Waterborne Freight Study

Final Report

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Abbreviations & Definitions

Abbreviations	
BRES	Business Register and Employment Survey
DfT	Department for Transport
FLAGs	TfSE Freight, Logistics & Gateway Strategy
HGV	Heavy Goods Vehicles
ITL	International Territorial Levels
IWW	Inland Waterway
LDC	Large Distribution Centres
Lo-Lo	Lift-on/Lift-off Cargo
LSOA	Lower Super Output Area
MRN	Major Road Network
ONS	Office for National Statistics
RFI	Rail Freight Interchange
Ro-Ro	Roll-on/Roll off Cargo
SRN	Strategic Road Network
SSS	Short Sea Shipping
STB	Sub-national transport body
TE	Transport East
TfSE	Transport for the South East
VOA	Value Office Agency

Definitions

- **Short Sea Shipping:** Maritime traffic that moves cargo along a coast without having to cross an ocean (DfT, 2022e).
- **Dry Bulk**: Is carried in the main cargo hold of bulk carrier vessels, typically in large quantities without packaging. Example goods include coal, ores and scrap metal.
- **Inland Waterway Traffic:** Freight traffic carried by both barges and seagoing vessels along inland waters, both non-seagoing traffic and seagoing traffic, which crosses into inland waters from the sea (DfT, 2017).
- **Lift-on/Lift-off:** Consists of container traffic. TEU (twenty-foot equivalent units) is a standardised measure to allow for the different sizes of container boxes.
- **Liquid Bulk**: Consists of any liquid or liquid gas that is transported in a tank, typically in large quantities and in specialised tankers. Example goods include crude oil, petroleum products, chemicals, or liquefied natural gas.
- **Major Ports:** Ports moving cargo volumes of at least 1 million tonnes annually (DfT, 2023h).
- **Roll-on/Roll off:** Cargo that can be moved on to, or off, a vessel either by their own propulsion (e.g. passenger car) or with assistance (e.g. unaccompanied trailer).

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Executive Summary

Introduction & Project Background

The freight and logistics sector plays a vital role supporting the movement of goods, providing economic benefits to the South East. The sector is currently facing several challenges including road congestion and transitioning to a net zero future to support the UK government's 2050 net zero commitment.

Waterborne transportation presents an opportunity to alleviate road congestion and minimise the sector's carbon impact. Transport for the South East (TfSE) is the sub-national transport body (STB) for the South East of England and has commissioned City Science to explore the viability of transferring some freight movements from the road to waterborne freight. This study will inform delivery of the Freight, Logistics & Gateway Strategy and the Transport Strategy vision, alongside supporting the economic growth of the area. Waterborne freight includes coastal shipping, such as short sea shipping (SSS), and inland water ways (IWW).

Aims, Objectives & Scope

The primary aim of this study is to evaluate the viability of integrating SSS and IWW into the TfSE freight transportation system. The study's anticipated key outcomes are to ascertain whether increasing waterborne freight in the TfSE area is a viable way to:

1. Reduce Greenhouse Gas Emissions	2. Mitigate Road Network Congestion	3. Stimulate Economic Growth in Coastal Towns

To achieve these aims this study has conducted analysis to:

- Identify the freight market segmentation(s) most suitable for transfer to waterborne methods.
- Assess whether there is a substantial volume of freight, currently reliant on road networks, that could be efficiently and viably shifted to waterborne freight.
- Project the future trajectories of relevant market segments.
- Evaluate the viability and competitiveness of establishing a SSS service connecting ports along the coast.
- Identify any infrastructure enhancements and modifications that are required to facilitate a seamless transition to waterborne freight.
- Investigate the economic viability of the transition to waterborne freight.

Key Study Findings

We have categorised the key study findings into the categories shown below.

Market Factors & Commercial Viability	Operational & Infrastructure	Policy & Collaboration	Social & Environment	Data for Decision Making

Market Factors & Commercial Viability

- **Competitiveness:** While a large volume of freight in the TfSE area, such as aggregates and metals, is suited for waterborne transport, road freight dominates due to its flexibility and speed. For waterborne transport to grow, it must be more cost-competitive than road and rail options. Hybrid models combining passenger, freight, and rail services could improve viability.

Operational & Infrastructure

- **Cost:** Expanding waterborne freight faces challenges, particularly the high costs of upgrading port facilities and limited rail connectivity.
- **Limited IWW:** The fragmented IWW network also hinders continuous freight movement, requiring substantial investment for viable alternatives to road transport, resulting in SSS having more potential.
- **Port Specialisation:** This limits growth across a wide variety of cargo types.

