



# GRANGEMOUTH INVESTMENT ZONE: FREIGHT FLOW ANALYSIS

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## EXECUTIVE SUMMARY

### Introduction

Scottish Enterprise commissioned MDS Transmodal (MDST) in partnership with Steer Davies Gleave (SDG) in September 2016 to carry out a study of freight flows in the Grangemouth Investment Zone (GIZ).

The objective of the study was to understand the current and future freight flows to and from the Grangemouth area as well as the current and future constraints to potential growth. It also provides an Action Plan, setting out what should be done to allow the GIZ to achieve its potential over the next ten years.

### The business environment

With its central location between the two major conurbations in the Central Belt, the availability of port facilities providing access to global markets and rail services to and from the logistics 'golden triangle' in the Midlands, the GIZ is well-located for national distribution serving the whole of Scotland.

Policy at a Scottish national and local level is highly supportive of the development of the GIZ as a freight transport and logistics hub, particularly when it can both support economic growth and reduce carbon emissions. The Grangemouth area is regarded in NPF3 as being a nationally important development area for infrastructure and investment and the Local Development Plan supports the focus of investment in freight infrastructure.

Planned investment by the Scottish Government in and around the Central Belt, including the motorway and rail networks and the Forth crossings, will support the development of freight transport and logistics activity in the GIZ.

There appear to be two main threats to the development of the GIZ as a freight transport and logistics hub:

- The lack of rail network capacity, which could reduce the potential of the GIZ to develop new domestic intermodal rail freight services and discourage developers from developing warehousing located adjacent to an intermodal rail terminal and the port. This will both limit the GIZ's attractiveness as a location for warehousing in comparison with road-based distribution centres and will also reduce Scotland's ability to reduce carbon emissions from freight transport.

- Potential strong competition from the Tees Valley, which has a major petro-chemical industry cluster and a deeper water port than Grangemouth, allied to an extensive network of feeder container services and rail links to and from the Central Belt.

## GIZ freight facilities & flows

The GIZ contains 66 freight facilities which relate to port infrastructure, manufacturing/processing facilities (mainly related to the petro-chemical industry), distribution sites outside the port and a variety of other facilities that generate or attract freight movements.

The Port of Grangemouth is a multi-purpose port, which handles a wide variety of containerised and bulk cargoes, with locked access to the Firth of Forth. As well as 142,000 containers, the Port of Grangemouth handled an estimated 5.8 million tonnes of bulk and semi-bulk cargo in 2015. There are seven scheduled container shipping services, each offering a weekly frequency and providing connectivity to the Near Continent and, via transshipment, to the rest of the world. The port has an active rail link, but there are currently no rail freight services to and from the port.

The key freight generating facility outside the port is the oil refinery, which generates road tanker movements to petrol stations in Scotland and the North of England and train load volumes of petroleum products mainly to Prestwick Airport and tank storage in Cumbria. There are also intermodal rail freight services between the WH Malcolm intermodal terminal located in the GIZ and Teesport (via Mossend), Daventry and Aberdeen.

There are 191,000 m<sup>2</sup> of logistics space in the GIZ across 24 properties and seven of these warehouses are large scale units above 9,000 m<sup>2</sup> in size. Two of these large warehouses are located within the port estate.

A total of 14.3 million tonnes of road freight is transported to and from the GIZ, with 68% outbound and 32% inbound. 22% of outbound and 30% of inbound HGVs are making trips within the Falkirk area, while a further 70% of outbound and 62% of inbound flows are to/from the rest of Scotland. This shows the extent to which the GIZ is serving a Scottish hinterland, with only 4% of outbound and 8% of inbound flows to the rest of Great Britain. There are an estimated 610,000 tonnes of rail freight from the GIZ and 280,000 tonnes to the GIZ, with an estimated modal split for rail of 6% in both directions.

## Forecasts to 2025

Baseline forecasts up to 2025 are for growth in container traffic through the port of 24.9% and non-unitised traffics through the port of 24.8%. Baseline forecasts up to 2025 are for growth in HGV

flows of 9.4%, while rail freight flows are forecast to increase by 5.6% over the same period. Forecasts were also produced for logistics space in the GIZ, with baseline forecasts for a need for around 31,000 m<sup>2</sup> of new build warehousing in the GIZ up to 2025, requiring about 8 hectares of land; it is possible that a significant proportion of this land requirement could be accommodated through the refurbishment of existing stock or plot recycling rather than requiring additional land.

However, forecasts for the GIZ Potential Scenario were also developed for the study and this scenario assumes that the GIZ is able to attract additional market share in the 'large' warehouse sector due to the competitiveness of its location and its access to both port and rail freight facilities. There is some 1.14 million m<sup>2</sup> of large scale warehousing in the Central Belt as a whole, most located in Lanarkshire and West Lothian; this implies that some 347,000 m<sup>2</sup> of new warehousing will be required up to 2025 and we have assumed that the GIZ could secure the equivalent of three of the larger warehouses up to 2025, requiring about 26 hectares of land.

## Vision for the GIZ to 2025

The consultants' vision for the Grangemouth area in relation to freight and logistics is the development of the GIZ as a tri-modal national distribution hub for Scotland, which offers a cost effective location for distribution activities. This can be achieved through offering the occupiers of warehouses access to lower cost:

- Maritime transport via the Port of Grangemouth for direct access to international markets and;
- Rail freight transport via intermodal terminals for access to markets in England and many parts of Scotland, such as the Aberdeen area.

The Action Plan for the GIZ sets out the practical actions that would be required to take forward a series of measures by the public and private sector. These include some short-term measures - which could be regarded as 'quick wins' - and longer term measures that require some significant infrastructure investment.

### Action plan for the proposed measures for the GIZ

Measure	Tasks	Organizations involved	Timescale for implementation
Enhancement to A801	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
Enhancement of access to J5 of the M9	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
Icehouse Brae/Lauriston Road Upgrade	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
A9/A904 Westfield Roundabout Upgrading	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
A904 Westfield Roundabout to West Mains including A904 Grangemouth Road	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
A904 Falkirk Northern Distributor Road Works & Laurieston Link Road Works	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
J4 M9 Lathallan Upgrade	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
Development of large warehouses in the GIZ	Planning application; implementation	Private sector developers Falkirk Council	2020-25
HGV Parking Facility in the GIZ	Planning application; implementation	Private sector developer Falkirk Council	2020
Purchase of a 3rd container crane at the Port of Grangemouth	Investment made, with delivery of the crane in Quarter 3 2018.	Forth Ports	2018
On-going investment in the container terminal at the Port of Grangemouth	Develop commercial case for investment; secure funding' procurement process; implementation	Forth Ports	2018-25
Development of enhanced intermodal rail freight facilities at the Port of Grangemouth	Develop commercial case for investment; secure funding; procurement process; implementation	Forth Ports	2018-25
Develop planning policies to support the development of distribution activity in the GIZ.	Research into potential sites; allocation of sites in LDP; marketing of opportunity to potential developers	Falkirk Council	2018
Ensure that adequate rail network capacity is available	Study of existing & forecast network capacity; develop action plan to ensure sufficient network capacity is available; implementation.	Network Rail, Transport Scotland, Forth Ports, Malcolm Group, major shippers	Up to 2025
Marketing of the GIZ	Develop brand for freight and logistics in the Grangemouth area; develop marketing plan; implementation in the form of a public-private partnership.	Forth Ports & Malcolm Group Falkirk Council Scottish Enterprise	2018

Total modelled annual benefits from these measures are £11.65 million of user benefits (cost reductions for the freight and logistics industry and its customers) and £1.80 million of non-user benefits (mainly environmental benefits and reductions in congestion secured by society as a whole). The present value in 2017 of the benefits over 60 years is some £336 million.

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## 1 INTRODUCTION

### 1.1 Background

Scottish Enterprise commissioned MDS Transmodal (MDST) in partnership with Steer Davies Gleave (SDG) in September 2016 to carry out a study of freight flows in the Grangemouth Investment Zone (GIZ). While MDST led the study and carried out the analysis of the freight flows and forecasting, SDG focused on carrying out a consultation exercise with businesses that generate or attract freight transport movements in and around the GIZ.

The Grangemouth Investment Zone (GIZ) incorporates Scotland's only oil refinery with its associated petro-chemical manufacturing cluster, the country's largest container port by traffic volume and a nationally significant cluster of intermodal rail freight terminals. It is already an important location for distribution activity and is centrally-located in the Central Belt, about 40km from the centre of Scotland's capital city and 45km from the centre of its most populous urban area. It has direct motorway access towards Edinburgh via the M9, towards Glasgow via the M9/M876/M80 and to the north via the M9/A9/A90 to Stirling, Perth and Dundee and then on to Aberdeen. As well as its highway connections the GIZ has access to a W9 gauge-cleared rail freight route to the West Coast Main Line, which has allowed domestic rail freight flows to develop between Grangemouth and the logistics 'golden triangle' in the English Midlands.

### 1.2 Study objective

The **objective of the study** was to understand the current and future freight flows to and from the Grangemouth area as well as the current and future constraints to potential growth. It also provides an Action Plan, setting out what should be done to allow the GIZ to achieve its potential over the next ten years.

### 1.3 Study scope

**Freight transport** in this study was defined as the carriage of goods in a heavy goods vehicle (HGV) and by rail and sea between an origin and a destination for commercial reasons; the goods are transported because goods available at one geographical location are required at another location for processing, storage or consumption. This definition excludes "white van" traffic in light goods vehicles (up to 3.5 tonnes gross vehicle weight), which is less relevant to the economic activities in the GIZ, is often related to the provision of services or personal travel rather than for the transport of goods and for which there is very little reliable data. However, the scope of the study includes the wider concept of logistics and, in particular, warehousing/storage because of the importance of

distribution centres as nodes in the wider freight network, in adding value to the goods stored and in creating employment.

The **geographic scope** for the study focuses on the Grangemouth Investment Zone (GIZ) as an origin or destination for the freight flows that are examined within the study. The extent of the GIZ is defined on the map below (Figure 1.1) and includes the Port of Grangemouth, the Ineos oil refinery and associated petro-chemical plants, intermodal rail freight terminals located in Grangemouth and the clusters of distribution centres and other freight facilities that generate freight activity located in the zone.



**Figure 1.1: The Grangemouth Investment Zone**

Source: Scottish Enterprise

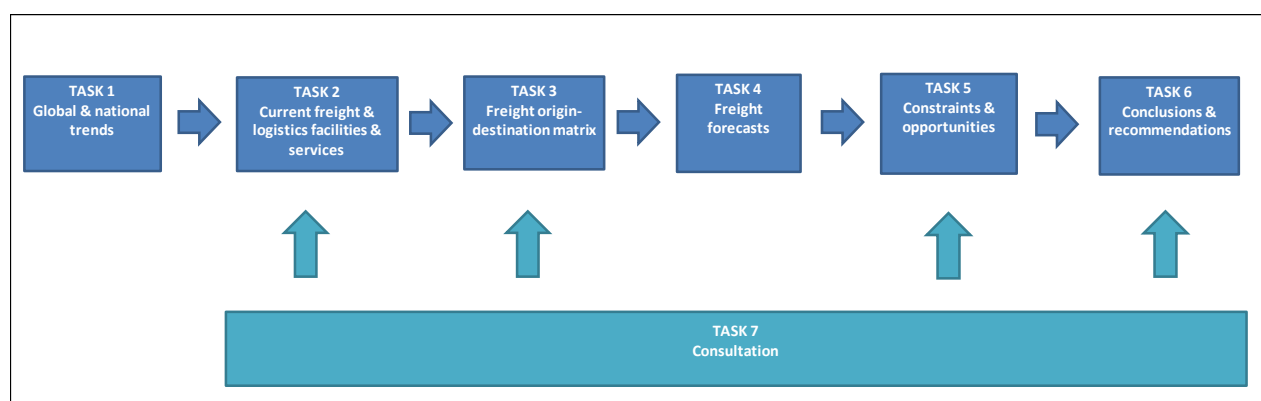
The **base year** for the study was 2015 as port, trade and road traffic data was generally available for this year. The **time horizon** for forecasting and modelling was 2025.



## 1.4 Approach to study

The study was completed in seven main tasks, as set out below in Figure 1.2.

**Figure 1.2: Flow chart for study tasks**



Task 1 focused on setting out the main global and national trends that are likely to affect freight flows to and from the GIZ up to 2025. Task 2 focused on establishing the freight facilities and related scheduled shipping and rail services that transport goods to and from the GIZ. Task 3 developed an origin destination (OD) matrix for the freight flows by all modes in 2015 for all the freight facilities defined in Task 2. Task 4 focused on forecasting the baseline freight flows up to 2025, while Task 5 set out the potential constraints on this growth and the economic arguments for public and private sector interventions to remove them. Task 6 provided conclusions and recommendations for the study, adopting a high level pre-appraisal approach. Task 7 related to consultation which was fully integrated into the overall work programme through a telephone survey of relevant businesses.

## 1.5 Data issues

There are a number of issues related to freight transport and trade data in Scotland and we have set these out below.

Port traffic data is collected and published by the Department for Transport (DfT) and is generally of high quality. Along with data for many other estuarine ports in the UK, such as the Clyde and the Thames, statistics are only published for the Forth for the port authority area rather than by port facility. This means that no data is published on the traffic handled at Grangemouth in its own right, except that HM Revenue and Customs (HMRC) does provide some trade data for individual customs ports such as Grangemouth for extra-EU imports and exports. However, for the purposes of this study Forth Ports also provided port traffic data specifically for the Port of Grangemouth.

One of the key issues for ports is the extent of their hinterlands for different kinds of traffic, but ports often do not carry out their own surveys and no official survey has been carried out by the DfT since the mid-1990s.

Origin and destination data for road freight movements has been sourced for this study from the GB Freight Model (GBFM), which forms the freight module of the DfT's National Transport Model; this model provides modelled estimates based on data from the DfT's Continuing Survey of Road Goods Traffic (CSRGT) and is, itself, based on a 1% annual survey of road hauliers. The detailed origins and destinations of the flows that are reported in the CSRGT are commercially sensitive and so are not made available by the DfT. Carrying out a bespoke survey of shippers and road hauliers to obtain origin-destination data at a detailed level (such as post codes) within this study would be very expensive to carry out and is likely to achieve poor results because of respondents' concerns about the confidentiality of the data. However, the stakeholder consultation carried out for the study secured some more general information about the origins and destinations of freight such as areas and regions of the UK and overseas markets.

Trade data for Scotland published by HMRC is based on Scotland being a 'region' of the UK and so there is no published trade data between Scotland and the rest of the UK. These trade flows with the rest of the UK can only be estimated through an examination of road, rail and shipping transport statistics.

## 1.6 Structure of report

**Chapter 2: The Business Environment** sets out the global and national trends that are likely to affect the business environment within which the GIZ is operating and will operate in the future. It also reviews the most relevant policy documents at a UK and Scottish level and concludes on how they affect the GIZ. Finally, the potential impact of the UK's departure from the EU is considered.

**Chapter 3: Freight facilities & flows** provides analysis of the freight facilities that are located in the GIZ and the freight flows to and from the GIZ; it concludes with baseline traffic forecasts for the GIZ up to 2025.

**Chapter 4: Results of consultation exercise** sets out the key conclusions from telephone and face-to-face interviews with shippers and logistics companies based in the GIZ and the wider Central Belt. It highlights the stakeholders' views on their future prospects over the next 5 years and the strengths and weaknesses of the GIZ and its opportunities and threats.

**Chapter 5: Constraints and opportunities** provides an analysis by the consultants of the existing strengths and weaknesses and the opportunities and threats for the GIZ up to 2025, informed by the

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results of the consultation exercise as well as the work of the consultancy team. It concludes with a vision for how the GIZ should develop over the next 10 years.

**Chapter 6: Evaluation and Action Plan** sets out the potential public sector measures and private sector investments that would allow the GIZ to achieve its potential as a freight and logistics hub over the next 10 years. It also provides a high level appraisal of these measures and investments and sets out the results of modelling carried out for the study using the GB Freight Model<sup>1</sup>; this model has been used to estimate the potential user and non-user benefits from the development of the GIZ as a multi-modal freight and logistics hub up to 2025. The chapter concludes with an Action Plan for the GIZ up to 2025.

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<sup>1</sup> The Great Britain Freight Model is a freight demand model, which forms the freight module of the DfT's current National Transport Model.

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## 2 THE BUSINESS ENVIRONMENT

### 2.1 Introduction

This section of the report sets out the results of the analysis of global and national trends in terms of their potential impact on trade, freight traffic and logistics in the GIZ. It also considers existing policy, which will affect the public policy measures that can be implemented in the GIZ in the future. Finally, it considers the potential impact on the GIZ of the decision to leave the European Union following the referendum in June 2016.

### 2.2 Market trends

#### Scottish trade by value

UK exports in 2015 amounted to £279bn (see Table 2.1 below) and the value of Scottish exports was £17bn (6.3% of the UK total). The value of Scottish exports has tended to fluctuate in terms of value and as a proportion of the UK total. Scottish exports to non-EU countries are consistently greater than exports to the rest of the EU, with non-EU exports representing about 60% of the total by value.

Unlike the UK as a whole, Scotland is a net exporter, highlighted in the fact that since 2008 Scottish imports account for only between 3.0% and 3.7% of UK total imports by value. The balance of Scottish trade was 57:43 in favour of exports in 2015, although many imports bound for Scottish consumers are handled at English ports and distributed to Scotland by road and rail from National Distribution Centres (NDCs) located in the Midlands. While the volume of these Scottish imports from NDCs in England can be estimated using transport statistics, no official statistics for trade between Scotland and the rest of the UK are published.

**Table 2.1: Scottish trade\* and UK trade in physical goods by direction, 2008-15**

£million

		Exports							
		2008	2009	2010	2011	2012	2013	2014	2015
<b>Scotland</b>	EU	6,030	5,342	5,423	6,232	8,162	8,714	8,364	6,720
	Non-EU	8,226	9,626	9,235	11,128	11,898	11,966	11,273	10,748
	Total exports	14,256	14,968	14,658	17,360	20,060	20,680	19,637	17,468
<b>Total UK</b>	Total exports	248,807	225,266	262,516	294,501	296,327	298,664	286,959	279,305
% Scotland		5.7%	6.6%	5.6%	5.9%	6.8%	6.9%	6.8%	6.3%
		Imports							
		2008	2009	2010	2011	2012	2013	2014	2015
<b>Scotland</b>	EU	3,325	3,020	3,505	3,671	5,117	5,352	5,178	4,895
	Non-EU	6,956	7,740	7,739	8,519	9,769	9,847	9,971	8,109
	Total imports	10,281	10,761	11,244	12,190	14,885	15,199	15,149	13,005
<b>Total UK</b>	Total imports	341,775	307,598	361,182	393,047	406,306	411,154	407,802	398,205
% Scotland		3.0%	3.5%	3.1%	3.1%	3.7%	3.7%	3.7%	3.3%

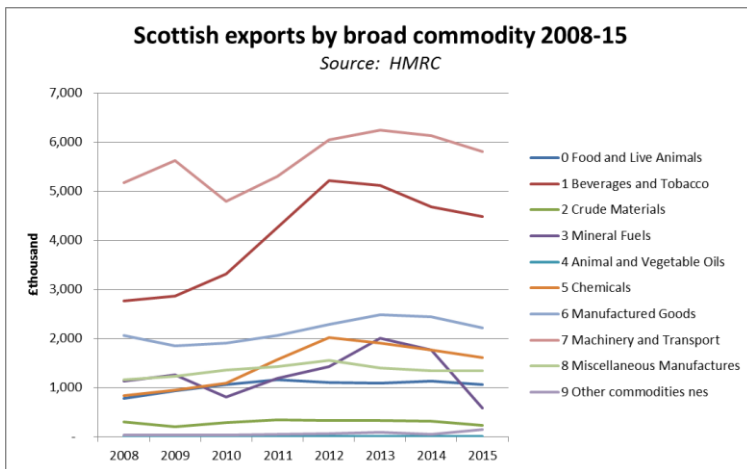
Source: HMRC

\* Excluding trade between Scotland and the rest of the UK

The balance of trade for physical goods in Scotland is also reflected in the balance of the container traffic handled at the Port of Grangemouth, where there are more full export boxes than import boxes handled at the container terminal.

