OXFORDSHIRE RAILFREIGHT INTERCHANGE LIMITED

OXFORDSHIRE SRFI

TECHNICAL NOTE 3: TRIP GENERATION

ADC Infrastructure Limited
Suite 3a, King Edward Court
King Edward Street
Nottingham
NG1 1EW

www.ADCinfrastructure.com

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1.0 INTRODUCTION

1.1 ADC Infrastructure Ltd are appointed by Oxfordshire Railfreight Interchange Ltd (the Applicant) to assess the transport and infrastructure requirements of a Nationally Significant Infrastructure Project (NSIP), that being a proposed Strategic Rail Freight Interchange in Oxfordshire, to be known as Oxfordshire Strategic Rail Freight Interchange (OxSRFI).

1.2 Oxfordshire County Council (OCC) are the local highway authority and Highways England have responsibility for the strategic road network (SRN), which in the vicinity of the site comprises the M40, A43 and A34.

1.3 This Technical Note presents the methodology used to determine the road-based trip generation associated with OxSRFI for use in the transport modelling work and Transport Assessment (TA) for the scheme. Trip generation for the scheme was discussed at the Transport Working Group[1] (TWG) meeting held on 13 November 2020. At this meeting Aecom recommended that the trip generation follow a similar methodology to that used on the recently consented Northampton Gateway SRFI. This Technical Note therefore adopts that approach. The document is structured as follows:

- Section 2 sets out the site location and the road and rail connectivity.
- Section 3 details the development proposals.
- Section 4 provides a description of the type of trips that the development would generate.
- Section 5 sets out the trip generation for the warehousing and distribution uses at the site.
- Section 6 sets out the trip generation for the rail terminal.
- Section 7 sets out the interaction between the rail terminal and the warehousing uses and the total traffic flow without considering the effect of the Travel Plan.
- Section 8 sets out the total person trip generation.
- Section 9 identifies the total traffic flows including for the effect of the Travel Plan.

[1] A Transport Working Group has been established to provide a forum for discussion and allow a step-by-step approach to the assessment and agreement of transport matters relating to OxSRFI. The TWG comprises representatives from OCC, Highways England and their consultant Aecom, the Applicant and their consultant team, comprising ADC Infrastructure Ltd, BWB Consulting Ltd, and Oxalis Planning.

2.0 SITE LOCATION AND ROAD AND RAIL CONNECTIVITY

2.1 The OxSRFI site is in Cherwell District Council, within northern Oxfordshire. It is located to the southwest of M40 Junction 10, approximately 6km from Bicester. A general site location plan is shown at **Figure 1**.

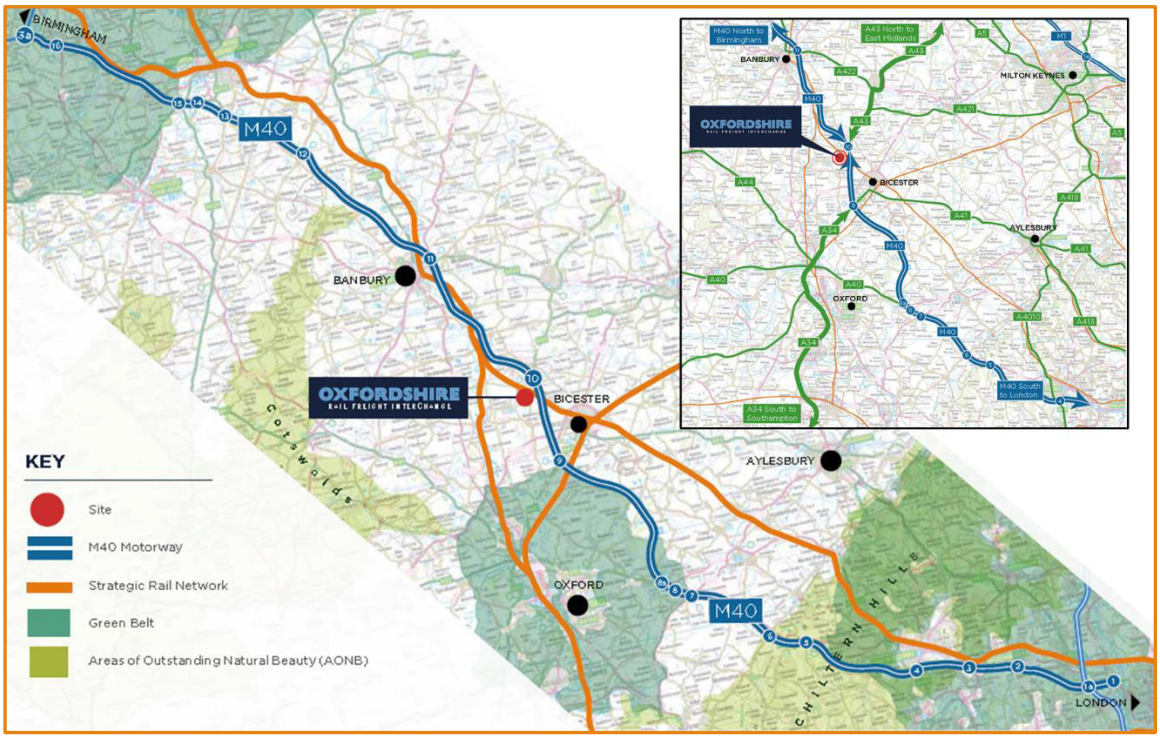

Figure 1: general site location

2.2 The site is bounded to the north by the Chiltern Main Line railway, part of the strategic rail network operated by Network Rail (**Figure 2**). The Chiltern Main Line Railway is configured as a two-track railway which passes the site in cutting. Passenger trains operate at up to 100mph and freight trains at up to 70mph. To the east, the site is bounded by the B430 and the Viridor 'Ardley Energy from Waste' facility, to the south by farmland, and to the west by the Heyford Park development, which is located on the former RAF Upper Heyford site. The village of Ardley is approximately 1km to the north of the site. The village of Middleton Stoney is approximately 2km to the south of the site.

2.3 The closest point of access to the SRN from the site is at Junction 10 of the M40, approximately 3.5km to the north of the site when accessed via the B430. At Junction 10 there is also direct access to the A43. The M40 connects to Birmingham (and the M42 and M5) to the north, and the M25 and London to the south. The A43 heads northeast from M40 Junction 10 and connects to the M1 at M1 Junction 15A.

2.4 Although less direct, access to the M40 could also be possible via Junction 9, which is a 10.5km drive to the south of the site, when accessed via the B430, passing through the village of Middleton Stoney, and then via the B4030 and then the A41.

2.5 To the south of the site the A34 runs in a northeast to southwest direction and connects Bicester to Oxford. It continues further south, connecting with the M4 at Newbury and the M3 at Winchester. The B430 runs between the A34 to the south and Junction 10 of the M40 to the north.

3.0 PROPOSED DEVELOPMENT

Development proposals

3.1 The OxSRFI would provide a rail freight terminal accommodating trains of up to 775m long, and include container storage and HGV parking, with rail sidings within the site with the potential to serve some of the individual warehouses. It would provide 6.5 million sqft of predominantly large scale B8 warehousing and distribution space. The scheme will also provide substantial mounding and woodland/tree planting around the site edges for visual screening and ecological connectivity.

3.2 The maximum floor space for the B8 use will be set by the Parameters Plan at 6.5 million sqft (603,850 sqm). The warehousing will include ancillary B1 office space, and an allowance will be made within the Parameters Plan for up to one third of the warehouses (201,283 sqm) to provide B8 mezzanine floor space use.

3.3 The OxSRFI scheme will accommodate 12 freight trains per day. The freight terminal would be connected to the Chiltern Main Line Railway, part of the strategic rail freight network.

Operation

3.4 All the B8 units are likely to operate on a 24-hour basis, seven days a week. The main shifts are therefore likely to be 0600-1400 hours, 1400-2200 hours and 2200-0600 hours, although there will be some variation depending on the individual occupier requirements. Some occupiers may operate a 12-hour shift, for example from 0700-1900 hours and 1900-0700 hours.

3.5 Mezzanines are typically introduced to enhance access to existing high level storage areas, or to house automated operations. In each case, these functions would not result in a pro-rata increase in staff numbers compared to conventional floor space. The former because, in the absence of mezzanine levels, high level storage is typically used to access the warehouse space. The latter, because automated operations are less staff intensive. It is possible that part of the mezzanine floor space would be used to house the ancillary office functions within the warehousing. However, the ancillary office space would be a small proportion of the floor space (typically less than 5%). Hence if the ancillary office were housed within the mezzanine level, it would not lead to a significant 'freeing-up' of general warehousing space.

3.6 HGV generations are related to the number of loading bays, which would not be increased. Hence, whilst the mezzanine levels may include automated operations which could improve efficiency and HGV throughput, there would not be a pro-rata increase in HGV numbers as these would be restricted by the number of loading bays.

3.7 In keeping with most inland rail freight terminals, the rail freight terminal is likely to operate on a 24-hour basis from Sunday evenings until Saturday mornings. However, volume growth at the main ports could lead to an increase to 24/7 operation in the future.

3.8 For the purposes of assessment, to ensure a robust approach, maximum capacity has been assumed to occur within the time period set for the transport modelling process, which in accordance with DfT Circular 02/2013[2] adopts an opening year of 2026 and a forward planning year of 2031. The latter has been selected to coincide with the end of the Local Plan period. In

[2]Circular 02/2013 'The Strategic Road Network and the Delivery of Sustainable Development' Department for Transport, September 2013

reality, due to the wider aspirations for SRFI sites, and the gradual increase in both the number of trains that can be accommodated on the wider network and the train's capacity, it is anticipated that it would be a number of years after this before the rail freight terminal would operate at full capacity.

3.9 Initially the loading and unloading of containers to and from the trains at the rail terminal would be by reach stacker, which would be replaced by gantry cranes as volumes and through-put at the rail terminal increased.

3.10 The loading and unloading of containers to and from the rail vehicles on pads adjacent to the individual warehouse units, if required by the end users, is expected to be by reach stacker operation.

4.0 TRIP GENERATION: BACKGROUND

4.1 This section describes the development vehicle trip types, and it describes the methodology for calculating the forecast traffic generation of the proposed OxSRFI scheme.

4.2 Given the size and nature of the proposed development it is not appropriate to use the TRICS database to calculate the trip rates and traffic generation for the OxSRFI, as there are no comparative rail served sites within the database.

4.3 Therefore, reference has been made to the work undertaken for the recently consented Northampton Gateway SRFI at M1 Junction 15 in Northamptonshire. The trip generation for the Northampton Gateway SRFI was calculated using a first principles approach, combined with existing data from similar sites[3]. The calculation methodology and resulting trip generations were agreed by the Transport Working Group for the Northampton Gateway SRFI, which comprised Highways England and Northamptonshire County Council. The trip generation was approved and accepted as part of the Development Consent Order (DCO) for Northampton Gateway SRFI.

4.4 Aecom have also recommended that the OxSRFI trip generation follow a similar methodology to that used Northampton Gateway SRFI. Therefore, that approach has been adopted for the OxSRFI development.

4.5 The proposed OxSRFI, comprising both the warehousing units and the rail terminal, would generate the following type of trips:

1. Employee trips to and from work at both the B8 units and the rail terminal.
2. Visitor and delivery trips to both the B8 units and the rail terminal.
3. HGV traffic to and from the B8 units.
4. HGV traffic to and from the rail terminal.
5. HGV (or tug) traffic between the rail terminal and the B8 units.
6. Rail trips to and from the rail terminal and the rail served warehousing.

