Qatar 2050 قطر
الخطة الشاملة للنقل
Transportation Master Plan

وزارة المواصلات
MINISTRY OF TRANSPORT

2050

Updating Transportation
Master Plan For Qatar
TMPQ

Truck Route Network

نقل متكامل ومستدام للجميع
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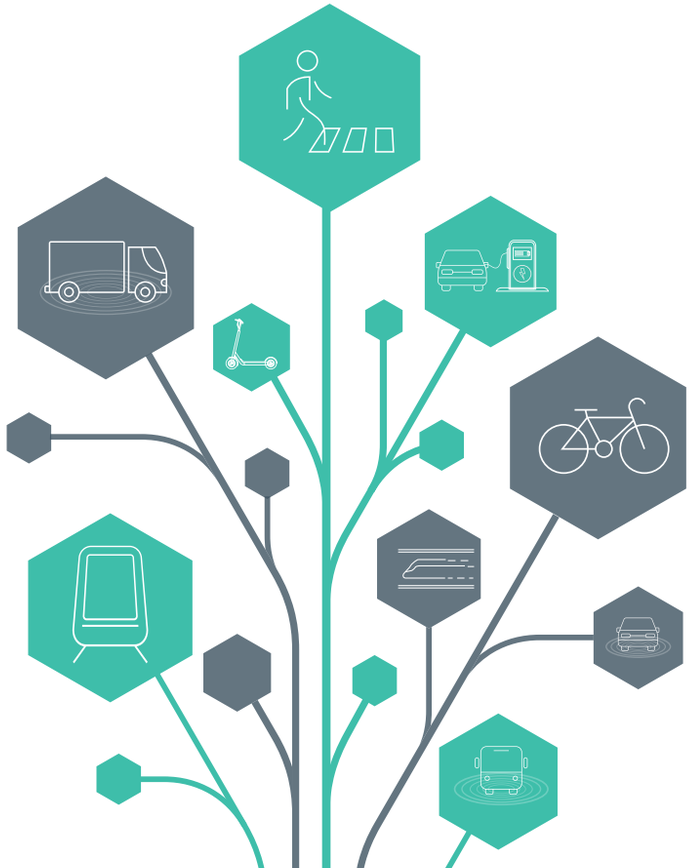

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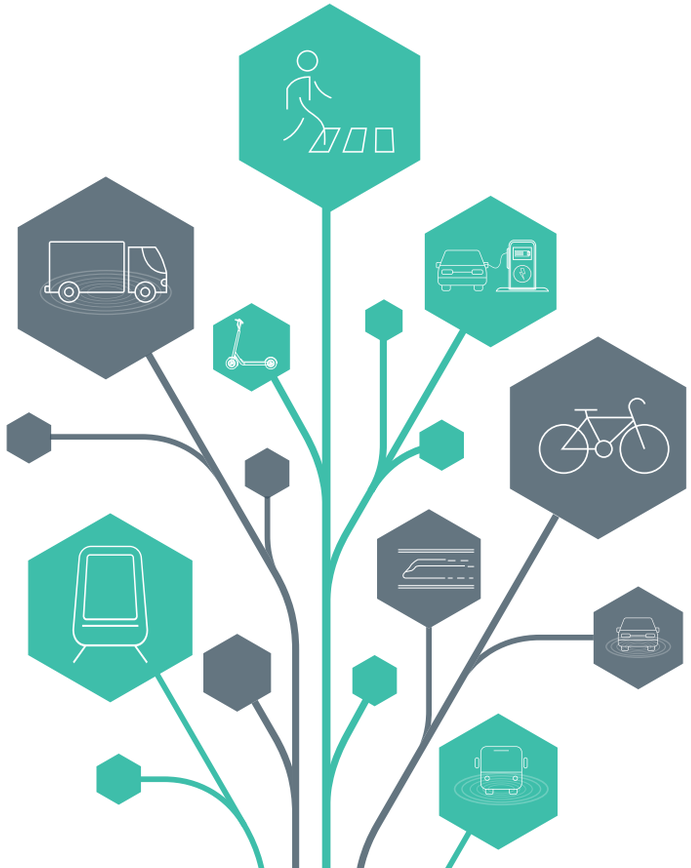
ملاحظة:

يرجى العلم أن أي إشارة أو ذكر لـ "وزارة المواصلات والاتصالات" واختصارها "MOTC" في هذا التقرير، أصبحت تشير حالياً إلى "وزارة المواصلات" و اختصارها "MOT".

Note:

Please note that any reference or mention of the "Ministry of Transport and Communications" and its abbreviation "MOTC" in this report, now refers to the "Ministry of Transport" and its abbreviation "MOT".



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مقدمة

يعتبر قطاع النقل البري أحد القطاعات الرئيسية في تطوير مختلف جوانب الحياة وضمان لنقل السلع والخدمات للأفراد والمجتمعات، كما يدعم نمو القطاعات الأخرى، مثل الزراعة والصناعة والتعدين والتجارة ويدفع التنمية المستدامة للمدن والمجتمعات والاقتصاد لتحقيق أهداف رؤية قطر الوطنية 2030.

ومن هذا المنطلق والتزاماً بمسؤولياتها قامت وزارة المواصلات والاتصالات بإعداد خطة النقل الشاملة لدولة قطر حتى عام 2050م بمشاركة ومساهمة العديد من الجهات الحكومية والخاصة والمختصين بهذا المجال.

توفر خطة النقل الشاملة لدولة قطر إطارًا شاملاً لمستقبل النقل البري فضلاً عن مجموعة متكاملة من المبادرات والمشاريع لخدمة جميع مستخدمي أنظمة وشبكات النقل البري، وذلك لتطوير مستوى خدمات النقل بما يتواكب مع النمو السكاني المتزايد في جميع أنحاء دولة قطر والتنمية الاقتصادية على مدار الثلاثين عامًا القادمة حتى عام 2050م. وهذه الخطة بعيدة المدى ستضع دولة قطر في المقدمة كأحد أكثر دول العالم استدامة من خلال توفير حلول نقل مبتكرة ومستدامة لدعم الاقتصاد، وتحسين جودة الحياة للمواطنين والمقيمين في دولة قطر مع الحفاظ على هويتها الوطنية.

واستمدت هذه الخطة مبادراتها وسياساتها وأدلتها من ركائز رؤية قطر الوطنية 2030، والتي تطمح إلى أن تكون دولة قطر في طليعة الدول المتقدمة، في ظل القيادة الرشيدة لحضرة صاحب السمو الشيخ تميم بن حمد آل ثاني أمير البلاد المفدى.

كما قدمت العديد من الجهات مساهمات وتعاوناً كبيراً في إعداد هذه الخطة الطموحة. ولمواصلة تطوير هذه الخطة وضمان تنفيذها بنجاح تحث وزارة المواصلات والاتصالات جميع الجهات الأخرى للاطلاع على هذه الخطة، والعمل معًا مسترشدين بها لتطوير أنظمة نقل بري متكاملة تلتزم بالأهداف الوطنية لمستقبل مزدهر ومستدام.

كما تؤكد وزارة المواصلات والاتصالات على التزامها بالعمل الجاد والدؤوب من خلال المشاريع والبرامج المستقبلية التي تهدف إلى بناء نظام نقل بري قائم على أحدث التقنيات وأفضل الممارسات في هذا القطاع.

Foreword

Land transportation is one of the key sectors that tremendously helps improve all aspects of life and ensures the delivery of goods and services to individuals and communities. It also underpins the growth of other sectors, such as agriculture, industry, mining and trade and drives the sustainable development of cities, societies and the economy in step with the objectives of the Qatar National Vision 2030.

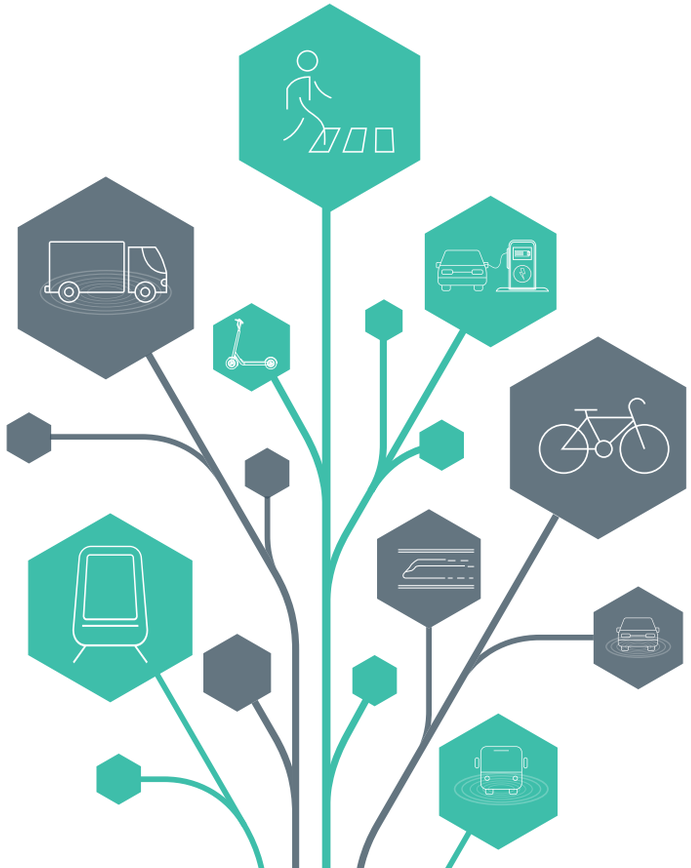
It is with this understanding that the Ministry of Transport and Communications (MOTC), in compliance with its responsibilities, has developed the Transportation Master Plan for the State of Qatar (TMPQ) with collaboration and input from multiple government and private entities and other relevant stakeholders and organizations.

The TMPQ provides an overarching framework for the future of land transportation that recommends an integrated set of transportation initiatives and projects for all users of land transportation systems, which will accommodate the population growth and a growing development momentum across Qatar over the next 30 years until 2050. This far-reaching masterplan can eventually bring Qatar to the forefront of world's most sustainable nations by providing innovative and sustainable transportation solutions that further boost the economy, improve the quality of life for citizens and residents, while preserving the national identity of Qatar.

The transportation schemes, initiatives, policies and manuals within TMPQ have been derived from the pillars of the Qatar National Vision 2030, which strive to place Qatar in forefront and the most advanced nations under the leadership of the Emir of Qatar, His Highness Sheikh Tamim Bin Hamad Al Thani.

A multitude of stakeholders played key roles and made very significant contributions to this ambitious plan. To continue that development and for successful implementation, MOTC encourages all other entities to familiarize themselves with the TMPQ and work together guided by this plan to develop integrated transportation systems that zoom on in the national objectives for a prosperous and sustainable future.

MOTC further stresses its commitment to working relentlessly on many future projects and programs and which aim to deliver a land transportation system that is based on latest technologies and best practices in the transportation field.



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تنويه

قامت وزارة المواصلات والاتصالات بإعداد هذا التقرير ضمن اختصاصاتها وصلاحياتها وفقاً لأحدث الممارسات العالمية في هذا المجال وبناءً على المعلومات، والإحصائيات والبيانات المتوفرة عند إعداد هذا التقرير. لذا إن استخدام هذا التقرير لأي عمل، لا يعفي المستخدمين من استخدام أحدث الممارسات العالمية، واتباع الأساليب الهندسية الصحيحة وفقاً لأحدث التقنيات العالمية المتبعة.

وعليه وجب التأكيد على أن وزارة المواصلات والاتصالات لا تتحمل أي مسؤولية مالية أو قانونية يمكن أن تُعزى إلى هذا الاستخدام، كما أنه لا يحق للمستخدمين المطالبة أو استلام أي نوع من التعويض عن أية أضرار أو خسائر.

وللحصول على نسخة من هذا التقرير، يجب التقدم بطلب رسمي إلى وزارة المواصلات والاتصالات في دولة قطر والذي يعد موافقة على ماورد في هذا التنويه. ويجوز للمستخدمين عرض محتويات التقرير ونسخها وطباعتها للاستخدام الخاص فقط، شريطة أن تحمل جميع النسخ والمطبوعات الخاصة بالمحتويات حقوق النشر وإشعارات الملكية وإخلاء المسؤولية الأخرى المعروضة على التقرير. كما لا يجوز للمستخدمين الإعلان أو النشر أو الإفصاح عن البيانات و / أو الكشف عن أي معلومات مدرجة في هذا التقرير على الإطلاق دون موافقة كتابية مسبقة من قبل وزارة المواصلات والاتصالات.

وفيما يخص التغييرات أو الإصدارات المستقبلية، ستقوم الوزارة بتوفيرها ويمكن الحصول عليها من خلال الاتصال بالإدارة المخولة في الوزارة، وعليه يتوجب على المستخدمين التحقق بشكل متواصل بأن لديهم أحدث إصدار من هذا التقرير.

ملاحظة: ستقوم وزارة المواصلات والاتصالات بمواصلة تحديث وتعديل هذا التقرير مع الأخذ بعين الاعتبار النظريات الجديدة وأحدث الأساليب التكنولوجية والمواضيع المُستجدة التي تتعلق بتخطيط وتحليل وتصميم أنظمة النقل والمرور.

إن وزارة المواصلات والاتصالات تشجع المستخدمين على تقديم الملاحظات والاقتراحات والتعليقات وردود الأفعال وذلك من خلال قنوات الاتصال الخاصة بالوزارة، وسيتم مراجعة هذه الملاحظات والاقتراحات ومن ثم تقييمها للنظر في إمكانية إدراجها ضمن الإصدار القادم من التقرير.

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Note: New findings, technologies, and topics related to the planning, designing, operating, and maintaining of transportation and traffic systems will regularly be used by MOTC to keep this report up to date. Users are encouraged to provide feedback through MOTC communication channels. Feedback will be reviewed, assessed, and possibly included in the next version.

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الخطة الشاملة للنقل
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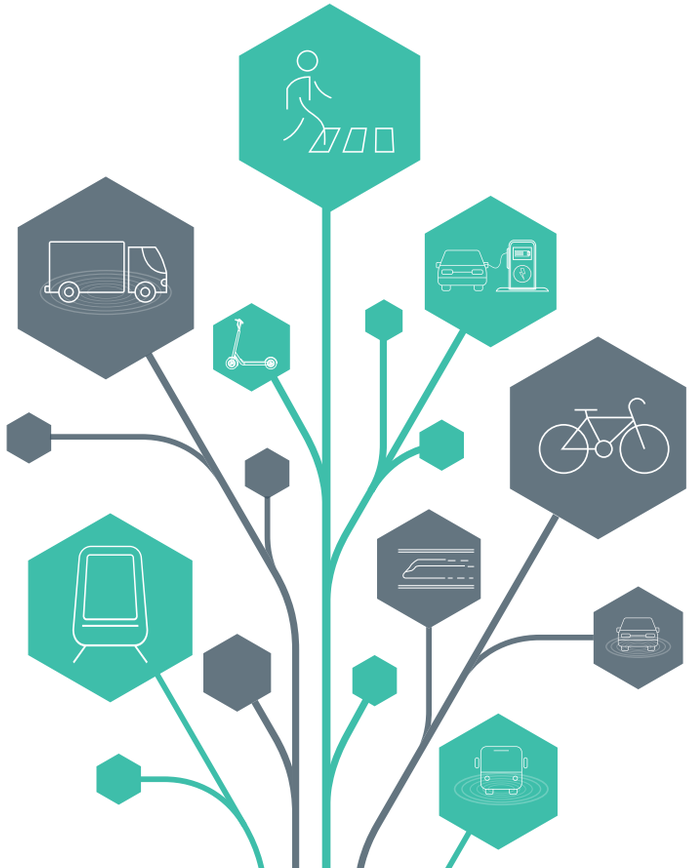

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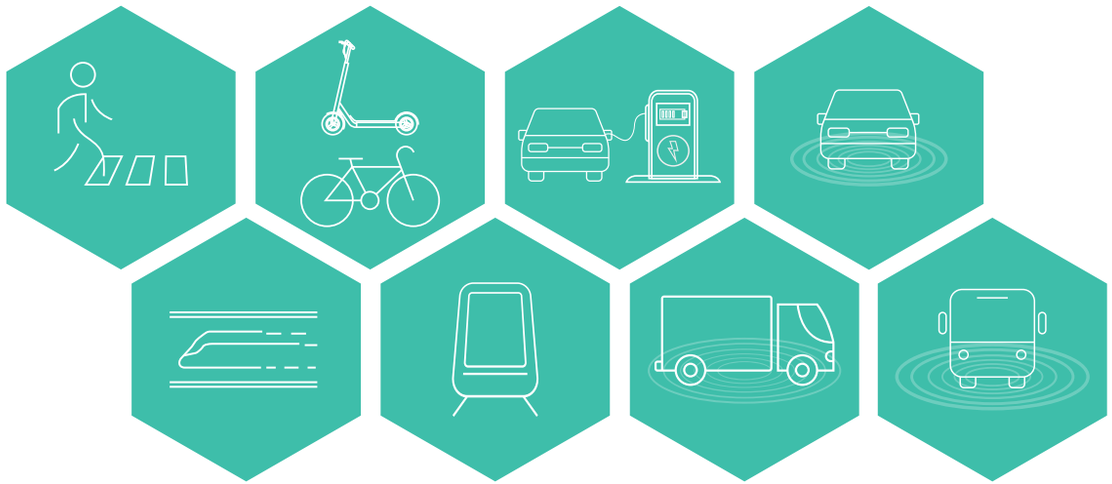
LIST OF ABBREVIATIONS



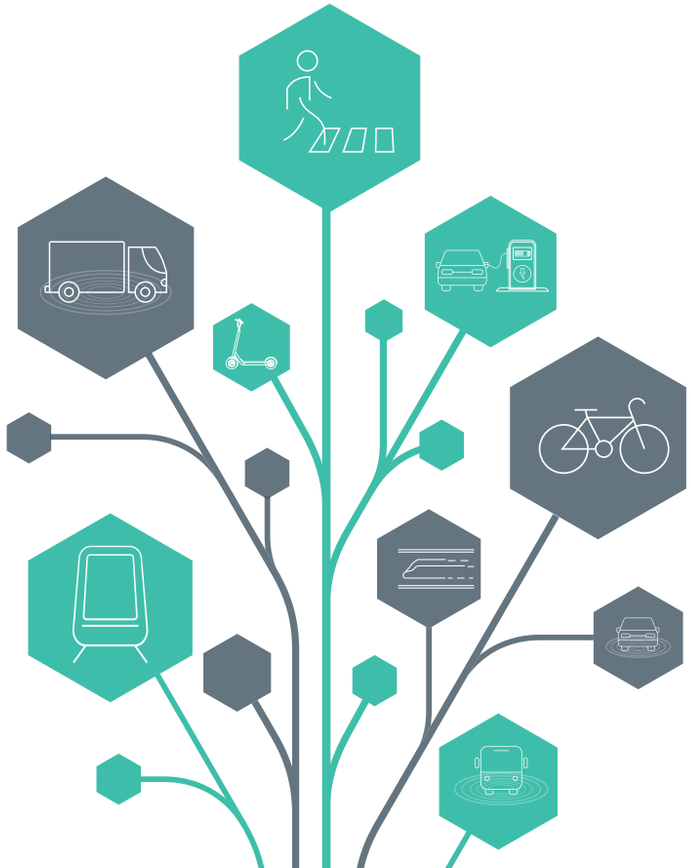

أنت في الطابق
You are on Level
-2
خروج
Way Out
-1
إلى القطارات
To Trains
-2

ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
AKCC	Al Khaleej Cement Company
ASTRoMaP	Atlanta Strategic Truck Route Master Plan
CNG	Compressed Natural Gas
DIA	Doha Industrial Area
DMA	Doha Metropolitan Area
EVPS	Emergency Vehicle Pre-emption System
FAHES	Vehicle Inspection Facility
FHWA	Federal Highway Association (US)
GIS	Geographic Information System
GPS	Global Positioning System
GVW	Gross Vehicle Weight
HGV	Heavy Goods Vehicle
HIA	Hamad International Airport
ITS	Intelligent Transport Systems
KPI	Key Performance Indicator
LEZ	Low Emission Zone
LGV	Light Goods Vehicle
LMP	Logistics Management Plan
LTPD	Land Transport Planning Department

MIC	Mesaieed Industrial City
MMA	Ministry of Municipal Affairs
MME	Ministry of Municipality and Environmental
MOH	Ministry of Health
MOI	Ministry of Interior
MOTC	Ministry of Transport and Communications
MPS	Mobile Petrol Stations
MSAL	Maximum Singe Axle Load (),
NCFRP	National Cooperative Freight Research Program
NFE	North Field Expansion
OSOM	Over Size Over Mass
PCU	Passenger Car Unit
QAR	Qatari Riyal
QEZ	Qatar Economic Zone
QEZ1	Qatar Economic Zone 1 (Ras Bufontas)
QEZ2	Qatar Economic Zone 2 (Al Karana)
QEZ3	Qatar Economic Zone 3 Umm Alhoul)
QFMP	Freight Master Plan
QHDM	Qatar Highway Design Manual
QNCC	Qatar National Cement Company
QNHS	Qatar National Housing Strategy

QNMP	Qatar National Master Plan
QPMC	Qatar Primary Materials Company
QSTM	Qatar Strategic Transportation Model
RLIC	Ras Laffan Industrial City
Ro-Ro	Roll onRoll off
SAL	Single Axle Load
SCATS	Sydney Coordinated Adaptive Traffic System
SCENR	Supreme Council for the Environment and Natural Resources
SGV	Special Goods Vehicle
TEU	Twenty-foot Equivalent Unit
TMPQ	Transportation Master Plan for Qatar
TOR	Terms of Reference
TRN	Truck Route Network
TTR	Temporary Truck Route
TSE	Treated Sewage Effluent
TWD	Typical Week Day
UAE	United Arab Emirates
UFT	Urban Freight Transport



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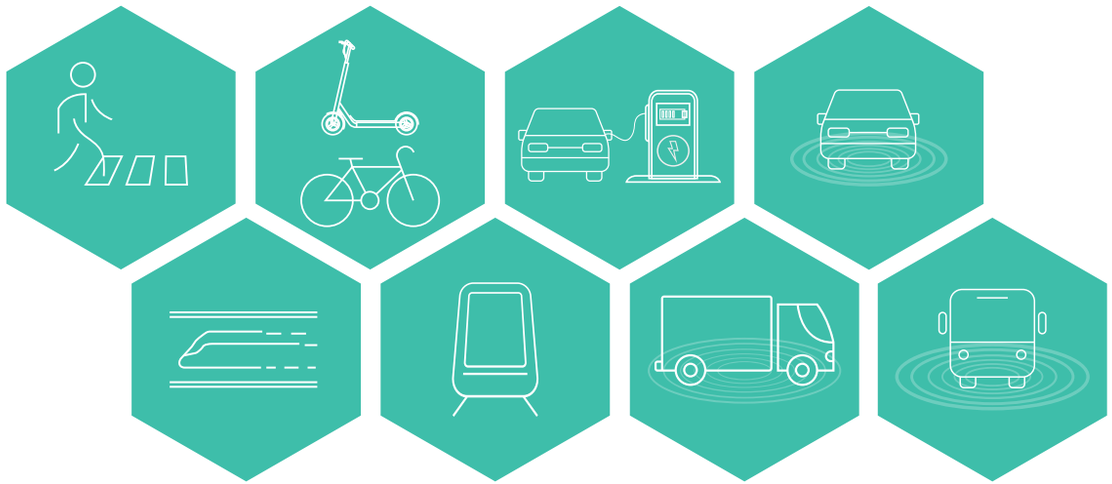
SECTION - 01

INTRODUCTION



1 INTRODUCTION

1.1 BACKGROUND

This Report addresses the development of the Truck Route Network (TRN), by analyzing existing truck routes, future truck routes, and key stakeholder requirements. The report will provide input to the Qatar Freight Master Plan (QFMP) which is currently being developed by the Ministry of Transport and Communications (MOTC).

Freight and logistics are critical to the functioning of Qatar's economy. Freight and logistics supply chains enable Qatar to access goods from across the world and connect local businesses to new markets. The efficiency of those supply chains affects the price of goods at home and the competitiveness of Qatar's goods abroad. The number of times goods need to be handled during transport, and the volume of goods that can be moved in each trip, influence efficiency and therefore costs.

Trucks form the backbone of Qatar's supply chain and the consequence of this need for efficiency is a desire to use larger and more productive trucks on the State's roads. However, granting access to 'higher productivity' vehicles creates clear risks that the government must manage effectively:

- Larger and heavier vehicles can present safety risks to other road users, therefore a properly planned truck route network with clear safety measures is necessary for the safe movement of trucks
- Larger and heavier vehicles can present a risk to infrastructure, both in terms of accelerating wear and tear and exceeding design parameters

Trucks also contribute to traffic congestion. Larger and heavier vehicles can face the challenge of maneuvering through urban areas; whereas the use of smaller vehicles results in a substantially higher number of vehicle trips to move a given volume of goods.

The heavy vehicle access arrangements described in this document have been based on three principles, as follows:

- Safety – Ensuring the safe integration of trucks across the entire transport system.
- Productivity – Ensuring trucks have the most direct high capacity routes to drive productivity growth across the State.
- Amenity – Ensuring trucks do not have negative impacts on communities across the State.
- The arrangements seek to ensure that the right kinds of vehicles have access to the right parts of the road network.

1.2 PURPOSE OF THIS REPORT

The purpose of this document is to outline the role of trucks in supporting the local economy and define road network arrangements that strike a balance between the benefits and impacts of heavy vehicles operating on Qatar's road network.

The report sets out how spatial analysis, including land use data, location of key generators, and potential demand for goods movement, analysis of transportation facilities, and assets have been used to inform the development of a truck route network. The TRN will contribute to meeting

the overall Vision of the Updated TMPQ and its objectives.

This report includes the following **plans and recommendations**:

i. A strategic truck route network for Doha and Qatar.
ii. Supporting truck network facilities such as parking sites weigh stations etc.
iii. Details of truck restrictions for the proposed truck route network.
iv. Routes for hazardous goods and oversized trucks.
v. Policies and regulations required to implement the proposed truck network. It is noteworthy to mention that policies related to freight or the TRN are covered in Policy Position Papers Report in TMPQ.

1.3 REMIT OF THE UPDATED TMPQ IN RELATION TO THE QATAR FREIGHT MASTER PLAN

Before proceeding with the development of the TRN, it is worth noting an important distinction that is relevant when considering the relationship between the Updated TMPQ and the project which was awarded by the MOTC for the development of the Qatar National Freight Master Plan.

Freight is defined as "goods transported in bulk by truck, train, ship or aircraft". Freight transportation is the physical process of transporting commodities and merchandise, goods and cargo. So, the Freight Master Plan covers all modes and all types of goods, whereas the focus of the Updated TMPQ is more on truck movement. Trucks move one component of those goods - the highway-based component.

The Freight Master Plan has been commissioned to deliver a multi-modal freight framework, with an efficient network and complementary policies, through an optimized system that manages and controls freight demand and supply.

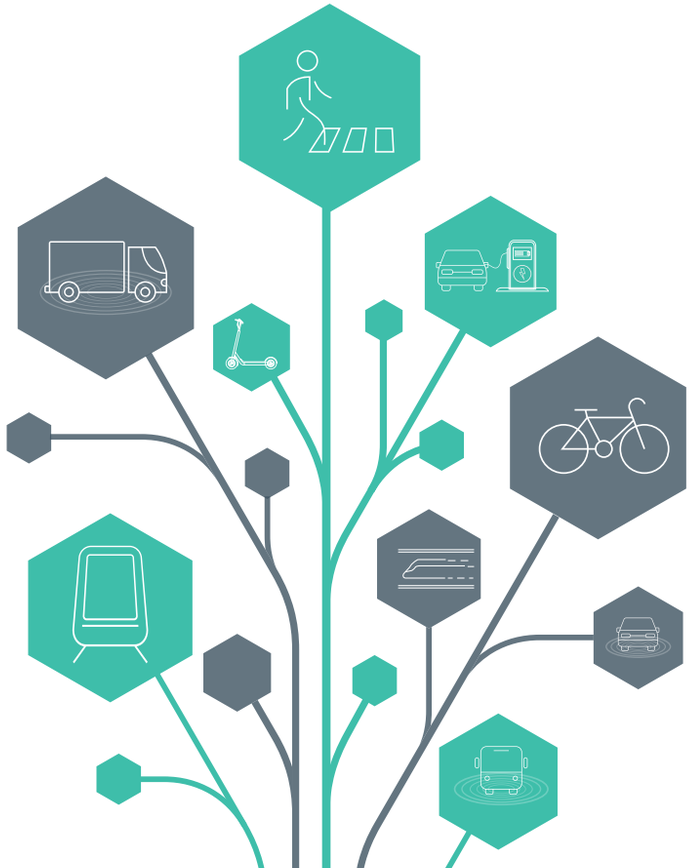
The goods vehicles policies developed within the Updated TMPQ will facilitate the implementation of an effective truck route network. But the truck route network will also be considered in a way that will facilitate the transfer of goods from rail to the road in the future once the longer distance rail network is implemented.

The truck route network within the Updated TMPQ has been designed with the subsequent needs of the Freight Master Plan in mind.

1.4 REPORT STRUCTURE

The structure of the remainder of this report is as follows:

- Section 2 - Review of International Best Practices;
- Section 3 - Existing Condition;
- Section 4 - Major Truck Generators;
- Section 5 - Future Condition;
- Section 6 - Proposed Truck Route Network, Policies, and Facilities;
- Section 7 - Proposed Hazardous Goods and Oversized Truck Routes;
- Section 8 - Assessment of Proposed Truck Route Network;
- Section 9 - Implementation.



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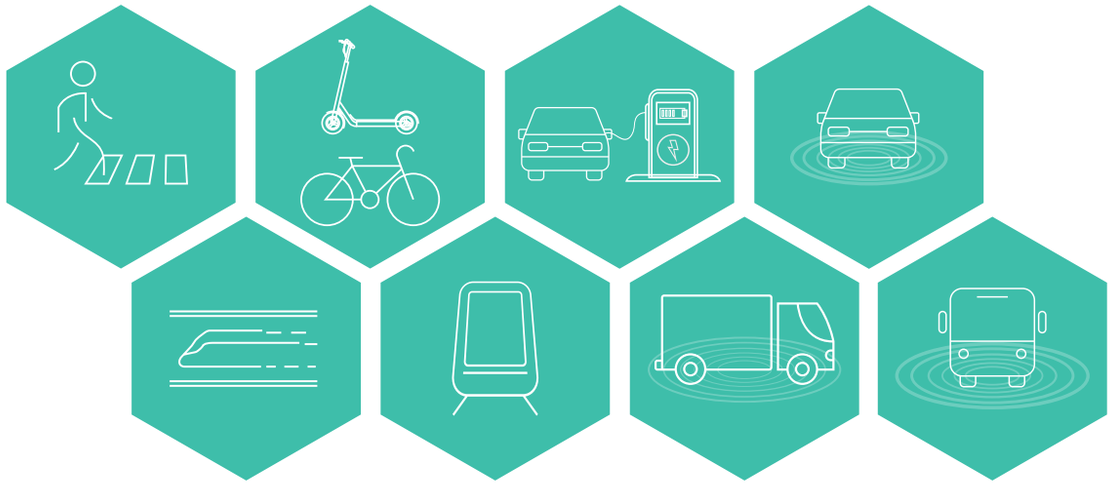
02

SECTION - 02

REVIEW OF INTERNATIONAL BEST PRACTICES

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2 REVIEW OF INTERNATIONAL BEST PRACTICES

2.1 INTRODUCTION

The advances in modern technology and logistics management techniques have meant that solutions for challenges regarding truck management have been introduced globally. This section highlights a few examples of issues and challenges faced by cities developing truck routes, and the solutions identified by these cities to address those challenges. Some of these solutions are innovative, whilst others better manage the existing assets and infrastructure of these cities. Reference is also made to the International Best Practice Report in TMPQ, which selected five cities (Dubai, Singapore, London, Atlanta, and Auckland) for a detailed examination of transportation policies, infrastructure, and measures.

Best practice examples have been considered at three levels:

- **Regional Best Practices** – To inform the development of the truck network for Qatar, this section provides a summary of the experience of Dubai and Abu Dhabi, like other Gulf cities developing truck route networks, and the critical success factors contributing to their successful implementation. Regional truck route networks from Abu Dhabi are considered to have some commonalities and similarities with those in Qatar.
- **Global Best Practices** – This section also briefly summarizes the key features of globally known networks such as those in London, Auckland, and Atlanta. Networks have been developed in these cities which successfully integrate trucks with car traffic, and effectively allow goods to be transported across the first mile and last mile. This final journey leg can often be a short one, but overcoming this challenge contributes to the successful movement and management of trucks.
- **Other Best Practices.** Additional information about freight management has been identified about how freight issues are resolved in developed countries. Two sources of relevant information have been found:
  a. A research paper by National Cooperative Freight Research Program (NCFRP); and
  b. Last Mile management solutions.

Consideration of best practices has been a key input to the truck route network development task. These examples are for illustrative purposes, and examples that address the specific truck challenges facing Qatar are identified within Section 3 of this report.

2.2 REGIONAL BEST PRACTICES

2.2.1 DUBAI

Dubai suffers many of the same problems related to trucks as other countries in the Middle East. It was estimated that there were more than one million trucks in operation in Dubai in 2018, with growth rates between 5% and 9% per annum. Truck driver behavior is poor, vehicle maintenance standards are low, and trucks are involved in a high proportion of severe and fatal accidents. Dubai is attempting to tackle these issues with limitations on truck movements, better enforcement, and the provision of truck facilities.

Truck restrictions are relatively limited and are not backed up by a formal Freight Master Plan or strategy. Truck movement is prohibited during peak hours within the city of Dubai (coastal area). The hours of truck movement prohibition are from 6:30 am up to 8:30 am, then from 1:00 pm to 3:00 pm, and from 5:30 pm to 8:00 pm. Stricter conditions apply to the historical center and on Sheikh Zayed Road, where trucks are only allowed to circulate at night, and to some road segments (bridges and tunnels), where trucks are prohibited at all times.

Figure 2.1 Figure 2.1 below depicts the truck limitations in Dubai during Ramadan. It has to be noted that the morning restriction shifts to 7:30 am - 9:30 am during the holy month.

Figure 2.1 – Dubai Truck Limitations

Source: Road and Transport Authority (https://rta.ae/wpsv5/links/TrucksMov_Ramadan_En.pdf)

The UAE's amended federal traffic law, covering Dubai, Abu Dhabi and the other Emirates, came into effect on 1 July 2017. The new regulations aim to further protect the lives of road users and reduce traffic casualties from about 6 per 100,000 people to 3 per 100,000. Apart from the normal traffic offences, the following specific offences and fines are relevant to truck drivers:

- Driving a heavy vehicle that endangers lives, harms public or private properties, jumping the red light and causing his or another vehicle to overturn - AED3,000 fine and license to be suspended for a year.
- Heavy vehicle not following lane discipline - AED 1,500 and 12 license points.
- Driving a heavy vehicle that does not comply with safety and security conditions - AED 2,000 and six points.
- Driving a vehicle that causes pollution - AED 1,000 fine and six points.
- Not fixing reflective stickers at the back of trucks and heavy vehicles - AED 500 fine.
- Driving expired tires (more than 5 years old) - AED 500 fine, four points and seven-day vehicle confiscation.

Dubai RTA has produced a Truck and Bus Handbook. The handbook specifies legal requirements for heavy vehicle drivers, along with road safety information and guidance. The handbook does not specify hours of service or rest times and is mainly focused on good driving practices.

Dubai is aiming to improve truck supporting facilities. A new truck rest stop at Dubai land on Emirates Road is expected to be completed in 2021. The construction of the facility, which is being undertaken in partnership with the private sector, is the first integrated truck-stop zone that will meet

all the basic and daily needs of drivers of heavy vehicles across Dubai. The Truck Stop covers five hectares and includes 100 parking slots for trucks and other facilities to serve the basic and daily needs of truck drivers, as well as a specialized technical testing center for heavy vehicles.

By establishing this Truck Stop, RTA aims to sort out issues related to the parking of trucks along highways and in residential areas. It will also enable RTA to meet the rising demand for truck stops, considering that trucks make about 145,000 trips and lift about 3 million tons of load every day in Dubai.

RTA has already constructed 18 temporary truck rest stops on the right-of-way of several vital roads in Dubai with a total capacity of 538 parking slots to provide safe and convenient parking spaces for trucks during the restricted hours of movement.

RTA has commissioned a comprehensive study of truck movements in Dubai, along with site surveys, interviews and workshops with the departments and companies concerned. It has also developed a model to predict future truck movements and assess the need for dry ports and assembly and distribution centers for goods.

RTA has also finalized technical and commercial studies for sites to build permanent truck rest stops — the first is in Jebel Ali Industrial Area 3, near Shaikh Mohammad Bin Zayed Road; and the second is at Al Ayyas, near Emirates Road. Private sector tenders for the two sites will be issued in 2021. These two stations will have all requisite facilities and services.

LESSONS LEARNED

- Improved regulation and enforcement are essential
- A Truck Route Network has to be comprehensively designed and supported by a Freight Master Plan.
- Truck route networks and restrictions require supporting parking, holding, servicing and rest facilities.

2.2.2 ABU DHABI

A key regional example of a city facing similar challenges to Doha regarding truck routes is Abu Dhabi. The population of Abu Dhabi is increasing at a higher rate and to meet demand of the growing population, the efficient movement of trucks (freight) becomes more vital. Abu Dhabi, like Qatar, is also facing traffic congestion and increases in trucks exacerbate the situation.

The major issues related to truck movement in Abu Dhabi are stated below:

- There is no formal governance structure of freight movement;
- Lack of truck parking and rest facilities;
- Lack of formal truck route maps;
- Lack of freight traffic information for operators and drivers;
- Regulation and policies are either not clear or not easily available;

- Lack of planning and implementation of goods vehicle weight regulations;
- Poor enforcement of current policies.

To address the freight transportation issues, Abu Dhabi conducted a detailed strategic Freight Master Plan (FMP) project which was completed in 2012. The vision of the FMP was, "To deliver an effective transport system that contributes to the economic growth, quality of life and environmental sustainability of the Emirate of Abu Dhabi". In 2014, the Abu Dhabi Department of Transport (DOT) published its Abu Dhabi Multimodal Freight Master Plan (FMP), which articulated a vision to formalize and clarify the Emirate's approach to regulating the freight industry.

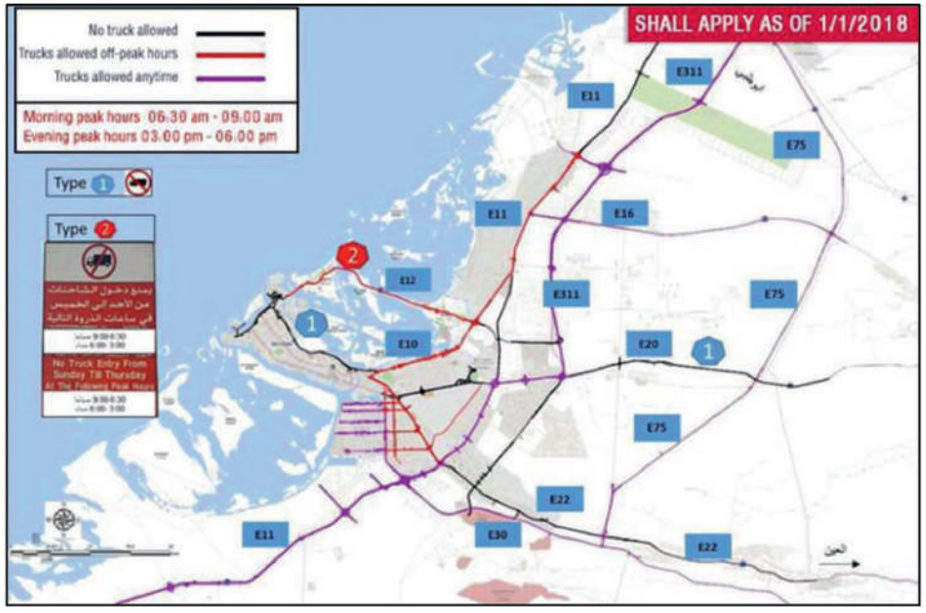
In addition to broader regulatory challenges relating to insufficient planning and enforcement, DOT identified the lack of basic data on operators as a key issue preventing sound regulation. The department did not possess, for example, contact information for a large number of freight operators, or data relating to the size, operations and management of their fleet.

Earlier failures to enforce the law and prosecute offenders culminated in the majority of the truck fleet failing to meet basic safety standards. Inspections in 2013 found that approximately 60% of freight vehicles failed to meet safety requirements due to defects to vehicle lights, brakes, tyres and various other components. It also created an uneven playing field for operators, as larger companies who tended to comply with requirements were routinely undercut by smaller operators who would simply ignore them.

To address this issue, the DOT launched new requirements for all heavy vehicle operators wishing to renew their trade licenses alongside a new, streamlined online portal. The portal required operators to provide proper information upon renewing their licenses, enabling DOT to maintain a good record of heavy vehicles in Abu Dhabi. This, in turn, provided a solid foundation, informed by up to date data, with which to continue the regulatory reform agenda outlined in the FMP, and ensure the safe and efficient movement of trucks across the UAE.

Further, in 2017 the DOT in coordination with Abu Dhabi Police (ADP) introduced a ban on heavy vehicles using Abu Dhabi's internal and external roads during peak hours (06.30-09.00am, and 15.00-18.00pm). This was intended to make roads safer and minimize road accidents involving trucks and heavy vehicles. As part of this ban, ADP released an updated truck route network which clearly identified the proposed changes. The revised truck network (shown in Figure 2.2) outlines three types of routes: unrestricted (trucks allowed anytime), restricted (trucks allowed off-peak hours), and prohibited (no trucks allowed). This simple classification makes it easy for the industry to understand, and for government to manage the network.

Figure 2.2 – Abu Dhabi Truck Route Network



Source: Abu Dhabi Police GHQ, 20 December 2017

The Freight Master Plan came up with the following recommendations:

- Establish a strong relationship between government and the freight industry;
- Prepare a formal governance structure of freight;
- Prepare and implement an effective land use policy supporting freight transport;
- Provide freight transport regulations;
- Establish a research program and freight data collection system; and
- Develop guideline for urban truck routes and truck parking

In Abu Dhabi, supporting heavy goods facilities are progressively being provided. The Khalifa Industrial Zone Abu Dhabi (KIZAD) officially opened in September 2012. Next to the new Khalifa Port, KIZAD is positioned equidistant between Abu Dhabi and Dubai cities, and is accessed from the strategic highway system. Logistics parks, warehousing and truck parking are key elements of the zone. In June 2020 owner Abu Dhabi Ports announced a new dedicated Truck Plaza, comprising parking, refueling and rest facilities. The truck plaza will cover 87,000 sq.m. and will include a dedicated Adnoc Distribution service station for trucks, comprising two main canopies and six diesel bay canopies, and a community center with 275 shaded truck, bus and car parking spaces. It will also have several retail outlets, including a convenience store, restaurants, a car care service, and a 1000 sq.m. mosque. Follow on enhancements may include a dedicated overnight rest area for drivers and additional comfort facilities.

Truck driver hours of service are not mandatory, but truck owners are encouraged to adopt an hours-of-driving rule for their truck drivers in a bid to ensure they have adequate rest. DOT have suggested a maximum shift length, which varies from 10 to 11 hours and 30 minutes. The maximum driving before a break could vary from 2 hours and 30 minutes to 2 hours. If a driver works for 2 hours and 30 minutes, he must take a 30-minute break. A four-hour trip would require a break of 45 minutes to one hour.

Enforcement of lorry drivers' working time will come later. The Department intends to further research, develop, and consult on more defined limits for drivers that will, over time, be given the force of law. It has also come up with manuals on better truck maintenance, a driver's guide to daily

truck safety checks and guidance for owner-drivers on the prevention of truck driver fatigue. 17 per cent of fatal accidents are truck-related.

Freight movement is also controlled through vehicle dimensions and load limits. Maximum overall vehicle length is related to the class of vehicle and is embodied in the UAE Traffic Law. Loads may not project forward or rearward more than 1.2 meters. Overall height of the vehicle and load may not exceed 4.2 meters. However, on-road enforcement systems are limited. The UAE has only three weighing stations, one in Abu Dhabi, one in Ras Al Khaimah and one between Fujairah and Al Dhaid.

LESSONS LEARNED

- Possessing accurate, up-to-date data of the local freight industry establishes the foundation for a good regulatory framework and helps to build investor confidence in the sector
- Adopting simple classifications for the network makes it easier for road users to familiarize themselves with where they can and cannot go. It also increases levels of compliance
- Truck route networks and restrictions require supporting parking and rest facilities.

2.3 GLOBAL BEST PRACTICES

2.3.1 GENERAL

On reviewing management of truck movements across the globe, it is noted that some countries have been dealing with higher numbers and a broader diversity of trucks for a long time. The increasingly sophisticated systems being adopted in those countries to manage truck road access and road safety provide good examples for how the same issues can be managed in Qatar. This section reviews best practice in London, Auckland, Atlanta, and Australia.

2.3.2 LONDON, UK – TRUCK CONTROL

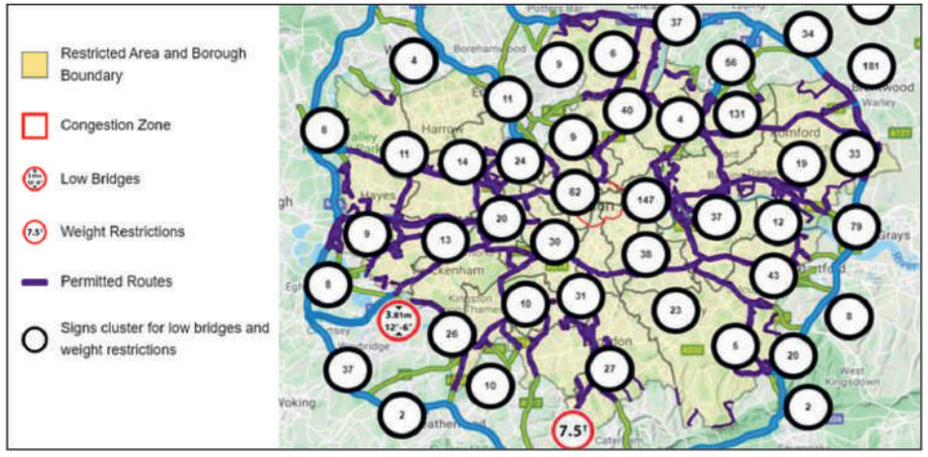
The London Lorry Control Scheme (LLCS) controls the movement of HGVs with a Gross Vehicle Weight (GVW) of over 18 tonnes throughout Greater London. Introduced in 1985, the scheme was developed to minimize noise pollution at unsociable hours.

The LLCS restrictions operate during the evening and on weekends:

- Monday to Friday - 9pm-7am (including Friday night/Saturday morning)
- Weekends – 1pm Saturday to 7am Monday morning
- Public and Bank Holidays

Under the scheme, roads throughout London are classified as either restricted – that require permission to be used or permitted – which are exempt from the control. The scheme area is shown in Figure 2.3 below.

Figure 2.3 – London Lorry Control Scheme Map



Source: https://www.londoncouncils.gov.uk/services/london-lorry-control

A freight operator requiring access to a restricted road during the scheme's control hours must obtain a permission permit from the relevant London Councils for each vehicle. Permits can be granted to vehicles, subject to travel plans identifying a proposed route that minimizes travel distances between the permitted routes (also known as the Excluded Route Network (ERN)) and the final destination.

If a journey can be undertaken making complete use of the ERN, or the truck weighs less than 18 tons, a permission is not required. Penalty charges are issued to both the driver and freight operator when a vehicle contravenes the scheme's restrictions. The penalty charge is currently £550 (approximately QAR 2800 at current exchange rate) for operators and £130 (QAR 700) for drivers.

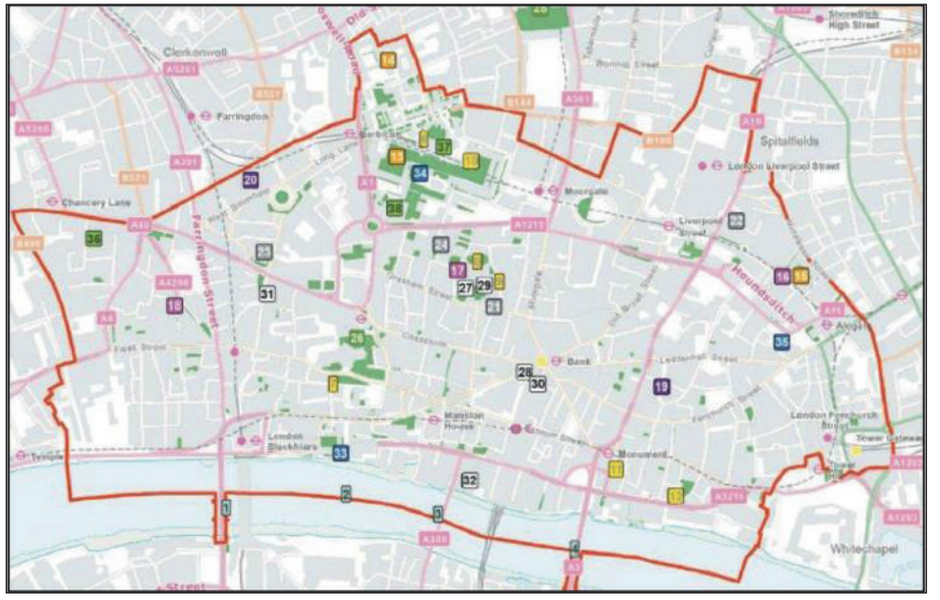
In 2017, a review into the scheme by London Councils, a cooperative represented by the 32 boroughs across Greater London, identified that industry had a poor understanding of the LLCS and, as a result, had low rates of compliance. The review made several recommendations to address this issue, including:

- Developing a comprehensive and ongoing communications strategy to improve the understanding among industry and the public of how, where and when the scheme operates.
- Exploring opportunities to integrate technologies such as CCTV and Automatic Number-Plate Recognition (ANPR) to improve enforcement.
- Streamlining the online permission application process to ease administrative burden for freight operators.

Trucks are also controlled by weight limits. The City of London Corporation operates 7.5 tons maximum gross weight (MGW) limit in the central area of the City of London. Vehicles needing access to premises within the ban zone to load or unload are exempted from the restriction. The weight limit area is shown in Figure 2.4 .

Truck weights are also controlled by the Direct Vision Standard (DVS) and HGV Safety Permit scheme for HGV's, which requires operators of lorries over 12 tons gross vehicle weight to obtain a safety permit before entering and operating in most of Greater London. The DVS measures how much an HGV driver can see directly through their cab windows. This indicates the level of risk to vulnerable road users, such as people walking and cycling, near the vehicle. The DVS and HGV safety permit scheme is part of the Mayor of London's Vision Zero plan to eliminate all deaths and serious injuries on London›s transport network by 2041.

Figure 2.4 – London Lorry Control Scheme Map



Source: City of London Corporation

Transport of Hazardous Goods in London is covered by the Dangerous Goods Regulations issued by the UK Department of Transport. These regulations adhere to international standards. These follow the UN Model Regulations which put the rules on the different transportation methods into a classification system. This system assigns each dangerous substance or article a class that defines the type of danger the substance presents. The UN classifies dangerous goods as follows:

Table 2.1 – UN Dangerous Goods Classifications

UN Class	Dangerous Goods	Division(s) if applicable	Classification
1	Explosives	1.1 – 1.6	Explosive
2	Gases	2.1	Flammable Gas
		2.2	Non-flammable, Non-toxic Gas
		2.3	Toxic Gas
3	Flammable Liquids		Flammable Liquid
4	Flammable Solids	4.1	Flammable Solid
		4.2	Spontaneously Combustible Substance
		4.3	Substance which emits flammable gas in contact with water
5	Oxidizers and Organic Peroxides	5.1	Oxidizing Substance
		5.2	Organic Peroxide
6	Toxic and Infectious Substances	6.1	Toxic Substance
		6.2	Infectious Substance
7	Radioactive Material		Radioactive Material
8	Corrosive Substances		Corrosive Substance
9	Miscellaneous Dangerous substances		Miscellaneous Dangerous Substance

LESSONS LEARNED

- The simplicity of the road classification system (restricted and excluded roads), and the time parameters make for an easy-to-understand regulatory system that fosters compliance.
- An integrated use of technology represents a smart way to improve enforcement.
- Extensive public information concerning lorry control schemes is essential.
- Strict control of hazardous goods movement requires comprehensive regulations.

2.3.3 AUCKLAND FREIGHT NETWORK

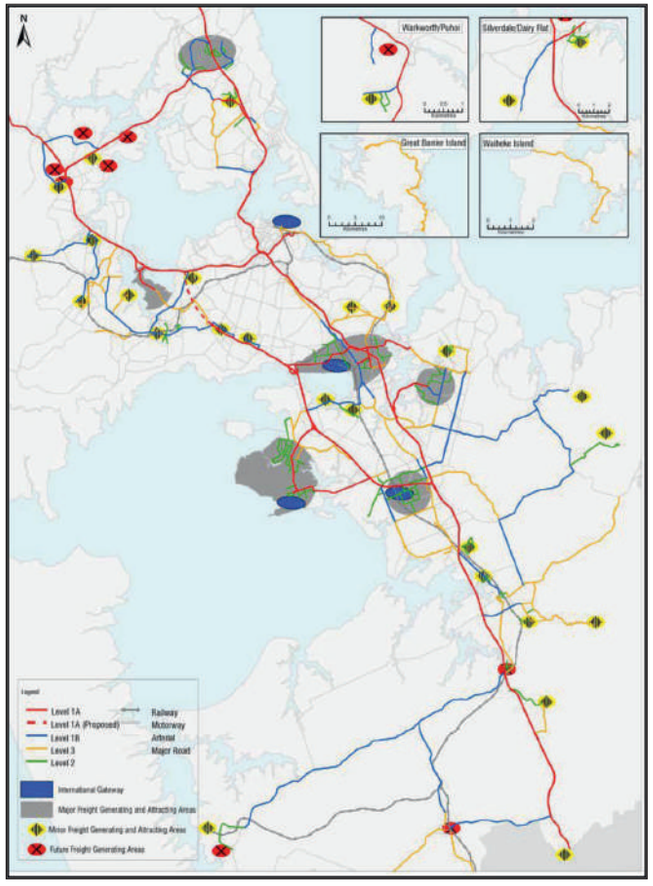
Like Qatar, the bulk of Auckland freight is transported by roads. Increased travel times and poor reliability have a severe impact on the freight industry and the efficient movement of goods and services in Auckland.

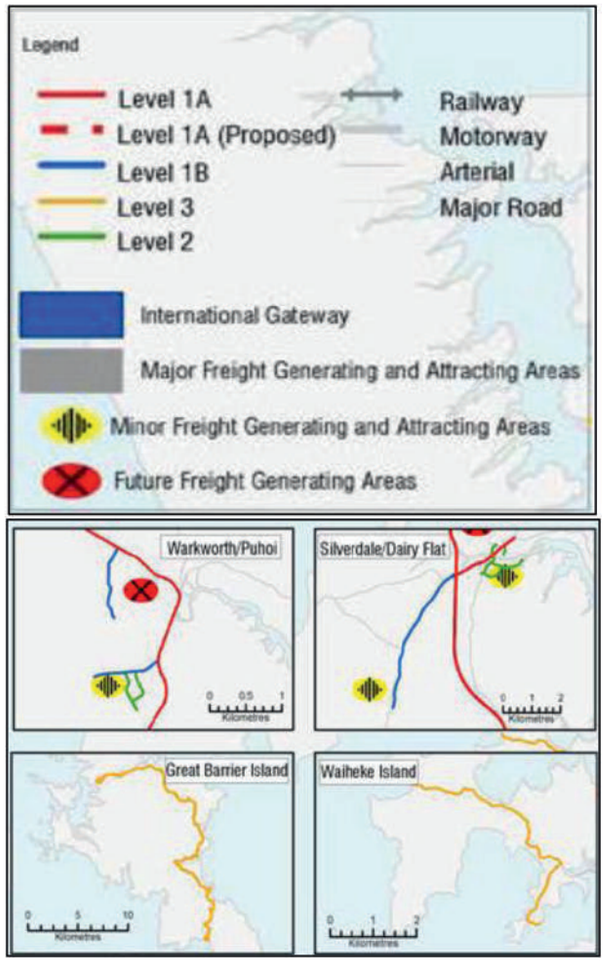
The major issues faced by freight in Auckland before the implementation of the updated freight network were:

- Travel delays and poor reliability caused substantial costs to industries;
- Auckland being a car-dependent city, has frequent congestion causing delays to goods movement, especially internally within Auckland;
- Freight in Auckland is going to grow substantially over the next 30 years;
- Freight kilometers travelled are going to increase by 53%.

To have an efficient freight transport system, Auckland developed a regional freight transport network that comprises the State Highways, motorways, and arterial road network (Figure 2.5). However, in industrial areas, freight movements make up a substantial portion of travel on local roads as they provide access to warehouses and distribution centers.

Figure 2.5 – Auckland Regional Freight Network





Source: Auckland Regional Freight Plan, Auckland Transport

National Government heavy vehicle standards cover all vehicles above 3500 kilograms weight. These include requirements related to lights, tires and wheels, mirrors, seatbelts, emission standards, registration and licensing, certificate of fitness tests, overweight and over dimension vehicles. The Land Transport Rule: Vehicle Dimensions and Mass 2016 establishes legal requirements for nine classes of heavy vehicles comprising:

- Heavy rigid vehicles
- Light rigid vehicles
- Heavy trailers and vehicle combinations (full, semi, simple, pole, A- and B- train)
- Light trailers (light simple trailers)
- Static roll thresholds
- Heavy buses
- High productivity motor vehicles (HPMVs)
- Specialist vehicles
- Tiny homes

For each vehicle class, the regulation establishes maximum width, weight and height, front and rear overhangs, ground clearance, turning circle, permitted axle sets and configurations, loads and maximum speeds.

The New Zealand Transport Agency has established the Weigh Right program. In the program, roadside technology is installed, and intelligent software developed to screen heavy vehicles and to direct potentially overweight vehicles into a commercial vehicle safety center (CVSC, formerly weigh station) for further inspection. Vehicle screening involves weigh-in-motion or in-road scales, automatic number plate recognition

cameras and electronic signs all working together to identify potentially overweight vehicles.

Twelve CVSC sites are being rolled out in the Weigh Right Program. The weigh station at Glasnevin (north Canterbury) was upgraded and opened in January 2019 and another at Paengaroa (Bay of Plenty) was opened in July 2020. The locations of the CVSCs are on heavy-volume routes and cover 46% of the total freight kilometers travelled in New Zealand. These sites are close to major centers, seaports or significant highway junctions and at locations where it is difficult for heavy vehicles to avoid.