Policy & Collaboration

- **Government Support:** A lack of targeted government incentives and long-term regulatory frameworks creates uncertainty. Supportive policies, such as growth targets, planning protections, and financial incentives, could help build momentum for waterborne freight.
- **Encouraging Uptake:** The majority of freight market segments which are considered suitable for transfer to waterborne freight, and have reasonable volumes loaded to or unloaded from Heavy Goods Vehicles (HGVs) within the TfSE area, are expected to continue to grow or remain stable. This emphasises that introducing a policy of infrastructure changes to encourage transfer of freight from HGVs to waterborne modes would likely have long term benefits.
- **Knowledge Sharing & Collaboration:** Increased public sector knowledge and cross-sector collaboration will also be crucial to realising its potential.

Social & Environmental

- **Environment:** Shifting freight from road to waterborne modes could reduce congestion, air pollution, and carbon emissions, benefiting urban and coastal communities.
- **HGV Increase:** Overall, annual HGV kilometres in the TfSE area is expected to increase 17% to 28% from 2022 to 2040 and many of the Local Transport Authorities within the TfSE area which currently have high levels of HGV vehicle kilometres inside their boundary also contain waterborne freight infrastructure. This highlights the possibility of securing local support for the changes required to enable waterborne freight. However, increased port activity may cause localised congestion.

Data for Decision Making

- **Data Gaps & Confidentiality:** Data gaps, particularly in freight type and routes, limit the ability to assess the feasibility of shifting freight to waterborne transport. Improved data on current movements and robust freight modelling systems are needed, although data confidentiality concerns remain a barrier to open sharing.

Key Opportunities

This study has identified a number of priority locations for waterborne expansion.

- **Isle of Wight & Solent:** This region could utilise existing vessels and operational frameworks to build on this successful model, minimising the need for extensive new infrastructure. While the impact may be localised, this initiative could serve as a scalable model for similar projects.
- **Southampton:** With established rail connectivity, Southampton Port is positioned to expand its rail freight share. Opportunities exist to use waterborne freight for a portion of the journey, particularly where destinations are accessible via both rail and port connections. However, it's unclear how many journeys are better suited for rail-water transport versus rail alone.
- **Port of London Authority:** Whilst outside of the TfSE area, London Gateway and Port of Tilbury are actively expanding, creating opportunities to increase the demand for waterborne freight at smaller feeder ports. Expansion here could attract a greater volume of bulk and containerised goods for redistribution within the TfSE area. Investment in supporting infrastructure at these ports will be essential for accommodating increased waterborne freight capacity.

We suggest that further discussions are had with key stakeholders to continue to explore waterborne freight expansion at these sites.

Study Conclusions

This study has demonstrated that there is some potential for shifting some road freight to waterborne modes within the TfSE area. However, there are a number of key challenges including:

- **Data:** Improved availability and use of data will enable better identification and optimisation of suitable goods and routes for waterborne freight.
- **Cost Competitiveness:** Waterborne freight must become more cost-competitive compared to road and rail transport.
- **Infrastructure Development:** Ports and intermodal connections require significant investment to accommodate increased freight volumes.
- **Policy & Incentives:** Financial incentives, long-term regulatory frameworks and targeted investments that foster collaboration between public and private stakeholders are needed. to promote a fundamental shift away from

road freight. Without these, waterborne options frequently lack the commercial appeal necessary for broad private sector adoption.

Despite these challenges there are opportunities and potential benefits:

- **Bulk Goods & Port Access** Shifting specific types of goods, such as bulk commodities, and in regions with well-established port access such as Southampton, the Solent and the Port of London Authority.
- **Environmental & Economic Benefits:** Transitioning freight from road to waterborne modes can reduce congestion and air pollution as well as support job creation, particularly in port-related activities and associated supply chains.

Key Recommendation

As a result of the challenges, the study has not been able to demonstrate that increasing the volume of waterborne freight in the TfSE area is currently financially viable. The report makes a number of recommendations about what would be needed to improve financial viability. However, even if it was found to be viable, it is unlikely to have significant impact on carbon emissions, road traffic congestion and economic growth and would deliver negligible returns for the scale of investment anticipated. Any further work would be reliant on obtaining better data on which to assess its potential in greater detail, and in the current economic climate, the significant financial investment needed for infrastructure improvements at the ports and inland waterways is unlikely to be forthcoming. Therefore, there is little prospect of the stakeholders taking the actions necessary to support an increase in the viability of waterborne freight in the TfSE area in the near future