4.6 Only trip types 1 to 4 would use the off-site highway network. Trip type 5 would be on the estate road network internal to the OxSRFI site, between the rail terminal and warehousing area. Trip type 6 would be on the rail network only, and the capacity of the rail network and the impact of these trips will be examined in a separate report[4].

4.7 This Technical Note therefore focuses on trip types 1 to 4, as the TA is ultimately concerned with the impact of the development on the off-site highway network. However, it is recognised that the number of HGVs generated (trip types 3, 4 and 5) will be related to the number of rail trips (trip type 6), the numbers of containers passing through the rail terminal, and the operation and interaction between the rail terminal and the on-site warehousing.

4.8 The above dependencies and interactions are examined at Section 7 of this Technical Note, but first the warehousing and rail terminal elements of the proposed OxSRFI are considered in isolation at Sections 5 and 6, respectively.

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[3] Report ref ADC1475 TN2 v4 'Technical Note 2: Trip Generation', Appendix 5 Northampton Gateway SRFI Transport Assessment.

[4] For the rail component at OxSRFI, the Applicant is in discussions with Network Rail to evaluate the engineering and operational viability of connecting into their network and evaluating path availability through a typical 24-hour cycle.

5.0 TRIP GENERATION: WAREHOUSING AND DISTRIBUTION UNITS

Base data

5.1 The Homes and Communities Agency's (HCA) employment density guide (3rd edition 2015) sets out that B8 warehousing uses at national, regional and final mile distribution centres typically accommodate 1 full time equivalent employee per 95sqm, 77sqm and 70sqm, respectively. These figures are based on gross external area (GEA).

5.2 ProLogis also have empirical data on this subject, collected in 2010 and 2014, the latter from the occupiers of 24 of their B8 units (which have a total GFA of 6.05 million sqft). A copy of the ProLogis Technical Note detailing the research findings is contained in **Appendix A**. This confirms that their B8 unit occupiers typically accommodate between 1 employee per 77sqm (2010) and 1 employee per 69sqm (2014). However, most of the units included in the ProLogis Note are smaller than the units that would be constructed at OxSRFI and hence the ProLogis findings are likely to be biased towards the higher end of the employment density range.

5.3 Nevertheless, the ProLogis Technical Note provides a useful indication of the potential split between employee roles. It confirms that warehouse operatives form the majority (50%) of the workforce. Drivers account for around 8% of staff, 21% are admin staff or managerial staff working in the ancillary offices, with 21% represented in the others category (comprising IT, customer service, sales and engineering functions). The Note compares this breakdown with data available from 2003 Cranfield University research and concludes that there has, in recent years, been a positive trend in both the quantity and breadth of jobs provided by B8 warehousing and distribution uses.

5.4 The end occupiers at OxSRFI are not yet known and the development is likely to contain a mixture of distribution centre types. However, the form and location of OxSRFI, combined with the large size of the proposed units, means that these centres are more likely to be national and regional in nature. Therefore, when considering an appropriate employment density for the warehousing at the site, a balanced view should be taken between the lowest (1 per 95sqm) and highest (1 per 70sqm) density range. Adopting the central ratio of 1 full time employee per 77sqm of GEA, that is suggested for regional distribution centres provides a robust figure for assessment purposes.

5.5 Based on this information, it is reasonable to apply the 1 per 77sqm ratio to the proposed GFA of B8 use at OxSRFI site to provide an estimate of the number of employees that would be associated with warehousing at the site. If the 603,850 sqm GFA represents 95% of the GEA, then OxSRFI would have a GEA of 635,632 sqm for the warehousing elements of the scheme. This equates to 8,255 full time equivalent employees associated with the proposed B8 use, based on 1 full time employee per 77sqm of GEA.

5.6 However, there is a difference between the total number of employees, and the number attending during any one time period. To calculate the traffic generation of the employees, it is necessary to obtain a daily profile of trip rates per employee or per 100sqm. As discussed at paragraphs 4.3 and 4.4, this has been calculated using the trip rate profile agreed for the Northampton Gateway SRFI.

5.7 Northampton Gateway SRFI used trip rates derived from Swan Valley Industrial Estate, which is located adjacent to Junction 15A of M1 in Northampton. At the time of the traffic count the Swan Valley site had the following characteristics:

- it included a number of large-scale warehouses, comprising nearly 1.5 million sqft GFA;
- it had an employee density of 1 employee per 77sqm;

- the majority of units at the site operated three shift system (6 – 2 – 10), however Morrisons (formerly Sainsbury's) adopted an extended 12-hour two shift patterns (7 to 7), and therefore provided a robust shoulder peak trip rate; and
- it had no bus service, with low pedestrian and cycle usage (3%), with a single occupancy car driver usage rate of 92%, and car passenger modal share of 5%, providing a robust car usage figure as a base starting point.

Light vehicle trip rates

5.8 To provide a robust assessment for the light vehicle trips (predominantly employee journeys), the Swan Valley vehicle trip rates per 100 employees, was first used to calculate an equivalent trip rate per 100sqm GFA, based on the HCA ratio of 1 full time equivalent employee per 77sqm of GEA (635,632sqm). This ensured that there was correlation with the HCA employee ratios. This resulted in slightly evaluated vehicle trip rates per 100sqm of GFA.

5.9 As part of the Northampton Gateway SRFI work a comparison of the resultant vehicle trip rates per 100sqm GFA derived from the Swan Valley data to trip rates from other available B8 sites was undertaken. That comparison is reproduced below.

comparison of Swan Valley light vehicle trip rates per 100sqm to average of all survey sites									
	am peak (0800 to 0900 hrs)			pm peak (1700 to 1800 hrs)			daily (24 hrs)		
	arrive	depart	two-way	arrive	depart	two-way	arrive	depart	two-way
average of sites	0.087	0.036	0.124	0.032	0.083	0.115	0.978	1.102	2.080
Swan Valley	0.128	0.014	0.142	0.031	0.114	0.145	1.119	1.101	2.220

5.10 The comparison demonstrated that the trip rates for Swan Valley were higher than the average trip rates determined across all the survey sites. In addition, it was found that the Swan Valley vehicle trip rates produce a distinctly elevated inbound vehicle trip rate in the morning peak hour and an elevated outbound vehicle trip rate in the evening peak hour. The correlation of these elevated values with the direction of peak tidal flow (inbound in the morning peak hour and outbound in the evening peak hour), was considered to add further robustness to the assessment. A copy of Table 1 from the Northampton Gateway trip generation technical note, showing the comparison sites, is provided at **Appendix B**.

5.11 It was concluded as part of the Northampton Gateway work that the resultant light vehicle trip rates were robust and therefore suitable to represent the large-scale warehousing and distribution units at an SRFI. The trip rates and assessment methodology were accepted by Highways England and Northamptonshire County Council. The agreed daily light vehicle trip rate profile for is provided at **Table 1** at the end of this technical note.

HGV trip rates

5.12 For the HGV movements, which are principally dependent on the size of the warehouse units and number of loading bays, the trip rates were calculated from the Swan Valley date on a per 100sqm of GFA basis.

5.13 In similarity to the light vehicle trip rates, a comparison of the derived HGV trip rates to trip rates for ither B8 sites was undertaken. That comparison is reproduced below.

comparison of Swan Valley HGV trip rates per 100sqm to average of all survey sites									
	am peak (0800 to 0900 hrs)			pm peak (1700 to 1800 hrs)			daily (24 hrs)		
	arrive	depart	two-way	arrive	depart	two-way	arrive	depart	two-way
average of sites	0.024	0.022	0.046	0.021	0.019	0.040	0.319	0.277	0.596
Swan Valley	0.012	0.015	0.028	0.013	0.016	0.029	0.306	0.316	0.623

5.14 The comparison showed that Swan Valley has a peak hour HGV profile that is below the average, but that the daily HGV trip rate is above average. It was found that in the morning peak hour the two-way HGV trip rate was 64% lower than the average and in the evening peak hour it was 37% lower. Therefore, to ensure a robust assessment of the peak hour HGV generations, the average HGV trip rates were adopted for the peak hour periods. This also had the effect of increasing the overall daily HGV trip rates, providing further robustness to the assessment.

5.15 The HGV trip rates, and assessment methodology were accepted by Highways England and Northamptonshire County Council. The agreed daily HGV trip rate profile (including the adjusted peak hour HGV trip rates) is provided at **Table 1** at the end of this technical note.

Assessment of mezzanine floor space

5.16 OxSRFI would provide 6.5million sqft (603,850 sqm) of conventional B8 floor space use. However, to provide some flexibility for future occupiers seeking mezzanine space, the Parameters Plan will also include an additional allowance for approximately one third of the units (201,283 sqm) to provide mezzanine floor space.

5.17 The Applicant does not hold empirical data regarding mezzanine trip rates and no empirical trip rate information was available at the time of the Northampton Gateway SRFI DCO. It is also noted that the employee density for B8 uses given in the HCA employment density guide are based on GEA, which is not influenced by mezzanine floor space.

5.18 Taking the above into account, along with the operational characteristics of mezzanine floor space as explained at paragraphs 3.5 and 3.6, it was agreed with Highways England and Northamptonshire Council County as part of the Northampton Gateway DCO that, for assessment purposes, the mezzanine floor space be treated as generating trips at 50% of the rate of conventional floor space. This recognised that the mezzanine floor space would not add to the GEA of the units and hence, based on the HCA definition of employee densities, would not generate additional trips, whilst still providing a robust position in the absence of empirical data. The 50% factor allows for the mezzanine floor space to generate additional employee and HGV trips, but not be at pro-rata levels compared to conventional floor space.

5.19 Notwithstanding that the HCA guidance on employment densities being unaffected by mezzanine floor space, should the additional mezzanine floor space be assumed to generate vehicle trips at a rate of 50% of conventional floor space, then if follows that this must be equated to additional employee trips. In which case, adopting the 50% ratio, the mezzanine floor space allowance could equate to a further potential 1,307 full time employees at OxSRFI.

5.20 Should empirical data on the trip generation characteristics of mezzanine floor space become available in the future it may allow a re-calibration of the mezzanine floor space allowance for the OxSRFI site based on the traffic generations assumed in this technical note.

Vehicle traffic generation for warehouse and distribution units

5.21 The resulting daily vehicle traffic generation profile for the conventional floor space at the B8 units, based on a GFA of 603,850 sqm is shown at **Table 2** at the end of this technical note. The resulting daily vehicle traffic generation profile for the additional mezzanine floor space, based on the additional floor area and 50% trip generation ratio given above, is shown at **Table 3**. The total trip generation (the sum of Tables 2 and 3) is provided at **Table 4**.

5.22 **Table 4** identifies that in the evening, the hourly periods (the shoulder periods) either side of the 1700 to 1800 peak hour are forecast to generate higher light vehicle traffic flows than the traditional 1700 to 1800 peak hour period. The earlier shoulder peak hour of 1600 to 1700 hours has a higher departure rate and the greater total traffic generation. Therefore, in accordance with the same approached adopted for the Northampton Gateway DCO, to ensure a robust assessment of the light vehicle trips, the light vehicle trip generation associated with the shoulder peak hour 1600 to 1700 have been swapped with the light vehicle trip generation for the 1700 to 1800 peak hour. This ensures that any potential overlap of the shoulder peak with the highway network peak hour is considered. This is not an issue in the morning peak hour, where the shift change occurs much earlier.