Auckland Transport has the authority to issue infringement notices to vehicle owners under this legislation:

- Land Transport (Motor Vehicle Registration & Licensing) Regulations 2011
- Land Transport Act 1998
- Land Transport Rule: Operator Licensing 2007
- Land Transport (Road User Rule) 2004
- Auckland Transport Traffic Bylaw 2012
- Land Transport Rule: Tyres and Wheels 2001
- Schedule 6 Land Transport (Motor Vehicle Registration & Licensing) Regulations 2011
- Land Transport (Offences & Penalties) Regulations 1999.

Truck drivers generally get five types of fines:

- Logbook and work time infringements
- Speeding infringements
- Driving a vehicle with the wrong license class
- Insecure or overweight load
- Certificate of fitness or road user charges

In 2018, there were over 3000 fines for logbook/work time offences, averaging a fine of QAR 400, nearly 4000 speeding offences averaging QAR 240, and over 300 licensing/registration offences averaging QAR 800.

With respect to movement of hazardous goods, Auckland adheres to the national New Zealand Dangerous Goods (DGs) Regulatory System Map describes the components of the current regulatory system for managing DGs across the transport system, including interactions between those components. Its objective is to outline the nature of the system to support future work to identify possible issues, overlaps, gaps and risks. The map is not intended to be a comprehensive guide to DGs requirements for industry operators.

DGs are substances internationally classified as potentially dangerous during transport. Consequently, international and associated domestic regulatory frameworks have been established with requirements to ensure DGs' safe and effective transport. These comprise:

- The overarching international framework of the United Nations Recommendations on the Transport of Dangerous Goods – Model Regulations (UN Model Regulations), under which DGs are classified and regulated at the highest level.
- International frameworks referencing the UN Model Regulations, regulating transport of DGs in the aviation and maritime sectors, including the:
  - o International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air; International Air Transport Association Dangerous Goods Regulations.
  - o International Maritime Organization's International Maritime Dangerous Goods Code.
- Domestic transport frameworks comprising legislation covering each of the transport modes (air, sea and land) including overarching Acts, dedicated rules containing much of the detail for regulating DGs, and regulations including offences and penalties as follows:
  - o Civil Aviation Act 1990, Maritime Transport Act 1994, Land Transport Act 1998, their associated offences regulations, and the Railways Act 2005.
  - o Civil Aviation Rules Part 92: Carriage of Dangerous Goods; Advisory Circulars under Rules Part 92.
  - o Maritime Rules Part 24A: Carriage of Cargoes – Dangerous Goods.
  - o Land Transport Rule: Dangerous Goods 2005 (45001/1).
  - o Land Transport (Driver Licensing) Rule 1999 (SR1999/100).
  - o NZ Standard 5433:2020 Transport of dangerous goods on land.

The 67-page System Map document outlines each of the components above. This includes the DGs specific sections of the transport Acts, the nature of the DGs rules and supporting material, and the offences and penalties that might apply to requirements, whether DGs-specific or more general within overarching Acts.

LESSONS LEARNED

- There is a need to limit the growth in congestion affecting the freight network, and to improve connections to major freight hubs
- Integration of planning of land use and transportation is essential.
- Weighing stations and weigh in motion scales represent effective monitoring and control of overweight vehicles.
- Control of hazardous goods requires comprehensive regulation and enforcement.

2.3.4 ATLANTA – STRATEGIC TRUCK ROUTE MASTER PLAN

The Atlanta Freight Mobility Plan (FMP) was completed in February 2008, and identified a need to further develop the Regional Freight Priority Highway Network. The purpose of the FMP was:

- To conduct a comprehensive regional study of freight, goods, and services mobility needs.
- Develop a framework to proactively address freight and goods movement mobility needs and challenges in our region.
- Examine all modes of freight transportation system with emphasis on air, rail and trucking.

The Atlanta Strategic Truck Route Master Plan (ASTRoMaP) followed on from the FMP. The purpose for ASTRoMaP was to identify preferred routes and develop strategies to support the efficient movement of truck traffic without disproportionately impacting existing communities, the environment, or the transportation network. To realize this purpose, the project consisted of four objectives:

- Collect and analyze data pertinent to the status, condition, and suitability of all routes within the Regional Freight Priority Highway Network;
- Develop the specific route network into a grid system spanning the metropolitan region, considering the physical characteristics of the roadways alongside recommendations from stakeholders;
- Identify and organize a series of "best practices" to guide future access management policies; and
- Identify and evaluate projects to enhance the utilization of existing roadways as designated within the truck route plan.

The focus of the work was on cross-town travel – the routes that would link the city to other economic activity centers. The focus was not about first mile-last mile solutions. The project contained extensive public and stakeholder outreach and benefitted significantly from this. The main findings included:

- Comprehensive land use and transportation plans had largely neglected to adequately address the needs of a growing volume of freight movement through communities.
- The study identified two fundamental approaches that have historically been used to define a designated truck route within the region:
  - Route adoption/positive signing that indicates routes where commercial trucks are permitted, and
  - Prohibitive signing that indicates where commercial trucks may not travel.
- Local jurisdictional needs have led to numerous cases of conflicting roadway designation at county borders.
- Areas with a significant concentration of distribution and manufacturing entities show numerous intersections and lengths of roadway that proved to be persistent bottlenecks in the region. Most of the identified bottlenecks were attributed to geometries which failed to effectively accommodate truck traffic, or to capacity issues, which increase the rate of truck interaction with the driving public.

The Regional Freight Priority Highway Network highlighted the following categories of truck route:

- Primary, which mainly includes interstate highways; and
- Secondary, which consists of state routes that serve a significant number of freight generators.

ASTRoMaP aimed to identify preferred routes and develop strategies to support the efficient movement of truck traffic without disproportionately impacting communities, the environment, or the transportation network.

Two distinct paths were pursued for evaluating the Regional Freight Priority Highway Network (RFPHN), and those roadways requested for inclusion by the various jurisdictions involved:

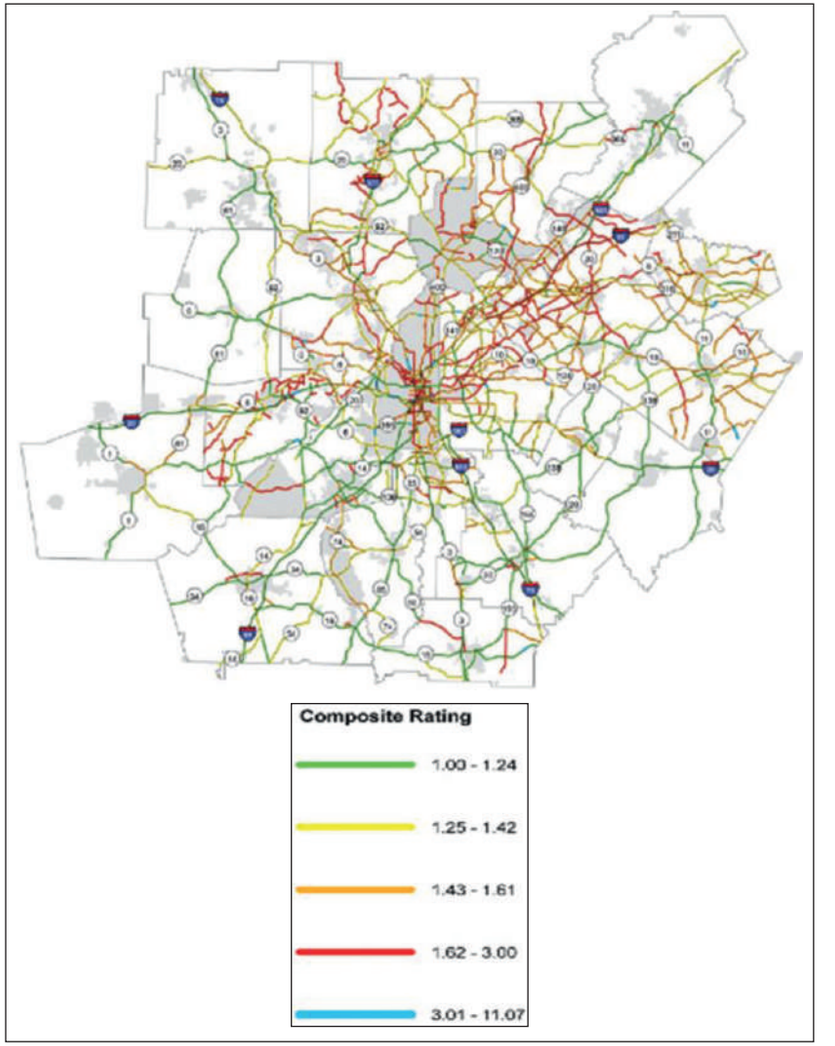
- Outreach programs: three stakeholders groups impacted by or influencing the truck route network were engaged: the public sector, the private sector, and the communities.
- Data collection: jurisdictional bodies and agencies were approached for data pertinent to the physical characteristics of the identified roadways. These also included other empirical datasets such as land use designations and Environmental Justice designated census blocks.

Once the data were collected and interviews with stakeholders carried out, a criteria matrix was developed. Values and weights were assigned to quantitative, and then qualitative, characteristics of roadways to help judge most appropriate truck route designation.

Items such as functional classification and lane width, which weigh heavily on the ability of a truck to safely and successfully negotiate a route, were viewed as having more influence. Attributes such as shoulder width and at-grade crossing presence, while still important regarding delay and safety, were seen as less detrimental to the assignment of trucks to the roadway. This provided scoring at the level segment.

The overall road network under consideration and the applicable scoring is depicted in the Figure 2.6.

Figure 2.6 – Road Network Graphic Scorecard

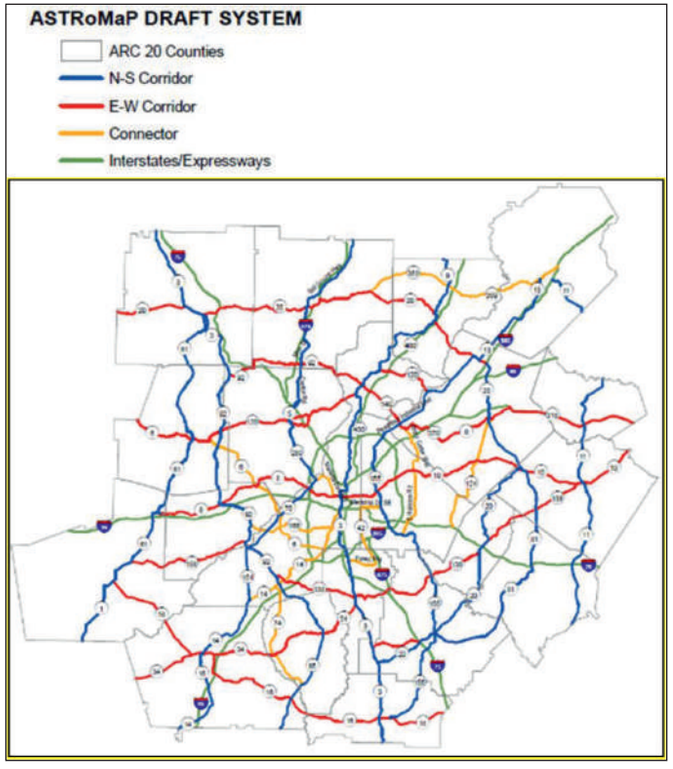


Source: https://atlantaregional.org/transportation-mobility/freight/atlanta-strategic-truck-route-master-plan-astromap/

The network was evaluated for corridors along the east-west and north-south axes. As corridors were developed, common segments were found that both an east-west and north-south corridor shared. These are described as concurrent corridors and further assisted the identification of primary areas of focus for future project identification.

Figure 2.7 shows the network resulting from the ASTRoMap.

Figure 2.7 – ASTRoMap System



Source: https://atlantaregional.org/transportation-mobility/freight/atlanta-strategic-truck-route-master-plan-astromap/

With over 1,300 miles of continuous roadway included in the ASTRoMaP system, a significant number of strategies and project locations were identified:

- Policy or design strategies:
  - Truck friendly roundabout design and implementation
  - Signage practices, placement
  - Addressing at-grade rail crossings
- Project categories:
  - Intersection geometrics
  - Bridge replacement
  - Pullouts
  - Capacity enhancement
  - Grade separation, rail crossings

In 2015, the City of Atlanta completed Cargo Atlanta: A Citywide Freight Study. The goals of the study included:

- Strengthen the opportunities for the movers of freight, the communities served by freight and the neighborhoods connected to freight.
- Improve the City of Atlanta's transportation infrastructure to meet increases in freight and goods movement demand.
- Improve the economic efficiency of the City's freight network.
- Increase investment in system improvements for truck movement throughout the City of Atlanta.

- Develop strategies for reducing community impacts from freight movement.
- Identify truck routes within the city.

The study carried out consultation of Government and industry stakeholders, reviewed existing policies, plans and studies including the Comprehensive Development Plan, and relevant truck codes and ordinances. A revised Fright Route Map was developed, considering the 1954 Atlanta Truck Route Map, the ASTRoMaP truck routes and the Georgia DOT Freight Route Map. Development of the new freight routes was based on:

- Street Jurisdiction
- State Functional Classification
- City Functional Classification
- Direct Access to Other Truck Routes
- Direct Interstate Accessibility
- Corridor Land Use
- Rail Yard Destination
- Industrial District Service

Along with the new Freight Route Map, the study developed a matrix of transportation project recommendations supporting the movement of freight and goods while protecting residential areas, as well as a list of recommended policy changes and initiatives.

Other truck management and control measures include weighing stations on certain highways and at many trucks stops in Georgia, over height sensors at critical locations, and a system of hazardous goods movement permits, and penalties established under the Georgia Department of Public Safety Transportation Rulebook.

LESSONS LEARNED

- Network of truck routes needs to be developed without disproportionately impacting on sensitive land uses and communities
- Integration of planning of land use and transportation is essential.
- Network and intersection capacities are important to determine suitability of highway links.

2.3.5 AUSTRALIA – NATIONAL HEAVY VEHICLE REGULATION

In 2013, the Australian Government established the National Heavy Vehicle Regulator (NHVR) to regulate and manage heavy vehicle movements on public roads in Australia (defined as possessing a gross vehicle weight of more than 4.5 tons). Created to promote a "safe, efficient and productive heavy vehicle industry serving the needs of Australia", the statutory authority's mandate is to:

- Minimize the compliance burden for industry
- Streamline and harmonize heavy vehicle regulation across Australia
- Provide leadership and drive sustainable improvement to safety, productivity and efficiency outcomes.

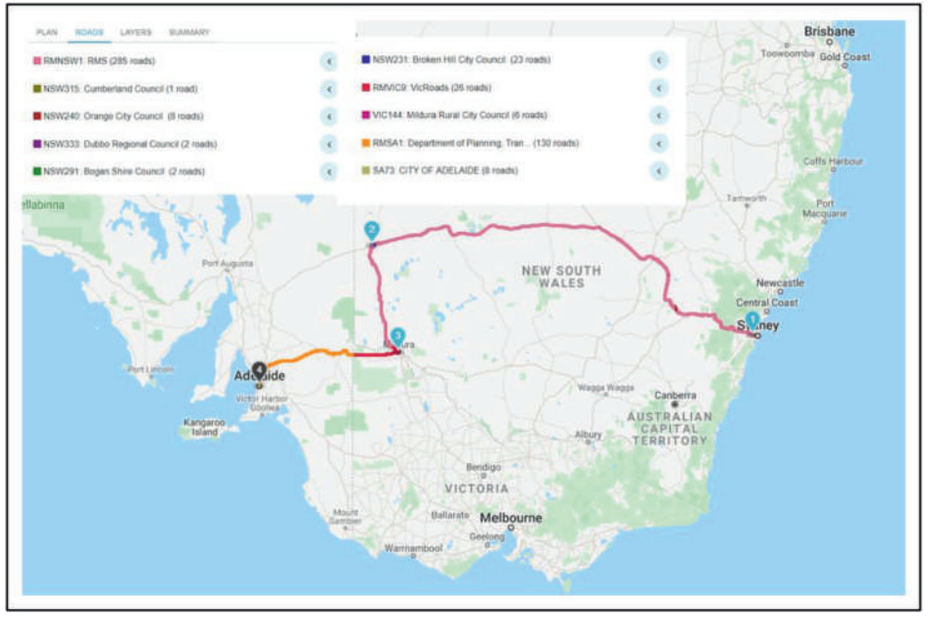
A key driver for the NHVR was to create a "one-stop shop" for freight services, applications, queries and other services. Prior to the establishment of the regulator, the industry was subject to eight different forms of regulation (for each of Australia's six states and two territories).

To this end, the NHVR delivers a range of services, including:

- Vehicle design and access approvals for vehicles on the Performance-Based Standards scheme.
- Vehicle road access permit application processing.
- Vehicle standards, modifications and exemption permits.
- National exemption notices.
- Provision of regulatory and safety information and guidance.
- On-road safety, compliance and enforcement.
- Investigations and prosecutions.
- Accreditation services.
- National driver work diaries.

The NHVR classifies roads on the basis of their ability to accommodate vehicles of difference sizes and mass. While this results in a complex range of different networks, the NHVR's online 'route planner' tool simplifies navigation by enabling operators to view networks or available routes based on the specifications of their vehicle. This information is also dynamic, updated in real time to account for disruptions such as road works or other road closures. Figure 2.8 below illustrates how the tool enables operators to plan the shortest possible route of travel based on current conditions. The approach is intended to increase compliance by improving the quality and reliability of information available to operators.

Figure 2.8 – NHVR Route Planner Tool



Note: different color roads denote the various road authorities responsible for the approved roads selected

Source: National Heavy Vehicle Regulator. https://www.nhvr.gov.au/road-access/route-planner

Chain of Responsibility Laws

Since 2018, the Australian freight industry has been subject to laws establishing a "chain of responsibility" (CoR). CoR was adopted to address systemic abuses of traffic law and in acknowledgement of the fact that abuses were often the result of the demands and expectations of customers rather than fleet managers and truck drivers themselves. The CoR provides that every party in the freight supply chain, not just freight operators and drivers, shares responsibility for ensuring compliance with the laws and preventing breaches.

The parties in the CoR for a heavy vehicle include:

- An employer of a driver.
- A prime contractor for the driver – if the vehicle's driver is self-employed.
- An operator of the vehicle.
- A scheduler for the vehicle.
- A loading manager for any goods in the vehicle.
- A loader and/or unloader of a vehicle.
- A consignor of any goods for transport by the vehicle.
- A consignee of any goods in the vehicle.
- A loader and/or unloader of any goods in the vehicle.

Multiple parties may be responsible for offences committed by the drivers and operators of heavy vehicles. Legal liability applies to all parties for their actions or inactions.

The CoR laws were introduced out of a recognition that unlawful behavior by truck drivers was often influenced and/or controlled by the actions of other parties. Previously, transport laws had often focused on the actions of drivers without sufficiently recognizing and regulating the actions of other parties.

A third-party business that is found to have imposed unrealistic contractual arrangements on a freight operator that causes or encourages a heavy vehicle driver to exceed the speed limit, drive on unauthorized roads, or drive while fatigued in order to meet the deadline is legally liable under the CoR laws.

In a prosecution, the courts may consider the actions of each party in the supply chain, including the extent to which freight operators attempted to prevent breaches of the laws encouraged by consignees.

The movement of hazardous goods in Australia comes under the Australian Dangerous Goods Code (ADGC or ADG7) which was promulgated by The Advisory Committee on Transport of Dangerous Goods. The most current version is the seventh edition, 7.7 released in 2020 and mandated from October 1, 2021. Read in conjunction with accompanying national and State laws, the document creates a significant level of standardization for the transportation of dangerous goods in Australia. ADG7 complies with international standards of importation and exportation of dangerous goods (United Nations Recommendations on the Transport of Dangerous Goods).

LESSONS LEARNED

- Establishing a positive relationship between government and industry and improving the accessibility and availability of information for freight operators can be an effective way to boost regulatory compliance.
- Understanding how abuses of traffic law can be encouraged by factors across the supply chain can lead to more effective solutions.

2.4 OTHER BEST PRACTICES

2.4.1 NATIONAL COOPERATIVE FREIGHT RESEARCH PROGRAM

The National Cooperative Freight Research Program (NCFRP) comes under the United States (US) Transportation research Board (TRB). The NCFRP Report 16, "Preserving Freight Infrastructure and Routes", 2012, was produced for the main purpose of providing guidance on how to preserve and protect freight facilities and routes. This report also identified the current shortcomings in proper freight route planning and lessons learnt that can be implemented in future to overcome such issues.

The main lessons learnt during this work are:

1. Land-use planning processes generally plan inadequately for freight due to the following reasons:
   a. Land-use planners are not usually trained in freight planning.
   b. Lack of adequate maps to identify accurate routes for freight.
   c. Freight entities are generally not involved in transportation planning.
2. Funding of facilities and routes are generally inadequate for freight planning.
3. Accurate data is not available on the freight industry.
4. Lack of proper policies and regulations.

This report also identified some innovative solutions:

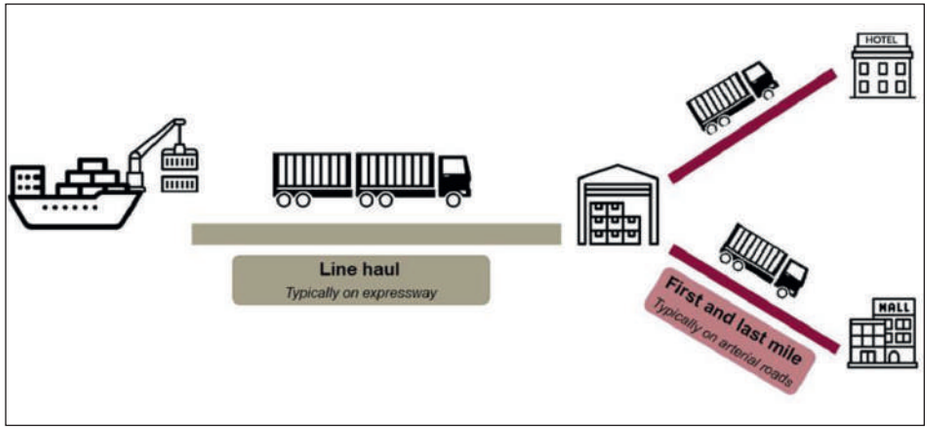
1. Land-use planners should have proper training covering freight transportation requirements, along with other requirements related to noise, vibration, environmental impacts, etc.
2. Official maps to be available of truck routes with restrictions for the public and all freight companies.
3. Private and public entities to partner to provide proper education and training for truck drivers.
4. Well-thought policies shall be enacted to improve current corridors and plan for future freight corridors.

2.4.2 FIRST MILE / LAST MILE SOLUTIONS

A major challenge facing large cities and metropolitan regions is identifying a cost effective, environmentally sustainable way of moving goods to their final destination. A typical supply chain includes two components, as shown in Figure 2.9; the **Line Haul** – moving larger volumes using high productivity vehicles along expressways, and the **First and Last Mile** – using other types of Heavy Goods Vehicles (HGV's) and Light Goods

Vehicles (LGV's) to distribute goods from intermediary warehousing to final destinations. It is this portion of the supply chain that is the most critical as trucks interface with urban environments, and in some cases must utilize local roads which have not necessarily been designed to cater for large HGVs.

Figure 2.9 – Typical Supply Chain



Source: National Cooperative Freight Research Program

The movement of goods to their final destination in a cost effective and least damaging way for the environment is one of the biggest challenges facing large cities and city regions. There is often a need for transfer depots to transfer goods from larger HGV's to LGV's and to move goods from ports and airports to warehouses, retailers or the front doors of people's homes. The last portion of the journey can impact road network more significantly since goods are transferred from larger vehicles into smaller vehicles which can travel along the more local roads to their final destinations. So, where these transfers occur, combined with the routing and timing of the final leg, deliveries can have an impact on the overall transportation network, because there are more vehicles delivering goods and they travel on more of the local residential and access roads.

New technology plays a significant role in managing routes over the first and last miles of their journey. This includes mobile computing solutions, barcode scanners and barcode readers, supply chain software which can help speed up fulfillment of orders and deliveries, provide real time traceability of shipments and help ensure operational efficiencies that help keep costs down and deliveries affordable.

City governments are attempting to mitigate the problems of last-mile deliveries, but to do this successfully requires integration of the conflicting interests of diverse stakeholders. An important urban policy action is to regulate how motorized freight vehicles are allowed to operate in cities. Local governments sometimes choose to regulate last-mile delivery vehicles through restrictions on vehicle size, fuel type and emission factor and allowing deliveries only in stipulated zones and time frames. Boston regulates delivery vehicles according to commercial permits, specific streets and hours of operation. Los Angeles and Long Beach encourages urban-friendly delivery times with a PierPASS Off-peak program which establishes time frames when deliveries are allowed. To discourage deliveries at other times, the program imposes a delivery fee.

In Europe, the C-LIEGE initiative, a showcase for good practices in Urban Freight Transport (UFT), was established to address many aspects of last-mile challenges faced by cities and to identify how local authorities can influence UFT planning towards a more sustainable governance model. C-LIEGE delivered practices and guidance on UFT energy efficiency, use of renewable

energy sources for delivering goods and innovative measures for reducing pollutants. Other EU-sponsored programs to support last-mile delivery practices include CIVITAS, BESTFACT, ENCLOSE and FREVUE. [1]

Management of the central areas of large cities, particularly those with conservation areas, and heritage areas, requires protection from the negative impacts of vehicles which may be passing through them. Some cities have Expressways which pass through the urban areas of the city, and therefore may also be classed as strategic truck routes, which may not align with the road hierarchy objectives or may negatively impact the surrounding residential environments. Cities have adopted different approaches to managing trucks within the central area. These include:

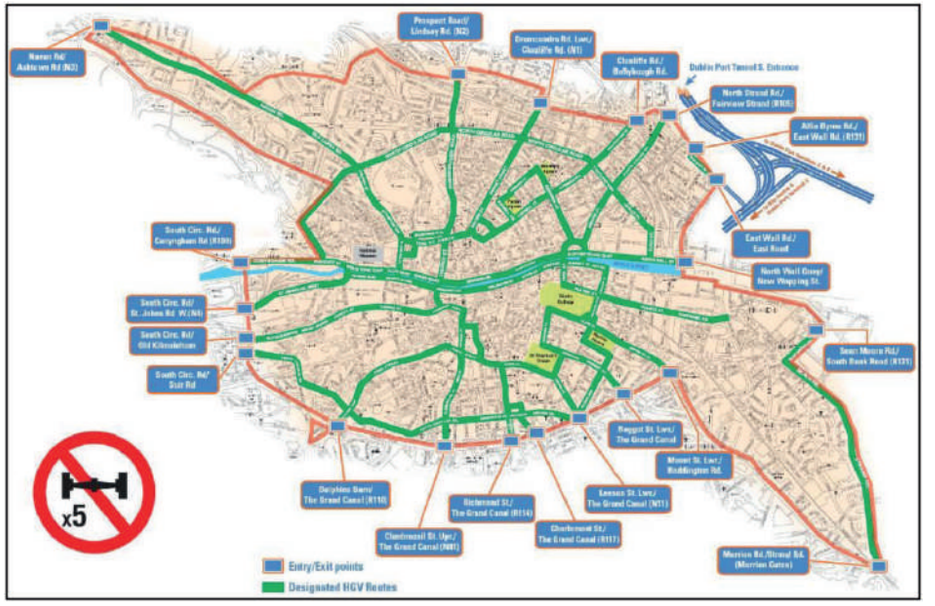
- Time/turning movement restrictions within a heritage or Downtown area (e.g. Vancouver. See below in Figure 2.10);
- Restrictions based on the arterial routes entering the main part of the city. In Metro Manila, trucks with gross weights of more than 4.5 tonnes are prohibited from travelling along 11 primary arterial routes, one road between 6am and 9pm, ten others between 6am to 9am, and from 5pm to 9pm.
- Certain cities have a cordon-based approach whereby access to the central area is restricted via a cordon, and trucks can then enter via designated HGV routes. Examples include Dublin (see below in Figure 2.11)

Figure 2.10 – Truck Restricted Area in Downtown Vancouver

Source: City of Vancouver. https://vancouver.ca/streets-transportation/truck-routes-maps-and-regulations.aspx

1 Bee Smart City website – Last Mile Delivery Solutions in Smart Cities and Communities – Best Practice Solutions

Figure 2.11 – Dublin Designated HGV Routes for Trucks of up to four axles



Source: Dublin City Council. https://www.dublincity.ie/sites/default/files/media/file-uploads/2018-07/map_hgv_restricted_zone.pdf

LESSONS LEARNED

- Time of day restrictions on access to urban areas can help to mitigate the interaction of trucks and passenger vehicles during peak times.
- Sound freight planning should consider cost effective, sustainable first and last mile solutions that appropriately consider the differing interests of community and industry stakeholders.

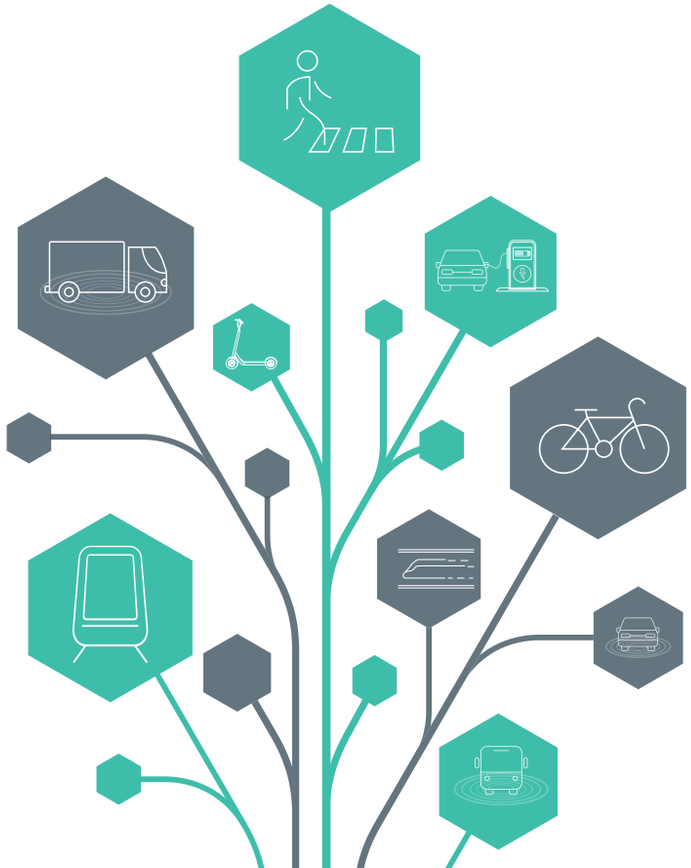
2.5 KEY LESSONS LEARNT

The key lessons learnt from the best international practices which can be applied to the TRN in Qatar are stated below:

- The developed TRN should be supported by a Freight Master Plan, and should not disproportionately impact on sensitive land uses and communities;
- Truck holding areas and truck stops need to be provided, and located and managed in a way which does not deter drivers from using them due to queuing;
- Clear information is required for drivers, operators and the public, including simple easy to understand road network classifications;
- Link and intersection capacities are important in identifying links in the TRN;
- Solutions require the integrated use of technology, particularly for first/last mile links;
- A strong relationship needs to be established between government and the freight industry;
- A formal governance structure needs to be prepared for freight movement;
- An effective land use policy supporting freight transport needs to be prepared and implemented;
- Integration of land use and transportation planning is essential;
- Accurate data regarding the freight industry needs to be available;

- Comprehensive policies, regulations and enforcement are essential, particularly for the control of hazardous goods movement;
- Vehicle height and weight issues are important in defining the truck route network. Strong enforcement is essential to ensure that the truck route network and truck restrictions perform effectively.

Qatar has its own unique context which will affect the exact implementation of such best practice, but the issues which have been identified will inform the truck network which is developed for Qatar.



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INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

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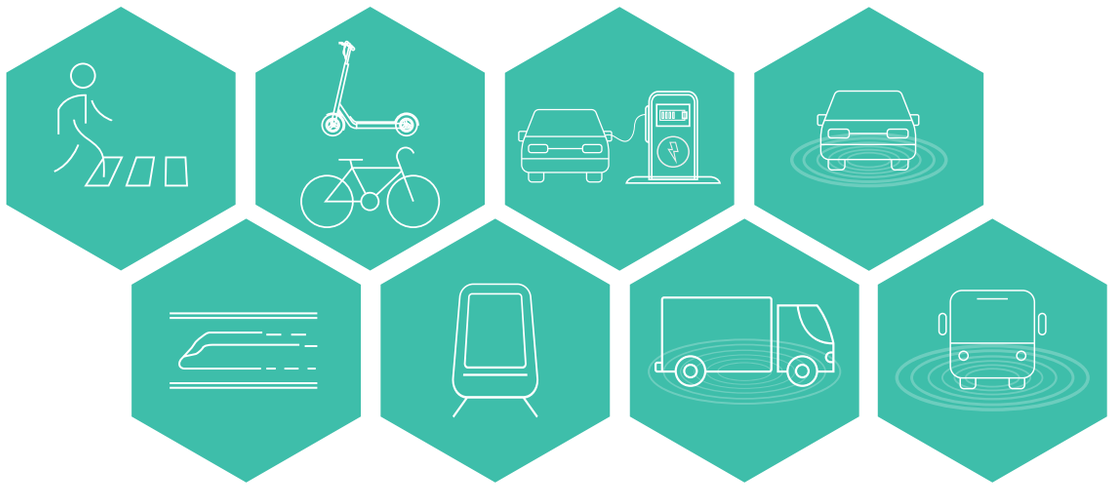
SECTION - 03

EXISTING CONDITION



3 EXISTING CONDITION

3.1 INTRODUCTION

An official truck route network has not formally been established in Qatar. However, there are several routes which are used in practice by trucks and all Expressway routes are designed to the standard required to accommodate trucks. Certain sections of the highway network, such as, on the Al Majd Highway have dedicated lanes for trucks, and these constitute the main truck network.

This section of the report outlines the main routes that the trucks currently are using. Some of these main truck routes were proposed within the TMPQ 2008 while other routes, especially the expressways, are used by trucks for freight movement. This basically constitutes the informal truck route network. It should be noted that there are space and time restrictions on truck movements in limited areas, but a coherent truck route network is currently not available.

The TMPQ 2008 set out a series of proposed routes for trucks including Strategic, Dangerous Goods and Local Routes, for Qatar and for Doha. The current informal truck route network follows the road hierarchy with adequate connectivity and continuity and is constituted by the 2008 TMPQ truck route network and Ashghal Expressway program.

The development of an efficient truck route network also includes facilities and services for trucks, such as logistic centers, truck parking, weigh stations, etc. This summary also includes the location of these facilities on the truck network, and how they support implementation of a successful network.

Freight operations have been reviewed as part of the Updated TMPQ, and the following key issues identified:

- The enforcement of truck regulations is weak, and truck operators often prefer to bear fines for non-compliance rather than observe the rules.
- Insufficient and unsatisfactory training contributes to the poor safety record of heavy vehicles in Qatar.
- The current truck network has evolved to serve the locations that are generators and attractors of goods movement, but since freight is largely a private sector operation, spatial coordination is a challenging task.
- Public freight parking areas are in limited supply and poor truck parking design and accommodation, result in ad hoc parking which often blocks traffic flow, degrades civic environment, and provides poor accommodation for truck drivers
- There are specific issues and considerations that need to be addressed as part of on-going work to develop a truck route network for Qatar.
- The current time of day truck restrictions and permitting process is complex compared to similar strategies in other cities.

3.2 TMPQ 2008 TRUCK ROUTE RECOMMENDATIONS

The TMPQ 2008 considered the supply and demand needs of the transportation network during the development of the truck route network. It set out a network providing routes at three hierarchical levels (Strategic Through, Local Access, Dangerous Goods Routes). The network also included components of construction truck routes. Some of the proposed truck routes have not been implemented.

Recommendations for the TRN and freight policies were included in TMPQ 2008 Report 2.6a "Truck Route Development and Policy Conditions". The report set out the proposed development of a truck route network for Qatar, by outlining the policy conditions surrounding the management of that freight network, and by identifying policy proposals.

The following strategies/recommendations were stated:

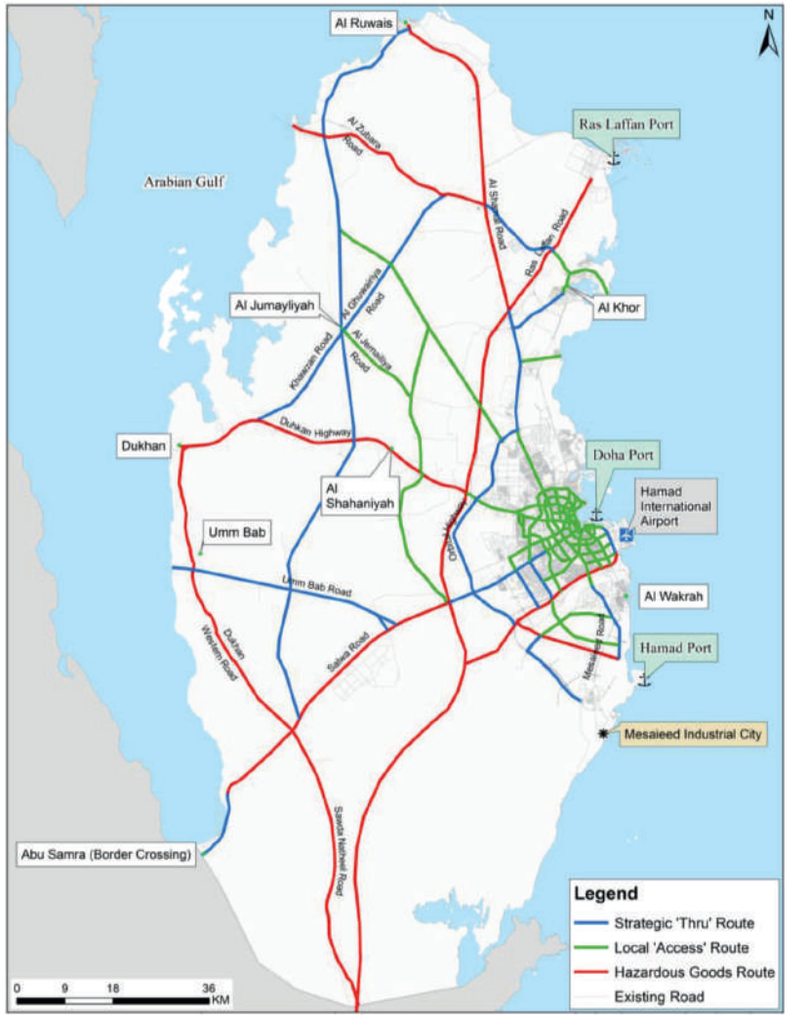
- Integrated periodical Review of Major Truck Generating Land Use and Truck Route Network Proposals;
- Integration of the Truck Route Network into the Development Planning Process;
- Introduction of Further Freight Handling Facilities;
- Establishment of Construction Consolidation Centers;
- Introduction of Truck Operator Licenses;
- Introduction of a Network of Truck Parking / Rest Areas;
- Provision of New Truck Maintenance, Vehicle and Driver Testing Facilities;
- Introduction of Standard Truck Route Classifications;
- Establish Standard Methods of Truck Route Implementation;
- Establish a National Truck Route Network for Qatar.

The development of the 2008 Freight Strategy and network took a policy led approach. It reviewed land use trip distribution, which affected truck routes, truck origins and destinations. It identified the location of major truck generating land uses and any required ancillary infrastructure. This was used to identify three classes of route:

- Strategic Through Routes
- Local Access Routes
- Dangerous Goods Routes

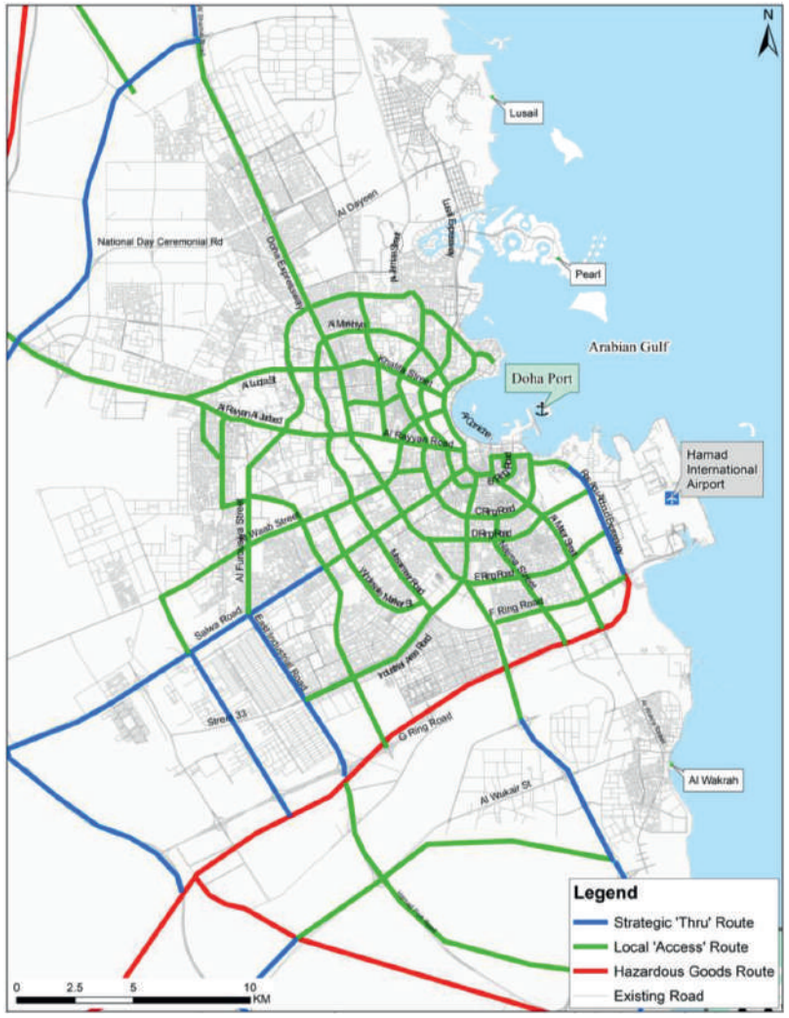
The proposed spatial distribution of these routes is shown in Figure 3.1 for all of Qatar and Figure 3.2 for Doha:

Figure 3.1 – Qatar Freight Network (as defined within the TMPQ 2008 Freight Plan)



Source: TMPQ 2008 Freight Plan

Figure 3.2 – Doha Freight Network (as defined within the TMPQ 2008 Freight Plan)



Source: TMPQ 2008 Freight Plan

SECTION 3

The report provided an overview of the proposed truck route network, including the following corridors:

- **Freeway 1 – Al Shamal -** this proposed freeway linking Al Wakra in the south to Madinat Al Shamal in the north, would form a key route joining many of the major development projects along the east coast of Qatar.
- **Freeway 2 – Khalifa / Dukhan Road -** this route would provide an important connection between the Dukhan oilfields to the west and Doha to the east. It would have intersections with a number of other key Freeway routes including Freeway 4 – Orbital Freeway. The section of this route to the east of the intersection with Freeway 4 – Orbital Freeway was proposed to form a Local Access Truck Route only
- **Freeway 3 – Salwa Road -** this route provided an important link between the border point at Abu- Samra and B-ring within central Doha, with key truck generating land uses such as the Doha industrial city and Doha wholesale market lying along its length. It was proposed that the full length of Salwa Road, up to the Doha Wholesale Market, was designated as Strategic Through Truck Network**.** The remaining section of Salwa Road was proposed as a Local Access Truck Route only.
- **Freeway 4 – Orbital Freeway** - this route had a key role in defining the boundary of the Strategic Through Truck Route network, as well as providing an important orbital route around Doha. Due to its orbital nature it also connects with many of the proposed truck routes radiating out from Doha, providing important linkages between these routes. The route was proposed to form an important 'bypass' of greater Doha for strategic longer distance truck traffic, as well as form part of the Dangerous Goods Route Network.
- **Freeway 6 – Doha Bay Freeway** - the Doha Bay Freeway would follow an eastern arc from an intersection with Freeway 1 - Al Shamal in the north to an intersection with Freeway 4 – Orbital Freeway in the south. The route would be carried via a bridge/ tunnel across Doha Bay. Only the southern section of the route from the New Doha International Airport, to the intersection with Freeway 4 – Orbital Freeway was proposed to form part of the Strategic Through Truck Network. All types of truck were to be strictly prohibited from using the Doha Bay crossing.

The freight plan was more comprehensive than the other mode plans, as it provided a relatively clear specification of the spatial definition for the routes – where the different categories of route should be aligned, both for Qatar as a whole and the urban area of Doha.

The subsequent impact of various economic drivers since 2008 has been considered within the Updated TMPQ. These included the re-location of the port and the airport, the implementation of the Qatar Economic Zones, and the changing nature of the location of freight businesses within Qatar

TMPQ 2008 Report 2.6a provides good guidance as to how the freight network can be developed to segregate construction traffic. The TMPQ 2008 network plans have been reviewed to identify whether the major freight generators upon which the original freight network was based still prevail, and whether appropriate trans-shipment points to offload goods from larger trucks onto smaller distribution vans to have been identified.

The results of the stakeholder engagement process, in particular, the Port, the Airport and the Qatar Economic Zones have formed an important input to the shape of the future freight plan. The development of the Updated TMPQ TRN has involved a review of the TMPQ 2008 route plans, to identify what information is still required to be able to develop a revised set of routes. This included a classification of routes, confirmation that the Strategic Through Routes, Local Access Routes, Dangerous Goods Routes and Construction Truck Routes are the best classifications, and whether the previous routes suggested still meet this.

In addition, TMPQ 2008 Report 2.6b "Movement of Goods Policy paper" made recommendations on freight policies. The report recommendations were as follows:

- Development of standard vehicle definitions.
- Transfer of vehicle registration administrative functions to administrative staff.
- Implementation of a revised vehicle classification scheme.
- Implementation of high productivity freight vehicles.
- Implementation of a graduated truck driver licensing scheme.
- Provision of improved driving training facilities.
- Improved driver testing.
- Development of a coordinated dangerous goods transport emergency response plan.
- Development of designated dangerous goods routes.
- Distribution of an information pack on the transport of dangerous goods to all transport operators and drivers.
- New truck weight limits are adopted.
- Additional truck dimension limits be implemented for key vehicle components.
- Production of best practice guides for restraining specific loads.
- Implementation of enhanced regulatory requirements for vehicle roadworthiness.
- Implementation of legislation which would declare a truck to be unregistered if it was more than six weeks overdue for an annual inspection.
- Reduction of the period that a truck registered in another country could operate in Qatar without undergoing an inspection, from six months to six weeks.
- A definition of 'Extraneous Road' was included in existing traffic law.
- Trucks were to be restricted to specified lanes on roads with differential speed limits, unless turning at intersections.
- Development of a vehicle specification for water tankers.
- Development of a stand-alone truck compliance and enforcement division.
- Development of a long-term heavy vehicle compliance and enforcement strategy.
- Provision of information on truck regulations and operating requirements to all parties in the transport chain

The status of implementation of proposed recommendations is varied and has been addressed by the Updated TMPQ. This has also included a review and identification of major freight generators and suitable routes. Many of the locations of freight generators have changed since the TMPQ 2008 was developed, and the identification of the location of new or additional freight generators has been an important input to the TRN development.

3.3 EXISTING GUIDELINES FOR NETWORK HIERARCHY

The hierarchical functional classification of the roads and adjacent land usage is integral to the development of a strategic TRN. As stated in the previous section the current truck network follows the established road hierarchy and is constituted mainly of Ashghal Expressways and arterials with some restrictions.

In the roads functional classification system, described in QHDM, Tables 5.5 and 5.6 (2015), restrictions on heavy trucks are identified for different classes of roads for both urban and rural roads (Table 3.1). The guidance provided in QHDM has input into the development of a future TRN on sound footings.

Table 3.1 – Roads Functional Classification and Truck Restrictions

Functional Classification	Land Use Frontage	Heavy Trucks Restriction
Urban Roads		
Expressway	Not residential or recreational	No restrictions
Major Arterial	Commercial or Industrial preferred	Some restrictions
Minor Arterial	Commercial or industrial preferred	Restricted
Boulevard	Retail, commercial or recreational	Restricted
Collector Distributor	Not residential or recreational	Some restrictions
Major Collector	Industrial	No restrictions
	Commercial	Some restrictions
	Residential	Local access only
	Recreational	Prohibited
Minor Collector	Industrial	Some restrictions
	Commercial	Local access only
	Residential	Local access only
	Recreational	Prohibited
Service Road	Any	Some restrictions
Local Road	Industrial	Some restrictions
	Commercial	Local access only
	Residential	Local access only
	Recreational	Prohibited
Rural Roads		
Rural Freeway	-	No restrictions
Rural Arterial	-	Some restrictions
Rural Collector	-	Local access only
Rural Local Road	-	Access only

In general, higher classification roads should have less restrictions on trucks and residential and recreational land use have more restrictions.

The Updated TMPQ has also produced a guide for planning roads in Qatar including guidance for heavy goods vehicle routes. Therefore, planning engineers must take cognizance of the dedicated Truck and Dangerous Goods Route Networks, and any heavy vehicle banned routes.

Expressways and freeways must be designed for heavy and oversized vehicles connecting transport gateways to economic and industrial zones.

Arterial and collector roads must be designed for heavy and oversized vehicles servicing economic and industrial zones.

Connector and local roads within economic zones and industrial precincts are intended to provide access to major industrial sites with reduced operating restrictions.

Trucks, in particular HGVs, can have a significant impact on the road network. HGVs carrying major loads can cause far more damage to road pavements and structures than cars. According to the American Association of State Highway and Transportation Officials (AASHTO) road test, the damage vehicles cause to roads increases exponentially with weight. As an example, a typical HGV of ٤٥ ton is ٣٠ times heavier than a passenger car and causes significantly more damage to road infrastructure.

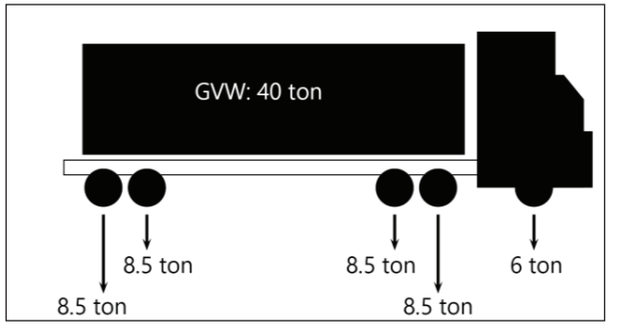
Unless carefully controlled, HGVs operating on the wrong parts of the road network can lead to pavement failure, or even major incidents such as the collapsing of bridges and structures. Over Sized and/or Over Mass (OSOM) vehicles can also lead to the destruction of low bridges, or damage to overhead gantries.

HGVs also have a negative impact on local neighborhoods in terms of safety, noise and air pollution. A typical HGV releases a significantly greater amount of greenhouse gas and nitrous oxide than a standard passenger vehicle. Furthermore, the size and weight of HGVs makes their stopping distance much higher than passenger vehicles, making them more dangerous on local roads where unexpected obstructions mean that sharp braking is sometimes required. While equivalent data is not available for Qatar, research by the Australian government has indicated that while heavy vehicles represent 3 per cent of all registered vehicles in Australia, however, they are involved in 17 per cent of all fatal crashes.

It is therefore essential that trucks, in particular HGVs and OSOM vehicles are carefully managed and restricted to minimize the potential for infrastructure damage, reduce the negative amenity impact caused, and to reduce the risks to other road users.

Why is the Single Axle Load (SAL) an important design parameter?

The axle load of a vehicle is the total weight felt by the roadway for all wheels connected to a given axle, as shown in the following diagram. Put simply, it is the proportion of total vehicle weight resting on a given axle. This is an extremely important consideration as roads are designed to tolerate a maximum weight-per-axle. Exceeding this could cause damage to structures and/or even a structure to collapse. The diagram below details how a vehicle weight is commonly distributed across axles. The maximum allowed SAL in Qatar is 13 ton.



Source: Updated TMPQ

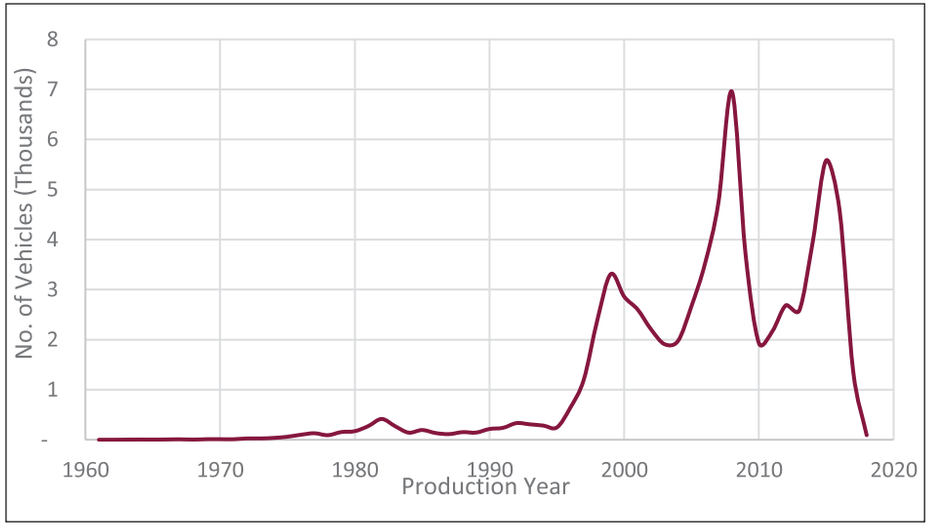
3.4 EXISTING TRUCK FLEET

The Ministry of Interior database of vehicle registration shows that approximately 7.7% of registered vehicles in Qatar are heavy vehicles. Most trucks (96.6%) have a "private vehicle" registration plate, 2.2% have a "government" plate and 1.1% have a "public transport" plate.

A large proportion of trucks (39%) use diesel fuel compared to diesel's share of all vehicles (5.4%). Other fuel types used by trucks are petrol (the highest proportion at 60.7%), electricity (0.01%), and natural gas (0.001%).

The number of registered trucks in each production year from 1960 to 2018 is shown in Figure 3.3. Notably, registered trucks are older on average compared to private cars. About 79% of vehicles were produced after 2000 and there are major spikes at 1999, 2008, and 2015, with the highest number of trucks being made in 2008 (about 7,000).

Figure 3.3 – Production Years of Registered Goods Vehicles (Trucks) as at 2018



Source: MOI Database

This database also shows the number of trucks by different types, classified by a categorization used to collect the vehicle data (covering all vehicles, cars and trucks). This provided a total of 67,000 trucks registered in Qatar, with 29,000 of those being trailer heads. A breakdown of the numbers shown in this database is shown in Table 3.2.

These trucks range from small, rigid vehicles through to large articulated vehicles with multiple trailers. For the purposes of defining access arrangements, this document divides trucks into three broad categories based on their Gross Vehicle Weight (GVW), Single Axle Load (SAL), size, and the type of goods that are being carried as detailed in Table 3.3 below.

