Operation
- Land price
- Location with respect to distribution zones and production plants / customers
- Good cooperation with local authorities

The shape of logistics facilities differs according to their main functions. Figure 3 illustrates the typical shape of a transfer depot and a warehouse dedicated to the storage of goods. Warehouses for the storage of different goods are generally rectangular and of large scale with few truck docking gates. The storage can also be organised vertically. Warehouses that are dedicated to the transfer and turn over of goods are generally rather narrow, of lower height and equipped with many truck docking gates. However, a company survey in the Hamburg region (see below) illustrated that most of the logistics service providers offer a mix of services and thus need space for both, storage and transshipment. Harbour related logistics services often show rather smaller warehouses and large outside depots for container handling and storage.

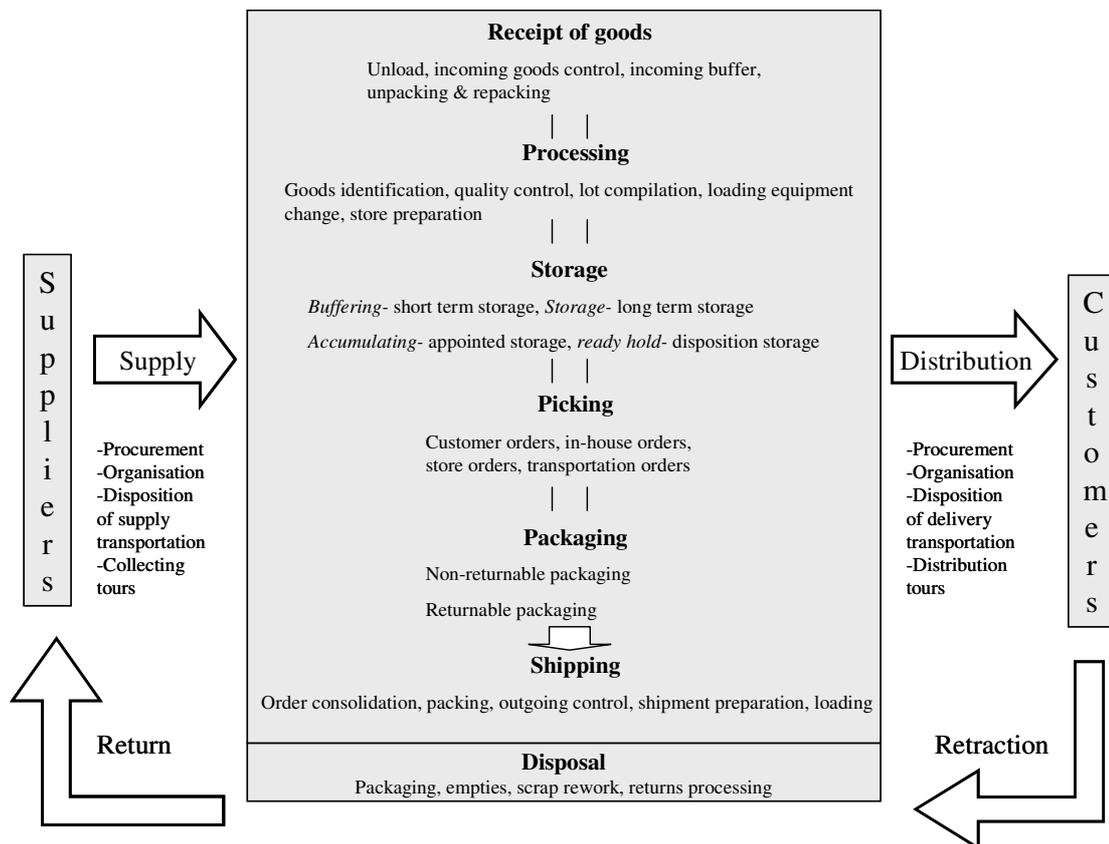


Fig. 2: Scope of activities of a logistics facility (based on Gudehus 2004:25)