5.23 On this basis, the peak hour and daily trip rates and traffic generation that are proposed for the warehousing and distribution units are summarised in the tables below.

peak hour and daily vehicle trip rates for B8 uses per 100sqm/GFA (no interaction with rail terminal)									
period	light vehicles			heavy vehicles			total vehicles		
	arrive	depart	2-way	arrive	depart	2-way	arrive	depart	2-way
AM peak	0.128	0.014	0.142	0.024	0.022	0.046	0.152	0.036	0.188
PM peak*	0.042	0.147	0.190	0.021	0.019	0.040	0.063	0.167	0.230
daily	1.119	1.101	2.220	0.326	0.326	0.652	1.445	1.427	2.872

peak hour and daily vehicle trip generation for B8 uses (no interaction with rail terminal)									
period	light vehicles			heavy vehicles			total vehicles		
	arrive	depart	2-way	arrive	depart	2-way	arrive	depart	2-way
AM peak	903	97	1,000	169	155	324	1,072	252	1,324
PM peak*	298	1,038	1,336	148	134	282	446	1,172	1,618
daily	7,884	7,756	15,640	2,293	2,296	4,589	10,177	10,052	20,229

* higher light vehicle trips for shoulder peak of 1600 to 1700 hrs used in place of the lower 1700 to1800 hr trip rates, thereby ensuring a robust assessment of the development and highway network peak period combined.

5.24 It has been agreed with the Transport Working Group that the traffic generated by the proposed development in the hour before both the AM and PM peak hour is also modelled as part of the strategic transport modelling[5]. This will ensure that the highway conditions generated by the development traffic in the pre-peak are passed into, and therefore represented in, the peak hour assessment. The pre-peak traffic flows are provided at Section 8 of this technical note.

[5] The strategic transport modelling will be undertaken using the Bicester Transport Model (BTM). The BTM is a 2hr model and hence both the pre-peak hour and peak hour development traffic will be represented in the model.

Comparison with existing SRFI sites

5.25 As part of the review of version 2 of this technical note, Highways England have confirmed that the trip rates presented form a good basis to assess the impact of the proposed OxSRFI scheme and are acceptable to them in principle. However, Highways England also asked whether ADC had considered whether fresh traffic survey data could be collected at comparable SRFI sites, such as DIRFT or East Midlands Gateway SRFI, to provide further confidence to the assessment.

5.26 It is not possible to undertake meaningful survey work at existing sites without an on-site presence and detailed information regarding a development, such as the amount of floor space occupied at the site, mezzanine floor space constructed, and current operations of the rail terminal. This is particularly the case for East Midlands Gateway SRFI, which is not yet fully built out and hence there is uncertainty regarding occupancy and operation. There is also an element of commercial sensitivity surrounding such information, and hence new survey work was not considered a viable option at East Midlands Gateway.

5.27 Survey work was, however, undertaken at DIRFT as part of the DCO for the recently approved West Midlands Interchange SRFI[6]. The external vehicle trip rates for the B8 uses at DIRFT were determined based on the results of traffic surveys undertaken in 2016. The resultant trip rates have been extracted from that work and are provided below.

peak hour and daily vehicle trip rates for B8 uses per 100sqm/GFA based on DIRFT survey									
period	light vehicles			heavy vehicles			total vehicles		
	arrive	depart	2-way	arrive	depart	2-way	arrive	depart	2-way
AM peak	0.072	0.012	0.084	0.017	0.016	0.032	0.089	0.028	0.117
PM peak	0.040	0.059	0.099	0.017	0.022	0.038	0.057	0.081	0.137
daily	0.834	0.821	1.655	0.382	0.366	0.748	1.216	1.187	2.403

5.28 Comparison of the above surveyed DIRFT vehicle trip rates to those proposed for OxSRFI that are given at paragraph 5.23 above provides further confidence that the proposed OxSRFI trip rates are robust.

[6] Table 12 and Table 16, Document 6.2, The West Midlands Rail Freight Interchange Technical Appendix 15.1 – Transport Assessment, WSP July 2018

6.0 TRIP GENERATION: RAIL TERMINAL

Rail terminal light vehicle trips

6.1 The rail terminal would employ a small number of staff, typically between 10 to 20 employees per shift. Therefore, an average of 15 employees per shift (0600 to 1400 hours, 1400 to 2200 hours, and 2200 to 0600 hours) is assumed.

6.2 **Table 5** provides summary of the light vehicle movements associated with the rail terminal employees.

Rail terminal HGV trips

6.3 The number of HGVs generated by the rail terminal would depend on the number of trains and the length of each train using the rail terminal, as this will dictate the number of containers that each train can carry.

6.4 An HGV can carry two 20ft containers, or one 30ft/40ft/45ft container at a time. A HGV will either:
- arrive at the rail terminal empty, departing with a container (or containers);
- arrive at the rail terminal with a container (or containers), and depart empty; or
- arrive loaded with a container (or containers) for drop off and depart loaded with a new container (or containers).

6.5 From the above it can be seen that there is a container to HGV handling ratio. The Applicant has commissioned Intermodality to provide advice in relation to the operation of the rail terminal. As part of that work, Intermodality have prepared a report detailing the interrelationship between rail and road activity that would be associated with the rail terminal. A copy of the Intermodality report[7] is provided at **Appendix C**. Paragraph 1.8 of the report identifies that container to HGV handling ratios have fallen from around 1.3 HGVs to 1 container (2006 data), to a ratio of 1.1 HGVs to 1 container in 2020. This has resulted from a drive for efficiency to reduce the number of empty HGV movements to and from rail terminals. Based on the Intermodality findings, the recent 1.1 HGV to 1 container ratio has therefore been adopted in this technical note.

6.6 Based on the findings from the Network Rail Freight Market Study, paragraph 1.7 of the Intermodality report identifies that the average number of containers per train will increase from the 2011/12 baseline of 34 containers per train, to 41 containers per train by 2023/24, and then remain constant beyond this. The increase is assumed to reflect a continued drive for efficiency by the train operating companies, including the use of longer trains from 500m towards 640m and in some cases maximum 750m in length (775m including locomotives).

6.7 Based on the above, as calculated at paragraph 2.6 of the Intermodality report, each train would accommodate an average of 41 containers. This is equivalent to:
- 46 HGVs per trainload delivering and exporting containers from the rail terminal
- 92 HGV trips per trainload (46 inbound and 46 bound) at the rail terminal
- 1,104 HGV trips per day (based on a maximum of 12 trains per day using the rail terminal).

6.8 The rail terminal would therefore lead to a mode shift from long haul road freight to rail freight equivalent to 1,104 HGV trips per day (552 HGVs inbound loads and 552 HGVs outbound loads).

[7] 'Oxfordshire RFI: rail information and assumptions', Intermodality, January 2021.

7.0 INTERACTION BETWEEN RAIL AND WAREHOUSING UNITS

Introduction

7.1 This section identifies the interaction between the rail operation and the warehousing and distribution operations that would occur at the OxSRFI site.

7.2 Containers arriving at OxSRFI by rail (or vice versa) will typically be processed on the terminal in the following ways:

- Train to HGV for direct transhipment to a final destination with no added value on site. It is assumed that this type of operation would take place at the rail terminal, as opposed to being undertaken at a direct rail served warehouse.
- Train to warehouse for breaking down, warehousing and then onward transhipment to either a final destination (typically currently road based), or onwards distribution to regional distribution centres (traditionally road based, but with clear indications of movement to rail). This operation has potential to take place either on the main terminal, where a warehouse occupier does not require a dedicated rail siding alongside the warehouse, or at a direct rail served warehouse.
- Train to stack on the pad (or designated container storage area), and from stack to destination either by road or rail. Again, is assumed that this type of operation would take place at the rail terminal.

7.3 Container movements to the individual warehouse units on the site would either be direct to the individual warehouse unit (or plot) by rail, by means of an adjacent rail siding, or by delivery of the containers to the rail terminal, with the containers then being transferred by HGV (or tug) between the rail terminal and warehouse units.

Rail and warehousing interaction

7.4 The DCO for Northampton Gateway SRFI used evidence from DIRFT to consider the above interrelationships between rail and the warehouses. Two snap shots of the operations at DIRFT were considered.

7.5 The first snapshot came from roadside interviews undertaken in February 2010 at DIRFT rail terminal at part of the DIRFT III Expansion, that identified the origin of HGV arriving at the facility and the designations of HGVs departing the facility. The survey found that 31% of HGVs were starting from, or destined for, other locations within DIRFT. This survey predated the rail-connected Tesco distribution centre coming on-line at DIRFT.

7.6 The second snapshot based on more recent data from DIRFT, established that the warehousing at a modern SRFI should be capable of capturing up to 56% of container traffic handled by the rail terminal.

7.7 Based on the above, for the Northampton Gateway SRFI, a more conservative average figure of 40% was adopted in the assessment work. This was approved by Highways England and Northamptonshire County Council as part of the traffic generation work, which in turn was approved by the Planning Inspectorate as part of the DCO submission for the Northampton Gateway SRFI scheme.

7.8 Paragraph 1.9 of the Intermodality report (**Appendix C**) also references that one third figure from the first DIRFT snapshot, and notes that 2020 data from iPort SRFI in Doncaster confirms that a small percentage (2.4%) of total container traffic arrived at the site by road and then departed again by road.

7.9 Based on this information the Intermodality report recommends that for OxSRFI it would be appropriate to assume that 35% of the container traffic would be captured at the site.

7.10 Therefore, the following assumptions have adopted for the assessment of HGV trips associated with the rail operations at the OxSRFI site:

- 35% of HGV trips remain on site, to and from the warehousing; and
- 65% of HGV trips travel to and from the hinterland.

Rail terminal daily HGV profile

7.11 Of the operations described in paragraph 7.2, only a lift from the train direct to HGV (assume worst case 65%) would provide a direct correlation between train and HGV movements. If the lifted container is either transferred to a warehouse (35%) or to stack (no data) any HGV movement arising would be totally independent of train arrival and departure times.

7.12 It is impossible to say with certainty at this stage the split of container movements or the final pattern of local distribution for the OxSRFI site, as this will depend on a combination of the appointed terminal operator, end customer requirements and inter relationship with other SRFI sites and their sphere of operations.

7.13 Based on the assessment of 1,104 HGV movements associated with the rail terminal (12 trains per 24 hours) as identified in Section 7, the following assessment can be made of operations assuming 35% of all containers handled at the terminal have an origin and destination within the OxSRFI site and 65% have an origin and destination off-site:

- 35%, 386 HGV trips remain on site for add on value operations prior to onward distribution (193 trips to and from the warehousing and the rail terminal). It is assumed that onward distribution would be via road, with HGV timing being totally independent of train times.
- 65%, 718 HGV trips travel external to the site (359 arrivals and 359 departures to and from the rail terminal) and would be directly linked to train arrival times.

7.14 The timing of train arrivals and departures is not known in detail as train paths and hence arrival and departure times will depend on a combination of end user requirements, paths bid from Network Rail by the Freight Operator to meet the end customer needs and the paths granted by Network Rail. For the assumed 65% of containers that go out by road direct from train it is not therefore possible to be precise at this stage on times of day.

7.15 Due to the inability to state with certainty at this stage exactly how HGV movements would correlate with train arrivals and departures it is considered that the best indicator of associated HGV movements can be derived from how other similar terminals within the UK operate and the HGV trip generation that ensues. This was the approach adopted at Northampton Gateway SRFI, where data from the rail terminal at Hams Hall was used.

7.16 Since then, data is also available from iPort SRFI, and this is included at Figure 2 of the Intermodality report alongside the Hams Hall data. An average of data is provided, and this has been used to determine a daily profile of HGV movements associated with direct rail to HGV movements at OxSRFI. The resulting HGV profile for the external HGV trips (65%) associated with the rail terminal at OxSRFI is shown at **Table 6**, at the rear of this report.

8.0 TOTAL TRIP GENERATION

8.1 The internalised HGV trips would be independent of the train times and, as they would not appear on the off-site highway network, they are deducted from the total HGVs that would be generated by the warehousing and distributions units operating in isolation. This is summarised at **Table 7** at the rear of this report.