Table 3.2 – Number of Trucks Registered in Qatar by Type

Truck Type	Number
Trailer Head	29,437
Tanker	8,867
Carrier Truck	7,358
Refrigerator Truck	6,200
Lorry + Lift	2,648
Concrete Mixer Truck	2,637
Lorry	2,405
Garbage Truck	1,221
Breakdown Truck	1,122
Light Truck	687
Other Trucks	4,442
Total	**67,024**

Source: MOI Database

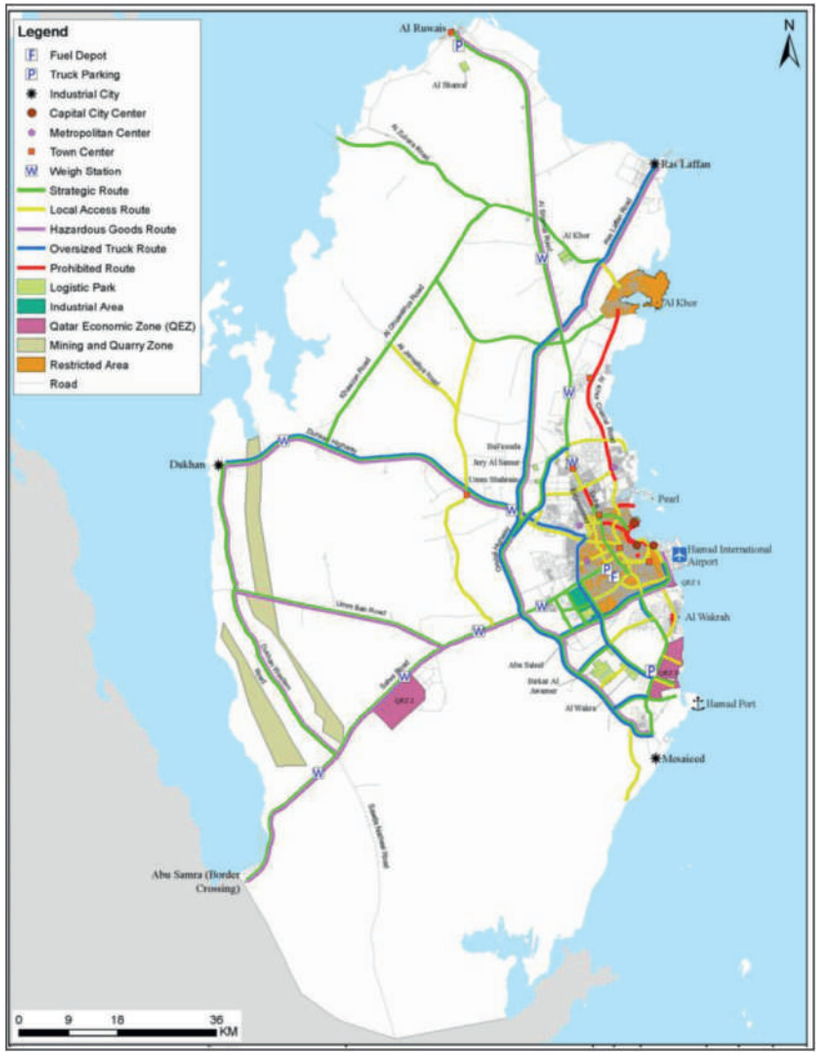
Table 3.3 – Categorization of Trucks in Qatar

Vehicle class	Description	Design parameters	Type of management required
Light Goods Vehicle (LGV)	Smaller trucks used for local distribution and delivery.	- Single unit - Max no. of axles: 2 - GVW: 7.5 – 12 ton - Max SAL: 8 ton	Reduction of impacts on road network congestion
Heavy Goods Vehicle - (HGV)	Larger trucks carrying heavier loads.	- No. of axles: 3+ - GVW: 12 – 45 ton - Max SAL: 13 ton	Management of impacts on road user safety and amenity
Special Goods Vehicle (SGV)	Over Size and/or Over Mass (OSOM) vehicles.	- GVW: >45 ton - SAL: >13 ton - Height: >4.2m - Width: >2.6m	Management of impacts on infrastructure and road user safety
	Dangerous/hazardous goods vehicles.	- Trucks carrying: Liquified Natural Gas, diesel, petrol, and toxic material	Management of impacts on road user and community safety
	Military vehicles.	- Any heavy military vehicle not falling into the above categories	Management of impacts on road user and community safety

3.5 EXISTING SUPPLY CONDITION

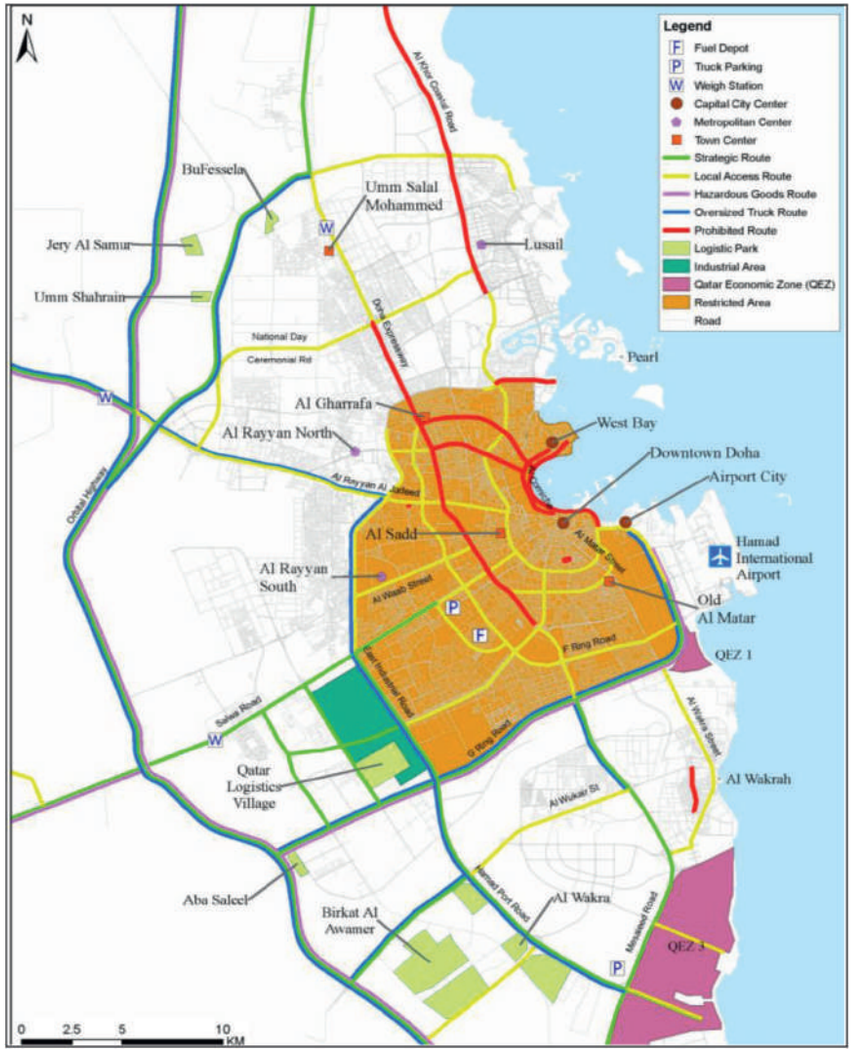
Whilst no official TRN has been established for Qatar, the TMPQ 2008 identified 'strategic truck routes' and 'local access truck routes' which cater for the movement of freight via roads across the State. Since 2008 several dedicated truck lanes have been constructed along strategic routes to improve the reliability of truck movements. Figure 3.4 and Figure 3.5 identify the existing informal TRN for Qatar and Doha Metropolitan Area (DMA).

Figure 3.4 – Informal Existing TRN – Qatar



Source: Updated TMPQ

Figure 3.5 – Informal Existing TRN - DMA



Source: Updated TMPQ

The current truck network has evolved to serve the locations identified as generators and attractors of goods. The key drivers for this are the industrial cities (Mesaieed Industrial City (MIC), Ras Laffan Industrial City (RLIC) and Dukhan), industrial area (south-west of Doha), central Doha, Hamad Port, Logistic parks and Hamad International Airport (HIA). The truck network tends to concentrate around these locations.

The definition of the "existing truck route network" is important for proper planning, operation and efficient goods movement. The TMPQ 2008 truck routes were not formalized. Ashghal has since developed a network (in 2011), based on the 2008 truck routes. However, an 'official' truck route network map does not exist.

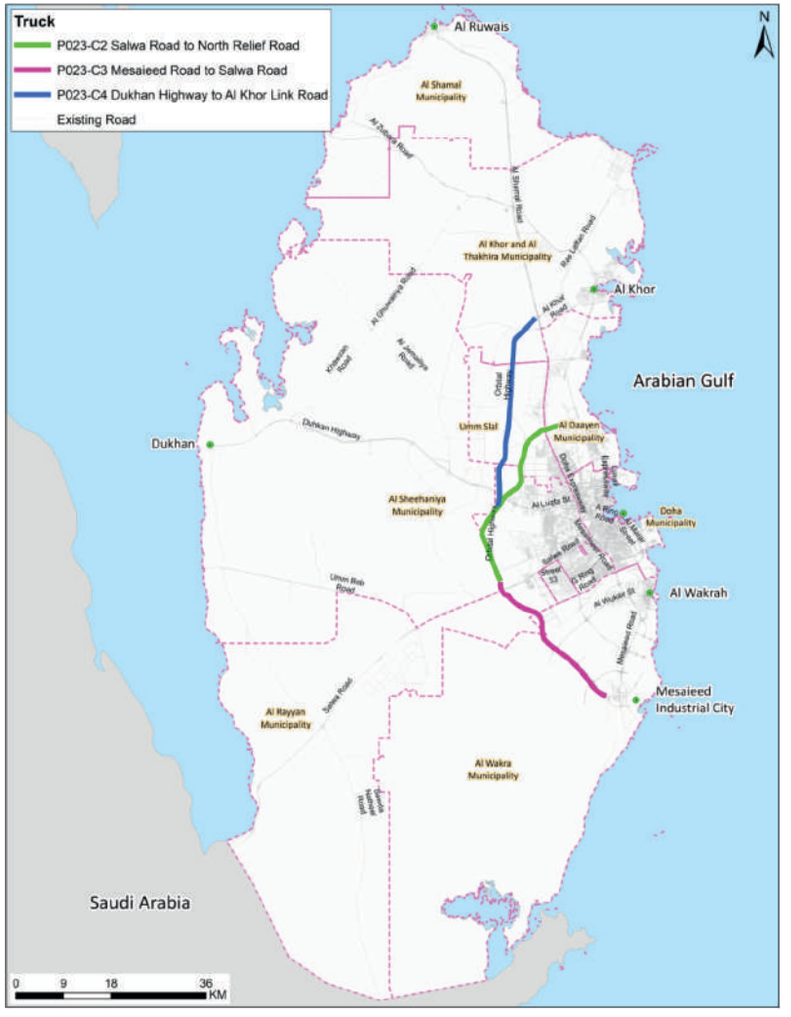
This report has taken a wider view to incorporate inputs from key stakeholders, utilize existing data, and use local knowledge to identify a truck network that is efficiently serving the requirements of truck goods movement from origin to destination. Whilst the analysis has considered HGVs and LGVs, the truck network is really designed around accommodating heavy goods vehicles with more than 12,000kg of gross vehicle load. Light Goods Vehicles (< 12,000kg gross vehicle load) can use the road network except where there are specific restrictions.

Key network elements included are:

- Key truck generators are Hamad International Airport, Hamad Port, Doha Part, Al Ruwais Port, Ras Laffan Industrial City, Mesaieed Industrial City, Umm Bab, Dukhan City, Al Khor, Industrial Area;
- Logistics Parks to store goods at intermediate points at Al Ruwais, Al Khor, Jery al Samur, Al Wakra, Abu Saleel, Birkaht Al Awamer;
- A key urban distribution center exists at Qatar Logistics Village to the south-west of Doha;
- 132km of truck segregated routes are in place (Orbital Expressways C2, C3 and C4) with dedicated truck lanes;
- Other truck routes link Doha to Abu Samra; Mesaieed and Al Khor;
- Ashghal have identified a number of over-height vehicle routes without height constraints;
- Truck parking facilities are provided at Al Shamal and a new one is being implemented at Mesaieed; and
- Facilities for managing the movement of trucks include truck holding areas, parking areas, rest areas, over-weight stations and over-height monitoring stations.

Figure 3.6 shows the alignment of routes C2, C3, C4 which provide dedicated truck lanes for trucks. These dedicated truck lanes extend from northwest of Mesaieed on the Al Majd Road (Orbital Highway) to the junction of Al Khor Road and Al Shamal Road.

Figure 3.6 – Existing Dedicated Truck Lanes (Qatar)



Source: Updated TMPQ

3.5.1 STRATEGIC AND LOCAL ACCESS ROUTES

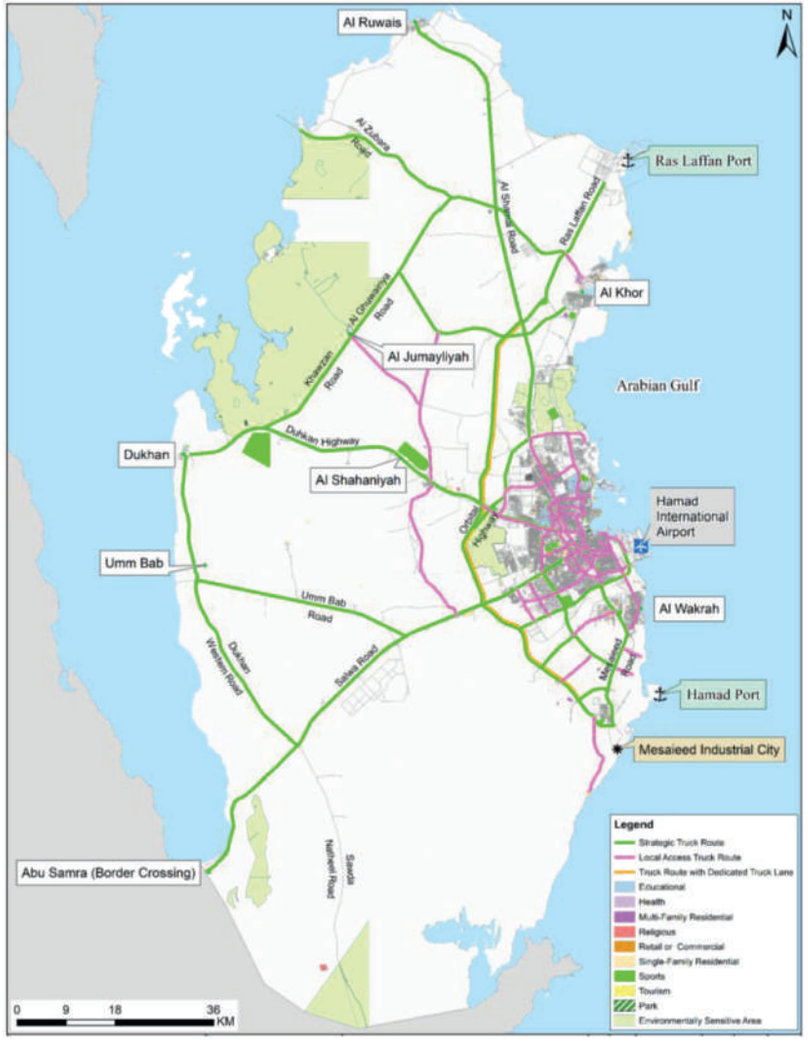
Strategic truck routes form the core of the existing informal truck route network, intended for longer distance truck trips. They are primarily concentrated along expressways and provide connections to key destinations such as Hamad International Airport, Hamad Port, Ras Laffan Industrial City, Mesaieed Industrial City, Umm Bab, Dukhan City, Al Khor, and Al Ruwais. There is also a strategic truck route to Abu Samra - the primary land gateway for imports and exports to Saudi Arabia and the United Arab Emirates (UAE). On strategic truck routes, dedicated truck lanes have been constructed to ensure reliable links for high productivity freight vehicles. Over 130km of segregated network has been developed along Al Majd Road (former Orbital Expressway), extending from northwest of Mesaieed on the Al Majd Road to the junction of Al Khor Road and Al Shamal Road. These dedicated lanes ensure reliable journeys for trucks wanting to cross the DMA.

Local access truck routes are mostly found within the DMA and located along major arterial roads. These routes provide first and last mile access to logistics and warehousing precincts and other major truck traffic generators within the metropolitan area. Outside of Doha, Rawdat Rashed Road is a local access route, providing a connection between Salwa Road and Dukhan Highway. Local access routes were selected based on roads which 'pass around' parcels of land within the urban areas, avoiding the need for trucks to 'pass through' sensitive areas. Trucks should only use these routes to access their final destination.

3.5.2 TRUCK ROUTES AND SENSITIVE LAND USE AREAS

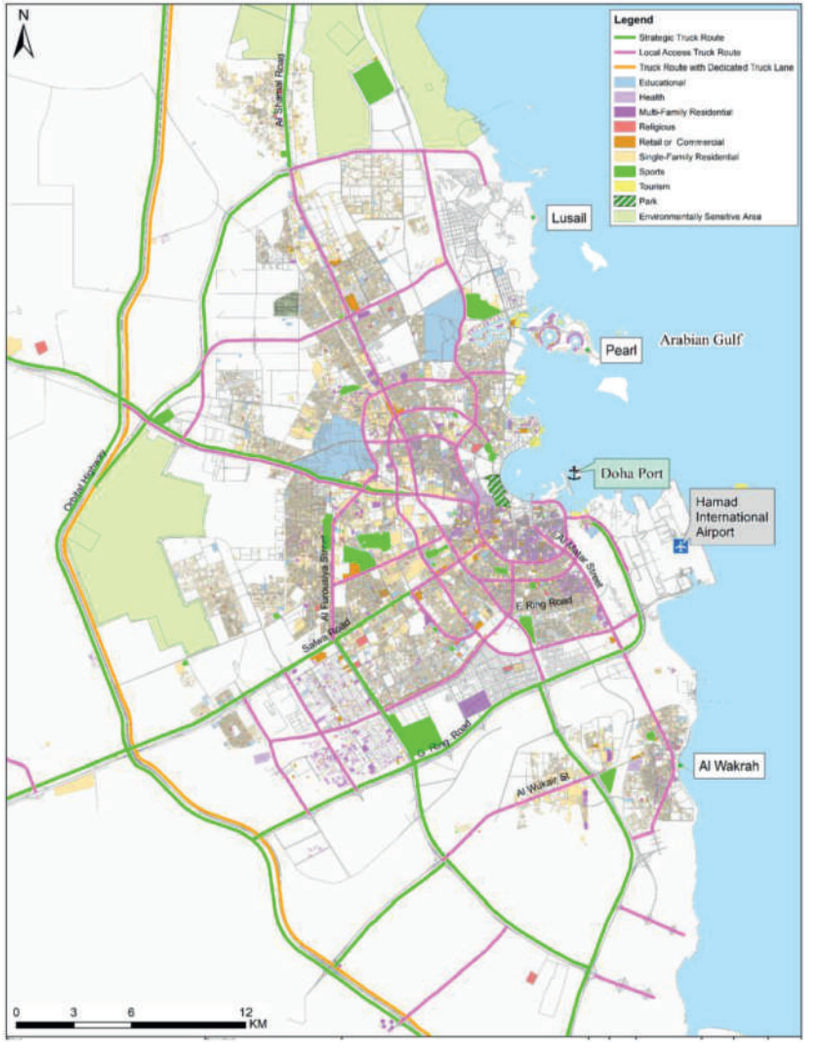
The existing land uses adjoining and adjacent to the current informal truck route network are shown in Figure 3.7 (Qatar) and Figure 3.8 (DMA) to identify whether there are sensitive land uses which may be affected by a truck route. The Qatar map shows that much of the strategic network is adjoined by logistics-distribution warehousing. Many of those areas on the edge of Doha are adjoined by mixed land use sites. The Doha map shows this trend in more detail. A fair proportion of the truck network is surrounded by vacant land, some residential areas are close to the network around the ring roads in central Doha. Generally, the truck routes being used are avoiding sensitive residential, environmental and cultural areas.

Figure 3.7 – Informal Truck Routes and Sensitive Land Use (Qatar)



Source: Updated TMPQ

Figure 3.8 – Informal Truck Routes and Sensitive Land Use (DMA)



Source: Updated TMPQ

3.5.3 EXISTING ASSOCIATED TRUCK FACILITIES (PARKING AND HOLDING AREAS)

3.5.3.1 Truck Parking Areas

Several truck parking areas have been identified for implementation across Qatar.

One project which was not successful was the Al Baraha Truck Park opened in 2009 by Barwa Real Estate Company. This was claimed to be the first truck park in The Middle east, and had 4200 truck parking spaces, 8 truck entrances and 12 truck exits, a technical inspection center for trucks and vehicles, a diesel fueling station, motor showrooms and vehicle auction, and state-of-the-art security control systems. The cost at the time was QAR 600 million, for a total area of 675,878 sqm, but included other uses, such as labor accommodation. Although the labor accommodation went ahead, the truck park attracted negligible numbers of trucks, and in June 2020, Barwa awarded a contract to build warehousing and workshops on the truck park area.

Al Shamal Truck Parking Area - Strategically located near Al Ruwais Port and spanning an area of 75,000 square meters, the new truck parking facility provides 285 parking spaces that can accommodate all types of trucks. See Figure 3.9.

Figure 3.9 – Location of Al Shamal Truck Parking

Source: Updated TMPQ

The parking facility is not so easy to access as the northbound trucks have to go through the internal roads to reach the facility, so this does not provide seamless connectivity to Al Shamal freeway.

The 285 parking spaces have been constructed to secure a wide range of services for trucks, in addition to safety and security around the clock. The project includes many supporting facilities which serve the needs of drivers and project workers, such as repair and maintenance workshops, cafeteria, restrooms, public facilities and others. Currently additional truck parking facilities have been proposed in Um Alhoul (QEZ3) and Mesaieed.

A second truck park project was tendered by MOTC, near Mesaieed Industrial City in the south of the country, however, there has been no further progress on that facility. The Public Works Authority (Ashghal) invited Expressions of Interest in November 2019 to develop a truck and heavy equipment parking facility in the Doha Industrial Area through a public-private partnership (PPP). The tender was for a Design, Build, Finance, Operate, Maintain and Transfer (DBFOMT) project. A truck and heavy equipment parking complex will be constructed in Abu Nakhla to provide approximately 4,000 parking bays for such vehicles along with related facilities, including complementary commercial and service facilities on the site to support additional revenue generation.

3.5.3.2 Truck Holding Areas

There is currently a lack of truck holding areas, such as have been implemented in other cities around the world to introduce timing restrictions on the movement of trucks into central urban areas. Where truck holding areas are used, there needs to be provision for trucks to wait for their allotted travel time. These areas can also be used as checkpoints to check the height and weight of the vehicles and their general suitability to enter the city. Whilst there may be informal areas which fulfil some of these functions, there are no formal truck holding areas yet in place.

3.5.4 EXISTING TRUCK PROHIBITIONS AND RESTRICTIONS

This section reviews existing tools for managing trucks to promote safe operations. Again, not all are formalized, but they include:

- Truck Parking Ban;
- Truck Movement Ban;

3.5.4.1 TRUCK PARKING BAN

As developments and transportation projects have increased, there has been an increase in difficulties caused by trucks parking in places where they cause obstruction, for example, trucks parking on the verges of roundabouts. Arbitrary truck parking has increased with the number of projects, for example, just one project (such as Doha Metro) can generate around 4,000 truck trips daily.

There are a number of routes where there are outright bans on heavy and special goods vehicles, and other routes where access may be restricted by time. From 30th January 2014, a parking ban was introduced for trucks, trailers and heavy machinery, prohibiting parking anywhere in central Doha or the suburbs except in the industrial area and dedicated truck parking areas. Stopping for loading and unloading is still allowed, but trucks are not permitted for wait for long periods.

3.5.4.2 Truck Movement Restriction

The Ministry of Interior introduced regulations in 2014 which restricted the movement of heavy and special goods vehicles inside Doha between the hours provided in Table 3.4. The restricted area is shown in Figure 3.5 above.

Table 3.4 – Timing Restrictions on Trucks Accessing Doha

During Ramadan (2018)	Outside Ramadan
7.30am to 9.30am	6am to 8am
12.30pm to 3pm	12 noon to 3pm
6pm to midnight	5pm to 10pm

The Ministry of Interior identified 21 sections of routes where trucks are currently prohibited from traveling at any time. These are shown in Figure 3.10 and the sections of the routes are listed in Table 3.5.

Table 3.5 – Roads Where Truck Movements are Banned at any time

SN	Street Name
1	Al Corniche Street
2	Majlis Al Taawon Street
3	Al Bidda Street
4	Doha Expressway (within National Day Ceremonial Road to Al Matar Street)
5	Al Khor Coastal Road
6	Midmac Roundabout
7	Al Gharrafa Interchange

Table 3.5 – Roads Where Truck Movements are Banned at any time

SN	Street Name
8	Al Sailiyah
9	Al Jabal Roundabout (for traffic coming from Mesaieed)
10	Abdul Rahman Bin Jasim Street.
11	Road from Al Kharrara to Al Wukair
12	Woqod Roundabout on Al Wukair Rd for traffic coming from Al Kharrara direction
13	Al Jebailat area
14	Al Markhiya Street
15	Onaiza Street
16	Khalifa Street
17	Al Ebb St. on intersection with Al-Khīsah street toward the north
18	Street 153 zone 70 on intersection with services road on Al Shamal Road in the East direction
19	Jarayan Jnaihat street zone 70 on intersection with Omar Bin Abdulaziz street and streets 139, 149, 153, 157, and Omar Bin Al Khattab Street
20	Jassim Bin Mohammad street (Zone 71) on intersection with Umm Salal Mohammed street and street 600 and Al Khuzama Street
21	Mohammad Bin Jassim street (Zone 71) on intersection with street 600 and Umm al Raba & Barzan Street

Figure 3.10 – Location of Existing Truck Prohibited Roads

Source: MOI

SECTION 3

With these restrictions in place, there need to be facilities where trucks can wait for the permitted time to access truck routes.

Some roads can be accessed if the vehicle operator has a permit. There are four different types of permits giving trucks access at different times set by the Ministry of Interior (MOI). Truck operators need to apply for the necessary permit:

- Permit No. (1): 24-hour access – these are granted to Ready-mix, petrol, oil and sewage water trucks only – for specific areas for a period of 1 month;
- Permit No. (2): Access permitted from (6 am to 8:30 am);
- Permit No. (3): Access permitted from (5 pm to 6 am), and from (10 pm to 6 am);
- Permit No. (4): Access permitted from (6 am to 8:30 am), (12 pm to 3 pm), and (5pm to 10 pm), everywhere in Qatar and is for a 6-month period.

The MOI has also undertaken a study into extending the existing ban on trucks on Doha Expressway (22nd February Street) which currently exists between Duhail and Salwa (Midmac junction), to extend to Fereej Al Ali and to ban trucks of 4 axles or more all day (rather than the current 5 axles) and buses with over 25 passengers. This section of Doha Expressway experiences high levels of traffic congestion and limited space for increasing capacity due to the limits of existing building boundaries.

MOI considered the diversion routes which trucks would be likely to take if this ban were imposed, and these included:

- C Ring;
- Al Bustan Street (Sabah al Ahmed Corridor running parallel to 22nd February Street);
- Furousiya Street;
- Al Majd Highway

The recommendations of this study have been considered as an input to development of the proposed TRN, and are:

- Issue permits for medium and heavy trucks inside greater Doha; this is important otherwise if there is no permit system, then trucks will take the shortest route;
- Determine times of restriction, whether these are overnight or off peak;
- Apply a traffic ban on trucks and buses on the section of 22nd February Street between Duhail and Fereej Al Ali;
- Prohibit buses and trucks without permits from working inside prohibited areas;
- Activate enforcement and awareness before implementation

The proposal has been developed because there is limited traffic capacity on Doha Expressway (22nd February Street). However, as an Expressway, this route is the highest level in the roads hierarchy and in that sense is the most suited to accommodate these truck vehicles. Additionally, the current alternatives do not have enough capacity to cater for trucks being diverted – the Expressways are still partly under construction, the Al Majd Highway is relatively far away and a long diversion route; C Ring is a

major arterial rather than an Expressway so is signalized at key junctions. Al Bustan Street (Sabah Al Ahmed) is the most suited to cater for these additional trucks as it is parallel and close to 22nd February Street and already being upgraded to Expressway standard.

3.5.5 RESTRICTIONS / REQUIREMENTS ON BRIDGE LOADING/ INSPECTION

For bridges, the designs in Qatar follow the standards of HP45 (which is a British standard) which requires 450 kilo-newtons on one axle on 4 points – this gives a 112-point load. For the port and airport, a higher design standard is adhered to due to the cranes and other larger vehicles working in this area. This is above the weight of any trucks using the network.

For electricity and water lines under the roads which are subject to heavy truck wheel loads / vibrations, pre-cast reinforced concrete should be provided as per Kahramaa standards and specifications.

3.5.6 ENFORCEMENT AND PENALTIES FOR NON-COMPLIANCE

Penalties have been introduced for truck offences, including QAR 500 fine for truck vehicles broken down and not moved off the highway, which is higher than the fine for non-truck vehicles. The fines for the main truck offences as per the MOI schedule are shown in Table 3.6.

Table 3.6 – List of MOI Violation Fines Relating to Trucks

Violation Number	Description	Fine (QAR)
104	Putting the load on a vehicle without organizing, arranging and fixing it properly in a condition that will allow the loaded materials to move or fall while the vehicle is moving	1,500
105	Not considering the following factors when the load is placed on the vehicle: a) To not endanger persons or to not cause any risk for public/ private property b) To not make noise or to leak anything that may affect public health or harass pedestrians c) To not obstruct vision of vehicle driver or to not hide auto or manual traffic signal or side signs or vehicle lights or reflectors or number plates d) To not affect vehicle balance or not causing the driver for danger	1,500
106	Exceeding the height of the load on vehicles or things appearing from it for more than 2.6m without written permission of the concerned authority	3,000
107	Exceeding width of load on vehicle or things appearing from it for more than 2.6m without written permission of the concerned authority	3,000
108	a) To exceed the gross weight of the vehicle in a single axle by 13 tons b) To exceed the maximum permitted weight of the vehicle on a double axle without written permission of the licensing authority c) To exceed the gross weight of a vehicle by more than the permitted load limit without written permission of the licensing authority	3,000
109	Load extension to the front side of vehicle for more than one meter, or to back side for more than 2m from the body of the vehicle without written permission from the licensing authority	3,000
110	Not holding a written permission from licensing authority to transportation materials which cannot be parted while its length will be more than permitted	3,000
111	Not putting clear red signs on side of load for alerting others	1,000
112	Making extensions on load boxes of transport vehicle and truck with the aim of carrying more than the dimensions and specifications either by width, length or height	1,000
113	Not writing down the gross weight and number of passengers on the body of the vehicle, that its load capacity (net weight) is 3 tons or more	1,000

3.5.7 HAZARDOUS GOODS AND OVERSIZED VEHICLES

Certain sections of strategic truck routes have also been identified for the movement of hazardous goods and for use by oversized vehicles.

The hazardous goods network has been selected to link major land uses which are likely to result in the movement of dangerous goods, whilst avoiding major areas of non-industrial land uses. The network provides connections between Al Ruwais, Ras Laffan Industrial City, Dukhan, Hamad International Airport, and Mesaieed Industrial City, and largely encompasses Al Shamal Road, Ras Laffan Road, Dukhan Highway, Salwa Road, Al Majd Highway, and Um Bab Road. The G Ring Road is currently the only road providing access for hazardous goods into the DMA.

For the future there may be a requirement to transport hazardous goods via the second Saudi Arabia border crossing, along the Sawdat Natheel Road. This is currently not identified as a hazardous goods route.

The oversized truck network is also confined to major expressways, and connects Ras Laffan Industrial City in the North East, Dukhan in the West, Mesaieed Industrial City, Hamad International Airport, and also QEZ 3 in the East of Qatar.

Posted clearances along Al Shamal Road and Salwa Road currently restrict the operation of certain oversized trucks between Al Ruwais and Doha, and Abu Samra and Doha.

The provision of routes for vehicles carrying hazardous goods and oversized trucks is an important part of the truck network provision. However, these vehicles use parts of the overall strategic network for trucks, rather than having a separate, segregated network, so they are covered separately in this section.

There is not a formal network in place currently to cater for hazardous goods or oversized vehicles. Before the proposed hazardous goods and oversized vehicles networks are discussed, definitions are given of hazardous goods and oversized vehicles for clarity.

3.5.7.1 Hazardous goods

In considering the movement of hazardous goods, it is important to distinguish between the usual terminology which refers to "Hazardous materials" and "Dangerous goods".

Hazardous substances

These have a potential harm to human health (whether they are immediate or long term). They may be solids, liquids or gases (often producing vapors, fume, dusts and mists); they may be pure substances or mixtures. There are many industrial, laboratory and agricultural chemicals which are classified as hazardous. Hazardous substances may cause immediate or long-term health effects. Exposure could result in:

- Poisoning;
- Irritation;
- Chemical burns;
- Sensitization;

- Cancer;
- Birth defects; or
- Diseases of certain organs such as the skin, lungs, liver, kidneys and nervous system.

Dangerous goods

These are classified according to their *immediate physical or chemical effects*, such as fire, explosion, corrosion and poisoning, affecting property, the environment or people. Dangerous substances may be corrosive, flammable, explosive, spontaneously combustible, toxic, oxidizing or water reactive. These goods can be deadly and can seriously injure or kill people, damage property and the environment. Numbers of dangerous substances are covered under the *Dangerous Goods Act 1985* and the *Dangerous Goods (Storage and Handling) Regulations 2012* (Victoria, Australia), as well as other regulations covering transportation of these substances. These are what tend to be referred to within the category of Hazardous Goods moved by trucks, including Liquefied Natural Gas (highly flammable), diesel, petrol, other fuels and toxic materials.

Truck routes have been designated according to where the above types of goods are most likely to be carried from their expected origins to destinations, such as Ras Laffan, Dukhan and Mesaieed. It was also considered important to provide a route around Doha – this has been provided to the airport round the south side of Doha. The hazardous goods routes are shown in pink in Figure 3.4.

3.5.7.2 Oversized Truck Routes

Oversized trucks are defined as those which exceed the maximum height, width, length, or weight dimensions specified under the current traffic law (Traffic Law No. 19, Ministry of Interior - 2007) which are also the maximum vehicle dimensions standards in the Qatar Highway Design Manual (QHDM) of 2015. This builds on the original Qatar Traffic Law & Executive Law No.10 of 1979 & Article (1) of Law No 13 of 1998. These dimensions (shown in Table 3.7) include any parts or items protruding from the vehicle.

Table 3.7 – Maximum Allowable Vehicle Dimensions and Weights

Parameter	Maximum Value
Maximum length of a motor vehicle	Not defined
Maximum height of a motor vehicle	4.2 m
Maximum width of a motor vehicle	2.6 m
Maximum authorized weight on a single axle	13,000 kg
Maximum gross vehicle weight (GVW)	45,000 kg

Source: QHDM 2015

Under special circumstances, where these dimensions are to be exceeded due to the need to transport indivisible loads, special permit must be obtained before transporting the goods, and routes should be planned so as to avoid clearance issues.

The most critical vehicle dimension of the above is the vertical height. If the length and width clearance (which requires the proper horizontal swept

path analysis) is not provided, that can be mitigated, for example, the vehicle can be allowed to cover multiple lanes, use channelization areas, or use lanes meant for the other direction (with proper precautions taken). However, if vertical clearance is not provided, it cannot be mitigated, and the vehicle must use a different road.

To develop the oversized truck route network, a Geographic Information System (GIS) database of structures which require clearance consideration (such as bridges, tunnels, etc.) from Ashghal (the PWA) was used. Table 3-8 shows these structures which fall within the proposed Oversized Truck Route Network. Several structures in the database do not have available data on vertical clearance. The data is also only available for existing structures and no data is available on committed highway schemes, therefore, once more data is collected, the proposed network should be reviewed in light of the new information.

The existing QHDM requires a minimum design vertical clearance of 6.5 meters on roads designated for overweight vehicles, however, this limit would exclude the majority of the existing expressway network. As shown in the last column of Table 3.8 below, a minimum posted vertical clearance of 5.5 meters along the proposed network was chosen. Figure 3.11 shows this information on a map, together with the current informal truck network.

Table 3.8 – Vertical Clearance of Structures long the Proposed Oversized Truck Route Network

Structure Name	Structure Type	Bound Direction	Road Carried	Obstacle Crossed	No. Of Lanes	Vertical Clearance (m)
Al Ghesen Interchange (Exit 48)	Overpass	East & West	Secondary Road	Al Shamal Road	2	5.5
Al Kaaban Interchange (Exit 66)	Overpass	East & West	Secondary Road	Al Shamal Road	4	5.5
Al Karaana Interchange (Exit 62)	Flyover	North & South	Service Road	Salwa Road	2	5.7
Km 61.0 Al Khattiya Interchange (Route 39)	Overpass	East & West	Access to Dukhan	Umm Bab Rd - Dukhan Road	2	N/A*
Al Mafyar Interchange (Exit 87)	Overpass	East & West	Secondary Road	Al Shamal Road	2	5.5
Al Mazrooah Interchange (Exit 16)	Overpass	East & West	Secondary Road	Al Shamal Road	8	5.5
Al Nasraniya Intch (Exit 50)	Flyover	North & South	Secondary Road	Al Rayyan - Dukhan Hwy	2	N/A
Km 60.3 Dukhan Interchange (Route 39)	Overpass	East & West	Access to Dukhan	Umm Bab Rd - Dukhan Road	2	N/A
Fuwairit Interchange (Exit 79)	Overpass	East & West	Secondary Road	Al Shamal Road	2	5.5
Garafat Al Rayyan Bridge 1	Overpass	East & West	Al Rayyan - Dukhan Road	Controlled Area	6	N/A
Al Sailiya Interchange (Exit 17)	Flyover	North & South	Street	Salwa Road	6	5.7

* Clearance information not available

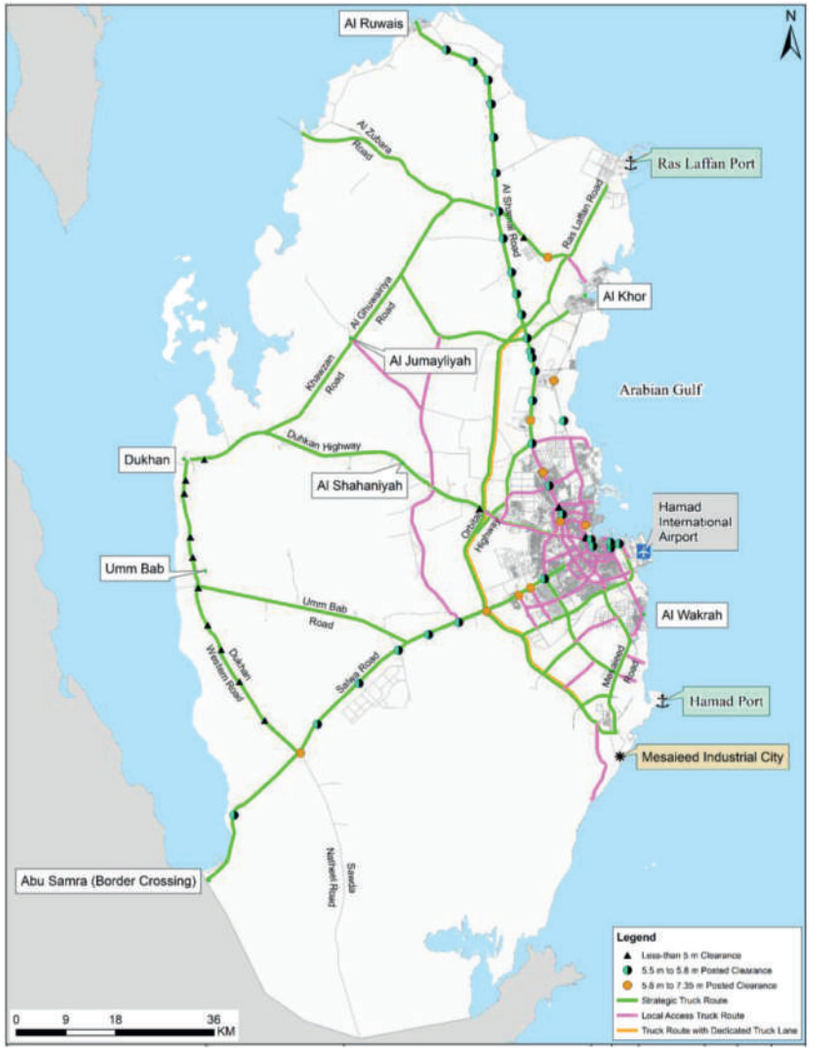
Table 3.8 – Vertical Clearance of Structures long the Proposed Oversized Truck Route Network

Structure Name	Structure Type	Bound Direction	Road Carried	Obstacle Crossed	No. Of Lanes	Vertical Clearance (m)
Al Sheehaniya Intch (Exit 33)	Underpass	East & West	Al Rayyan - Dukhan Road	Al Sheehaniya St	8	N/A
Al Zubara Interchange (Exit 59)	Overpass	East & West	Al Zubara Road	Al Shamal Road	8	5.5
Umm Jamajim Interchange (Exit 51)	Flyover	North & South	Service Road	Salwa Road	2	5.7
Athba Interchange (Exit 83)	Overpass	East & West	Secondary Road	Al Shamal Road	2	5.5
Bu Sidra (Intch 15) (Exit 15)	Flyover	North & South	Street	Salwa Road	6	5.7
Rasheeda Interchange (Exit 40)	Overpass	East & West	Secondary Road	Al Shamal Road	2	5.5
Rawdat Al Faras Viaduct	Overpass	North & South	Viaduct	Al Rayyan - Dukhan Hwy	8	N/A
Rawdat Rashed Interchange (Exit 29)	Flyover	North & South	Rawdat Rashed Road	Salwa Road	2	5.7
Sawda Natheel Interchange (Exit 68)	Flyover	North & South	UAE - Qatar Road	Salwa Road	6	5.7
Umm Sa'id- Sealine Beach F.O.	Flyover	North & South	Sealine Beach Road	Mesaieed Road	4	N/A
Umm Al Shukhoot Interchange (Exit 44)	Overpass	East & West	Secondary Road	Al Shamal Road	2	5.5
Umm Bab Interchange (Exit 42)	Flyover	North & South	Umm Bab Road	Salwa Road	6	5.7
Umm Ethnaitain Interchange (Exit 54)	Overpass	East & West	Secondary Road	Al Shamal Road	4	5.5
Garafat Al Rayyan Bridge 2	Overpass	East & West	Al Rayyan - Dukhan Road	Controlled Area	6	N/A
Industrial Interchange - Flyover	Flyover	East & West	Salwa Road	Furousiya St and Industrial St	6	5.7
Industrial Interchange - Underpass	Underpass	North & South	Furousiya St & Industrial St	Salwa Road	6	5.7
Khawzan Intch (Exit 66) (Jemaliya)	Flyover	North & South	Secondary Road	Al Rayyan - Dukhan Hwy	2	N/A
Learaig Interchange (Exit 84)	Flyover	North & South	Service Road	Salwa Road	2	5.7
Leawaina Intch (Exit 62) (Jaow Al Owainah)	Flyover	North & South	Secondary Road	Al Rayyan - Dukhan Hwy	2	N/A
Lebsayyer Intch (Exit 42) (Samriyah Al Khayis)	Flyover	North & South	Secondary Road	Al Rayyan - Dukhan Hwy	2	N/A
Lejthaya Interchange (Exit 72)	Overpass	East & West	Secondary Road	Al Shamal Road	2	5.5
Madinat Al Shamal Interchange (Exit 93)	Overpass	East & West	Secondary Road	Al Shamal Road	2	5.5
Mekaines Interchange (Exit 35)	Flyover	North & South	Service Road	Salwa Road	2	5.7

Table 3.8 – Vertical Clearance of Structures long the Proposed Oversized Truck Route Network

Structure Name	Structure Type	Bound Direction	Road Carried	Obstacle Crossed	No. Of Lanes	Vertical Clearance (m)
Mesaieed Interchange (Exit 24)	Flyover	North & South	Street	Salwa Road	6	5.7
Zekreet Intch (Exit 72)	Flyover	North & South	Secondary Road	Al Rayyan - Dukhan Hwy	2	N/A

Figure 3.11 –Vertical Clearances at Existing Informal Truck Route Network



Source: PWA

3.5.8 TRANSPORTATION FACILITIES FOR TRUCKS

As well as the network itself, other key aspects to consider include the assets or facilities which serve trucks, such as the truck parking and weigh stations, truck holding areas outside of the major cities, over height/ overweight vehicle detection, and other facilities. The future needs for such facilities will inform the development of the truck route network.

Logistics Parks – Manateq are developing six Logistics Parks at key strategic locations across Qatar. Capable of handling goods, providing opportunities for transshipping goods from larger to smaller vehicles and providing storage and warehousing facilities, these logistics parks provide opportunity for enhancing use of the truck network and ensuring that goods movement is undertaken more efficiently.

Truck Parking – MOTC Technical Affairs Department (TAD) have considered the options for providing truck parking and identified six locations where truck parking should be considered. These sites have been reviewed considering the following criteria:

- Siting parking on key approaches to Doha;
- Siting parking close to key truck generators, for example industrial areas such as QEZ2;
- Identifying areas where facilities for truck drivers such as accommodation can be provided; and
- Selecting areas where reasonable public transport exists to transport lorry drivers during their rest periods.

The locations were selected using the criteria above, and additionally, some truck parking plots were approved and allocated by MME.

Existing areas are designated for truck parking along Dukhan Road leading to the Imtiaz Dukhan area (owned by QP) and truck parking locations to the south along Umm Bab Road-Salwa (Route 39).

Oversized Vehicle Detection – Overweight vehicle detection should be carried out at each of the key approaches to Doha (possibly at the same locations as truck parking facilities). Over height detection should be undertaken at the points at which the over height vehicle routes end on the edge of Doha city. Also, as trucks come off the over height truck network at Dukhan and close to Al Khor.

Weigh Stations – Checking vehicle weight to ensure they comply with weight limits is part of the checking procedure envisaged at the truck holding areas on each approach to Doha. These should ideally coincide with where truck parking and other facilities are located. These stations should be located on the key corridors into Doha (Salwa Road from the Saudi border, Dukhan, Shamal Road, as well as approaches to Doha from Hamad Port). It is suggested that mobile weigh stations are a suitable way of ensuring that, on corridors where there are alternative routings, drivers are unaware of where the weigh stations are, and so are not able to divert round them to conveniently avoid them.

3.6 EXISTING DEMAND

3.6.1 OVERALL TRUCK MOVEMENTS

Freight transport is an important source of truck demand on the transportation system. It supports the economic benefits of infrastructure development and supply of goods related to industrial, retail and construction sectors. All land transport freight movement across Qatar is currently undertaken by road. Looking at the size of different sectors of Qatar's economy in 2017, the biggest non-energy sector was construction, largely driven by the major infrastructure investment as well as a boom in building ahead of the 2022 FIFA World Cup. This level of construction activity would have increased truck demand in the base year 2018.

Based on latest data, it is estimated that over 120,000 HGV trips are made on the network on a typical weekday. These trips are almost exclusively moving goods between points of supply and consumption within the DMA.

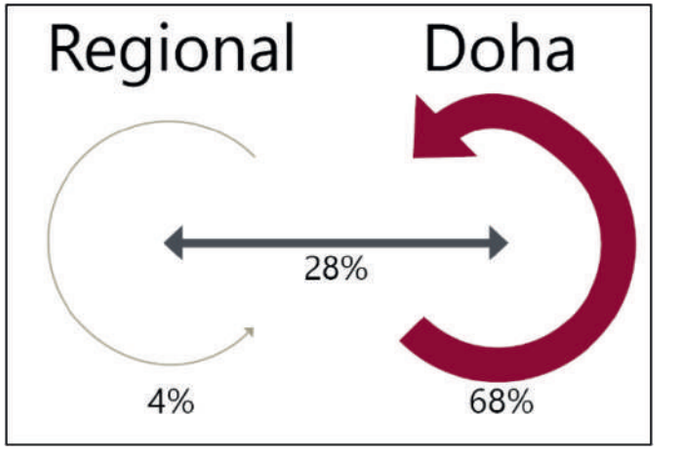
As shown in Figure 3.12, almost two thirds of these trips take place solely within the DMA, facilitating the distribution of imported goods from transport gateways to end destinations such as hotels and shopping malls. Ras Abu Abboud Expressway, the G Ring Road, and Doha Expressway are the major corridors that facilitate these movements.

A further quarter of truck trips are between regional areas of Qatar and Doha, transporting construction supplies, petroleum and natural gas from points of production in the north, south and west of the country. Al Majd Road (formerly Orbital Road), Salwa Road and Dukhan Highway are the most significant of these routes, providing connections between Industrial Cities, mining and quarry areas the DMA.

Less than five per cent of trips are between regional areas.

Over 80% of HGV trips are made outside of the peak periods, with truck operators recognizing the challenges of congestion, particularly on arterial roads within the metropolitan area.

Figure 3.12 – Typical Truck Movements Across Qatar



Source: Updated TMPQ

3.6.2 TRUCK MOVEMENTS THAT SUPPORT DOMESTIC CONSUMPTION

Qatar has experienced significant population and economic growth in the last decade. Annual population and GDP growth has been approximately 7 and 4.5 per-cent respectively. Approximately 80% of the population live within Doha. To sustain this growth the state is highly reliant on imports, with 90 per-cent of the country's food requirements, for example, supplied

from other countries across the region and the world. These dynamics create a logistics sector and supply chain that is largely driven by the movement of goods to satisfy growing consumption.

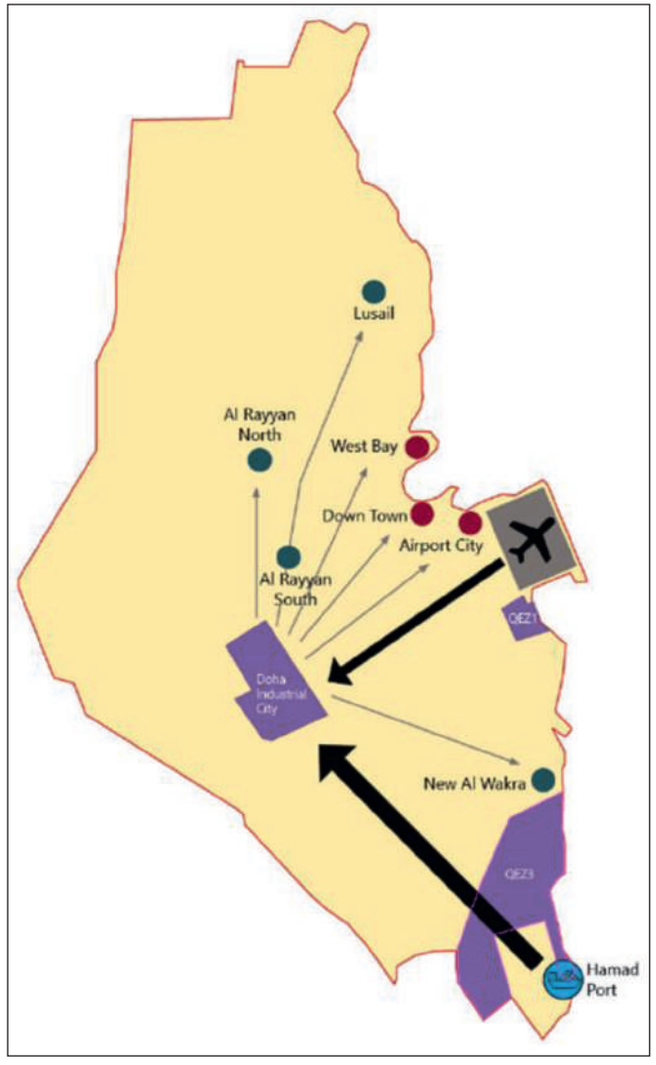
A large portion of imports have historically been delivered overland via the border with Saudi Arabia at Abu Samra border crossing. This generated almost 1,000 truck movements between the border and Doha every day (along the Salwa Road corridor). During the blockade, this was largely replaced by imports via Hamad Port and Hamad International Airport, significantly changing the distribution of truck movements on the State's roads.

Today the import task can be largely characterized by truck movements from these two key transport gateways to logistics and warehousing precincts in the west and south west of Doha. Approximately 6-9,000 HGV trips are made each day between Mesaieed/Hamad Port and the Outer Doha region. Up to 500 HGV trips are made each day between Hamad International Airport and Doha Industrial City.

From distribution centers in Doha Industrial City and other logistics and warehousing parks, goods are delivered to customers across the city. This distribution task generates more than 10,000 light and heavy vehicle trips every day to localities like West Bay and downtown, areas with a concentration of retail, food and beverage, and tourist activity.

Typical movements for imported goods are illustrated in Figure 3.13.

Figure 3.13 – Typical Movement of Goods Across Qatar



Source: Updated TMPQ

Across Qatar the road network is fundamental to domestic supply chains.

Qatar Petroleum distributes hydrocarbon products from Ras Laffan and Mesaieed Industrial Cities via road to the domestic market in Qatar. With almost 9,000 tankers currently registered in the State, this supply chain generates a significant number of daily truck trips. In the South West, Mesaieed Road is a major route, with trucks making up almost 20% of the total daily traffic numbers. This road provides access to the G-Ring Road and Ras Abu Aboud Expressway, critical to accessing central Doha, and Doha Industrial Area. In the North West, Ras Laffan Road is an important route that connects the industrial area with the DMA.

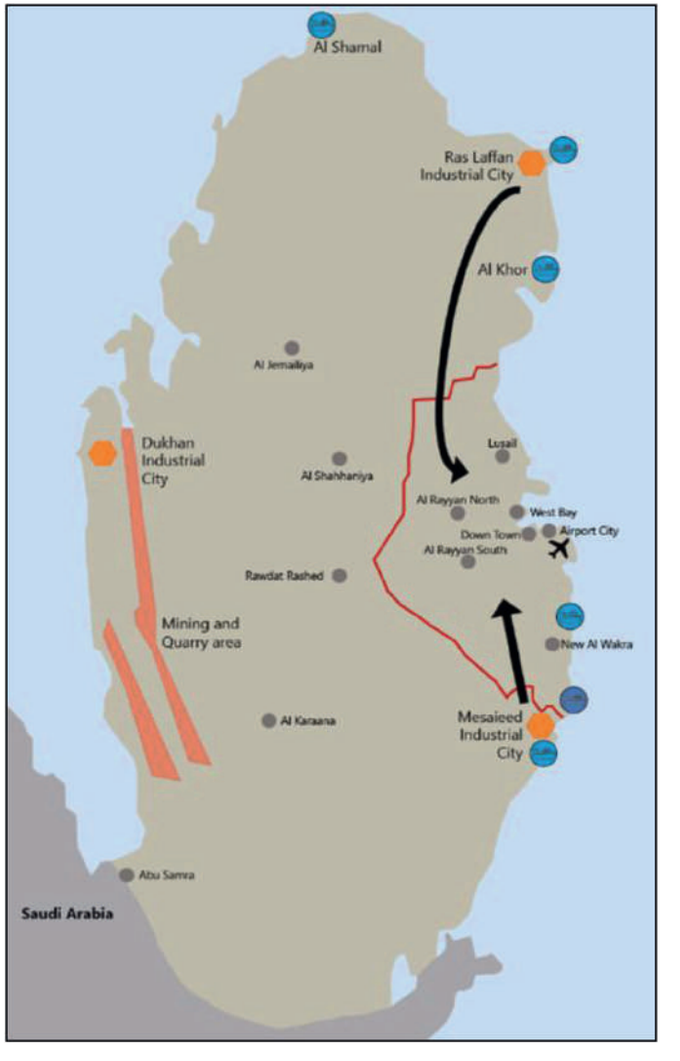
As the population, and subsequent car ownership continues to rise, the demand for petrol and gas is increasing significantly. Between 2009 and 2015 domestic demand for gas doubled, reaching 44.8 billion cubic meters per year. To cater for this growing demand, Woqod and other fuel station operators are constructing new facilities, most of which are located within the DMA. By 2022, Woqod alone will operate 150 fuel stations across Qatar.

Growing demand for petroleum and gas, and a greater number of facilities to service means the number of petrol tanker movements on the State's road network will increase in the coming years.

Furthermore, since the blockade Qatar has increased production of agriculture and dairy to cater for the domestic market. This has also led to increase in the number of trucks on the network.

Typical domestic movements for petroleum and gas are illustrated in Figure 3.14

Figure 3.14 – Typical Movement of Fuel Trucks



Source: Updated TMPQ

3.6.3 TRUCKS MOVEMENTS THAT SUPPORT CONSTRUCTION ACTIVITY

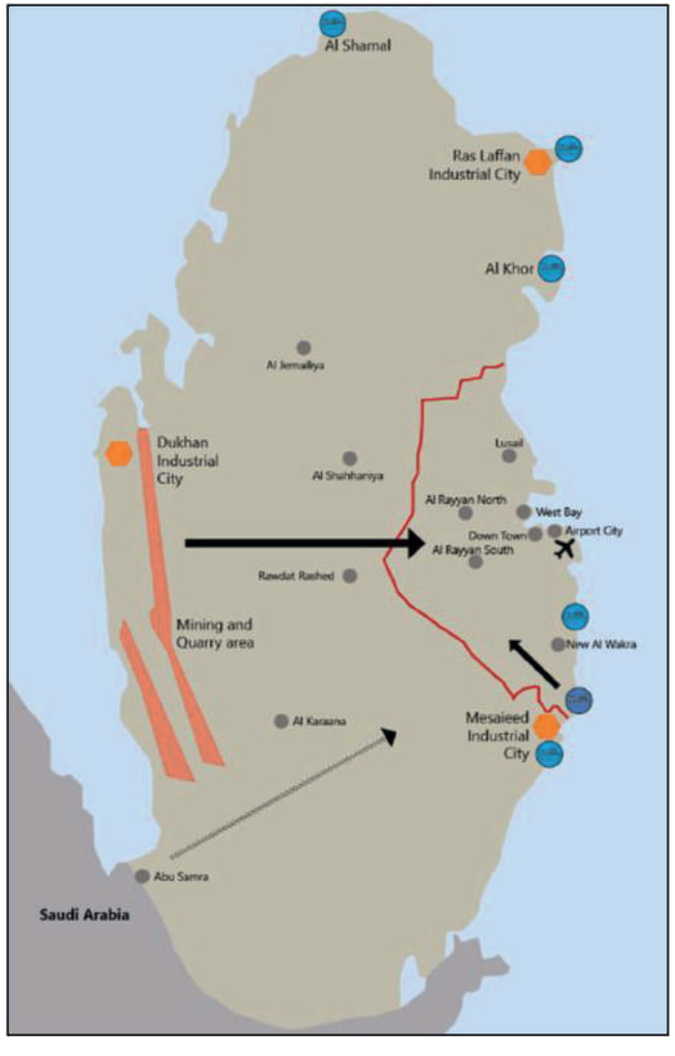
Domestic production of construction materials like limestone, sand, cement and other aggregates follows a similar supply chain to imported goods. HGV's move material from quarries in the west of the State to storage yards on the fringes of the DMA. From here they are moved to various construction and major development sites across Doha and other parts of Qatar. Limestone quarries in the Dukhan region alone generate almost 2,000 truck movements per day between the west coast and Doha, with much of this traffic being focused on Umm Bab Road.

Qatar is also a significant importer of construction material, and in 2014 it was estimated that over 25 million tons of crushed stones entered the country. A significant volume of this came from the UAE, contributing to the 1,000 daily truck trips between Abu Samra and Doha. During the blockade this supply chain changed, with construction materials coming via Hamad Port.

The destinations of construction related trips are likely to change over time as different parts of the metropolitan area are developed. Currently the City of Lusail is a primary destination for construction trucks, as the area is built out to accommodate almost 400,000 residents and workers. In the future, the development of Qatar Economic Zones will shift construction truck traffic to the south of the city.

Typical domestic movements related to construction activity are illustrated in Figure 3.15.

Figure 3.15 – Typical Movement of Construction Materials Trucks



Source: Updated TMPQ

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3.6.4 TRUCK DEMAND IN BASE YEAR MODEL

To analyze the current light and heavy goods vehicle travelling to deliver freight in Qatar, trip generated data from QSTM2 has been used. The below sections briefly describe this data.

QSTM2.0 classifies goods vehicles as LGV's and HGV's. LGV's are one category in the model, whilst HGV numbers are split into HGV-Permitted and HGV-Restricted. This distinction is created from the assignment process in the model whereby certain vehicles are allowed along certain routes due to their height or weight.

There are around 50% more LGV trips on the network than there are HGV trips. Across the typical weekday, there are around 167,000 LGV trips compared to around 122,000 HGV trips.

The total number of vehicle trips by truck is highest in the AM peak hour (20,000 goods vehicles), and lowest in the Midday (MD) peak hour (just under 17,000). The total volume of trips over a typical weekday (289,000 goods vehicles) indicates that there are significant volumes of trucks throughout much of the day. Table 3.9 shows this breakdown across the peaks and typical weekday.

Table 3.9 – Numbers of Goods Vehicles by Category and Time Period in BY Model

Mode	AM Peak Hour	MD Peak Hour	PM Peak Hour	Typical weekday
LGV	12,000	10,666	11,166	166,663
HGV	7,314	6,100	7,801	121,897
Total	*20,014*	*16,766*	*18,967*	*288,560*

Source: QSTM2.0

For LGV's, the highest flows are during the AM peak hour, for the Permitted HGV's, the highest flows are during the PM peak hour. Restricted HGV's have similar flows across each of the three peak hours, but much lower flows. The Restricted HGV's only comprise around 3-5% of the total volume of goods vehicles.

3.6.5 MAIN ORIGIN-DESTINATIONS FLOWS

3.6.5.1 Light Goods Vehicles

To understand the flow of the LGV and HGV data obtained from QSTM2.0, the entire Qatar was divided into nine sectors while the DMA was divided into 12 sub-sectors based on the land use homogeneity. Based on this categorization, QSTM2.0 runs were made, and further details are available in Technical Report 3.