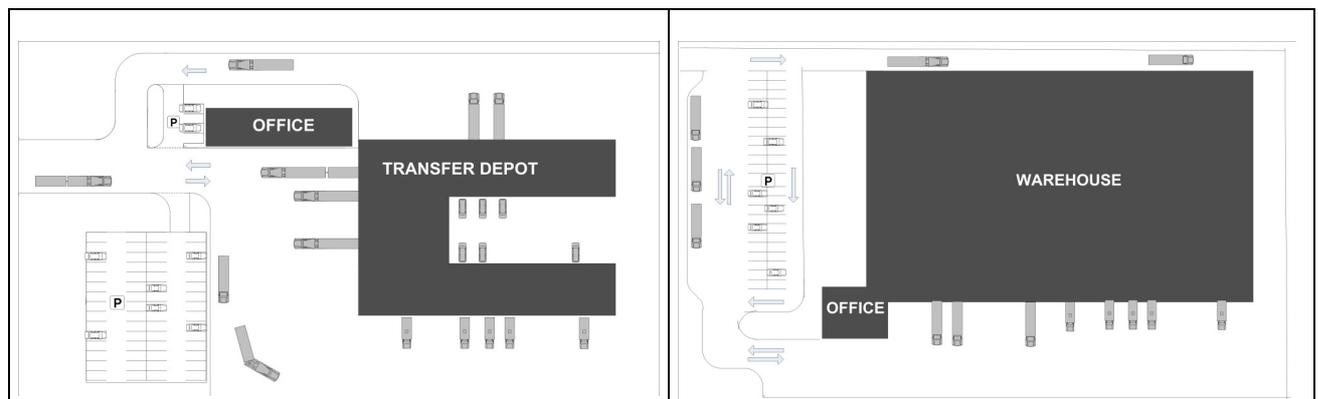


Fig. 3: Layout of a typical transfer depot and a typical warehouse (based on Schreck 2006 and Habacker 2006)

Both, the location factors and the typical shape of logistics facilities indicate a high potential for conflicts with neighbouring areas. The question of compatibility includes aspects of land consumption and environmental impacts like noise and emissions, barrier effects and increased risk of accidents as well as impact on urban form. With the development of new, modern warehouses, where most of the goods handling is done inside, noise and emissions from goods handling generally declines. However, harbour related logistics services can still produce noise and emissions from handling. The environmental impacts are closely connected to the traffic that is generated by logistics facilities. Locally, peaks of heavy vehicles as well as trucks parked in the surrounding of logistics facilities have to be dealt with. With extending operating hours the impacts from moving vehicles and other activities can also occur at night time.

2.2 Characteristics of logistics facilities

In order to get a more detailed insight into the characteristics, services and traffic generation of logistics land use two surveys were carried out in the Hamburg region in 2007. The first survey was a company survey of the transport and trade logistics service providers. The second was a traffic count in two industrial areas (Hamburg Allermöhe and Valluhn-Gallin) where many logistics facilities are located.

For the company survey, 860 companies of the transport and trade sector¹ were contacted via E-mail or phone, 64 of which (i.e. 7.5%) participated in the survey. Only companies situated on industrial or commercial areas were included. Because of their minor importance in terms of traffic generation, transport companies with less than 10 employees and trade companies with less than 20 employees were excluded from the survey. Additionally, in 20 large companies expert interviews were conducted.

The short-term aim of the survey was to explore the traffic problems of the logistics sector in the Hamburg region. The long-term goal was to generate more generic information on logistics facilities for regional and transport planning.

Some general results of the survey are²:

- Transportation (80 %), storage (78 %) and handling (57 %) are still the core functions of logistics service providers, although value added services are also offered by 40 % of the participating companies. On average, the companies selected 2.7 of 5 possible answer categories indicating that only a few companies are focussing on one particular service.
- About half of the companies surveyed have more than 50 employees. The mean number of employees is 60 for companies of the transport sector and 110 for companies of the trade sector.
- Around 40 % of the companies state a land requirement of less than 0.5 ha, 80 % of the responses are under 5 ha. Only 3 facilities have space requirements of above 10 ha. This indicates, that there is a high range of land consumption of logistics service providers.
- 30 % of the companies operate 24 hours a day, 43 % up to 12 hours, the remaining companies operate between 12 and 20 hours a day. The interviews revealed a high willingness to extend operating hours if possible and necessary.
- The mean value of daily truck traffic (i.e. incoming and outgoing trucks at company gate) is calculated to 138 trucks per day for companies of the transport sector and 163 trucks per day for companies of the trade sector. Only few companies show a trip generation of over 300 and up to 1000 daily truck trips.
- Companies show a highly varying distribution of truck traffic throughout the day. The traffic volume of a regional cargo warehouse shows noticeable peaks at nights (main runs), early in the mornings (outgoing distribution traffic), and late afternoons (incoming distribution traffic), while a warehouse or a contracted logistics company for import and export tends to show a uniformly distributed truck traffic volume throughout the day.