8.2 In total, it is forecast that OxSRFI would generate 4,920 external two-way HGV trips per 24 hours, with morning and evening peak hour external HGV flows of 331 and 300 two-way movements, respectively.

8.3 Combining the external HGV trips (**Table 7**) with the light vehicle movements (**Tables 4 and 5**) gives the total development vehicle trip generation. This is shown at **Table 8** at the rear of this technical note and it is also summarised below for the pre-peak and peak hour periods and across the day.

total development pre-peak hour, peak hour, and daily vehicle trips (no Travel Plan)									
period	light vehicles			heavy vehicles			total vehicles		
	arrive	depart	2-way	arrive	depart	2-way	arrive	depart	2-way
AM pre-peak	665	211	876	124	157	280	789	368	1,156
AM peak	903	97	1,000	172	159	331	1,075	256	1,331
PM pre-peak	217	806	1,023	132	89	221	349	895	1,244
PM peak	298	1,038	1,336	157	143	300	455	1,181	1,636
daily	7,929	7,801	15,730	2,459	2,461	4,920	10,388	10,262	20,650

8.4 To calculate the overall person trips associated with the development, the light vehicle trips given at **Table 8** have been converted to person trips based on the 92% single occupancy vehicle (SOV) modal split characteristic detailed in Section 5. As the main purpose of an HGV trip is the transportation of its cargo, the HGV trips are excluded from this calculation.

8.5 The resultant person trip generation is given at **Table 9** for the peak hour periods.

8.6 Adding back in the HGV trips, overall, it is forecast that OxSRFI would generation 22,098 two-way daily person trips, with 1,418 and 1,752 two-way person trips forecast in the morning and evening peak hour periods.

9.0 TOTAL TRIP GENERATION WITH TRAVEL PLAN

9.1 It is proposed that the Travel Plan for the OxSRFI will include a target to reduce reliance on the private car by 10%. This target is consistent with the 9.3% targeted reduction in single occupancy car trips identified in the Commercial Travel Plan[8] for the Heyford Park development, which is located adjacent to the OxSRFI site. This will be achieved at OxSRFI through the Public Transport Strategy and the promotion of car sharing, cycling and walking at the development.

9.2 Paragraph 25 of Circular 02/2013 sets out that the overall forecast demand against which traffic impacts on the Strategic Road Network should be assessed, should include for *"…any reduction arising from any travel plan or demand management measures that are being proposed".* Therefore, it is appropriate to allow for the effect of the Travel Plan on the forecast vehicle trip generation.

9.3 A 10% reduction in the baseline 92% SOV trips, equates to a 9.2% modal shift and hence an initial target SOV modal split of 82.8%.

9.4 Applying this to the person trips (excluding HGV trips) at **Table 9**, the resultant vehicle trip generation can be calculated (including allowance for the Travel Plan). This is shown at **Table 10** at the rear of this technical note and is also summarised below for the peak hour periods and across the day.

total development peak hour and daily vehicle trips (with Travel Plan)									
period	light vehicles			heavy vehicles			total vehicles		
	arrive	depart	2-way	arrive	depart	2-way	arrive	depart	2-way
AM peak	813	87	900	172	159	331	985	246	1,231
PM peak	268	934	1,202	157	143	300	425	1,077	1,502
daily	7,136	7,087	14,233	2,459	2,461	4,920	9,595	9,549	19,144

9.5 The above traffic flows represent the likely traffic generation for OxSRFI once the effect of the Travel Plan is considered.

9.6 However, to provide a robust assessment, Highways England requested that the travel plan reductions considered above are not applied to the vehicle traffic generations used in the Transport Assessment. This was agreed with OCC at the Transport Working Group meeting held on 11 March 2021. Therefore, the vehicle trip generations without the Travel Plan that are given at **Table 8** of this technical note are the development traffic flows to be used for modelling and assessment purposes.

[8] Heyford Park Commercial Travel Plan, April 2018 Revision 5, Peter Brett Associates. Table 7.2 gives the 2017 surveyed modal share for single occupancy car trips as 87.1%, and the target single occupancy car modal share of 79%. This is an 8.1 percentage point reduction, which equates to a target 9.3% reduction in single occupancy car trips (8.1/87.1 = 9.3%).

TABLES

Time Window	Northampton Gateway SRFI trip rates								
	Light vehicles			Heavy vehicles			Total vehicles		
	trip rates per 100sqm GFA			trip rates per 100 sqm GFA			trip rates per 100 sqm GFA		
	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way
00.00-01.00	0.011	0.008	0.018	0.007	0.012	0.019	0.018	0.019	0.037
01.00-02.00	0.007	0.002	0.009	0.011	0.011	0.022	0.018	0.013	0.031
02.00-03.00	0.005	0.018	0.022	0.012	0.012	0.023	0.016	0.029	0.046
03.00-04.00	0.008	0.010	0.018	0.008	0.012	0.020	0.016	0.022	0.038
04.00-05.00	0.025	0.012	0.036	0.011	0.007	0.018	0.035	0.019	0.054
05.00-06.00	0.172	0.083	0.255	0.017	0.010	0.027	0.189	0.093	0.282
06.00-07.00	0.082	0.061	0.143	0.017	0.007	0.024	0.099	0.068	0.167
07.00-08.00	0.094	0.030	0.124	0.015	0.020	0.036	0.110	0.050	0.160
08.00-09.00	0.128	0.014	0.142	0.024	0.022	0.046	0.152	0.036	0.188
09.00-10.00	0.061	0.019	0.081	0.016	0.015	0.031	0.077	0.034	0.111
10.00-11.00	0.048	0.029	0.077	0.018	0.020	0.038	0.066	0.049	0.115
11.00-12.00	0.036	0.027	0.063	0.016	0.015	0.031	0.052	0.042	0.094
12.00-13.00	0.052	0.058	0.111	0.012	0.011	0.023	0.065	0.069	0.134
13.00-14.00	0.085	0.061	0.147	0.010	0.017	0.027	0.095	0.078	0.174
14.00-15.00	0.041	0.094	0.135	0.012	0.020	0.032	0.054	0.113	0.167
15.00-16.00	0.024	0.118	0.142	0.008	0.015	0.023	0.032	0.134	0.165
16.00-17.00	0.042	0.147	0.190	0.017	0.010	0.027	0.059	0.158	0.217
17.00-18.00	0.031	0.114	0.145	0.021	0.019	0.040	0.052	0.133	0.185
18.00-19.00	0.094	0.094	0.188	0.016	0.013	0.029	0.110	0.107	0.217
19.00-20.00	0.014	0.035	0.049	0.014	0.009	0.023	0.028	0.045	0.072
20.00-21.00	0.016	0.018	0.035	0.015	0.012	0.028	0.031	0.031	0.062
21.00-22.00	0.037	0.014	0.051	0.009	0.014	0.023	0.046	0.028	0.074
22.00-23.00	0.003	0.026	0.029	0.009	0.011	0.020	0.012	0.037	0.049
23.00-00.00	0.002	0.008	0.011	0.010	0.012	0.022	0.012	0.020	0.033
Totals	**1.119**	**1.101**	**2.220**	**0.326**	**0.326**	**0.652**	**1.445**	**1.427**	**2.872**

Table 1: Agreed vehicle trip rates for warehousing and distribution uses from Northampton Gateway SRFI TA

Time Window	Northampton Gateway SRFI trip rates									Predicted Traffic Profiles for OxSRFI B8 use								
	Light vehicles trip rates per 100sqm GFA			Heavy vehicles trip rates per 100 sqm GFA			Total vehicles trip rates per 100 sqm GFA			Light vehicles OxSRFI			Heavy vehicles OxSRFI			Total vehicles OxSRFI		
	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way
00.00-01.00	0.011	0.008	0.018	0.007	0.012	0.019	0.018	0.019	0.037	65	46	111	44	70	114	109	116	225
01.00-02.00	0.007	0.002	0.009	0.011	0.011	0.022	0.018	0.013	0.031	42	14	56	66	66	132	108	80	188
02.00-03.00	0.005	0.018	0.022	0.012	0.012	0.023	0.016	0.029	0.046	28	107	135	70	70	140	98	177	275
03.00-04.00	0.008	0.010	0.018	0.008	0.012	0.020	0.016	0.022	0.038	46	60	106	48	75	123	94	135	229
04.00-05.00	0.025	0.012	0.036	0.011	0.007	0.018	0.035	0.019	0.054	148	70	218	66	44	110	214	114	328
05.00-06.00	0.172	0.083	0.255	0.017	0.010	0.027	0.189	0.093	0.282	1039	501	1540	101	61	162	1140	562	1702
06.00-07.00	0.082	0.061	0.143	0.017	0.007	0.024	0.099	0.068	0.167	496	366	862	101	44	145	597	410	1007
07.00-08.00	0.094	0.030	0.124	0.015	0.020	0.036	0.110	0.050	0.160	570	181	751	92	123	215	662	304	966
08.00-09.00	0.128	0.014	0.142	0.024	0.022	0.046	0.152	0.036	0.188	774	83	857	145	133	278	919	216	1135
09.00-10.00	0.061	0.019	0.081	0.016	0.015	0.031	0.077	0.034	0.111	371	116	487	97	88	185	468	204	672
10.00-11.00	0.048	0.029	0.077	0.018	0.020	0.038	0.066	0.049	0.115	288	176	464	110	119	229	398	295	693
11.00-12.00	0.036	0.027	0.063	0.016	0.015	0.031	0.052	0.042	0.094	218	162	380	97	92	189	315	254	569
12.00-13.00	0.052	0.058	0.111	0.012	0.011	0.023	0.065	0.069	0.134	315	352	667	75	66	141	390	418	808
13.00-14.00	0.085	0.061	0.147	0.010	0.017	0.027	0.095	0.078	0.174	515	371	886	61	101	162	576	472	1048
14.00-15.00	0.041	0.094	0.135	0.012	0.020	0.032	0.054	0.113	0.167	250	566	816	75	119	194	325	685	1010
15.00-16.00	0.024	0.118	0.142	0.008	0.015	0.023	0.032	0.134	0.165	144	714	858	48	92	140	192	806	998
16.00-17.00	0.042	0.147	0.190	0.017	0.010	0.027	0.059	0.158	0.217	255	890	1145	101	61	162	356	951	1307
17.00-18.00	0.031	0.114	0.145	0.021	0.019	0.040	0.052	0.133	0.185	186	691	877	127	115	242	313	806	1119
18.00-19.00	0.094	0.094	0.188	0.016	0.013	0.029	0.110	0.107	0.217	570	566	1136	97	79	176	667	645	1312
19.00-20.00	0.014	0.035	0.049	0.014	0.009	0.023	0.028	0.045	0.072	83	213	296	83	57	140	166	270	436
20.00-21.00	0.016	0.018	0.035	0.015	0.012	0.028	0.031	0.031	0.062	97	111	208	92	75	167	189	186	375
21.00-22.00	0.037	0.014	0.051	0.009	0.014	0.023	0.046	0.028	0.074	223	83	306	57	83	140	280	166	446
22.00-23.00	0.003	0.026	0.029	0.009	0.011	0.020	0.012	0.037	0.049	19	158	177	53	66	119	72	224	296
23.00-00.00	0.002	0.008	0.011	0.010	0.012	0.022	0.012	0.020	0.033	14	51	65	61	70	131	75	121	196
Totals	**1.119**	**1.101**	**2.220**	**0.326**	**0.326**	**0.652**	**1.445**	**1.427**	**2.872**	**6756**	**6648**	**13404**	**1967**	**1969**	**3936**	**8723**	**8617**	**17340**