1 Chapter One - Introduction

1.1 Project Background

TfSE is the STB for the South East of England. The TfSE Transport Strategy (TfSE, 2020) presents the region's vision to 2050, aiming to foster sustainable economic growth and reduce carbon emissions. The Strategy acknowledges that to achieve this goal will require the successful integration of transport, digital and energy networks and a high-quality, reliable, safe and accessible transport system. Freight is considered extensively within the strategy which notes the need for key stakeholders and the public to be at the heart of transport planning. To meet environmental sustainability goals, the strategy specifies that there must be attractive alternatives available for road freight. The plan identifies key challenges for freight which focus on "accommodating future growth and reducing the impact of freight transport on the environment"

The TfSE Freight, Logistics & Gateway Strategy (Freight Strategy) emerged as a recommendation from the TfSE Transport Strategy, and has been subsequently developed (TfSE, 2022). It provides a route map to enable the sustainable growth of the industry. Key strategic objectives include improving the operational efficiency and capacity of the sector, the connectivity at international gateways and reducing the environmental impact of freight and logistics operations. The action plan outlined a need to review the potential of inland waterway (IWW) freight and coastal shipping, such as short sea shipping (SSS), for freight movement, and hence informed the commissioning of this study.

One of the key challenges highlighted across these strategies is the decarbonisation of the freight and logistics sector, reducing freight-based congestion on the local road network and supporting wider co-benefits such as improved air quality. To address these challenges, TfSE are actively exploring sustainable alternatives to road-based freight transportation. The TfSE Freight Strategy specifically recognises the potential for waterborne freight to enable this across the region.

TfSE commissioned City Science to explore the viability of transferring some freight movements from the road to water within or to and from the TfSE area. The study forms part of the delivery of the Freight Strategy Action Plan and delivery of the Transport Strategy vision, alongside supporting the sustainable economic growth of in the area.

1.2 Report Purpose

TfSE identified the two core objectives of the study were to provide:

- A more informed position on the potential for coastal shipping, SSS and inland waterways to be used more extensively for the movement of freight.

- Greater insight into possibilities and recommend points for action or further investigation, for example, which types of materials and/or goods would be suitable and the origins and destinations of these.

To meet these objectives, six study questions were developed to inform this study including:

1. Understand the segmentation of the freight market suitable for transferring to waterborne transport methods.
2. Assess whether there is a substantial volume of freight, currently reliant on road networks, that could be efficiently shifted to waterborne transportation.
3. Project the future trajectories of relevant market segments.
4. Evaluate the viability and competitiveness of establishing a coastal shipping service connecting ports along the coast.
5. Identify necessary infrastructure enhancements and modifications essential for facilitating a seamless transition to waterborne freight transportation.
6. Investigate the economic sustainability of this transition, potentially attracting participation from private sector operators

A key challenge for this study has been the availability of data which has restricted our ability to fully answer the first three study questions. Whilst some datasets are available, they are often fragmented and provide an incomplete picture. Specific data limitations have included the lack of:

- **Geospatial granularity:** Makes it difficult to determine values specific to the TfSE area.
- **Commodity granularity**: Reduces the ability to isolate specific goods flows that would be suitable for transition to waterborne freight. This is primarily due to data collection on waterborne freight largely being based on ship type (e.g. container cargo). As such there is insufficient granularity to determine specific goods or materials being transported by water.

Where data has been a constraint, we have liaised closely with TfSE to discuss and agree alternative approaches to inform this Final Report.

1.3 Aims & Objectives

The primary aim of this study is to evaluate the viability of integrating SSS and IWW into the TfSE freight transportation system. The study's anticipated key outcomes are to ascertain how increasing the use of waterborne freight in the TfSE area can:

1. Reduce Greenhouse Gas Emissions

2. Mitigate Road Network Congestion

3. Stimulate Economic Growth in Coastal Towns

1.4 Scope

The viability of using the following modes of waterborne freight to replace HGV freight movements are in scope of this study:

- **SSS:** Maritime traffic that moves cargo along a coast without having to cross an ocean (DfT, 2022e).
- **IWW:** Freight traffic carried by both barges and seagoing vessels along inland waters, both non-seagoing traffic and seagoing traffic, which crosses into inland waters from the sea (DfT, 2017).