Overall it is seen that a wide range of logistics companies exist and consequently highly varying requirements of space and infrastructure occur. While existing company sites differ, new logistics facilities often tend to be space consuming. According to a study of Jones Lang Lasalle (2006), the outsourcing of logistics activities to logistics service providers leads to a demand of new, optimised sites larger than 5 hectare.

¹ The companies were chosen based on the economic sector they belong to according to the NACE classification. The relevant sectors for logistics services are: Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods and transport, storage and communication. The following sub groups according to the NACE code were selected:

- 51.2 Wholesale of agricultural raw materials and live animals
- 51.3 Wholesale of food, beverages and tobacco
- 51.4 Wholesale of household goods
- 51.5 Wholesale of non-agricultural intermediate products, waste and scrap
- 51.8 Wholesale of machinery, equipment and supplies
- 51.9 Other wholesale
- 60.1 Transport via railways
- 60.24 Freight transport by road
- 61 Water transport
- 62 Air transport
- 63.1 Cargo handling and storage
- 63.4 Activities of other transport agencies
- 64.1 Post and courier activities

The selection of economic sectors is based on Wrobel (2004). Additionally, some distribution centres of retailers were included in the survey.

² For detailed information and results of the company survey also refer to Wagner (2008a).

2.3 Trip generation of logistics facilities

In regional and transport planning, trip generation is often estimated based on trip generation rates for specific land uses. From the company survey and the traffic counts³, trip generation rates could be derived. Both, the company survey and the traffic counts reveal that trip generation per hectare of built up land as well as trip generation per employee show a broad range.

The trip generation of Hamburg Allermöhe, a densely developed industrial area close to Hamburg containing many regional transfer depots and regional and national trade distribution centres, is almost 90 daily truck trips per hectare of developed real estate. The trip generation of the industrial area Valluhn-Gallin located in a rather rural area containing some large distribution facilities is 10 daily truck trips per hectare of developed real estate. From the company survey, the following trip generation rates per hectare developed real estate could be derived: 46 to 159 daily trips per hectare for companies of the transport sector and 33 to 76 daily trips per hectare for companies of the trade sector⁴. Bosserhoff (2000:43), whose work is the major German source for trip generation estimates, suggests 10 to 15 daily truck trips per hectare developed real estate for transport related land use and 40 to 90 daily truck trips per hectare developed real estate for land use dedicated to hauliers and logistics centres.

The trip generation rates derived from the traffic counts of logistics areas are 0.8 and 1.7 daily truck trips per employee. The values derived from the company survey are slightly higher. For companies of the transport sector they range from 1.6 to 4.1 and for companies of the trade sector from 0.9 to 2.2 daily truck trips per employee. Bosserhoff (2000:43) suggests 2 to 4 daily truck trips per employee for storage facilities and 2 to 9 daily truck trips per employee for facilities of shippers. The higher truck trip generation rates for single facilities compared to the values for whole areas seem plausible, because the areas contain not only logistics facilities but also other companies.

To get an impression of the truck traffic intensity of logistics land use, it can be compared to truck trip generation rates of other land use types. Bosserhoff (2000:42) states for example that an industrial park generates 0.6 to 0.8 daily truck trips per employee or 10 to 12 daily truck trips per hectare developed real estate. Commercial land uses except of wholesales generate up to 2 daily truck trips per employee. Office land uses have a low truck trip generation rate of 0.1 daily truck trips per employee.

2.4 Defining typical logistics facilities for planning purposes

General truck trip generation rates give only a rough indication of truck traffic that has to be expected from new logistics land use developments. To get a more precise picture of future truck traffic, different types of logistics facilities should be differentiated and used for trip generation estimates. Based on the results of the company survey, the expert-interviews as well as literature⁵, the following types of logistics land use could be identified:

- Trade related logistics facilities
 - Regional distribution centres of retail chains that supply the stores of a region (e.g. supermarket chains).
 - National distribution centres of retailers that supply the regional distribution centres or directly supply large stores (e.g. DIY stores)
 - Warehouses of wholesalers that might distribute on a regional or national level depending on their service area. They often supply regional distribution centres of retail chains or industries depending on the material or product they trade in.
- Industry related logistics facilities
 - Warehouses that are dedicated to the supply of a particular factory and are usually located close to that factory. Different suppliers deliver their resources and parts to the warehouse. From the warehouse, the factory can be supplied just in time or just in sequence.