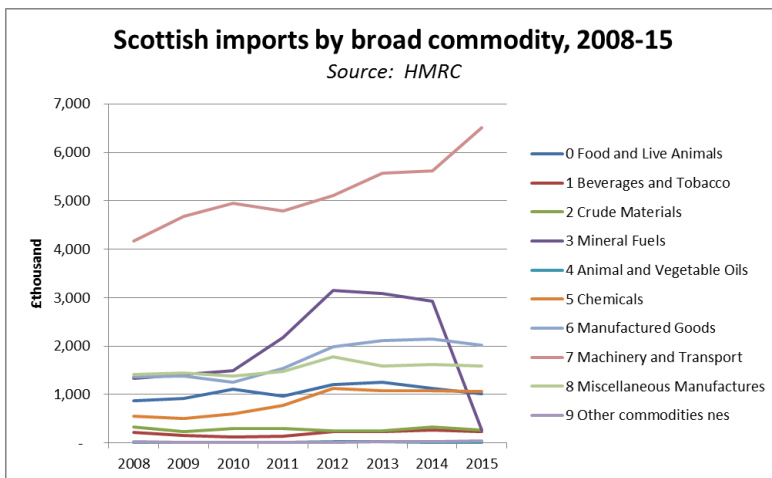
The top five Scottish export industries by value in 2015 (Figure 2.1) were Machinery and Transport (£5.8bn), Beverages and Tobacco (£4.4bn), Manufactured Goods (£2.2bn), Chemicals (£1.6bn) and Miscellaneous Manufactures (£1.3bn). With regards to the export of Food and Drink, distilling and blending of spirits accounted for over 70% of the value, underlining its importance to the Scottish economy.

Figure 2.1



Machinery and Transport was also the largest imported commodity group (£6.5bn), followed by Manufactured Goods (£2.0bn), Beverages and Tobacco (£0.2bn) and Chemicals (£1.1bn), which were all imported at lower values than the exports for their respective categories, suggesting general value added in Scotland’s largest exported commodity groups (Figure 2.2).

Figure 2.2



Again, the higher value commodities, such as beverages and food products and chemicals, are often handled in containers through the Port of Grangemouth.

## Port traffic

Scotland's ports handle much of the bulk and non-bulk commodities associated with the above import and exports flows, although some of the non-bulk import flows and fast-moving export flows (such as perishable food products), are also handled via English ports such as Felixstowe, Southampton, London Gateway, Tilbury, Teesport, Port of Tyne, Dover and the Eurotunnel Shuttle.

Table 2.2 below shows the annual traffic in tonnes for UK ports, with the total for Scotland and the Forth Ports group (including Grangemouth) shown separately.

**Table 2.2: UK ports, all freight traffic, 2004-15**

Million tonnes

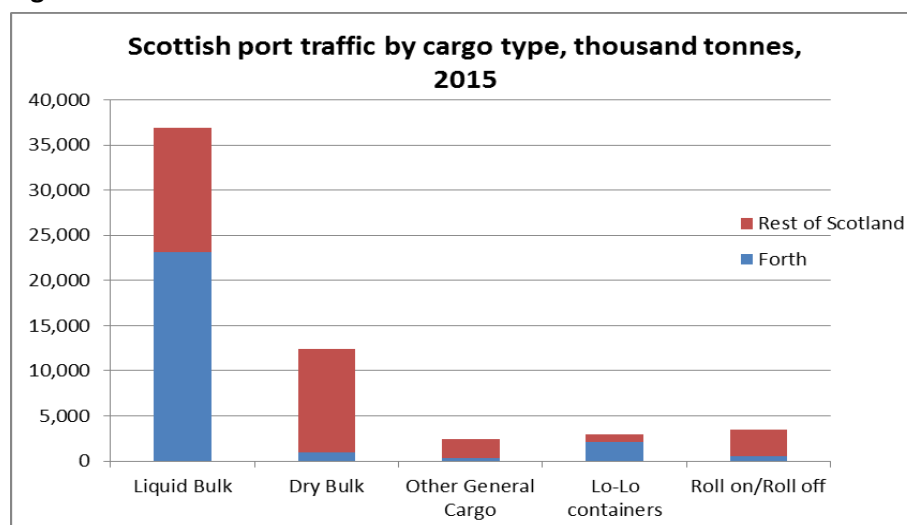
Ports	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Forth	34.2	31.6	36.7	39.1	36.7	34.3	27.9	25.3	26.4	24.6	27.0
Rest of Scotland	74.7	70.0	65.3	57.3	48.9	50.5	49.5	50.8	45.6	46.8	42.9
Scotland Total	108.9	101.6	102.0	96.3	85.6	84.8	77.4	76.1	72.0	71.4	70.0
United Kingdom	584.5	583.3	581.5	562.2	500.1	511.9	519.5	500.9	503.3	503.1	496.7

Source: MDS Transmodal, based on DfT Maritime Freight Statistics

With the decline in North Sea Oil-related traffic and the volumes of imported coal for inland power stations (both in Scotland and England) via Hunterston, Scotland's port traffic declined by some 36% between 2005 and 2015. At the same time, Forth Port's traffic has declined by only 21%, leading to the group's Scottish market share increasing from 31% in 2005 to 39% in 2015.

The change in market share reflects the mix of traffics handled by Forth Ports, which was not involved in the import of coal to any great extent and has been more focused on higher value container traffic via Grangemouth and RORO traffic on the Rosyth-Zeebrugge ferry service.

Figure 2.3 shows the total Scottish traffic by commodity, split between Forth Ports and the rest of Scotland. With its pipeline connection to the Forties oil and gas field and loading of crude oil exports from Hound Point, liquid bulk is the dominant traffic handled by Forth Ports and accounts for two thirds of Scotland's total traffic.

**Figure 2.3**

Detailed statistics are only published for the Forth as a whole rather than the individual port facilities on the estuary, but Grangemouth's main traffic flows are outbound petroleum products (from the refinery) and two-way flows of containers. Grangemouth is Scotland's major container port and 72% of the containers passing through Scottish ports (excluding Scottish domestic movements to and from the Northern Isles via Aberdeen) are handled at Grangemouth; this makes Grangemouth Scotland's main export port for high value goods such as whisky and chemicals.

Table 2.3 below provides an estimate of the size of the whole Scottish maritime container market in terms of the number of maritime containers that have an inland origin or destination in Scotland, including those that are transported by rail to and from an English port. Of this estimated market of 268,000 units in 2015, 73% of the containers enter the country via a Scottish port – with 53% of the total market being handled at Grangemouth - while the remaining 27% are handled at an English port and then railed north to rail terminals at Coatbridge and Mossend.

**Table 2.3: Estimated Scottish maritime container market, 2015**

Port facility	Containers
Grangemouth	142,000
Greenock	54,000
Felixstowe & rail	18,000
Southampton & rail	15,000
London Gateway & rail	15,000
Tilbury & rail	6,000
Garston & rail	12,000
Teesport & rail	6,000
Total	268,000

Source: DfT Port Freight Statistics & MDS Transmodal GB Freight Model



Grangemouth does, however, experience competition in the short sea market from the RORO service via Rosyth (which can now handle containers very efficiently on a RORO vessel), Greenock on the Clyde and a range of container and RORO services carrying containers via the Tees and the Tyne. The Teesport RORO services are integrated with an intermodal rail freight service to/from Mossend in the Central Belt of Scotland.

In the deep sea container market Grangemouth is competing with feeder services between Rotterdam/Antwerp and Teesport, the Port of Tyne and Greenock and also with English deep sea container ports such as Felixstowe, London Gateway and Southampton and their intermodal rail freight services from Coatbridge. In addition, the Central Belt can be served by a feeder container service to Teesport and then an intermodal rail freight service to Mossend/Grangemouth.

In conclusion, while the Port of Grangemouth has a strong competitive position in the Scottish container market because of its location on the east coast and in the middle of the Central Belt, it does experience competition from other Scottish and English ports. It also acts as an import port for dry and liquid bulk products which are often used as raw materials for manufacturing processes in Scotland.

## Container Shipping

One of the key issues affecting the global and European container shipping market is the rapid increase in the size of container ships as the major shipping lines seek to secure greater economies of scale.

Table 2.4 below shows the evolution of vessel size and the change in deployed capacity of container shipping at a European and a global level between 2006 and 2016. This shows that the deployed capacity in Europe has increased by 46% as demand has gone up, but the increase in average ship size has been 74%. The largest ships currently deployed on the key Far East-Europe routes have roughly doubled in size<sup>2</sup> in just ten years.

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<sup>2</sup> The largest container ship afloat is the *MOL Triumph*, which was delivered to its owners in March 2017. She has a reported capacity of 20,170 TEU and will operate on the Far East-Europe trade lane, making her maiden voyage in April 2017.

**Table 2.4: Changes in capacity offered by deep sea container shipping lines to/from Europe, 2006 and 2016**

European	2006Q3	2016Q3	2006 vs 2016
Number of services	165	137	-28
Max ship size (TEU)	9,560	19,200	+101%
Deployed capacity (million TEU)	28.5	41.7	+46%
Average ship size (TEU)	3,449	6,035	+74%
Global	2006Q3	2016Q3	2006 vs 2016
Number of services	388	387	-1
Max ship size (TEU)	9,560	19,200	+101%
Deployed capacity (million TEU)	59.6	95.4	+60%
Average ship size (TEU)	3,067	4,909	+62%

Source: MDS Transmodal Containership Databank

Due to their size, it is more economical for the larger ships to only make a limited number of calls at the large deep sea ports, such as Rotterdam, Hamburg, Antwerp and Felixstowe. This means that smaller 'regional' ports, such as Grangemouth and Greenock will be served by feeder services.

More details of the container shipping services that call at Grangemouth are provided in section 3 below, but the size of the ships that call at the port varies significantly from just over 300 TEU to 1,700 TEU. This suggests that most of the container shipping lines do not regard the Scottish market as being sufficiently large to justify deploying larger feeder or short sea container ships of over 1,500 TEU. The future trend in the size of container ships is considered in section 2.3 below.

## Road haulage

Table 2.5 provides an analysis of the origins and destinations of Scottish road freight, measured as tonnes lifted by HGVs registered in the UK. The data suggests that some 90% of road freight trips with an origin in Scotland are intra-Scotland movements and the corresponding percentage for trips with a destination in Scotland is 87%; this reflects the flexibility, convenience and cost-effectiveness of road haulage over shorter distances.

The dominance of road haulage for the transport of goods to, from and within the GIZ is no exception and this is shown in the freight origin and destination matrices for the GIZ provided in section 3 below.

**Table 2.5: Goods lifted by UK HGVs by origin and destination of journey, 2005-15**

Million tonnes

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>On journeys originating in Scotland</b>											
<i>by destination:</i>											
Scotland	152.7	155.5	159.8	144.2	118.8	116.8	130.3	136.6	122.4	123.4	136.7
Elsewhere in UK											
<i>England</i>	12.0	13.2	15.8	11.4	12.2	13.9	12.9	12.7	12.8	13.6	16.0
<i>Wales*</i>	0.2	0.6	0.5	0.6	*	0.8	*	*	*	*	*
<i>Northern Ireland</i>	0.2	0.4	*	0.3	0.2	0.1	*	0.7	0.2	0.1	0.5
Total elsewhere in UK	12.5	14.2	16.4	12.3	12.6	14.8	13.6	13.7	13.2	13.9	17
Outwith UK	0.4	0.4	0.6	0.5	0.5	0.4	0.3	0.3	0.3	0.2	0.2
Total	165.6	170.0	176.8	157.0	131.9	131.9	144.2	150.6	135.8	137.6	153.9
<b>On journeys with Scottish destinations</b>											
<i>by origin of journey:</i>											
Scotland	152.7	155.5	159.8	144.2	118.8	116.8	130.3	136.6	122.4	123.4	136.7
Elsewhere in UK											
<i>England</i>	16.7	18.6	21.2	17.1	15.5	17.3	16.8	19.0	16.0	17.9	19.8
<i>Wales*</i>	0.5	0.2	0.6	0.3	*	0.4	*	*	*	*	*
<i>Northern Ireland</i>	0.2	0.1	*	0.3	0.4	0.2	0.3	0.5	*	0.2	0.5
Total elsewhere in UK	17.4	18.9	21.9	17.7	16.0	17.9	17.5	19.8	16.4	18.4	20.4
Outwith UK	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.2
Total	170.4	174.6	182.0	162.2	134.9	134.9	147.9	156.6	138.9	141.9	157.3

Source: Scottish Transport Statistics

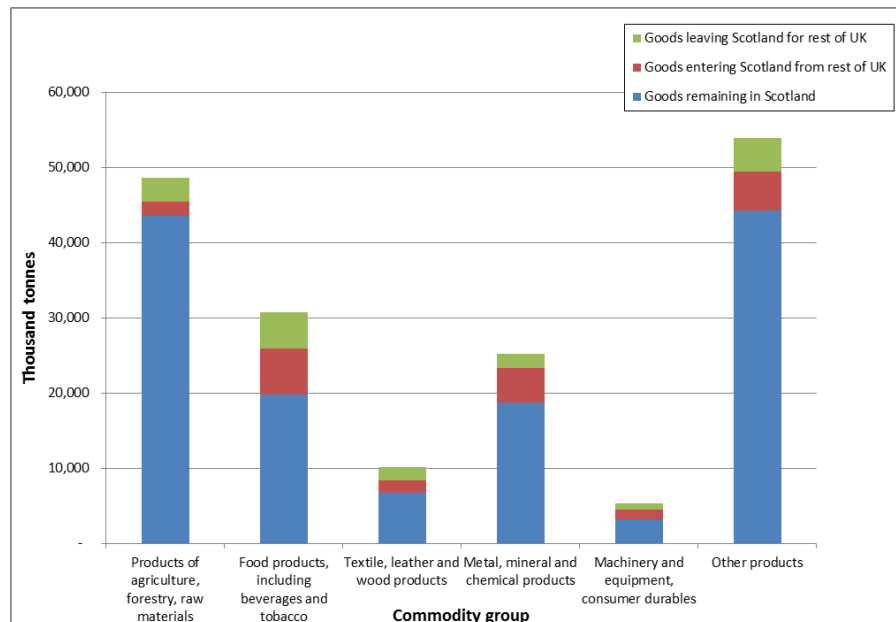
\* = Sample too small for a reliable estimate

Figure 2.2 provides a breakdown of the commodities lifted by road in Scotland and shows that the most significant by volume are agricultural/forestry products and a wide variety of manufactured goods, chemicals, food products and beverages.

While the port handles some imported forest products, the main road freight flows relate to the distribution of refined petroleum products from the oil refinery, the delivery of containers to or the collection of containers from the Port of Grangemouth and the distribution of a variety of other mainly dry and liquid bulk goods to and from the port. The GIZ's road freight flows are shown in more detail in section 3 below.

**Figure 2.2: Goods lifted or moved by UK HGVs, for journeys within the UK with a Scottish origin or destination, by commodity, 2015**

Source: Scottish Transport Statistics



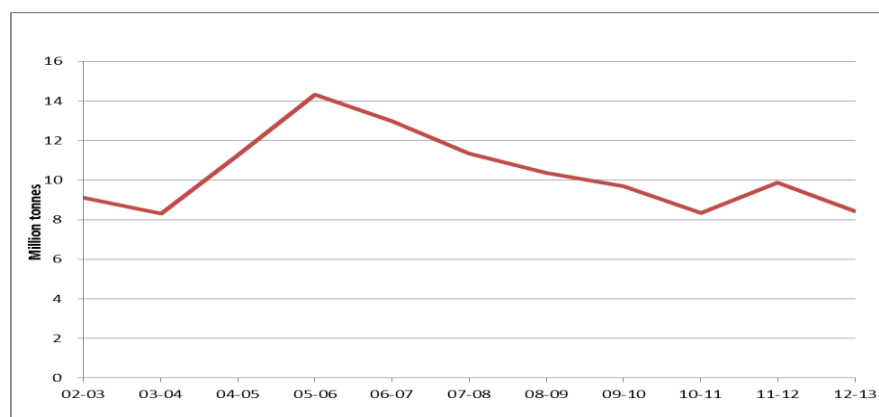
### Rail Freight

Figure 2.3 shows the volume of rail freight lifted in Scotland in tonnes for the period 2002-13.

**Figure 2.3: Rail freight lifted in Scotland, 2002-13**

Million tonnes

Source: Scottish Transport Statistics



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After a peak of 14 million tonnes lifted in 2005-2006, rail freight tonnes lifted has since declined to around 8 million tonnes in 2012-13, mainly due to the decline in the volume of imported coal transported to coal-fired power stations from the Port of Hunterston on the Clyde Estuary.

The GIZ is a major source of rail freight traffic in Scotland, with both bulk and intermodal rail freight flows. There are flows of petroleum products by rail in bulk tankers to Prestwick (aviation fuel, roughly weekly) and Dalston in Cumbria (probably a variety of refined products, twice a day) and more infrequent trains to tank storage facilities at locations such as Fort William, Lairg and Riccarton) from the oil refinery's rail loading facility. There are also daily intermodal rail freight services between the inland terminal operated by WH Malcolm and the rail-connected distribution park at Daventry in the Midlands, an intermodal terminal in Aberdeen and to Mossend Euroterminal.

### **Distribution**

The GIZ already contains a cluster of logistics activity and the warehouses that are located there are described in Table 3.2 below. However, the most important clusters of distribution centres in Scotland are to the south and west of Grangemouth – such as the Tesco distribution centre located adjacent to the M8 near Livingston. As in the rest of the UK, these tend to be on greenfield sites close to motorway junctions rather than on sites that are rail- or water-connected. The main rail-connected distribution sites in Scotland are closer to Glasgow, but they do not provide occupiers with access to maritime transport.

## 2.3 Potential trends for the future

### Size of container ships

As the analysis in Table 2.4 above shows, deep sea container ships have increased dramatically in size in the last 10 years as the major lines have sought greater economies of scale to reduce the cost of transporting each unit. Table 2.6 below provides analysis of the deep sea container new build vessels on order in summer 2017 and provides evidence of future ship sizes in this market. The data suggests that over the next 3/4 years the average size of new build vessel is likely to grow to over 15,200 TEU for the 154 ships new build vessels and 21,100 TEU for the largest vessel currently on order.

**Table 2.6: Size of deep sea container ships on order, 2017-20**

Year	Ship size band (TEU)	Max vessel size (TEU)	Number of vessels	Average vessel size TEU
<b>2017</b>		<b>21,100</b>	<b>61</b>	<b>14,102</b>
	7500-9999	9,400	7	9,314
	10000-12499	12,200	22	11,027
	12500-14999	14,500	12	14,250
	15000-19999	15,300	6	15,300
	>20000	21,100	14	20,689
<b>2018</b>		<b>21,000</b>	<b>73</b>	<b>15,952</b>
	10000-12499	12,200	15	11,787
	12500-14999	14,500	27	13,920
	15000-19999	19,000	6	17,150
	>20000	21,000	25	20,359
<b>2019</b>		<b>21,000</b>	<b>14</b>	<b>16,119</b>
	10000-12499	11,800	4	11,800
	12500-14999	14,000	4	13,968
	>20000	21,000	6	20,433
<b>2020</b>		<b>20,150</b>	<b>6</b>	<b>17,032</b>
	12500-14999	14,000	3	13,913
	>20000	20,150	3	20,150
<b>Grand total</b>		<b>21,100</b>	<b>154</b>	<b>15,277</b>

Source: MDS Transmodal Containership Databank

The largest of these ships are likely to be deployed on the Europe-Far East trade lane, which means that the average exchange of containers at the major deep sea container ports in North West Europe is likely to increase. This may have a knock-on effect on the size of feeder ships that operate between these ports and Grangemouth.

Table 2.7 below provides analysis of the feeder/short sea container new build vessels on order in summer 2017 for operators that deploy vessels in North West Europe and provides evidence of future ship sizes in this specific market.

**Table 2.7: Size of feeder/short sea container ships on order, 2017-20**

Year & Operator	Ship size band (TEU)	Max vessel size (TEU)	Number of vessels
<b>2017</b>		<b>3,600</b>	<b>12</b>
<i>Eimskip</i>	500-999	875	1
<i>BG Freight Line</i>	1000-1999	1,000	4
<i>Seago Line</i>	3000-4999	3,600	7
<b>2018</b>		<b>1,400</b>	<b>3</b>
<i>Containerships</i>	1000-1999	1,400	3
<b>2019</b>		<b>2,150</b>	<b>3</b>
<i>Eimskip</i>	2000-2999	2,150	2
<i>Royal Arctic Line</i>	2000-2999	2,150	1
<b>Grand Total</b>		<b>3,600</b>	<b>18</b>

Source: MDS Transmodal Containership Databank

The data suggests that over the next three years the average size of new build feeder/short sea vessel on order is over 2,200 TEU, which is about 500 TEU larger than the largest ship that is currently calling at the port, and the largest ship is 3600 TEU. Average ship size is likely to increase over the next 10 years in the North West European feeder/short sea fleet.

## E-commerce

One of the key trends that are affecting the freight and logistics market is the increase in on-line (e-commerce) sales at the expense of bricks and mortar retail activity and the desire for next day or even same day delivery. This trend is set to continue over the next ten years. This has the effect of substituting journeys in cars or by public transport to and from retail outlets with 'white vans' carrying out deliveries where people live or work. This is having an impact on distribution patterns as the unit of freight becomes a parcel rather than (say) a pallet. The parcels operators tend to have their final sorting offices/depots located close to individual major population centres, which means that in the Central Belt they are likely to be located close to both Glasgow and Edinburgh. The GIZ is unlikely to represent an ideal location for the final sorting of parcels for on-line deliveries as it is too far from the two major population centres, but it remains an excellent location for more traditional distribution to retail outlets and for large-scale e-commerce distribution centres serving the whole of Scotland from a single central location.