	Proposed B8 use at OxSRFI
GFA sqm	603850
GEA sqm	635632
Employees	8255
Ratio	1 per 77 sqm GEA

Table 2: Forecast vehicle trips for warehousing and distribution uses (conventional floor space)

Time Window	Northampton Gateway SRFI trip rates									Predicted Traffic Profiles for OxSRFI mezzanine B8 floor space use (trip rates taken as 50%)								
	Light vehicles			Heavy vehicles			Total vehicles			Light vehicles			Heavy vehicles			Total vehicles		
	trip rates per 100sqm GFA			trip rates per 100 sqm GFA			trip rates per 100 sqm GFA			OxSRFI			OxSRFI			OxSRFI		
	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way
00.00-01.00	0.011	0.008	0.018	0.007	0.012	0.019	0.018	0.019	0.037	11	8	19	7	12	19	18	20	38
01.00-02.00	0.007	0.002	0.009	0.011	0.011	0.022	0.018	0.013	0.031	7	2	9	11	11	22	18	13	31
02.00-03.00	0.005	0.018	0.022	0.012	0.012	0.023	0.016	0.029	0.046	5	18	23	12	12	24	17	30	47
03.00-04.00	0.008	0.010	0.018	0.008	0.012	0.020	0.016	0.022	0.038	8	10	18	8	12	20	16	22	38
04.00-05.00	0.025	0.012	0.036	0.011	0.007	0.018	0.035	0.019	0.054	25	12	37	11	7	18	36	19	55
05.00-06.00	0.172	0.083	0.255	0.017	0.010	0.027	0.189	0.093	0.282	173	83	256	17	10	27	190	93	283
06.00-07.00	0.082	0.061	0.143	0.017	0.007	0.024	0.099	0.068	0.167	83	61	144	17	7	24	100	68	168
07.00-08.00	0.094	0.030	0.124	0.015	0.020	0.036	0.110	0.050	0.160	95	30	125	15	20	35	110	50	160
08.00-09.00	0.128	0.014	0.142	0.024	0.022	0.046	0.152	0.036	0.188	129	14	143	24	22	46	153	36	189
09.00-10.00	0.061	0.019	0.081	0.016	0.015	0.031	0.077	0.034	0.111	62	19	81	16	15	31	78	34	112
10.00-11.00	0.048	0.029	0.077	0.018	0.020	0.038	0.066	0.049	0.115	48	29	77	18	20	38	66	49	115
11.00-12.00	0.036	0.027	0.063	0.016	0.015	0.031	0.052	0.042	0.094	36	27	63	16	15	31	52	42	94
12.00-13.00	0.052	0.058	0.111	0.012	0.011	0.023	0.065	0.069	0.134	53	59	112	12	11	23	65	70	135
13.00-14.00	0.085	0.061	0.147	0.010	0.017	0.027	0.095	0.078	0.174	86	62	148	10	17	27	96	79	175
14.00-15.00	0.041	0.094	0.135	0.012	0.020	0.032	0.054	0.113	0.167	42	94	136	12	20	32	54	114	168
15.00-16.00	0.024	0.118	0.142	0.008	0.015	0.023	0.032	0.134	0.165	24	119	143	8	15	23	32	134	166
16.00-17.00	0.042	0.147	0.190	0.017	0.010	0.027	0.059	0.158	0.217	43	148	191	17	10	27	60	158	218
17.00-18.00	0.031	0.114	0.145	0.021	0.019	0.040	0.052	0.133	0.185	31	115	146	21	19	40	52	134	186
18.00-19.00	0.094	0.094	0.188	0.016	0.013	0.029	0.110	0.107	0.217	95	94	189	16	13	29	111	107	218
19.00-20.00	0.014	0.035	0.049	0.014	0.009	0.023	0.028	0.045	0.072	14	36	50	14	10	24	28	46	74
20.00-21.00	0.016	0.018	0.035	0.015	0.012	0.028	0.031	0.031	0.062	16	19	35	15	12	27	31	31	62
21.00-22.00	0.037	0.014	0.051	0.009	0.014	0.023	0.046	0.028	0.074	37	14	51	10	14	24	47	28	75
22.00-23.00	0.003	0.026	0.029	0.009	0.011	0.020	0.012	0.037	0.049	3	26	29	9	11	20	12	37	49
23.00-00.00	0.002	0.008	0.011	0.010	0.012	0.022	0.012	0.020	0.033	2	9	11	10	12	22	12	21	33
Totals	**1.119**	**1.101**	**2.220**	**0.326**	**0.326**	**0.652**	**1.445**	**1.427**	**2.872**	**1128**	**1108**	**2236**	**326**	**327**	**653**	**1454**	**1435**	**2889**

	Proposed mezzanine B8 use at OxSRFI
GFA sqm	201283
GEA sqm	211877
Employees*	1376
Ratio	1 per 77 sqm GEA

*employees assumed at 50% ratio for mezzanine space

Table3: Additional allowance for vehicle trips for warehousing and distribution mezzanine floor space

Time Window	Predicted Traffic Profiles for OxSRFI B8 floor space use including mezzanine								
	Light vehicles OxSRFI			Heavy vehicles OxSRFI			Total vehicles OxSRFI		
	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way
00.00-01.00	76	54	130	51	82	133	127	136	263
01.00-02.00	49	16	65	77	77	154	126	93	219
02.00-03.00	33	125	158	82	82	164	115	207	322
03.00-04.00	54	70	124	56	87	143	110	157	267
04.00-05.00	173	82	255	77	51	128	250	133	383
05.00-06.00	1212	584	1796	118	71	189	1330	655	1985
06.00-07.00	579	427	1006	118	51	169	697	478	1175
07.00-08.00	665	211	876	107	143	250	772	354	1126
08.00-09.00	903	97	1000	169	155	324	1072	252	1324
09.00-10.00	433	135	568	113	103	216	546	238	784
10.00-11.00	336	205	541	128	139	267	464	344	808
11.00-12.00	254	189	443	113	107	220	367	296	663
12.00-13.00	368	411	779	87	77	164	455	488	943
13.00-14.00	601	433	1034	71	118	189	672	551	1223
14.00-15.00	292	660	952	87	139	226	379	799	1178
15.00-16.00	168	833	1001	56	107	163	224	940	1164
16.00-17.00	298	1038	1336	118	71	189	416	1109	1525
17.00-18.00	217	806	1023	148	134	282	365	940	1305
18.00-19.00	665	660	1325	113	92	205	778	752	1530
19.00-20.00	97	249	346	97	67	164	194	316	510
20.00-21.00	113	130	243	107	87	194	220	217	437
21.00-22.00	260	97	357	67	97	164	327	194	521
22.00-23.00	22	184	206	62	77	139	84	261	345
23.00-00.00	16	60	76	71	82	153	87	142	229
Totals	**7884**	**7756**	**15640**	**2293**	**2296**	**4589**	**10177**	**10052**	**20229**

Table 4: Total vehicle trips for warehousing and distribution uses (no rail interaction)

Time Window	Rail Terminal light vehicles employee movements		
	Arrive	Depart	Two-way
00.00-01.00	0	0	0
01.00-02.00	0	0	0
02.00-03.00	0	0	0
03.00-04.00	0	0	0
04.00-05.00	0	0	0
05.00-06.00	15	0	15
06.00-07.00	0	15	15
07.00-08.00	0	0	0
08.00-09.00	0	0	0
09.00-10.00	0	0	0
10.00-11.00	0	0	0
11.00-12.00	0	0	0
12.00-13.00	0	0	0
13.00-14.00	15	0	15
14.00-15.00	0	15	15
15.00-16.00	0	0	0
16.00-17.00	0	0	0
17.00-18.00	0	0	0
18.00-19.00	0	0	0
19.00-20.00	0	0	0
20.00-21.00	0	0	0
21.00-22.00	15	0	15
22.00-23.00	0	15	15
23.00-00.00	0	0	0
Totals	**45**	**45**	**90**

Table 5: Light vehicle trips associated with rail terminal

	HGV arrivals				
	iPort		Hams Hall		Average
Time window	HGV arrivals	% HGV arrivals	HGV arrivals	% HGV arrivals	
00:00	9.2	2.8%	0.8	0.2%	1.52%
01:00	7.3	2.2%	1.4	0.4%	1.31%
02:00	7.3	2.2%	1.4	0.4%	1.31%
03:00	5.3	1.6%	1	0.3%	0.95%
04:00	6.2	1.9%	2.8	0.8%	1.34%
05:00	9.9	3.0%	9.4	2.6%	2.82%
06:00	17.1	5.2%	21.8	6.0%	5.64%
07:00	20.8	6.4%	28.8	8.0%	7.18%
08:00	14.6	4.5%	18.6	5.2%	4.82%
09:00	17	5.2%	18.4	5.1%	5.16%
10:00	18.7	5.7%	25.6	7.1%	6.42%
11:00	22.1	6.8%	24.2	6.7%	6.74%
12:00	22.3	6.8%	32	8.9%	7.86%
13:00	19.4	5.9%	25.8	7.2%	6.55%
14:00	23.9	7.3%	18.4	5.1%	6.21%
15:00	20.3	6.2%	25.6	7.1%	6.66%
16:00	17.2	5.3%	28.8	8.0%	6.63%
17:00	14.1	4.3%	26.4	7.3%	5.82%
18:00	9.3	2.9%	24.4	6.8%	4.81%
19:00	8	2.5%	14.6	4.1%	3.25%
20:00	8.8	2.7%	5.8	1.6%	2.15%
21:00	10.1	3.1%	2.6	0.7%	1.91%
22:00	9	2.8%	1.2	0.3%	1.55%
23:00	8.4	2.6%	0.6	0.2%	1.4%
Total	**326.3**	**100%**	**360.4**	**100%**	**100%**

Rail Terminal* HGV trips (in isolation) i.e. 100%		
Arrive	Depart	Two-way
8	8	17
7	7	14
7	7	14
5	5	10
7	7	15
16	16	31
31	31	62
40	40	79
27	27	53
28	28	57
35	35	71
37	37	74
43	43	87
36	36	72
34	34	69
37	37	74
37	37	73
32	32	64
27	27	53
18	18	36
12	12	24
11	11	21
9	9	17
8	8	15
552	**552**	**1104**

Rail Terminal external HGV trips		
	65%	external
Arrive	Depart	Two-way
5	5	11
5	5	9
5	5	9
3	3	7
5	5	10
10	10	20
20	20	41
26	26	52
17	17	35
19	19	37
23	23	46
24	24	48
28	28	56
24	24	47
22	22	45
24	24	48
24	24	48
21	21	42
17	17	35
12	12	23
8	8	15
7	7	14
6	6	11
5	5	10
359	**359**	**718**

*Arrivals based on average of Hams Hall and iPort
Assume 50%/50% split between Arrivals and Departures