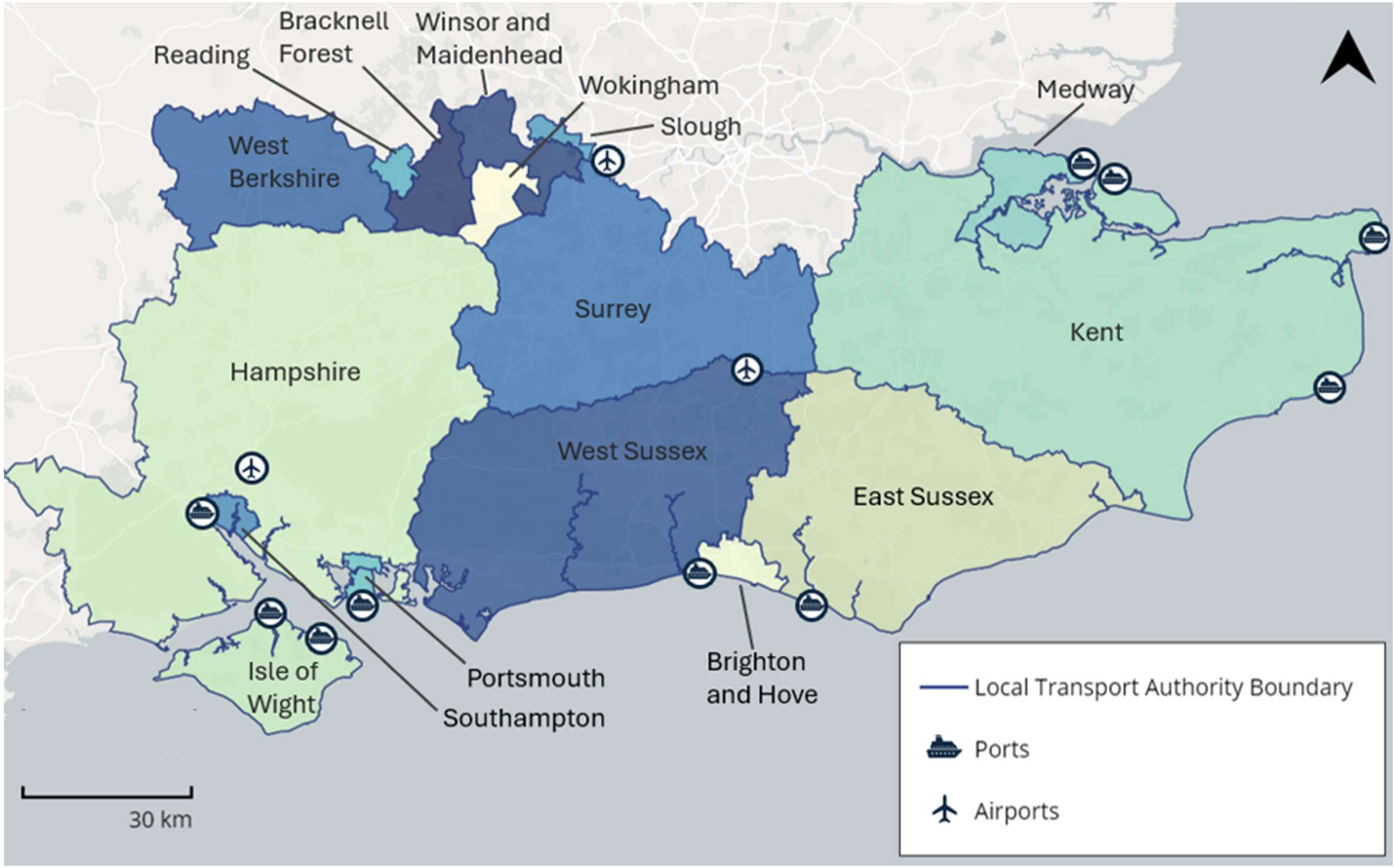
Opportunities may also exist to support substituting rail freight (e.g. Southampton – Port of London Authority) by using waterborne services to transport cargo between smaller, regional and major hub ports. However, a detailed analysis of this opportunity is outside of the study's scope. The geographical scope of this study is the TfSE area, illustrated below in Figure 1-1.

1.5 Context: The Role of Waterborne Freight

The use of waterborne freight presents opportunities to reduce transport emissions, because the movement of freight by costal domestic shipping (often referred to as SSS) and IWW uses considerably less energy than that used in the transport of goods by road, rail or air (European Community Shipowners' Associations, 2020). This was demonstrated by previous Cross River Partnership trials, see Table 2-2 for more detail, that highlighted how bringing goods into central London via the River Thames produced less than half of the carbon emissions of road transport due to reduced journey mileage (Cross River Partnership, 2022). The Cross River Partnership trials also found that transferring goods to waterborne methods reduced congestion through an overall reduction in vehicles on the road.