## Trends in logistics

3D printing is now readily available for the manufacture of a variety of goods, such as parts for manufacturing processes, without the need for large-scale manufacturing plants. It seems unlikely

that 3D printing will replace factories to any great extent over the next ten years and, in any event, the raw materials for 3D printing still require freight transport to deliver them to the printing site.

Other modes of freight transport, such as cycling and walking, may have niche roles in urban areas and drones may have a niche role for the delivery of lightweight cargo to remote areas, but we believe it is unlikely that they will have a significant market share in the next ten years. The GIZ's freight and logistics activity is likely to continue to be focused on heavy freight transported in high volumes in ships, trains and HGVs.

ICT is already used extensively by the logistics industry to manage bookings and reservations of capacity, to manage operations (including managing fleets), for tracking and tracing of consignments, for cost-effective routing and for financial management. There may be some scope for 'disruptive' technology to be developed which will facilitate the sharing of the capacity provided by freight transport operators – which would therefore facilitate collaboration between shippers and receivers. However, collaboration is often difficult to achieve in practice because the cost of road haulage is so much lower than the value of the goods being transported; this means that the priorities for shippers and receivers are related to receiving the goods quickly and on-time rather than seeking to reduce costs by sharing capacity. Hauliers also have well established contacts with other operators and manufacturers, meaning that spare capacity can easily be filled by more traditional means such as by telephone.

The main technological trends over the next ten years are likely to be towards increasing the cost-effectiveness and sustainability of existing modes of transport. For example, it seems likely that the UK Government will allow the introduction of longer semi-trailers (which are being trialled in the UK) because they provide both environmental benefits in terms of emissions per tonne transported and so provides efficiencies for the operators; the rail freight industry will be able to adapt by introducing longer intermodal units and WH Malcolm has already done this.

In addition, there is likely to be a move towards platooning HGVs so that a single driver in a lead vehicle can guide several HGVs on some sections of the strategic road network. The following HGVs would automatically maintain an optimum gap in terms of air resistance and drag. Trials of this technology are due to start in 2017. This could lead to a reduction in costs for road hauliers but a number of safety issues will need to be addressed. Drivers would still need to accompany the HGVs following the lead vehicle in a platoon (for the initial departure from origin to the final approach at a destination), meaning the cost savings are likely to be generated from reduced fuel consumption.

Finally, with increasing political attention being paid to the impact that poor air quality has on human health, there is likely to be a much greater focus on ensuring that only low emission freight vehicles are entering urban areas. This is likely to be regulated through the introduction of Low Emission Zones or Clean Air Zones in urban areas such as Edinburgh and Glasgow and will have the



effect, at least in the next few years, of encouraging the development of regional distribution centres on the edge of major conurbations so they are within the range of electric vehicles using the existing battery technology. In the medium term, however, it is likely that battery technology develops so that the GIZ is within the range of both Glasgow and Edinburgh for electric powered vehicles. Existing battery technology tends to encourage the use of electric 'white vans', which lack the economies of scale provided by an HGV; however, manufacturers are focused on developing the battery technology and there is already, for example, a Mercedes electric HGV on the market.

## 2.4 Policy analysis

### Introduction

At a UK level there is very little freight transport policy that is relevant to this study, partly because the Westminster Government has taken a 'light touch' approach to freight transport policy (justified by it being owned and operated by the private sector) and partly because freight transport policy is a devolved matter. This section of the report focuses therefore on policy documents in Scotland, both at a national and local level, with the exception of the DfT's Rail Freight Strategy (published in September 2016) because of its UK-wide significance and the importance of long distance rail freight services to and from the GIZ.

### DfT Rail Freight Strategy

In September 2016 the DfT published a *Rail Freight Strategy* which was generally positive about the prospects for rail freight but which also increased the uncertainty about whether network capacity will be available for additional services in the future, particularly for domestic intermodal services such as those that operate between Grangemouth and Daventry. This is despite Network Rail publishing its *Freight Network Study* (August 2016) which broadly supported demand forecasts that were produced by MDS Transmodal in 2013; these demand forecasts suggested there was potential for significant additional domestic intermodal traffic up to 2033 if an enhanced network of rail connected distribution parks (or Strategic Rail Freight Interchanges, SRFIs) was developed.

Measured in tonne kilometres, the Freight Network Study arrived at an overall growth in rail freight from 2011 to 2033 of 70% or 2.4% per annum, a figure reached as a result of making transparent assumptions about trends in labour and energy costs, network enhancement to permit longer trains to operate on the network, weekend operations and the development of several rail linked distribution parks or SRFIs. SRFIs are distribution parks where an intermodal terminal and warehousing share the same site so that local rail to road haulage transfer costs can be eliminated, which makes a major difference to rail competitiveness; the GIZ, along with Mossend, are likely to be the most cost-effective locations for such SRFIs in the Central Belt of Scotland.

However, the DfT's *Rail Freight Strategy* includes capacity constrained forecasts which have the impact in the DfT's Central Constrained Forecast of reducing by over 80% the forecast volume of domestic intermodal traffic to just 4 million tonnes in 2030 due to a lack of train paths along the principal rail corridors on the network such as the West Coast Main Line (WCML) and the East Coast Main Line (ECML). At the same time, in its Central Constrained Forecast the DfT anticipates a more than doubling of traffic to and from the deep sea container ports in the South of England from 15 million to 32 million tonnes lifted between 2011 and 2030. Given that the DfT study appears to have assumed no more capacity along the principle rail corridors (and in some cases less) it is difficult to see how this can be achieved; almost all this ports traffic uses the West Coast Main Line at some point in its journey.

The DfT strategy highlights the crucial impact of limiting the capacity of the network available to freight. The DfT strategy's Central Constrained Forecast anticipates that such a capacity constraint is likely to limit the development of domestic intermodal freight to just 4.0 million tonnes, which is only double that currently passing through the largest SRFI operating (DIRFT, near Daventry). Given that DIRFT is itself being expanded so that it will provide double the level of warehouse floor space and terminal capacity, this projection could imply that the DfT expects no more SRFIs will be built or will at least contribute to mode shift.

The DfT strategy therefore has two significant impacts, at least in theory, on the GIZ:

1. It implies there is unlikely to be sufficient rail network capacity to allow the further development of domestic intermodal services, such as those which already operate between DIRFT and Grangemouth; if train paths are not available, then warehouse developers are less likely to develop further SRFIs in Scotland;
2. At the same time the strategy implies there will be sufficient network capacity for additional intermodal services to and from the English deep sea container ports, which compete with the Port of Grangemouth via the intermodal rail terminal at Coatbridge.

The strategy does not appear to be entirely consistent in its approach and there is a lack of transparency about the methodology in the approach taken to network capacity issues. However, there is generally accepted to be a lack of network capacity to the south of Crewe and to the north of Carlisle on the WCML. This implies that the general shortage of network capacity is a threat to the development of domestic intermodal traffic to and from the GIZ, but it will also encourage greater use of container shipping services to and from the Port of Grangemouth to cater for market growth rather than additional rail freight services between ports in the south of England and Coatbridge.

The Scottish Government also published a rail freight strategy in 2016. This is considered in the context of Scotland's overall *National Transport Strategy*, as follows.

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## National Transport Strategy

The updated Scottish National Transport Strategy, published in January 2016 mainly focuses on passenger mobility but it generally reflects the need in the context of freight transport to find a balance between securing economic efficiency while reducing environmental emissions and other wider impacts.

With respect to freight the document notes that total freight moved from Scotland has fallen over recent years, driven more recently by reductions in freight moved by coastal shipping. Road freight now dominates when measured as goods lifted and in terms of tonne-kilometres; in 2012 road freight accounted for 42% of total tonne kilometres, shipping for 30% and rail for 9%. Freight moved by pipeline in Scotland has remained roughly the same for the last eight years and accounts for just under one fifth of the total; Scotland has a higher share of freight moved by pipeline than other EU countries because of the relative importance of the oil and gas industry.

The document states that the Scottish Government promotes freight modal shift, while respecting competition between transport modes, through various Scottish Government support schemes, principally:

- Freight Facilities Grant (FFG): a grant scheme managed by Transport Scotland that helps companies with the capital costs associated with moving freight by rail or water instead of road, by offsetting the extra costs of providing freight handling facilities.
- Mode Shift Revenue Support: a grant scheme managed by Transport Scotland that helps companies with the extra operating costs associated with moving freight by rail or inland waterways instead of road.
- Waterborne Freight Grant: a grant scheme managed by Transport Scotland that helps companies with the extra operating costs associated with moving freight by coastal and short sea shipping instead of road.
- Strategic Timber Transport Fund: a scheme managed by Forestry Commission Scotland that supports sustainable timber transport in rural Scotland.

The most important scheme historically is FFG and 39 awards of FFG totalling almost £73m have been made in Scotland, which have removed over 172 million lorry miles from Scotland's roads to date.

The Strategic Transport Projects Review (STPR) is the framework for land-based transport interventions in Scotland, taking the future needs of Scotland's strategic transport infrastructure into account. The 29 STPR recommended interventions form part of *the Infrastructure Investment Plan* (see below) to help prioritise future transport investment. These recommendations include improvements to the A720, the A737 and the A90 and are in addition to the economic benefits associated with the £1.4bn Queensferry Crossing and the £439m M8/M73/M74 Motorway Improvements Project.

### **Delivering the goods: Scotland's rail freight strategy**

This strategy, published in 2016, sets out the Scottish Government's vision for a competitive, sustainable rail freight sector that will play an increasing role in Scotland's economic growth, providing a 'safer, greener and more efficient way of transporting products and materials.' It forms part of the wider *National Transport Strategy*, which aims to support a safe, efficient and sustainable transport system, for both passengers and freight, as a key enabler of sustainable economic growth. However, Scotland's rail freight strategy is distinct in two main ways, namely:

- It seeks to address the pressing market challenges faced by the rail freight industry due to the decline of the dominant, traditional markets of coal and steel; and
- It reflects the regulated nature of the industry and the opportunities and challenges of a fixed network with defined rights of use and associated charging mechanisms.

The strategy has four broad categories regarding the future of rail freight in Scotland. As well as encouraging innovation in the rail freight industry in Scotland, promoting the role of rail freight in competition with road freight and facilitating the efficiency and availability of network capacity the strategy is focused on investment in the following areas:

- Creating the right environment for a targeted, whole industry approach to investment which enables rail freight's potential for growth and maximises its contribution to Scotland's economy;
- Providing certainty in the long term investment programme, encouraging third parties to also invest in rail freight services and facilities; and
- Complete alignment between the Scottish and UK Governments on cross-border investments, with a focus on supporting Scottish exports.

Rail freight is cited as being required in development plans to encourage future development and investment, particularly regarding the development of rail freight terminals, railheads and the efficient management of local traffic accessing such sites. This would certainly be the case with development at sites within the Grangemouth Investment Zone.

The strategy also refers to planning policy in the context that it sets out the needs of rail freight, including through new or expanded interchanges should be regarded as being important in the preparation of development plans. Local authorities are encouraged to locate freight generating development on sites accessible to suitable railheads in their Local Development Plans. The strategy also cites the extensive consultation process which development plans are subject to and that the rail freight industry is always strongly encouraged to engage in that process.

### **Scotland's Third National Planning Framework (2014)**

The *National Planning Framework 3 (NPF3)* is the long term planning strategy for Scotland. It is the spatial expression of the Government's economic strategy and outlines the plans for infrastructure investment, promoting sustainable economic growth for Scotland. The vision brings together plans and strategies in economic development, regeneration, energy, environment, climate change, transport and digital infrastructure.

Statutory development plans must have regard to the NPF3, and Scottish Ministers expect planning decisions to support its delivery. The GIZ is recognised as a nationally important development area for infrastructure and investment, one of 14 national developments that have been identified as being needed to help deliver the spatial strategy. National development status establishes the need for a project but it does not grant development consent. The delivery of national developments is designed to be carried out by a range of public and private sector organisations.

Specifically in relation to the GIZ the NPF3 states:

'We wish to see co-ordinated action at Grangemouth, a nationally important area for infrastructure and investment. The Grangemouth Investment Zone is designated as a national development, along with a new power station with CCS. Together with wider developments on the Firth of Forth, these projects will make a significant contribution to the spatial strategy and support major employment and investment. The area includes many communities who have long lived adjacent to significant industrial activities and it will be important to ensure that their living environment and quality of life are protected and enhanced. A strategic approach will be needed to avoid adverse impacts on the environment of the Forth Estuary. There is considerable potential to support this through the delivery of the Central Scotland Green Network.'

Grangemouth is also recognised as an important freight interchange, providing the Central Belt with national and international connections, with future enhanced rail freight connections to and from Grangemouth considered as an integral part of the national developments.

As well as the GIZ being designated as a national development in NPF3, additional freight capacity on the Forth – where consenting of new freight handling facilities at Rosyth was progressing at the time

- was also designated in the same way. Subsequently, the Rosyth International Container Terminal (RICT) was granted planning permission, but no decision has been made to invest in the facility.

### Infrastructure Investment Plan 2015

The *Infrastructure Investment Plan* sets out priorities for investment and a long-term strategy for the development of public infrastructure in Scotland. The document notes that Transport Scotland will take forward plans that balance strategic economic objectives with the need to promote modal shift, and balance funding for new assets with the maintenance of current ones. Investment in transport across Scotland will deliver the best possible connectivity across the roads and public transport network, improving journey times and tackling inequality by improving accessibility of services and opportunities. Further, it aims to invest in a way that reduces carbon emissions in Scotland.

Transport schemes relevant to Grangemouth included in the project pipeline include:

- Replacement Forth Crossing – due to open in 2017;
- The M8/M73/M74 Motorways Improvement Project, which will complete the central Scotland motorway network and help to reduce congestion and provide faster, more reliable journey times;
- A876 Kincardine Refurbishment: refurbishment and essential repair of existing structure;
- Aberdeen to Central Belt Rail Improvements: programme links to encouraging modal shift on this route for both passenger and freight traffic by 2030.

### Falkirk Grangemouth Framework for Growth (2011)

The framework focuses on the Falkirk/Grangemouth area, specifically identifying its economic development potential and how it can be realised. A lot of the focus is on the port activities at Grangemouth and how this boosts the wider economy, including the chemicals industry. One of the key roles of the framework is to better position Falkirk, Grangemouth and the Upper Forth as a priority for investment, for public sector resources and encouraging private sector investment.

The framework recognises the importance of the port, including the need for its further development to support the local economy and establish the port as a major logistics and distribution hub. The area's low carbon industrial development in the future is focused on the development of:

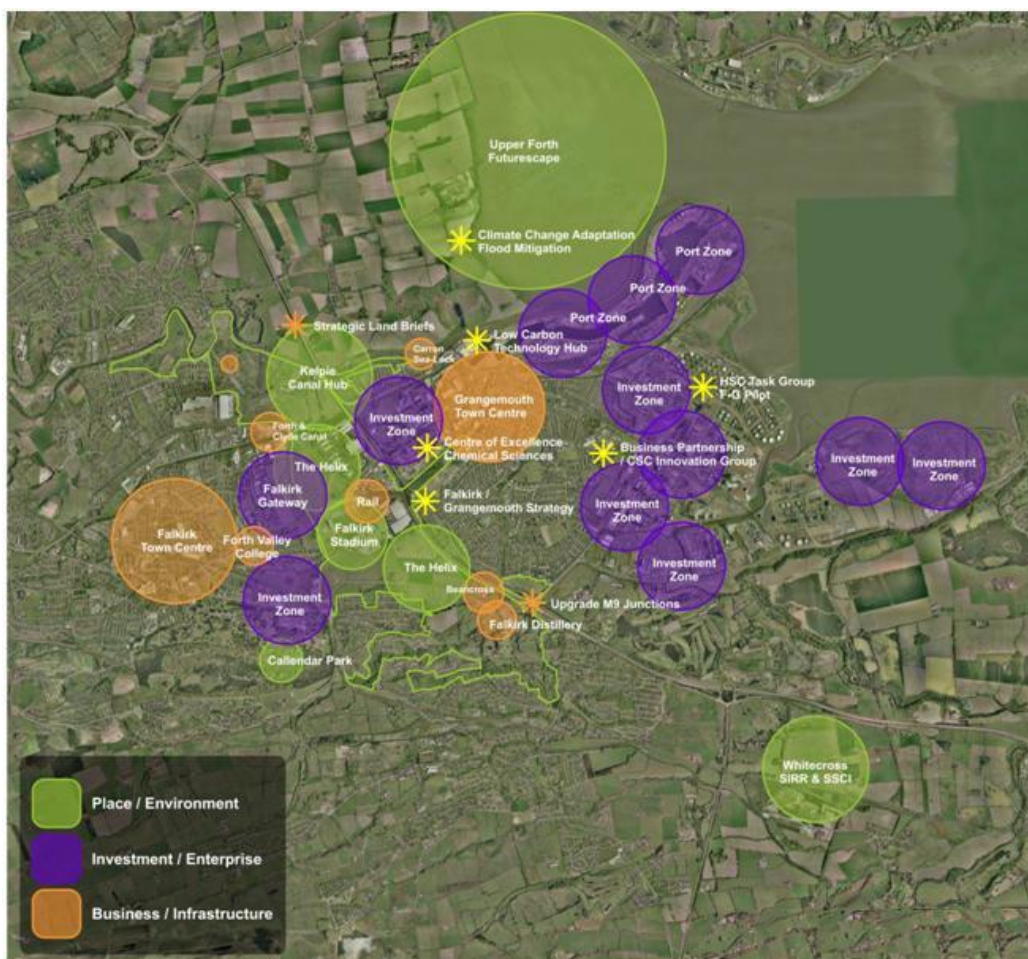
- Chemical-science based research and manufacturing to bring forward new carbon-efficient products;
- A clear and lead role for the multi-modal infrastructure at the Port of Grangemouth in reducing long distance freight movements by road;

- Locating bio-mass/bio-fuel and or shared energy generation in and around the area; and
- The development of the Helix, which straddles Falkirk and Grangemouth and offers a potential symbol of the dynamism and adaptation within the local economy.

The framework also points to how the area can move forward, citing four broad categories:

- Repositioning the area in the face of strategic market change;
- Flood prevention;
- Enabling Infrastructure to release capacity; and
- An enabling regulatory and planning environment

The map below shows the numerous Investment/Enterprise zones falling within the port and the wider GIZ area.



The majority of sites marked for development within the GIZ are expected to be either chemicals, general industrial and/or warehousing development or warehousing only development.

The focus on the GIZ as set out in the framework is on generating growth and investment primarily in the petrochemicals, chemical sciences and distribution. Investment will aim to support industry, as well as fund training and research. With regard to transport infrastructure, this is seen as crucial to supporting the development of the area, without outlining particular sites that require enhancement.

The framework also recognises the existence of competition from other port and chemical industry clusters, notably the Tees Valley Enterprise Zone which also emphasises the development of sites for the petro-chemical industry, the renewables industry, advanced engineering and the digital industry.

### **Falkirk Local Development Plan (2015)**

The Falkirk Local Development Plan (LDP) has been prepared to guide the future use and development of land within the Falkirk Council area over the next 20 years. The three broad themes that make up the vision of the development plan are thriving communities, growing economy and sustainable place.

Like previous policy and strategies covered, emphasis is placed on the importance of the Grangemouth port area with regard to the country's trade and also the chemical industry cluster.

The section within the plan on infrastructure considers the merits of prudential borrowing for priority projects and progressing Tax Increment Financing (TIF) as a means of delivering strategic infrastructure improvements connected to the Grangemouth Investment Zone, as well as the Falkirk Investment Zone.

From a housing point of view, Grangemouth is considered to have low growth potential in the future, reflecting the focus on economic development. Infrastructure investment is also cited as being crucial to the Grangemouth Freight Hub, including upgrading of Junctions 5 and 6 of the M9 and a comprehensive flood prevention scheme.

In the supporting policies section of the LDP, there is a section on freight. It cites the importance of the GIZ in a national development context and states that the council will continue to support the development of strategic infrastructure associated with the Investment Zone, directing freight intensive development to locations primarily around the GIZ, "utilising its road, rail and sea connections, where adverse impacts on communities and the existing transport network can be minimised."



Policy INFO9 relates directly to freight transport and states:

1. Freight intensive investment will be directed to the Grangemouth Investment Zone and to other locations that can be accessed without significant impact on local communities, or on the local and strategic road network.
2. Development which will encourage the transfer of freight from road to rail, including the development of freight handling facilities, will be supported subject to other LDP policies.
3. The Council will continue to work with SEStran, freight companies, developers and others in developing freight quality partnerships.

## 2.5 Potential impact of Brexit

The volume and pattern of freight transport is affected by changes in the level of economic activity, the nature of the legal and regulatory environment (which forces the operators to adapt their strategies and operations) and trading relationships with neighbouring countries. All of these issues will be affected by the outcome of the negotiations between the UK Government and the rest of the EU in relation to its departure from the European Union.