Summary

A summary of the movement patterns and tidality of LGV trips is shown in Table 3.10

Table 3.10 – LGV Flows and Tidality Summary, 9x9 Qatar Sectors (vehicle-trips) in BY Model

Movement	Two-Way Trip Numbers				Percentage of Trips				Trip Tidality (Inbound/Outbound)		
	TWD	AM	MD	PM	TWD	AM	MD	PM	AM	MD	PM
Movements Within Doha Metropolitan Area (DMA)	121,955	8,781	7,805	8,171	73%	73%	73%	73%			
Within Doha Capital City Precinct (DCCP)	5,563	401	356	373	3%	3%	3%	3%			
Between Inner Doha and DCCP	17,415	1,254	1,115	1,167	10%	10%	10%	10%	50% / 50%	50% / 50%	50% / 50%
Between Outer Doha and DCCP	23,262	1,675	1,489	1,559	14%	14%	14%	14%	50% / 50%	50% / 50%	50% / 50%
Within Inner Doha	13,274	956	850	889	8%	8%	8%	8%			
Between Outer Doha and Inner Doha	35,311	2,542	2,260	2,366	21%	21%	21%	21%	50% / 50%	50% / 50%	50% / 50%
Within Outer Doha	27,130	1,953	1,736	1,818	16%	16%	16%	16%			
Movements to and From Doha Metropolitan Area (DMA)	36,723	2,644	2,350	2,460	22%	22%	22%	22%			
Between Other Towns and DCCP	6,954	501	445	466	4%	4%	4%	4%	50% / 50%	50% / 50%	50% / 50%
Between Other Towns and Inner Doha	10,149	731	650	680	6%	6%	6%	6%	50% / 50%	50% / 50%	50% / 50%
Between Other Towns and Outer Doha	15,248	1,098	976	1,022	9%	9%	9%	9%	49% / 51%	49% / 51%	49% / 51%
Between Rural Areas and DCCP	745	54	48	50	0%	0%	0%	0%	52% / 48%	52% / 48%	52% / 48%
Between Rural Areas and Inner Doha	1,077	78	69	72	1%	1%	1%	1%	52% / 48%	52% / 48%	52% / 48%
Rural Areas and Outer Doha	2,550	184	163	171	2%	2%	2%	2%	51% / 49%	51% / 49%	51% / 49%
Other Movements	7,984	575	511	535	5%	5%	5%	5%			
Within Other Towns	5,922	426	379	397	4%	4%	4%	4%			
Between Other Towns	437	31	28	29	0%	0%	0%	0%			
Between Rural Areas and Other Towns	1,326	95	85	89	1%	1%	1%	1%	46% / 54%	46% / 54%	46% / 54%
Within Rural Areas	291	21	19	20	0%	0%	0%	0%			
Between Rural Areas	9	1	1	1	0%	0%	0%	0%			
Totals	166,663	12,000	10,666	11,166							

Source: QSTM2.0

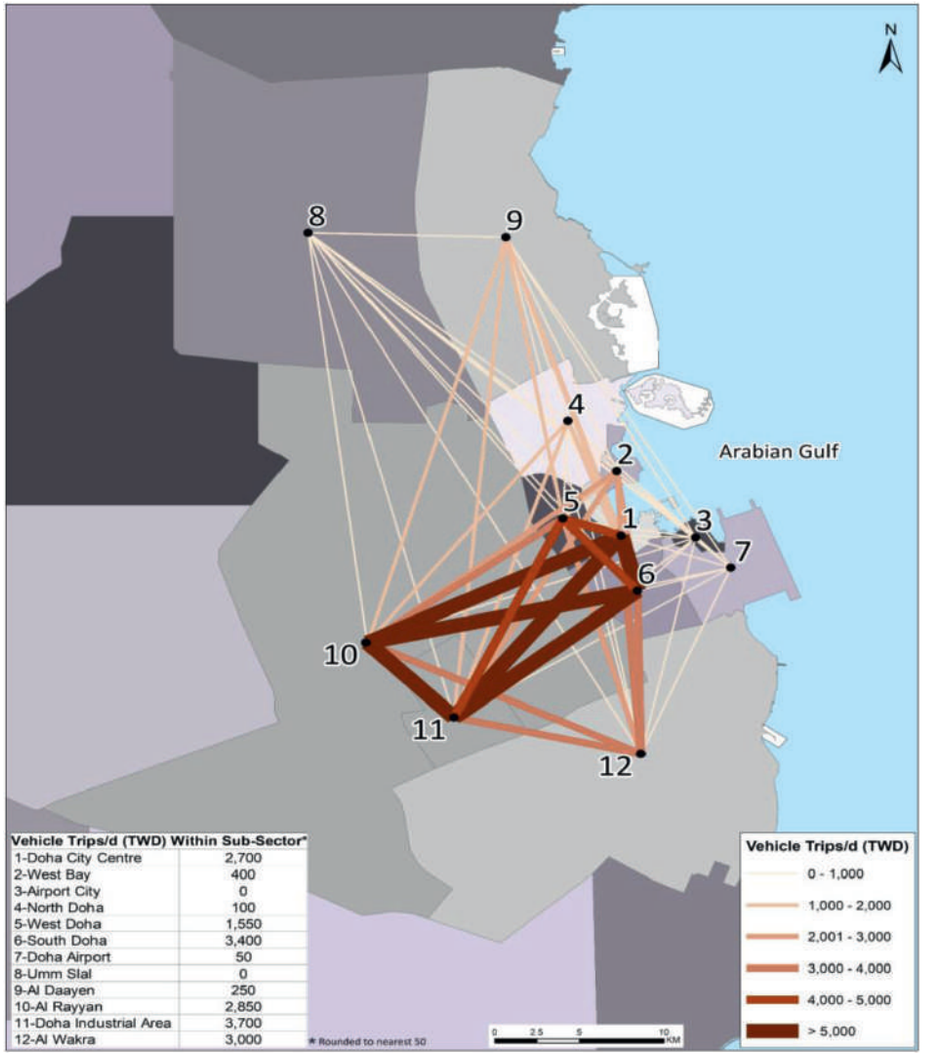
The specific trend observed on the directional flows of LGV trips is that they seem to be very symmetrical across all peaks. Nearly all origins and destinations are generating and attracting similar number of trips to each other. This may reflect the nature of freight demand, where goods vehicles unload their cargo at the destination (or a series of destinations within a sector) in a relatively short period of time and make a return trip. For work or education person trips, in contrast, the activity at the destination takes a longer time, so the journey patterns are less symmetrical in nature.

Desire Line Maps

Figure 3.16 and Figure 3.17 show the above flows by area in map form for the typical weekday (i.e. 24 hours)) for Qatar and the DMA respectively. From the desire flow line maps, the following can be inferred:

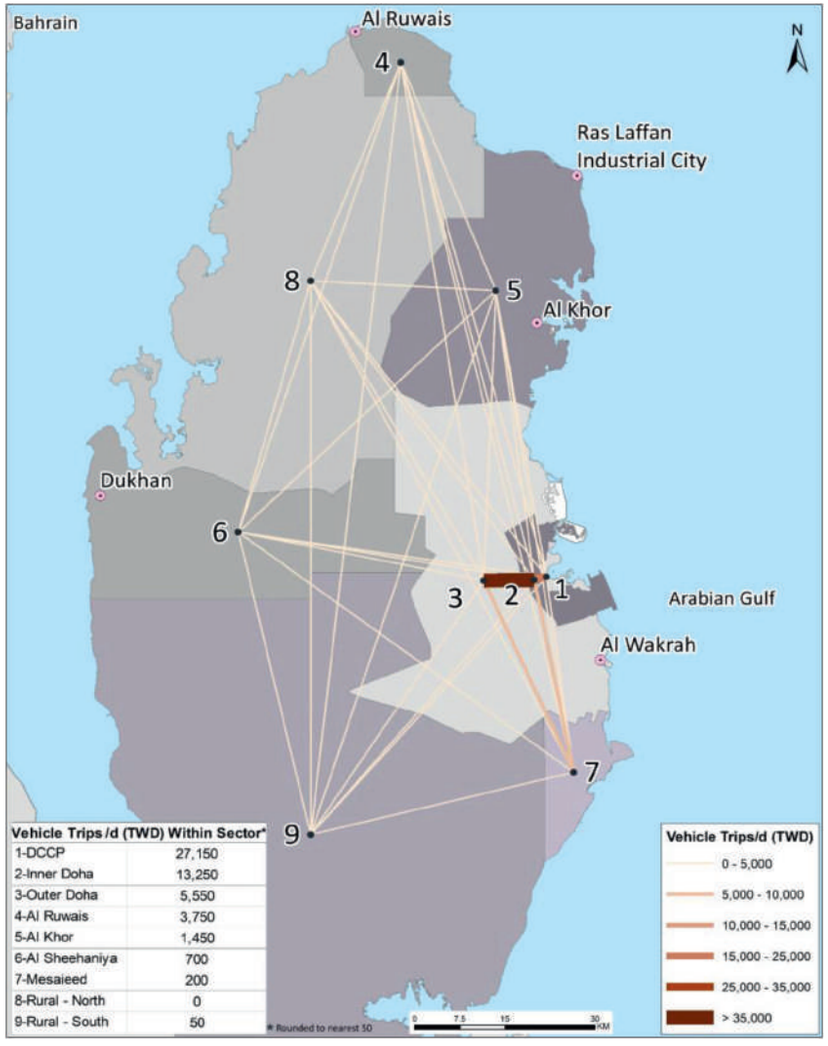
- Regarding the Qatar wide nine sectors, significant LGV trips for the full week-day occur among Inner Doha and Outer Doha (industrial area and Al Rayyan)
- Mesaieed Industrial City (MIC) is also contributing considerable LGV trips.
- Regarding the DMA (12 Sub-sectors) there are significant trips occurring between Doha City Centre, South Doha, Doha Industrial Area and Al Rayan.
- Considerable trips also occur between Doha City Centre, West Doha, South Doha and Doha Industrial Area

Figure 3.16 – LGV OD Flows – Typical Weekday (vehicle-trips) in the DMA



Source: QSTM2.0

Figure 3.17 – LGV OD Flows – Typical Weekday (vehicle trips) in Qatar



Source: QSTM2.0

Heavy Goods Vehicles

Similar to LGV flows in Doha, HGV flows are more evenly distributed over all 12x12 sectors compared to private vehicles and other modes.

- The highest HGV trip volumes are not internal to Al Rayyan (sector 10) as is the case with LGV and other modes. They are between West Bay (sector 2) and South Doha (sector 6). This may reflect the high level of construction around the West Bay area at the base year.
- Higher overall HGV trips take place during the PM peak hour, but the overall trip patterns are very similar between the three peak hours.
- As with LGVs, at both Qatar and Doha levels, trip orientations are nearly perfectly symmetrical in both directions.

HGV data was also obtained from QSTM.20 for the base year 2018. This data is presented for Qatar wide nine sectors and the DMA's 12 sub-sectors.

Summary

A summary of the movement patterns and tidality of private vehicle trips is shown in Table 3.11.

Table 3.11 – HGV Flows and Tidality Summary, 9x9 Qatar Sectors (vehicle-trips)

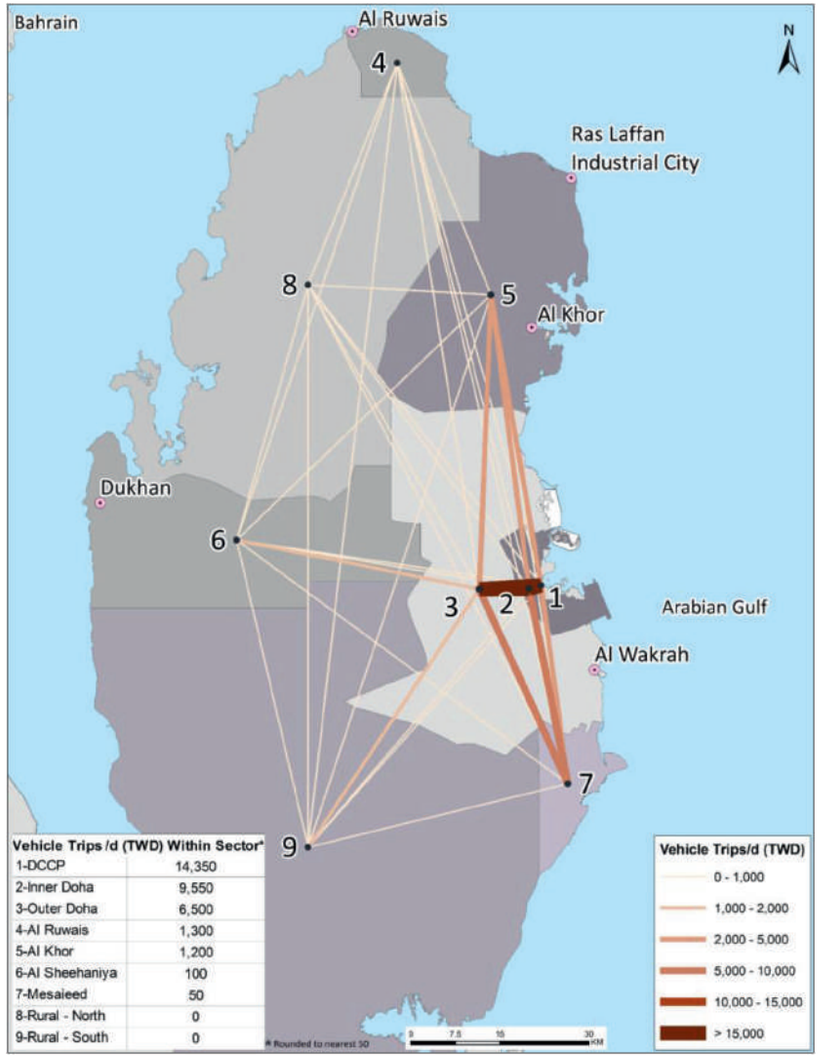
Movement	Two-Way Trip Numbers				Percentage of Trips				Trip Tidality (Inbound/Outbound)		
	TWD	AM	MD	PM	TWD	AM	MD	PM	AM	MD	PM
Movements Within Doha Metropolitan Area	82,867	4,972	4,392	5,304	68%	68%	68%	68%			
Within DCCP	6,477	389	343	415	5%	5%	5%	5%			
Between Inner Doha and DCCP	16,449	987	872	1,053	13%	13%	13%	13%	50% / 50%	50% / 50%	50% / 50%
Between Outer Doha and DCCP	16,591	995	879	1,062	14%	14%	14%	14%	50% / 50%	50% / 50%	50% / 50%
Within Inner Doha	9,559	574	507	612	8%	8%	8%	8%			
Between Outer Doha and Inner Doha	19,447	1,167	1,031	1,245	16%	16%	16%	16%	50% / 50%	50% / 50%	50% / 50%
Within Outer Doha	14,345	861	760	918	12%	12%	12%	12%			
Movements to and From Doha Metropolitan Area	34,300	2,058	1,818	2,195	28%	28%	28%	28%			
Between Other Towns and DCCP	8,053	483	427	515	7%	7%	7%	7%	50% / 50%	50% / 50%	50% / 50%
Between Other Towns and Inner Doha	9,454	567	501	605	8%	8%	8%	8%	50% / 50%	50% / 50%	50% / 50%
Between Other Towns and Outer Doha	13,011	781	690	833	11%	11%	11%	11%	50% / 50%	50% / 50%	50% / 50%
Between Rural Areas and DCCP	1,006	60	53	64	1%	1%	1%	1%	49% / 51%	49% / 51%	49% / 51%
Between Rural Areas and Inner Doha	1,175	70	62	75	1%	1%	1%	1%	51% / 49%	51% / 49%	51% / 49%
Rural Areas and Outer Doha	1,601	96	85	102	1%	1%	1%	1%	51% / 49%	51% / 49%	51% / 49%
Other Movements	4,730	284	251	303	4%	4%	4%	4%			
Within Other Towns	2,579	155	137	165	2%	2%	2%	2%			
Between Other Towns	1,058	63	56	68	1%	1%	1%	1%			
Between Rural Areas and Other Towns	1,028	62	54	66	1%	1%	1%	1%	49% / 51%	49% / 51%	49% / 51%
Within Rural Areas	53	3	3	3	0%	0%	0%	0%			
Between Rural Areas	13	1	1	1	0%	0%	0%	0%			
Totals	121,897	7,314	6,461	7,801							

Source: QSTM2.0Desire Line Maps for HGV's

Figure 3.18 and Figure 3.19 show the above flows by area in map form for the typical weekday (i.e. 24 hours) for Qatar and the DMA respectively. From the desire flow line maps, the following can be inferred:

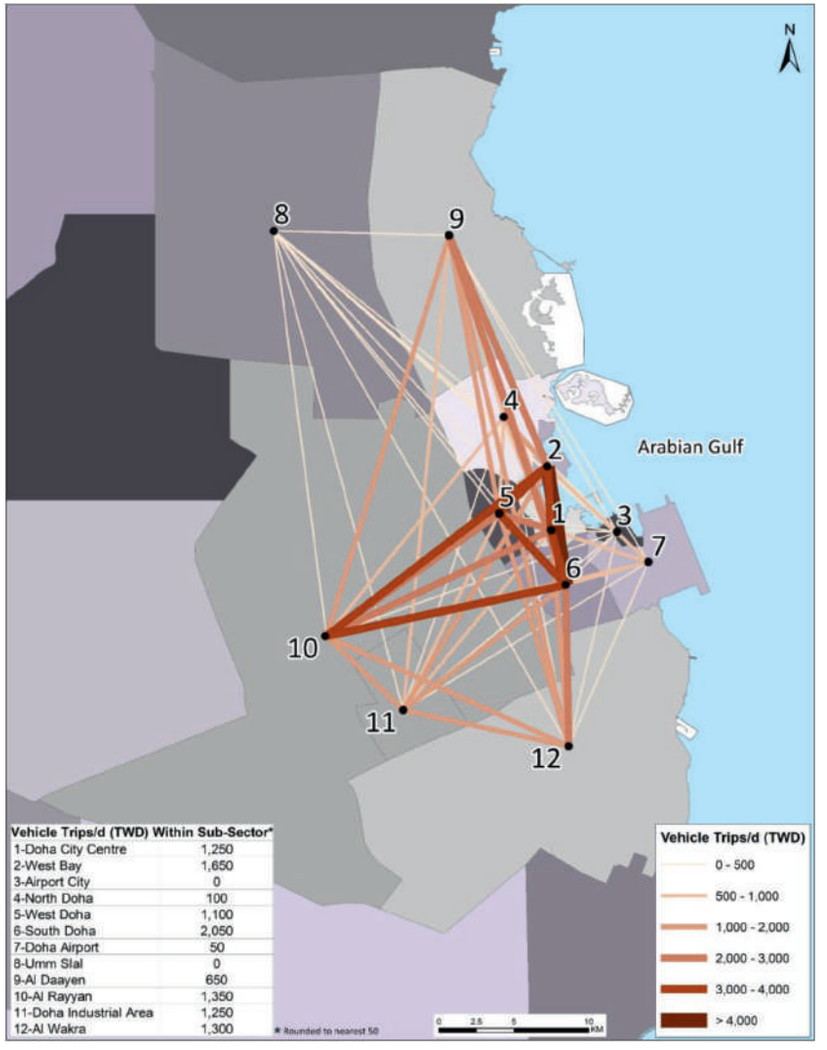
- Regarding the Qatar wide nine sectors, significant HGV trips for the full week-day occur between Doha City Centre, Inner Doha and Outer Doha (industrial area and Al Rayyan);
- MIC, Ras Laffan Industrial City (RLIC) and Doha Industrial area are also contributing considerable HGV trips;
- Regarding the DMA (12 Sub-sectors) there are significant trips occurring between West Bay and South Doha. This is an anomaly but could be contributed to by heavy construction on major developments in both areas;
- Considerable trips also occur among Doha City Centre, West Doha, South Doha and Al Rayyan.

Figure 3.18 – HGV OD Flows – Typical Weekday (vehicle-trips) in Qatar



Source: QSTM2.0

Figure 3.19 – HGV OD Flows – Typical Weekday (vehicle trips) in the DMA



Source: QSTM2.0

3.6.6 TRUCK FLOWS ON THE EXISTING ROAD NETWORK

This section aims to give a general description and analysis of the percentages of trucks on links, looking at percentages of the total number of vehicles (not PCU values), and goods vehicles will be considered jointly. Truck percentages for the AM, MD, and PM peak hours form part of the assessment and are shown in Figure 3.20 to Figure 3.21. The trends shown by the QSTM model have also been compared with information derived from traffic counts. The model information is shown by bandwidth colors on the maps, whilst the truck percentages shown by the traffic counts are shown as spot points on the maps for each peak.

Differences between peak hours are minimal. Looking at the main corridors in Qatar the key details of truck demand patterns on major truck routes are:

Rural Corridors

- **Al Majd Road**: This corridor is carrying high volumes of LGV's in the section from Mesaieed to Salwa Road. The section to the north carries lower percentages and volumes of goods vehicles.
- **Doha Expressway (Al Shamal Road):** Volumes of goods vehicles are low on this route – (5-10% in Doha area and dropping to 0-5% between the northern edge of Doha and Ruwais
- **Salwa Road:** This shows low proportions of trucks along the Salwa Road stretch within Doha up to the Al Majd Highway, particularly in the AM and MD peaks (0 to 10%), with higher proportions in the PM peak (15-20%). Outside of Doha, percentages increase to higher proportions than within Doha (see below), reaching 20-25% during the PM peak at certain points

- **Mesaieed Road:** This is a major corridor for trucks, showing consistent proportions of trucks of around 15-20% across all peaks. The corridor carries trucks to G-Ring Road and onto Ras Abu Aboud Expressway and Al Corniche Street, forming one of the main truck routes in Qatar.

Inside Doha's urban area, looking at the main radial corridors:

- **Doha Expressway (Section within Doha):** Volumes of goods vehicles are high, however, the high total volumes on this corridor means the proportion of trucks are very low.
- **Salwa Road:** This shows low proportions of trucks along the Salwa Road stretch within Doha up to the Al Majd Highway, particularly in the AM and MD peaks (0 to 10%), with higher proportions in the PM peak (15-20%).
- **Industrial Area Road:** This corridor is a major link for good vehicles, showing high proportions of trucks, higher in the southwest, closer to the industrial area.
- **Al Matar Street:** Although proportions of trucks are higher on some sections, overall they are generally low.
- **Ras Abu Aboud Expressway / G-Ring Road:** This is a major truck corridor, it carries high volumes of goods vehicles. The proportions of goods vehicles are low however (less than 5% mostly), this is likely due to the high overall traffic volume attracted by this expressway.

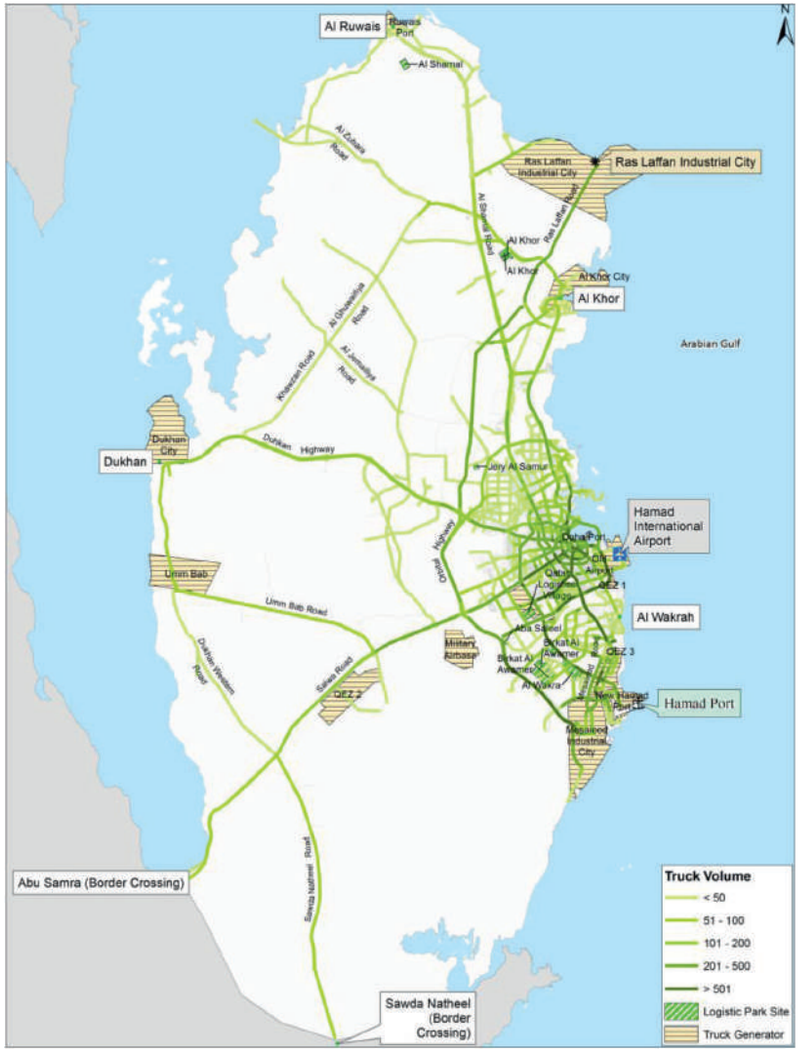
Main Ring Roads:

- **C-Ring Road:** This corridor is not a major truck route. It carries low percentages of goods vehicles.
- **East-Industrial Street / Furousiya Street:** This corridor shows similar trends to C-Ring road.

Overall, Qatar's network has an unusually high percentage of trucks. This is likely due to the high amount of construction stemming from infrastructure investments. However, the controls on goods vehicles in Doha are reasonably effective at minimizing the impact of trucks on the urban area.

Expressways and Major Arterials are forming the major freight transport network in Qatar, with major truck flows routed through these corridors. Salwa Road to the Saudi Arabian border carries higher proportions of trucks, with less trucks seen on the routes to Al Shamal.

Figure 3.20 – Existing Goods Vehicles Volume (AM Peak Hour, Qatar)



Source: QSTM 2.0

Figure 3.21 – Existing Goods Vehicles Volume (AM Peak Hour, DMA)

Source: QSTM 2.0

Figure 3.22 Existing Goods Vehicles Percentage on links (AM Peak Hour, Qatar)

Source: QSTM 2.0

Figure 3.23 Existing Goods Vehicles Percentage on links (AM Peak Hour, DMA)

Source: QSTM 2.0

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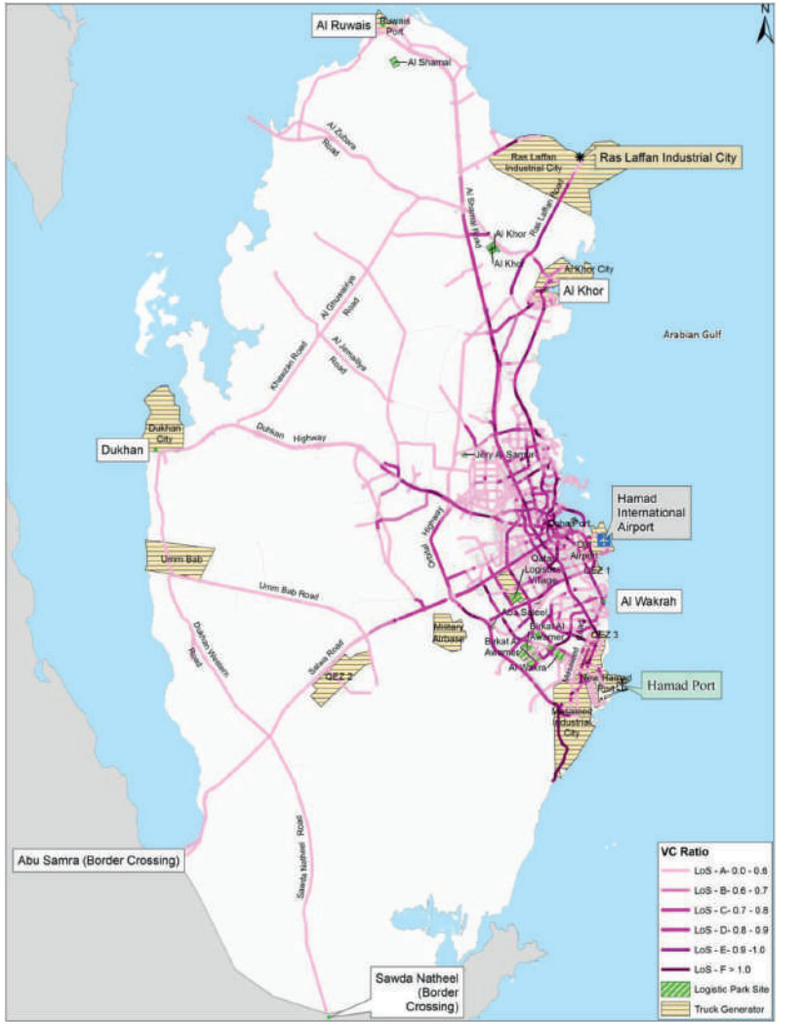
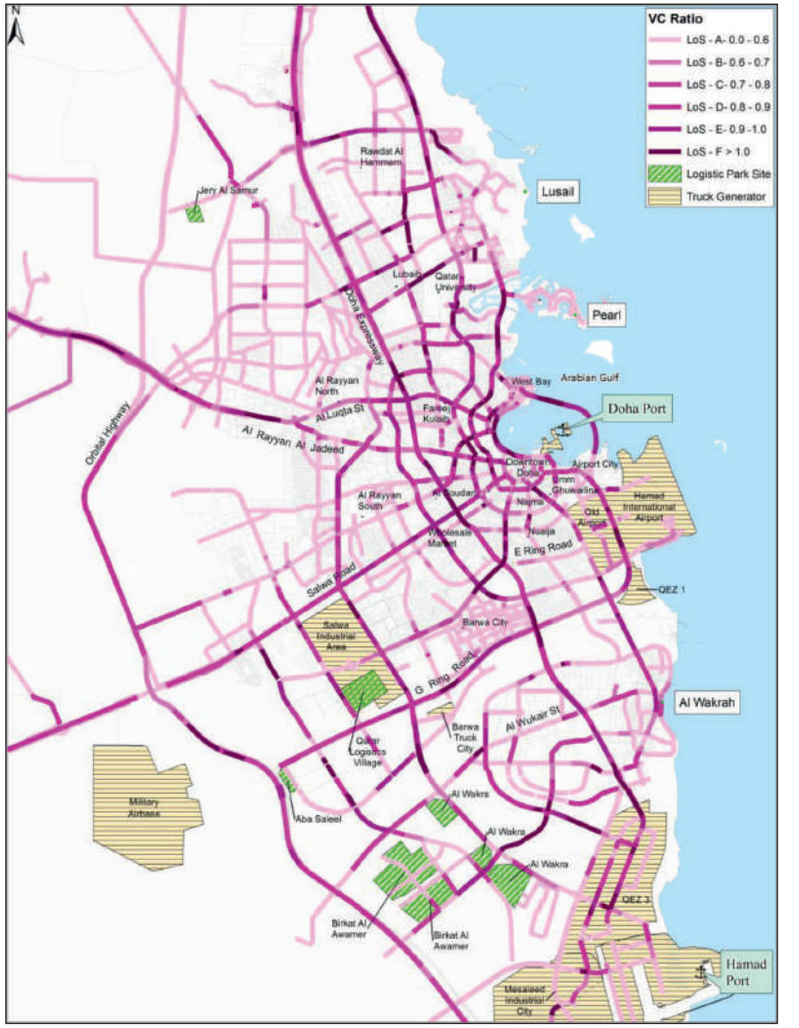
Figure 3.24 Existing Volume to Capacity Ratio on Links (AM Peak Hour, Qatar)



Source: QSTM 2.0

Figure 3.25 Existing Volume to Capacity Ratio on Links (AM Peak Hour, DMA)

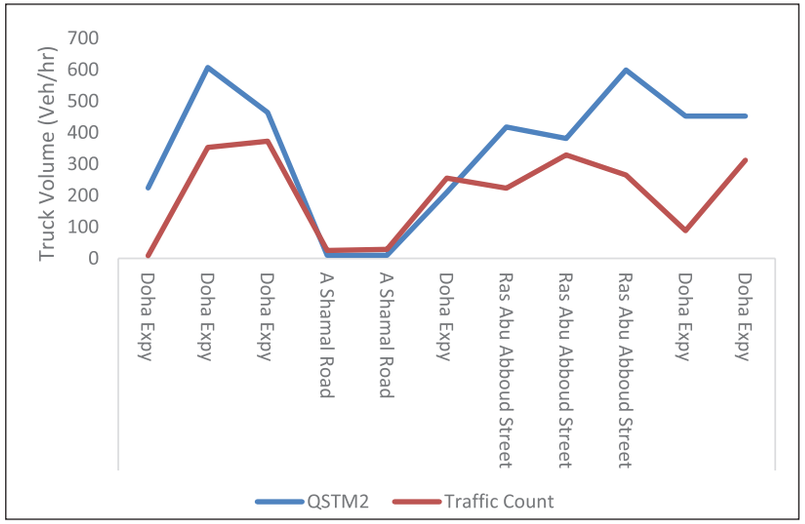


Source: QSTM 2.0

When comparing the model output with traffic count data, the QSTM model shows significant HGV trips for the full week-day occur between Doha City Centre, Inner Doha and Outer Doha (industrial area and Al Rayyan) and MIC, RLIC and Doha Industrial area are also contributing considerable HGV trips. Within the DMA there are significant trips occurring between West Bay and South Doha, and considerable trips also occur between Doha City Centre, West Doha, South Doha and Al Rayyan.

The traffic counts also pick up more clearly trucks which are recorded within the DMA. (this applies to all peaks). The traffic counts also pick up higher truck proportions on those roads which cut between the main arteries into Doha. For example, between Salwa Road and Dukhan Road, and between Al Shamal Road and Al Khor Road.

Figure 3.26 – Truck Hourly Volumes at Main Freeway Stations

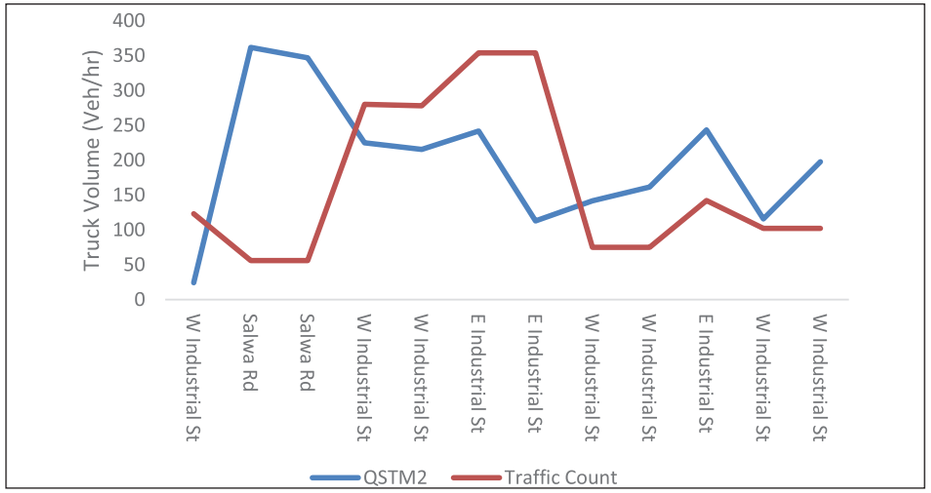


Source: QSTM 2.0 and the updated TMPQ

The QSTM model tends to reflect the volumes and proportions on the main corridors, with the local and internal roads within Doha showing lower truck proportions. The traffic count data does show higher proportions of trucks on main corridors into Doha, whereas the traffic model shows almost a universally low proportion of trucks within the central urban area. Figure 3.27 to Figure 3.24 show the comparison of QSTM2 and Traffic Count Data for major Freeways, Expressways and Arterial Roads.

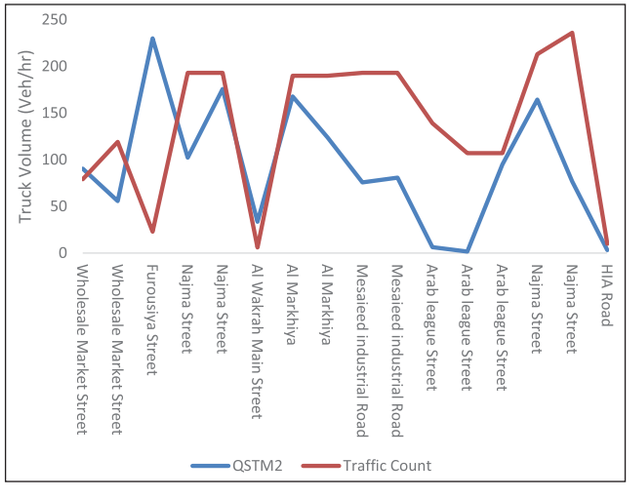
It can be observed that there is variation in the truck traffic volumes between the data collected in the field and in the QSTM2 data. This variation is less pronounced in Figure 326 as on Shamal Road, some data points are very close. However, in Expressways (Figure 327) and Arterial Roads (Figure 328), the variation is greater. This could be attributed to construction traffic in 2018 and the changes to freight movement due to the political situation.

Figure 3.27 – Truck Hourly Volumes at Main Expressway Stations



Source: QSTM 2.0 and the updated TMPQ

Figure 3.28 – Truck Hourly Volumes at Main Arterial Stations



Source: QSTM 2.0 and the updated TMPQ

It should be noted that the graphs above show traffic count locations on the x-axis, therefore some road corridors are shown multiple times. These relate to multiple traffic counts on the same road corridor.

3.7 ASSESSMENT OF EXISTING CONDITION

3.7.1 EXISTING TRUCK ROUTE NETWORK PERFORMANCE

The informal TRN forms part of the main highway network in Doha and Qatar and connects key truck generators and logistics parks. This section outlines how well the truck route network provision meets the demand and needs of freight operators and businesses in moving goods from their origins to their final destinations. Truck routes tend to follow the alignments offered by Expressways, but the connectivity issues are around those links between the local distribution centers and the destinations of the final warehouses and local retail outlets.

This section re-caps on some of the aspects of supply and of demand for the truck network. But the commentary around supply and demand aspects considers the demand shown for the supply network, so it is applied in the context of providing assessment of the use of that truck network. For example, in considering the port and airport, the accessibility to those locations is considered and thus forms part of the assessment.

3.7.1.1 Accessibility to Main Truck Generators

There are several key truck generators with specific requirements for moving goods. These generators include the new Hamad International Airport (HIA), the two port locations (New Hamad Port, and Doha Old Port which now focuses on cruise ships), Qatar Economic Zones (1,2,3), Industrial cities and key logistics parks in Qatar. It is worthwhile to note that some of these mega developments are open but are partially completed, such as HIA where there is currently a contract awarded for another terminal.

International airports are key generators of cargo and require trucks to service their needs. Doha International Airport (DIA) closed for commercial activity in 2013, and movement of cargo moved to HIA. Advanced scanning technology ensures the complete safety and security of the facility, its staff and cargo. Access to HIA for trucks is via Ras Abu Abboud Expressway with adequate interchanges (current and planned) to serve HIA increasing cargo demand. Trucks with goods for Doha may trans-ship goods on to more local delivery vehicles.

Hamad Port has been operational since 2016.The port has three main access routes – the Northern Access Road, the Central Access Road and the Southern Access Road which are adequate for the current and forecasted demand. However, the Central Access Road has wide ROW which can be utilized in future expansion. In addition to the roads access, Qatar Rail has planning in the future to connect Hamad Port with GCC rail network.

One of the key issues raised by stakeholders such as Manateq, was a lack of good linkage from the port and airport to the key warehouses, new logistics parks and other specific facilities such as food stores. The new logistics parks and warehouses are mostly located west of Umm Al Houl and, with Hamad Port Road recent upgrade, there is now better truck accessibility. An interchange on G-Ring Road is under construction to provide direct access to Ras Bufontas economic zone. Al Karana economic zone is connected directly to Salwa Road and another road project (Southern Highway) is planned to provide direct connection to Hamad Port and Um Al Houl. Another road (Al Karana – Al Khor Highway) is being planned in future to connect Al Karana with northern Qatar (Al Khor and RLIC).

Qatar Petroleum raised an issue of truck traffic congestion on Ras Laffan Road due to increased truck traffic serving the waste treatment facility on the western side of Ras Laffan Road. Accessibility to RLIC will be improved by the upgrade of the Ras Laffan Road and in this report a second truck route is identified for RLIC to provide direct heavy vehicles access from Al Shamal Freeway to RLIC.

MIC has good accessibility due to the current road network upgrade, especially it directly connects to Al Majd Road and Messaieed Road. In future another connection is planned (Sea Line Corridor) to accommodate future growth.

Qatar Petroleum raised an issue of safety and high truck traffic on Umm Bab Road toward Dukhan. truck traffic congestion on Ras Laffan Road due to increased truck traffic serving the waste treatment facility on the western side of Ras Laffan Road. Dukhan City trucks accessibility will be improved by the upgrade of Umm Bab Road and the inclusion of Dukhan Highways in the truck route network.

3.7.1.2 Assessment of Existing Truck Routes

The key truck routes in Qatar form part of the Expressway network, the main routes being:

- Al Majd Road,
- Al Shamal Road,
- Salwa Road,
- Dukhan Highway
- Mesaieed Road/Doha Expressway.

Al Majd Road being the main artery to distribute truck traffic across Qatar, has dedicated truck lanes and performs generally at acceptable level of service. However, the V/C ratio and increased truck traffic toward MIC needs to be monitored to identify future improvements.

V/C ratios on the network are shown in Figure 3.27 for Qatar and 3.28 for Doha.

The Doha Expressway sections consists of Routes C2, C3 and C4 between Mesaieed Port, round to the west of Doha and up to Al Khor are the key Expressway routes used by trucks. When reviewing the percentage of trucks using the network compared to other traffic, a higher than average proportion is noted (15%-20% rather than 10%). This level of truck activity is reflecting the construction boom in Qatar. There are also considerable numbers of truck movements between Doha and Al Khor, and Doha and Ras Laffan. The Expressways provide suitable highways such that separate and dedicated lanes can be provided for these trucks.

Salwa Road and Dukhan Highway perform at acceptable V/C ratios, however the truck percentage increase in the western sections is usually due to less car traffic with low truck volumes.

Ras Laffan Road has higher V/C ratio in the future and therefore close monitoring will be needed to assess future improvements. However, with a second access for trucks identified in the truck route network, the truck traffic can be managed properly.

Mesaieed Road has been upgraded to expressway and is performing at acceptable level of service. Truck percentages and volumes are low as this road is not used for through truck traffic but to provide accessibility to the adjacent main truck generators (Hamad Port, Um Al Houl, Logistic Parks, etc.).

There are no major congestions in the foreseeable future on the truck route network connection to main generators, except on the section of Ras Laffan Road, Doha Expressway southern section and Al Majd Road southern sections. The monitoring of these roads will determine suitable improvements to these roads in future.

The key issue regarding the truck movements and their impact on the urban areas is how they move from the mainline trunk route network from distribution centers and interim warehouses, to reach their final destinations at warehouses, retail stores and outlets and home deliveries. Where adequate transfer facilities do not exist for transferring goods from HGV's to LGV's, heavy vehicles are using the local network to reach their final destination.

3.7.1.3 Analysis of Relevant Truck Route Key Indicators

Network-Wide Truck Metrics

The performance of the truck network can be summarized using some network-wide indicators. These are summarized in Table 3.12, Table 3.13 and Table 3.14 for the AM, MD and PM peak hours.

Between the three peak periods, overall numbers of trips and total travelled distances are similar. AM and PM peaks are close, while MD trips and distances are slightly lower. The PM period shows the best performance in terms of less congestion. The lost travel time for AM and MD is just over 50%, on average, whereas it is around 30% for PM.

The metrics provide separate detail for "Permitted" and "Restricted" trucks, since these vehicles take different routes. Permitted trucks can follow fairly direct routes between their origins and destinations, whereas Restricted trucks have to take more circuitous routes due to the mandated restrictions. To be consistent with the demand section, because this is a model assignment issue rather than a travel demand issue, these categories have been combined in the tables below. But the differences

in their travel patterns will be reflected within the development of the Truck Route Network.

Average delays are around 30 mins for AM and MD peaks, but much lower (around 12 minutes) for the PM peak hour.

Table 3.12 – Existing Network Performance Indicators for Goods Vehicles (AM)

Mode	Avg Speed (km/h)	Avg Travel Time (Min)	Total Travel Distance (Vehicle Trip-km/h)	No of Trips	Avg Trip Length (Km)	Avg Delay (Min)	Lost Travel Time (%)
LGV	31	48	303,308	12,000	25.3	37	56.3%
HGV	37	56	221,554	7,314	30.3	31	55.0%
All Trucks	34	52	524,862	19,314	27.2	29	55.6%

Table 3.13 – Existing Network Performance Indicators for Goods Vehicles (MD)

Mode	Avg Speed (km/h)	Avg Travel Time (Min)	Total Travel Distance (Vehicle Trip-km/h)	No of Trips	Avg Trip Length (Km)	Avg Delay (Min)	Lost Travel Time (%)
LGV	31	48	269,091	10,666	25.2	27	56.3%
HGV.	47	55	194,998	6,100	32.0	30	54.5%
All Trucks	35	52	464,088	16,766	27.7	29	55.4%

Table 3.14 – Existing Network Performance Indicators for Goods Vehicles (PM)

Mode	Avg Speed (km/h)	Avg Travel Time (Min)	Total Travel Distance (Vehicle Trip-km/h)	No of Trips	Avg Trip Length (Km)	Avg Delay (Min)	Lost Travel Time (%)
LGV	45.0	33	278,563	11,166	24.9	12	26.4%
HGV	55.5	36	234,352	7,801	30	11	29.2%
All Trucks	52	34	512,915	18,967	27	11	32.8%

Splitting by truck sub-mode, LGV's have the major share of vehicle kilometers and trips, with 65% more trips than the HGV's.

Although not shown in the data, further assessment of the data shows that Restricted HGV's have longer trip lengths on average, since they must take longer routes due to the route restrictions. There are few Restricted HGV's compared to Permitted HGV's, which accounts for the big difference in trip lengths of the different goods vehicle categories.

Truck Metrics by Road Type

The key indicators of Avg speed, Avg travel time and total travel distance were considered for the three truck types against the four different road types (Freeways, Expressways, Arterials and Collectors). Table 3.15 to Table 3.17 show the different trends for AM, MD and PM peak hours.

On Freeways and Expressways, speeds Avg around 57 km/h for all trucks for AM/MD peak, and then rise to 78 km/h in the PM peak. Whilst speeds

drop to around 15 km/h for collector roads (AM and MD peak), truck speeds on arterial roads are disproportionately high compared to other classes of road.

Average travel time varies significantly between the different road types but is consistent between goods vehicle types and the different peak periods.

Total travel distances are similar on Freeways and Expressways, and less on arterials and collectors, as would be expected, with similar trends seen across the peaks, and higher distances for the restricted HGV's owing to the longer routes they need to take due to restrictions.

Table 3.15 – Existing Network Performance Indicators for Goods Vehicles, Per Road Class (AM Peak Hour)

Mode	Freeway		Expressway		Arterial		Collector	
	Av. Speed (km/h)	Total Travel distance (km)	Av. Speed (km/h)	Total Travel distance (km)	Av. Speed (km/h)	Total Travel distance (km)	Av. Speed (km/h)	Total Travel distance (km)
LGV	56	117,830	58	88,449	44	51,761	18	17,733
HGV	62	98,395	62	60,741	46	37,027	17	8,851
All Trucks	58	216,225	60	149,190	45	88,789	18	26,584

Table 3.16 – Existing Network Performance Indicators for Goods Vehicles, Per Road Class (MD Peak Hour)

Mode	Freeway		Expressway		Arterial		Collector	
	Av. Speed (km/h)	Total Travel distance (km)	Av. Speed (km/h)	Total Travel distance (km)	Av. Speed (km/h)	Total Travel distance (km)	Av. Speed (km/h)	Total Travel distance (km)
LGV	57	105,733	59	77,253	45	45,637	17	15,995
HGV	63	86,272	64	52,941	48	33,406	17	7,910
All Trucks	60	192,005	62	130,194	46	79,043	17	23,905

The large fall in total travel distance by trucks on Collectors, compared to Freeways, Expressways and Arterials is due to less travel by heavy goods vehicles on Collector roads – as they mainly use Freeways and Expressways. Speeds on Freeways and Expressways are similar for each truck category; with slower speeds on Arterials. All speeds are relatively consistent across all peaks.

Table 3.17 – Existing Network Performance Indicators for Goods Vehicles, Per Road Class (PM Peak Hour)

Mode	Freeway		Expressway		Arterial		Collector	
	Av. Speed (km/h)	Total Travel distance (km)	Av. Speed (km/h)	Total Travel distance (km)	Av. Speed (km/h)	Total Travel distance (km)	Av. Speed (km/h)	Total Travel distance (km)
LGV	76	118,810	73	82,213	56	40,046	27	13,881
HGV	83	113,975	76	60,969	58	34,786	27	7,960
All Trucks	79	232,785	74	143,282	57	74,832	27	21,842

The trip distance information in the tables above show variation between the truck types. The PM peak shows a higher speed for all truck categories than the other peaks, with a particularly high speed shown by HGV's on Freeways (83 km/h).

3.7.2 SAFETY ISSUES ARISING FROM TRUCK ROUTE NETWORK CHARACTERISTICS

A number of safety issues arise from the high volumes of trucks and the impacts of trucks using routes which may be inappropriate. This generates a higher risk of pedestrian accidents, which may be caused in residential areas where more pedestrians are active, although data is limited on the linkage to accident type.

It is noteworthy that 60% of all road traffic accidents occur at night, and that large numbers of trucks movements occur at night. In 70% of those cases, drivers were recorded by police as being to blame for the accidents. It is noted that street lighting levels are not always good on all classes of road, and this can contribute to accidents where pedestrians are crossing key roads. This may also be associated with the location and availability of pedestrian crossings.

Speeds of trucks can be a risk factor. On Freeways and Expressways, speeds Avg around 57 km/h for all trucks for AM & MD peak hours, rising to 78 km/h in the PM peak hour. Whilst speeds drop to around 15 km/h for collector roads (AM and MD peak hours), truck speeds on arterial roads are disproportionately high compared to other classes of road. This may lead to a higher accident rate on these roads.

This is connected to driving standards and the need for good driver training to improve safety for trucks and reduce negative impacts on residential and local areas. Several new driver training schools have been started to address this issue.

3.7.3 ASSESSMENT OF FACILITIES AND SERVICES FOR TRUCKS

This section outlines the issues and problems associated with provision of facilities and services for trucks, such as waiting facilities and monitoring facilities to catch infringements. This section picks up on and provides assessment of those issues defined in the Existing Network Supply section above. Where possible, it compares demand for the supply provided. It also comments on the value of the facilities being provided.

3.7.3.1 Waiting and Parking Facilities

Further review of the supply of waiting and parking facilities identified that there are limited dedicated waiting and parking facilities for trucks on approach or within the major cities. In Doha, an issue was observed with trucks parking on the grass verges on approach to roundabouts, away from the main center of Doha. This leads to problems of visibility (sight lines) for other drivers approaching the roundabouts.

Parking facilities for trucks are important to ensure that adequate provision is made for trucks delivering different types of goods. In Doha, limited parking facilities exist. Drivers have a habit of parking trucks wherever they find a place – this creates traffic jams, and loss of productivity for businesses.

Many trucks stay on the move looking for parking slots. This roaming creates traffic congestion, environmental pollution and health hazards for people living in the Industrial Area.

In more developed truck route networks, truck parking is integrated with the location of truck holding areas on every city approach traversed by trucks. For Qatar, there is a lack of suitably located truck parking.

The biggest strategic parking location for trucks is at Al Shamal, which is not strategically located for the needs of trucks and haulage operators.

3.7.3.2 Truck Restrictions

Further analysis of the truck restrictions highlighted in the Existing Network Supply section identified some further factors affecting use of the truck network. Prior to the overall truck ban which has been implemented in the DMA, a Temporary Truck Route (TTR) was introduced on the Salwa-Lusail Road. The road stretching 41km was opened in 2014, aimed at improving the traffic flow in Doha, and diverts incoming truck transit traffic between the north and south of the country out of the city.

However, after the implementation of that TTR, trucks were still visible on almost every road and seen to be violating traffic regulations. Residents still observed trucks even on small roads in the residential areas as they tried to bypass the traffic on main roads themselves.

The TTR was replaced by truck routes along the Expressways (C2, C3, C4), and at the same time, a truck ban was imposed on access into Doha for trucks at certain times of day (morning, midday and evening peak).

Haulage operators have indicated that the existence of the TTR and the overall city peak hour truck ban has not been publicized well. Trucks are still operating on Doha roads because most of them had their work in the city, such as delivering building materials on projects under construction, while others carried goods for sale for warehouses and shopping centers inside Doha.

Certain freight stakeholders consider that it would be difficult for them to stay in business if their trucks didn't use the roads in the city, as this would require trucks to trans-ship goods from freight goods vehicles to light vans for onward distribution. The fine imposed by the Ministry of Interior for violating the truck restrictions is QAR 500. This could be considered too low because some businesses are said to factor the cost of the fine into the cost of doing business and take the risks of going through the city roads.

Additionally, truck route restrictions are not always well enforced.

3.7.4 SUMMARY OF ASSESSMENT (BASE YEAR) – TRUCK ROUTE NETWORK

Supply Highlights:

- Key truck generators are HIA, Hamad Port, RLIC, MIC, Umm Bab, Dukhan City, Al Khor, Industrial Area;
- Logistics Parks to store goods are at intermediate points at Al Ruwais, Al Khor, Jery al Samur, Al Wakra, Abu Saleel, Birkaht Al Awamer;
- A key urban distribution center exists at Qatar Logistics Village to the south-west of Doha;
- 132km of truck segregated routes are in place (Al Majd Highway/ Orbital Expressways C2, C3 and C4) with dedicated truck lanes;
- Other truck routes link Doha to Abu Samra; Mesaieed and Al Khor;
- Ashghal have identified a number of over-height vehicle routes without height constraints;
- Truck parking facilities are provided at Shamal and a new one is being implemented at Mesaieed;
- Facilities for managing truck movement include truck holding areas, parking areas, rest areas, over-weight stations and over-height monitoring stations.

Demand Highlights:

- Trucks comprise around 8% of registered vehicles in Qatar;
- As per QSTM2.0, there are around 288,000 truck trips across the typical weekday in Qatar on the whole network;
- 166,000 LGV vehicle trips are on the network per day (around 11,000 in each peak);
- 121,553 Permitted truck trips are made on the overall network per day (around 6,000 in each peak);
- 83% of truck movements originate within the central Doha zones;
- 60% of road traffic accidents in Qatar are at night;
- In 70% of cases, drivers of HGV's were recorded by police as being to blame for accidents.

Assessment – Current Problems and Issues

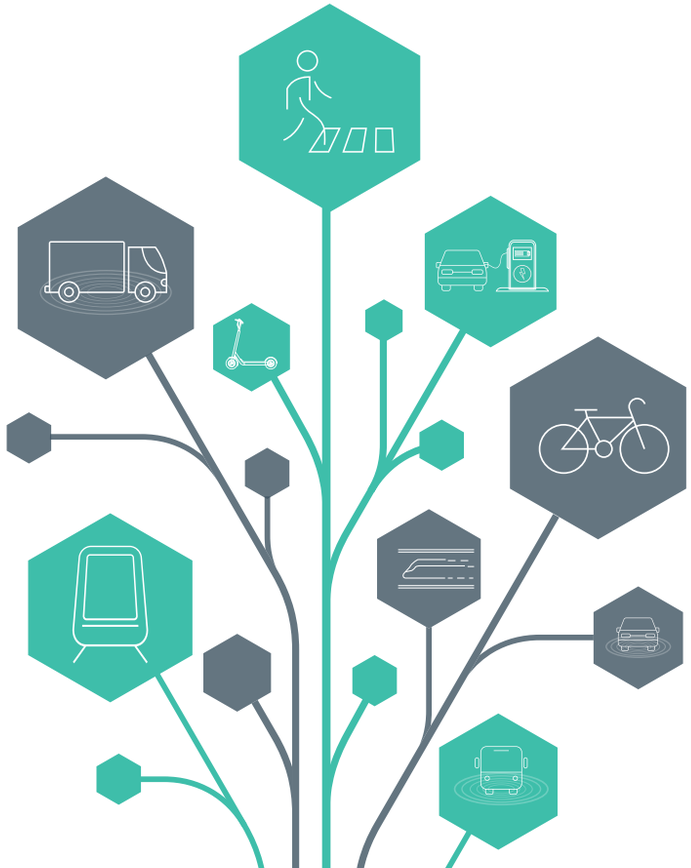
- Lack of suitable access from the main truck routes to the local destinations for goods (retail outlets and local warehouses);
- Certain routes are congested by trucks at certain times of day (routes to Al Khor and Ras Laffan);
- Poor night-time safety record attributable in part to trucks;
- Impact on other traffic due to arbitrary truck parking on verges around roundabouts;
- Operators wish to fill numbers of vehicles as full as possible to reduce numbers of vehicles required – leads to over-height, over-weight issues;
- Truck route restrictions have some negative impact on residential / business areas;
- Lack of dedicated truck parking causes congestion due to lorries searching for parking;
- Over-weight vehicles can create safety issues and damage to carriageways especially trucks parked on approaches to roundabouts;
- Details of truck restrictions are not always publicized widely;
- Enforcement of truck restrictions is not always widespread;
- Truck operators may sometimes pay the fines as it is cheaper than the cost to their business of adhering to the restrictions;
- Driver training for truck driving is limited;
- Lack of affordable accommodation facilities for many low-income truck drivers (adds to travel distance);
- Certain strategic Through Truck Routes were designated as Dangerous Truck Routes in the TMPQ 2008 but have not been implemented yet.

3.8 SWOT ANALYSIS OF TRUCK ROUTE NETWORK

Below is provided a summary of the Strengths, Weaknesses, Opportunities and Threats of the proposed truck network.

Table 3.18 – Strengths, Weaknesses, Opportunities and Threats of Proposed Truck Network

Strengths	Weaknesses
1. A truck route network to efficiently serve current and future truck traffic major generators 2. A modern truck network built to all necessary design standards following the established Road Network Hierarchy 3. Provides designated truck routes for hazardous goods and oversize vehicles 4. Provides connected and continuous truck routes catering for general freight 5. Provides three zone areas of restriction in Doha by time period 6. Water Mega Reservoirs are on the main utility corridor along the same alignment as the Orbital Highway 7. Infrastructure is well designed to cater for goods volumes expected to use it.	1. Lack of policies enforcement and monitoring 2. Lack of awareness of the truck network and what the regulations are 3. Lack of facilities to enable goods to be moved to and from their last mile 4. Network is focused on one large city where it is currently not possible to bypass with an orbital route 5. Lack of accurate data availability 6. No specific government department for freight transport 7. Currently no formal truck route map.
Opportunities	**Threats**
1. To improve freight movement a Government agency is needed which will also coordinate to establish public private partnership 2. With generally one route between cities, there is less opportunity for re-routing to avoid weigh stations and other monitoring facilities 3. Legacy opportunities through the network established to serve the FIFA 2022 eight stadia and sports sites 4. Enforcement of current policies and development of new polices to regularize freight transport 5. Well-designed orbital route round outskirts of Doha (Orbital Highway).	1. Lack of awareness of the network amongst haulers 2. Lack of adherence to the regulations 3. Lack of enforcement and fines too low to discourage freight operators from using restricted routes 4. Proposed truck parking may not be used 5. Less educated drivers from various cultures.