Table 6: HGV movements associated with the rail terminal

Time Window	HGVs B8 warehouses*			HGVs rail terminal 35% Internal**			HGVs rail terminal 65% external HGVs***			Total external HGVs OxSRFI		
	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way
00.00-01.00	51	82	133	-4	-7	-11	5	5	11	52	80	133
01.00-02.00	77	77	154	-6	-7	-13	5	5	9	76	75	150
02.00-03.00	82	82	164	-7	-7	-14	5	5	9	80	80	160
03.00-04.00	56	87	143	-5	-7	-12	3	3	7	54	83	138
04.00-05.00	77	51	128	-6	-5	-11	5	5	10	76	51	127
05.00-06.00	118	71	189	-10	-6	-16	10	10	20	118	75	193
06.00-07.00	118	51	169	-10	-4	-14	20	20	41	128	67	195
07.00-08.00	107	143	250	-9	-12	-21	26	26	52	124	157	280
08.00-09.00	169	155	324	-14	-13	-27	17	17	35	172	159	331
09.00-10.00	113	103	216	-10	-8	-18	19	19	37	122	113	235
10.00-11.00	128	139	267	-11	-11	-22	23	23	46	140	151	291
11.00-12.00	113	107	220	-10	-9	-19	24	24	48	127	123	250
12.00-13.00	87	77	164	-7	-7	-14	28	28	56	108	98	207
13.00-14.00	71	118	189	-6	-10	-16	24	24	47	89	132	220
14.00-15.00	87	139	226	-7	-12	-19	22	22	45	102	149	252
15.00-16.00	56	107	163	-5	-9	-14	24	24	48	75	122	197
16.00-17.00	118	71	189	-10	-6	-16	24	24	48	132	89	221
17.00-18.00	148	134	282	-12	-12	-24	21	21	42	157	143	300
18.00-19.00	113	92	205	-10	-7	-17	17	17	35	120	102	222
19.00-20.00	97	67	164	-8	-6	-14	12	12	23	101	73	174
20.00-21.00	107	87	194	-9	-7	-16	8	8	15	106	87	193
21.00-22.00	67	97	164	-6	-8	-14	7	7	14	68	96	164
22.00-23.00	62	77	139	-5	-7	-12	6	6	11	63	76	138
23.00-00.00	71	82	153	-6	-7	-13	5	5	10	70	80	150
Totals	**2293**	**2296**	**4589**	**-193**	**-193**	**-386**	**359**	**359**	**718**	**2459**	**2461**	**4920**

* from Table 4

** Based on B8 HGV profile

*** Based on avreage of Hams Hall and iPort HGV arrivals

Table 7: Total external HGVs including for interaction between rail and warehousing and distributions uses

Time Window	Predicted Traffic Profiles for OxSRFI no Travel Plan								
	Light vehicles			Heavy vehicles			Total vehicles		
	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way
00.00-01.00	76	54	130	52	80	133	128	134	263
01.00-02.00	49	16	65	76	75	150	125	91	215
02.00-03.00	33	125	158	80	80	160	113	205	318
03.00-04.00	54	70	124	54	83	138	108	153	262
04.00-05.00	173	82	255	76	51	127	249	133	382
05.00-06.00	1227	584	1811	118	75	193	1345	659	2004
06.00-07.00	579	442	1021	128	67	195	707	509	1216
07.00-08.00	665	211	876	124	157	280	789	368	1156
08.00-09.00	903	97	1000	172	159	331	1075	256	1331
09.00-10.00	433	135	568	122	113	235	555	248	803
10.00-11.00	336	205	541	140	151	291	476	356	832
11.00-12.00	254	189	443	127	123	250	381	312	693
12.00-13.00	368	411	779	108	98	207	476	509	986
13.00-14.00	616	433	1049	89	132	220	705	565	1269
14.00-15.00	292	675	967	102	149	252	394	824	1219
15.00-16.00	168	833	1001	75	122	197	243	955	1198
16.00-17.00*	217	806	1023	132	89	221	349	895	1244
17.00-18.00*	298	1038	1336	157	143	300	455	1181	1636
18.00-19.00	665	660	1325	120	102	222	785	762	1547
19.00-20.00	97	249	346	101	73	174	198	322	520
20.00-21.00	113	130	243	106	87	193	219	217	436
21.00-22.00	275	97	372	68	96	164	343	193	536
22.00-23.00	22	199	221	63	76	138	85	275	359
23.00-00.00	16	60	76	70	80	150	86	140	226
Totals	**7929**	**7801**	**15730**	**2459**	**2461**	**4920**	**10388**	**10262**	**20650**

* light vehicle generation for 1600 to 1700 hrs from Table 3 and 3A swapped with 1700 to 1800 hrs generation to ensure worst case shoulder peak is assessed

Table 8: Total OxSRFI development traffic (no Travel Plan)

Time Window	Person Trip** (excluding HGV drivers)			Person Trip (HGV driver)			Total Person Trips		
	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way
00.00-01.00	83	139	222	52	80	133	135	219	354
01.00-02.00	53	17	71	76	75	150	129	92	221
02.00-03.00	36	136	172	80	80	160	116	216	331
03.00-04.00	59	76	135	54	83	138	113	159	273
04.00-05.00	188	89	277	76	51	127	264	140	404
05.00-06.00	1334	635	1968	118	75	193	1452	710	2162
06.00-07.00	629	480	1110	128	67	195	758	547	1305
07.00-08.00	723	229	952	124	157	280	847	386	1233
08.00-09.00	982	105	1087	172	159	331	1154	264	1418
09.00-10.00	471	147	617	122	113	235	592	260	852
10.00-11.00	365	223	588	140	151	291	505	373	879
11.00-12.00	276	205	482	127	123	250	403	328	731
12.00-13.00	400	447	847	108	98	207	508	545	1053
13.00-14.00	670	471	1140	89	132	220	758	602	1360
14.00-15.00	317	734	1051	102	149	252	420	883	1303
15.00-16.00	183	905	1088	75	122	197	258	1028	1285
*16.00-17.00**	236	876	1112	132	89	221	368	965	1333
*17.00-18.00**	324	1128	1452	157	143	300	481	1271	1752
18.00-19.00	723	717	1440	120	102	222	843	819	1662
19.00-20.00	105	271	376	101	73	174	206	344	550
20.00-21.00	123	141	264	106	87	193	229	229	457
21.00-22.00	299	105	404	68	96	164	367	201	568
22.00-23.00	24	216	240	63	76	138	86	292	379
23.00-00.00	17	65	83	70	80	150	87	145	233
Totals	**8618**	**8560**	**17178**	**2459**	**2461**	**4920**	**11077**	**11021**	**22098**

* light vehicle generation for 1600 to 1700 hrs from Table 3 and 3A swapped with 1700 to 1800 hrs generation to ensure worst case shoulder peak is assessed

**Based on Swan Valley Single vehicle occupancy of 92%

Table 9: Total OxSRFI person trips

Time Window	Predicted Traffic Profiles for OxSRFI with Travel Plan								
	Light vehicles			Heavy vehicles			Total vehicles		
	Arrive	Depart	Two-way	Arrive	Depart	Two-way	Arrive	Depart	Two-way
00.00-01.00	68	115	183	52	80	133	121	195	316
01.00-02.00	44	14	59	76	75	150	120	89	209
02.00-03.00	30	113	142	80	80	160	109	192	302
03.00-04.00	49	63	112	54	83	138	103	146	249
04.00-05.00	156	74	230	76	51	127	232	125	356
05.00-06.00	1104	526	1630	118	75	193	1222	601	1823
06.00-07.00	521	398	919	128	67	195	649	465	1114
07.00-08.00	599	190	788	124	157	280	722	347	1069
08.00-09.00	813	87	900	172	159	331	985	246	1231
09.00-10.00	390	122	511	122	113	235	511	235	746
10.00-11.00	302	185	487	140	151	291	442	335	777
11.00-12.00	229	170	399	127	123	250	356	293	649
12.00-13.00	331	370	701	108	98	207	439	468	908
13.00-14.00	554	390	944	89	132	220	643	521	1164
14.00-15.00	263	608	870	102	149	252	365	757	1122
15.00-16.00	151	750	901	75	122	197	226	872	1098
16.00-17.00*	195	725	921	132	89	221	327	814	1141
17.00-18.00*	268	934	1202	157	143	300	425	1077	1502
18.00-19.00	599	594	1193	120	102	222	719	696	1415
19.00-20.00	87	224	311	101	73	174	188	297	485
20.00-21.00	102	117	219	106	87	193	207	204	412
21.00-22.00	248	87	335	68	96	164	315	183	499
22.00-23.00	20	179	199	63	76	138	82	255	337
23.00-00.00	14	54	68	70	80	150	84	134	218
Totals	**7136**	**7087**	**14223**	**2459**	**2461**	**4920**	**9595**	**9549**	**19144**

* light vehicle generation for 1600 to 1700 hrs from Table 3 and 3A swapped with 1700 to 1800 hrs generation to ensure worst case shoulder peak is assessed

Travel Plan single occpancy car target 82.8%

Table 10: Total OxSRFI development traffic with Travel Plan

APPENDIX A

Prologis Technical Insight - Jobs

DISTRIBUTION WAREHOUSES DELIVER MORE JOBS

When discussing proposals for new developments with local planning authorities, Prologis is often asked about the type and number of jobs that its distribution centres will bring to an area. In order to answer these questions as accurately as possible, Prologis regularly surveys its customers and because this data is proving useful more widely within the UK logistics industry, it has decided to publish the results.

The first survey was carried out in 2006[1]. Prologis repeated the exercise in 2010[2] and again in 2014. In 2010, customers provided employment statistics for 28 distribution centres across the country. This survey represented 6,800 employees working in 5.65 million sq ft By 2014, the survey data had increased to 8,187 employees and to over 6 million sq ft.

The 2014 survey asked:

- **How many people do you employ?**
- **How many employees are full time and how many are part time?**
- **Can you split the jobs your employees carry out into these five areas:**
  - **Office**
  - **Warehouse**
  - **Drivers**
  - **Managerial**
  - **Other?**

Using the data provided by the three surveys, Prologis found that job numbers are rising and that the nature of employment within distribution warehouses is changing.

[1] Prologis, Not Just Stacking Shelves, Spring 2006

[2] Prologis, Do Distribution Warehouses Deliver Jobs? September 2010

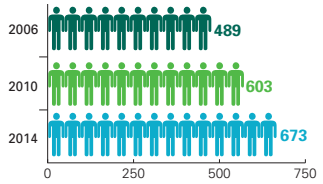
[3] Cranfield University School of Management, Bedford and King Sturge, Future Trends in the Demand for Warehouse Property, April 2003

NUMBERS OF JOBS

In 2006, Prologis calculated that on average, its customers employed one person for every 95m² of floor space within its logistics facilities. By 2010, this ratio had increased to one person for every 77m² and by 2014 it had risen again to one person for every 69m². The 2014 survey also shows an increase in full time jobs from 88% in 2010 to 89% in 2014 and a corresponding decrease in part time employment from 12% to 11%.

Number of Employees

Based on a 500,000 sq ft building (46,450 sq m)



TYPES OF JOBS

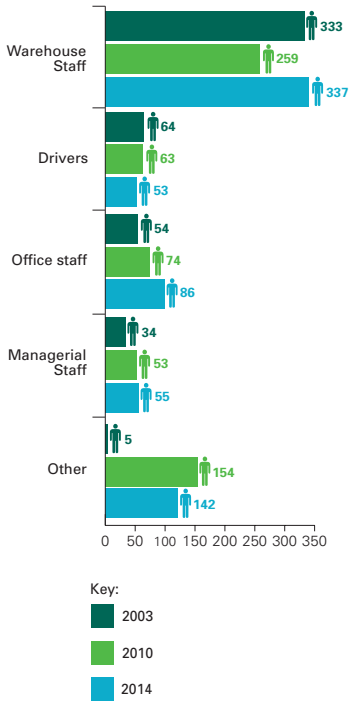
Research carried out by Cranfield University shows that in 2003 68% of logistics workers were staff who work on the warehouse floor. Of the remaining employees 13% were drivers; 11% were administrative or support staff; 7% were managerial and the remaining 1% were categorised as 'other'.[3]

By 2010, the employment picture was more complex. The proportion of people who worked in the warehouse was 43%, while the number of drivers was down to 10%. The proportion of administrative and support staff, however, was 12% and while the number of employees at a managerial level had increased to 9%. Those employed in 'other' categories had jumped to 25% and subsequent discussions with customers indicated that these jobs included IT and customer services along with sales and marketing.