There is a high degree of uncertainty about the future direction of the UK and Scotland as a result of the UK's departure from the EU and its practical implications for the Scottish freight transport market, particularly given the result of the 2017 UK General Election. For example, in the event that the UK leaves both the EU Single Market and the Customs Union without achieving a new trade agreement with the EU, this could lead to:

- The introduction of tariffs on some goods. The tariff on exports of Scotch whisky to the EU is currently zero<sup>3</sup> and is unlikely to change but as the UK would not be covered by the EU's existing free trade deals the costs would go up in some markets in the rest of the world;
- Introduction of rules of origin for trade with the EU;
- The introduction of rules and laws in the UK in relation to the standardisation of labelling and weights and measures in order to facilitate trade across borders;
- The possible re-introduction of customs controls at UK borders. The additional costs involved can be reduced through using electronic customs clearances as much as possible, but automatic clearance of imports and exports would not be guaranteed.

The Scottish Government has stated that, in the event that the UK as a whole does not retain membership of the Single Market through the Brexit negotiations, it would like to be able to remain in the Single Market. However, the UK Government is arguing that the whole of the UK will be leaving the EU in March 2019.

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<sup>3</sup> Source: Scotch Whisky Association

The implications for the GIZ of the UK leaving the Single Market and the Customs Union may be some reduction in GDP and some additional costs in relation to customs procedures. However, freedom from EU regulations and laws would also allow the GIZ to act as a free zone where companies could import, store or add value and then re-export goods tariff free within a designated area; for any goods that are for UK domestic consumption, the regulations might allow the payment of tariffs or other taxes only when the goods are physically moved outside the free zone, thereby providing a cash flow advantage. This cash flow advantage can, however, also be provided under existing customs rules by storing goods in bonded warehouses. In general terms, a free zone might be competitive in two main situations:

- For processing semi-finished goods before export to the EU, particularly where there are inverted tariffs (where the semi-finished goods would incur higher tariffs than the finished goods);
- To store finished consumer goods before delivery to the rest of the EU (cash flow advantage of tax-free storage).

The GIZ would effectively be in competition with locations that are currently competitive for these activities in the EU, principally the Benelux area for European Distribution Centres, and major manufacturing locations in the EU for processing/assembly/manufacturing. The GIZ might be able to offer lower rental and labour costs compared to the Benelux area and Germany, but would be more remote from the major markets in NW Europe; in addition, Scotland is a net exporter and so it would not be able to take advantage of cheaper backload rates that would be available in England to the Continent.

In the event of a vote for independence and Scotland becoming a member of the EU, there would be an EU customs border between Scotland and England. This would encourage the major retailers to regard Scotland as a single national retail market, rather than a 'region' of the UK and the GIZ would be well-located to act as a location for Scottish national distribution. This would be likely to increase the volume of goods that are imported directly to Scotland via the port of Grangemouth from European Distribution Centres, which are mainly located in the Netherlands and Belgium.

Overall, Brexit and Scottish independence may both offer opportunities for the GIZ as it has a port with direct links to the continental mainland and indirect links via transshipment ports to the rest of the world. The final implications of Brexit are uncertain because they will be the result of complex negotiations between the UK Government and the EU27 over a two year period during a period of rapid political change. Falling back on WTO rules would allow the UK to take advantage of differences in tariffs that are applied by the EU to develop free zones. These free zones are most likely to be established at ports and airports where the goods physically enter and leave the UK and so this may provide a further opportunity for the GIZ after 2019.

## 2.6 Conclusion

Scotland is a net exporter of physical goods by value and this is also reflected in the dominant direction of full containers that are handled at the Port of Grangemouth. Forth Ports has increased its share of the Scottish port market, mainly as a result of the decline in the volume of imported coal through Hunterston on the Clyde Estuary. Ship sizes in the container shipping market have increased rapidly in the last ten years as the shipping lines have sought to secure economies of scale, but at this point the lock gate at Grangemouth does not appear to be a significant constraint given that the port is operating in the short sea/feeder container market rather than the deep sea container market.

Road haulage flows in Scotland are dominated by short haul flows within Scotland and, to a lesser extent, to and from the North of England and the flows in the origin-destination matrix for the GIZ specifically (see Chapter 3 of this report) also reflect the use of HGVs mainly for short haul movements. Rail freight tonnages have declined in Scotland, mainly due to the loss of imported coal volumes, but the petroleum and intermodal flows to and from the GIZ have not been affected by this overall decline.

The GIZ is in a better location for traditional bricks and mortar retail distribution rather than as a location for final sorting depots for e-commerce parcels. However, most of these parcels, prior to arriving at final sorting depots, have passed through more traditional distribution channels and the GIZ remains a good location for e-commerce distributions centres serving the whole of Scotland. The most important technological trends over the next ten years are likely to focus on increasing the cost effectiveness and sustainability of road freight transport; this should not be a significant issue for the GIZ as long as battery technology and other alternatives to diesel propulsion do not require distribution centres to be located in close proximity to urban centres.

Policy at a Scottish national and local level is highly supportive of the development of the GIZ as a freight transport and logistics hub, particularly when it can both support economic growth and reduce carbon emissions. The Grangemouth area is regarded in NPF3 as being a nationally important development area for infrastructure and investment and the Local Development Plan supports the focus of investment (by both the public and private sectors) in freight infrastructure in the GIZ, particularly as it is not seen as having significant potential for housing development. Planned investment by the Scottish Government in and around the Central Belt, including the motorway and rail networks and the Forth crossings, will support the development of freight transport and logistics activity in the GIZ.

There appear to be two main threats to this development of the GIZ as a freight transport and logistics hub:

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- The lack of rail network capacity, which could reduce the potential of the GIZ to develop new domestic intermodal rail freight services and discourage developers from developing warehousing located adjacent to an intermodal rail terminal. However, this lack of rail network capacity would also encourage greater use of container shipping services to and from the Port of Grangemouth to cater for market growth rather than additional rail freight services between ports in the south of England and Coatbridge.
  - Potential strong competition from the Tees Valley, which has a major petro-chemical industry cluster and a deeper water port than Grangemouth, allied to an extensive network of feeder container services and rail links to and from the Central Belt.

## 3 FREIGHT FACILITIES & FLOWS

### 3.1 Introduction

This chapter sets out the freight facilities that are located within the GIZ and which generate significant volumes of freight traffic. It also provides a high level summary of the flows to and from the GIZ, based on an origin–destination (OD) matrix which was developed specifically for this project. A detailed OD matrix has been provided as a spreadsheet that accompanies this report and which also sets out the forecast flows up to 2025.

### 3.2 Freight facilities in the GIZ

We developed a complete list of all the facilities that are likely to generate significant volumes of freight activity within the GIZ based on an interrogation of the Scottish Assessors Association (SAA) database of rateable premises. The data from the SAA was then validated by observation of the type of freight activity in and out of the sites during a visit to the Port of Grangemouth and the area along the A904 Earls Road.

The nature of the freight flows was established based on observations during the site visits and the market knowledge of the consultants, backed up by some internet research where necessary into the businesses of the operators of the freight facilities.

The number and nature of the facilities is summarised in Table 3.1 below.

**Table 3.1: Number & type of freight facilities in the GIZ**

Type of facility	Total number of facilities
Harbour undertaking	1
Oil refinery	1
Manufacturing	9
Jetties	1
Tank storage	5
Distribution centre/warehouse/storage	32
Road haulage depot/terminal	6
Other	11
Total	66

Source: MDS Transmodal, mainly derived from SAA rateable value data

This shows the importance of distribution/logistics within the GIZ and the significance of manufacturing activity, particularly related to the petro-chemical industry. A comparison of the SAA

data with the facilities observed during the port visit suggested that not all the port facilities are included specifically in the SAA database; this is likely to be due to the special rules that relate to business rates in ports.

Traffic volumes by direction, including laden and empty loads, were then associated to each of the freight facilities, based on assumptions about the likely traffic volumes associated with particular types of facilities. The traffic volumes for port-based facilities were validated against port traffic data provided by Forth Ports and the overall traffic volumes to/from the GIZ were validated against data from GB Freight Model relating to road freight transport for Falkirk which is the local authority area for which the data is reported. The latter required us to make assumptions about the proportion of traffic to and from Falkirk that related to traffic to/from the GIZ and the amount of traffic within the GIZ itself.

The facilities themselves can be categorised as follows:

- Port infrastructure, with warehousing within the port;
- Manufacturing/processing facilities;
- Distribution sites outside the port;
- Other facilities

A map showing the locations of the freight facilities by type is provided as Appendix 1.

Each of these types of facilities is considered in turn below.

## Port facilities

The port-based facilities in the GIZ are located in the Port of Grangemouth, which is a locked port on the Firth of Forth. The locks provide access to and egress from the port either side of high tide for the largest ships that the port can accommodate. The port has a number of berths for petro-chemical cargoes (with associated tank storage) close to the lock entrance in the Eastern Channel. Further west there is Grange Dock, where the container terminal is located, and in the Western Channel there are a number of general purpose berths that handle a wide variety of cargoes from wind turbines, to forest products, liquid bulks and steel and this is also the proposed site for a combined heat and power (CHP) plant which has secured planning permission.

Forth Ports has successfully developed the potential of the port for port-centric distribution, with modern warehousing being developed for forest products companies and plasterboard suppliers. There are also manufacturing activities within the port that rely on raw materials being shipped in by sea, such as the production of fish food for the aquaculture industry.

The port is connected to the rail network, with two sidings of about 300 metres in length close to the container terminal, but there is currently no rail freight traffic to and from the port. While the sidings are short by modern standards, requiring the splitting of intermodal trains, there is potential for enhancing the rail capability at the port by extending the length of sidings. Forth Ports have also allowed in their planning for potential rail connections for warehousing at the port.

There are two ship-to-shore container cranes at the container terminal and this means that in the event of needing to discharge and re-load two ships simultaneously there is no flexibility if there is a mechanical breakdown. In addition, there is no potential to increase the speed of handling of the two vessels if, for example, one of the vessels needs to sail on the tide. For this reason Forth Ports has ordered a third crane which will be delivered in the third quarter of 2018 and it may, in due course, invest in a fourth crane; this will allow the terminal to increase its productivity and reduce the turnaround time for vessels in port. The container terminal is open 24 hours a day, seven days a week.

While the port can accommodate vessels with a draft up to 12 metres, the container terminal can only handle container ships with a draft of up to 7.7 metres. Forth Ports has carried out technical and commercial feasibility work on whether to deepen the container berth and this investment could be made in due course; however, in 2017 the level of demand is such that there is no immediate need to be able to cater for deeper drafted vessels.

### **Manufacturing/processing facilities**

The main manufacturing or processing activity is the Ineos oil refinery and associated tank storage and petro-chemical complex to the east of the port. The Ineos oil refinery receives crude oil by pipeline from the Forties Field before the refining process. The refined products are distributed inland by road to petrol stations in Scotland and parts of the North of England and by short sea tanker to coastal tank farms via the port. There are also bulk rail freight services to inland storage facilities in Scotland and Cumbria using the refinery's private rail connection and rail loading facility.

Other petro-chemical manufacturing and processing sites are found along the A904 Earls Road and include Calachem and Syngenta, which rely on feedstock from the oil refinery.

The oil refinery and the associated petro-chemical complex are highly reliant on pipelines to provide crude oil feedstock from the North Sea and to transfer products between the refinery and the port and the petro-chemicals plants in a cost effective way. The crude oil for the Grangemouth oil refinery comes from the Forties Pipeline, which links the North Sea offshore production platforms to the Scottish coast at Cruden Bay (about 40 kilometres to the north of Aberdeen); the crude oil is then pumped by pipeline to the Kenneil Terminal (3 kilometres to the south of Grangemouth) to remove water, gaseous hydrocarbons and hydrogen sulphide so that it can be transported safely by

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tanker. About 20% of the crude oil is then transferred by pipeline to the oil refinery to be processed into petroleum products and the remainder is transferred by pipeline to the Dalmeny Oil Depot (near Queensferry, to the east of the Forth Rail Bridge) from where it is pumped via a pipeline to the Hound Point oil terminal in the Firth of Forth for loading to crude oil tankers.

### **Distribution sites outside the port**

There are two relatively modern intermodal rail freight terminals that were developed adjacent to each other at Grangemouth – one originally for TDG (now owned by XPO Logistics) and one for WH Malcolm. We understand that WH Malcolm has taken over the TDG terminal so there is the potential for the operation of a single large-scale facility. WH Malcolm also has warehousing on the same site as the intermodal terminal, which significantly improves the economics of rail freight.

Table 3.2 below provides a list of existing warehouse floor space capacity located within the GIZ, differentiated by location, occupier and floor space. The floor space refers to the quantum designated as ‘warehouse’ or a similar function by the Scottish Assessors Association (SAA) when assessing the building for rateable value purposes. Ancillary floor space designations, such as offices, within each identified property have been excluded.



**Table 3.2: Existing Warehouse Floor Space in the GIZ**

Location	Occupier	Warehouse Floor Space (sq m)
Tillyflats, Grangemouth	WH Malcolm	51,100
Earls Road, Grangemouth	Asda ADC	45,500
West Mains Ind Est, Grangemouth	Vacant (Formerly Asda)	23,000
West Mains Ind Est, Grangemouth	Whyte and MacKay	11,900
Central Dock Road, Port of Grangemouth		10,000
North Shore Road, Port of Grangemouth		9,800
Grangemouth Wholeflats Ind Est	Verdo Renewables	9,400
Earls Road, Grangemouth	HW Coates	8,300
Abbotsinch Road, Grangemouth	Green Circle Recycling	6,700
McCafferty Way, Grangemouth	Duncan Adams	3,000
West Mains Ind Est, Grangemouth	Arinsdale	2,300
West Mains Ind Est, Grangemouth	Applus	1,800
West Mains Ind Est, Grangemouth	Ede and Ravenscroft	1,500
Caledon Green, Grangemouth	Fasco	1,500
West Mains Ind Est, Grangemouth	MGM Timber	1,000
West Mains Ind Est, Grangemouth	Indesit	1,000
West Mains Ind Est, Grangemouth	Smith and Frater	700
Abbotsinch Road, Grangemouth	Street Lighting Supplies	700
West Mains Ind Est, Grangemouth	MRC Transmark	500
West Mains Ind Est, Grangemouth	Klinger	400
West Mains Ind Est, Grangemouth	Your Equipment Solutions	400
West Mains Ind Est, Grangemouth	Reynolds Catering Supplies	300
Grange Court, Grangemouth	CLC Presentation Systems	300
Inchyra Road	Enviroclean Supplies	200
	<b>Total</b>	<b>191,500</b>

Source: SAA& MDS Transmodal

NB: In some cases, the SAA records do not show floor space; in such circumstances, developer or occupier websites have been used to quantify the floor space. The two warehouses located in the port that are shown in the list are not included in the SAA data, but their size has been estimated.

In total, just over 191,000 square metres of warehouse floor space has been identified across 24 properties. The largest quantum of warehouse floor space is recorded at the WH Malcolm depot (across six areas within the property). The largest individual building is the new ASDA ambient distribution centre on Earls Road. However, 17 warehouses are small scale in nature with an area of less than 9,000 square metres or 100,000 ft<sup>2</sup>.

## Other facilities

There are a number of other facilities in the GIZ that will generate some movements of freight vehicles such as haulage depots and petrol stations.

### 3.3 Scheduled freight services

There were seven scheduled container services operating to and from the Port of Grangemouth in summer 2017 (Table 3.3), providing connectivity for both the GIZ and Scotland to European markets via ports in the Near Continent and Scandinavia, as well the rest of the world via feeder connections to major deep sea container transshipment ports at Rotterdam, Antwerp, Hamburg and Le Havre. The services all provide a weekly frequency and deploy short sea/feeder vessels; some of these vessels are relatively large at about 1,000 TEU or more.

There used to be a clear distinction between short sea container services (providing door-to-door transport of containers within Europe) and feeder container services (transporting containers between 'regional' ports such as Grangemouth and major transshipment ports for transfer to intercontinental services), but this distinction is increasingly blurred as shipping lines seek to compete in both markets.

**Table 3.3: Scheduled container services to/from the GIZ, summer 2017**

Operator	Type of service	Route	Weekly frequency	Average ship size (TEU)
BG FREIGHT LINE	Short sea/feeder container	Rotterdam - Immingham - Felixstowe - Grangemouth - Rotterdam	1	850
BG FREIGHT LINE	Short sea/feeder container	Rotterdam - Immingham - Grangemouth - Rotterdam	1	660
MSC	Feeder container	Le Havre - Grangemouth - Le Havre	1	800
MSC	Feeder container	Antwerp - Grangemouth - Tees - Antwerp	1	1,712
SAMSKIP	Short sea container	Rotterdam - Grangemouth - Rotterdam - Tilbury - Rotterdam	1	340
UNIFEEDER	Feeder container	Rotterdam - Felixstowe - Tees - Grangemouth - Rotterdam	1	508
UNIFEEDER	Feeder container	Rotterdam - Immingham - Grangemouth - Felixstowe - Rotterdam	1	808

Source: MDS Transmodal Containership Databank

There are also almost daily intermodal rail freight services between the intermodal terminal operated by WH Malcolm in the GIZ and both Daventry in the logistics 'golden triangle' and Aberdeen. In addition, there is an almost daily intermodal service between the same terminal and Teesport (via Mossend), which is effectively in competition with the container services via the Port of Grangemouth.

**Table 3.4: Scheduled non-road unitised services to/from GIZ, autumn 2016**

Operator	Mode	Route	Weekly frequency
DB SCHENKER	Intermodal rail	Grangemouth-Daventry	7
DB SCHENKER	Intermodal rail	Grangemouth-Mossend-Teesport	5
DIRECT RAIL SERVICES	Intermodal rail	Grangemouth-Aberdeen	7

Source: MDS Transmodal in-house databases

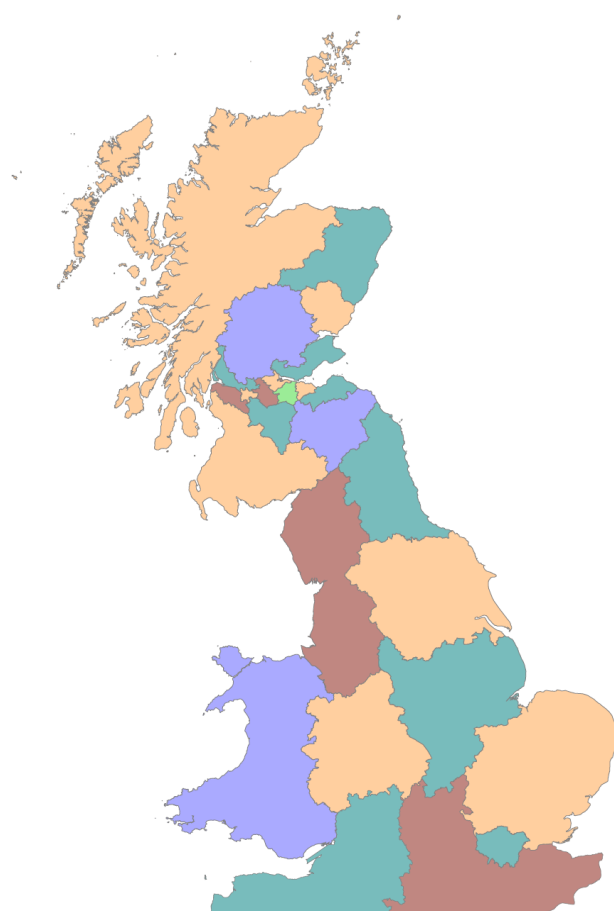
### 3.4 Origins and destinations of traffic to/from the GIZ

#### Introduction

The origin-destination matrix for the study was developed based on a zoning system that was more detailed for the immediate area around the GIZ and then less detailed the further the distance from the Grangemouth/Falkirk area. The OD matrix is based on the estimated HGV flows to/from the GIZ that are associated with the freight facilities described in section 3.2 above, with the inland ODs being sourced from the GB Freight Model (GBFM). This model, which forms the heavy freight module of the DfT's National Transport Model, includes a road freight OD matrix which is in turn based on an annual survey of HGVs by the DfT.

The zoning system is shown in Figure 3.1.

**Figure 3.1: Zoning system for the GIZ origin-destination matrix**



Source: MDS Transmodal

## Road freight flows

The origin-destination matrix for road freight flows to, from and within the GIZ based on this zoning system is shown in Table 3.5 below. This shows the movements in terms of tonnes lifted in both directions and in terms of HGV movements that have to be accommodated on the road network.