2050

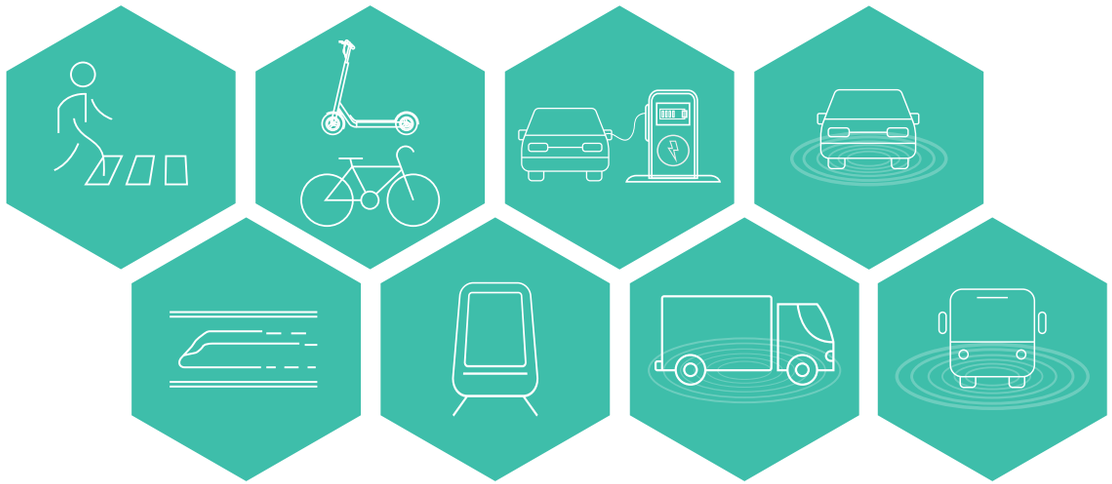
نقـل متكامـل ومسـتدام للجميـع

INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

2070

SECTION - 04

MAJOR TRUCK GENERATORS



4 MAJOR TRUCK GENERATORS

The Qatar National Master Plan (QNMP) provides guidance for future land use allocation for major developments in Qatar. Some of these major generators are either partially completed (e.g.: Doha Port, HIA), or under construction (e.g.: Um Alhoul (QEZ3)) or under design/planning (e.g.: Al Karanna (QEZ2)). These major truck traffic generators have been considered, along with stakeholder inputs on existing conditions and their future aspirations, to develop an efficient TRN, to meet the current and future requirements of Qatar freight movement.

The key truck generators reviewed include:

- Hamad International Airport;
- New Hamad Port;
- Qatar Petroleum Master Plans: Ras Laffan Industrial City, Mesaieed Industrial City, Dukhan;
- Economic Zones (Ras Abu Fantas, Um Alhoul and Al Karana) and Logistics sites;
- Mega Development Master Plans (Lusail, Msheireb, Qatar Foundation, Qatar University, Hamad Bin Khalifa Medical City, District Centers);
- Ambulance stations (Hamad Medical Corporation);
- Small and medium scale industry locations (Ministry of Energy and Industry);
- Petrol stations and Woqod depots (Woqod);
- Water tankers, and sewage treatment (Kahramaa and Ashghal);
- Mega malls;
- Hotels, Food and Beverage Markets; and
- Sports stadia (Supreme Committee for Delivery and Legacy).

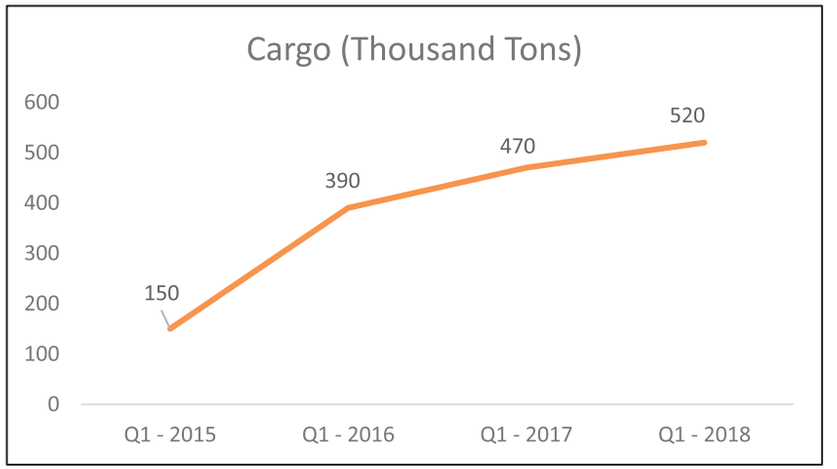
The relative demands of these key generators have been considered within this section. The future needs of these generators have been overlaid on the current truck network, so that it can be seen how well the current network will or will not serve those generators in future.

4.1 HAMAD INTERNATIONAL AIRPORT

The new Hamad International Airport (HIA) is one of the main generators of truck movements in Qatar. The cargo terminal will be capable of simultaneously handling 5,700 shipments and up to 1.4 million tons of cargo annually, and up to 2.8 million tons once the second terminal is built.

In 2018, the HIA handled approximately 514 tons of cargo in the first quarter (ref: https://dohahamadairport.com/media/hamad-international-airport-announces-2018-first-quarter-figures-marked-increase-cargo. The increasing trend has continued in the subsequent months. The increase in freight has been witnessed since the opening of the HIA (Figure 4.1). The increase in cargo will generate an increase in truck trips.

Figure 4.1 – HIA Cargo Data



Source: www.Bloomberg.com (confirmed in Q1-2018 with Qatar Airways Data)

The two-floor cargo facility at the airport incorporates warehouse spaces, automated systems / retrieval systems, mezzanine, offices and shops. The split-level facility covers 55,000 square meters, 11 wide-body freighter aircraft stands and 42 Airside loading docks. Additionally, 31 landside truck-loading facilities will enable the swift and efficient transfer of cargo in and out of Qatar. With advanced scanning technology it will ensure the complete safety and security of the facility, its staff and cargo.

One of HIA's key carriers, Qatar Airways, saw its air freight increased significantly in 2017/18 compared to 2016/17 as it carried critical medical, food and manufacturing supplies to the country following the blockade by neighboring countries implemented in June 2016.

4.2 HAMAD PORT

The expansion of Hamad Port will see changes in terms of the volume of goods being carried and the number of trucks required to move those goods. The main categories of goods carried to and from the port were defined in a Market Analysis report undertaken for Hamad Port project and discussed below.

The statistics from this Market Analysis report were used in the Traffic Impact Study for the Hamad Port[2]. The estimation of truck volumes generated by the Port has been informed by some findings from the Market Study Report[3]. The following assumptions have been adopted in predicting the likely generation of trucks:

- **Container Terminals** – the growth of container volumes in local cargo is not expected to be significant up to 2050 due to the type of activity in the port being concentrated on transshipment. If there is an accelerated development of free zones, economic zones and local industries within the port area, then this growth may increase. The local Twenty-foot Equivalent Units (TEU's) which transferred through the Port to Qatar were 604,000 in 2017 and are forecast to increase to 1,112,000 by 2037. An indicative calculation of the number of trucks required to move the goods which arrive at the port used the following assumptions:
  - Each truck will transport the goods from two TEU's;
  - Equal numbers of trucks will return to the port (empty);

2 Hamad Port Traffic Impact Study Addendum
3 HAMAD PORT PROJECT/0086 Phase 2 Master Plan and Design Services, Market Analysis Technical Memorandum, WorleyParsons/Mercator, 4 April 2017

- 2017 case will be all of Terminal 1; for 2022, an equal split was assumed between Terminal 1 and 3 and for 2027, an equal split between Terminal 1, 2 and 3; and
- The load is spread equally over 24 hours.

- **Ro-Ro** – The Roll-On, Roll-Off (Ro-Ro traffic) trucks (transporters) are vehicles which carry wheeled cargo, and had a growth rate of 0.8% per annum between January 2014 and July 2017. The auto sector is unlikely to see strong growth in the short term since there has been an element of overstocking in the region and this will take time to correct. The Market Analysis report predicts that annual growth is expected to be 4.8% between 2016 and 2037. The number of Ro-Ro units arriving in Qatar is forecast to reach 159,851 by 2037.

The assumptions used to forecast the movement of cars by Ro-Ro are:

- Ro-Ro units are anticipated to rise from 61,560 in 2017 to 159,851 in 2037 which represents 160% increase;
- It is assumed that the Ro-Ro vehicles will go on a vehicle transporter to Doha;
- 8 vehicles per transporter;
- These movements will be spread over 24 hours.

- **Break Bulk** – as opposed to bulk cargo, which is carried in loose form, break bulk are cargoes carried in unitized form – palletized, bagged, strapped, bundled, crated. It is expected that in the lead up to the FIFA World Cup, the volume growth on Break Bulk will be higher, as many projects will be required to import construction and other materials to complete the projects already underway. Therefore, a higher rate was assumed up to 2022, and thereafter a more stable rate of 4.8% per annum was assumed. The assumptions regarding the transportation of break bulk by truck are:
  - 22t per truck (equivalent to 11t / TEU) is assumed;
  - 12-hour operations are assumed.
- **Bulk** – bulk cargoes are goods carried in loose form, the cargo is not packed (iron ore, grain, coal, aluminum). Similar assumptions are used to those for break bulk:
  - 22t per truck (equivalent to 11t / TEU) is assumed;
  - 12-hour operations are assumed.
- **Offshore Vessels** – this will not be a significant volume of truck trips. It has been assumed that there will be 167 vessel calls per month, assuming an Avg of 3 trucks per vessel, calculated as per the Market Analysis study. So, 167 * 3 trucks = 500 trucks per month.
- **Livestock** – the Market Analysis report states that all livestock shipments are handled on a direct delivery basis, with an Avg of one vessel call per month. An Avg of 48,835 animals are discharged per vessel call. Projections have been based on the 2015 volume. In 2016, 578,761 livestock passed through the port, and the market is projected to grow to 1.3 million head by 2022 to 2.5 million head of livestock by 2037.
- **Strategic Food Facility** generates a small number of additional trucks per day (around 52).

Table 4.1 shows the results of the estimated number of truck movements daily and hourly by 2037.

Table 4.1 – Estimated Number of Trucks Required to Transport Goods from Hamad Port (2037)

Numbers of Trucks by Category (Estimated for 2037)						
Container Terminals	TEUs	Number of trucks/ TEU	Split between CTs	Trucks per year	Trucks/day	Trucks/hour
	1,112,000	2	33% CT 1, 2 & 3	556,000	1776	89
Ro Ro			Ro Ro units	Trucks/year	Trucks/day	Trucks/hour
			159,851	19,981	64	3
Break Bulk			Total Tonnes	22tonnes/ truck	Trucks/day	Trucks/hour
			5,879,093	267,232	854	43
Bulk			Total Tonnes	22tonnes/ truck	Trucks/day	Trucks/hour
			461,520	20,978	67	4
Offshore Vessels		No of trucks per vessel	Peak vessel calls/month	Truck/ month	Trucks per day	Trucks at one time
		3	167	501	38	38
Livestock			No of animals per vessel	No of vessel calls per month	No of animals per truck (day)	Trucks/hour
			48,835	2	8	1
SFSF					52	26
Total Trucks				**864,694**	**2,859 per day**	**288 per hour**

Source: Hamad Port Traffic Impact Study Addendum

As it can be seen, a total of 2,859 trucks per day, or 288 trucks per hour, on Avg will be generated by 2037 only from the Hamad port.

4.3 ABU SAMRA SAUDI BORDER

Abu Samra was previously a very busy land border for transporting goods into Qatar. The *National* journal reported on the 5th June 2017 that, according to the Qatar Customs Department, prior to the blockade, around 800 trucks per day (292,000 per annum) passed through this border – mainly food and construction materials from the UAE, Saudi Arabia, Jordan, Lebanon and Egypt. Until the blockade, Qatar imported 90% of its food. This proportion has dropped since 2017, and more imports have come into Qatar via sea and air. But the longer-term transportation plan needs to accommodate the return to these volumes of goods coming by land in the future, as the blockade has now been lifted.

4.4 QATAR PETROLEUM SITES

Other ports in Qatar are more predominantly handling oil, gas and petroleum. Qatar Petroleum manages three sites, of which two are the industrial ports for processing and shipping of hydrocarbons in Qatar. The three primary locations are:

- Ras Laffan Industrial City (industrial port),
- Mesaieed Industrial City (industrial port); and
- Dukhan (heavy processing operations but no industrial port).

Although huge volumes of oil and gas are handled at Ras Laffan and Mesaieed Industrial City ports, much of the fuel comes in by ship directly from the oil and gas fields, which is processed in the ports and then transferred all over the world by sea vessels. Limited amounts are processed and transferred to the road network for use by the local market within Qatar. However, despite this, the vast majority of hydrocarbon products are transported by road to the local market in Qatar from the storage depot in Ras Laffan City which is operated by Qatar Petroleum Company (Woqod).

Qatar's demand for domestic gas doubled between 2009 to 2015, to reach 44.8 billion cubic meters per annum. Trucks from these sites use the strategic truck route network, which includes dedicated truck lanes on C2/C3/C4 corridors, but these do not currently extend as far as Al Khor.

The following facilities will open in the next 2-3 years which will generate additional numbers of trucks:

- Compressed Natural Gas Station (CNG) in Ras Laffan Industrial City;
- Compressed Natural Gas Station (CNG) in Messaieed Industrial City;
- Fuel storage and shipping depot (Mesaieed Industrial City),
- Al Jabir depots operated by Qatar Primary Materials Company;
- Liquified Natural Gas (LNG) Station in Ras Laffan Industrial City (expected to produce 40,000+ LNG canisters daily); and
- Other projects in Ras Laffan including
  - North Field Expansion (NFE); and
  - New global petrochemicals convention.

These supporting projects will increase the movement of trucks on the road network, including Road 77 which is the main road to Ras Laffan. These projects are likely to be initiated in early 2020 and continue up to 2026.

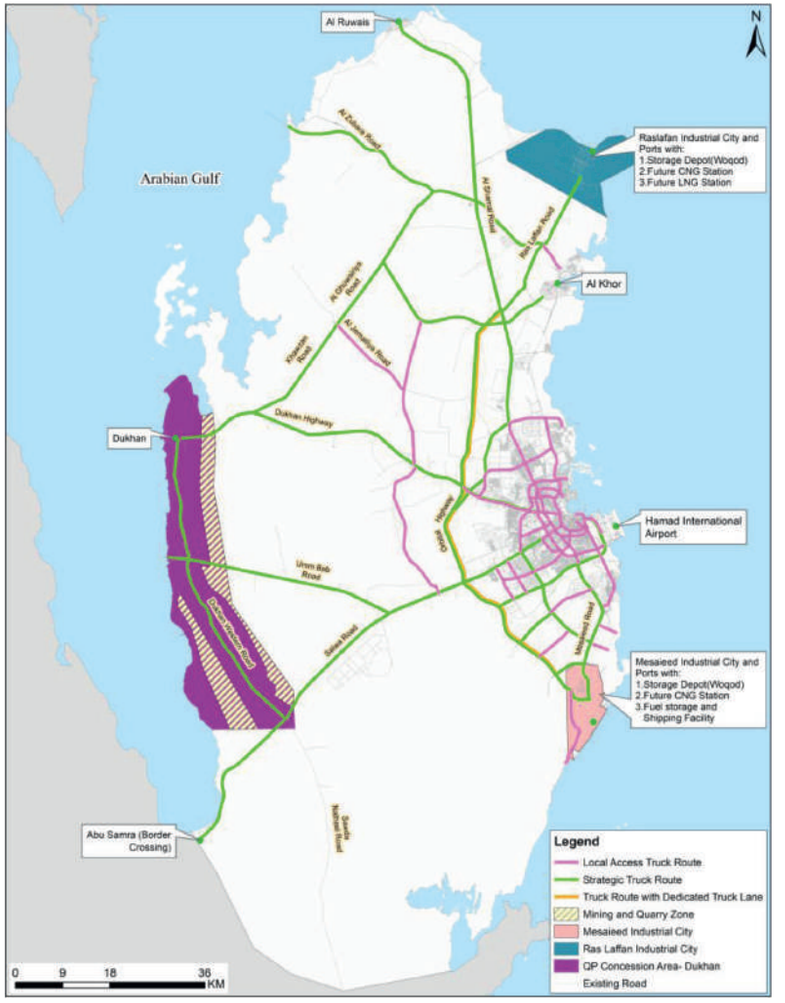
Figure 4.2 shows the main generators of petroleum in Qatar in the context of the current truck route network.

There are a number of limestone quarries and sand and cement industries located close to Dukhan. These include:

- Qatar National Cement Company (QNCC);
- Qatar Primary Materials Company (QPMC); and
- Al Khaleej Cement Company (AKCC).

The generation of trucks from the two cement companies represents a large percentage of truck movements on Umm Bab Road – Mukaynis. This route has been recognized within the Scheme Development task where Highway Scheme HW-09 (31kms) will be upgraded to a two-lane dual highway with median and hard shoulders and will connect at the roundabout which is adjacent to Umm Bab on the Abu Samra to Dukhan Road.

Figure 4.2 – Qatar Petroleum – Major Generators



Source: Updated TMPQ

4.5 HOTELS & FOOD / BEVERAGE OUTLETS

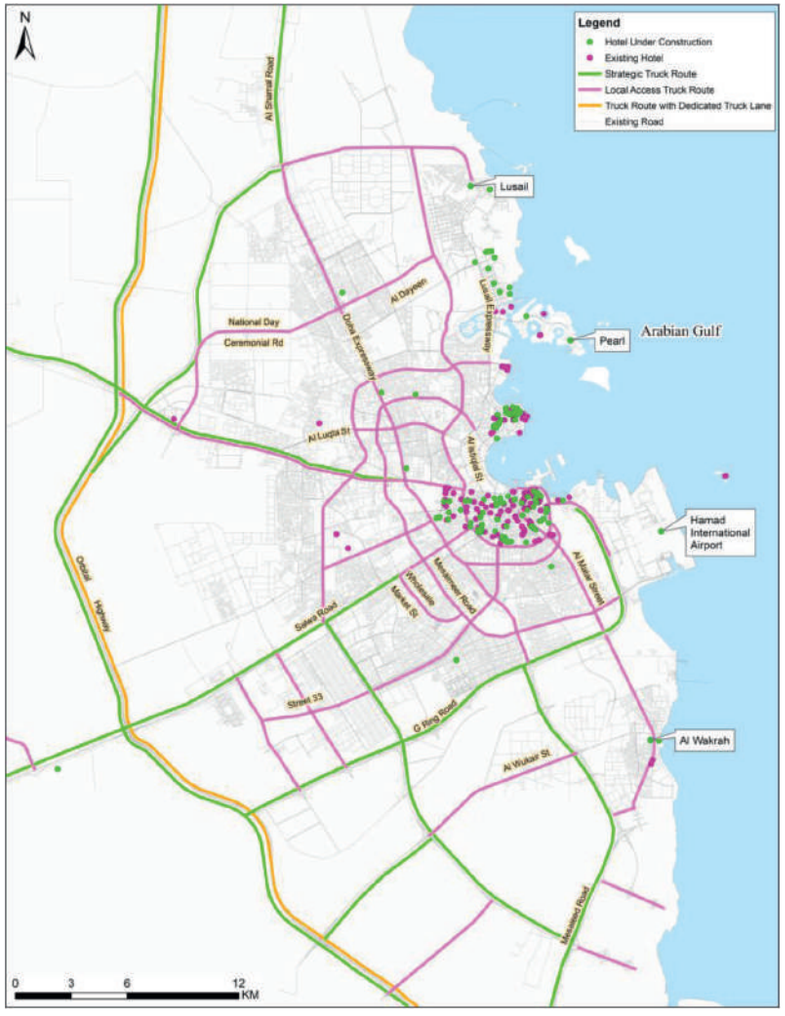
As a key part of the tourism and business service industry, hotels are a large attractor of trucks bringing food and other goods to hotels, although many of these trucks are the delivery service size of truck.

Figure 4.3 shows the existing hotels and hotels under construction in and around Doha in the context of the designated truck route network. The main concentration of hotels is located in the traditional historic core of Doha around Souq Waqif, and also in the West Bay area. These are highly commercial/residential areas and heavy vehicles should not be allowed to enter at any time of day or night except with permit.

The new proposed hotels tend to concentrate at locations along the Lusail Expressway, reflecting the needs created due to the expansion of the city towards the north. Katara is the largest hotel owner in Qatar, owning 42 hotels, within a total of 108 hotels in Qatar overall.

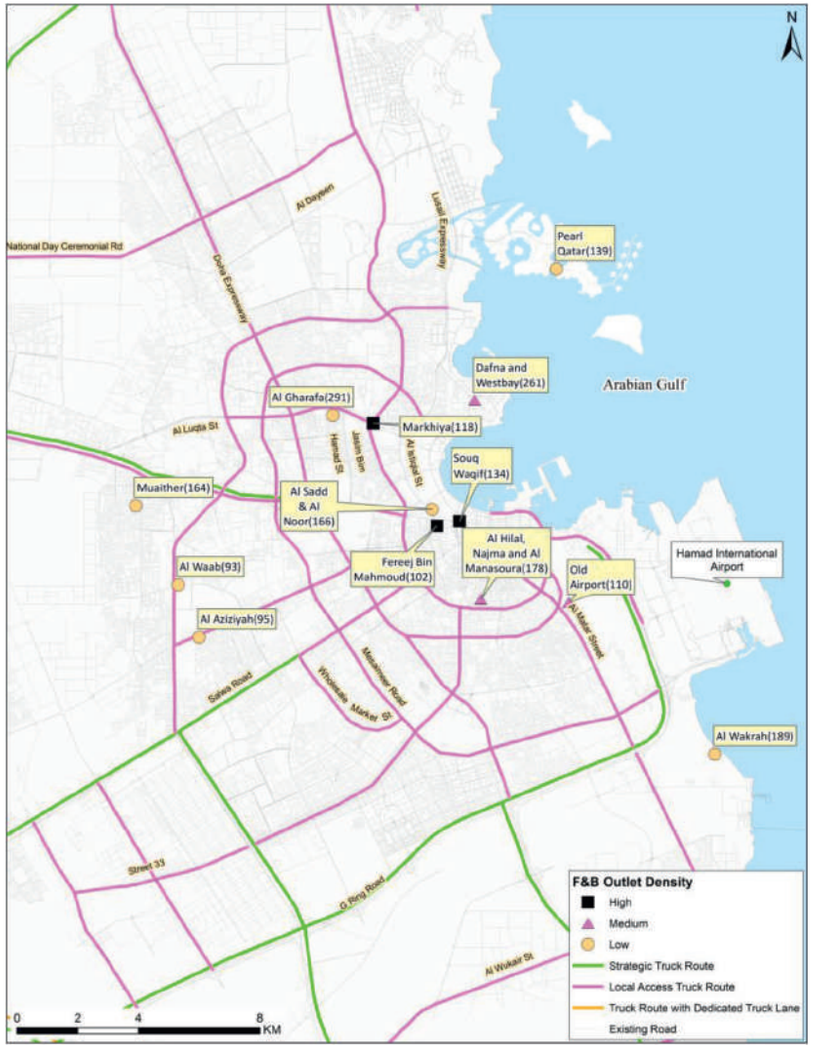
Hotel occupancy was 67% in 2019. In February 2019, 376,000 people visited Qatar with Europe and Asia accounting for 71% of visitors. In planning for FIFA 2022, there is a push to develop creative tourist accommodation services that ensure market needs are met without over-developing the sector, a further 17,000 hotel rooms have been added to the 26,000 originally envisaged as being needed for this event. Food and beverage outlets are also generators of truck activity for deliveries. Figure 4.4 below shows key food and beverage locations in Doha and can be compared against the local truck routes in Doha to understand how well the network meets the needs of these businesses. Table 4.2 shows the number of food and beverage outlets in Doha by type and geographic area. Beverage outlets are scattered across DMA. The outlet within inner Doha shall be served by truck lighter than 12,000kg.

Figure 4.3 – Doha Hotels (New and Proposed) – As Major Generators of Truck Activity



Source: MME and Updated TMPQ

Figure 4.4 – Spatial Distribution of Key Food and Beverage Locations in Doha



Source: MME and Updated TMPQ

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Table 4.2 – Number of Food and Beverage Outlets by Area and Type[4]

Food and Beverage Outlet	Fine Dining	Casual Dining	Quick Service Restaurant	Cafe	Desserts	Cafeteria	Total Outlets
Al Gharafa	-	29%	25%	15%	15%	13%	**291**
Dafna & West Bay	24%	25%	12%	29%	7%	3%	**261**
Al Wakrah & Barwa Village	-	30%	23%	13%	12%	20%	**223**
Muaither		12%	34%	8%	10%	35%	**164**
Peal Qatar	8%	42%	5%	27%	14%	1%	**139**
Musheireb		30%	20%	13%		37%	**164**
Markhiya		25%	33%	10%	17%	13%	**118**
Old Airport Area		22%	35%	15%	8%	18%	**110**
Fereej Bin Mahmoud	8%	31%	25%	17%	4%	15%	**102**
Al Aziziyah & Al Waab	3%	24%	23%	14%	10%	23%	**188**
Al Sadd and Al Nasr	3%	43%	18%	16%	8%	11%	**166**
Salwa Road		26%	20%	11%	13%	27%	**83**
Najma	2%	25%	30%	4%	1.2%	38%	**81**
Abu Hamour & Mesaimeer & Ain Khalid		24%	40%	11%	9%	15%	**182**
Al Muntazah	15%	27%	23%	13%	4%	19%	**75**
Al Ghanim	1%	20%	17%	6%	1%	53%	**70**
Umm Ghuwailina	8%	20%	17%	12%	1.5%	42%	**66**
Al Hilal							**62**
Al Rayyan							**56**
Bin Omran							**55**
Al Salata							**49**
Madina Khalifa							**48**
Al Doha Al Jadeeda							**44**
Al Asmakh							**35**
Al Mansoura							**35**
Nuaija							**24**
Others							**177**
Total							**3,068**

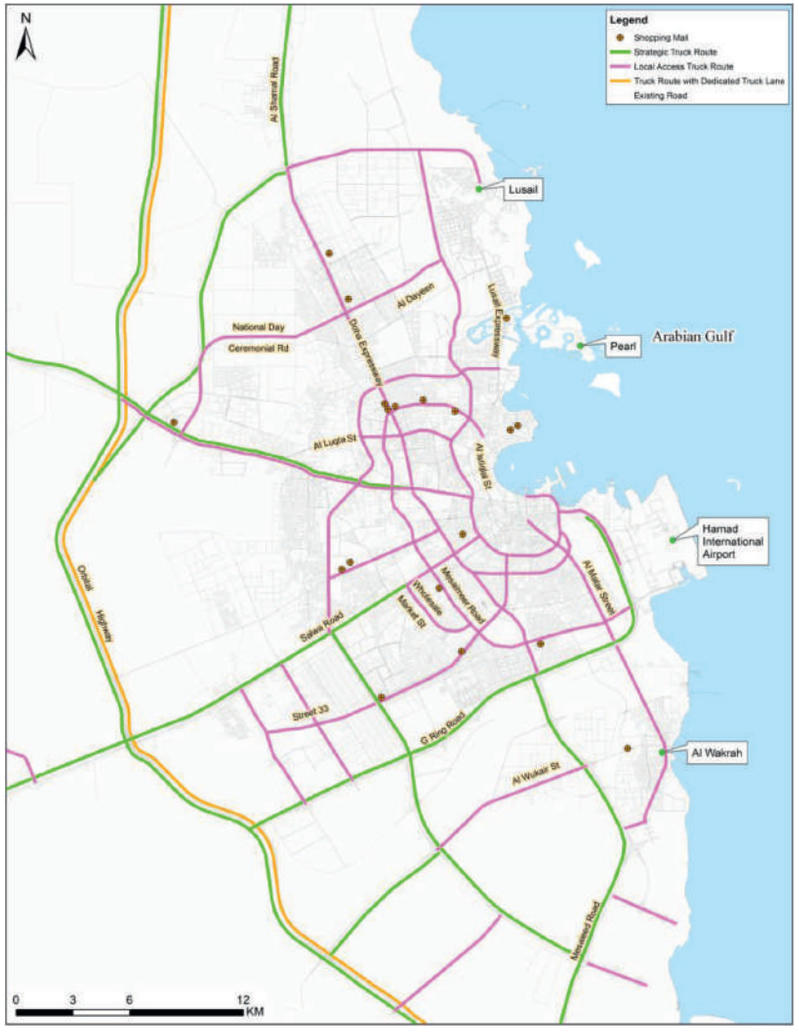
4 Food and Beverage Services Sector in Qatar 2018, Qatar Development Bank

4.6 SHOPPING MALLS

Shopping Malls are a key destination for goods, where supplies need to be delivered to major retail outlets from warehouses, for onward sale to customers and end users. The local truck network plays an important role in serving these destinations on the local level.

Figure 4.5 shows the locations of these major malls and how close they are to the highway network.

Figure 4.5 – Shopping Malls as Key Generators of Trucks for Goods Delivery



Source: MME and Updated TMPQ

4.7 SPORTS STADIUMS AND TRAINING SITES

As the FIFA World Cup approaches, the activity generated at the various stadia and sports training sites will generate a need for the movement of goods by trucks, including equipment, food and other supplies to the venues. Some of these venues may remain as legacy locations after the World Cup and still be used for events and conferences.

There are eight stadia in Qatar, as summarized in Table 4.3, according to the location and capacity (number of seats).

Table 4.3 – Stadia and Sports Training Sites in Qatar

N.	Stadium name	City	Seats (unit)
1	Al Bayt	Al Khor	60,500
2	Ahmed bin Ali	Al Rayyan	44,740
3	Al Thumama	Doha	69,000
4	Al Wakrah Stadium	Al Wakrah	69,143
5	Education City Stadium	Al Rayyan	45,350
6	Khalifa International Stadium	Doha	68,030
7	Lusail Stadium	Al Dayeen	86,250
8	Ras Abu Aboud Stadium	Doha	48,000
		TOTAL	**491,013**

These eight sites will cater for 491,000 visitors across the events spanning six weeks in November to December 2022. These sports training sites locations are shown in Figure 4.6, in the context of the designated truck route network.

Figure 4.6 – Doha Stadiums and Sports Training Sites - Major Attractors of Trucks

Source: MME and Updated TMPQ

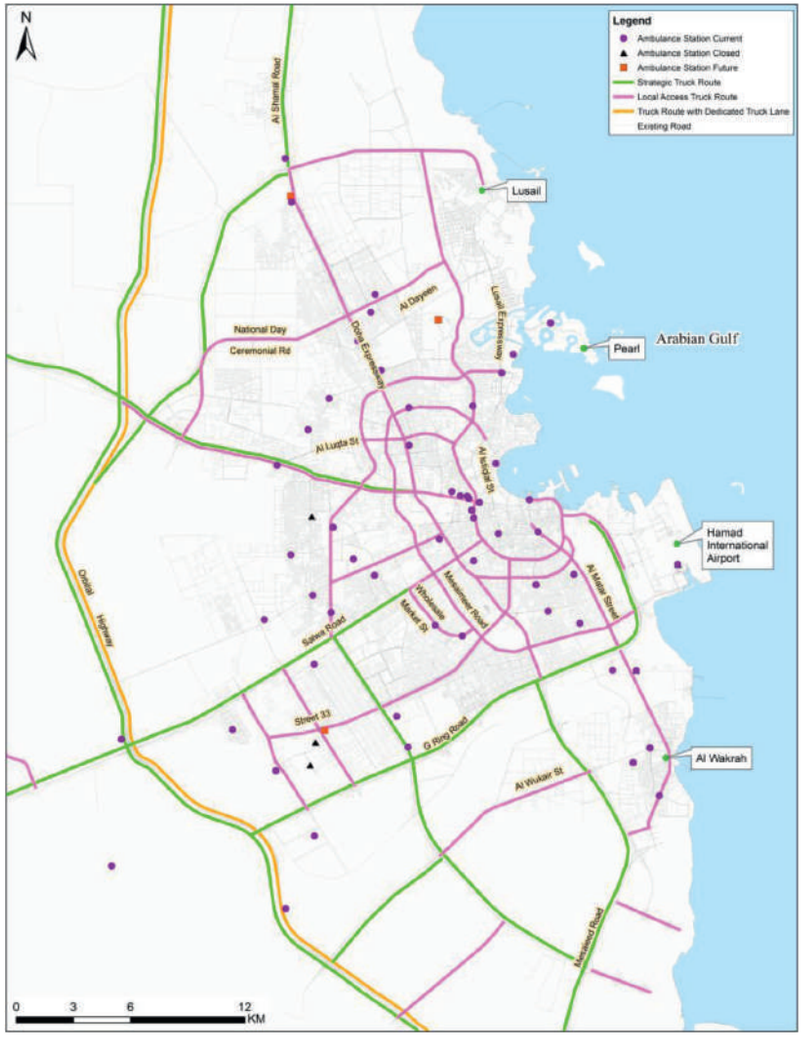
4.8 MEDICAL FACILITIES

Medical facilities such as hospitals and health centers are attractors of goods vehicles for medical supplies. Information has been obtained on the location of ambulance stations. The Hamad Medical Corporation operates over 167 ambulances and 20 rapid response vehicles from the locations shown on Figure 4.7, in the context of the truck route network. As well as ambulance stations, there are hospitals and health centers which generate movements by truck sized vehicles.

This map shows the locations of current, closed and future ambulances stations. There are a number of ambulance stations in the west of Doha which are off the main strategic highway and truck network and there is a need for accessibility into the local community areas where these ambulance locations are located. The ambulance service receives 100,000 calls per year. This provides an indication of scale of vehicle movements.

There are several specialized hospitals which will require higher priority during road network planning. These hospitals are Hamad Medical Corporation, Al Ahli Hospital, Doha Clinic, Al Emadi Hospital, American Hospital in Doha and Al Wakra Hospital and Al Khor Hospital. Some of these hospitals should have 24 hours truck delivery including emergency services and supplies.

Figure 4.7 – Doha Ambulance Sites - Major Attractors of Trucks



Source: MME and Updated TMPQ

4.9 PETROL STATIONS

Woqod operates a network of petrol stations in Qatar which generates a need for tanker trucks to deliver petrol to these stations.

Figure 4.8 shows the locations of petrol stations across Qatar, while Figure 4.9 shows the location of petrol stations in Doha. The main sites outside Doha are on Salwa Road towards Abu Samra, Al Shamal Road and Al Khor.

These maps show:

- Woqod Petrol Stations (WPS);
- Mobile Petrol Stations (MPS); and
- Vehicle Inspection Petrol Station Locations (FAHES).

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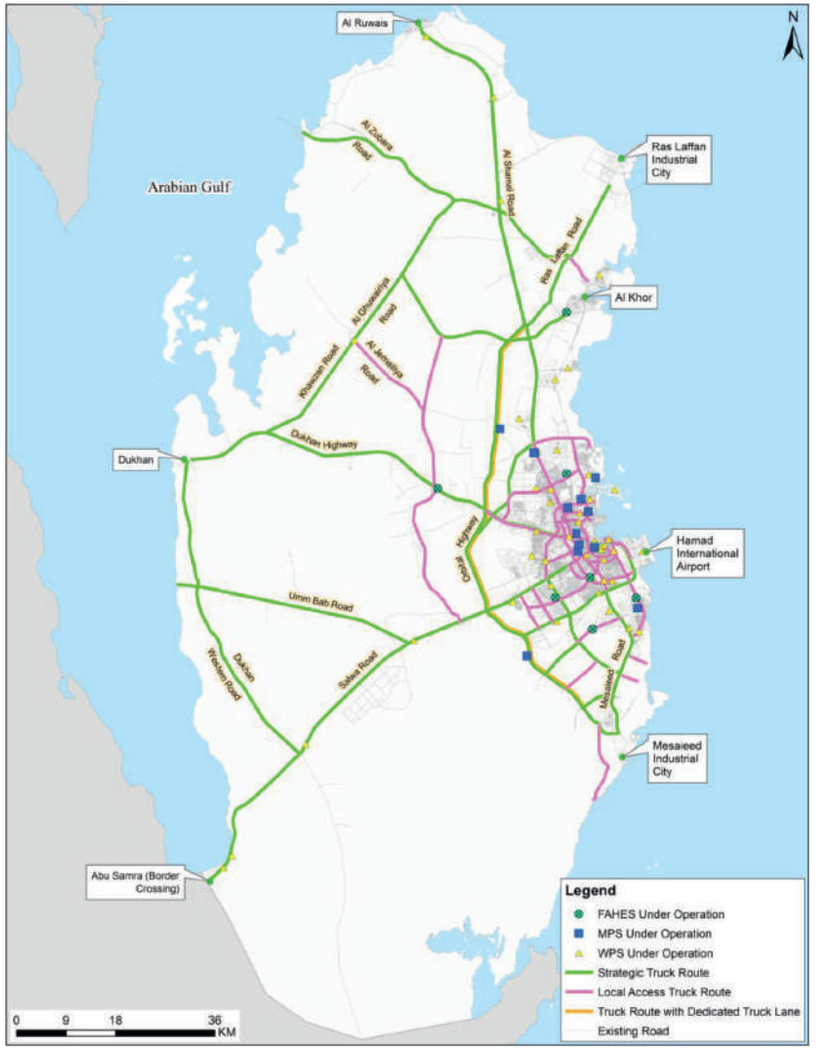
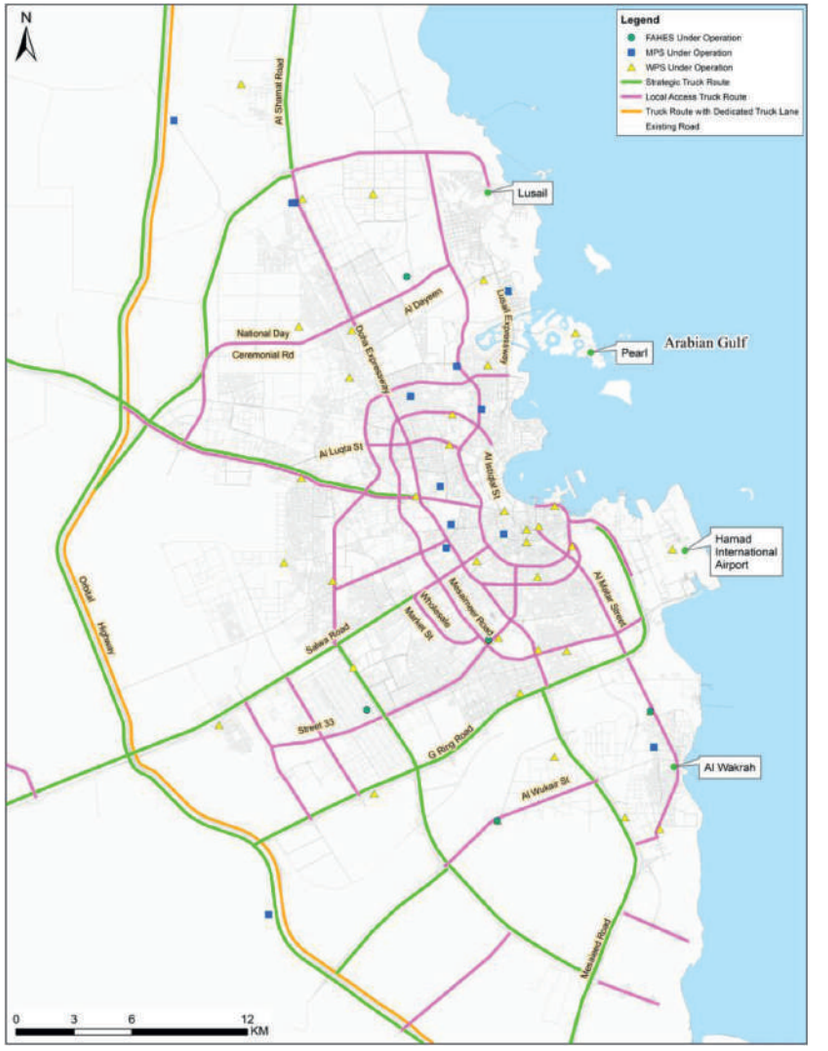
Figure 4.8 – Woqod Petrol Stations (Qatar) and Informal Truck Network



Source: MME and Updated TMPQ

Figure 4.9 – Woqod Petrol Stations (DMA) and Informal Truck Network



Source: MME and Updated TMPQ

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4.10 WATER TANKERS

Once developments become established and fully connected to the network, their water requirements are generally catered for by the underground utility network. However, up to that point, and during times where there may be a rupture or problem on the network supply, there may be a need for tankers for the transportation of the following types of water and waste water:

- Fresh water;
- Waste water;
- Treated Sewage Effluent (TSE); and
- Storm Water.

Of these, the greater need may be for TSE, plus also for storm water, but this need is for selected locations only.

Where developments are not complete, and in the event of damaged pipes, breaks or droughts, road tankers will always be needed as a backup measure. The usage of water in local communities can range between 200 and 250 liters per head per day, so with tankers carrying 20,000 liters each, supplying a community of 250,000 people could require around 3,000 tanker round trips per day.

As well as for water, tankers are needed to convey waste water between incomplete developments and the three existing sewage treatment plants – Doha North (new), Doha South (existing) and Doha West (new). Again, this waste is generally conveyed through the underground sewage collection system, but some developments may not yet be connected, so tankers are needed in reserve. Around 85% of the volume capacity for water supply is needed for waste water.

TSE is used for irrigation, and an Emiri Decree of 2016 stated that district cooling using potable water should be stopped, and seawater or TSE to be used instead.

Each development has its own requirements in terms of fresh water and waste water. Certain developments, such as the Pearl, do not yet have their own sewage treatment works, so waste is tankered to Lusail. This would be around 60,000m3 per day at full build out.

The locations of the new Water Reservoir Pumping Stations currently being built are on the main utility corridor which coincides with the alignment of Al Majid Road (Orbital Highway). The movements of water tankers and waste water tankers will, therefore, be spread across the network depending on where the incomplete developments are at the time, and how far away these are from the water pumping stations and the sewage treatment plants. The water reservoir stations are at:

- Umm Birkah;
- Umm Slal;
- Rawdat Rashed;
- Abu Nakla; and
- Al Thumama.

Figure 4.10 shows the alignment of the Right of Way (ROW) corridor for the water utilities, together with the location of the proposed water pumping stations.

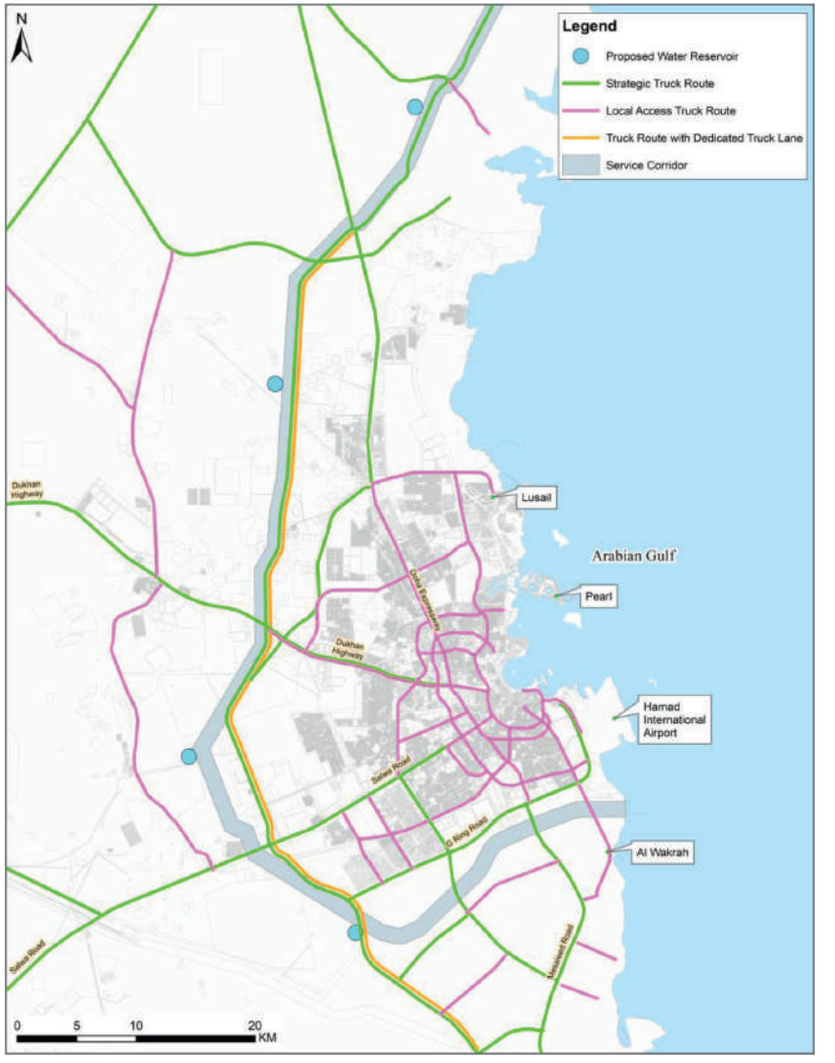
From Qatar Petroleum perspective, safety on roads accessing the industrial areas is very important, and especially on Road 77. This has been considered in the development of the truck network. The construction of the Umm Birkah sewage treatment plant is almost complete, and a large increase in the numbers of sewage water tankers and irrigation tankers is expected, when it starts operating in 2020. The movement of tankers will noticeably impact on the level of service on this link, which will fall at this point. As part of the Updated TMPQ, the proposed scheme HW-20 involves two highway upgrades. These are:

An upgraded/new bypass to Al Khor extending from the boundary of Ras Laffan Industrial City to the North Relief Road (Al Khor Expressway) to the south of Al Khor

Umm Birkah Road (from the west side of the Al Khor bypass into Al Khor)

- 40 km of main road is proposed to be upgraded, and four running lanes and a hard shoulder will be provided either side of the central median on the bypass with four lanes and a hard shoulder at Umm Birkah Road;
- Service roads will be included where necessary; and
- Two interchanges and 10 signalized intersections will be constructed.

Figure 4.10 – Water Utility Corridor and Pumping Station Locations



Source: MME and Updated TMPQ

4.11 URBAN PLANNING PROJECTS

The Ministry of Municipality and Environment (MME) has a variety of other projects underway which will influence the generation of trucks in future. These include two key elements:

- The Qatar National Housing Strategy (QNHS), which sets out the actions to meet the housing needs of the country (Current and future demand). It seeks to support the delivery of a sustainable housing development for the country's needs. The strategy defines a diverse supply of housing options that responds to the needs of nationals and expats and anticipates future demand. This will allow service providers to ensure the timely provision of supporting infrastructure, services and amenities.
- The Strategy for Workers Accommodation is also a key influence on the demand for trucks, and locations selected are based on the following criteria:
  - Permanent and Temporary Accommodation selected according to whether low impact industrial zone, greenbelt zone, rural desert zone, workers accommodation;
  - Good access to existing and committed / approved Mega projects;
  - Must not be within or close to residential uses;
  - Can be located within low impact industrial zones land; and
  - Must have convenient access to major road corridors and expressways beyond D-Ring Road.

Workers accommodation generates a need for trucks moving goods to and from the site (food and supplies to shops). Vehicle demand from workers buses is also generated from workers accommodation.

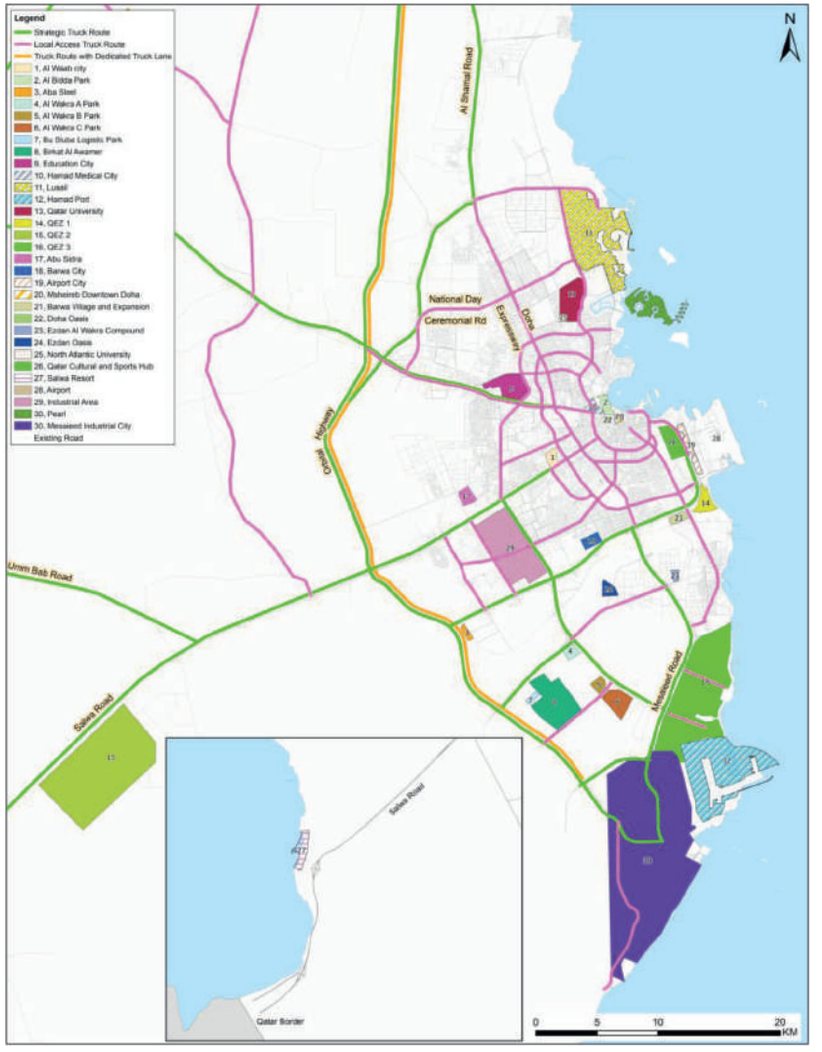
4.12 ON-GOING CONSTRUCTION PROJECTS

Having considered the needs of individual generators (industrial areas, malls, hotels, sports stadia etc.), the locations of existing and new developments were also considered, so that this could be compared with how well these developments are served by the current truck network, and whether changes need to be made to the proposed network to accommodate the demands of future developments.

The development of the TRN has been undertaken on the basis that for the large development projects (such as QEZ-2), the construction and handover period extends for a long period. The roll out of truck network facility improvements can be phased according to the phasing of these large developments.

Figure 4.11 below shows the locations of the key developments in Qatar, with the current truck network overlaid on this to identify where there are gaps in provision.

Figure 4.11 – Ongoing and New Developments and Informal Truck Network

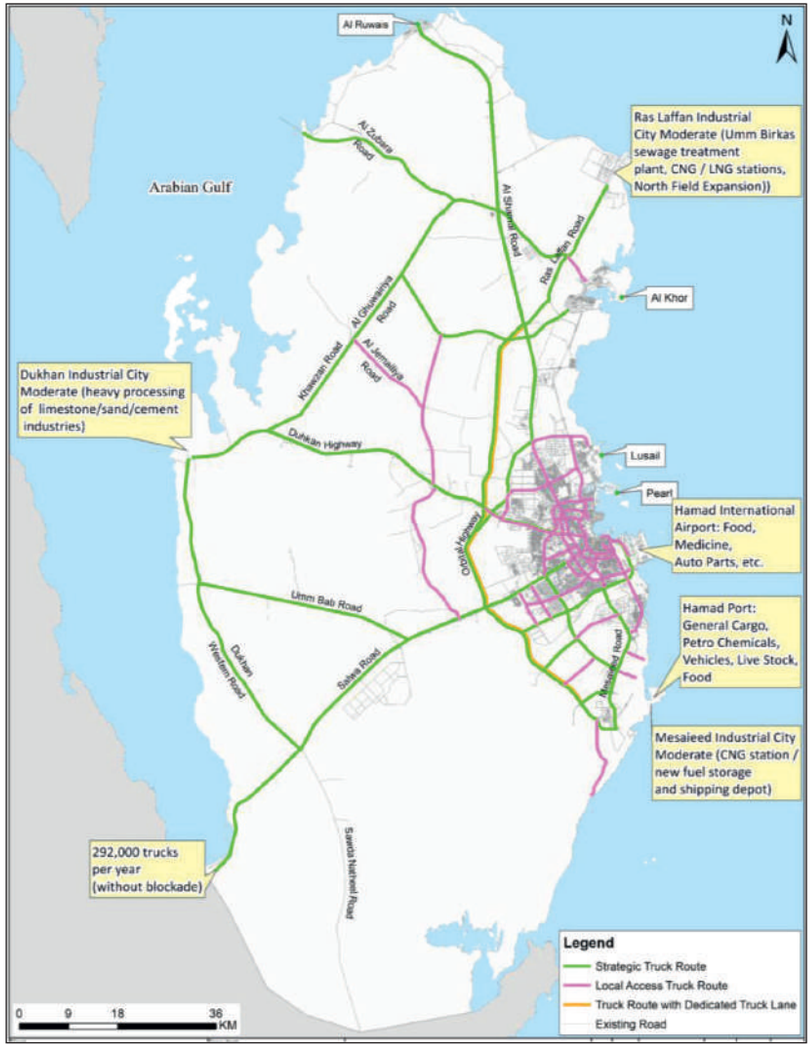


Source: MME and Updated TMPQ

4.13 SUMMARY OF RELATIVE TRUCK DEMAND FROM KEY GENERATORS

Figure 4.12 below shows a flow map with the key volumes of the estimated numbers of trucks into Qatar from the different access points, based on analysis of reported volumes of goods to each key location.

Figure 4.12 – Indicative Truck Demand for Major Truck Generator



Source: Updated TMPQ

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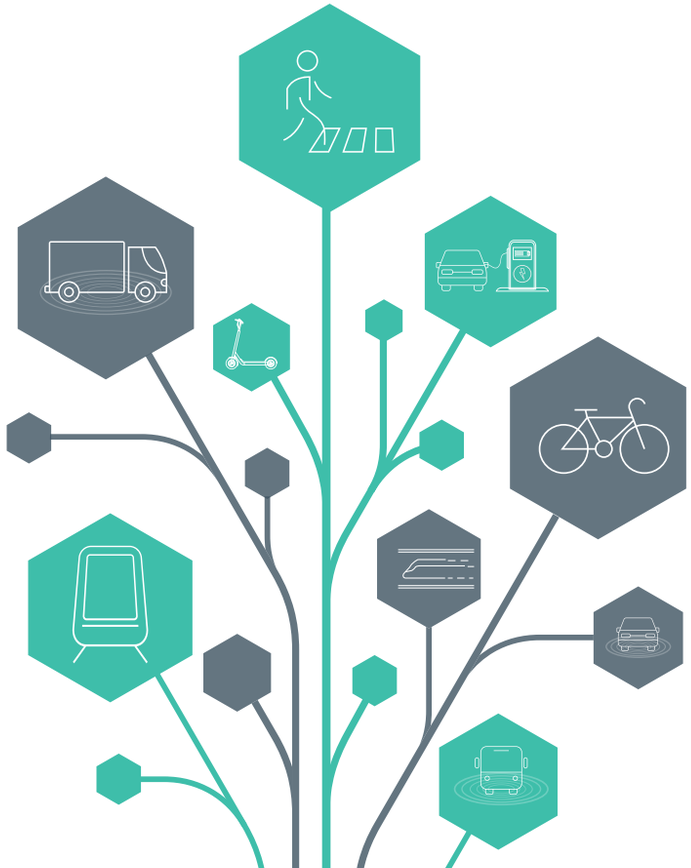


2050

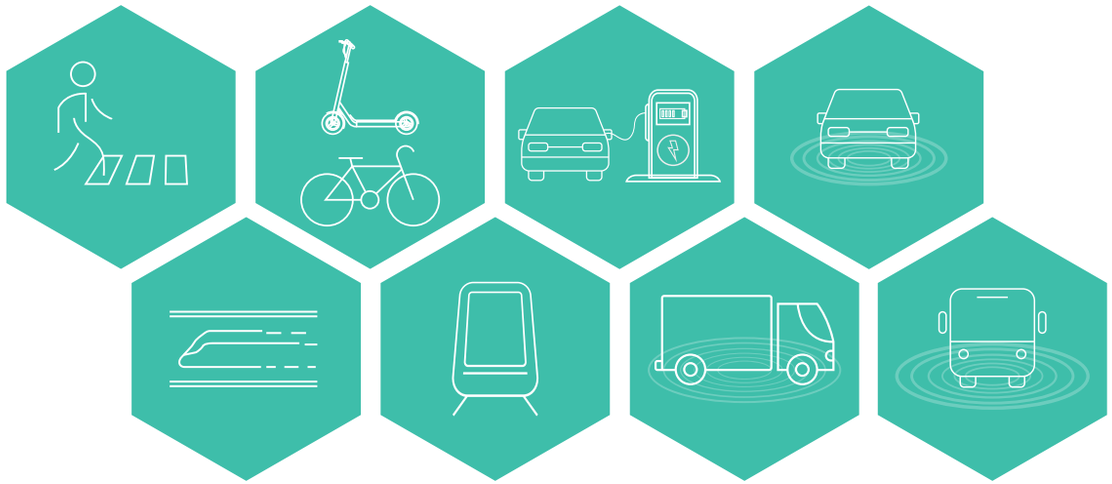
نقـل متكامـل ومسـتدام للجميـع

INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

2050

SECTION - 05

FUTURE CONDITION



5 FUTURE CONDITION

5.1 FUTURE SUPPLY

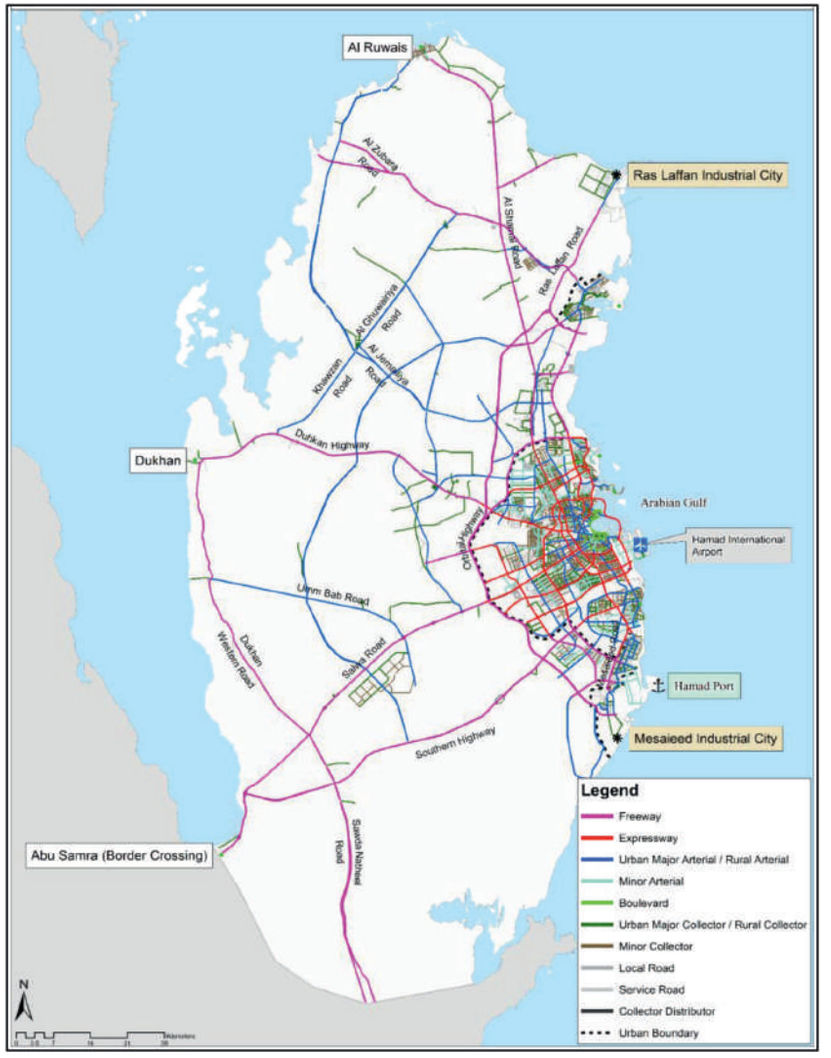
Highway schemes have been conceived to increase capacity and reduce congestion, considering the underlying trends for demand growth in the future. An effective and efficient road network is crucial for promoting economic prosperity, high living standards and social well-being of Qatar and its people, while facilitating the movement of people and goods across the country.