By 2014, the pattern had changed once again. The number of people working in the warehouse itself was 50%, while the proportion of drivers was 8%. The numbers of office-based jobs continued its steady rise to 13%, while the proportion of people working in managerial roles decreased slightly to 8%. The 'other' category dropped back to 21%.

Absolute Number of Employees

Based on a 500,000 sq ft building (46,450 sq m)



PROLOGIS®

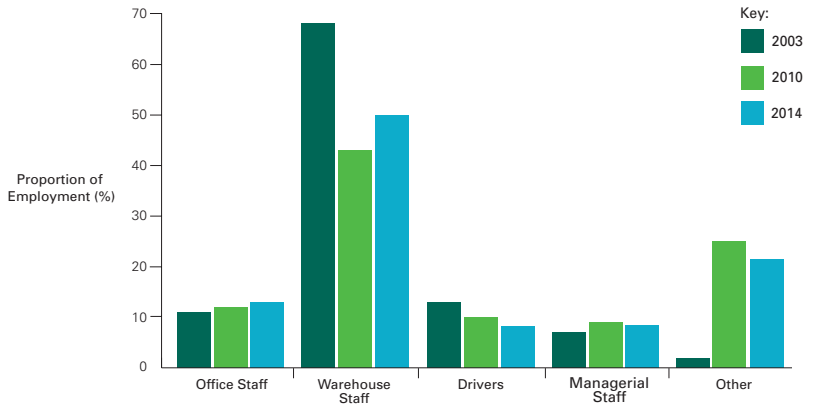
DISTRIBUTION WAREHOUSES DELIVER MORE JOBS

CUSTOMER EMPLOYMENT SURVEY 2014

	Building Area* (Sq ft)	Office	Warehouse	Drivers	Managerial	Other	Full time	Part time	Total
	370,000	42	166	32	10	0	250	0	250
	65,000	30	50	25	15	2	120	2	122
	90,000	10	25	0	1	0	36	0	36
	85,000	149	71	0	106	0	295	31	326
	305,000	82	459	7	69	649	1266	0	1266
	310,000	50	400	100	100	25	650	25	675
	185,000	6	38	15	8	1	67	1	68
	325,000	128	202	0	20	0	350	0	350
	165,000	8	42	5	0	12	45	22	67
	385,000	30	60	10	10	0	110	0	110
	95,000	15	31	9	4	1	60	0	60
	175,000	33	129	141	42	0	345	0	345
	530,000	10	515	0	30	20	300	275	575
	240,000	10	114	0	8	8	89	51	140
	70,000	10	43	45	25	377	500	0	500
	400,000	136	64	8	0	65	133	140	273
	45,000	10	28	0	5	0	43	0	43
	55,000	16	8	0	14	7	44	1	45
	195,000	49	43	53	18	0	157	6	163
	230,000	25	110	70	17	3	225	0	225
	85,000	3	27	2	0	30	49	13	62
	140,000	57	207	24	1	2	291	0	291
	185,000	15	7	0	20	224	264	2	266
	545,000	22	613	41	107	0	763	20	783
	130,000	0	115	1	5	0	121	0	121
	250,000	6	102	24	12	0	136	8	144
	260,000	54	220	19	17	200	310	200	510
	135,000	41	218	12	0	100	301	70	371
Total(s)	**6,050,000**	**1,047**	**4,107**	**643**	**664**	**1,726**	**7,320**	**867**	**8,187**
% of Total		**12.79%**	**50.17%**	**7.86%**	**8.12%**	**21.09%**	**89.4%**	**10.6%**	**100%**

Note: *Building areas have been rounded to protect confidentiality. Total(s) and analysis is based on actual numbers.

Changing nature of employment within the logistics sector 2003-2014



SUMMARY

The first three Prologis customer employment surveys, which were carried out at four year intervals in 2006, 2010 and 2014, indicated that the logistics industry can offer an increasing number of jobs. The data shows that the majority of these jobs are full time and that opportunities for full time employment are growing. A comparison between the 2003 Cranfield University research and both the 2010 and 2014 customer employment surveys demonstrates that logistics offers an increasingly diverse range of jobs. This is a dynamic employment sector and as the data shows, it continues to make a significant contribution to the UK economy.

APPENDIX B

Table 1 from 'Technical Note 2: Trip Generation', Appendix 5 of Northampton Gateway SRFI Transport Assessment

			Light vehicle trip rates per 100sqm GFA									HGV trip rates per 100 sqm									Total trip rates per 100sqm GFA								
			AM peak hour			PM peak hour			Daily (24 hours)			AM peak hour			PM peak hour			Daily (24 hours)			AM peak hour			PM peak hour			Daily (24 hours)		
SITE	GFA (in sqm)	Information	arrive	depart	two-way	arrive	depart	two-way	arrive	depart	two-way	arrive	depart	two-way	arrive	depart	two-way	arrive	depart	two-way	arrive	depart	two-way	arrive	depart	two-way	arrive	depart	two-way
Grange Park M1 J15, Northants	49,237	Three large units, all occupied by New Wave Logistics, each with approx. 5% ancillary B1	**0.152**	**0.018**	**0.170**	**0.051**	**0.118**	**0.169**	unknown			**0.020**	**0.022**	**0.042**	**0.020**	**0.019**	**0.040**	unknown			**0.172**	**0.040**	**0.212**	**0.071**	**0.138**	**0.209**	unknown		
Marston Gate, M1 J13, Brogborough	92668	Three large units, occupiers UCI Logistics, Wolseley, Amazon and Argos. Average B1 across the three units 7%	**0.110**	**0.048**	**0.158**	unknown			unknown			**0.024**	**0.015**	**0.039**	unknown			unknown			**0.133**	**0.064**	**0.197**	**0.084**	**0.141**	**0.225**	unknown		
Swan Valley, M1 J15A M1 J15A, Northants	137,500	Four large units, occupiers Carlsberg, Levi Strauss and Morrison within two units, approx. 5.6% ancillary B1	**0.122**	**0.013**	**0.135**	**0.029**	**0.108**	**0.137**	**1.060**	**1.043**	**2.103**	**0.012**	**0.015**	**0.028**	**0.013**	**0.016**	**0.029**	**0.306**	**0.316**	**0.622**	**0.134**	**0.028**	**0.162**	**0.042**	**0.124**	**0.166**	**1.366**	**1.359**	**2.725**
EuroHub A43, Corby	80,823	Three large units, occupiers Wincanton, Comet and Sainsbury's. Average ancillary B1 5.7% across the three units	**0.153**	**0.015**	**0.168**	**0.027**	**0.138**	**0.165**	unknown			**0.023**	**0.031**	**0.054**	**0.032**	**0.012**	**0.044**	unknown			**0.175**	**0.046**	**0.222**	**0.059**	**0.150**	**0.209**	unknown		
Gap M6 J1, Rugby	41,805	One large unit, ancillary office space 3.6%	**0.045**	**0.081**	**0.126**	**0.012**	**0.018**	**0.030**	unknown			**0.017**	**0.019**	**0.037**	**0.005**	**0.039**	**0.044**	unknown			**0.062**	**0.100**	**0.163**	**0.017**	**0.057**	**0.074**	unknown		
Sainsbury's M25 J25, Waltham	63,172	One large unit, ancillary office space 2.6%	**0.042**	**0.012**	**0.054**	**0.023**	**0.056**	**0.079**	unknown			**0.050**	**0.038**	**0.087**	**0.038**	**0.020**	**0.058**	unknown			**0.091**	**0.050**	**0.141**	**0.060**	**0.076**	**0.137**	unknown		
DIRFT M1 J18, Crick (Daventry)	60,385		**0.124**	**0.047**	**0.171**	**0.040**	**0.096**	**0.136**	unknown			**0.048**	**0.026**	**0.074**	**0.020**	**0.014**	**0.034**	unknown			**0.172**	**0.073**	**0.245**	**0.060**	**0.110**	**0.170**	unknown		
Sainsbury's M5 J7 Worcester	31,586		unknown			unknown			unknown			unknown			unknown			unknown			**0.166**	**0.064**	**0.229**	**0.039**	**0.173**	**0.212**	unknown		
Andover Airfield A303, Andover	43,500	One large unit occupied by the Co-op, with a high employee density ratio of around 1 per 46 sqm	**0.069**	**0.066**	**0.135**	**0.067**	**0.099**	**0.166**	**1.786**	**2.094**	**3.880**	**0.018**	**0.021**	**0.039**	**0.039**	**0.023**	**0.062**	**0.577**	**0.379**	**0.956**	**0.087**	**0.087**	**0.174**	**0.106**	**0.122**	**0.228**	**2.363**	**2.473**	**4.836**
Ocado (TRICS) Hatfield	80,000	Ocade distrbution centre, one large unit	**0.065**	**0.048**	**0.113**	**0.029**	**0.091**	**0.120**	**0.861**	**1.021**	**1.882**	**0.010**	**0.004**	**0.014**	**0.005**	**0.003**	**0.008**	**0.139**	**0.128**	**0.267**	**0.075**	**0.052**	**0.127**	**0.034**	**0.094**	**0.128**	**1.000**	**1.149**	**2.149**
Argos (TRICS) Darlington	80,066	Argos, two units approx 5% ancillary B1	**0.011**	**0.009**	**0.020**	**0.011**	**0.034**	**0.045**	**0.268**	**0.310**	**0.578**	**0.006**	**0.010**	**0.016**	**0.009**	**0.011**	**0.020**	**0.146**	**0.137**	**0.283**	**0.017**	**0.019**	**0.036**	**0.020**	**0.045**	**0.065**	**0.414**	**0.447**	**0.861**
Tesco (TRICS) Milton Keynes	52,125	Nation distrbution centre, one large unit	**0.068**	**0.042**	**0.110**	**0.031**	**0.069**	**0.100**	**0.915**	**1.041**	**1.956**	**0.036**	**0.042**	**0.078**	**0.025**	**0.035**	**0.060**	**0.426**	**0.425**	**0.851**	**0.104**	**0.084**	**0.188**	**0.056**	**0.104**	**0.160**	**1.341**	**1.466**	**2.807**
		AVERAGE	**0.087**	**0.036**	**0.124**	**0.032**	**0.083**	**0.115**	**0.978**	**1.102**	**2.080**	**0.024**	**0.022**	**0.046**	**0.021**	**0.019**	**0.040**	**0.319**	**0.277**	**0.596**	**0.116**	**0.059**	**0.175**	**0.054**	**0.111**	**0.165**	**1.297**	**1.379**	**2.676**

Table 1: Summary of surveyed vehicle trip rate data for large scale warehousing and distribution uses

APPENDIX C

Intermodality report
Oxfordshire RFI : rail information and assumptions

File note

intermodality
transport strategy & delivery

From: Nick Gallop
Date: 26th January 2021
Subject: Oxfordshire RFI: rail information and assumptions

1 Baseline information

Current rail services

1.1 The site is adjacent to the Chiltern Main Line (ChML), part of the national rail network operated by Network Rail as the designated Infrastructure Manager. The ChML is configured as a two-track railway which passes the site in cutting, passenger trains operating at up to 100mph and freight trains up to 70mph.

1.2 At present the Working Timetable (WTT) shows some 106 timetable paths for trains passing the site on a typical midweek day, the majority of these (102) being passenger trains operated by the current franchised train operator Chiltern Railways, the balance being freight trains operated on an "as required" basis to serve the High Speed 2 construction project at Aylesbury.

1.3 The passenger services are formed of the following types of rolling stock:

- Diesel multiple units from Classes 165/168/172 in sets of 2 – 4 coaches with up to 12 coaches per train;
- Loco-hauled sets with a Class 68 diesel locomotive and 7 Mark III coaches per train.