**Table 3.5: Origin-destination matrix for road traffic to/from the GIZ, 2015**

Zone	HGVs		Tonnes	
	Thousand HGVs		Thousand Tonnes-lifted	
	From GIZ	To GIZ	From GIZ	To GIZ
GIZ	24	24	387	325
Rest of Falkirk	89	134	1,272	1,069
Angus and Dundee	11	9	233	72
Clackmannanshire and Fife	33	43	595	448
East Lothian and Midlothian	12	7	264	47
Scottish Borders	4	2	92	11
Edinburgh	45	30	1,008	128
Perth and Kinross, and Stirling	25	25	501	137
West Lothian	23	27	359	154
East Dunbartonshire, West Dunbartonshire, and Helensburgh and Lomond	11	9	207	50
Glasgow	60	37	1,203	267
Inverclyde, East Renfrewshire, and Renfrewshire	26	19	489	184
North Lanarkshire	37	48	636	429
South Lanarkshire	22	18	387	123
Rest of SW Scotland	35	23	759	230
North Eastern Scotland	31	15	667	111
Highlands and Islands	12	7	277	59
North East England	7	12	160	170
North West England	10	17	203	270
Yorkshire & the Humber	1	5	20	101
East Midlands	..	3	2	55
West Midlands	1	1	13	10
East of England	..	1	4	28
London	1	..	11	8
South East England	..	1	7	10
South West England	..	1	2	18
Wales		1	2	6,264
Total	519	519	9,758	4,518

Source: MDS Transmodal GB Freight Model

The total freight lifted (sum of both directions) is an estimated 14.3 million tonnes, with 9.8 million tonnes (or 68% of the total) outbound and 4.5 million tonnes inbound (32%). This is due to the dominant flows by road from both the port and the oil refinery being outbound, as a variety of dry and liquid bulk cargoes, in particular, that are imported via the port are distributed by road inland

and refined petroleum products are also distributed from the oil refinery to petrol stations around Scotland and the North of England.

The results from the OD matrix suggest that some 22% of outbound and 30% of inbound HGVs are making trips within the local Falkirk area (defined as the GIZ and the rest of Falkirk). A further 70% of outbound and 62% of inbound flows are for the rest of Scotland. Only 4% of outbound and 8% of inbound flows are between the GIZ and the rest of Great Britain. 80-90% of road trips by HGVs between the GIZ and locations in England and Wales are to/from the North of England (defined as the North East, the North West and Yorkshire and the Humber). This shows the extent to which the GIZ is mainly serving a hinterland that extends to the Central Belt of Scotland, while the wider area of influence also extends to the whole of Scotland and into the North of England. The value of the goods distributed inland by road in 2015 was estimated at some £27 billion<sup>4</sup>.

### Rail freight flows

The origin-destination matrix for rail freight flows to and from the GIZ based on the above zoning system is shown in Table 3.6 below and provides the estimated movements in terms of tonnes lifted in both directions.

**Table 3.6: Origin destination matrix for estimated rail freight flows to/from the GIZ, 2015**

Thousand tonnes

Zone	From GIZ		To GIZ	
	Intermodal	Petroleum products	Intermodal	Petroleum products
North Lanarkshire	50	-	50	-
Rest of SW Scotland	-	50	-	-
North Eastern Scotland	80	-	80	-
Highlands & Islands	10	10	-	-
North West England	-	250	-	-
East Midlands	150	10	150	-
Total	290	320	280	-

Source: MDS Transmodal GB Freight Model

The main flows are two-way flows of intermodal traffic between the rail-connected distribution park at Daventry in the East Midlands and between Grangemouth and Aberdeen/Inverness; there are also intermodal flows between Grangemouth and Mossend (handling trains to/from Teesside). Finally, there are outbound flows of petroleum products from the oil refinery to rail-connected oil depots in Cumbria, Strathclyde, Prestwick and the East Midlands. In total an estimated 610,000 tonnes of freight is distributed inland from the GIZ by rail, while some 280,000 tonnes of freight are

<sup>4</sup> Based on the values per tonne that are declared to HM Customs and Revenue for the different types of commodity that are imported from and exported to non-EU countries.

distributed to the GIZ by rail. This means that the rail modal split is 6% for flows both to and from the GIZ. The value of the goods distributed inland by rail in 2015 was estimated at some £1.5 billion.

### Port traffic flows

The Port of Grangemouth handled 142,000 containers and an estimated 5.8 million tonnes of bulk and semi-bulk cargo in 2015 (Table 3.7). The inbound non-unitised cargo amounted to some 2.1 million tonnes of processed petroleum products, raw materials for manufacturing processes and the construction industry and project cargo such as wind turbines. The outbound non-unitised cargo amounted to some 3.7 million tonnes of processed petroleum products from the oil refinery.

**Table 3.7: Port traffic through the GIZ, 2015**

	Unit of measurement	Broad commodity	Inwards	Outwards	Total
Unitised	Thousand units	Containers	76	66	142
Liquid bulk	Thousand tonnes	Liquefied gas	64	1,834	1,898
	Thousand tonnes	Oil products	1,692	1,752	3,444
	Thousand tonnes	Other liquid bulk products	116	-	116
Sub-total liquid bulk	Thousand tonnes	All liquid bulk traffic	1,948	-	5,600
Dry bulk	Thousand tonnes	Agricultural products	112	-	112
Other general cargo	Thousand tonnes	Forestry products	23	-	23
	Thousand tonnes	Steel products	5	-	5
	Thousand tonnes	General cargo & containers <20'	25	-	25
Sub-total other general cargo	Thousand tonnes	All other general cargo traffic	53	-	53

Source: MDS Transmodal, based on DfT Port Freight Statistics & data from Forth Ports

The estimated value of the goods handled at the port, based on the values per tonne that are declared to HM Customs and Revenue for goods imported from and exported to non-EU countries, is £8.6 billion.

An estimated 9% of the non-unitised maritime traffic to/from the Port of Grangemouth in 2015 had an origin or destination in a non-EU country, while 71% had an EU origin or destination (Table 3.8). The remaining 19% of maritime traffic was distributed by sea to/from UK domestic coastal tank farms.

**Table 3.8: Overseas trading partners for bulk & semi bulk goods, 2015**

Thousand tonnes

Direction	Broad commodity	Tonnes	Non-EU	EU	UK domestic
Inwards	Liquefied gas	76	100%	-	-
	Oil products	1,692	15%	76%	9%
	Other liquid bulk	116	36%	63%	-
	Agricultural products	112	-	100%	-
	Forestry products	23	-	100%	-
	Steel products	5	-	100%	-
	General cargo	25	100%	-	-
Outwards	Liquefied gas	1,834	2%	78%	21%
	Oil products	1,752	6%	63%	31%
Total		5,662	9%	71%	19%

Source: MDS Transmodal, based on HMRC trade data

An estimated 44% of the maritime container traffic to/from the Port of Grangemouth in 2015 had an origin or destination in a non-EU country, while 56% had an EU origin or destination (Table 3.9).

**Table 3.9: Overseas trading partners for containers, 2015**

Thousand units

Direction	Units	Non-EU	EU
Inwards	76	54%	46%
Outwards	66	33%	67%
Total	142	44%	56%

Source: MDS Transmodal, based on HMRC trade data

However, the 44% of container traffic with an origin or destination in deep sea non-EU markets is transhipped onto deep sea container ships at ports such as Rotterdam, Antwerp and Felixstowe before being transported to/from these markets.



## 3.5 Forecasts to 2025

### Introduction

We have produced baseline freight forecasts for the study in order to provide a view of the volumes of traffic that the GIZ's transport networks might need to accommodate in 2025. Three forecasts have been produced for the time horizon of 2025:

- Trade forecasts for freight traffic to/from the Port of Grangemouth;
- Domestic freight forecasts for traffic to/from the rest of the GIZ;
- Warehousing demand forecasts to show the amount of land that might be required to accommodate logistics space in the GIZ.

These forecasts were then applied to the OD matrix for 2025.

### Trade forecasts for port-based freight traffic

For imports and exports via the Port of Grangemouth, our overall approach was to produce trade forecasts for each relevant broad commodity using the forecasting module of the MDS Transmodal World Cargo Database (WCD). The forecasts from the WCD are produced at a highly detailed commodity level (3,000 commodities) and for every country-to-country trade pairing. The computer software develops forecasts of UK trade based on long-term trends in trade flows (since 1996), but using an algorithm that gives greater weighting to more recent years and therefore to more recent trends. The forecasts are therefore independent of forecasts of GDP and other potentially judgmental assumptions, but automatically incorporate through the algorithm all factors that might have affected trade in the relevant commodities between the UK and individual world markets such as changes in tastes, liberalisation of trade, changes in disposable income and the impact of past economic downturns.

The forecasts shown in Table 3.10 below have therefore been produced based on long-term trends in trade between the UK and the rest of the world for the specific products that are relevant to the GIZ and then applied to the port traffics through the Port of Grangemouth. While the forecasts for bulk and semi-bulk traffics are specifically for non-unitised traffic within the WCD, the forecasting software also produces forecasts that are specifically for containerised trade based on factors for the proportion of certain types of traffic that are transported by sea in containers.

**Table 3.10: Trade forecasts for Port of Grangemouth 2015-25**

Commodity	Forecast growth in tonnes 2015-25
Containers (for dominant export flow)	+24.9%
Refined petroleum products imports	+11.6%
Steel imports	+21.8%
Fish meal imports	+19.5%
Sugar preparations (molasses) imports	+12.4%
Other chemicals imports	+34.9%
Forest products imports	+12.2%

Source: MDS Transmodal World Cargo Database

The trend-based forecasts for the non-containerised commodities, which can be affected by significant structural changes in the global market and the regulatory environment such as the oil price and government energy policy, were reviewed by the consultancy team but were regarded as being reasonable for the purposes of this study.

### Domestic freight forecasts

A domestic freight forecast was developed based on DfT's overall traffic forecasts for freight up to 2040, but removing international traffic via ports which is forecast to grow at a faster rate. This produces a forecast for total growth between 2015 and 2025 of 5.6%.

Rail freight flows were also assumed to grow at 5.6%, so that the rail freight services grow in line with forecast domestic road freight traffic, but without winning significant additional modal share.

### Baseline forecasts for road and rail freight flows

The baseline forecast origin-destination matrix for road freight to, from and within the GIZ is shown in Table 3.11 below. This shows the movements in terms of tonnes lifted in both directions and in terms of HGV movements that would have to be accommodated on the road network in 2025.

**Table 3.11: Forecast origin-destination matrix for road traffic to/from the GIZ, 2025**

Zone	HGVs		Tonnes	
	Thousand HGVs From GIZ	Thousand HGVs To GIZ	Thousand Tonnes-lifted From GIZ	Thousand Tonnes-lifted To GIZ
GIZ	28	28	437	387
Rest of Falkirk	97	146	1,387	1,170
Angus and Dundee	13	10	253	80
Clackmannanshire and Fife	36	47	650	498
East Lothian and Midlothian	13	8	285	54
Scottish Borders	4	3	100	13
Edinburgh	49	33	1,085	145
Perth and Kinross, and Stirling	27	27	542	146
West Lothian	25	30	391	165
East Dunbartonshire, West Dunbartonshire, and Helensburgh and Lomond	12	10	223	56
Glasgow	65	41	1,301	300
Inverclyde, East Renfrewshire, and Renfrewshire	29	21	530	211
North Lanarkshire	40	52	693	480
South Lanarkshire	24	20	418	134
Rest of SW Scotland	38	25	823	261
North Eastern Scotland	34	17	725	126
Highlands and Islands	13	8	301	66
North East England	8	13	176	185
North West England	11	18	219	289
Yorkshire & the Humber	1	5	21	106
East Midlands	..	3	2	58
West Midlands	1	1	14	11
East of England	..	1	4	30
London	1	1	11	8
South East England	..	1	7	11
South West England	..	1	2	19
Wales	..	1	2	7
Total	569	569	10,605	5,016

Source: MDS Transmodal GB Freight Model

Overall the total amount of freight lifted by road increases by 9.4% over the ten year period, reflecting the mix of international and domestic freight that passes through the GIZ, with the balance between outbound and inbound tonnes lifted remaining almost exactly as in 2015 (68% outbound and 32% inbound). Similarly, the geographic distribution of the HGV trips remains largely unchanged.

The number of rail freight trains to/from the GIZ is forecast to increase by 5.6% from about 1,800 annual trains in 2015 to about 1,900 annual trains in 2025.

## Baseline forecasts for logistics space

This section of the report provides two forecasts for logistics space (i.e. warehousing) in the GIZ up to 2025:

- GIZ Baseline Scenario: A proportion of the existing warehouse floor space capacity within the GIZ is replaced, as it becomes life-expired, on a broadly like-for-like basis up to 2025 (i.e. no allowance for growth in net floor space or market share); and
- GIZ Growth Potential Scenario: The GIZ is able to attract a proportion of the large scale warehouse new-build expected across the Central Belt of Scotland up to 2025. The occupiers of such warehousing would require a Central Belt location, but would also be attracted to Grangemouth given its 'tri-modal' transport connections.

The existing baseline for the amount of logistics space in the GIZ is set out in section 3.2 above and shows that the GIZ has an estimated 191,000 square metres of warehouse floor space across 24 properties. Seven of these warehouses are 'large scale' warehouses over 9,000m<sup>2</sup>.

Warehouse floor space becomes physically or functionally obsolete over time and, consequently, existing stock requires replacement or substantial refurbishment as it becomes life-expired. On this basis, excluding the recently developed floor space at ASDA and within the port estate, we estimate that 25% of the existing floor space capacity in the GIZ will need to be replaced like-for-like up to 2025 (see Table 3.12 below); this assumes that the useful life of a modern warehouse building is around 40 years, though in practice many developers will depreciate their warehouse stock over a 25-30 year economic life. There is also evidence to suggest that many relatively new buildings are becoming functionally obsolete as the automated picking and packaging equipment associated with e-commerce cannot be retro-fitted into them.

**Table 3.12: Baseline scenario: replacement of existing GIZ warehouse capacity to 2025**

Basis for calculation	Space required
Total existing logistics space - excluding ASDA and port-based warehouses	126,159 m <sup>2</sup>
25% replaced - life expired	31,540 m <sup>2</sup>
Land required*	7.88 hectares

Source: MDS Transmodal

\*Assumes floor space occupies 40% of total plot footprint

On this basis, around 31,000m<sup>2</sup> of new-build warehousing can be expected to be developed within the GIZ by 2025. This equates to a land requirement of around 8 hectares or just over 19 acres. However, this does not necessarily reflect the amount of 'new land' that will potentially need to be brought forward by 2025; it may be the case that much of this replacement can be accommodated through the substantial refurbishment of the existing stock or through plot recycling. As noted above this scenario does not account for any growth in the market share for logistics space in the GIZ.

### **GIZ Potential Development Scenario**

This scenario estimates the quantum of large scale new-build warehousing expected across the Central Belt by 2025, and the proportion of that new-build which could realistically be attracted to the GIZ. The underlying concept behind this scenario is that such warehousing could be built anywhere in the Central Belt, but with some occupiers attracted to Grangemouth given its 'tri-modal' transport connections, which therefore provides access to lower cost forms of freight transport.

Planners often consider the 'net change' in floor space, but for large scale warehousing the gross new-build rate is the more important figure as, in many cases, new capacity will need to be accommodated at new sites. This is because many existing sites are characterised by one or more of the following factors:

- Poorly located in relation to the wider road network;
- Not rail-connected;
- Close to residential areas; or
- The plots cannot accommodate the larger warehouses that are usually required by the market.

Therefore new sites need to be brought forward (or new plots at existing sites), thereby allowing occupiers to re-locate to new buildings and releasing the existing facility for refurbishment or plot recycling. In addition, economies of scale can be gained through merging operations based at multiple sites to one new location. The ability to operate fewer but larger distribution centres has been facilitated by advances in modern ICT inventory management systems which have permitted much larger warehouses to be operated more efficiently than was previously the case. Finally, changing market conditions, both within specific companies/sectors and in the wider economy, mean that warehouse operations might need to relocate in order to remain competitive. Sites and locations which were originally competitive can over time become sub-optimal. For example, occupiers who previously sourced goods from domestic suppliers (and therefore had a Midlands/North of England location) but now predominantly import from Eastern European and deep-sea markets may find that a rail-linked site or port centric location is now the competitive

option. As a result, a proportion of newly built floor space is required simply to 'stand still' (i.e. will be built anyway regardless of traffic growth).

Table 3.13 below identifies the current stock of large scale warehouses in the Central Belt by location, occupier and floor space. As per above, the floor space refers to the quantum designated as 'warehouse' or a similar function by the SAA when assessing the building for rateable value purposes, and ancillary floor space designations (e.g. offices) within each identified property have been excluded.

The Central Belt has been defined as the following local government areas:

- North Lanarkshire;
- South Lanarkshire;
- West Lothian;
- Falkirk;
- Stirling; and
- Clackmannanshire;
- Fife

In this case, a large scale warehouse has been defined as one with a rateable value greater than £350,000 and 9,000 square metres of warehouse floor space or similar. In total, 1.1 million square metres of floor space across 49 buildings has been identified. The mean size per unit is just over 21,500 square metres.

**Table 3.13: Existing large scale warehousing in the Central Belt**

Location	Occupier	Warehouse Floor Space (sq m)
<b>Lanarkshire</b>		
Eurocentral, Holytown	Vacant	12,100
Dale Avenue, Cambuslang	DHL Tradeteam	10,500
Swinhill Avenue, Larkhill	NHS Scotland	12,000
Newbridge Road, Newbridge	Batleys	9,000
Wardpark Road, Cumbernauld	Co-op	22,000
Castlecary Road, Cumbernauld	Gist	14,500
Eurocentral, Holytown	Vacant	10,200
Mossbell Road, Bellshill	Exel	11,000
Orchardton Road, Cumbernauld	M&S	43,200
Eurocentral, Holytown	Morrisons	9,800
Eurocentral, Holytown	Scottish Gas Networks	10,500
Eurocentral, Holytown	Amazon	9,000
Eurocentral, Holytown	Wincanton	14,800
Lenziemill Road, Cumbernauld	BOC (M&S Food)	10,500
Eurocentral, Holytown	TDG	31,000
130 Industrial Estate, Newhouse	WH Malcolm	43,100
Stirling Road, Aidrie	A Bartlett and Sons	29,800
Edinburgh Road, Newhouse	Co-op	39,000
Edinburgh Road, Newhouse	Brakes	16,200
Belgovan Street, Bellshill	Kast Retail	13,500
Netherhall Road, Wishaw	Royal Mail	9,700
Eurocentral, Holytown	TDG	11,200
Mellford Road, Bellshill	Morrisons	58,500
Hurlawcrook Road, East Kilbride	Sainsburys	12,000
Eurocentral, Holytown	Wincanton	17,500
Hurlawcrook Road, East Kilbride	Sainsburys	36,000
<b>Central Scotland</b>		
Abbots Road, Falkirk	Asda	23,500
North Bridge Street, Grangemouth	Diageo	20,800
Earls Road, Grangemouth	Asda	45,500
Wholeflats Ind Est, Grangemouth	Verdo Renewables	9,400
Tillyflats, Grangemouth	WH Malcolm	51,100
West Mains Ind Est, Grangemouth	Vacant (Formerly Asda)	23,000
West Mains Ind Est, Grangemouth	Whyte and MacKay	11,900
<b>West Lothian</b>		
Blackburn Road, Bathgate	Vacant	18,000
Inchmuir Road, Bathgate	JBT Transport	13,500
Deans Road, Livingston	Lidl	24,000

Caputhall Road, Livingston	Nisa (DHL)	15,000
Newbridge Ind Est, Newbridge	Edgen Murray Europe Ltd	13,800
Houstoun Road, Livingston	Semi-chem	13,000
Nettlehill Road, Livingston	Iron Mountain	20,700
Nettlehill Road, Livingston	Booker	22,000
Royston Road, Livingston	Vacant (formerly Lidl)	15,000
Nettlehill Road, Livingston	Yodel	9,000
Strand Drive, Bathgate	Schuh Ltd	22,700
Pottishaw Road, Bathgate	Aldi	38,000
Strand Drive, Bathgate	K&N Drinks Logistics	14,000
Inchmuir Road, Bathgate	Spring Distribution	18,600
Carnegie Road, Livingston	Tesco	85,000
Firth Road, Livingston	Prestige Leisure	12,300
<b>Fife</b>		
Amazon Way, Dunfermline	Amazon	80,000
	<b>Total</b>	<b>1,136,400</b>

Source: SAA, analysis by MDS Transmodal

Taking into account the above regarding the replacement of existing life expired capacity, up to 2025 we could therefore expect around 25% of the existing warehouse stock in the Central Belt of Scotland to require replacement. This implies that we can expect just over 284,000 m<sup>5</sup> of new warehouse floor space to be built in the Central Belt up to 2025 simply to replace existing stock.

Based on standard conversion factors which relate floor space to cargo throughout, we estimate that the existing supply of large scale warehouse capacity in the Central Belt handles around 31.9 million tonnes of cargo per annum. This is shown in Table 3.14 below.

**Table 3.14: Throughput via existing warehouse supply in the Central Belt**

Floor Space (sq m)	1,136,414
Pallets per square metre	1.5
Tonnes/pallet	0.8
Pallets in stock at any one time (90% utilisation)	1,534,159
Stock turns per annum	26
Pallets per annum	39,888,131
Tonnes per annum	31,910,505

Source: MDS Transmodal

The baseline forecasts for this study suggest that road traffic in the Grangemouth area grows by a 5.6% up to 2025. This growth rate has been subsequently applied to the estimated annual cargo throughput via the existing supply of large scale warehouse capacity in the Central Belt. Then, using

<sup>5</sup> 25% x 1,136,400 sq metres = 284,100 sq metres



the standard conversion factors which relate floor space to cargo throughout, the growth in throughput to 2025 was equated as the requirement for additional floor space i.e. the growth build element. This is shown in Table 3.15 below.