The highway network also carries freight in Heavy Goods Vehicles (HGVs) and Light Goods Vehicles (LGVs), with the heavier vehicles mostly dependent on expressways and arterial links, and LGVs dependent on all the road network for the distribution of goods to businesses, shopping malls, medical establishments, hotels, places of sport and leisure and private homes.

A designated Truck Route Network (TRN) is crucial for supporting the local, regional and national economic activity and development within Qatar. It can efficiently serve the haulage industry by facilitating truck operations and decreasing freight costs.

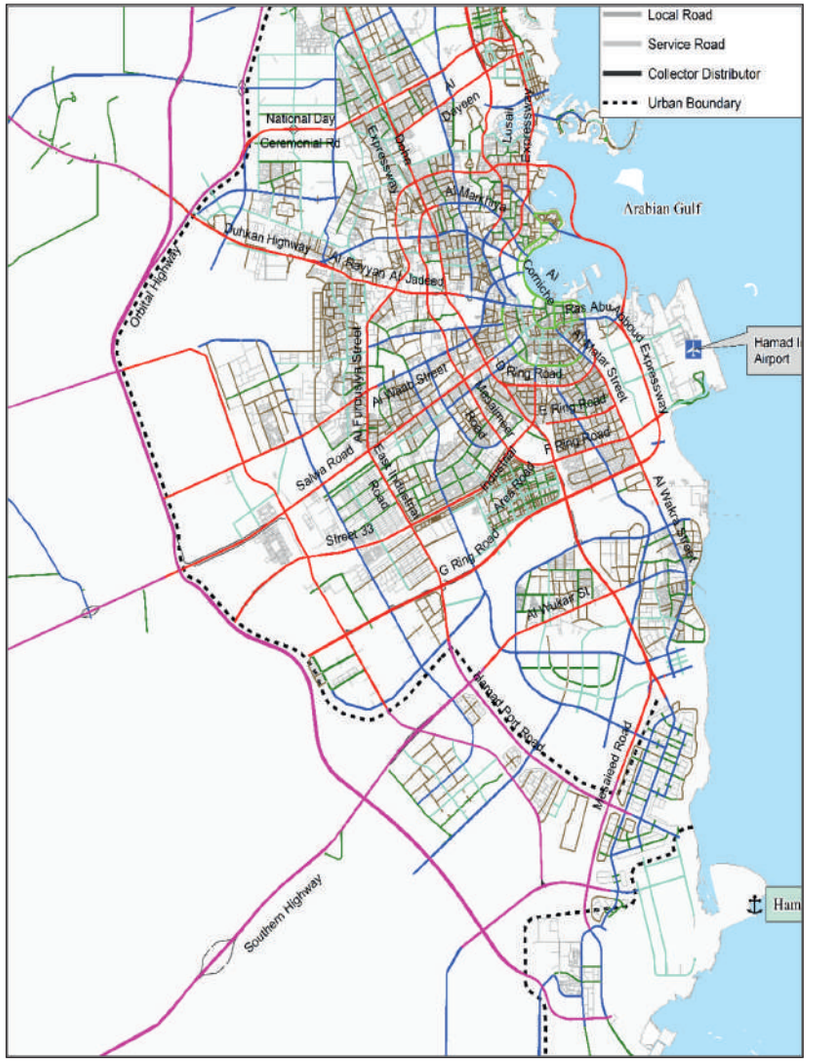
If not provided with a designated and effective TRN, freight can have an even greater adverse impact on the environment, safety and public health and amenity, for example if freely circulating in residential or other sensitive areas less suitable for sizable and more polluting vehicles. The proposed Updated TMPQ road network and road network hierarchy are shown below for Qatar (Figure 5.1) and Doha (Figure 5.2)

Figure 5.1 – Updated TMPQ Future Road Network (Qatar)



Source: Updated TMPQ

Figure 5.2 – Updated TMPQ Future Road Network (DMA)



Source: Updated TMPQ

5.2 FUTURE DEMAND

A TRN aims at addressing future truck route requirements, increasing the nationwide truck operational efficiency, safety, the wellbeing of drivers, the quality of living for the wider community, and at achieving improvements in infrastructure, facilities, operations and fleet, as well as to implement supportive regulation or policy actions.

Trucks are expected to continue being the most flexible mode for transporting the majority of goods within Qatar.

5.2.1 FORECASTED FUTURE TRUCK O-D TRIPS

To understand the flow of the LGV and HGV data obtained from QSTM, the entire Qatar was divided into 9 sectors while the DMA was divided into 12 sub-sectors based on the land use homogeneity. Based on this categorization, QSTM2 runs were made, and further details are available in Technical Report 4:

Table 5.1 presents a summary of daily key demand trends for LGVs.

The overall LGV demand increases by 26,000 trips between 2025 and 2050, and most of this growth occurs between the movements wholly within DMA (19,000 trips) and movements to and from DMA (6,000).

Movements wholly within DMA increase by 14% between 2025 and 2050, but the largest growth is observed in the movements between Outer Doha and Inner Doha, by almost 6,000 trips across the forecast years.

In terms of the movements to and from the DMA, these movements increase by 14% and although the movements between Rural Areas and Outer Doha slightly reduce between 2025 and 2050, the general observed trend is for trips to grow. The largest changes in trips occur between Other Towns and Outer Doha, as well as between Other Towns and Inner Doha, both of about 2,000 trips.

Other movements show a relatively low growth, of about 1,000 trips between the forecast years. Most of this growth is concentrated on movements within Other Towns, with 800 new trips across the forecast years.

Table 5.2 shows the summary of the total LGV trips for 2050 by peak period, and the tidality pattern verified for specific movements.

Table 5.1 – LGV Flows Summary, 9×9 Qatar Sectors (vehicle-trips)

Movement	Two-Way Trip Numbers				Percentage of Trips				Change in Trips (%)		
	2025	2030	2035	2050	2025	2030	2035	2050	2025-2030	2025-2035	2025-2050
Movements Wholly Within Doha Metropolitan Area	**137,557**	**135,344**	**133,149**	**156,646**	73.1%	73.1%	73.1%	73.1%	-1.6%	-3.2%	13.9%
Within DCCP	6,466	6,406	6,345	7,465	3.4%	3.5%	3.5%	3.5%	-0.9%	-1.9%	15.5%
Between Inner Doha and DCCP	20,776	20,698	20,620	24,259	11.0%	11.2%	11.3%	11.3%	-0.4%	-0.8%	16.8%
Between Outer Doha and DCCP	26,022	25,558	25,095	29,524	13.8%	13.8%	13.8%	13.8%	-1.8%	-3.6%	13.5%
Within Inner Doha	16,244	16,269	16,295	19,170	8.6%	8.8%	8.9%	8.9%	0.2%	0.3%	18.0%
Between Outer Doha and Inner Doha	40,668	40,187	39,726	46,736	21.6%	21.7%	21.8%	21.8%	-1.2%	-2.3%	14.9%
Within Outer Doha	27,382	26,225	25,069	29,493	14.6%	14.2%	13.8%	13.8%	-4.2%	-8.4%	7.7%
Movements to and From Doha Metropolitan Area	**41,878**	**41,323**	**40,737**	**47,926**	22.3%	22.3%	22.4%	22.4%	-1.3%	-2.7%	14.4%
Between Other Towns and DCCP	8,293	8,261	8,230	9,682	4.4%	4.5%	4.5%	4.5%	-0.4%	-0.8%	16.7%
Between Other Towns and Inner Doha	12,470	12,510	12,520	14,729	6.6%	6.8%	6.9%	6.9%	0.3%	0.4%	18.1%
Between Other Towns and Outer Doha	17,254	16,992	16,729	19,681	9.2%	9.2%	9.2%	9.2%	-1.5%	-3.0%	14.1%
Between Rural Areas and DCCP	675	628	580	682	0.4%	0.3%	0.3%	0.3%	-7.1%	-14.1%	1.0%
Between Rural Areas and Inner Doha	1,022	962	903	1,062	0.5%	0.5%	0.5%	0.5%	-5.8%	-11.6%	4.0%
Between Rural Areas and Outer Doha	2,164	1,970	1,776	2,090	1.2%	1.1%	1.0%	1.0%	-9.0%	-17.9%	-3.4%
Other Movements	**8,678**	**8,467**	**8,255**	**9,712**	4.6%	4.6%	4.5%	4.5%	-2.4%	-4.9%	11.9%
Within Other Towns	6,468	6,317	6,167	7,255	3.4%	3.4%	3.4%	3.4%	-2.3%	-4.7%	12.2%
Between Other Towns	454	438	422	496	0.2%	0.2%	0.2%	0.2%	-3.5%	-7.0%	9.4%
Between Rural Areas and Other Towns	1,412	1,371	1,330	1,564	0.8%	0.7%	0.7%	0.7%	-2.9%	-5.8%	10.8%
Within Rural Areas	345	341	337	396	0.2%	0.2%	0.2%	0.2%	-1.2%	-2.3%	14.9%
Totals	**188,114**	**185,134**	**182,142**	**214,284**					-1.6%	-3.2%	13.9%

Source: QSTM2.0

Table 5.2 – 2050 LGV Trip Peak & Tidality Summary, 9×9 Qatar Sectors (vehicle-trips)

Movement	Two-Way Trip Numbers				Percentage of Trips				Trip Tidality (Inbound/Outbound)		
	Full Day	AM	MD	PM	Full Day	AM	MD	PM	AM	MD	PM
Movements Within Doha Metropolitan Area	**156,646**	**11,279**	**10,025**	**10,495**	73%	73%	73%	73%			
Within DCCP	7,465	537	478	500	3%	3%	3%	3%			
Between Inner Doha and DCCP	24,259	1,747	1,553	1,625	11%	11%	11%	11%	50% / 50%	50% / 50%	50% / 50%
Between Outer Doha and DCCP	29,524	2,126	1,890	1,978	14%	14%	14%	14%	50% / 50%	50% / 50%	50% / 50%
Within Inner Doha	19,170	1,380	1,227	1,284	9%	9%	9%	9%			
Between Outer Doha and Inner Doha	46,736	3,365	2,991	3,131	22%	22%	22%	22%	50% / 50%	50% / 50%	50% / 50%
Within Outer Doha	29,493	2,123	1,888	1,976	14%	14%	14%	14%			
Movements to and From Doha Metropolitan Area	**47,926**	**3,451**	**3,067**	**3,211**	22%	22%	22%	22%			
Between Other Towns and DCCP	9,682	697	620	649	5%	5%	5%	5%	50% / 50%	50% / 50%	50% / 50%
Between Other Towns and Inner Doha	14,729	1,060	943	987	7%	7%	7%	7%	50% / 50%	50% / 50%	50% / 50%
Between Other Towns and Outer Doha	19,681	1,417	1,260	1,319	9%	9%	9%	9%	50% / 50%	50% / 50%	50% / 50%
Between Rural Areas and DCCP	682	49	44	46	0%	0%	0%	0%	52% / 48%	52% / 48%	52% / 48%
Between Rural Areas and Inner Doha	1,062	76	68	71	0%	0%	0%	0%	52% / 48%	52% / 48%	52% / 48%
Rural Areas and Outer Doha	2,090	150	134	140	1%	1%	1%	1%	51% / 49%	51% / 49%	51% / 49%
Other Movements	**9,712**	**699**	**622**	**651**	5%	5%	5%	5%			
Within Other Towns	7,255	522	464	486	3%	3%	3%	3%			
Between Other Towns	496	36	32	33	0%	0%	0%	0%			
Between Rural Areas and Other Towns	1,564	113	100	105	1%	1%	1%	1%	46% / 54%	46% / 54%	46% / 54%
Within Rural Areas	396	29	25	27	0%	0%	0%	0%			
Totals	214,284	15,428	13,714	14,357							

Source: QSTM2

The specific trend observed on the directional flows of LGV trips is that they seem to be very symmetrical across all peaks. Nearly all origins and destinations are generating and attracting similar numbers of trips to each other. This may reflect the nature of freight demand, where goods vehicles unload their cargo at the destination (or a series of destinations within a sector) in a relatively short period of time and make a return trip.

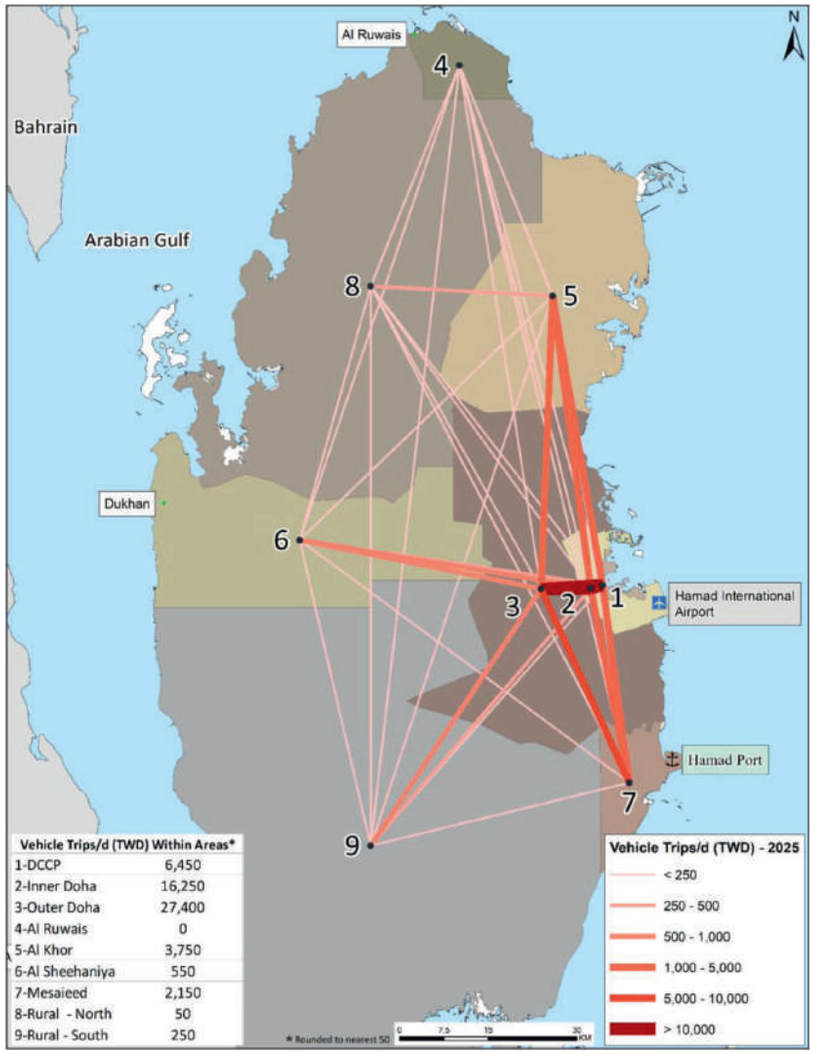
Figure 5.3 to Figure 5.4 illustrate the desire lines (in terms of the LGV vehicle-based origin-destination trip flows) for a typical weekday in Qatar and Doha, considering all HYs.

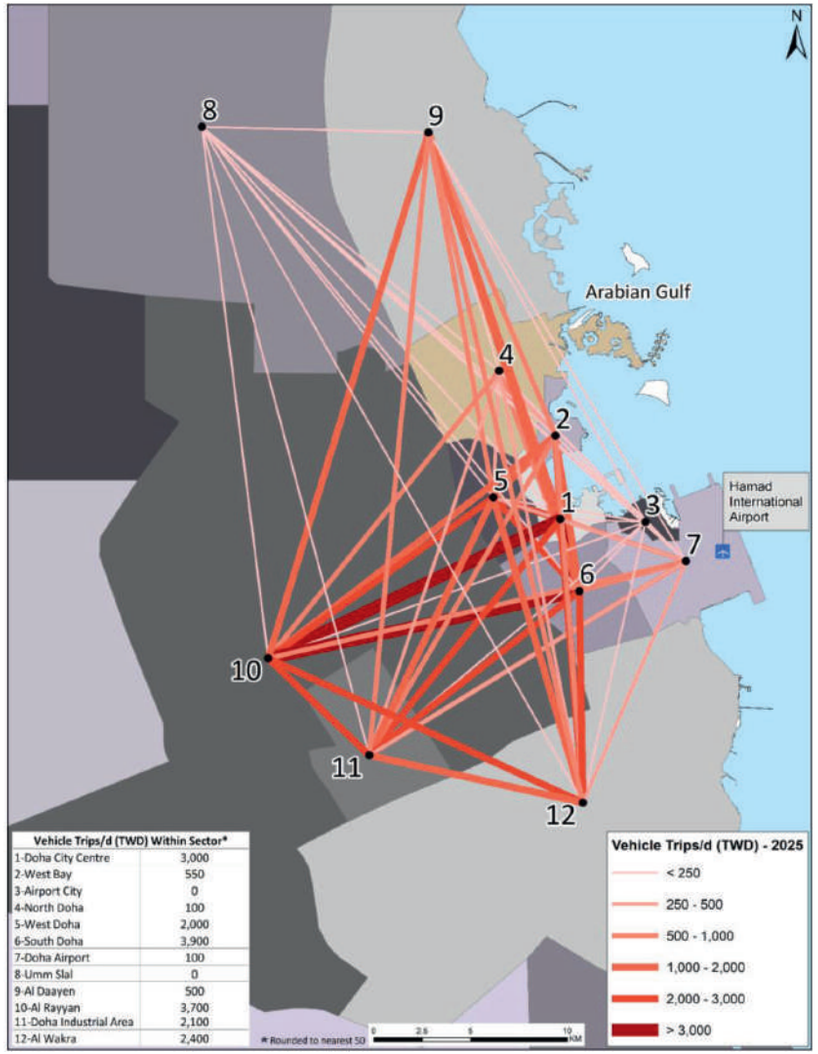
Desire Line Maps

Figure 5.5 and Figure 5.6 show the above flows by area in map form for the typical weekday (i.e. 24 hours)) for Qatar and the DMA respectively. From the desire flow line maps, the following can be inferred:

- Regarding the Qatar wide nine sectors, significant LGV trips for the full week-day occur among Inner Doha and Outer Doha (industrial area and Al Rayyan).
- Mesaieed Industrial City (MIC) is also contributing considerable LGV trips.
- Regarding the DMA (12 Sub-sectors) there are significant trips occurring between Doha City Centre, South Doha, Doha Industrial Area and Al Rayan.
- Considerable trips also occur between Doha City Centre, West Doha, South Doha and Doha Industrial Area. This trend is almost similar for all HYs except HY 2050 where the LGV trend changes to adjust for new developments, such as, new district and town centers as well as full developments of industrial areas.

Figure 5.3 – LGV OD Flows - Typical Weekday in 2025 (vehicle-trips)





Source: QSTM2.0

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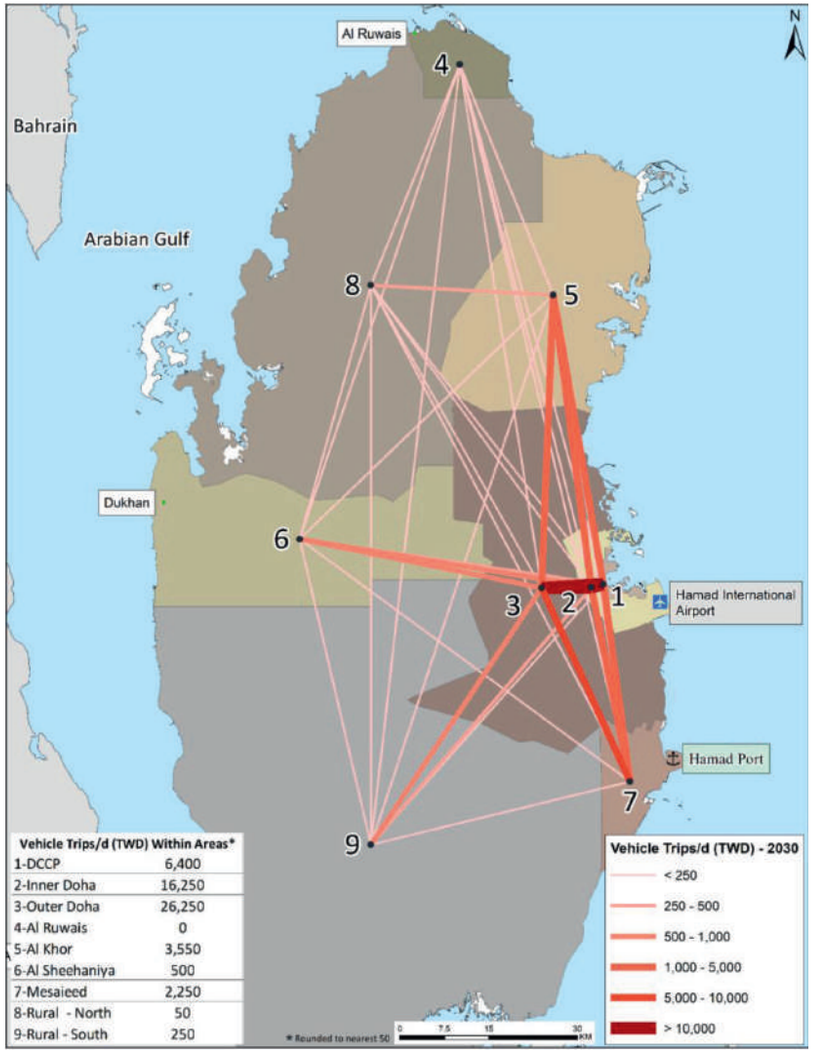
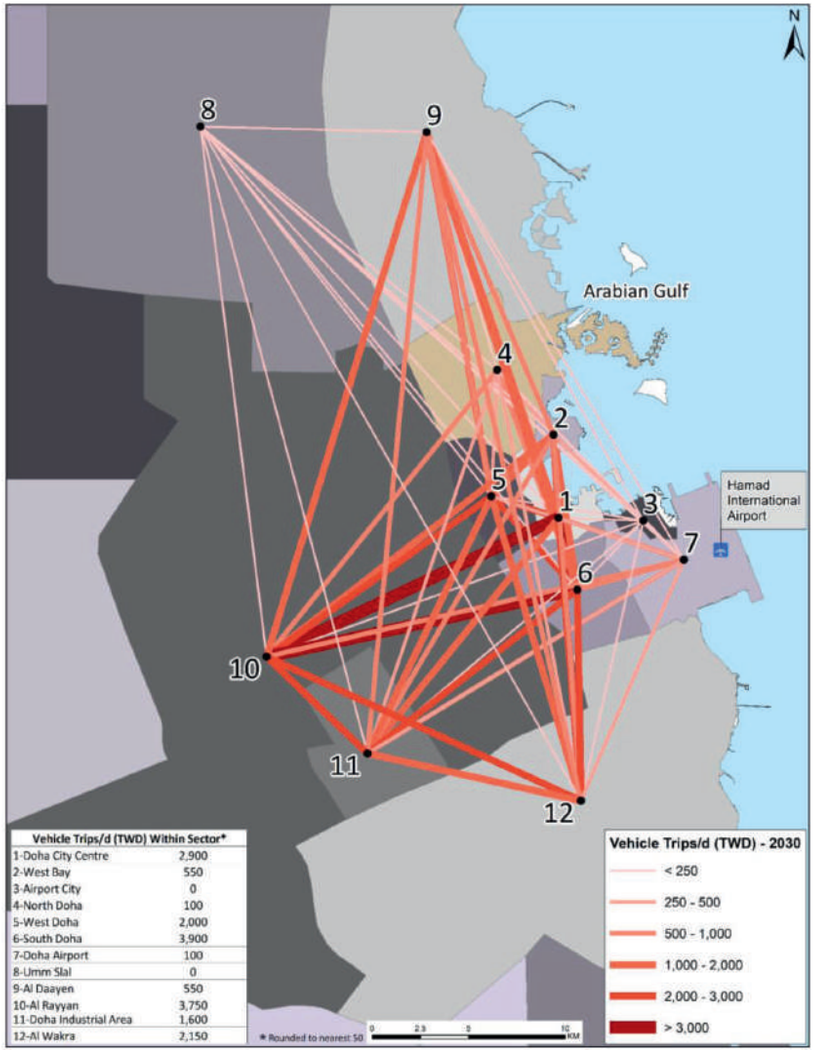
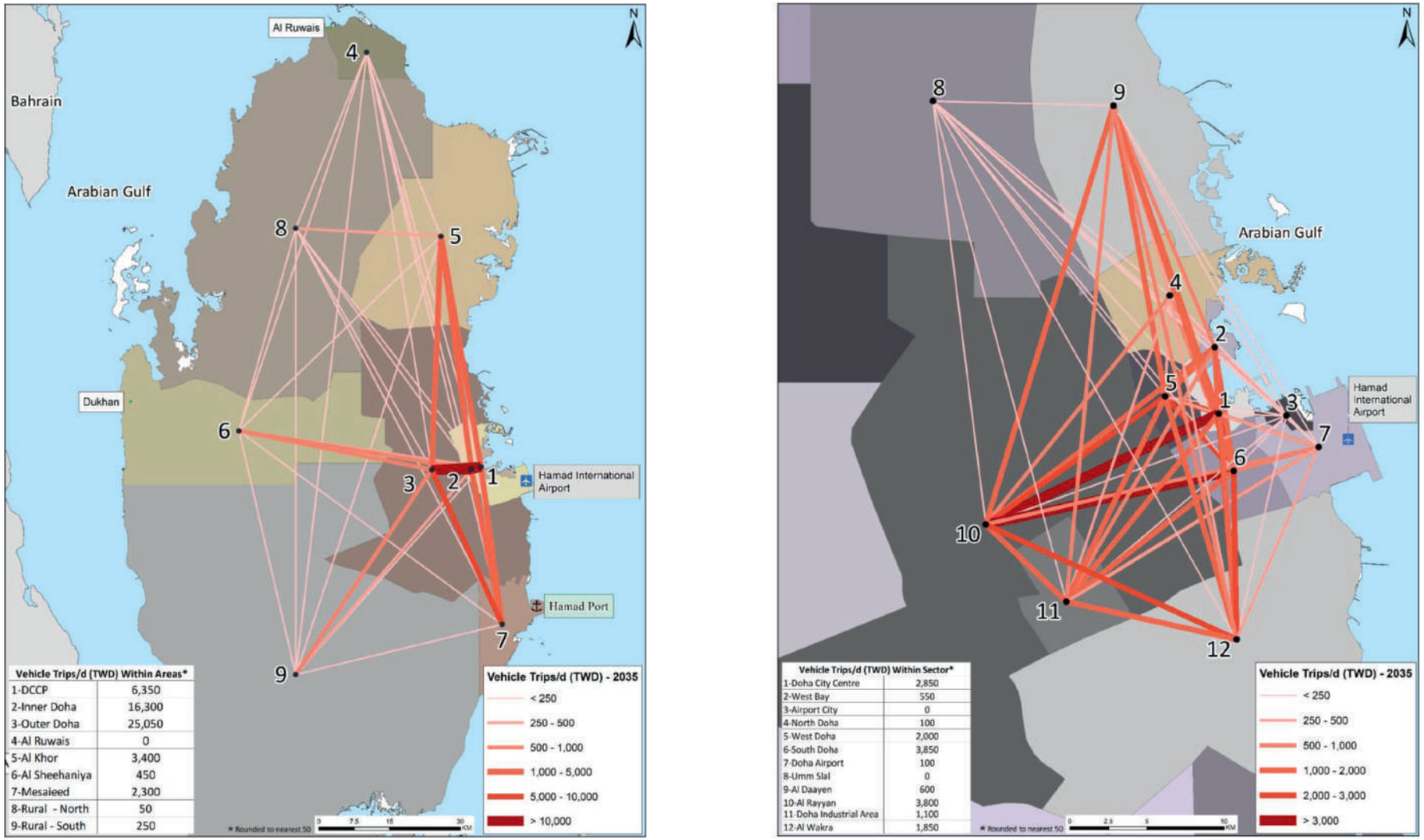
Figure 5.4 – LGV OD Flows - Typical Weekday in 2030 (vehicle-trips)





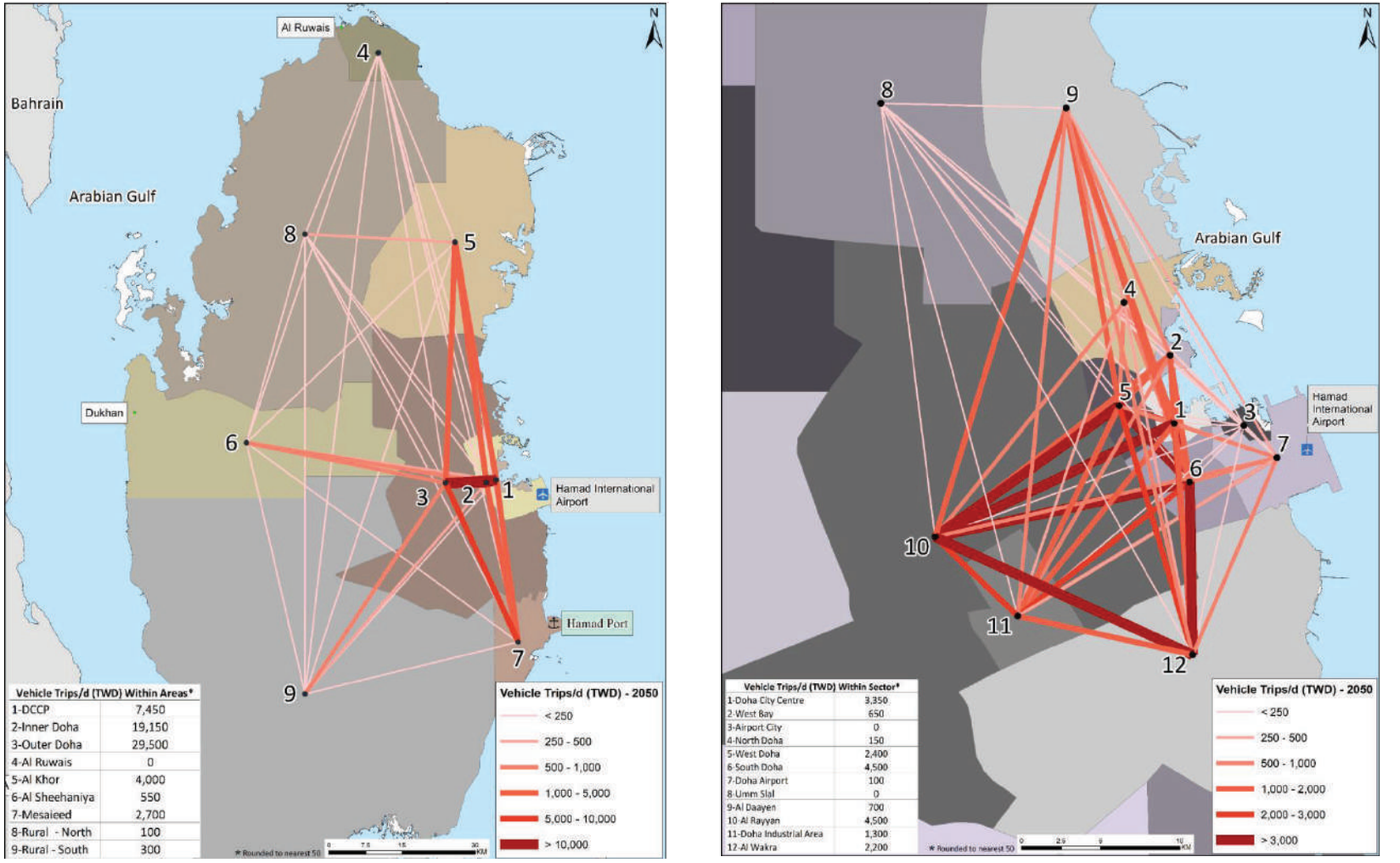
Source: QSTM2.0

Figure 5.5 – LGV OD Flows - Typical Weekday in 2035 (vehicle-trips)



Source: QSTM2.0

Figure 5.6 – LGV OD Flows - Typical Weekday in 2050 (vehicle-trips)



Source: QSTM2.0

Table 5.3 presents a summary of the key demand trends for HGVs.

Table 5.3 – HGV Flows Summary, 9×9 Qatar Sectors (person-trips)

Movement	Two-Way Trip Numbers				Percentage of Trips				Change in Trips (%)		
	2025	2030	2035	2050	2025	2030	2035	2050	2025-2030	2025-2035	2025-2050
Movements Wholly Within Doha Metropolitan Area	**86,357**	**83,358**	**83,053**	**94,565**	64.4%	62.1%	62.1%	59.8%	-3.5%	-3.8%	9.5%
Within DCCP	5,076	4,495	4,495	4,606	3.8%	3.4%	3.4%	2.9%	-11.4%	-11.4%	-9.3%
Between Inner Doha and DCCP	15,461	14,521	14,521	15,977	11.5%	10.8%	10.9%	10.1%	-6.1%	-6.1%	3.3%
Between Outer Doha and DCCP	15,547	14,588	14,588	16,035	11.6%	10.9%	10.9%	10.1%	-6.2%	-6.2%	3.1%
Within Inner Doha	11,421	11,380	11,380	13,340	8.5%	8.5%	8.5%	8.4%	-0.4%	-0.4%	16.8%
Between Outer Doha and Inner Doha	23,204	23,096	23,094	27,070	17.3%	17.2%	17.3%	17.1%	-0.5%	-0.5%	16.7%
Within Outer Doha	15,648	15,277	14,974	17,537	11.7%	11.4%	11.2%	11.1%	-2.4%	-4.3%	12.1%
Movements to and From Doha Metropolitan Area	**41,739**	**44,395**	**44,272**	**55,331**	31.1%	33.1%	33.1%	35.0%	6.4%	6.1%	32.6%
Between Other Towns and DCCP	8,474	8,747	8,747	10,613	6.3%	6.5%	6.5%	6.7%	3.2%	3.2%	25.2%
Between Other Towns and Inner Doha	12,765	13,993	13,982	17,884	9.5%	10.4%	10.5%	11.3%	9.6%	9.5%	40.1%
Between Other Towns and Outer Doha	17,012	18,397	18,299	23,272	12.7%	13.7%	13.7%	14.7%	8.1%	7.6%	36.8%
Between Rural Areas and DCCP	771	678	678	687	0.6%	0.5%	0.5%	0.4%	-12.1%	-12.1%	-10.9%
Between Rural Areas and Inner Doha	1,135	1,074	1,074	1,192	0.8%	0.8%	0.8%	0.8%	-5.4%	-5.4%	5.0%
Between Rural Areas and Outer Doha	1,582	1,506	1,492	1,683	1.2%	1.1%	1.1%	1.1%	-4.8%	-5.7%	6.4%
Other Movements	**5,921**	**6,427**	**6,398**	**8,156**	4.4%	4.8%	4.8%	5.2%	8.5%	8.0%	37.7%
Within Other Towns	3,374	3,708	3,691	4,757	2.5%	2.8%	2.8%	3.0%	9.9%	9.4%	41.0%
Between Other Towns	1,335	1,458	1,452	1,859	1.0%	1.1%	1.1%	1.2%	9.2%	8.8%	39.2%
Between Rural Areas and Other Towns	1,147	1,198	1,192	1,470	0.9%	0.9%	0.9%	0.9%	4.5%	4.0%	28.2%
Within Rural Areas	66	63	62	70	0.0%	0.0%	0.0%	0.0%	-4.5%	-4.8%	7.1%
Totals	**134,017**	**134,180**	**133,722**	**158,052**					0.1%	-0.2%	17.9%

Source: QSTM2.0

The overall demand increases by 24,000 trips between 2025 and 2050, most of this growth occurs as movements to and from DMA (13,000 trips) and movements wholly within DMA (8,000).

Movements wholly within DMA increase by 10% between 2025 and 2050. The average increase in demand is 1,300 trips but the largest growth is observed in the movements between Outer Doha and Inner Doha, almost 3,800 trips across the forecast years.

In terms of the movements to and from DMA, these movements increase by 33% and although the movements between rural Areas and DCCP slightly reduce between 2025 and 2050, the general observed trend is trips to grow. The largest changes in trips occur between Other Towns and Outer Doha as well as between Other Towns and Inner Doha, about 2,000 and 5,000 trips respectively.

Other movements show a relatively low growth in comparison, about 2,000 trips between the forecast years. Most of this growth is concentrated on the movements within Other Towns; 1,000 new trips across the forecast years.

Table 5.4 shows the summary of the total HGV trips for 2050 by peak period, and the tidality pattern verified for specific movements.

Table 5.4 – 2050 HGV Trip Peak & Tidality Summary, 9×9 Qatar Sectors (person-trips)

Movement	Two-Way Trip Numbers				Percentage of Trips				Trip Tidality (Inbound/Outbound)		
	Full Day	AM	MD	PM	Full Day	AM	MD	PM	AM	MD	PM
Movements Within Doha Metropolitan Area	**94,565**	**5,674**	**5,012**	**6,052**	60%	60%	60%	60%			
Within DCCP	4,606	276	244	295	3%	3%	3%	3%			
Between Inner Doha and DCCP	15,977	959	847	1,023	10%	10%	10%	10%	50% / 50%	50% / 50%	50% / 50%
Between Outer Doha and DCCP	16,035	962	850	1,026	10%	10%	10%	10%	50% / 50%	50% / 50%	50% / 50%
Within Inner Doha	13,340	800	707	854	8%	8%	8%	8%			
Between Outer Doha and Inner Doha	27,070	1,624	1,435	1,733	17%	17%	17%	17%	50% / 50%	50% / 50%	50% / 50%
Within Outer Doha	17,537	1,052	929	1,122	11%	11%	11%	11%			
Movements to and From Doha Metropolitan Area	**55,331**	**3,320**	**2,933**	**3,541**	35%	35%	35%	35%			
Between Other Towns and DCCP	10,613	637	562	679	7%	7%	7%	7%	50% / 50%	50% / 50%	50% / 50%
Between Other Towns and Inner Doha	17,884	1,073	948	1,145	11%	11%	11%	11%	50% / 50%	50% / 50%	50% / 50%
Between Other Towns and Outer Doha	23,272	1,396	1,233	1,489	15%	15%	15%	15%	50% / 50%	50% / 50%	50% / 50%
Between Rural Areas and DCCP	687	41	36	44	0%	0%	0%	0%	50% / 50%	50% / 50%	50% / 50%
Between Rural Areas and Inner Doha	1,192	72	63	76	1%	1%	1%	1%	50% / 50%	50% / 50%	50% / 50%
Rural Areas and Outer Doha	1,683	101	89	108	1%	1%	1%	1%	50% / 50%	50% / 50%	50% / 50%
Other Movements	**8,156**	**489**	**432**	**522**	5%	5%	5%	5%			
Within Other Towns	4,757	285	252	304	3%	3%	3%	3%			
Between Other Towns	1,859	112	99	119	1%	1%	1%	1%			
Between Rural Areas and Other Towns	1,470	88	78	94	1%	1%	1%	1%	49% / 51%	49% / 51%	49% / 51%
Within Rural Areas	70	4	4	4	0%	0%	0%	0%			
Totals	**158,052**	**9,483**	**8,377**	**10,115**							

Source: QSTM2.0

Similar to LGVs, there is a marked trend of near perfect symmetry in trip tidality for HGV trips. The same reasons drive this trend as well.

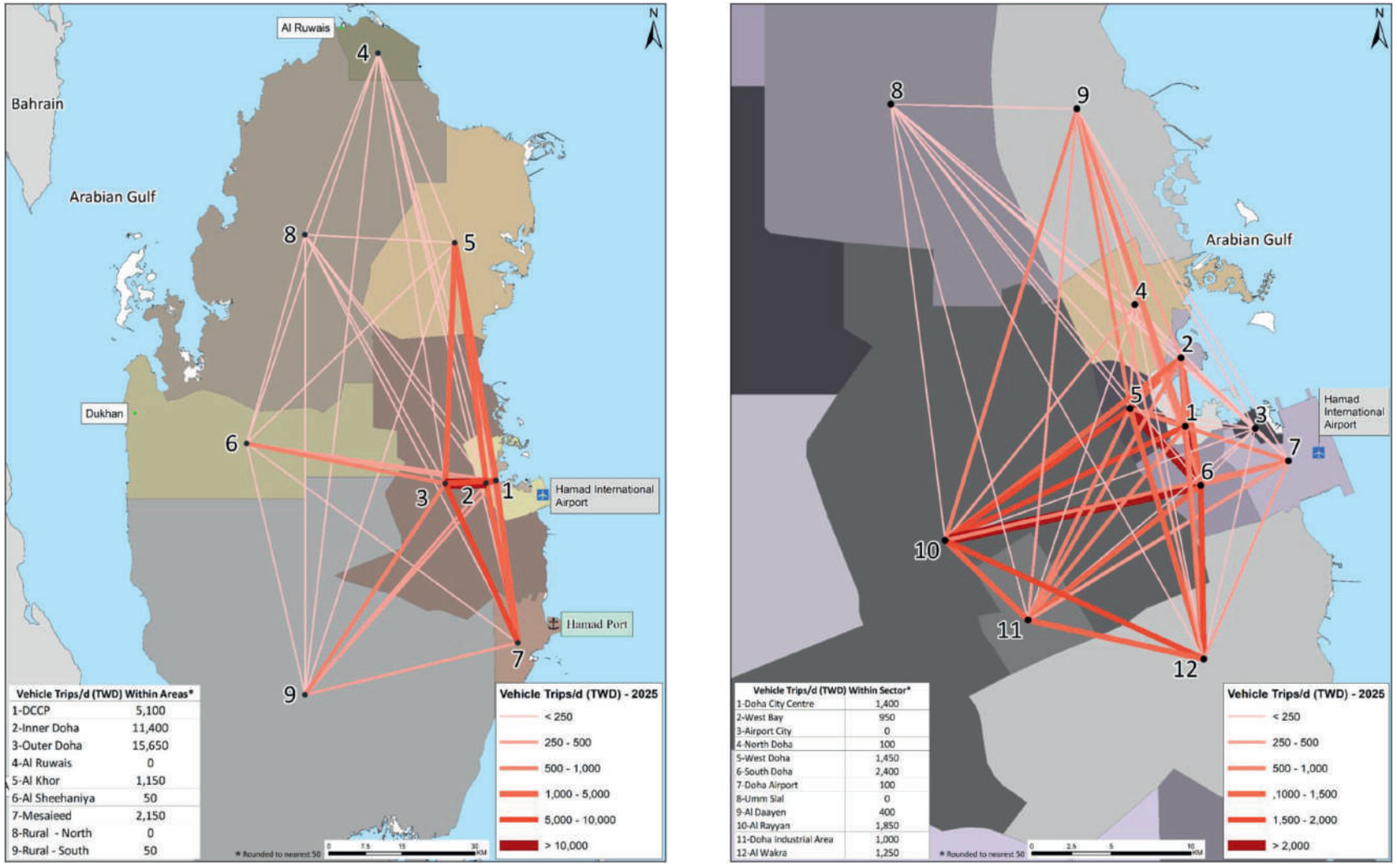
Figure 5.7 to Figure 5.8 illustrate the desire lines (in terms of HGV vehicle-based origin-destination trip flows) for a typical weekday in Qatar and Doha, considering all HYs.

Desire Line Maps for HGV's

Figure 5.9 and Figure 5.10 show the above flows by area in map form for the typical weekday (i.e. 24 hours) for Qatar and the DMA respectively. From the desire flow line maps, the following can be inferred:

- Regarding the Qatar wide nine sectors, significant HGV trips for the full week-day occur between Doha City Centre, Inner Doha and Outer Doha (industrial area and Al Rayyan);
- MIC, Ras Laffan Industrial City (RLIC) and Doha Industrial area are also contributing considerable HGV trips;
- Regarding the DMA (12 Sub-sectors) Considerable trips also occur among Doha City Centre, South Doha, Western Doha and Al Rayyan which is similar for all the HYs.

Figure 5.7 – HGV OD Flows - Typical Weekday in 2025 (vehicle-trips)



Source: QSTM2.0

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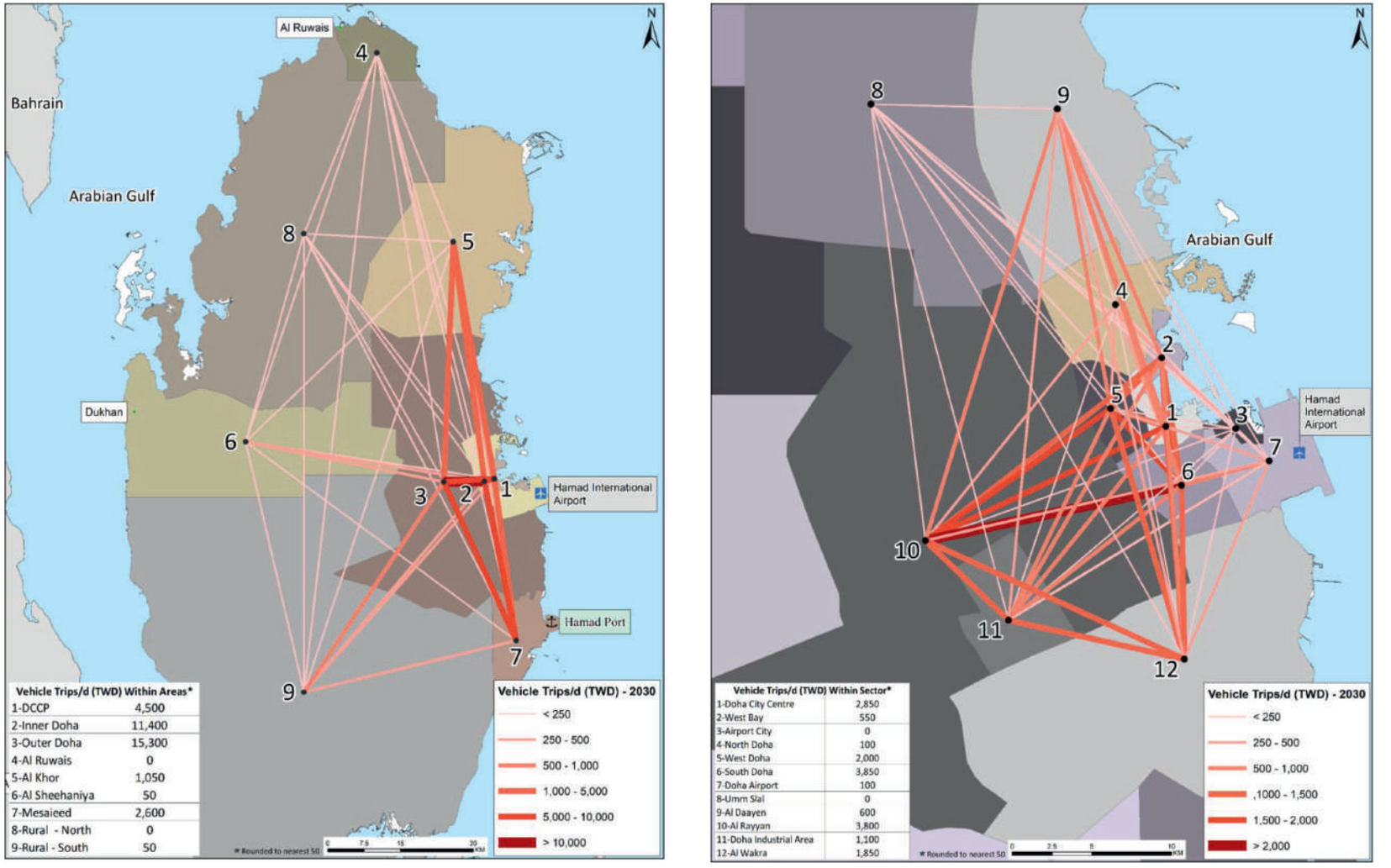
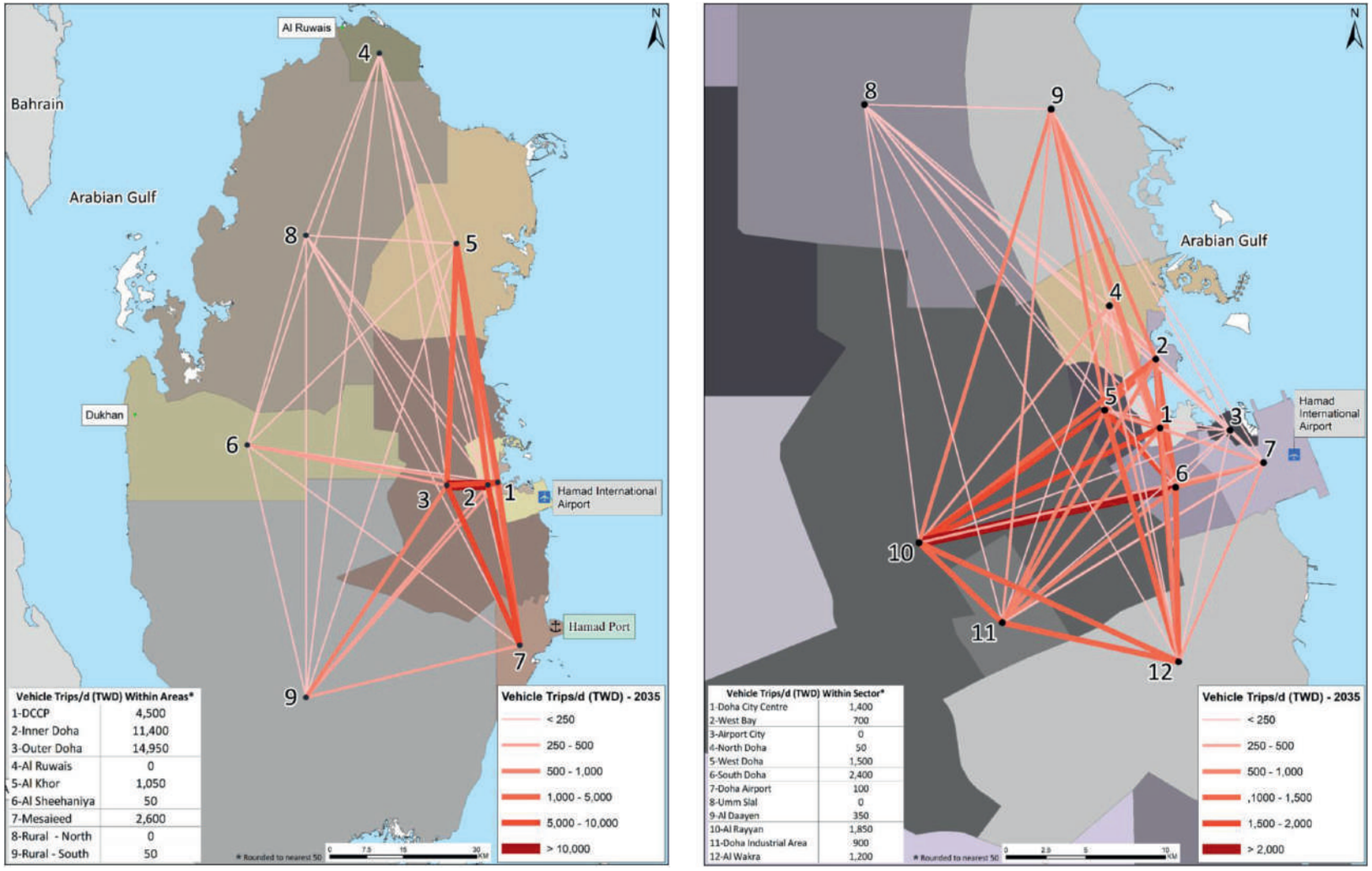
Figure 5.8 – HGV OD Flows - Typical Weekday in 2030 (vehicle-trips)



Source: QSTM2.0

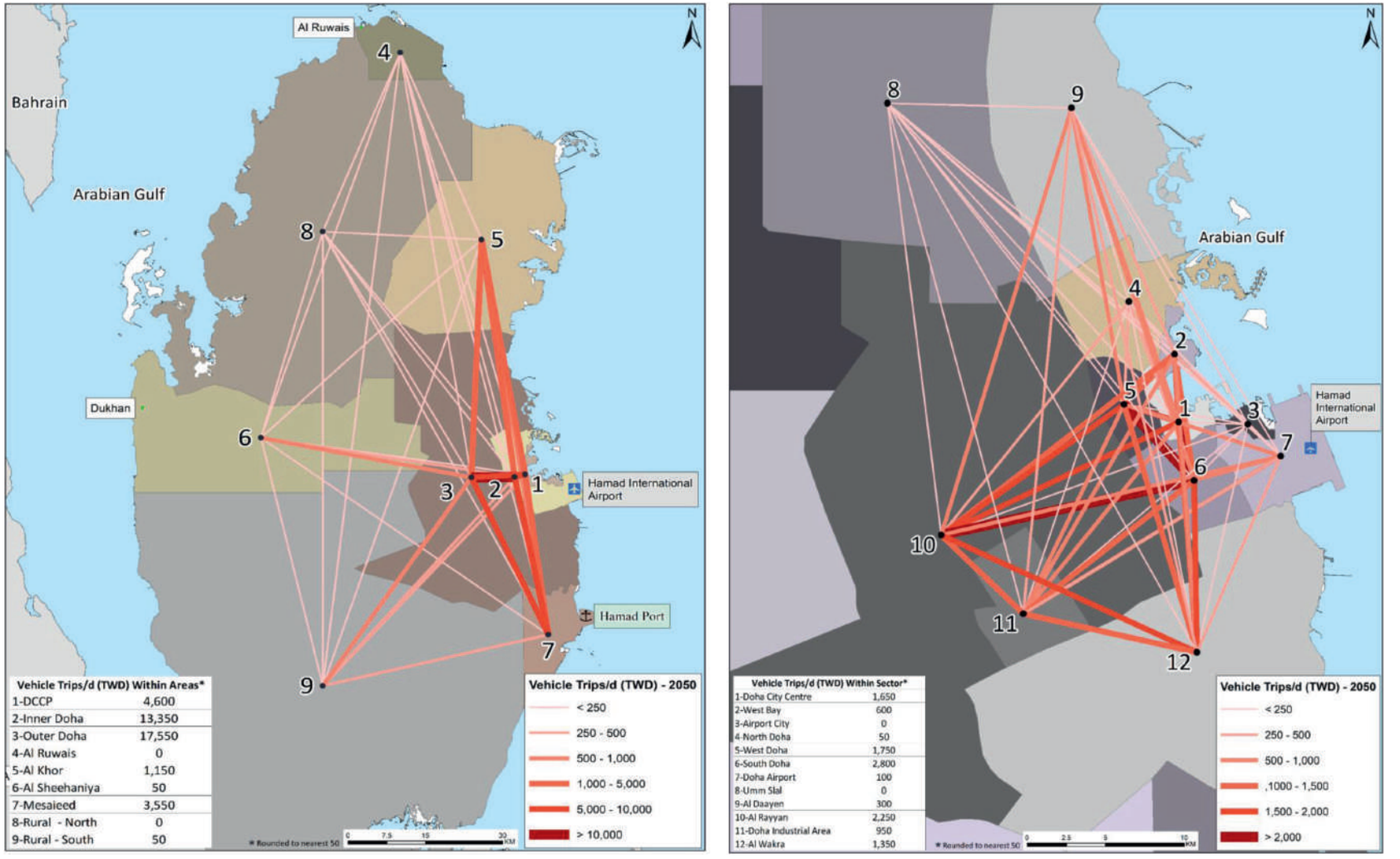
Figure 5.9 – HGV OD Flows - Typical Weekday in 2035 (vehicle-trips)



Source: QSTM2.0

SECTION 5

Figure 5.10 – HGV OD Flows - Typical Weekday in 2050 (vehicle-trips)



Source: QSTM2.0

5.2.2 EXPECTED FUTURE TRUCK FLOWS ON ROADS

The analysis of future demand of the truck traffic in respect of truck volume/capacity, truck percentages of total volume and trucks volume are shown in Figure 5.11 for Qatar and Figure 5.12 in Doha.