1.4 Freight services are formed of a diesel locomotive and wagons as required by the end user.

1.5 The first morning train passes the site around 05:30 and the last night-time train around 01:15, the intermediate period then used by Network Rail for access by maintenance engineers and associated mobile plant.

Rail and road activity at SRFI intermodal terminals

1.6 The following sources have been used to determine baseline assumptions for trains, containers and HGVs associated with the intermodal terminal:

- DIRFT I Railport container / HGV survey, Intermodality, June 2006. Provided a comparison of containers and HGV flows to determine the ratio between the two;
- Freight Best Practice Report: Efficient Intermodal Terminals Deliver Supply Chain Benefits, Department for Transport December 2010. Provided a profile of HGV arrivals at the Hams Hall SRFI intermodal terminal by hour across week commencing 1st February 2010;

- DIRFT III SRFI DCO application, Need Report October 2012. Provided information on the catchment area for containers arriving by rail at the DIRFT I intermodal terminal within the surrounding hinterland (para 5.76 onwards);
- Network Rail Freight Market Study 2013 and supporting forecasts as referenced in the National Policy Statement on National Networks (NPSNN). Provides an indication of baseline and assumed future levels of container numbers per train;
- Information provided by iPort Rail, operators of the intermodal terminal at the iPort Doncaster SRFI 2021. Provides a profile of HGV and container arrivals / departures by day and hour across a four-week period commencing 22nd November 2020.

1.7 The Network Rail Freight Market Study's supporting research indicated a base year (2011/12) average payload per intermodal train of 498 tonnes, which equates to 34 containers (14.5 tonnes per container comprising 11 tonnes of goods and 4.5 tonnes container tare weight). The forecasts then assumed that intermodal train lengths and weights would increase by 20% by 2023/4 (41 containers) and then remain constant beyond this. The increase is assumed to reflect a continued drive for efficiency by the train operating companies, including the use of longer trains from 500m towards 640m and in some cases maximum 750m in length (775m including locomotives).

1.8 The ratio between the number of HGVs arriving at SRFI intermodal terminals and the number of containers arriving by rail, has fallen from 1.3 HGVs to 1 container in 2006 to 1.1 HGVs to 1 container in 2020, which may be explained by a similar increased drive for efficiency to reduce the number of empty HGV movements to and from intermodal terminals.

1.9 The extent and ratio of on-site to off-site use of SRFI facilities will vary according to the location, range of rail services and the individual preferences of SRFI occupiers and third-party users Analysis of the Prologis survey data for DIRFT I in Figure 1 below shows a distribution curve based on the rail-related HGV traffic out of the intermodal terminal, for those trips where an end destination was identified. The survey data suggests that one third of all rail-related traffic stays within the site, with a further third of all rail-related traffic remaining within 15 km of the site.

1.10 The pattern of HGV trip arrivals will vary by time of day and week, driven mainly by train arrival and departure times, where peak levels of HGV arrivals will tend to occur. Figure 2 below shows the average distribution of weekday HGV arrivals by hour at Hams Hall in 2010 and iPort Doncaster in 2020.

1.11 Note that it is also anticipated that an element of the container traffic moved through the intermodal terminal will arrive and depart by road with no interaction with the rail services. The operator of the iPort Doncaster SRFI intermodal terminal has confirmed that 2.4% of total container traffic arriving at the site by road departs again by road.

Figure 1 Distribution of rail-related HGV trips from DIRFT I with known destination

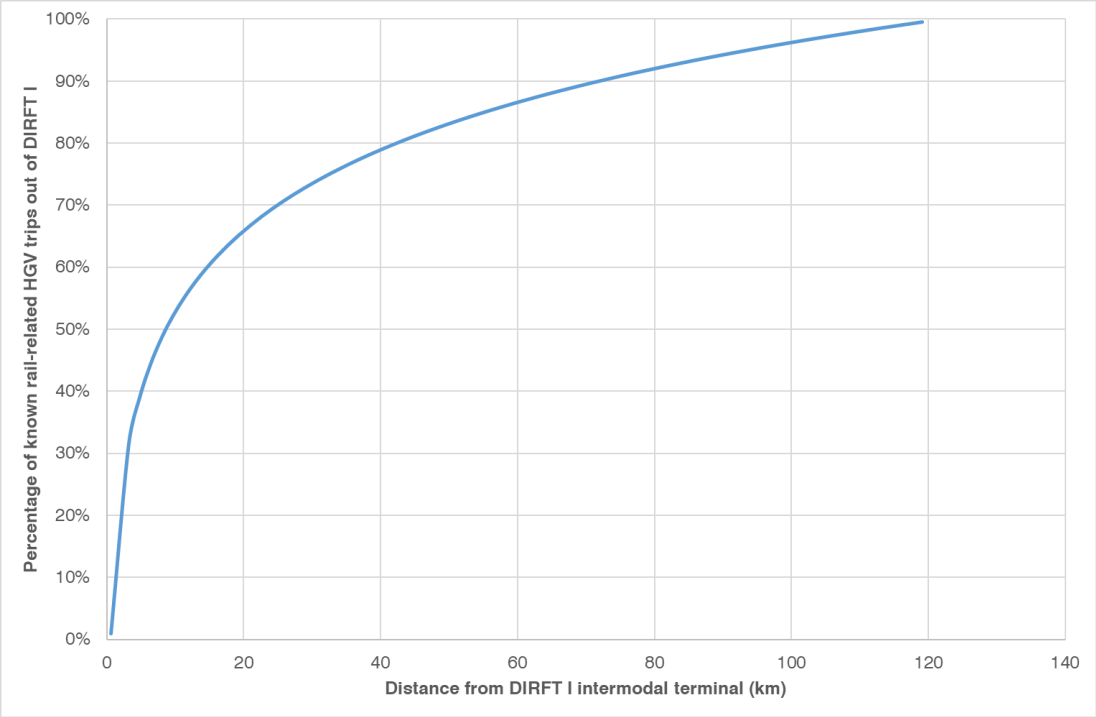
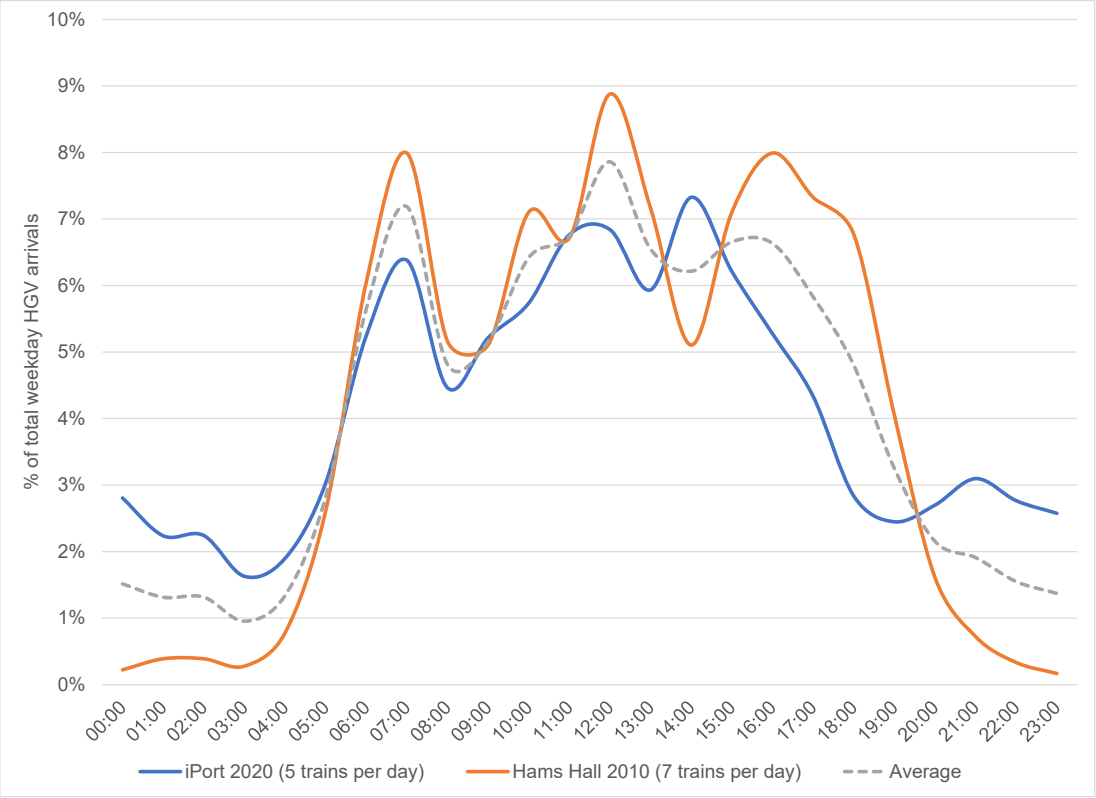


Figure 2 Average daily distribution of HGVs arriving at intermodal terminals by hour



2 Key assumptions

Construction

2.1 The Rail Freight Interchange (RFI) facilities would be constructed in two main works packages:

- The main intermodal terminal, featuring a series of parallel sidings each at least 795m in length and adjacent handling area, connected to the ChML at either end to allow trains to arrive and depart in both directions. The terminal would be constructed in a bowl set below the existing topography, retaining a section of the existing main line cutting face as a spine between the ChML and the site. It is likely that these works will be undertaken in two phases, the initial phase being operated by reachstackers from the 2 sidings nearest to the handling area, the second phase operated by gantry cranes spanning most or all of the sidings;
- A chord line running from the south-eastern end of the intermodal terminal, providing access to the rear service yards of warehousing situated on the eastern flank of the site.

Operation

2.2 The RFI is anticipated to attract the following types of trains:

- Intermodal (containerised) trains, formed of a diesel locomotive (typically Class 66) and a train of between 25 and 38 wagons and associated containers;
- Conventional wagon trains, formed of a diesel locomotive (typically Class 66) and a train of between 20 and 26 wagons and associated commodities;
- Express freight trains, formed of diesel-multiple units with up to 12 coaches per train, or a locomotive and up to 12 coaches per train.

2.3 The site is intended to provide capacity for up to 12 trains per 24 hours, initially operating with 4 trains per day within the first phase of operation, increasing over successive years towards its maximum capacity.

2.4 The majority of the rail traffic is anticipated to be formed of intermodal trains processed through the main intermodal terminal, with the balance of rail traffic in conventional or express trains.

2.5 The RFI facilities would be expected to commence operations between Sunday evenings and Saturday mornings, with the anticipation of operations extending to 24/7 as traffic grows.

2.6 In terms of HGV movements associated with the RFI, the following assumptions are made for a mature level of operation at maximum capacity:

- Up to 12 intermodal trains per day through the site;
- 41 containers / HGV loads per train (assuming further growth in train capacity / length)
- 1:1.1 ratio of containers to HGV movements, to take account of loaded and empty HGVs;

- 46 HGVs per trainload delivering 41 inbound containers to the RFI;
- 46 HGVs per trainload exporting 41 outbound containers from the RFI;
- 92 one-way HGV trips through the RFI highway access per trainload, of which:
  - 35% remain on site to and from warehouses;
  - 65% travel to and from the hinterland;
- 1,104 one-way HGV trips through the RFI highway access from 12 trains per day, of which:
  - 387 remain on site;
  - 717 travel to and from the hinterland.

2.7 In the event that some of the 12 trains per day are in conventional wagon or express freight services, the freight traffic moved to and from the warehouses by rail would then be moved from or to the warehouses by road, incorporated within the level of HGV traffic commensurate with floorspace rather than being seen to generate an additional quantum of rail-related HGV traffic.