**Table 3.15: Estimated requirement for additional floor space in Central Belt (growth build element)**

Basis for calculation	Floor space required (m <sup>2</sup> )
Tonnes per annum 2015	31,910,505
Growth factor to 2025	1.056
Tonnes per annum 2025	33,702,888
Pallets per annum 2025	42,128,609
Pallets in stock at any one time (90% utilisation)	1,620,331
Floor space required 2025 (sq m) <i>a</i>	1,200,245
Existing floor space (sq m) <i>b</i>	1,136,414
Floor space growth (sq m) <i>a-b</i>	63,831

Source: MDS Transmodal

By combining the 'replacement build' and 'growth build' elements, the total gross warehouse new-build which can be expected to 2025 across the Central Belt can be calculated. This is shown in Table 3.16 below, together with the associated land required, on the basis the floor space of a warehouse represents 40% of the total plot footprint.

**Table 3.16: Forecast newbuild to 2025 Central Belt and associated land requirements**

Basis for calculation	Floor space required (m <sup>2</sup> )
25% replaced - life expired	284,104 m <sup>2</sup>
Growth build	63,831 m <sup>2</sup>
<i>Total new-build</i>	<i>347,935m<sup>2</sup></i>
<i>Land required</i>	<i>87.0 hectares</i>
	<i>214.9 acres</i>

Source: MDS Transmodal

In total, the forecasts suggest that just over 347,000 square metres of new large scale warehousing can be expected across the Central Belt up to 2025. This equates to around 87 hectares of land. Note that, at this stage, the associated land use requirements do not reflect the amount of 'new land' that will potentially need to be brought forward over time, as it has not taken into account the supply of existing land with planning consents or coming forward in the planning 'pipeline'. It simply reflects the amount of land that will be required to accommodate the forecast new build; some of it will be available at existing plots with consents, while additional land may need to be brought forward at new sites such as in the GIZ.

However, assuming land can be made available within the GIZ and accounting for its comprehensive tri-modal transport connections, we would expect the GIZ to be able to capture a significant proportion of this forecast new-build. It was noted above that the mean size of large scale warehouse units in the Central Belt is just over 21,500 square metres. Given the size of some of the recent new-builds in the Central Belt, this can be expected to rise to around 25,000 square metres per unit. The forecast new-build figure from Table 3.15 above therefore represents around 14 new large scale warehouse buildings in the Central Belt to 2025. On the basis that the GIZ could capture around a third of this forecast figure, this equates to 4-5 large units at the assumed mean size per unit or 3 units at the top-end of the scale. In land use terms, this equates to 26 hectares or 65 acres.

### 3.6 Conclusion

The GIZ contains 66 freight facilities which relate to port infrastructure, manufacturing/processing facilities (mainly related to the petro-chemical industry), distribution sites outside the port and a variety of other facilities that generate or attract freight movements.

The Port of Grangemouth is a multi-purpose port, which handles a wide variety of containerised and bulk cargoes, with locked access to the Firth of Forth. The Port of Grangemouth handled 142,000 containers and an estimated 5.8 million tonnes of bulk and semi-bulk cargo in 2015. There are seven scheduled container shipping services, each offering a weekly frequency and providing connectivity to the Near Continent and, via transshipment, to the rest of the world. The port has an active rail link, but there are currently no rail freight services to and from the port.

The key freight generating facility outside the port is the oil refinery, which generates road tanker movements to petrol stations in Scotland and the North of England and train load volumes of petroleum products mainly to Prestwick Airport and tank storage in Cumbria. There are also intermodal rail freight services between the WH Malcolm intermodal terminal in the GIZ and Teesport (via Mossend), Daventry and Aberdeen.

There are 191,000 m<sup>2</sup> of logistics space in the GIZ, across 24 properties and seven of these warehouses are large scale units above 9,000 m<sup>2</sup> in size. Two of these large warehouses are located within the port estate itself.

A total of 14.3 million tonnes of road freight is transported to and from the GIZ, with 68% outbound and 32% inbound. 22% of outbound and 30% of inbound HGVs are making trips within the Falkirk area, while a further 70% of outbound and 62% of inbound flows are to/from the rest of Scotland. This shows the extent to which the GIZ is serving a Scottish hinterland, with only 4% of outbound and 8% of inbound flows to the rest of Great Britain (almost exclusively the North of England). There are an estimated 610,000 tonnes of rail freight from the GIZ and 280,000 tonnes to the GIZ, with an estimated modal split for rail of 6% in both directions.

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Baseline forecasts up to 2025 are for growth in HGV flows of 9.4%; rail freight flows were assumed to increase by 5.6% over the same period, so that rail would maintain its modal share compared to domestic road freight.

Forecasts were also produced for logistics space in the GIZ, with baseline forecasts for a need for around 31,000 m<sup>2</sup> of newbuild warehousing in the GIZ up to 2025, requiring about 8 hectares of land; it is possible that a significant proportion of this land requirement could be accommodated through the refurbishment of existing stock or plot recycling rather than requiring additional land.

However, we have also produced a forecast for the GIZ Potential Scenario, which assumes that the GIZ is able to attract additional market share in the 'large' warehouse sector due to the competitiveness of its location and its access to both port and rail freight facilities. There is some 1.14 million m<sup>2</sup> of large scale warehousing in the Central Belt, most located in Lanarkshire and West Lothian; this implies that some 347,000 m<sup>2</sup> of new warehousing will be required up to 2025 and we have assumed that the GIZ could secure the equivalent of three of the larger warehouses up to 2025, requiring about 26 hectares of land.

## 4 RESULTS OF CONSULTATION EXERCISE

### 4.1 Introduction

To complement the research undertaken by MDS Transmodal, Steer Davies Gleave was commissioned to undertake stakeholder interviews with a range of industry bodies and individual organisations with a business interest in the Grangemouth Investment Zone (GIZ). The information contained in this chapter reflects the opinions and perceptions of these stakeholders and so should be read alongside the information contained in other chapters of the report.

In total 20 organisations provided input to the study. The organisations interviewed were as follows:

Associations & Intermediaries	Heavy Industry	Food and Drink	Logistics
<ul style="list-style-type: none"> <li>Scotch Whisky Association</li> <li>Road Haulage Association</li> <li>Freight Transport Association</li> <li>Rail Freight Group</li> </ul>	<ul style="list-style-type: none"> <li>Chemical Sciences Scotland</li> <li>Ineos Olefins and Polymers</li> <li>CalaChem</li> </ul>	<ul style="list-style-type: none"> <li>Whyte &amp; Mackay</li> <li>Diageo Scotland</li> <li>Quaker Oats</li> <li>Mackays</li> <li>Graham's Family Dairy</li> </ul>	<ul style="list-style-type: none"> <li>DB Cargo</li> <li>JG Russell</li> <li>Samskip</li> <li>W.Knight Watson &amp; Co. Ltd</li> <li>WH Malcolm</li> </ul>

In addition to the organisations shown above, shorter discussions on the strengths, weaknesses and opportunities for the GIZ were undertaken with Highland Spring, Fyffes, and EWOS, to provide additional representation from the food and drink and fish farming industries.

Organisations were asked to comment on the following topics:

- Approximate staff volumes, changes over the last three years and expected changes over the next three years;
- Freight traffic flows in and out of Scotland and freight traffic flows in and out of the GIZ;
- Key strengths and weaknesses of the GIZ;
- Key opportunities for the GIZ going forwards;
- Perceived impacts of possible improvements; and
- Key threats to the GIZ going forward.

This chapter summarises the responses received under each of these topics. The questionnaire used for the interviews is provided in Appendix 3.

## 4.2 Approximate staff volumes, changes over the last three years and expected changes over the next three years

Organisations were asked to consider if their staff volumes had changed over the last three years and if they were expected to change over the next three years. Though a number of organisations were unable to comment, the majority of those that did indicated that staffing volumes had remained steady for the previous three years, and that they would either continue at the same level or increase slightly in the next three years. Only one organisation indicated a future decrease, due to a desire to relocate operations in Grangemouth nearer existing and developing facilities elsewhere in central Scotland.

**Table 4.1: Changes in staff numbers over last three years and next three years**

Number of stakeholders indicating change in staff numbers							
Last 3 years				Next 3 years			
Increase	Decrease	Same	No Response	Increase	Decrease	Same	No Response
7	0	4	9	8	1	6	4

## 4.3 Freight traffic flows in and out of Scotland and freight traffic flows in and out of the GIZ

Organisations were asked to consider the origins and destinations of their cargo flows, both across the rest of Scotland and in and out of the GIZ itself. The approximate number of units, projected change over the next three years and split by transport mode was also considered.

## Cargo flows into and out of Scotland and the GIZ

### Origins and destinations of cargo

The following table provides an indication of the origins and destinations of cargo reported by all stakeholders.

**Table 4.2: Overview of reported origins and destinations of cargo (N=15)**

Country	Scotland		GIZ	
	Origins	Destinations	Origins	Destinations
Rest of UK	✓	✓	✓	✓
France	✓	✓	✓	
Spain	✓	✓	✓	
Germany	✓	✓	✓	✓
Belgium	✓	✓	✓	✓
Netherlands	✓	✓	✓	✓
Luxembourg	✓	✓	✓	✓
Switzerland	✓		✓	
Scandinavia	✓	✓	✓	✓
Italy	✓	✓	✓	✓
Portugal		✓		✓
Malta		✓		
Central Eastern Europe	✓	✓	✓	✓
USA	✓		✓	
Barbados	✓	✓	✓	
Mexico		✓		
Guyana	✓		✓	
China	✓		✓	
Singapore		✓		
Taiwan		✓		
South Korea		✓		
Far East	✓			
UAE		✓		
South Africa		✓		
Tasmania		✓		
Other international		✓		✓
All continents		✓		✓

### Expected changes to cargo flows over next three years

Nine organisations provided an indication of whether they expected cargo flows to change over the next three years. Seven of the nine expected cargo flows to increase, and one indicated that flows would stay at a similar level.

### Transport mode use for cargo flows

Grangemouth provides road, rail, sea and pipeline options for flows of products in and out of the GIZ. 14 stakeholders provided information about how they use these modes as summarised in the following table.

**Table 4.3: Overview of mode used for cargo flows into and out of the GIZ (x % by mode)**

Mode	Approximate Mode share													
	Stakeholder													
	Org. 1	Org. 2	Org. 3	Org. 4	Org. 5	Org. 6	Org. 7	Org. 8	Org. 9	Org. 10	Org. 11	Org. 12	Org. 13	Org. 14
INBOUND TO GIZ														
Rail		100%	100%						18%					
Road					100%		10%		18%		100%		100%	
Sea	100%			Used		100%	90%	100%	66%					
Pipeline				Used										
OUTBOUND FROM GIZ														
Rail	30%	100%	100%	Used				20%	18%					
Road	70%			Used	100%		10%	80%	18%		40%		95%	100%
Sea				Used		100%	90%		66%	100%	60%	100%	5%	
Pipeline				Used										

The mode split of cargo flows into and out of Scotland were also investigated and responses were generally the same as for the GIZ. One stakeholder highlighted a higher mode share by rail for cargo flows in and out of Scotland as a whole, compared with the GIZ.

## 4.4 Key strengths and weaknesses of the GIZ

### Overview

Organisations were asked to comment on the strengths and weaknesses of the GIZ and to consider seven specific attributes of the area in terms of their strength or weakness. The key strength of the GIZ can be seen to be its geographic location. Stated weaknesses indicated by stakeholders varied.

**Table 4.4: Overview of strengths and weaknesses**

	Number of organisations stating topic as a strength or weakness			
	Strength	Neither	Weakness	Greatest negative impact
Geographical location	15	2	1	0
Levels of road congestion	3	8	5	1
Rail connectivity	5	6	5	2
Warehouse capacity	1	7	3	0
Resilience/Business Continuity	3	7	4	3
Access to skilled workforce	4	6	1	1
Planning issues	4	2	3	1

These strengths and weaknesses are explored in greater detail in the following section.

### Geographical location

Geographical location was indicated as a key strength of the GIZ by most stakeholders. Specifically, the GIZ was felt to be well located due to its position:

- Near key industries who use the port such as the drinks industry, allowing goods to be transported to the port very quickly by key customers;
- Within the central belt of Scotland, near Edinburgh and Glasgow;
- This short travel time has significant cost savings compared with transport of goods to ports further south;
- On the east coast of Scotland providing direct access to European ports by sea; and
- In close proximity to motorway and rail links, providing linkages to key destinations in the UK, including additional freight hubs in the Central Belt (Eurocentral, Mosside), Daventry, and deep sea ports in Southern England.

Two organisations indicated that the geographical location was a weakness for that organisation either because there was no natural local demand for their services or it was not in an optimal location to service its markets in the far north of Scotland and northern Europe.



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## Levels of road congestion

It was felt that the motorway network was relatively quiet most of the time (inter-peak and off-peak time periods) and connections were good outside the GIZ to the wider motorway network. However, road congestion was rated as a weakness by five organisations.

The road infrastructure connecting certain businesses and the port to motorway and railhead was felt to be under severe strain at certain times of day.

Junctions on the M9 closest to Grangemouth (Junction 5 and Junction 6) have an inconsistent layout and restrictions which result in last mile issues and poor linkages between the local and strategic road network. The layouts, where access and egress points are not provided at each junction, and timing restrictions at some points, result in situations where drivers may become confused and have to double back on themselves. This also can result in drivers having to use poorer quality local roads which increases journey time and impacts on the local community. Capacity issues on Gorge Road were also flagged up, though stakeholders were aware of plans to improve this route.

“Last mile” issues related to poor road maintenance, particularly at times of bad weather, were also highlighted. There was felt to be a focus from the local authority on maintaining roads for local traffic, rather than routes important for the GIZ. However it was also indicated that these issues were being addressed.

Access and egress issues at the port itself were also raised, with bottlenecks having knock-on effects on the efficiency of transfer of goods to and from the port.

## Rail connectivity

Rail connectivity was highlighted as a weakness by five stakeholders. Key issues related to both rail freight and a lack of passenger services.

Organisations indicated a lack of direct rail access, resulting in it being necessary to truck products to the rail head. However it was highlighted by another stakeholder that rail to sea transfer of containers at most ports is indirect using internal road vehicles, and thus Grangemouth is no different from the norm. More generally, rail access from the east was indicated as being more challenging than from the west; from the east, trains need to run to Mossend and then cross-country via Shotts/Carstairs to Edinburgh and the East Coast Main Line.

Planned electrification of the railway was indicated as being beneficial. One organisation indicated that they had considered shifting their activities to use rail rather than road transport but it was not felt to be beneficial.

Rail capability and capacity were also mentioned as weaknesses. Railheads have not been developed in a strategic manner. For example the two newest railheads were developed adjacent to each other and outside the dock area which does not optimise capacity and capability.

The WH Malcolm intermodal terminal was also indicated as being at capacity.

The gauge of the track in the wider rail network impacts on the GIZ. The West Coast Main Line is restricted to W10 loading gauge north of Carlisle through Carstairs to the Coatbridge and Mossend container terminals and W9 gauge north to Grangemouth. Full W12 loading gauge is currently only provided along the East Coast Mainline from the south through Edinburgh as far as Carstairs. Upgrading to W12 gauge from Carstairs to Grangemouth is being assessed by Network Rail.

Lack of passenger services was flagged as an issue, reducing accessibility for GIZ for employees and resulting in higher demand on the road network for commuters. This poses additional conflict with freight traffic and adds stress to the road network.

### **Warehouse capacity**

Four organisations felt warehouse capacity was a particular weakness within the GIZ. Though it is available, it is limited and expensive and there is little competition for specialist warehousing services (such as hazardous waste and perishable goods). Warehousing is more available further west of the GIZ. Some organisations require more flexibility in their warehousing needs (for example suppliers to the aquaculture industry) and this is not provided at present in Grangemouth.

### **Resilience/Business Continuity**

Key issues raised by stakeholders relating to resilience and business continuity included disruption during bad weather and congestion in terms of throughput to/from feeder ships. The industrial action in 2015 was also raised and it was felt that contingency planning was lacking for this. The industrial action in reality occurred at a relatively quiet time for some organisations and for a shorter period of time than expected. If it had been undertaken during the run up to the festive period or for a longer period of time, it would have had a more significant impact.

### **Access to skilled workforce**

One organisation indicated that there was a UK wide skills shortage for the skilled roles they required within their organisation. Another organisation indicated specific difficulties in finding customer service personnel and some technical engineering roles.

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## Planning issues

It was felt that there is a lack of specific services within the GIZ to meet business needs. For example support services for lorry drivers are felt to be poor. In addition, infrastructure has not kept pace with development of the site and this results in tensions with local residents for example complaints about on-street parking of HGVs.

One organisation indicated that the local authority's planning processes had not been supportive of the organisation's growth in the area which resulted in the organisation undertaking expansion elsewhere.

## Other strengths and weaknesses

A range of specific weaknesses were also raised including:

- **Vessel size:** Three organisations indicated that current port infrastructure does not support larger feeder vessels. This was felt to be an increasing weakness as feeder vessels themselves become larger.
- **Cost of energy:** The high cost of energy in the UK was highlighted as a weakness, compared to other countries (e.g. the US and Germany).
- **Feeder integrity:** If there are delays from the feeder vessel this can cause scheduling problems and means some stakeholders are forced to use the port of Greenock, particularly for imports.
- **Operating hours:** Operating hours at the port were felt to be a weakness, with more flexibility desirable.
- **Sea routes to southern England:** It was stated that there were a lack of sea routes from Grangemouth to other ports such as Tilbury.
- **Lack of Roll-on, Roll-off facilities:** A lack of roll-on, roll-off facilities, and focus on container traffic was felt to be a weakness, particularly in respect to chilled goods.
- **Turnaround times:** It was perceived that the port had a slow turn around and that an additional gantry crane would reduce the turnaround time of vessels.

## 4.5 Key opportunities and threats for the GIZ going forwards

### Overview

Organisations were asked to rate the level of opportunity that possible improvements to the GIZ would provide on a scale of one (a low level of opportunity) to five (a high level of opportunity). The option indicated by the most stakeholders that would provide the highest level of opportunity was improvement to facilities at the port. Improvements to the rail network had the highest number of responses ranking it as high or very high.

It should be noted that very few organisations felt able to comment on Brexit or Independence given the range of unknown factors surrounding this at the time of writing.

**Table 4.2: Overview of opportunities**

How would you rate the following options in terms of allowing the GIZ to make the most of future opportunities for growth and serving business needs? (No. of organisations responding)					
	5 Very High	4 High	3 Neither High or Low	2 Low	1 Very Low
Improved facilities in the port	11	5	1	0	1
Improvements to the rail network (connectivity, capacity)	7	7	0	0	3
Improvements to the strategic road network around the GIZ	5	5	5	1	1
Improvements to the local road network within the GIZ	7	3	3	1	1
Increase in warehouse capacity	7	1	5	2	0
More supportive planning regulations	5	1	4	0	0
Brexit/Independence	0	1	0	1	1

These opportunities are explored in greater detail in the following section.

### Improved facilities in the port

Those commenting on opportunities for improvements to the port highlighted the following areas of improvement:

- Improved resilience of the port in times of bad weather:** Currently this impacts on the feeder schedule which has a knock on effect to business relying on them. For example one organisation highlighted its 'just in time' style operations and that any inefficiencies which occur impact on this.

- **Constraints on access for larger vessels:** Concerns around a trend for larger feeder vessels were raised and current constraints on the size of vessels which can access Grangemouth. Berths were also highlighted as an area for improvement.
- **Links between railhead and port:** Direct road link from railhead to port to make it easier to access international freight.
- **Rail container facilities:** Enhancement of the Forth Ports rail container facilities.
- **Lack of facilities for road haulage industry:** Utilise 'dead space' in the GIZ to develop better facilities for trucks.
- **Operating hours:** More flexibility in terms of operating hours at the port.
- **Flood defences:** Flood defences were also highlighted as an area for improvement.

### Improvements to the rail network (connectivity, capacity)

Key opportunities for improvements flagged for the rail network related to:

- **Electrification:** Electrification was understood by stakeholders to be planned.
- **Wider rail network improvements:** Wider rail network improvements were highlighted such as full W12 loading gauge clearance over the West Coast Main Line and rail route capacity and capability enhancements north to Aberdeen and Inverness.
- **Passenger access:** Poor rail accessibility to the GIZ for passengers was highlighted as something that could be improved which would also provide more capacity on the road network and improve vehicle flow.

### Improvements to the strategic road network around the GIZ

Areas flagged for improvement on the strategic road network related to the M9, specifically J5 and J6 of the M9.