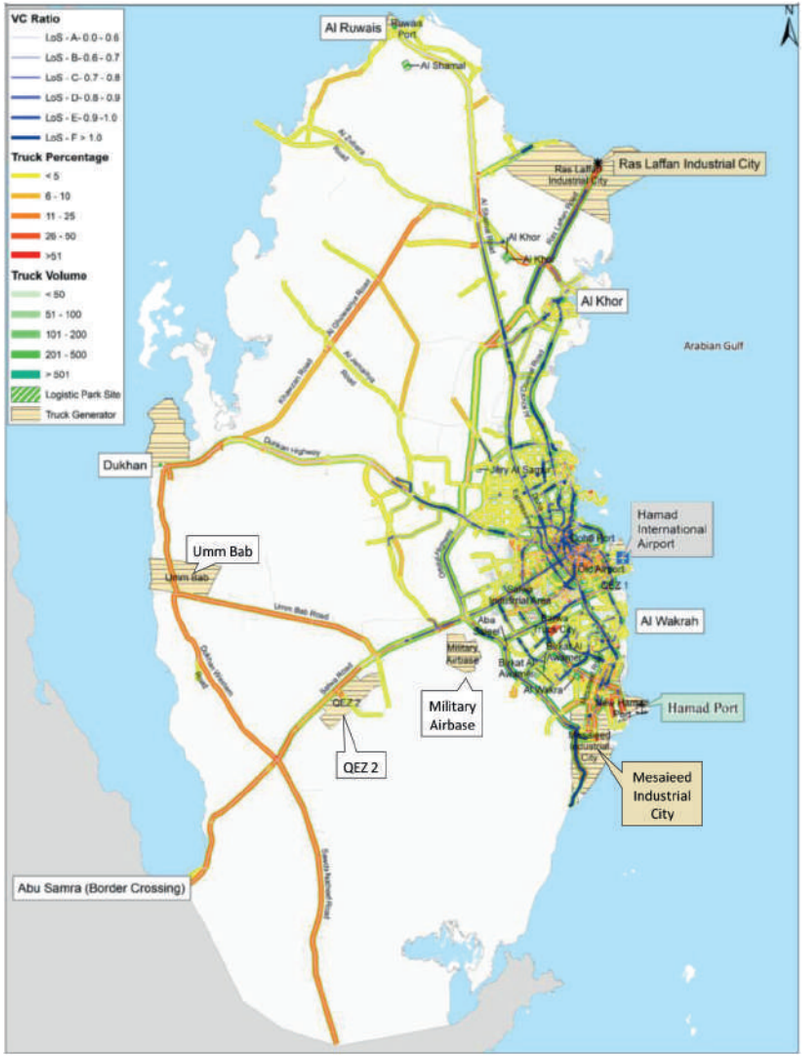
It can be observed in Figure 5.11, that generally truck percentages of total volumes are higher on roads outside DMA, however, the volumes and volume over capacity for overall traffic are low. However, on some major radial roads, such as, Salwa Road, Al Rayan Road, Al Shamal Road, Ras Laffan Road and most of the major roads in the vicinity of Hamad Port and MIC, the truck volume is high, as well as volume/capacity ratio. This means that these roads will carry the majority of the truck traffic outside DMA.

The proposed new additional roads or upgrades to the existing roads identified in the Updated TMPQ for the future truck route network outside of the DMA include, Southern Highway, Sawda Natheel Road, Al Karana-Al Khor Highway, Al Jamailiya Road, Al Zubara Road and Ras Laffan Road. These roads will play an important role to spread the truck traffic, with improved freight service to the industrial cities and farms.

From Figure 5.12, it can be observed that within DMA the truck traffic continues to use the radial roads to enter central Doha and therefore truck restrictions are critical for proper management of traffic inside the DMA. Therefore, in future the TDM measures recommended in the Updated TMPQ will play a vital role in the overall traffic and freight efficiency within Doha as well as outside DMA.

The proposed new additional roads or upgrades to the existing roads identified in the Updated TMPQ for the future truck route network within DMA include, extension of Industrial Area Road up to Al Majd Road, Western Industrial Expressway, South Industrial Highway, G-Ring Road, Al Furousiya Street, Bani Hajar-Lusail Link and Al Kahraitiyat Road. These roads will play an important role to spread the truck traffic with improved freight service within DMA.

Figure 5.11 – Truck Route Assessment - 2050 Reference Case (Qatar)



Source: QSTM2.0

Figure 5.12 – Truck Route Assessment - 2050 Reference Case (DMA)

Source: QSTM2.0

5.2.3 MAJOR FUTURE TRUCK GENERATORS

The future key truck generators will mostly remain the same but with an increasing truck traffic because of the development and expansion of these areas, such as, expansion of Hamad Port and Hamad International Airport as well as the industrial areas and economic zones.

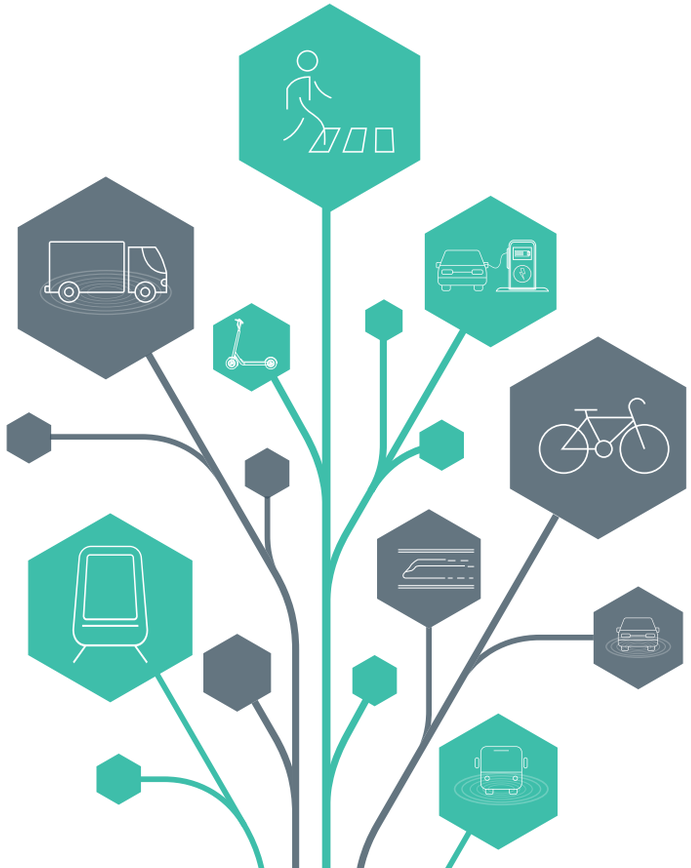
New key generators in future will be Al Karana (Economic Zone 2), Al Khor Industrial Area and the emerging logistic areas. All the major existing and future truck generator areas are:

1. Hamad Port
2. Doha Port
3. Al Ruwais Port
4. Hamad International Airport (HIA)
5. Mesaieed Industrial City
6. Ras Laffan Industrial City
7. Dukhan Industrial City
8. Lusail City
9. Al Wakra City
10. Al Khor City
11. Al Khor Industrial Area
12. Lusail City
13. Industrial Area
14. Abu Samra- Land Border with Saudi Arabia
15. Al Karana (QEZ2)
16. Umm Alhoul (QEZ3)
17. Ras Bufontas (QEZ1)
18. Logistic Areas (Parks, Warehouses, Holding Areas)

5.3 KEY FUTURE CHALLANGES

The key issues for the future of freight movement in Qatar are:

- Special training for truck drivers with emphasis on map reading, signage and smart technology;
- Technology introduction to optimize freight delivery by developing freight applications for Qatar conditions to improve efficiency and reduce costs;
- First and last mile solutions with technology-based management;
- Commitment of the key stakeholders to implement the recommended policies for designated trucks routes, parking and restrictions;
- Continuous monitoring of the Updated TMPQ KPIs related to heavy goods transport.



2050

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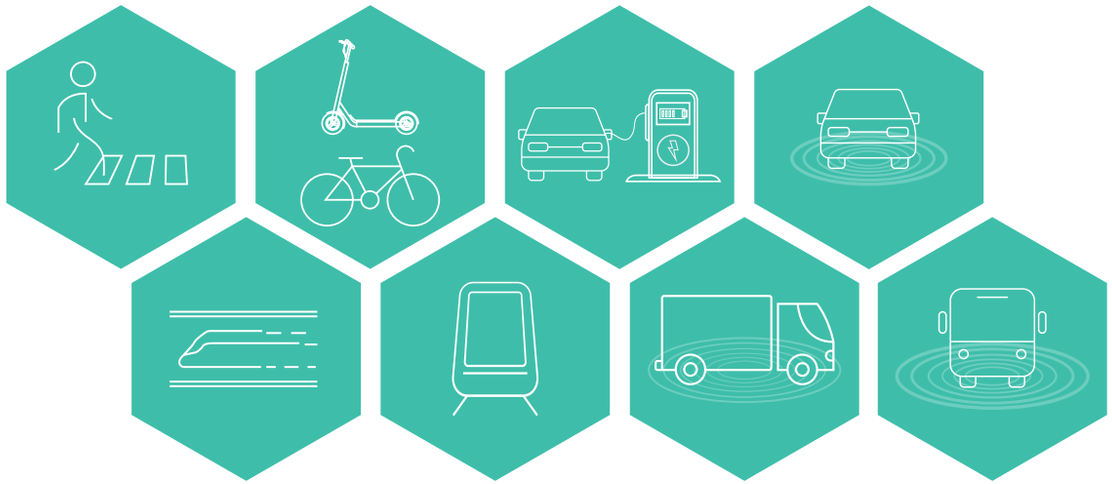
SECTION - 06

PROPOSED TRUCK ROUTE NETWORK, POLICIES, AND FACILITIES



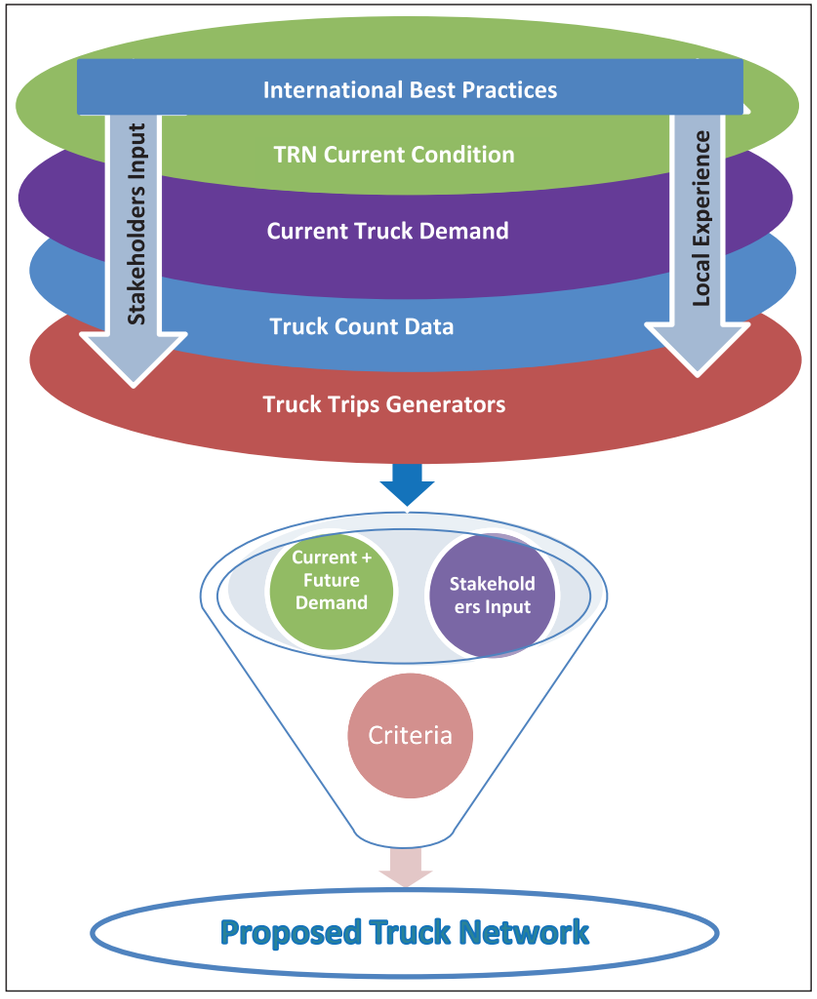
6 PROPOSED TRUCK ROUTE NETWORK, POLICIES, AND FACILITIES

6.1 APPROACH FOR THE DEVELOPMENT OF TRUCK ROUTE NETWORK

The approach adopted in developing the TRN is based on the analysis of the following information:

- International Best Practice;
- Review of the current truck network and identification of major issues;
- Review of the current demand of light and heavy goods vehicles obtained from QSTM2;
- Review of current traffic count data (2018) and its comparison to QSTM2 data;
- Review of the current and future requirements of major truck traffic generators;
- Review of TMPQ 2008 Truck Route Network;
- Review of the future network and truck flows;
- Key stakeholders input through workshops and correspondence;
- Updated TMPQ Vision and Objectives
- Updated TMPQ Freight Policies;
- Local experience and knowledge.

Figure 6.1 – Proposed Truck Route Network Approach



Source: Updated TMPQ

SECTION 6

Once all the required and available information/data was reviewed, a comprehensive TRN network has been developed, as proposed in this report. The proposed TRN will also incorporate the stakeholder requirements.

6.1.1 CRITERIA FOR DEVELOPING THE TRUCK ROUTE NETWORK

Before deciding on the criteria for developing the TRN, it is important to define the truck categories which meet the requirement of its users in a simple manner. For the TRN, the trucks are clearly categorized into three categories.

6.1.1.1 Definition of Trucks for Truck Route Network Usage

Trucks can be defined in a number of ways. Vehicles can be classified by weight, number of axles or width depending on whether the classification is being used for planning purposes or design purposes. The categorization of trucks by weight tends to be used more for pavement design, while dimensions of trucks are used during geometric design of roads. However, the TRN requirements are unique and therefore a categorization or classification of trucks is required to meet its specific requirements. For the purposes of the truck route network and policy framework, all vehicles are considered to fall into one the following categories:

- Class 1: Unrestricted Vehicles
- Class 2: Medium Semi-Restricted Vehicles
- Class 3: Heavy Restricted Vehicles

The classification depends on the Gross Vehicle Weight (GVW), the Maximum Singe Axle Load (MSAL), the number of axles, and the type of vehicle.

Class 1: Unrestricted Vehicles

This class encompasses all passenger cars, buses and anything other than Class 2 and Class 3 trucks. It also includes small trucks which have a limited impact on traffic and require more local access to deliver goods locally. This Class has the following characteristics:

- Passenger cars and vans (including when towing a trailer);
- Buses; and
- Single-unit (non-articulated) trucks which have no more than two axles and a GVW of no more than 12,000 kg and a MSAL of 8,000 kg.

Class 2: Semi-Restricted Trucks

Trucks in this category have a significant impact on the traffic operation of the road, and some restrictions should be placed on them. This category is defined as:

- Trucks with a GVW between 12,000 kg and 40,000 kg;
- Trucks with 3 or 4 axles; and
- Articulated trucks with a GVW of less than 40,000 kg.

Class 3: Restricted Trucks

The biggest and heaviest trucks fall in this category. These trucks are severely disruptive to traffic, and are entirely prohibited on most urban roads. They should only travel on the designated strategic truck routes. They are defined as:

- Trucks with a GVW of greater than 40,000 kg; and
- Trucks with 5 or more axles.

6.1.1.2 Criteria

The criteria used to develop the TRN include the following:

- Adopt the prevalent road hierarchy in the proposed TRN;
- Provide a continuous strategic network for trucks travelling across Qatar;
- Provide routes which relieve congestion, improve air quality, reduce mixed use traffic and improve safety;
- Avoid sensitive areas where possible, such as, environmental reservations, heritage and built areas;
- Address key stakeholder requirements where possible;
- Consider major developments, commercial centers, distribution centers and industrial areas;
- Consider locations of facilities such as logistics parks, transfer hubs (where goods can be transferred from larger vehicles to smaller vehicles for onward delivery to their final destination; plus, other facilities such as truck parking and regulatory facilities such as truck weigh stations;
- Provide zones of restriction on truck movement (based on time of day) within Doha city;
- Provide network continuity for vehicles carrying hazardous goods;
- Provide network continuity for oversized vehicles;
- Select routes and facilities which offer opportunities for focused infrastructure investment.

6.1.2 DATA GATHERED, AND STAKEHOLDERS ENGAGED IN DEVELOPING TRUCK NETWORK

The process adopted to develop the truck network included extensive collection of data and analysis, as well as inputs and suggestions from stakeholders. These have included:

- Extensive data from sources provided by MOTC (including land use data from MME, regulation and truck vehicle characteristics information from MOI;
- Review of traffic count data from Package 1, modelling data from QSTM, and analysis of such data within GIS;
- Views expressed by stakeholders at a Stakeholder Workshop held on 17th June 2019;
- Views expressed by MOTC officers at a workshop on Scheme Development held on 26/27 June 2019;
- Further information and requests provided by key stakeholders via letters sent on the first draft Truck Route Network Report sent to

them by MOTC-LTPD. Stakeholders providing responses included:

- Network Planning team of Land Transport Planning Department
- Ministry of Municipalities and Environment – Urban Planning Department
- Ashghal
- Ministry of Interior
- Qatar Petroleum
- Qatar Free Zones
- Hamad International Airport
- Kahramaa
- Manateq

The truck network has been considered taking into account the following factors, which include:

- Movement of hazardous goods – those routes for transport of hazardous goods have been considered. This includes the movement of goods between the following locations:
  - Dukhan and Doha;
  - Ras Laffan and Doha;
  - Mesaieed and Doha;
  - Dukhan and Mesaieed (there is a center for dangerous waste treatment in Mesaieed Industrial City); and
  - Special generators at Hamad Port and Hamad International Airport.
- Restrictions on bridge loading on the Qatar Primary Highway Network;
- The role of signage;
- Enforcement and penalties for non-compliance;
- Local exceptions and restrictions;
- Emergency vehicle routing;
- Military vehicles requirements and routing; and
- Location of supporting facilities (truck parking, weigh stations, etc.).

The development of the network has also taken account of a number of global best practices, including the role of truck holding areas, distribution centers, truck parking, and allowing for impacts of construction activity to be accommodated.

6.1.3 SERVING THE INDUSTRIAL CITIES WITH DIRECT ROUTES

A number of routes proposed for trucks support the development of the Industrial Cities. The network has been developed using the key radials in the country between Doha and Abu Samra, Doha and Dukhan and Doha and Shamal, with links from these to the Industrial Cities.

- **Mesaieed Industrial City** is served by a key arterial linking Doha with Mesaieed (this route also serves **QEZ3**) and then the new Sealine road will play a major role in easing movement of trucks in the near future and will help ease the current congestion and long queues at the city's security gates.

- **Ras Laffan Industrial City** is served by a spur off the link from Doha to Shamal passing close by to Al Khor, plus Al Huweila Road. Additionally, the link from Dukhan to Ras Laffan Industrial City will increase traffic mobility and ease of access to Ras Laffan and will also contribute to delivering major new hydrocarbon projects on time.
- **Dukhan** is served by the key radial between Doha and Dukhan, plus links to Salwa Road and Shamal. The route connecting Umm Bab to Salwa Road is of particular safety concern due to the deteriorated condition of the road. The road is largely used by cement manufacturers and quarries, the route is recommended to be a dedicated truck route with specific facilities for trucks (such as dedicated truck lanes, truck weight monitoring stations and other safety measures.
- **Al Karana (QEZ2)** is a major economic and industrial city and served by the radial route along Salwa Road between Doha and Abu Samra.
- **Ul Alhoul (QEZ3)** is a major economic and industrial city and served by the Mesaieed Expressway.

6.1.4 TRUCK ROUTE CATEGORIES

The truck route network on which the vehicles described in Sub-section 6.1.1 will travel has been defined under two tiers of route:

- **Strategic Routes**– Truck routes which form part of the strategic highway network (generally Freeways and Expressways) and which connect key cities or generators and have no restrictions.
- **Local Truck Routes** - Routes which connect the strategic truck route network to specific local destinations (e.g. key generators or attractors), are aligned generally along arterial roads, and can have restrictions. They provide local connectivity between parts of the strategic truck network and enable goods to reach their destination.

6.1.5 LOGISTICS PARKS

The network has taken account of the need for Logistics Parks, Consolidation Centers, Truck Holding Areas and Distribution Centers. These are located at Birkaht Al Awamer, Al Wakra, Abu Saleel, Al Ruwais and Jery al Samur, and are generally linked via the Al Majd Road, with local truck routes towards Mesaieed linking the logistics parks at Al Wakra and Birkaht Al Awamer. The locations proposed by Manateq have been selected with business interests and needs in mind and are mostly suited to aspirations of businesses within Qatar. These have been integrated into the overall truck network.

6.1.6 TRUCK PARKING

Separate locations have been identified for truck parking. The criteria for their selection took account of the following:

- On approach to key destinations of goods movement (industrial cities, economic zones, Hamad Port and Hamad International Airport, industrial area);
- Close to already existing logistics parks;

- Sufficient space off carriageway so that the trucks can be moved off the main highway;
- Opportunities to provide facilities for drivers (accommodation, food, where public transport is available to facilities during break periods); and
- Locations supported by key freight haulers and stakeholders

The effectiveness of these truck parking facilities will be significantly enhanced through the application of Intelligent Transport Systems (ITS). This will assist drivers in obtaining real-time information about the truck parking. Intelligent Transport Systems can provide an important tool, if applied in the right way, for regulating and managing the movement of trucks at peak hours inside Mesaieed Industrial City for example, including the entrance gates to the city to minimize current congestion and long queues experienced there.

6.2 PROPOSED TRUCK ROUTE NETWORK

6.2.1 INTRODUCTION

The proposed TRN is developed by providing a coherent and connected network for HY 2025 and HY 2050. Since there is no formal truck route network, therefore the HY 2025 TRN will become the formal network for truck drivers to follow.

6.2.2 FUTURE SCHEMES TO SUPPORT TRUCK ROUTES NETWORK

A designated Truck Route Network (TRN) is crucial for supporting the local, regional and national economic activity and development within Qatar. It can efficiently serve the haulage industry by facilitating truck operations and decreasing freight costs.

If not provided with a designated and effective TRN, freight can have an even greater adverse impact on the environment, safety and public health and amenity, for example if freely circulating in residential or other sensitive areas less suitable for sizable and more polluting vehicles.

A TRN aims at addressing future truck route requirements, increasing the nationwide truck operational efficiency, safety, the wellbeing of drivers, the quality of living for the wider community, to achieve improvements in infrastructure, facilities, operations and fleet, as well as to implement supportive regulation or policy actions.

Trucks are expected to continue being the most flexible mode for transporting the majority of goods within Qatar. Table 6.2 outlines the truck network schemes recommended in the Updated TMPQ.

Table 6.1 – Truck Network Schemes in the Updated TMPQ

ID	Mode	Option Type	Scheme Name	Scheme Description	Objective / Justification
TR-12	Truck	Facilities	Provide new truck maintenance, vehicle and truck driver testing facilities on specific routes	Review need for/benefit of additional maintenance and testing facilities to allow MOTC and operators to verify if standards are being met and with specific driver testing and vehicle testing facilities.	Improve standard of truck facilities for economic efficiency and safety
TR-21	Truck	Transport Planning	Provision of improved information on dangerous goods routes	Produce publicity relating to moving dangerous goods. Awareness brochure. Supplementary on-line information.	This scheme will widen driver awareness of where the routes for vehicles carrying hazardous goods are, and thereby improve public safety
TR-22	Truck	Transport Planning	Formalize the Truck Network as it currently stands to include Strategic Truck Routes, supported by local access routes for trucks	This scheme covers any required infrastructure improvements to connect local truck access routes to strategic truck access routes, and integrate those routes to be used by trucks carrying dangerous goods, trucks which are oversized and water trucks into the overall network, so that operations are made safer and more efficiently. Any further needed infrastructure improvements to deliver an integrated truck route network.	Reduce the impact of freight transportation on daily traffic, especially around large freight traffic generator areas and in urban centers with a high level of commercial activity.
TR-27	Truck	Regulatory	Develop and implement standard vehicle definitions	Specify goods vehicle types including number of axles, length, height, etc. and how these determine categorization to include in a manual. This is so that all freight carriers and enforcement bodies have a common understanding of the categorization.	This scheme will clearly define different types of truck vehicles for operators and government departments
TR-1,4,6,7,10,13,14,15,16,17, 18,19,20,21,25,26 & 28	Truck	Study	Implement Freight Transport Strategy	Implement Freight Transport Strategy and Enforcement (Truck Routes, Parking, Drivers Licensing Requirements and Training, Enforcement)	A comprehensive commercial strategy that will support the long-term planning for efficient movement of truck traffic and reduce impacts on existing communities, the environment, and the broader transportation network.
TR-2,3,8,11 & 24	Truck	Study	Qatar Freight Master Plan Study	Develop a comprehensive Freight Master Plan for 2050 that will harness latest technology to optimize freight transport to support QNV 2030, MOTC Strategy and support economic and social development.	Freight long-term planning to optimize freight transportation harness new fright technology and develop a robust heavy vehicles network.

6.2.3 THE PROPOSED TRUCK NETWORK AND FACILITIES

The future TRN is developed to provide three basic classifications for trucks operators to follow. This will help to better manage the movement of HGVs. Therefore, a simple classification has been proposed, and includes routes that are either **unrestricted**, **restricted**, or **prohibited**. This classification is described in Table 6.2 and will replace the strategic and local route definitions that are currently used.

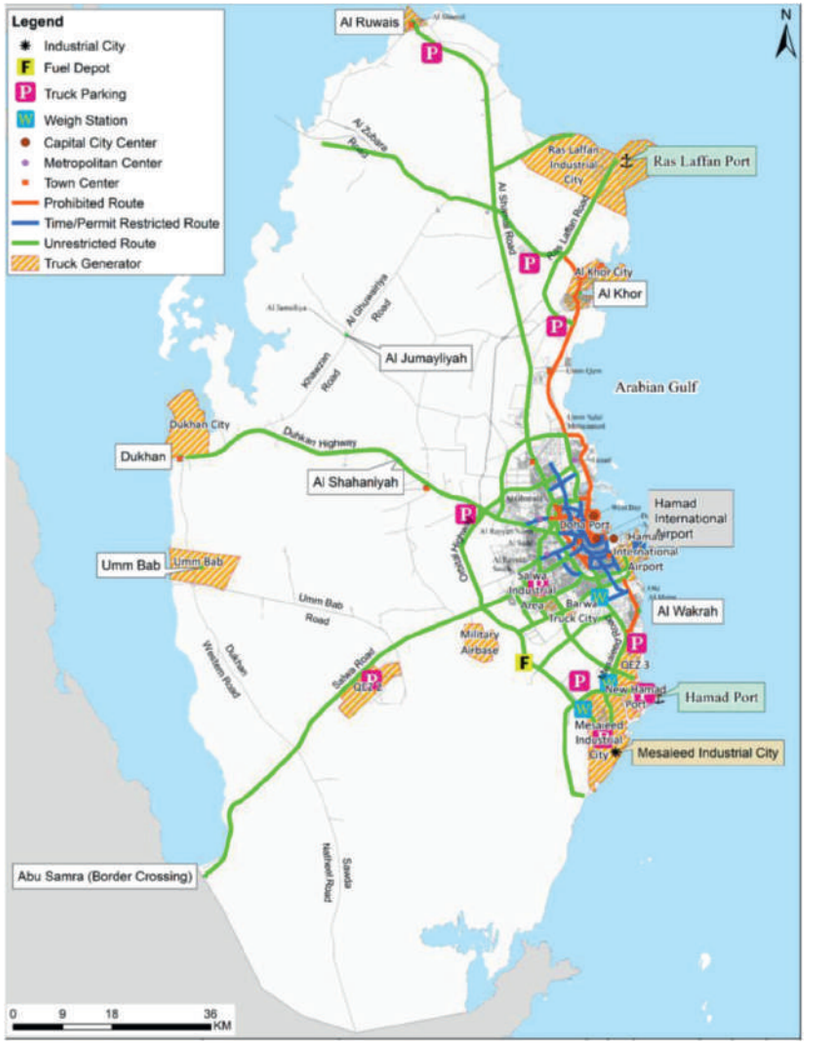
Table 6.2 – Route Classification

Unrestricted	Routes/areas that trucks can access freely.
Restricted	Routes/areas which have restrictions placed on them (e.g. time of day, clearance restrictions).
Prohibited	Routes/areas where trucks MUST NOT access at any time.

The proposed complete TRN for Qatar and Doha are shown in Figure 6.2 (Qatar), and Figure 6.3 (DMA) for HY 2025, and Figure 6.4 (Qatar) and Figure 6.5 (DMA) HY 2050. The figures also show truck facilities such as truck parking and logistics parks. The routes for hazardous goods vehicles and oversized vehicles are covered in section 7.

The network has been developed in light of comments and views of stakeholders, and in conjunction with the highway schemes developed as described in Technical Report 5. The policy aspects to support the truck route network are covered in the Policy Position Papers Report PKG4-WPR-RPT-TCN-0018.

Figure 6.2 – Proposed Truck Route Network for Qatar - 2025

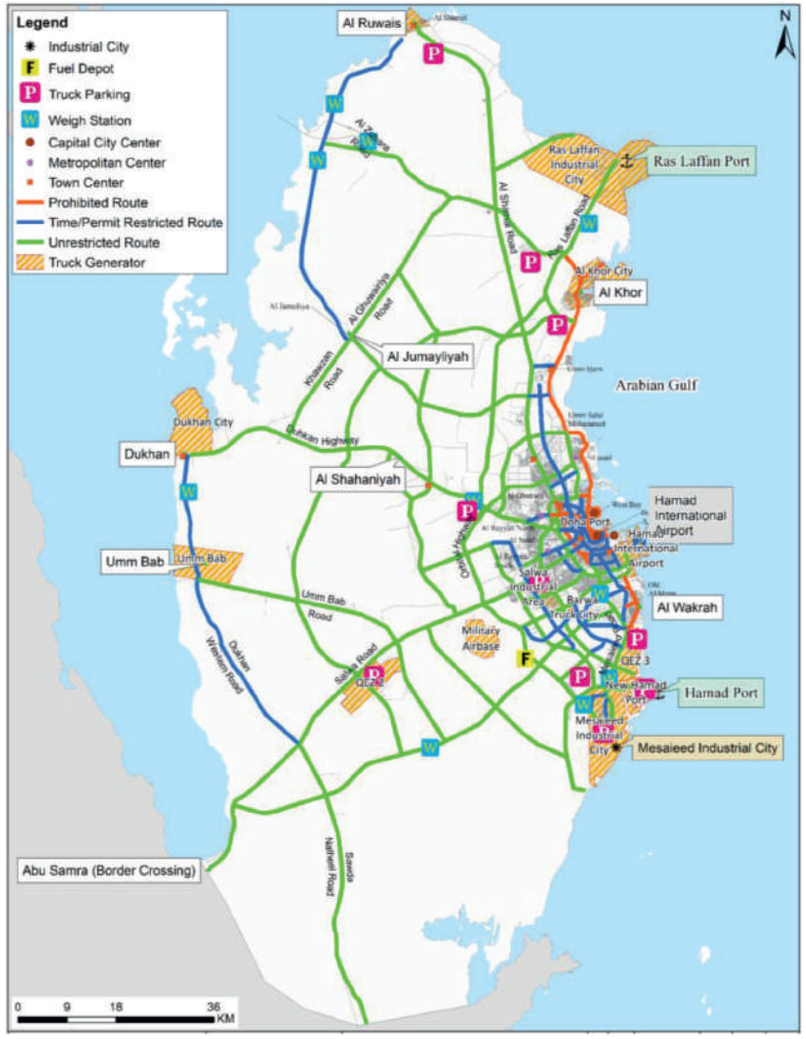


Source: QSTM2.0

Figure 6.3 – Proposed Truck Route Network for Doha – 2025

Source: QSTM2.0

Figure 6.4 – Proposed Truck Route Network for Qatar – 2050



Source: QSTM2.0

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Figure 6.5 – Proposed Truck Route Network for Doha – 2050

Source: QSTM2.0

6.2.4 JUSTIFICATION FOR TRUCK ROUTES SELECTED

Each truck route has been selected on the basis of the objectives and criteria stated at the beginning of this section. The justification for each key scheme is shown in Table 6.3 below

Table 6.3 – Justification by Route Section and Type

Route Section	TRN Category	Justification
New Highway (HW22) – Western Freeway (Salwa-Dukhan-Zubara-Ruwais)	Strategic	This is an important North-South link along the whole of the western side of Qatar. This provides an alternative to using Salwa Road / Orbital Highway / Al Shamal Road which is a longer route and carries high volumes of trucks already, those destined for Doha. This route will be designated as a strategic truck route.
New Highway (HW24) – Umm Bab Road (Umm Bab to Mekeines near QEZ2	Strategic	This scheme provides more direct access than Dukhan Road to the quarries and cement plants along Umm Bab, and alternative access to Dukhan from southern Doha. The scheme is also supported by Qatar Petroleum to link Dukhan Western Road (Umm Bab) with Salwa Road. This route will also include dedicated truck lanes, since there is space to do so, and other traffic may wish to pass trucks turning into quarries.
New Highway (HW25) – Al Khor Bypass and Service Road to Ras Laffan	Strategic	This scheme provides: ▸ Truck access for Ras Laffan in a way which bypasses Al Khor, and keeps the traffic separate; ▸ Alternative access to the northern access route in to Ras Laffan; ▸ It provides a direct link off the Orbital Highway into Ras Laffan;

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Table 6.3 – Justification by Route Section and Type

Route Section	TRN Category	Justification
New Highway (HW29) – Western Freeway (Al Ghuwairiya Road) – Al Khor Link	Strategic	To give trucks using the Western Freeway maximum accessibility, and to encourage the greatest use of the corridor, an access across to Al Khor will reduce the mileage for those trucks. This scheme connects from Al Ghumairiya Road to the south-east via the truck parking to reach Al Khor.
New Highway (HW30) - Southern Highway parallel to Salwa Road	Strategic	Provision for trucks integrated with the proposed highway improvement scheme to provide an alternative corridor to Salwa Road to avoid congestion. Provides alternative access routes for trucks coming from the Industrial Area, Wukair, Wakra and southern parts of Doha
New Highway (HW31 & HW32) Link Southern Highway to Salwa Rd	Strategic	These links connect Salwa Road to the Southern Highway to provide alternative locations where trucks can exit Salwa Road onto the southern alternative. One of these links provides strategic connection into QEZ2. The scale of this zones warrants two access routes to it.
Doha – Salwa Road – Abu Samra	Strategic	Required to provide access for goods coming across the border to and from Saudi Arabia at Abu Samra, through the busiest goods corridor in Doha. Over 292,000 trucks per year used this access previous to the introduction of the blockade, so future provision needs to allow for these goods.
Al Huwaila Road (Al Shamal Road to Ras Laffan)	Strategic	Truck route which provides alternative access into Ras Laffan for trucks from Shamal Road. Given the size of the Industrial City, it is important that the area has two routes in the event of any accident or incident. Also provides more direct access for trucks coming from Al Zubara.
Al Zubara Road to Al Khor	Strategic	To provide connection for trucks from north-west Qatar (Zubara area) into Al Khor. This provides alternative connection for trucks moving north-south across the country.
Al Ruwais – Shamal Road – Doha - Mesaieed	Strategic	This is the core strategic north/south link through Qatar between Ruwais and Mesaieed and is retained to provide connection for trucks. This will cater for trucks wishing to pass between Doha and Al Khor, as a separate coastal link between Doha and Al Khor is not provided for trucks.
Ras Laffan to Mesaieed via Orbital Highway (C2/C3/C4)	Strategic	This scheme provides a link between Ras Laffan and Mesaieed which does not run through the urban area of Doha. These routes will also include dedicated truck lanes as are currently provided on Routes C2/C3/C4.
Salwa Road and Doha Industrial Area Roads	Strategic	The link into Doha from Salwa Road is classified as strategic because there is a key generator at the Doha Wholesale Market. The links from Salwa to the Industrial Area are also classified as strategic due to the nature of activities in this area.
Mesaieed Industrial City link to Doha	Strategic	Connection from Mesaieed Industrial City to Doha, the Logistics Parks and Orbital Highway. Given activities regarding fuel storage and shipping, there is a need for a Strategic classified link between Mesaieed and Doha to give access to Doha International Airport and Industrial Area.
Industrial Area – G Ring – QEZ1 to Hamad International Airport	Strategic	To provide strategic connection to QEZ1 and Hamad International Airport, without trucks needing to enter the city.
Salwa Road to NW Connecting Link to Western Freeway	Local	To provide an alternative central north/south link for trucks running further west than the Orbital Highway. Running parallel to the Orbital Highway, this link offers an alternative routing for trucks
QEZ3 to Wakra to Doha	Local	Downgrade of this route to be a Local Access due to the current negative impact of trucks on Wakra residential area. By designating this as local, this will encourage larger trucks off this route onto the strategic truck network.

Table 6.3 – Justification by Route Section and Type

Route Section	TRN Category	Justification
Al Wukair Street	Local	Local access route to link the northern part of QEZ3 with the Logistics Parks at Birkaht Al Awamer. Alternative access is provided via routes from the south of QEZ3.
Arterials within Doha Restricted Area	Local	To connect the strategic route network together and to link that network to the local destinations of truck traffic. These are all designated as local access routes apart from Salwa Road which is designated Strategic as far as the Wholesale Market.
Doha Expressway (Duhail to Fereej Al Ali	Local	This route is retained as local to accommodate MOI's proposal, permitting 4 axles or more with time restrictions. There are local access alternatives on C-Ring, Furosiya, and Sabah Al Ahmed.
Doha Expressway to Al Shamal Road	Local	To provide connection from Khalifa Road to Al Shamal Road with a local access route ,to allow time restrictions to be placed on this as appropriate. The route then becomes a strategic truck route once it runs north of the intersection of the Salwa-Lusail temporary truck route with Doha Expressway
Airport City to C Ring	Local	To provide local access into the city for trucks without extending the strategic network into the city, and the Strategic Truck Network starts at the Airport.
Al Khafji Street to Lusail via Jamaiaa Street	Local	One local truck access route is retained between Doha and Lusail, the coastal route is not allocated as truck route.
Wadi al Wasah to Lusail	Local	Al Shamal Road to Lusail for local truck access. Route provides access for trucks to north and south Lusail
New Sealine Road	Strategic & Local	Link provided by new Sealine Road to Mesaieed Industrial City for trucks plus local access roads to this area. This was also requested by Qatar Petroleum to be incorporated within the network.

6.2.5 TRUCK FACILITIES

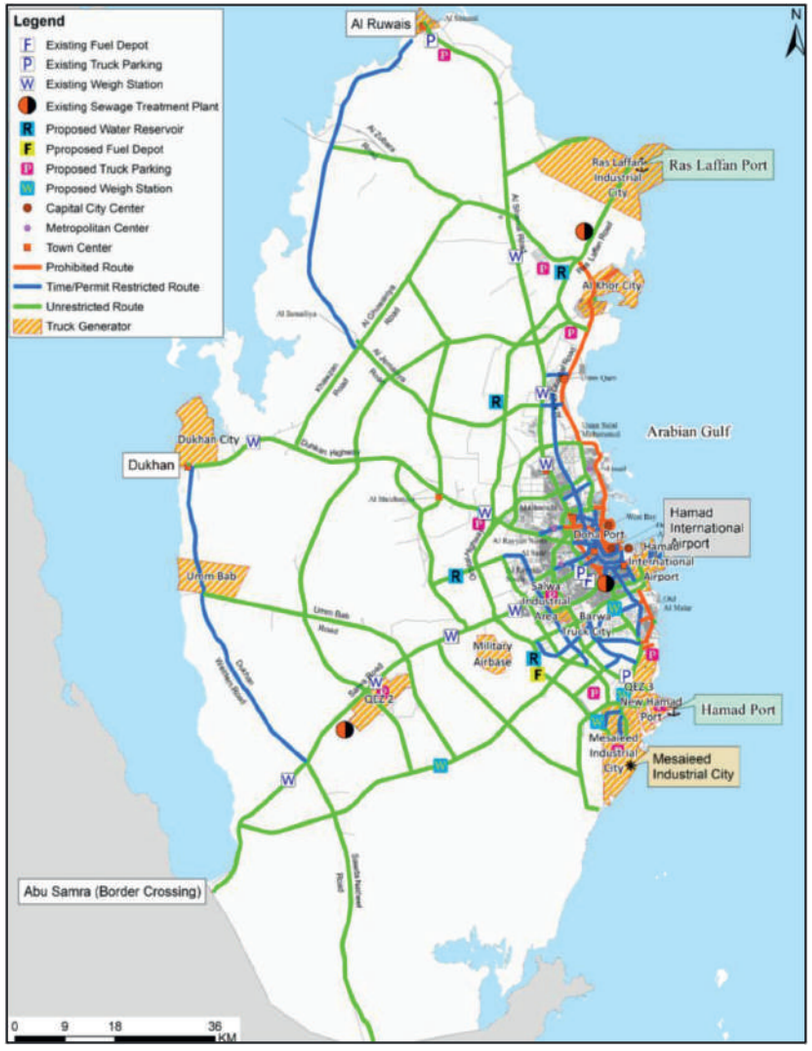
Recommended supporting truck facilities are shown in Table 6.4.

Table 6.4 – Key Changes to Supporting Facilities

Change	Justification
10 x additional truck parking facilities	4 located in the South East, supporting Hamad Port, Mesaieed Industrial City, and QEZ3. 1 located within QEZ2 to support the forecast growth in truck movements within this area 1 located in the north to support the Al Shamal logistics park 1 located in the north east to support the Al Khor logistics park 1 located within Doha Industrial City to support growth of freight and logistics activity 1 located close to Al Khor to enable trucks to park close to Al Khor during hours of restricted operations 1 located along the Orbital Highway to enable trucks to park outside of the DMA area during hours of restricted operations.
1 x additional fuel depot	Located close to Birkaht Al Awamer logistics part to support future growth in truck movements.
5 x additional weigh stations	2 located in the South East to support the safe movement of trucks out of Hamad Port and Mesaieed Industrial City 1 located on the Dukhan western road to support trucks from Dukhan Industrial Areas moving south towards Abu Samra 1 located close to the G ring road to support truck movements out of Hamad International Airport 1 located along the new southern highway to support truck movements from the industrial area.

Figure 6.6 and Figure 6.7 show the truck facilities in Qatar and Doha respectively.

Figure 6.6 – Proposed Truck Facilities in Qatar



Source: QSTM2.0

Figure 6.7 – Proposed Truck Facilities in Doha

Source: QSTM2.0

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6.3 LOCAL EXCEPTIONS AND RESTRICTIONS

Local exceptions and restrictions are to be applied in accordance with the Qatar Highway Design Manual. Essentially, this is ensuring that goods vehicles penetrate local residential areas down specific designated corridors rather than all the parallel routes within a community area. These local restrictions will cover vehicles such as garbage trucks, water delivery trucks, construction related trucks and school buses to enable them to pick up school children from close to home.

6.3.1 EMERGENCY VEHICLE ROUTING AND PRIORITIZATION AT TRAFFIC SIGNALS

Vehicles such as ambulances, fire vehicles and police vehicles need to be provided with easy paths to access the locations they need to reach, such as homes, hotels, offices or accident spots. Generally, the design of individual development caters for these vehicles, since these design elements are a requirement of the traffic and transportation assessment undertaken to support the new development. Co-ordination with relevant agencies is required regarding the provision of emergency vehicle routes – these include Ministry of Public Health and Ministry of Interior.

In terms of urban traffic network design, key junctions are designed in a way whereby there is dedicated multi-purpose space that can be utilized by the emergency vehicle, or to allow the emergency vehicle to access through the junction or the turning maneuver it is seeking to make. Figure 6.8 below shows a layout of a road junction where a short lane exists for buses, but which can also be utilized by emergency vehicles seeking to pass through the junction. The vehicles can also be fitted with transponders which can advance the signal cycle to give these vehicles priority (known as a "Hurry Call"). This type of layout can be customized onto the arrangement of typical signal junctions.

Figure 6.8 – Layout of Junction Permitting Emergency Vehicle Access

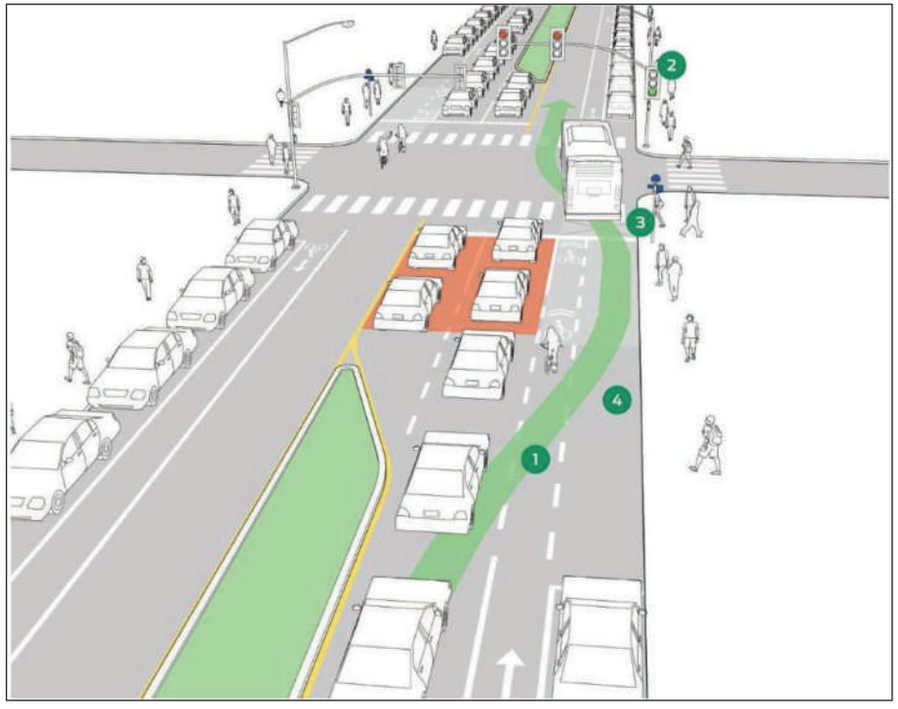
Source: Google Maps

Figure 6.9 shows an alternative layout where the vehicles can route out of the main queue of traffic, through the junction and re-join the other side. This again allows a different configuration where the junction layout suits this solution better. The main traffic is held back at a stop line further back on the right most lane, and priority here can be given to selected vehicles with transponder receivers on board. Education is needed to give attention to cyclists coming up on the right-hand side before the selected vehicles move out of their lane.

There are some locations which are difficult for emergency vehicles to reach. This can be addressed by considering:

- Alternative (secondary) access points to give emergency vehicles access;
- Good pedestrian areas where equipment can be moved easily out of the path of an emergency vehicle if it cannot gain close access easily;
- Reserved lanes for emergency vehicles in case of traffic congestion;

Figure 6.9 – Alternative Layout of Junction Permitting Selected Vehicle Priority



Source: National Association of City Transportation Officials

Ashghal have implemented a trial of a fully integrated Emergency Vehicle Pre-emption System (EVPS) where the Global Positioning System (GPS) will activate green signals for vehicles fitted with a pre-emption transmitter. These were initially installed at 25 intersections and 5 roundabouts, and to 15 ambulances and 10 Civil Defense vehicles. The EVPS is integrated into the SCATS (Sydney Coordinated Adaptive Traffic System) Urban Traffic Control System at Ashghal's Traffic Control center in West Bay.

So, it can be seen that the roads not being designed sufficiently is not necessarily the key issue. Most road categories are sufficiently designed to cater for a truck size larger than that likely to be using it. The issue is more that it is desirable to discourage trucks of more than a certain size from using particular roads. However, it is necessary that the roads are designed for the occasional use in an emergency, such that emergency vehicles can access a residential area for example, and the QHDM generally achieves this.

6.4 REQUIREMENTS FOR MILITARY VEHICLES

Military vehicles are generally classified as trucks, with the key military locations being the Naval Base and the airport. They may need to transfer goods or personnel between the military site and Doha or nearby towns. Much of the information about specific vehicle movements and needs is classified for security reasons.

6.5 INTEGRATION WITH UTILITY CORRIDORS AND SERVICES

When considering the implementation of truck routes on new routes, the future routes for electricity and water services will be considered in parallel and accommodated within the assessment.

Figure 6.6 and Figure 6.7 show that all the three main Sewage Treatment Plants, Water Reservoirs, Fuel Depots, etc., are located next to the proposed TRN roads.

For truck routes on existing roads, existing water and electricity corridors will be considered as part of the proposed improvement works (road widening, replacement of bridges and/or tunnels to accommodate oversized vehicles).

6.6. TRUCK ACCESS TO OTHER PARTS OF THE ROAD NETWORK

The TRN is intended to accommodate frequent, regular, and predictable truck movements along key corridors and between major points of supply and demand. Further, infrastructure on the network has been designed to accommodate the most common classes of vehicles.

However, there will always be circumstances where trucks need access to other parts of the broader road network. Similarly, there will always be circumstances where special types of vehicles or unique loads need to be carried on the network.

These circumstances will be managed through granting of road access permits and, in some situations, preparation of Logistics Management Plans (LMP's).

6.6.1 ROAD ACCESS PERMITS

The MOI has established road access permit application processes for:

- Businesses that require access to the DMA during restricted periods or at a time covered by the 'truck ban'
- Businesses that wish to use Special Goods Vehicles (SGV's) which exceed maximum allowances in terms of dimensions, GVW or SAL.

In terms of access to the DMA, MOI allows businesses to apply for one of four types of road access permits as described in Table 6.5 below.

Table 6.5 – Permits to Access Restricted Area

Permit reference	MOI reference	Description
All day permit	Permit No. (1)	24-hour access – these are granted to Ready-mix, petrol, oil and sewage water trucks only – for specific areas for a period of 1 month.
Morning peak permit	Permit No. (2)	Access permitted from (6 am to 8:30 am).
Evening peak permit	Permit No. (3)	Access permitted from (5 pm to 6 am), and from (10 pm to 6 am).
Peak period permit	Permit No. (4)	Access permitted from (6 am to 8:30 am), (12 pm to 3 pm), and (5pm to 10 pm), everywhere in Qatar and is for a 6-month period.

With the establishment of the TRN, there will be a need to expand road access permit arrangements to cover HGV access to other parts of the network. Like the arrangements for SGVs, in granting HGV access to other road corridors, whether for a single trip or a limited period, consideration will need to be given to:

- Capacity of infrastructure on the proposed route to accommodate the dimensions and mass of the vehicles in question
- Volumes of traffic on those routes and the most appropriate time for HGV's to access a given corridor
- Whether or not the purpose of the trip could be met in another way, through the use of LGV's for instance, and the extent to which this would avoid any potential negative impacts of HGV operations

Consistent with the way TRN's are managed in Australia, there is also merit in establishing processes through which Qatar's TRN can be regularly reviewed and routes added or removed as the needs of industry change. As an example, without a review mechanism any new logistics or warehousing park created off the TRN would overburden client businesses with road access permit requirements for all vehicle movements. Notwithstanding this point, it is equally important that MOTC retains a role in the consideration of relevant planning permit applications to consider the appropriateness of the proposed location of new freight and logistics land uses with respect to the TRN.

6.6.2 LOGISTICS MANAGEMENT PLANS

Where truck movements are likely to be regular for an extended but still limited period, there may be a need to require operators to prepare LMP's. An example where such an approach would be warranted would be servicing major construction sites. Construction could be considered a 'temporary' use in that the truck traffic it generates will only occur for a certain period, whether that be 12 months or a number of years.

Even where these sites are located on the TRN, the volume of truck traffic or the times of day that truck movements occur may necessitate deeper consideration of how impacts can be managed and mitigated.

Preparation of LMP's can inform impact management and mitigation. LMP's would typically address:

- The volume of truck movements required to support a construction site or other temporary use
- The classes of trucks required to move supplies to the site or waste from the use
- The location of supply points and storage yards that will support the site
- The proposed routes and hours of operation between the use and those supply points or storage yards
- The location of parking facilities or fuel depots that will be used to support truck operations

The requirement for an LMP may be set through the road access permit process for developments above a certain scale. Alternatively, LMP's may be required through planning permit processes managed by MME.

6.7 UPDATED TMPQ POLICIES RELATED TO GOODS TRANSPORT

In the same way as there is a need for policies and regulations to support the Master Plan, these are equally required for the truck route networks.

The following elements are covered within the Updated TMPQ Policy Position Papers Report, which covers the following issues:

a. Access to/from and circulation within industrial areas, including Salwa industrial area, Mesaieed Industrial area and Ras Laffan city;
b. Development of a truck route network;
c. Regulations governing ownership of light/heavy trucks;
d. Bus and heavy truck parking in residential areas and on undeveloped lands;
e. Contribution of heavy vehicles to traffic congestion during peak periods;
f. Regulation of unsafe, badly maintained and overloaded vehicles;
g. Operation of water trucks / design of water tanker stations;
h. Commercial access to industrial areas, marine ports and the airport (also see (a) above; and
i. Emergency co-ordination/response plans for emergencies involving dangerous goods vehicles.

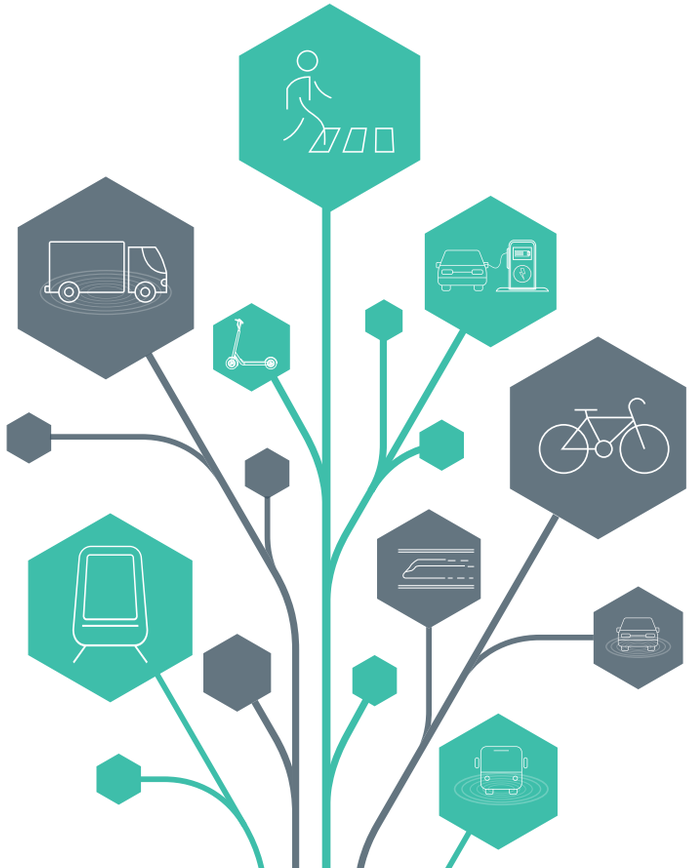
The Policy Report considers the current import and export regulations of the General Directorate of Customs, and how these might need to be adjusted to support the effectiveness of the truck route network. Also, how the Ministry of Interior regulations about truck accidents and vehicle registrations may need to be modified to provide more effective regulation of truck movement.

Following a review of all relevant policies, it was noted that there were more than 20 existing policies, with multiple overlaps, covering freight movement. Many policy actions are still valid and have been incorporated in the new definitive list of policies. The conclusions and recommendations are as follows:

- Strengthen the standards and requirements of truck operators, including driver licensing and vehicle registration.
- A commercial freight spatial strategy is needed that supports the efficient movement of goods between key industrial areas, distribution centers, consumers in urban areas and across borders, and provides adequate freight parking and rest facilities, as well as loading/unloading areas.
- In developing designated truck routes, raising awareness of this truck network will be important in supporting its successful implementation.
- To assist with the effectiveness and enforcement of time of day restrictions, a rationalization of the current restrictions (times and routes) and simplification of the permitting process is recommended.

The Policy Report has outlined four freight policies, as follows:

- Policy FM-001 – Update Truck Driver and Vehicle Licensing Regulations – including the inspection and regulation process, standard vehicle definitions, weight and height limits, and roadworthiness standards, operator and truck licensing, dangerous goods certification, training and supporting legislation
- Policy FM-002 – Develop a Commercial Freight Spatial Strategy – including connectivity to current and future generators, and expansion of the multi-modal freight network.
- Policy FM-003 – Develop Truck and Dangerous Goods Route Networks – including classification of truck routes, a designated TRN serving key destinations and demand, a dangerous goods route network, new maintenance and testing facilities, new truck parks and rest areas, and enhancement of IT systems.
- Policy FM-004 – Review and Update Time of Day Restrictions – including time restrictions, enhanced enforcement, and encouraging freight consolidation.



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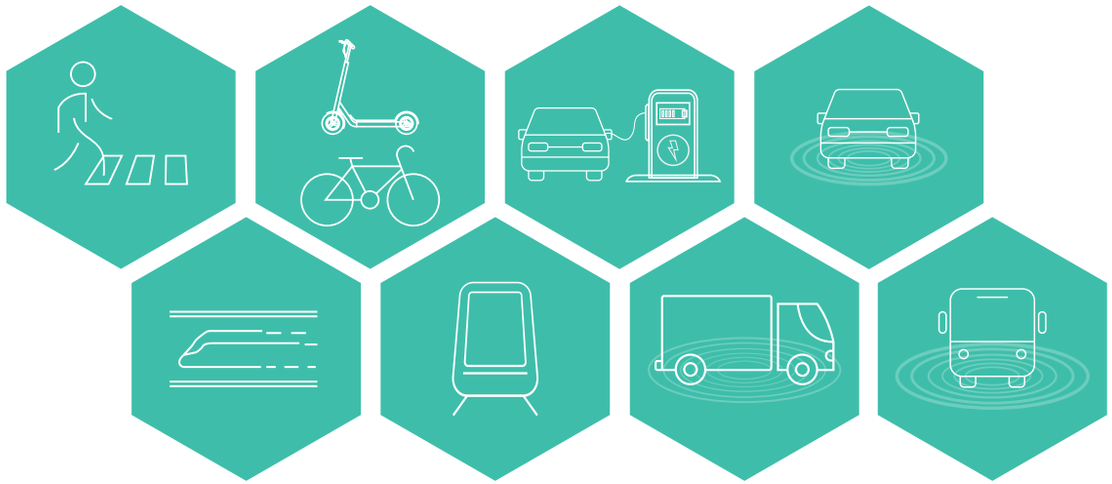
07

SECTION - 07

PROPOSED HAZARDOUS GOODS AND OVERSIZED TRUCKS ROUTES



7 PROPOSED HAZARDOUS GOODS AND OVERSIZED TRUCKS ROUTES

7.1 PROPOSED NETWORK FOR HAZARDOUS GOODS

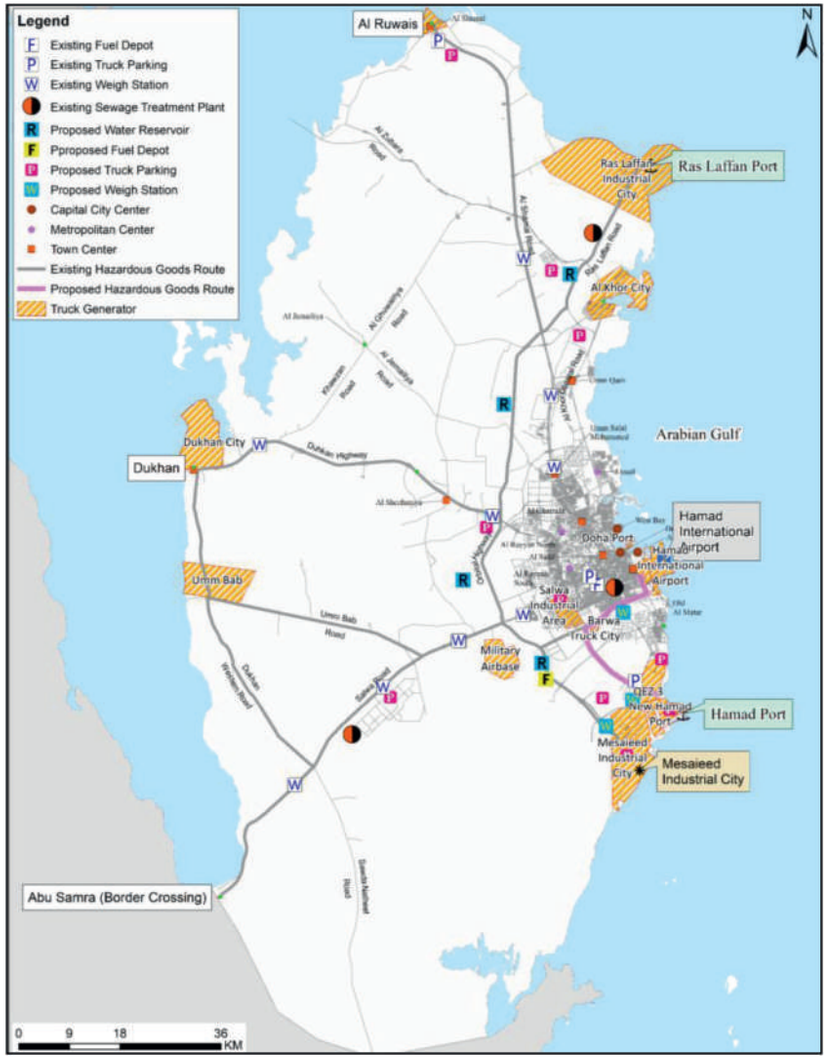
Hazardous goods vehicles are those that move dangerous goods such as liquid natural gas, diesel, petrol and toxic material. To best manage the movement of these vehicles, a **preferred network** has been adopted to identify routes which result in the least impact on sensitive land uses. Where it is necessary for hazardous goods vehicles to utilize areas of the road network that fall outside of this preferred route, a permit must be obtained for that journey.