³ For detailed information and results of the traffic counts refer to Wagner (2008b).

⁴ The values indicate the 95 % level of significance of the mean value.

⁵ See in particular: Sonntag (1999) and Landesinitiative Logistik NRW (2005).

- Warehouses that are dedicated to the distribution of products of a particular factory. They can be located close to the factory or close to the market areas served. They usually deliver into distribution centres of retailers or wholesales in the national and international market.
- Logistics centres of service providers for the transport of packaged goods and courier services that are organised in national or even international transport networks.
 - Regional transfer depots where packaged goods from the region or dedicated to the region are bundled and unbundled. The regional transfer depots are connected overnight with other regional transfer depots directly or via the national network hub. During daytime, the packaged goods are distributed into the region and collected from the region.
 - National hubs of packaged goods networks connecting the regional transfer depots. Their peak of operation is at night and they are usually located in the geographic centre of a country.
 - Consolidation hubs are the interface of national road networks and international transport networks. They are usually located at seaports or airports.
- Logistics centres of shippers and freight carriers that focus on full container / trailer loads or container / trailer part loads.
 - Warehouses of regional freight carriers that offer a broad range of logistics and transport services.
 - Facilities of shippers that focus on often container based import and export of goods and offer services that cover the whole supply chain.
 - Facilities of freight carriers that focus on special transport tasks like heavy goods or dangerous goods.
- Basic logistics services
 - Dedicated or multi-user warehouses that often serve for temporary or long term storage.
 - Company sites of trucking companies that actually operate transport services. They often are subcontractors of other logistics service providers that do not operate an own vehicle fleet.
- Logistics service providers that are dedicated to a harbour, airport or rail terminal.

These types of logistics land use offer similar services and thus have similar patterns of land consumption, operations and truck traffic generation. Because of the high diversity of the logistics sector, there are overlaps between the types and variations within the types. The main purpose of the classification is to help planners dealing with the complexity of logistics land use rather than to perfectly represent the whole logistics sector. Particularly in the state of zoning land for logistics services, this might be of great help. Different development scenarios can be compared and the decision of whether or not a potential site is suitable for logistics land use or if restrictions should be posed upon the land use can be supported.

In chapter 3.3, two of the described types of logistics facilities, that can be found in the study area Hamburg Wilhelmsburg, are elaborated in further detail.

3 THE LOCAL SITUATION OF HAMBURG WILHELMSBURG

In this section, a short description of Hamburg Wilhelmsburg is given and the urban development vision of the city of Hamburg for Wilhelmsburg is presented. Afterwards, the issue of compatibility of logistics and residential land use in the Reiherstieg area is discussed.

3.1 Location and status quo of Hamburg Wilhelmsburg

Hamburg is the second biggest city of Germany -1.7 million people live in the city that is situated in northern Germany. The Port of Hamburg is the second biggest port of Europe. Its overall seaborne cargo turnover in the year 2006 amounted to 135 thousand tons, of which two thirds were shipped in containers. Container turnover is expected to double up to the year 2015. While the Port of Hamburg is located south of the northern branch of the river Elbe, the town centre of Hamburg and most of the housing areas are located in the northern parts.

Wilhelmsburg is located in the South of Hamburg directly adjacent to the industrial harbour area (Figure 1). The suburb is actually an island that is formed by a northern and southern branch of the river Elbe and contains parts of the industrial harbour area. Due to its proximity to the port, Wilhelmsburg is one of the

most important locations for the logistics sector in Hamburg. An evaluation of company statistics of the Hamburg Chamber of Commerce shows that particularly companies from the transport sector are located in this district, while logistics facilities of the trade sector dominate the western suburbs of Hamburg. In the eastern suburbs of Hamburg, both trade and transport logistics facilities are located.

Wilhelmsburg is home to almost 49.000 inhabitants⁶. The suburb is among the poorest and most diverse of the City of Hamburg. This is reflected by a comparably high unemployment rate of 13.1 %, a low ratio of housing space per capita of 28.4 square meters and a high share of foreign nationals of 33.7 %. The overall unemployment rate in Hamburg is 7.8 %, the overall ratio of housing space per capita is 36.5 square meters and the overall share of foreign nationals is 14.8 %. The numbers indicate a rather low socio-economic level of Wilhelmsburg.