### Improvements to the local road network within the GIZ

It was suggested that "last mile" improvements such as greater consideration of maintenance for key local routes during periods of poor weather serving the GIZ were being considered. Improving facilities for trucks (including off-street parking) was highlighted as an improvement which would support better vehicle flows on local roads, and reduce conflicts with local residents. The Newlands area around Wood Street was highlighted by one stakeholder as a particular area where conflicts occur between the local community and trucks.

## Increase in warehouse capacity

Improvements to warehouse capacity which were mentioned related to:

- Increase warehousing capacity suitable for storage of perishable goods;
- Tank farm storage and access to more specialist warehousing;
- Move storage closer to Grangemouth rather than the M8 corridor, to improve link between warehouse capacity and the port; and
- Reduced warehousing costs.

## More supportive planning regulations

Improvements relating to planning regulations which were highlighted included:

- Introduction of a planning vision and development of a coherent approach to planning;
- Encouragement for more businesses to be based within the GIZ and ensuring that Forth Ports' attitude to investors is an encouraging and supportive one; and,
- Provide incentives for redevelopment of the GIZ to remove dilapidated buildings in the Grangemouth area outside the port. These could be replaced with improved facilities such as parking for trucks which in turn would remove parked trucks from arterial routes, improving traffic flow and reducing conflict with local residents and make it more pleasant for those working in and out of the port.

## Brexit/Independence

It was felt by most organisations that it was not possible to say with any certainty what opportunities Brexit and Independence would provide and what level of opportunity they would present. Depending on how negotiations are approached, there may be opportunities for business in the GIZ, Scotland and UK as a whole.

## Other opportunities

Organisations mentioned a range of additional opportunities:

- Provide more power generation nearby;
- Add more chemical and manufacturing and processing sites;
- Marketing of the port and the surrounding area, and the benefits of the area for conducting business; and
- Support for in relation to containing energy costs.

- One organisation indicated it had stopped using the port of Grangemouth because feeder vessels no longer connected the port with Tilbury. If this was re-introduced, Grangemouth would likely be used once more.

## 4.6 Impact of improvements

The potential impacts of the improvements to the GIZ would be expected to be as follows:

- **Improved attractiveness of the port for manufacturing and logistics companies:** Improved interchange between modes would make GIZ more attractive for manufacturing and logistics companies as movements would be easier and less costly. It would reduce the transactional costs associated with logistics and would provide a more efficient route to market.
- **Improved competitiveness of rail as a mode of freight transport:** Rail improvements would allow rail to become more competitive with road haulage, assist in managing congestion and assist in managing Government climate change and environmental targets.
- **Increased competitiveness of the GIZ:** Improvements would potentially result in increase in volume of freight passing through GIZ overall. Organisations would increase volumes through Grangemouth (as opposed to other ports such as Teesport). An improved GIZ would have a better chance of attracting investment and would be a more desirable place to put new manufacturing.
- **Job creation:** The impacts above would be likely to result in job creation, either through expansion of existing employers, or attraction of new ones.

## 4.7 Key threats to the GIZ going forward

### Overview

Organisations were asked to rate the level of threat that possible issues could pose to the GIZ in the future on a scale of high, medium, low or no threat. The highest level of threat to the GIZ related to increased congestion on the motorway network. Generally stakeholders commented that the threats would limit growth potential.

**Table 4.3: Overview of threats**

Are any of the following perceived as key threats?				
	High	Med	Low	None
Capacity constraints (road, rail, port)	5	10	2	2
Increased competition from other ports in Scotland	4	5	8	2
Increased competition from ports in northern England	5	8	2	2
Limitations on warehouse capacity in the future	6	4	4	2
Increased congestion on motorway network	7	6	2	2
Larger vessels not being able to access Grangemouth	6	7	6	0
Brexit/Independence	4	1	3	1

Specific threats are explored in greater detail in the following section.

### Capacity constraints (road, rail, port)

In terms of capacity of the road, rail and port, it was highlighted that rail network capacity constraints make it difficult to grow numbers of trains providing rail freight services. Not dealing with the weaknesses of rail capacity and capability was seen as a threat.

### Increased competition from other ports in Scotland

Not being able to keep pace with competitors such as Greenock and rail hubs e.g. Coatbridge, Mossend, Eurocentral is seen as a threat. If the GIZ does not remain competitive industries may consider more economical and efficient options. For example Greenock was indicated by one stakeholder as a lower cost option and provides better serviceability.

### Increased competition from ports in northern England

Teesport and the Humber were highlighted as two particular ports in the north of England which completed with the GIZ for a similar market. One respondent also felt there was competition from ports in the south of England.

### Limitations on warehouse capacity in the future

Limitation on warehouse capacity was seen as a threat as organisations may go elsewhere for these facilities.



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## Increased congestion on motorway network

In terms of the threat related to congestion on the motorway network it was highlighted that as 85% of movements are currently by road, driven by market forces, not responding to issues relating to the motorway network would threaten the efficiency of the GIZ.

## Larger vessels not being able to access Grangemouth

Evolving strategies of major shipping lines e.g. where they choose to use feeder and mother ships, poses a risk to the GIZ. Many stakeholders mentioned a concern that feeder ships were growing in size. Over time, this may result in shipping lines being unable to access the port at Grangemouth and as such, using alternative ports.

## Brexit/Independence

Brexit and Independence were seen as a threat by some organisations and an opportunity by others, however most organisations either didn't feel they could give a verdict due to the range of unknowns.

Specific threats in related to concerns around trade agreements and minimum pricing agreements on certain products. One organisation highlighted that Brexit in particular would provide specific short term benefits, however, in the longer term may be less positive.

It was suggested that organisations may put on hold investment decisions until it is clearer how Brexit and Independence proposals will work in practice.

European legislation currently makes some operations more expensive so they may become cheaper in future after Brexit.

## Other threats

Other threats highlighted included:

- Lack of coordination in delivery of improvements to the GIZ was felt to be a key threat. If the improvements are not delivered in a coordinated way their impact will be greatly reduced.
- Not delivering the improvements that are being talked about currently e.g. improved rail connectivity and better resilience between the strategic and local road network was also stated as a threat.

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- Lack of specialist and skilled personnel is a threat in relation to businesses locating to the area, expansion of existing specialist organisations or replacement of existing staff.
  - Lack of diversity of organisations within the GIZ e.g. over dependence on petro-chemical industry. Many organisations are interlinked in the area and over dependence on a small number of key industries is considered a risk.
  - Lack of promotion of the suitability of the GIZ area as a place to do business.
  - Lack of efficient weigh stations for road-based freight.
  - Competition from rail freight services from other locations in the central belt.
  - External threats which the GIZ will have to consider include:
    - High energy costs.
    - Performance of foreign owned companies.

## 5 CONSTRAINTS AND OPPORTUNITIES

### 5.1 Introduction

This section of the report sets out the key constraints and opportunities for the GIZ, building on an analysis of its existing strengths and weaknesses. This is summarised in a SWOT analysis, which is based on the consultants' analysis of the business environment within which the GIZ is operating and also reflects the views of stakeholders who were interviewed during the study. The key opportunities and constraints are then considered in more detail as these lead to consideration of the investments and other measures that would address them.

### 5.2 Summary SWOT analysis

#### STRENGTHS

Central location in the Central Belt, mid-way between Edinburgh and Glasgow.

Availability of tri-modal infrastructure (port, rail and road), offering cost-effective options for shippers and receivers of goods.

East coast location, offering access to the Near Continent and access to major deep sea container ports via the Port of Grangemouth.

Intermodal rail freight services providing cost effective connectivity with the 'golden triangle'.

High quality motorway network, providing mainly uncongested access to the rest of Scotland.

Direct access to the West Coast Main Line.

Availability of land for the further development of logistics space.

Oil refinery and petro-chemical complex, providing baseload demand for cargo.

Few restrictions on operations due to proximity of residential areas.

Very strong policy support at a Scottish national and local level for the development of the GIZ as a freight and logistics hub.

Forth Ports' commitment to invest in new facilities at the port.

#### WEAKNESSES

Congestion to secure access to the M9 at peak times.

No rail services to/from the port.

Poor access to the M8 between Edinburgh and Glasgow via the A801.

Lack of official parking facilities for HGVs within the GIZ.

#### OPPORTUNITIES

Enhancements to port, rail and road network infrastructure to increase competitiveness of the location.

TIF and FFG/WFG/MSRS funding available for some infrastructure enhancements and to support the development of sustainable distribution.

#### THREATS

Lack of rail network capacity to/from England for domestic intermodal rail freight traffic via WCML and ECML.

Increasing size of ships deployed by the container shipping industry.

Risk of flooding.

**OPPORTUNITIES (continued)**

Joint marketing of the GIZ, with its tri-modal connectivity, as a location for logistics activity.

Brexit may provide an opportunity for Grangemouth to develop as a free zone for manufacturing and added value activities.

Scottish independence (within the EU) provides opportunities for the GIZ to develop as the centre of national distribution for Scotland with direct access to the EU via the port.

Lack of rail network capacity could allow container traffic growth to be accommodated on shipping services via the Port of Grangemouth rather than on rail freight services to/from the English deep sea container ports.

On-going investment in the container terminal at the Port of Grangemouth.

Use redundant land for official parking for HGVs (e.g. within the port).

Little policy focus on the potential for more housing in the GIZ.

LNG bunkering for both ships and for HGVs, which would provide a lower cost and lower emission alternative to both Marine Gas Oil and diesel.

**THREATS (continued)**

Capacity restrictions for rail freight northwards toward Aberdeen and Inverness.

Competition from a potential new container terminal at Rosyth

Competition from other logistics clusters within Scotland such as Mossend/Coatbridge and the Clyde.

Strong competition from the Tees Valley

Lack of multimodal integration at the Port of Grangemouth

### 5.3 Key constraints

The GIZ generally enjoys a good central location within the Central Belt, with access to road, rail and port infrastructure.

Shippers and shipping lines are seeking to reduce port turnaround times and therefore Forth Ports can secure productivity gains by increasing the number of cranes at the berth; to this end the port has ordered a third ship-to-shore container crane and, in due course, an investment could be made in a fourth crane subject to available demand. While the existing level of demand does not justify deepening the depth of water available at the container terminal, future traffic volumes might justify additional investment in the terminal infrastructure up to 2025.

In addition, the rail facilities at the port could be improved to allow it to handle significantly longer trains (most likely achieved by increasing the length of sidings in the port), thereby allowing the port in itself to become a tri-modal facility; this would also help the development of port centric distribution because any warehouses in the port would be located at a railhead without any requirement for transferring freight by road using vehicles that are plated for use on the public highway.

The strategic road network is generally high quality and uncongested for most of the day. However, improvements have already been made to reduce congestion during peak hours at Junction 6 of the M9 and there are also plans to improve access to the M9 at junction 5. The A801 road link to the south towards the M8 and the cluster of distribution centres in the Bathgate/Livingston area is relatively poor quality. There is a project planned to improve the quality of this route, which will reduce journey times between the GIZ and some parts of the Edinburgh and Glasgow conurbations; however, it will also improve accessibility to a distribution cluster which competes with the GIZ.

Rail connectivity is already reasonably good with direct access to the WCML to the west and we understand that the route will soon be electrified, which should provide as a knock-on benefit an improved W10 loading gauge (albeit the existing W9 cleared route from Mossend can already accommodate the tallest container units on certain types of intermodal wagon). The main constraint in relation to rail is likely to be a lack of network capacity between the GIZ and England. This is a strategic issue for the UK, which involves not just bodies such as Transport Scotland and Network Rail but also the DfT.

In addition, rail connectivity could in theory be improved by developing a scheme providing direct access towards the east and the East Coast Main Line, but this would need to be the subject of detailed appraisal work and our initial view is that it may prove difficult in practice to develop such a scheme. In addition, the main reason for providing such eastbound connectivity would be to improve the resilience of the network in the event of maintenance works being required on the WCML and use of the ECML is already possible (if operationally inconvenient). Such a scheme may not therefore offer good value for money and for this reason we have not included it in the appraisal that is described in Chapter 6.

The GIZ appears to be relatively undeveloped as a location for distribution, with only major operators such as ASDA and WH Malcolm appearing to fully recognise the potential of the area. Much of the warehousing stock is small-scale, while the main distribution clusters in the Central Belt are located to the south and the west on sites which are only road or road and rail-connected. However, this essentially reflects where planners have released land for large scale warehouse developments over the past 20-30 years. Developers/occupiers subsequently took these sites as they were the only ones available.

## 5.4 Resilience issues

In the context of supply chain resilience the GIZ can reduce risks and increase resilience for shippers and their transport operators by offering:

- Tri-modal port-centric distribution facilities, so that customers have the option to store goods in a location that offers road, rail and maritime connectivity and which can therefore facilitate the planning of more flexible and resilient supply chains;

- Relatively easy access to two crossings of the Firth of Forth via both the Forth Road Bridge (and shortly the new Queensferry Crossing) and the Kincardine Bridge;
- Rail access to the WCML but also, in the event of maintenance works being required on the WCML, to the ECML via Mossend;
- Its central location, offering rapid access by road to both of the two main conurbations in the Central Belt, as well as good access towards Tayside and the North East.

The key risks to logistics resilience in relation to the GIZ are:

- Flood risk due to the impact of climate change; there are already plans to address this issue through the TIF process.
- Anxiety on the part of shippers and receivers about locating distribution centres in a port location, as ports have been seen as locations that suffer from industrial action. However, despite the relatively short period of industrial unrest that affected the container terminal at the Port of Grangemouth in 2016, strikes in UK ports are quite unusual with cargo handling being capital intensive and requiring a highly skilled labour force. The logistics sector can, in any event, take advantage of many of the advantages of a tri-modal location while being located outside but in close proximity to the port estate.

## 5.5 Vision for the GIZ

Our vision for the Grangemouth area in the context of freight and logistics is the development of the GIZ as a tri-modal national distribution hub for Scotland, which offers a cost effective location for distribution activities. This can be achieved through offering the occupiers of warehouses access to lower cost:

- Maritime transport via the Port of Grangemouth for direct access to international markets and;
- Rail freight transport via intermodal terminals for access to markets in England and many parts of Scotland, such as the Aberdeen area.

This vision also builds on the GIZ's main sources of sustainable competitive advantage in competition with other areas of Scotland and port and distribution facilities located in England which are its central location to serve the main centres of population and manufacturing in Scotland and its access to low cost maritime and rail freight transport, as well as offering access to the strategic highway network.

The existing emphasis on mainly road-based distribution in Scotland as a whole will only favour sites such as Bathgate and Livingston, which offers rapid access only by road to Scottish markets.

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Such a vision for the GIZ will offer significant benefits to the Grangemouth area and Scotland as a whole in terms of reduced transport costs and wider economic benefits.

The reduced transport costs for transport operators would be passed on to the wider economy. These so-called user benefits are the cost savings that are available to shippers and their transport operators from moving distribution centres from locations which are adjacent only to the highways network to locations where they can obtain cost-effective access to the rail and maritime transport over medium to long distances (such as for access to international markets via the North Sea and the Midlands). These user benefits are captured in the modelling for this study through generic costs models which are incorporated into the GB Freight Model.

Non-user costs are those costs that are not reflected in the price of road haulage such as carbon emissions, environmental pollution that has an impact on air quality and human health and the contribution that HGVs make to road congestion. Non-user benefits can be secured by removing HGVs from the road network, which forms the basis of the well-established Freight Facilities Grant scheme in Scotland. Again, these non-user benefits are captured in the modelling for this study through generic costs models which are incorporated into the GB Freight Model.

Wider economic benefits would be secured for the GIZ through additional employment in distribution centres, which provides additional prosperity to the area.

This vision can be achieved through some investment in road, rail and port infrastructure, but should also be marketed effectively through a new branding strategy for the GIZ that brings together private and public sector players to market the advantages of the location to potential investors in the GIZ area. Such a marketing strategy is likely to be required to overcome some market inertia as supply chains involving rail and waterborne freight can appear to be more complex to set up and manage and the infrastructure is relatively expensive compared to the highway network which is funded from general taxation. There is still some prejudice about the concept of port-centric distribution because of the fear that cargo stored at a port will become 'trapped' through industrial action by port workers. Finally, there may be a lack of awareness in the market of the potential opportunities offered by the GIZ.

The vision would also need to be supported by the public sector through the consistent application of land use planning policies that are supportive of the development of large-scale distribution centres in the GIZ with rapid and easy access to tri-modal infrastructure and services.

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## 6 APPRAISAL & ACTION PLAN

### 6.1 Introduction

This chapter sets out the potential public sector measures and private sector investments that would allow the GIZ to achieve its potential as a freight and logistics hub over the next 10 years. It also provides a high level appraisal of these measures and investments and provides the results of modelling carried out for the study using the GB Freight Model; this model has been used to estimate the potential user and non-user benefits from the development of the GIZ as a multi-modal freight and logistics hub up to 2025. The chapter concludes with an Action Plan for the GIZ.

### 6.2 Appraisal of measures

Some 15 measures were identified to allow the GIZ to achieve its potential by 2025 and these measures were grouped into the following categories:

- Road infrastructure enhancements: seven enhancements to the highways network located either within or in close proximity to the GIZ;
- Distribution and logistics: development of warehousing and associated HGV parking;
- Port infrastructure enhancements: improvements at the port, particularly related to the container terminal;
- Rail infrastructure: improvements to the railway network within the GIZ;
- Planning and marketing: land use planning, rail network capacity planning and joint marketing of the GIZ by the public and private sectors.

A description of the measures, grouped by category, is provided in Table 6.1 below.



**Table 6.1: Description of the proposed public and private sector measures for the GIZ**

Category	Measure	Description	Public or private sector
Road infrastructure	Enhancement to A801	Enhancement to the A801 between J4 of the M9 and J4 of the M8; upgrade of 1.7 miles of highway including a high level bridge across the River Avon.	Public
	Enhancement of access to J5 of the M9	Relatively minor enhancement for road freight, reducing queuing to access from the south to the M9 at J5 during the PM peak.	Public
	Icehouse Brae/Lauriston Road Upgrade	Upgrade of existing local road	Public
	A9/A904 Westfield Roundabout Upgrading	Scheme to improving traffic flow at roundabout allowing grade separated flow for traffic turning left on 3 of the 4 exits.	Public
	A904 Westfield Roundabout to West Mains including A904 Grangemouth Road works	Scheme to dual east-west route through the roundabout	Public
	A904 Falkirk Northern Distributor Road/Laurieston Link Road Works	Works to dual north-south route through the above roundabout;	Public
	J4 M9 Lathallan Upgrade	Upgrade to reduce queuing to access the M9 from the A801	Public
Distribution & logistics	Development of large warehouses in the GIZ	Development of 3 new large distribution centres in the GIZ; these would be both 'water-connected' and 'rail-connected'. This development would need public sector support through the land use planning process.	Private (with public sector support)
	HGV Parking Facility in the GIZ	Develop a suitable site for safe and secure HGV parking within the GIZ for trucks that need to park in advance of making deliveries of collections both within the port and to/from distribution centres. This development would need to public sector support through the land use planning process.	Private (with public sector support)
Port infrastructure	Purchase of a 3rd container crane at the Port of Grangemouth	Purchase of a third crane to allow the Port to increase the speed of handling of containers at the container terminal.	Private
	On-going investment in the container terminal	Potential purchase of a fourth crane and deepening of the berth at the container terminal (subject to demand).	Private
Rail infrastructure	Development of enhanced intermodal rail freight facilities at the Port of Grangemouth	Lengthening of the existing sidings to allow full-length intermodal trains to be accommodated in the port, requiring two 400 metre sidings and a head shunt.	Private
Planning & marketing	Develop planning policies to support the development of distribution activity in the GIZ.	Proactive planning policies to ensure that land is available for large distribution centres in close proximity to the port and intermodal rail freight terminals.	Public
	Ensure that adequate rail network capacity is available	Close collaboration between the Scottish Government/Network Rail and the users of rail freight services to ensure that network capacity can meet demand for intermodal rail freight services to/from the GIZ.	Public & private sectors working in partnership
	Marketing of the GIZ	Develop a single brand for the GIZ and then carry out joint promotion of the area as a tri-modal freight & logistics hub to potential inward investors.	Public & private sectors working in partnership

The measures were then appraised using a high-level multi-criteria analysis approach, focusing on the following three main criteria and taking into account only freight transport and logistics rather than impacts on passenger transport:

- The potential environmental impact of the measure, taking into account the impact on local air quality, overall levels of greenhouse gas emissions, levels of congestion that affect road users and the impact on noise levels, accidents and the general quality of life in the Grangemouth area.
- The potential economic impact of the measure, taking into account changes in user costs for the freight and logistics industry, journey time reliability for distribution and the impact on employment;
- The likely cost to the public sector in general terms for the eight measures that are likely to involve some degree of public expenditure.

The high level results are shown in Table 6.2, while the detailed results have been provided in an accompanying spreadsheet.