Figure 7.1 and Figure 7.2 show the informal existing and proposed hazardous goods routes in Qatar and DMA respectively in 2025. It should be noted that an additional route connecting Hamad Port to HIA has been added in HY 2025 to connect any hazardous goods movement from HIA to the overall network.

The proposed hazardous goods network for Qatar and DMA for HY 2050 are shown in Figure 7.3 and Figure 7.4 respectively by adding the below routes.

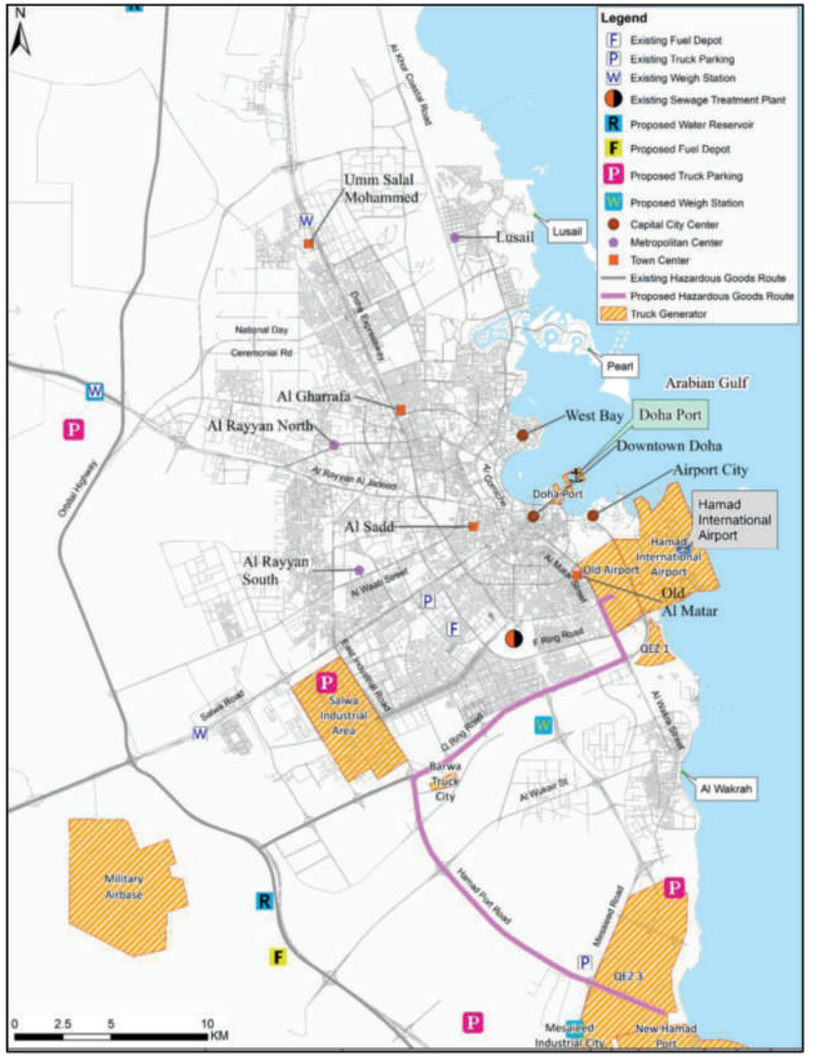
- Inclusion of the Sawdat Natheel Road as part of the preferred network, enabling the future movement of hazardous goods vehicles between Qatar and the UAE via Saudi Arabia;
- The Southern Highway has been proposed to provide future hazardous material movement between Hamad Port and MIC directly to KSA border skirting populated areas;
- Al Karana – Al Khor Highway have been proposed to provide future hazardous material movement between Ras Laffan and Al Karana industrial area;
- Inclusion of the Hamad Port Road as part of the preferred network, providing a connection to Umm Alhoul via the G Ring Road;
- Al Zubara road provides oversized vehicles connecting between Ras Laffan and the western coast and also expands the coverage of the hazardous network.

Figure 7.1 – Proposed Hazardous Goods Network in Qatar -2025



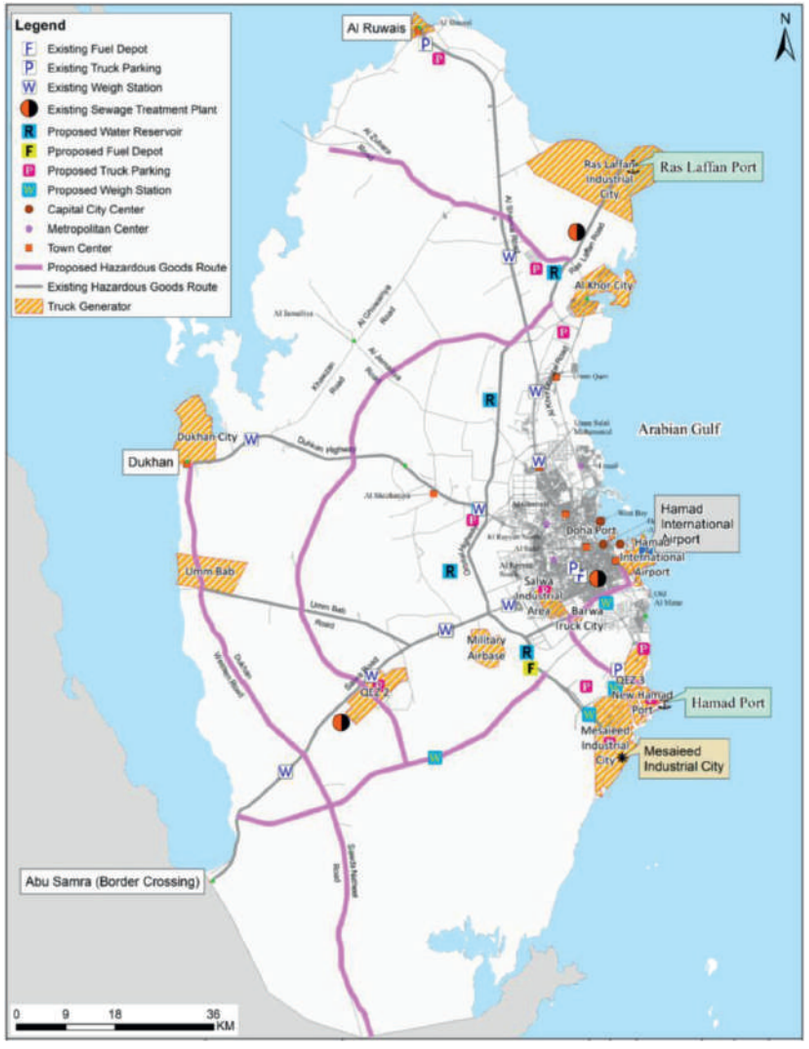
Source: Updated TMPQ

Figure 7.2 – Proposed Hazardous Goods Network in DMA-2025



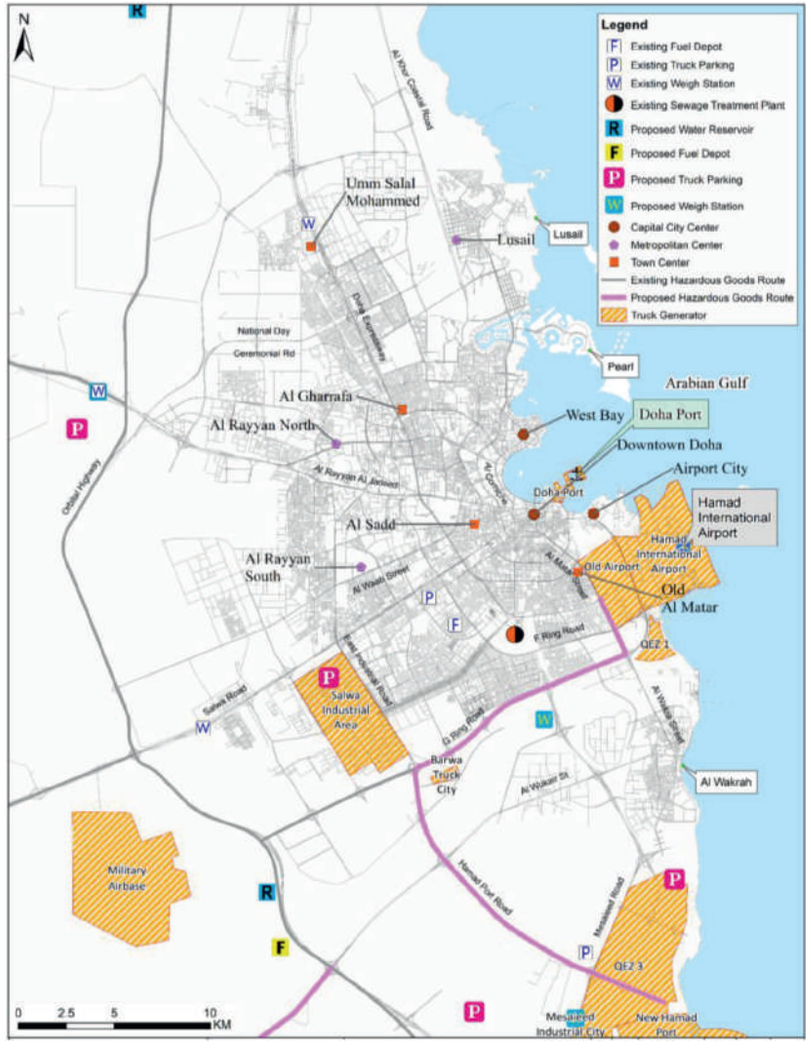
Source: Updated TMPQ

Figure 7.3 – Proposed Future Hazardous Goods Network in Qatar-2050



Source: Updated TMPQ

Figure 7.4 – Proposed Future Hazardous Goods Network in DMA-2050



Source: Updated TMPQ

SECTION 7

7.2 PROPOSED NETWORK FOR OVERSIZED VEHICLES

Over Size and Over Mass (OSOM) vehicles are defined as those which exceed the maximum height (4.2m), width (2.6m), or weight (13-ton SAL/45-ton GVW) specified under the current MOI traffic law. The careful management of OSOM vehicles is fundamental to the safety of all road users.

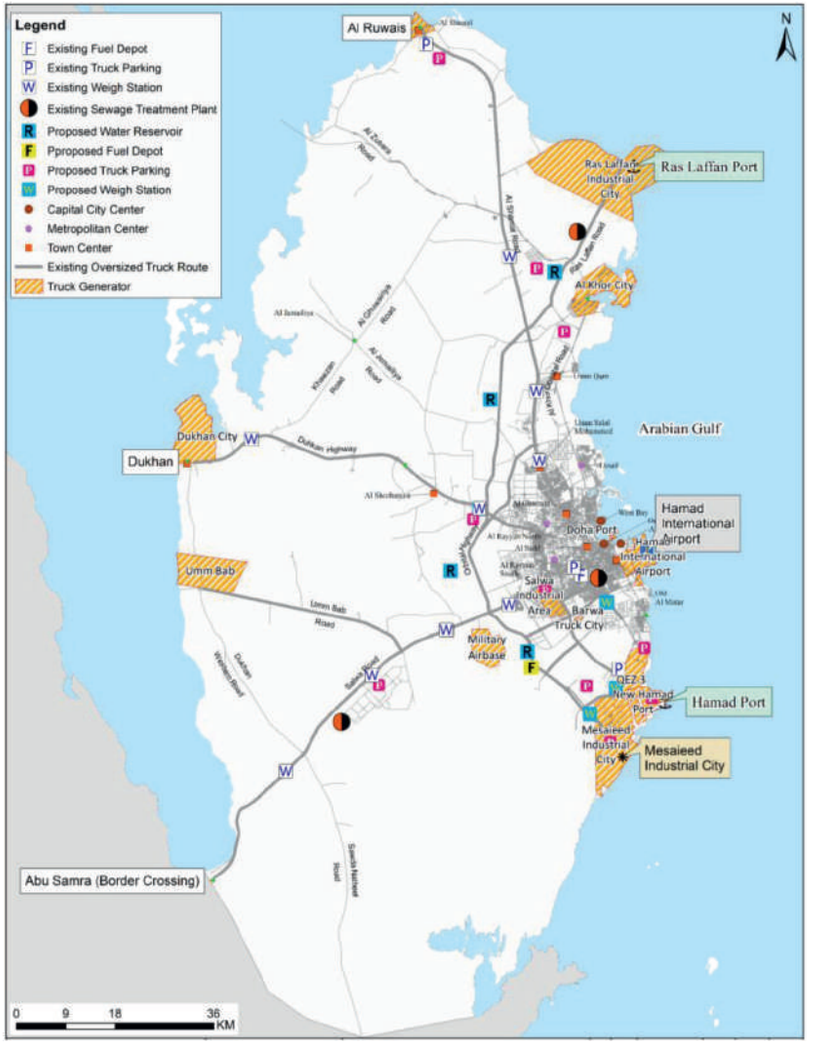
Where the above dimensions are exceeded a permit must be obtained before vehicles can operate on the network.

Figure 7.5 and Figure 7.6 show the informal existing and proposed oversized vehicles routes in Qatar and DMA respectively in 2025.

The proposed oversized vehicles network for Qatar and DMA for HY 2050 are shown in Figure 7.7 and Figure 7.8 respectively by adding the below routes.

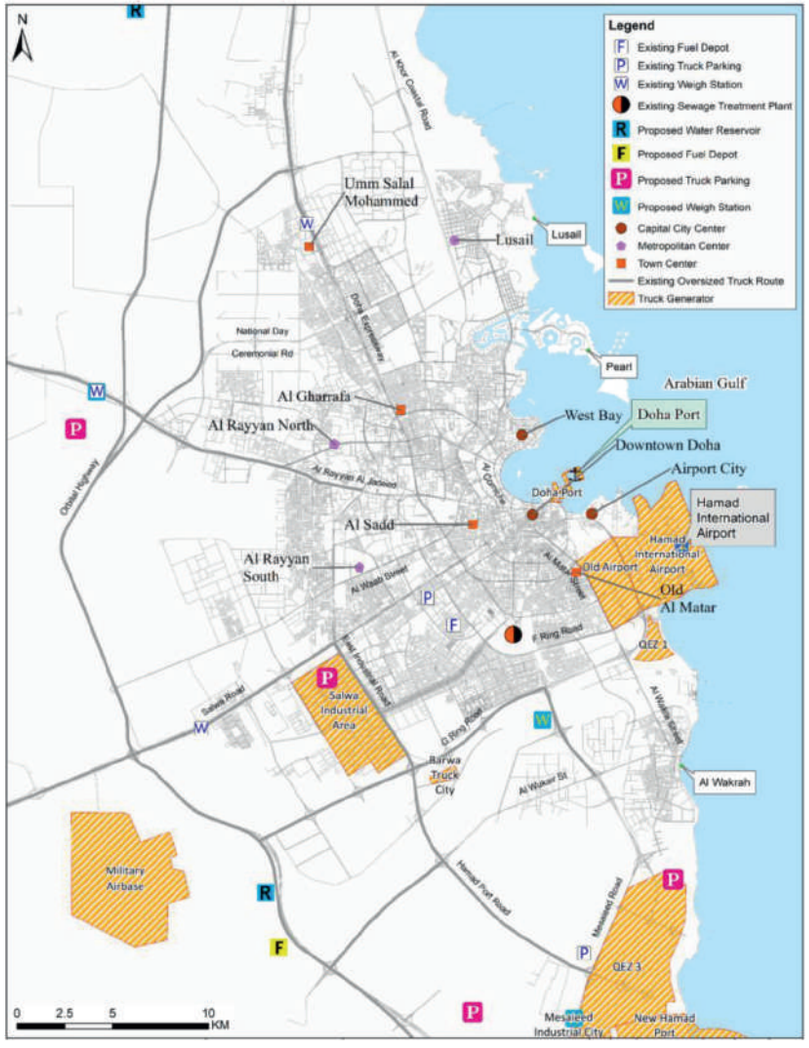
- Inclusion of the Sawdat Natheel Road to connect the oversized vehicles network between Qatar and the UAE via Saudi Arabia.
- The Southern Highway has been proposed to provide future connection between Hamad Port and MIC directly to KSA border skirting populated areas.
- Al Karana – Al Khor Highway has been proposed to provide future oversized vehicles movement between Ras Laffan and Al Karana industrial area.
- Al Zubara road provides for oversized vehicles connecting between Ras Laffan and western coast and also expands the coverage of the oversized network.

Figure 7.5 – Proposed Over Sized Network in Qatar -2025



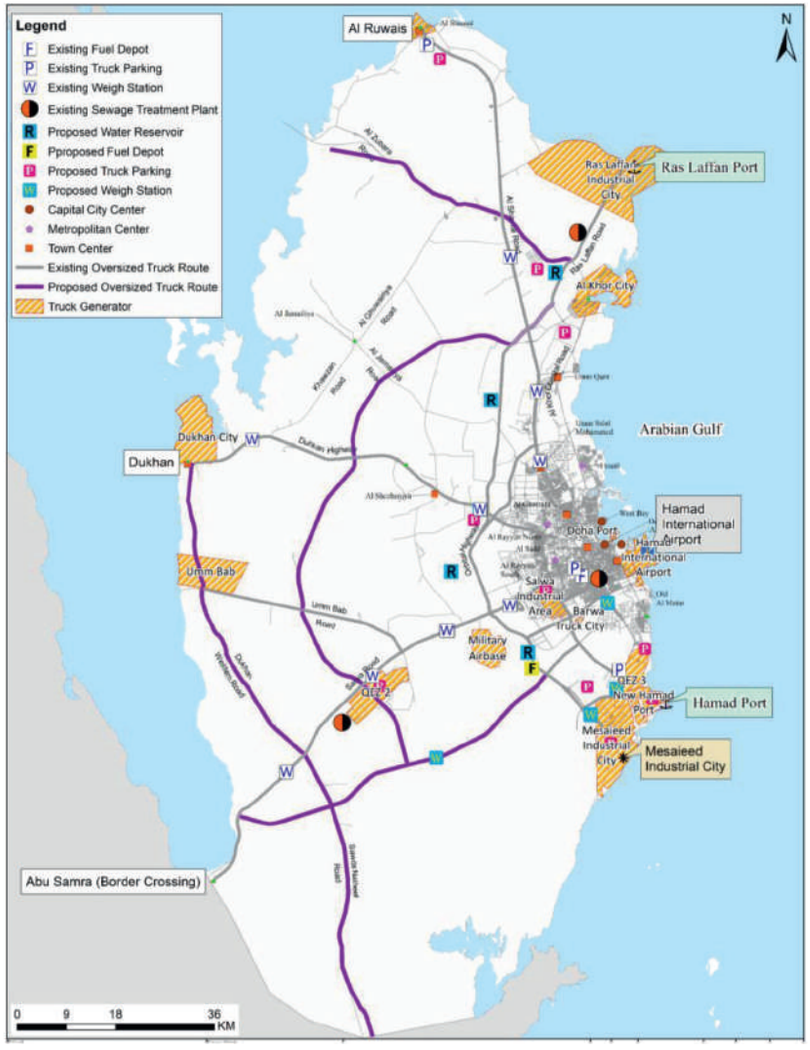
Source: Updated TMPQ

Figure 7.6 – Proposed Over Sized Network in DMA -2025



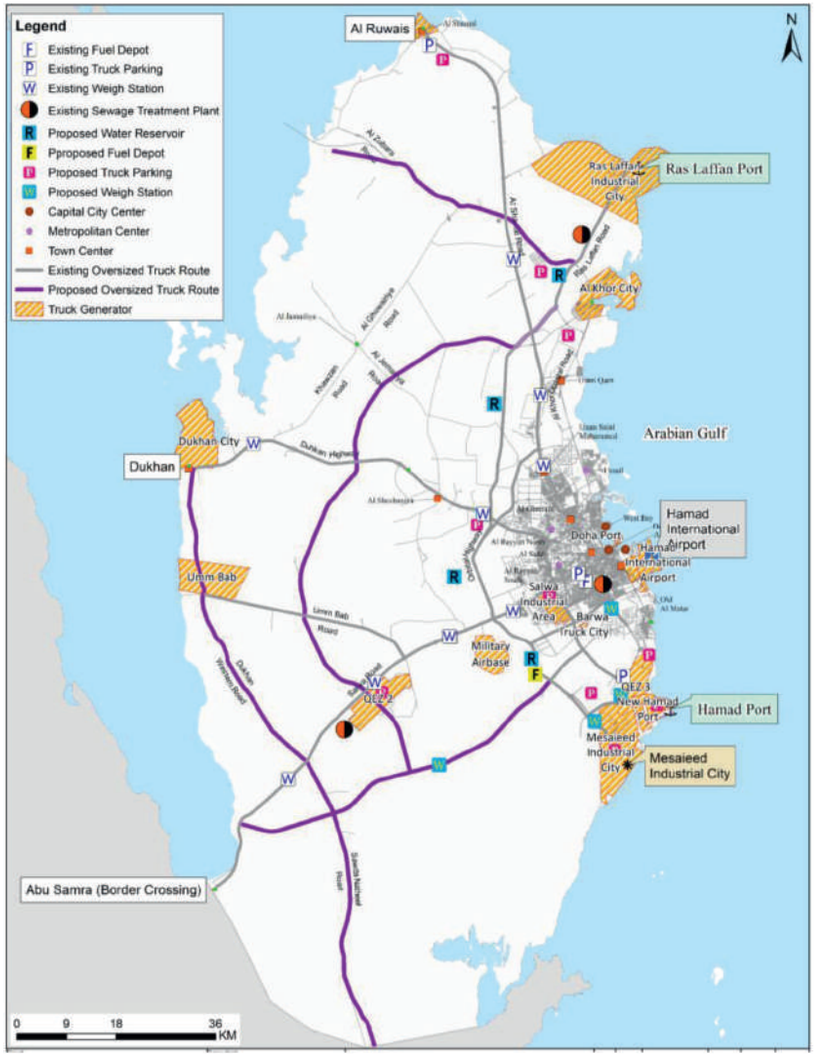
Source: Updated TMPQ

Figure 7.7 – Proposed Over Sized Vehicles Network in Qatar -2050



Source: Updated TMPQ

Figure 7.8 – Proposed Over Sized Vehicles Network in DMA - 2050

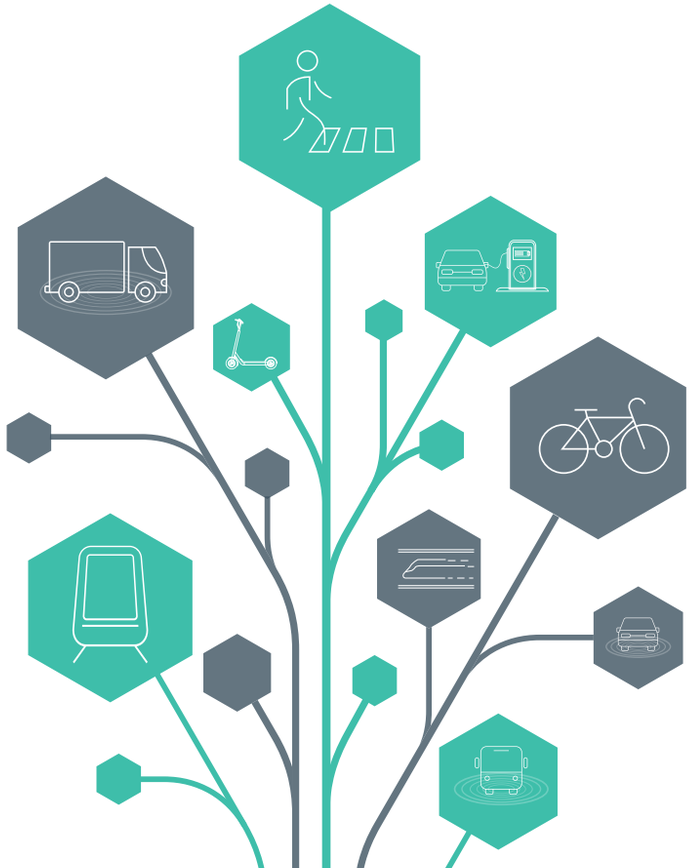


Source: Updated TMPQ

The proposed network connects all the identified major truck generators across Qatar, but it avoids entering deep into the urban area of Doha. In practice however, oversized vehicle routes should be planned and timed in detail on a case by case basis considering all the individual circumstances and existing conditions on the route.

These routes are justified as follows:

- **Oversized Vehicle Routes**
  - **Overweight** – Truck vehicles weighing up to the total legal weight limit of 45 tons (with a maximum legal single axle limit of 13 tons) can use routes on the strategic truck route network. Vehicles between 12 and 40 tons can use the local truck route network. Weigh stations include those already implemented on Salwa Road and Shamal Road and Dukhan Highway. New stations are recommended on the Southern Highway, plus the north-west corner towards Ruwais, Al Zubara and Al Ghuwairiya, on approach from Um Alhoul to Doha, plus weigh stations on approach to Ras Laffan, Mesaieed and Dukhan Industrial Cities. Mobile weigh stations can be provided in locations which may need to be moved in future rather than incurring the cost of providing fixed stations.
  - **Over height** –. High Load Truck Routes are able to accommodate trucks of at least 5.5m, and on a number of routes listed. For all Expressway Projects, a 6m minimum clearance is required by design, and requirements exist for 6.5m clearance for bridges crossing over high load routes, gantries and lightweight structures and pedestrian overpasses. For the route network shown, most routes can accommodate vehicles above 5.5m, the limitations in terms of posted clearance mainly being on Salwa Road and Shamal Road.



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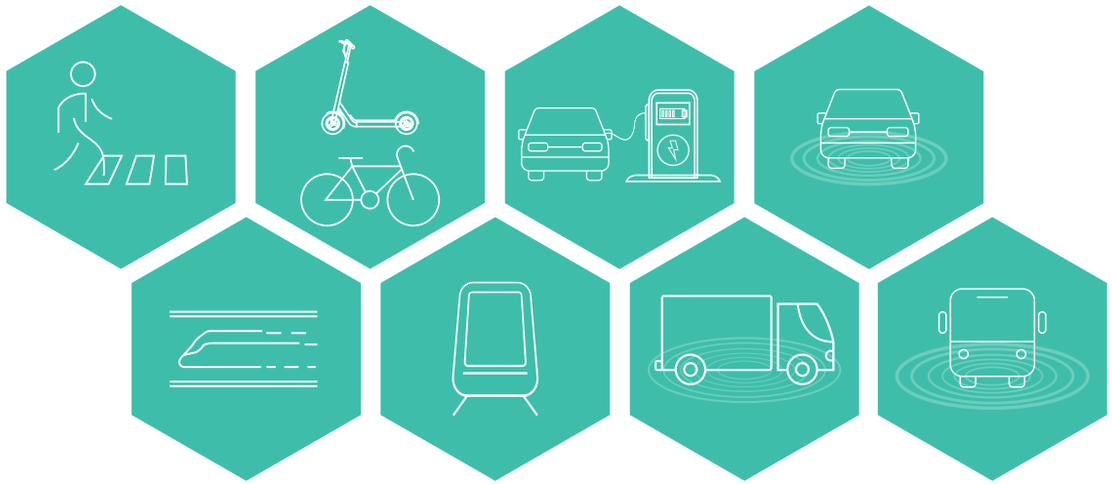
SECTION - 08

ASSESSMENT OF PROPOSED TRUCK ROUTE NETWORK

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8 ASSESSMENT OF PROPOSED TRUCK ROUTE NETWORK

8.1 INTRODUCTION

The truck network developed has been considered against a shortlist of criteria to identify its strengths, weaknesses, opportunities and threats after assessing the current and future transportation issues in Qatar. These criteria include factors such as whether the network:

- Serves the key future truck generators;
- Serves the World Cup 2022 and the sports stadiums;
- Accommodates the anticipated overall future land use changes in Qatar;
- Accommodates the anticipated future changes in flows of commodities;
- Enables the location of relevant facilities for trucks (weigh stations, oversized truck controls);
- Successfully enables goods to be moved over the first mile and last mile of their journeys – these are the key challenges in delivering a successful network;
- Includes relevant policies and regulations which can be applied to support the truck network;
- Costs of implementation offer value for money; and
- Allows metrics to be deployed which will enable its performance to be monitored.

8.2 KEY PERFORMANCE INDICATORS FOR TRUCK MOVEMENT IN THE UPDATED TMPQ

The updated TMPQ has proposed significant improvements to the truck route network over reference case for HY 2050 as given below:

- Has 24% improvement in average speed;
- Decrease in average delays by 57%;
- Reduced congested hours by 27%;
- Reduced lost travel time by 53%.

There are no major congestions in the foreseeable future on the truck route network connections to main generators. The assessment of the main KPIs is conducted in the below tables to explain the performance of the proposed truck network.

The performance of the truck network in HY 2050 is summarized using some network-wide key indicators for AM, MD and PM peak hours in Table 8.1, Table 8.2, and Table 8.3 for the reference case and Table 8.4, Table 8.5, and Table 8.6 for the updated TMPQ.

In the 2050 reference case, among the three peak periods, overall numbers of trips and total travelled distances are similar. AM and PM peaks are close, while MD trips and distances are slightly lower. The PM period shows the best performance in terms of speed, average travel time, average delays and lost travel time. The average trip length is similar in all peaks.

Table 8.1 – Reference Case TRN Performance Indicators in AM - 2050

Mode	Avg Speed (km/h)	Avg Travel Time (Min)	Total Travel Distance (Vehicle Trip-km/h)	No of Trips	Avg Trip Length (Km)	Avg Delay (Min)	Lost Travel Time (%)
LGV	25	53	342,988	15,429	22.0	34	65.26%
HGV Restricted	29	76	21,851	605	36.0	51	67.23%
HGV Permitted	26	56	218,621	8,879	25.0	37	65.21%
All HGV	26	57	240,472	9,484	25.7	37.9	65.38%
All Trucks	25	55	583,460	24,913	23.4	35.5	65.31%

Table 8.2 – Reference Case TRN Performance Indicators in MD - 2050

Mode	Avg Speed (km/h)	Avg Travel Time (Min)	Total Travel Distance (Vehicle Trip-km/h)	No of Trips	Avg Trip Length (Km)	Avg Delay (Min)	Lost Travel Time (%)
LGV	28	47	303,786	13,715	22.0	29	60.90%
HGV Restricted	34	63	19,261	535	36.0	38	60.68%
HGV Permitted	29	51	192,842	7,843	25.0	32	61.86%
All HGV	29	52	212,103	8,378	25.7	32.4	61.77%
All Trucks	29	49	515,889	22,093	23.4	30.3	61.25%

Table 8.3 – Reference Case TRN Performance Indicators in PM - 2050

Mode	Avg Speed (km/h)	Avg Travel Time (Min)	Total Travel Distance (Vehicle Trip-km/h)	No of Trips	Avg Trip Length (Km)	Avg Delay (Min)	Lost Travel Time (%)
LGV	41	32	309,219	14,358	22.0	13	41.78%
HGV Restricted	53	39	22,150	645	34.0	14	36.67%
HGV Permitted	43	33	227,347	9,471	24.0	14	41.23%
All HGV	44	33	249,497	10,116	24.6	14.0	40.89%
All Trucks	42	33	558,716	24,474	23.1	13.4	41.40%

In the 2050 updated TMPQ, among the three peak periods, overall numbers of trips and total travelled distances for AM and PM peaks are close, while MD trips and distances are slightly lower. The PM period shows the best performance in terms of speed, average travel time, average delays and lost travel time. The average trip length is similar in all peaks

Table 8.4 – Updated TMPQ TRN Performance Indicators in AM - 2050

Mode	Avg Speed (km/h)	Avg Travel Time (Min)	Total Travel Distance (Vehicle Trip-km/h)	No of Trips	Avg Trip Length (Km)	Avg Delay (Min)	Lost Travel Time (%)
LGV	33	44	375,658	15,424	24.0	21	47.97%
HGV Restricted	35	66	23,478	605	39.0	33	49.55%
HGV Permitted	40	45	266,244	8,874	30.0	19	42.86%
All HGV	40	46	289,722	9,479	30.6	19.9	43.46%
All Trucks	36	45	665,380	24,903	26.5	20.6	46.20%

Table 8.5 – Updated TMPQ TRN Performance Indicators in MD - 2050

Mode	Avg Speed (km/h)	Avg Travel Time (Min)	Total Travel Distance (Vehicle Trip-km/h)	No of Trips	Avg Trip Length (Km)	Avg Delay (Min)	Lost Travel Time (%)
LGV	38	38	331,546	13,710	24.0	15	39.65%
HGV Restricted	48	48	20,543	535	38.0	15	31.07%
HGV Permitted	45	40	234,178	7,839	30.0	14	34.68%
All HGV	45	41	254,721	8,374	30.5	14.1	34.41%
All Trucks	41	39	586,267	22,084	26.5	14.6	37.60%

Table 8.6 – Updated TMPQ TRN Performance Indicators in PM - 2050

Mode	Avg Speed (km/h)	Avg Travel Time (Min)	Total Travel Distance (Vehicle Trip-km/h)	No of Trips	Avg Trip Length (Km)	Avg Delay (Min)	Lost Travel Time (%)
LGV	48	30	343,315	14,353	24.0	7	23.65%
HGV Restricted	62	36	24,089	646	37.0	3	8.01%
HGV Permitted	58	30	275,018	9,466	29.0	4	13.95%
All HGV	58	30	299,107	10,112	29.5	3.9	13.51%
All Trucks	52	30	642,422	24,465	26.3	5.7	19.43%

In both the reference case and the update TMPQ in HY 2050, the PM peak hour has the best performance in terms of average speed, average delays and lost travel time, therefore they are compared below. The comparison of the two (reference case 2050 and TMPQ 2050) shows better results for the TRN in the updated TMPQ in Table 8.7 below:

Table 8.7 – Comparison of Updated TMPQ and Reference Case in 2050

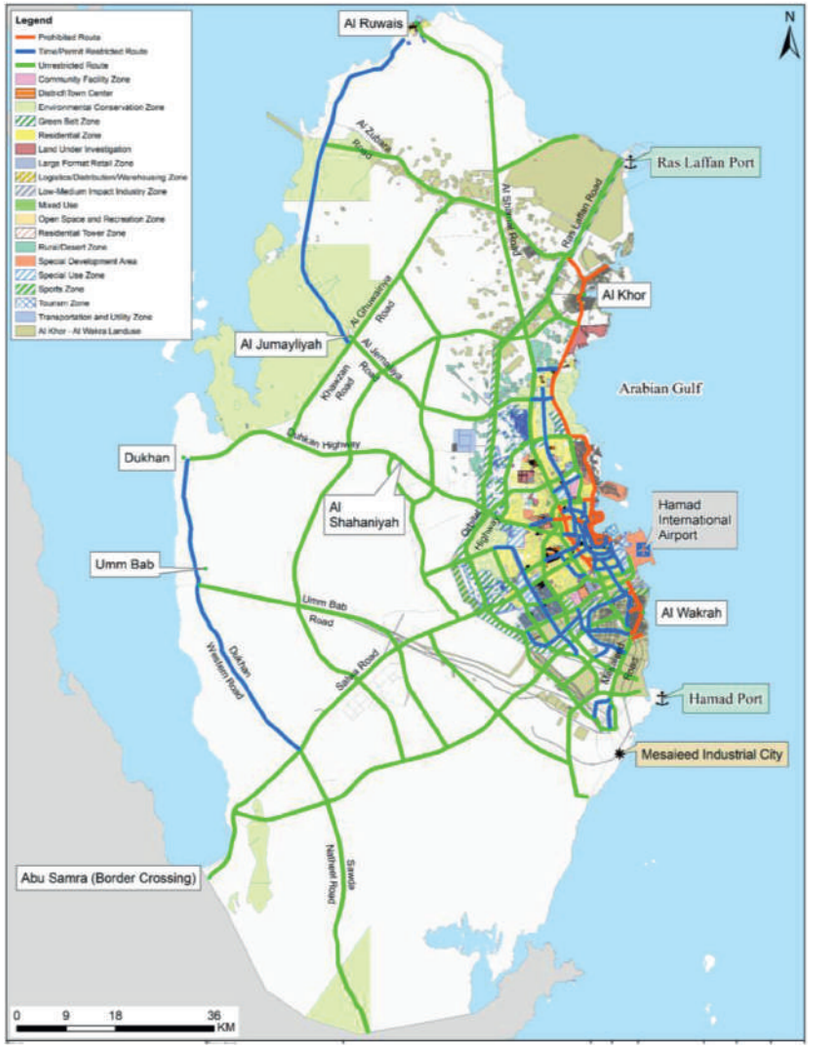
Indicator	Reference Case (2050)	Update TMPQ (2050)	Comparison
Avg Speed (km/h)	42	52	24%
Avg Travel Time (Min)	33	30	-9%
Total Travel Distance (Vehicle Trip-km/h)	558,716	642,422	15%
No of Trips	24,474	24,465	0%
Avg Trip Length (Km)	23.1	26.3	14%
Avg Delay (Min)	13.4	5.7	-57%
Lost Travel Time (%)	41.40%	19.43	-53%

The updated TMPQ exhibits significant improvements in average speed increase, average delays and lost travel time, while in the other indicators the total distance travel in the reference case is less than the updated TMPQ along with the associated average trip length which could be attributed to the increase of the overall TRN coverage in the updated TMPQ. The number of trips remain similar in both cases while average travel time has improved in the updated TMPQ.

8.3 LAND USES ADJACENT TO FUTURE TRUCK ROUTE NETWORK

A review was undertaken of the future land uses as forecast by the Ministry of Municipalities and Environment data, and the future truck route network as proposed within this Truck Route Network Development Technical Report to identify where future land uses may still be sensitive to the truck route network. Figure 8.1 and Figure 8.2 show where schools and hospitals are in relation to the truck route network as these are land uses which the truck route network has been designed not to impact negatively.

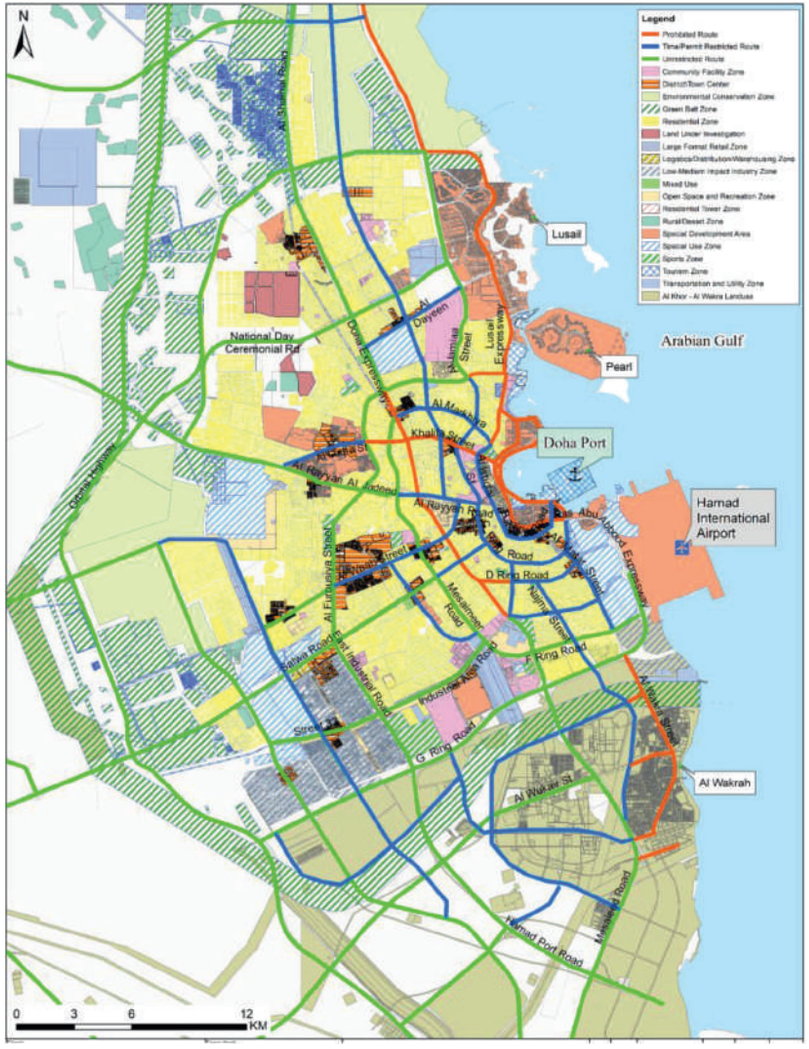
Figure 8.1 – Proposed Truck Route Network and Future Land Uses (Qatar)



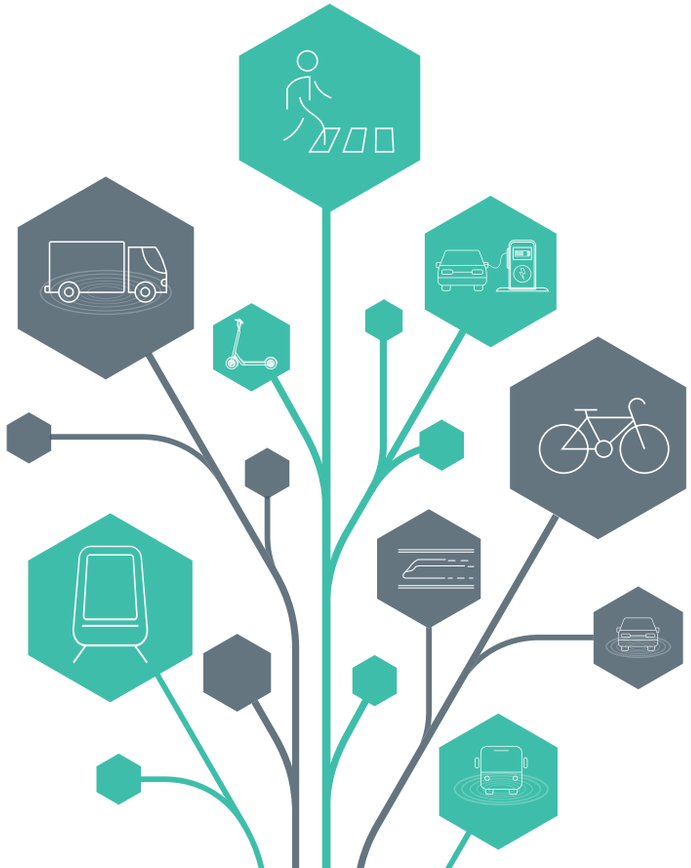
Source: MME and Updated TMPQ

SECTION 8

Figure 8.2 – Proposed Truck Route Network and Future Land Uses (DMA)



Source: Updated TMPQ



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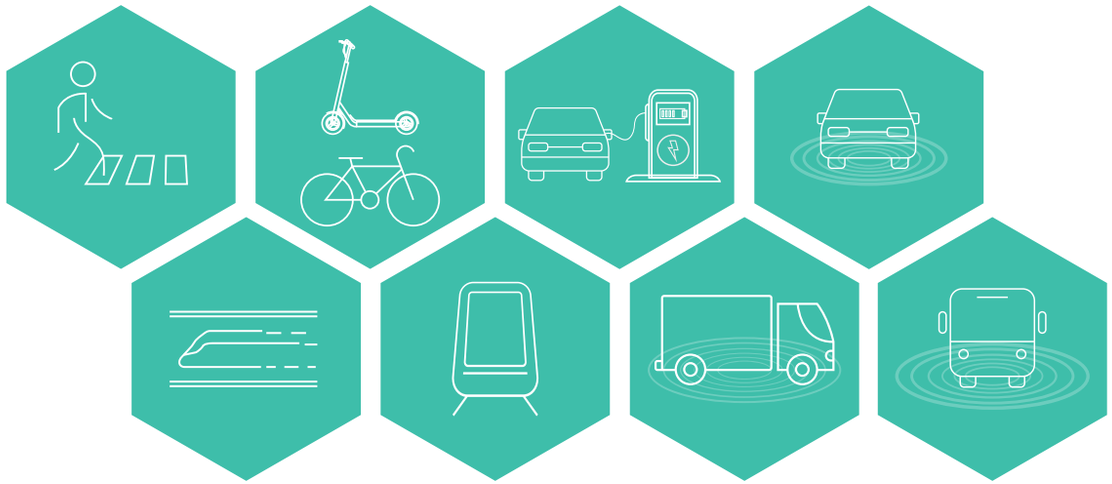
SECTION - 09

IMPLEMENTATION

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9 IMPLEMENTATION

9.1 THE ROLE OF GOVERNMENT

9.1.1 HOW CAN THE TRN BE PUBLICIZED?

For fleet managers and truck drivers to understand the restrictions on Heavy Vehicle movements in Qatar the TRN needs to be publicized and easily accessible. While Qatar has maintained an informal TRN since 2008, the network has not been made publicly available, meaning fleet managers or drivers are unlikely to be fully aware of where trucks should and shouldn't go within Doha or other areas of the State.

Other countries publish TRNs and other HGV restrictions in two ways:

- **Interactive online maps** that enable fleet managers to properly plan and manage truck journeys
- **Consistent roadside signage** that enables drivers to easily navigate the TRN or respond to changes in travel plans or road conditions during journeys

9.1.2 HOW CAN THE TRN BE ENFORCED?

Truck Driver Licensing

It is generally accepted that the level of education, skill and training required to drive safely progressively increases from driving a light car, to a rigid truck, and then to an articulated vehicle. Current truck licensing regulations in Qatar allow a person to apply for a truck driver's license if they are at least 21 years old, have held a car driver's license for at least two years, and have a medical certificate proving that they are medically fit to operate a heavy vehicle. Upon obtaining a truck driver's license, a person is eligible to drive any truck, including an articulated vehicle, which requires a significant increase in driving skills and knowledge from those required to drive a light car.

Insufficient and unsatisfactory training contributes to the poor safety record of heavy vehicles in Qatar. In over 70% of cases between 2008 and 2010, the drivers of heavy vehicles involved in crashes were recorded as being to blame.[5]

A measure to improve the safety of the vehicles in Qatar, set out in the National Road Safety Strategy 2013-2022, is to strengthen the standards and requirements for professional drivers of heavy vehicles. Amended truck license categories will ensure that truck drivers have the adequate level of skills and experience necessary to safely operate large vehicles in Qatar.

An alternative approach to licensing is evident in the state of Victoria (Australia), where a heavy vehicle license is required to drive a vehicle with a gross vehicle mass greater than 4.5 tons. Truck license categories are divided into five categories: **light rigid**, **medium rigid**, **heavy rigid**, **heavy combination**, and **multi-combination**. Further, to obtain a license to drive any of these vehicles, applicants must:

5 Qatar National Road Safety Strategy 2013-2022. National Traffic Safety Committee

- hold or have held an Australian car license for at least two years
- pass an eyesight test
- pass a heavy vehicle knowledge test
- pass an on-road heavy vehicle driving assessment
- pass an off-road heavy vehicle skills assessment
- complete a formal training course (heavy combination and multi-combination applicants only)
- meet national medical standards for private and commercial vehicle drivers.

Vehicle Registration

All vehicles, heavy or otherwise, must be registered annually under MOI traffic law. Further, any vehicle that is more than three years old must pass an annual inspection in order for its registration to be renewed (*Istimara*). The inspection is intended to ensure that vehicles on the road are roadworthy and safe to drive.

Although the vehicle registration regulations that are in place seem adequate, anecdotal evidence suggests non-compliance is an issue. The enforcement of truck regulations is weak, and truck operators often prefer to bear fines for non-compliance rather than observe the rules. The impact of this is adverse on public safety and infrastructure. For example, overweight vehicles increase the risk and severity of accidents and damage the roadways. If unaddressed, this could become a critical issue for road safety in Qatar.

In other countries governments have been proactive in mandating the progressive adoption of technology improvements to address broader concerns around heavy vehicle road safety. For example, in the European Union it has been mandatory for heavy vehicles to fit Auto Emergency Braking systems since 2013, a move since followed by South Korea and Japan. Australia is considering adopting a similar approach in response to the over-representation of heavy vehicles in fatal road accidents. In the United Kingdom, since 2015 heavy vehicles have been required to be fitted with side-guards and various close-proximity mirrors in response, improving safety for pedestrians and other vulnerable road users.

Other governments have also used vehicle registration requirements or truck access restrictions to drive fulfilment of other policy objectives. Transport for London created the Low Emission Zone (LEZ) to "encourage the most polluting heavy diesel vehicles driving in London to become cleaner". LEZ's are now common across Europe.

Vehicle Inspections

Compliance with route restrictions, parking locations, and travelling speeds are relatively straightforward for traffic police to monitor and enforce, and these are already contained within Law no. (19) of the 2007 Traffic Law. However, enforcement of vehicle weight restrictions and dimensions can be more complex. Overloading has been recognized as a major issue that is having a significant impact on road infrastructure, particularly through pavement failure. Such overweight vehicles also present a safety hazard for other road users due to the stresses placed on the vehicle, and the impact on braking distances.

In other countries, use of Heavy Vehicle Safety Stations that include weighbridges are commonplace. These stations operate at various times to randomly inspect heavy vehicles to ensure they are not operating illegally or in an unsafe manner. As noted in Section 3, there is currently a lack of such infrastructure in Qatar.

Enforcement

Compliance and enforcement is critical to ensuring the successful implementation of the future TRN. Under Article 88, in Law no. (19) of 2007 Traffic Law, vehicles can be impounded for up to 90 days for violation of offences. In relation to the movement of trucks, this includes failure to comply with only driving on the right-hand side of the road and to not overtake vehicles, exceeding of weight or length restrictions, and parking in unauthorized places.

Further, the MOI has introduced a range of penalties for truck specific violations on the road network. These are outlined in Table 9.1.

Table 9.1 – List of MoI Violation Fines Relating to Trucks

Violation no.	Description	Fine (QAR)
104	Putting the load on a vehicle without organizing, arranging and fixing it properly in a condition that will allow the loaded materials to move or fall while the vehicle is moving	1,500
105	Not considering the following factors when the load is placed on the vehicle: e) To not endanger persons or to not cause any risk for public/private property f) To not make noise or to leak anything that may affect public health or harass pedestrians g) To not obstruct vision of vehicle driver or to not hide auto or manual traffic signal or side signs or vehicle lights or reflectors or number plates h) To not affect vehicle balance or not causing the driver for danger	1,500
106	Exceeding the height of the load on vehicles or things appearing from it for more than 2.6m without written permission of the concerned authority	3,000
107	Exceeding width of load on vehicle or things appearing from it for more than 2.6m without written permission of the concerned authority	3,000
108	d) To exceed the gross weight of the vehicle in a single axle by 13 tons e) To exceed the maximum permitted weight of the vehicle on a double axle without written permission of the licensing authority f) To exceed the gross weight of a vehicle by more than the permitted load limit without written permission of the licensing authority	3,000
109	Load extension to the front side of vehicle for more than one meter, or to back side for more than 2m from the body of the vehicle without written permission from the licensing authority	3,000
110	Not holding a written permission from licensing authority to transportation materials which cannot be parted while its length will be more than permitted	3,000
111	Not putting clear red signs on side of load for alerting others	1,000
112	Making extensions on load boxes of transport vehicle and truck with the aim of carrying more than the dimensions and specifications either by width, length or height	1,000
113	Not writing down the gross weight and number of passengers on the body of the vehicle, that its load capacity (net weight) is 3 tons or more	1,000

Other countries have found that where fines are too low they do not sufficiently deter fleet managers and truck drivers from violating truck access restrictions. For example, on busy streets in New York, courier companies simply build the cost of infringement notices for double parking into their prices rather than safely parking vehicles in designated zones. This has a detrimental effect on the efficient functioning of the road network and road user safety. As previously noted, anecdotal evidence suggests non-compliance with existing restrictions on truck road access and truck registration is already an issue in Qatar.

Regulating the Movement of Hazardous Goods

While the MOI has overall responsibility for the transport of hazardous/ dangerous goods, day-to-day administration is undertaken by the Supreme Council for the Environment and Natural Resources (SCENR).

Other agencies involved in the transport of hazardous goods are Civil Defense, the Ministry of Municipal Affairs (MMA), and the Ministry of Health (MOH).

All companies which generate, use or store dangerous goods in Qatar must be registered with SCENR, and site inspections of premises in Qatar are undertaken by SCENR inspectors, who have wide-ranging powers. The classification of dangerous goods is in accordance with international standards and codes. All vehicles carrying dangerous goods must be placarded and vehicles must not carry a mixture of dangerous goods.

All companies importing dangerous goods into Qatar must be registered with SCENR and where it is necessary to utilize areas of the road network that fall outside of the hazardous goods routes, a permit must be obtained for that journey. The permit includes details of the consignor and receiver and the goods being carried. Applications for a permit are considered by a Technical Committee that includes a representative from SCENR, Ministry of Interior, Ministry of Municipal Affairs, and the Ministry of Health.

In case of an emergency involving the transport of dangerous goods, SCENR maintains an emergency telephone contact number, 24 hours, seven days a week. SCENR would coordinate with other relevant agencies in the event of such an emergency.

9.2 THE ROLE OF INDUSTRY

For the TRN and associated road access restrictions to be effective, the industry needs to be provided with both the incentives and capability to manage liability and risk.

Fines for individual violations, as discussed above, provide a level of incentive. However, stronger sanctions on fleet managers and other relevant businesses for repeat offenses by drivers, or the failure to create an environment whereby vehicles are safe, and drivers are well educated can significantly increase these incentives. Australia's Chain of Responsibility requirements under the Heavy Vehicle National Law (see Section 2) provides a good example of the legislative basis for stronger sanctions. It was under such laws that one fleet manager was banned from operating on roads in the state of New South Wales after investigations into a heavy vehicle accident revealed systemic safety issues within the firm[6].

6 'Cootes Transport trucks facing NSW roads ban over hundreds of safety defects', ABC News, accessed 20 Nov 2019 from: https://www.abc.net.au/news/2014-03-06/cootes-transport-given-two-weeks-to-show-why-it-should-continue/5303716

The industry also needs to be given proper opportunity and capability to comply with restrictions. Access to information is the most effective tool in this respect. As discussed above, in both Europe and Australia road managers make live route network maps available to industry. This not only allows fleet managers to undertake proper route planning and fleet decisions but also enables drivers to make informed decisions in real-time when journey planners can account for changes in the network due to road maintenance, traffic accidents or other temporary closures.

When the potential sanctions are sufficient to drive behavioral change and information is made publicly available, industry can develop solutions to effectively manage its liability and risk. An example of such a solution from the United Kingdom is LorryRoute, an online portal and mobile app which assists fleet managers and truck drivers to easily navigate approved truck routes around the country (refer to the case study below).

Case Study: LorryRoute – Industry solutions to access management

LorryRoute (accessible from http://www.lorryroute.com) is an online portal and mobile app which assists HGV drivers and fleet operators to successfully navigate approved truck routes across the UK.

It can be used to plan routes, and to identify rest and re-fuel areas for drivers. The platform also promotes compliance and safety by identifying when and where specific permits are required.

For truck drivers, through mobile functionality, it provides drivers with a navigational tool that provides turn-by-turn directions to ensure vehicles remain on approved routes. For fleet managers, it provides live tracking of vehicles on the road to enable oversight of drivers and their compliance with truck road access restrictions.

LorryRoute is a powerful example of how, when provided the opportunity to do so, industry can develop innovative solutions to promote compliance with truck road access restrictions.

Reflecting these considerations, MOTC and MOI, as an initial step, should ensure that all information relating to the TRN is easily available online so that fleet managers and truck drivers can appropriately plan journeys.

9.3 SUGGESTED STAKEHOLDER ENGAGEMENT FOR IMPLEMENTATION

This section provides a summary of any further requirements which will facilitate the successful implementation of the truck network. This includes any actions required from stakeholders, and any public/private sector collaboration, or Public Private Partnerships, to ensure an effective delivery of the network. Successful delivery of the network will include:

- Freight haulers and stakeholders to be acquainted with the routes provided for the different categories of their business;
- Freight haulers to understand the facilities on the network that they should comply with, including truck weigh stations and truck holding areas;

- Freight haulers to understand the regulations regarding the operation of their vehicles and where and at what times they are permitted to travel; and
- The relevant government departments (Ministry of Interior, Ministry of Transport and Communications) to co-ordinate the system for enforcement of regulations and scale of fines.

9.4 PUBLICIZING THE EXISTENCE AND USAGE OF TRUCK ROUTES

Improving public awareness and knowledge of the truck network will be an important part of the education program. Currently, haulers and goods companies are not always aware of where existing designated truck routes are, and more importantly, what the truck restrictions and regulations are. These would be best included within a Truck Route Network Guide, to be distributed to all businesses operating trucks and haulage vehicles within Qatar and issued at the ports to trucks arriving from overseas.

Further details of the contents of this Guide will be included within the Implementation Plan of the Updated TMPQ.

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