Most of the industrial / commercial areas of Wilhelmsburg are directly adjacent to the port (see Figure 1). A further industrial area is situated between the major railway axis that crosses the river Elbe, and the Wilhelmsburger Reichsstraße, a federal highway. Both are two heavily used traffic axes. In between the industrial / business areas lies a lively residential and commercial area. The industrial area under consideration in this study is called “Reiherstieg”, named after the harbour channel it borders.

3.2 Vision for Hamburg Wilhelmsburg

The City of Hamburg recently published a draft version of a spatial development vision. A major vision for urban development is the so called “Sprung über die Elbe”, which aims at connecting the southern part of Hamburg with the inner city and at renewing large parts of Wilhelmsburg. The Reiherstieg area is mentioned as one focal point. Alongside the Reiherstieg channel further development of logistics and harbour related businesses is foreseen. At the same time the shores of the channel are supposed to be greened and made accessible to the public and a small park is planned. The area is envisaged to transform into a green transition between the urban area and the harbour area (Freie und Hansestadt Hamburg 2007:60).

The current situation of Wilhelmsburg and the development vision raise the question, if and how logistics land use can actually serve as the envisaged buffer between the harbour and housing areas.

3.3 Compatibility of logistics land use and housing

Currently two types of logistics land use are prevailing in the Reiherstieg area. One are the regional transfer depots of Hellmann and DPD. Alongside these, there are some shipping companies offering storage, container and inland transportation settled in the Reiherstieg area (Pöhland, Translog and XXLogistics). The facilities show different land use patterns⁷. The warehouses of Hellmann and DPD are rather narrow with many docks, because the parcels are only transshipped and not stored (also refer to Figure 3). Hellman, however, not only operates a regional transfer depot at its site in Wilhelmsburg, but also carries out other transport and logistics services. Pöhland offers container logistics and storage with a focus on hinterland transport of the Port of Hamburg by road and rail. The warehouses are typically rectangular halls for the storage and handling of goods. Translog, whose warehouse is far bigger offers the whole range of third party logistics. The services focus on heavy and bulk goods that are shipped from or to the Port of Hamburg. Translog also runs its own empty container yard. XXLogistics also focuses on container and bulk goods handling and storage. They have a large outside container storage area and several small warehouses. While Pöhland, Translog and XXLogistics offer services that are directly related to the harbour, the transfer depots of Hellmann and DPD serve the whole city. Their connection to the harbour is rather weak.

Based on the results of the company survey mentioned before, the general characteristics of regional transfer depots can be described. At regional transfer depots, about 200 people are employed. They have a dimension of 2 to 5 hectares. The daily truck traffic amounts to 200 to 500 incoming and outgoing trucks. The share of long haul trips is about one third of the total trips. Regional transfer depots have a relatively structured trip generation due to scheduled main runs. Over night, the regional transfer depots are connected directly or via a national transport hub with all other regional transfer depots of the carriers or systems network. These long haul connections are usually operated with big trucks. In the early morning hours up to 6 am, trucks from the long hauls are coming into the regional transfer depots. The packaged goods are then unpacked and

⁶ All statistical data included in this paragraph are derived from Statistik Nord and refer to the year 2006. Source: <http://www.statistik-nord.de>, access date 04.03.2008.

⁷ The different land use patterns can be clearly seen on aerial photographs, refer for example to Google maps.

distributed to the delivery trucks that serve the region. The delivery trucks leave the depots between 6 and 9 am to start their delivery and collecting tours. Until 6 pm the delivery trucks come back with the packaged goods that need to be transferred to the long haul trucks. Depending on the direction, the long haul trucks start leaving the regional transfer depots at 6 pm. Usually, the transport is carried out by subcontractors. Some regional transfer depots offer parking possibilities for the trucks, others do not.

The other type of logistics service providers settled at the Reihertstieg - Translog, Pöhland and XXLLogistics - are all logistics centres of shippers and freight carriers that focus on full container / trailer loads or container / trailer part loads. Because of their proximity to the harbour, they specialise on heavy goods and containers. Based on the results of the company survey the size of such facilities is up to 5 hectare and up to 70 people are employed. Daily truck trip generation rate is in the range of 30 to 110 truck trips. The trip generation throughout the day is estimated to be more or less evenly spread and limited to the day. Beside the environmental impact of the truck traffic, the facilities also produce noise emission from container and heavy goods handling.