**Table 6.2: Summary of results of multi-criteria analysis of the proposed measures for the GIZ**

Category	Measure	Overall environmental impact	Overall economic impact	Cost to public sector
Road infrastructure	A801 Avon Gorge	Positive	Low/Medium	High
	Enhancement of access to J5 of the M9	Positive	Low/Medium	High
	Icehouse Brae/Lauriston Road Upgrade	Positive	Low/Medium	High
	A9/A904 Westfield Roundabout Upgrading	Positive	Low/Medium	High
	A904 Westfield Roundabout to West Mains including A904 Grangemouth Road works	Positive	Low/Medium	High
	A904 Falkirk Northern Distributor Road Works & Laurieston Link Road Works	Positive	Low/Medium	High
	J4 M9 Lathallan Upgrade	Positive	Low/Medium	High
Distribution & logistics	Development of large warehouses in the GIZ	Negative in local area	High	None
	HGV Parking Facility in the GIZ	Positive	Low/Medium	Medium
Port infrastructure	Purchase of a 3rd container crane at the Port of Grangemouth	Positive	High	None
	On-going investment in the container terminal	Positive	High	None
Rail infrastructure	Development of enhanced intermodal rail freight facilities at the Port of Grangemouth	Positive	Medium	None
Planning & marketing	Develop planning policies to support the development of distribution activity in the GIZ.	Neutral	High	Low
	Ensure that adequate rail network capacity is available	Positive	High	Unknown
	Marketing of the GIZ	Neutral	Medium	Low

Source: MDS Transmodal

A map showing the location of the proposed (or potential) road enhancements is provided as Appendix 2.

Most of the measures would help to reduce the overall environmental impact of freight and logistics at a local and national level by reducing congestion caused in part by HGVs, by encouraging a greater volume of freight to switch to maritime and rail transport and reducing the 'nuisance' caused by

HGVs parked in inappropriate locations. The main exception to that rule relates to the development of large distribution centres in the GIZ which would generate additional local traffic that would need to be accommodated on the highways network within the GIZ; this is more than balanced by the additional economic benefits that would be secured by the GIZ in terms of additional employment opportunities and the synergies that could be achieved for the logistics sector through having distribution centres that are well-located with access to cost-effective maritime and rail freight services. In addition, most of this traffic would be secured from long distance road haulage or rail traffic and so would provide other environmental benefits in terms of reduced GHG emissions and lower levels of traffic congestion on the strategic highways network.

In terms of economic impact, the main wider economic impacts of the measures are likely to come from a reduction in user costs for logistics operators and their customers due to a greater use of more cost-effective rail and maritime transport, as well as through employment in the distribution centres.

The enhancements to the highways network were regarded as having low/medium impacts for the freight and logistics sector because the schemes are likely to be focused mainly on addressing peak-time congestion caused by passenger cars. While some HGVs will not be able to avoid using the relevant network links during peak hours, much distribution activity occurs at non-peak times (including during the night) in order to avoid congestion and to maximise asset utilisation.

Four of the measures are not likely to involve any cost to the public sector because they relate to infrastructure and freight facilities that would be privately owned and operated and would require a commercial case to be developed. The planning and marketing measures would require little additional public expenditure, but the additional infrastructure on the publicly owned road and rail networks would have a significant cost.

The effectiveness of the GIZ as a freight and logistics hub for the long-term will rely in part on the ability of the railway network to accommodate additional intermodal rail freight services, which will have to be accommodated alongside passenger services; without this capacity, shippers will not be able to take advantage of the opportunities for transporting goods by rail on key corridors such as between the Midlands and the Central Belt. The cost of any freight-specific measures on the rail network are unknown at this point; there may be sufficient capacity already and it may be possible to manage the network more effectively without additional (expensive) infrastructure enhancements.

### 6.3 Modelling of impacts of the measures

The potential user and non-user benefits of the development of the GIZ up to 2025 has been modelled using the GB Freight Model, which is an integrated software/database system linking domestic and international GB freight data with simple economic models to explain freight demand and allowing trend and scenario based forecasting. The model forms the heavy freight module (i.e. for HGVs, rail freight and port traffic) of the Department for Transport's current National Transport Model.

The modelling was completed for 2025 for two scenarios:

- The GIZ Baseline Scenario;
- The GIZ Potential Scenario.

Modelling the two scenarios allows a comparison to be made between the total user and non-user costs associated with the GIZ Potential Scenario (incorporating the package of measures described above) and the GIZ Baseline Scenario (the counterfactual) to calculate the user and non-user benefits of the package of measures.

The assumptions that were used to carry out the modelling of the two scenarios are set out in Table 6.3 below. Some of the 'softer' measures, such as those relating to marketing and land use planning, could not be modelled directly but would support the policy and business environment within which the modelled 'hard' infrastructure measures could be implemented.

**Table 6.3: Summary of assumptions of the proposed measures for the GIZ**

Scheme/investment	Impact
A801 Avon Gorge: upgrade of 1.7 mile upgrade including a high level bridge across the River Avon; average speed assumed to increase from 34 mph to 50mph	Time saving per HGV of 1 minute in each direction
Icehouse Brae/Lauriston Road Upgrade: upgrade of existing local road	Time saving per HGV of 1 minute in each direction
A9/A904 Westfield Roundabout Upgrading: improving traffic flow at roundabout allowing grade separated flow for traffic turning left on 3 of the 4 exits.	Time saving per HGV of 0.5 minutes per HGV on the A9 (north-south) and the A904 (east-west)
A904 Westfield Roundabout to West Mains including A904 Grangemouth Road works to dual east-west route through the roundabout; average speed assumed to increase from 30mph to 45mph.	Time saving per HGV of 0.2 minutes.
A904 Falkirk Northern Distributor Road Works & Laurieston Link Road Works to dual north-south route through the above roundabout; average speed increases from 30mph to 45mph on these sections.	Time saving per HGV of 0.1 minutes.
J4 M9 Lathallan Upgrade to reduce queuing to access the M9 from the A801	Time saving per HGV of 0.1 minutes.
On-going investment in the container terminal at the Port of Grangemouth.	Cost savings for shipping lines

	and shippers.
Three additional 'large' rail and water-connected warehouses developed within the GIZ; located either within or in close proximity to the port estate and the existing intermodal rail freight terminals within the GIZ and supported by enhanced rail freight infrastructure (direct access to the east towards the ECML and W10/W12 loading gauge).	17%* of traffic inbound to the new warehouses is by rail
Enhanced rail freight infrastructure within the GIZ; 400 metre long sidings at an intermodal terminal with the Port of Grangemouth and W10/W12 loading gauge due to electrification.	20% longer trains, no capacity and routing restrictions

\*Based on the percentage of rail freight to a Grangemouth distribution park forecast by MDS Transmodal in its Freight Market Study for Network Rail in 2013

Source: MDS Transmodal

The user and non-user benefits from the implementation of the package of measures in the GIZ Potential Scenario are set out in Table 6.4 below. These are the results of the modelling of the difference between the user and non-user costs for the 2025 GIZ Potential Scenario and the 2025 GIZ Baseline Scenario using the GB Freight Model.

**Table 6.4: Summary of modelled annual user & non-user benefits from proposed measures for the GIZ in 2025**

£ million per annum

Scheme/investment	User benefits	Non-user benefits
Road schemes in GIZ (public sector)	£0.37	-
Container port schemes in GIZ (Forth Ports)	£6.72	£1.47
Rail & water-connected distribution centres with associated rail freight terminal & network enhancements (private sector developers & public sector)	£4.55	£0.34
Total	£11.65	£1.80

Source: MDS Transmodal

The modelled annual user benefits for the road schemes of £0.37 million are related to average time savings for HGVs over a 24 hour period, while the overall annual user benefits for the schemes would be higher when reductions in queueing for passenger traffic in peak periods is taken into account. For the purposes of this strategic analysis for these local road enhancements we have assumed there would be no route switching by HGVs (and therefore no change in non-user benefits or costs).

The enhancements at the container terminal in the port have the impact of increasing the traffic in 2025 from a baseline forecast of 177,000 units to 243,000 units in the GIZ Potential Scenario, an increase of some 37%. The modelled user benefits would be some £6.72 million per annum in 2025, due to on-going investment at the container terminal.

The development of three additional large rail- and water-connected distribution centres in the GIZ allows 17% of inbound traffic (35,000 HGV equivalents per annum) to be transported by rail direct to

a warehouse in the GIZ, rather than be transported by road to a road-based warehouse in (say) Bathgate. This generates some £3.53 million of user benefits and £0.34 million of non-user benefits per annum.

The main benefit from the rail network enhancements is to increase the efficiency of the rail freight services that can operate to and from the GIZ (e.g. longer trains) and this generates user benefits of £1.02 million per annum; this supports the ability to generate the £0.34 million of non-user benefits related to the development of the additional large warehouses.

Total modelled annual benefits are £11.65 million of user benefits and £1.80 million of non-user benefits. The present value in 2017 of the modelled user benefits over 60 years (i.e. up to 2077) at a public sector discount rate of 3.5% per annum is £291 million, while the present value of the non-user benefits is £45 million. Overall, the estimated present value of the public benefits in relation to freight is some £336 million.

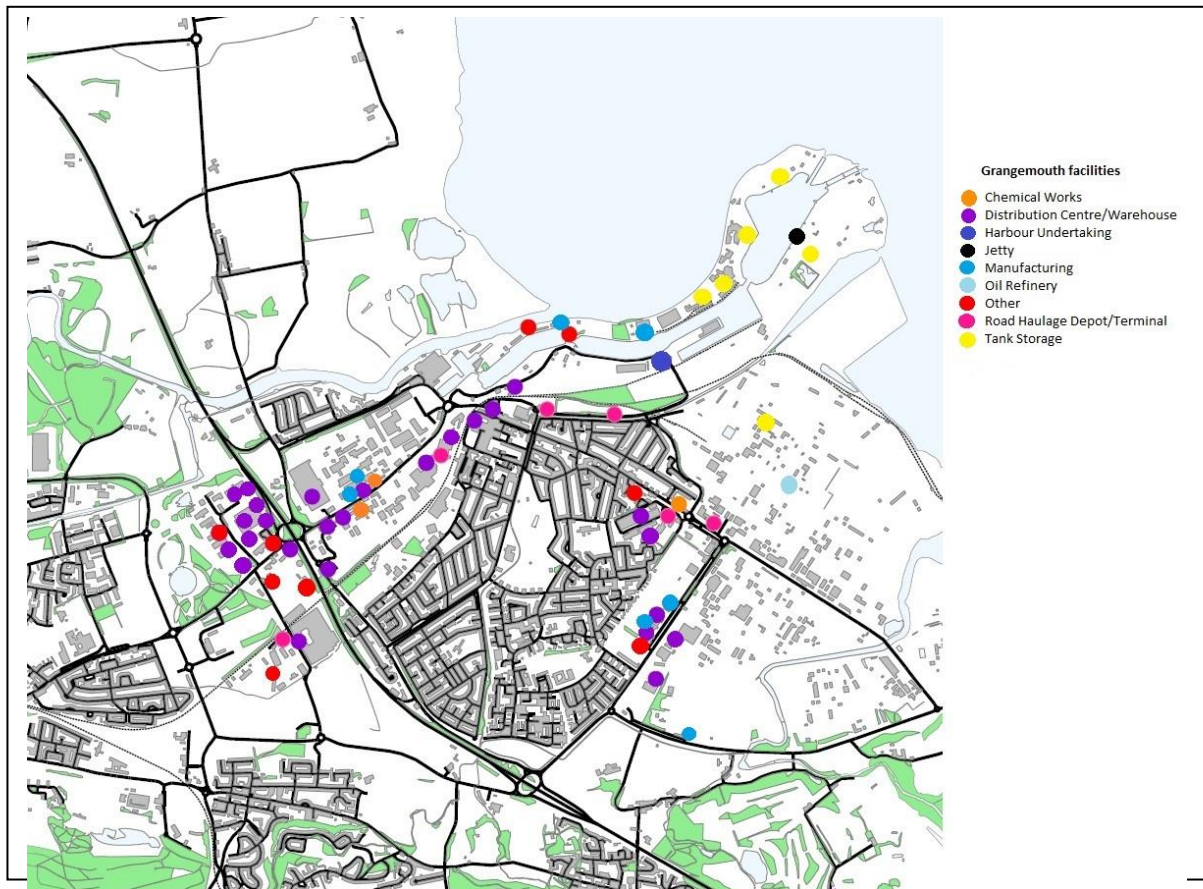
## 6.4 Action Plan

The Action Plan for the GIZ provided below (Table 6.5) sets out the practical actions that would be required to take forward the measures, including the organisations that would be involved and the time scale within which they can be implemented. These include some short-term measures (which could be regarded as 'quick wins') and longer term measures that require some significant infrastructure investment.

**Table 6.5: Action plan for the proposed measures for the GIZ**

Measure	Tasks	Organizations involved	Timescale for implementation
Enhancement to A801	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
Enhancement of access to J5 of the M9	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
Icehouse Brae/Lauriston Road Upgrade	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
A9/A904 Westfield Roundabout Upgrading	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
A904 Westfield Roundabout to West Mains including A904 Grangemouth Road	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
A904 Falkirk Northern Distributor Road Works & Laurieston Link Road Works	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
J4 M9 Lathallan Upgrade	Develop business case; secure funding; public tender; works to implement	Falkirk Council Transport Scotland	2020
Development of large warehouses in the GIZ	Planning application; implementation	Private sector developers Falkirk Council	2020-25
HGV Parking Facility in the GIZ	Planning application; implementation	Private sector developer Falkirk Council	2020
Purchase of a 3rd container crane at the Port of Grangemouth	Investment made, with delivery of the crane in Q3 2018.	Forth Ports	2018
On-going investment in the container terminal at the Port of Grangemouth	Develop commercial case for investment; secure funding' procurement process; implementation	Forth Ports	2018-25
Development of enhanced intermodal rail freight facilities at the Port of Grangemouth	Develop commercial case for investment; secure funding; procurement process; implementation	Forth Ports	2018-25
Develop planning policies to support the development of distribution activity in the GIZ.	Research into potential sites; allocation of sites in LDP; marketing of opportunity to potential developers	Falkirk Council	2018
Ensure that adequate rail network capacity is available	Study of existing & forecast network capacity; develop action plan to ensure sufficient network capacity is available; implementation.	Network Rail, Transport Scotland, Forth Ports, Malcolm Group, major shippers	Up to 2025
Marketing of the GIZ	Develop brand for freight and logistics in the Grangemouth area; develop marketing plan; implementation in the form of a public-private partnership.	Forth Ports & Malcolm Group Falkirk Council Scottish Enterprise	2018

**APPENDIX 1: LOCATION OF FREIGHT FACILITIES IN THE GIZ**



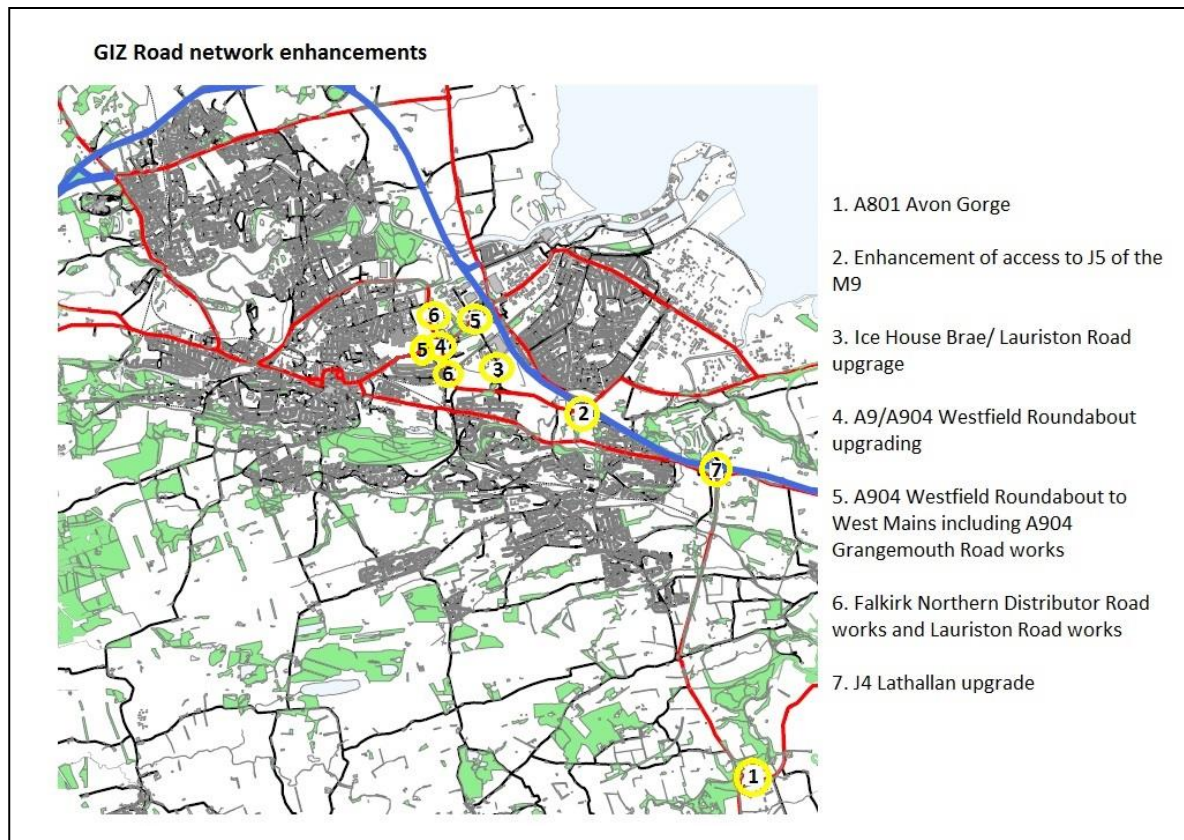
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**APPENDIX 2: LOCATION OF INFRASTRUCTURE PROJECTS**



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**APPENDIX 3: QUESTIONNAIRE USED FOR STAKEHOLDER CONSULTATION**

**Contact details (to be completed prior to interview)**

Main contact:	
Position:	
Company:	
Phone:	
Email:	
Summary of intermediary organisation's role/organisation's role:	

**Trade association or Company details**

Office address	
Postcode	

Organisations represented by intermediary in GIZ	Staff numbers (approx.)	Staff numbers (Last 3 years)			
		Inc.	Dec.	Same	No Ans.

Approximate staff represented/employed Organisation	Staff numbers (Next 3 years)			
	Inc.	Dec.	Same	No Ans.

Summary of goods/services provided by organisation or organisations represented

Traffic flows into and out of Scotland? (companies only)						
Cargo Flows	Origin(s)	Destination(s)	Unit (e.g. tonnes/containers/HGVs)	Increase, Decrease, Stay Same over next 3 years	Approx mode split (%)	
IN					Rail	
					Road	
					Sea	
					Pipeline	
OUT					Rail	
					Road	
					Sea	
					Pipeline	

**Traffic flows into and out of the GIZ? (companies only)**

Cargo Flows	Origin(s)	Destination(s)	Unit (e.g. tonnes/containers/HGVs)	Increase, Decrease, Stay Same over next 3 years	Approx mode split (%)
IN					Rail Road Sea Pipeline
OUT					Rail Road Sea Pipeline

**What do you consider to be the key strengths and weaknesses of the Grangemouth Investment Zone to be?**

Strengths	
Weaknesses	

Out of 3 where 3 is 'a strength' and 1 is 'weakness' how would you rate the Grangemouth area in terms of the following attributes:	
Geographical location	
Levels of road congestion	
Rail connectivity	
Warehouse capacity	
Resilience/Business Continuity	

Access to skilled workforce	
Planning issues	
Other points raised in open question	

Which have the greatest negative impact on the performance of the company?

Explore strengths and weaknesses in more detail e.g. where are the main pinch points on the road network?

**What do you consider to be the key opportunities for the Grangemouth Investment Zone going forward in terms of improvements?**

What could be done to improve the attractiveness of the GIZ in the future?

How would you rate them in terms of allowing the GIZ to make the most of future opportunities for growth and serving business needs?

Please rate out of 5 where 5 is 'very high level of opportunity' and 1 is 'very low level of opportunity'

Improved facilities in the port	
Improvements to the rail network (connectivity, capacity)	
Improvements to the strategic road	

network around the GIZ Improvements to the local road network within the GIZ Increase in warehouse capacity More supportive planning regulations Brexit/Independence Other points raised in open question	
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If these improvements are made, how do you think they would impact on your business/sector?  
**Quantify if possible.**

**What do you consider to be the key threats to the Grangemouth Investment Zone going forward?**

What do you see as the key threats to the Grangemouth Investment Zone going forward?

	Are any of the following perceived as key threats			
	High	Medium	Low	None
Capacity constraints (road, rail, port)				
Increased competition from other ports in Scotland				
Increased competition from ports in northern England				
Limitations on warehouse capacity in the future				
Increased congestion on				

motorway network  
Larger vessels not being able to access Grangemouth  
Brexit/Independence .  
Other points raised in open question

Do you expect these threats to influence your business in the next five years, and if so, in what way?  
**Quantify if possible.**

**Any other comments?**

**Thank You**

Your responses will be treated in confidence, and stored in accordance with the Data Protection Act (1998) and used to inform this study only. Results will not passed to any third party. A summary report will be created in which the data collected will be anonymised.