Overall it can be estimated that the five logistics service providers currently located at the Reihertstieg have a daily demand of at least 1000 truck trips, some of them operating at night. Additionally, an equal amount of car trips should be expected. The logistics facilities all belong to the transport sector. They are large and traffic intensive compared to the mean values derived from the company survey stated before. This is partly due to their direct connection to the harbour functions. However, the regional transfer depots that generate most truck traffic seem somewhat displaced, because they do not necessarily need to be located close to the harbour.

As mentioned earlier the development vision for the Reihertstieg area is that logistics land use can serve as a buffer between the mixed use and residential areas of Wilhelmsburg and the industrial harbour areas. Because of the traffic-intensity and noise emissions of the facilities described and the short distance to neighbouring mixed use and residential areas, this approach has to be questioned. In fact, there might need to be a larger distance between the logistics facilities and the mixed use and residential areas of Wilhelmsburg. Currently, there is a minimum distance of 100 meters to the adjacent mixed use area and of about 300 meters to the closest residential building block. In Germany, distances from new industrial / commercial sites to residential areas are supposed to be 500 m up to 1500 metres, depending on the noise emission and air pollution. Generally, real estate developers prefer industrial sites with sufficient distance to sensitive land use like housing for new logistics facilities. Hirdes (2005:92) for example states, that a distance of 1000 metres to the next residential area ensures that facilities can be re-used independently of the emissions of a certain company.

Logistics facilities with less truck traffic, mainly indoor activities and no night operations seem more compatible to residential or urban areas than the ones currently settled at the Reihertstieg. This could be basic logistics facilities like dedicated or multi-user warehouses or the sites of smaller trucking companies as well as logistics centres that focus on value added services. At the same time, such facilities would not profit as much from the proximity to the harbour as the existing facilities. Anyway, the relocation of existing facilities only appears as long-term planning solution, if at all.

From an urban planning perspective, the preservation of existing logistics facilities close to the harbour and their careful extension is comprehensible, because in the case of relocation, such facilities often move to greenfield sites at highway exits. For the people of Wilhelmsburg, extended logistics activities could increase the number of jobs offered close-by and thus strengthen the connection between the port and the adjacent neighbourhood. However, the needs of the local residents to be protected from emissions and to live in a liveable urban environment have to be catered for.

In order to mitigate the impacts of the existing logistics land uses on the residents, the following measures can be taken:

- A clear distinction should be made between urban and residential land uses and logistics land uses. If possible, logistics facilities with high emissions should be located further away from urban and residential areas than logistics facilities with less emissions and a sufficient distance should be provided. Between the areas, a green barrier, e.g. for recreational uses, or an area with smaller businesses should be developed. The latter uses could also be carefully mixed with logistics land uses in order to create a certain permeability and accessibility of the logistics area and to the shores of the channel Reihertstieg.

- Residential and mixed use areas should be protected from truck traffic generated by the logistics facilities. Therefore, adequate access roads to the logistics areas need to be provided and their usage be enforced by a truck guiding system or a local environmental zone. Parked trucks have to be catered for by offering dedicated parking space for trucks or making sure that trucks can be parked on company sites.
- Logistics companies could be encouraged to take technical measures that reduce noise from container handling and even to consider some design standards. Such measures would enhance their integration into the urban landscape. Infrastructure, too, should be built or maintained aiming at an appealing urban design.

4 CONCLUSION

The logistics sector is diverse and thus has a varying compatibility with urban and residential land use. Compatibility in this respect is highly determined by the size, noise emissions and traffic generation of the logistics facilities. Although the traffic counts show that industrial areas with many logistics facilities are traffic-intensive compared to other forms of land use, the company survey revealed that trip generation of a single company / facility can vary from just a few up to several hundred trucks per day. It also illustrates that many sites of existing logistics companies are rather small in size. However, for the development of new logistics facilities, often sites of more than 5 hectares are requested.

In Hamburg Wilhelmsburg, a spatial development vision envisages an existing area with logistics service facilities called Reiherstieg to serve as a buffer between the industrial harbour area and the mixed use and residential area. An assessment of the local situation and the existing logistics facilities revealed that such an approach is only feasible, if land uses are not mixed. The area should be zoned for different types of logistics facilities and measures should be taken to mitigate the impacts of the logistics facilities on the residents as well as to create a mutual identity of the port-city interface.

This local situation suggests that generally, a sound assessment of impacts from possible future uses and their truck traffic generation is necessary before greenfield or brownfield sites are developed for logistics land use. The provision of information on general traffic generation and on “typical” logistics land uses can help planners in dealing with the complexity of the topic.

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