However, transitioning towards a greater reliance on waterborne freight presents several challenges, including the need for additional infrastructure such as roads, rail networks, and interchange facilities to increase capacity at existing ports and support onward journeys. These infrastructure requirements also pose financial challenges due to their associated costs. The expansion of existing sites or the development of new sites, will require sufficient land to enable development, as well as the supporting infrastructure previously outlined.

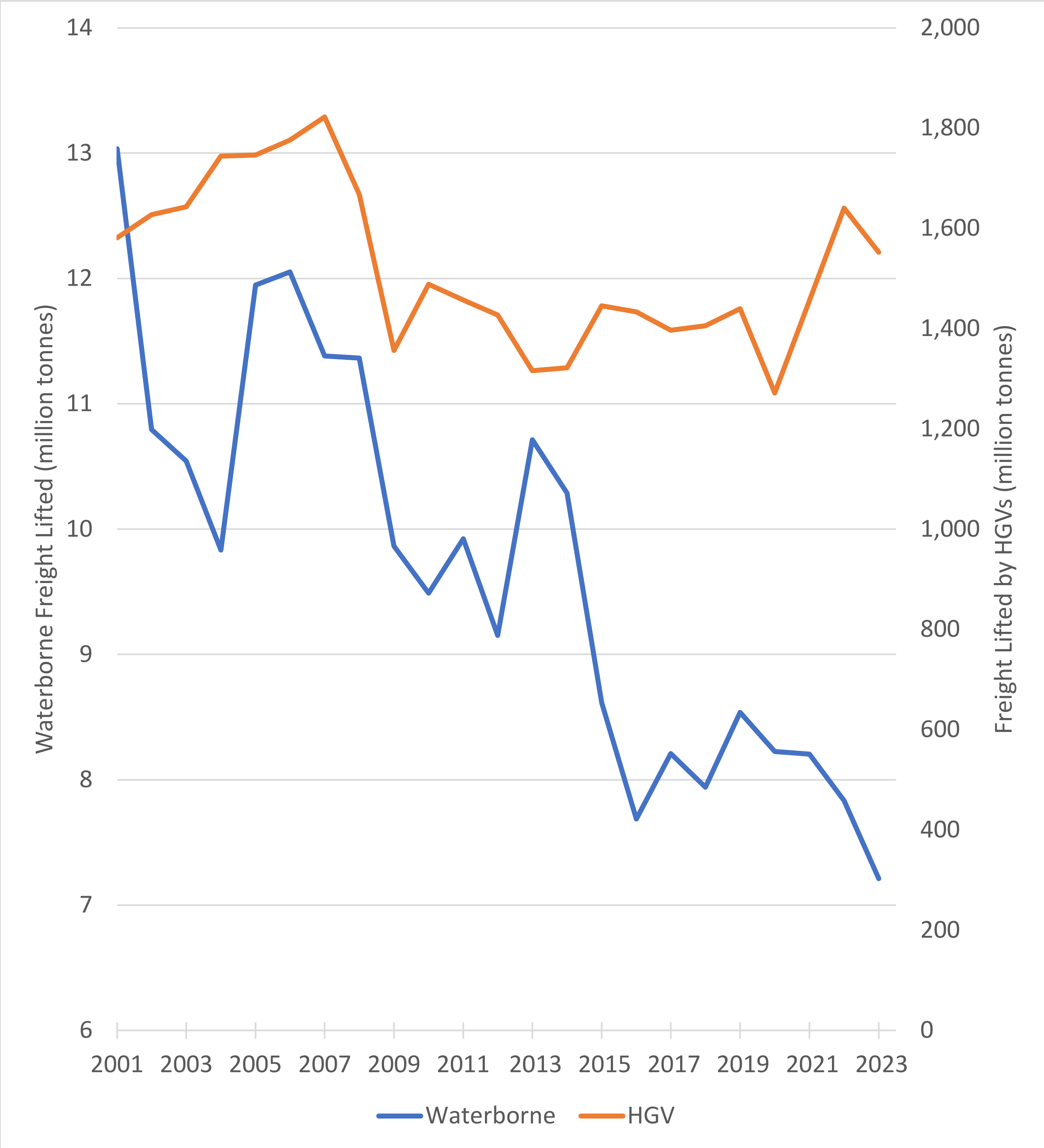
Figure 1-1: Map of Study Area. Source: (ONS, 2021) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].



1.6 Waterborne Freight Background

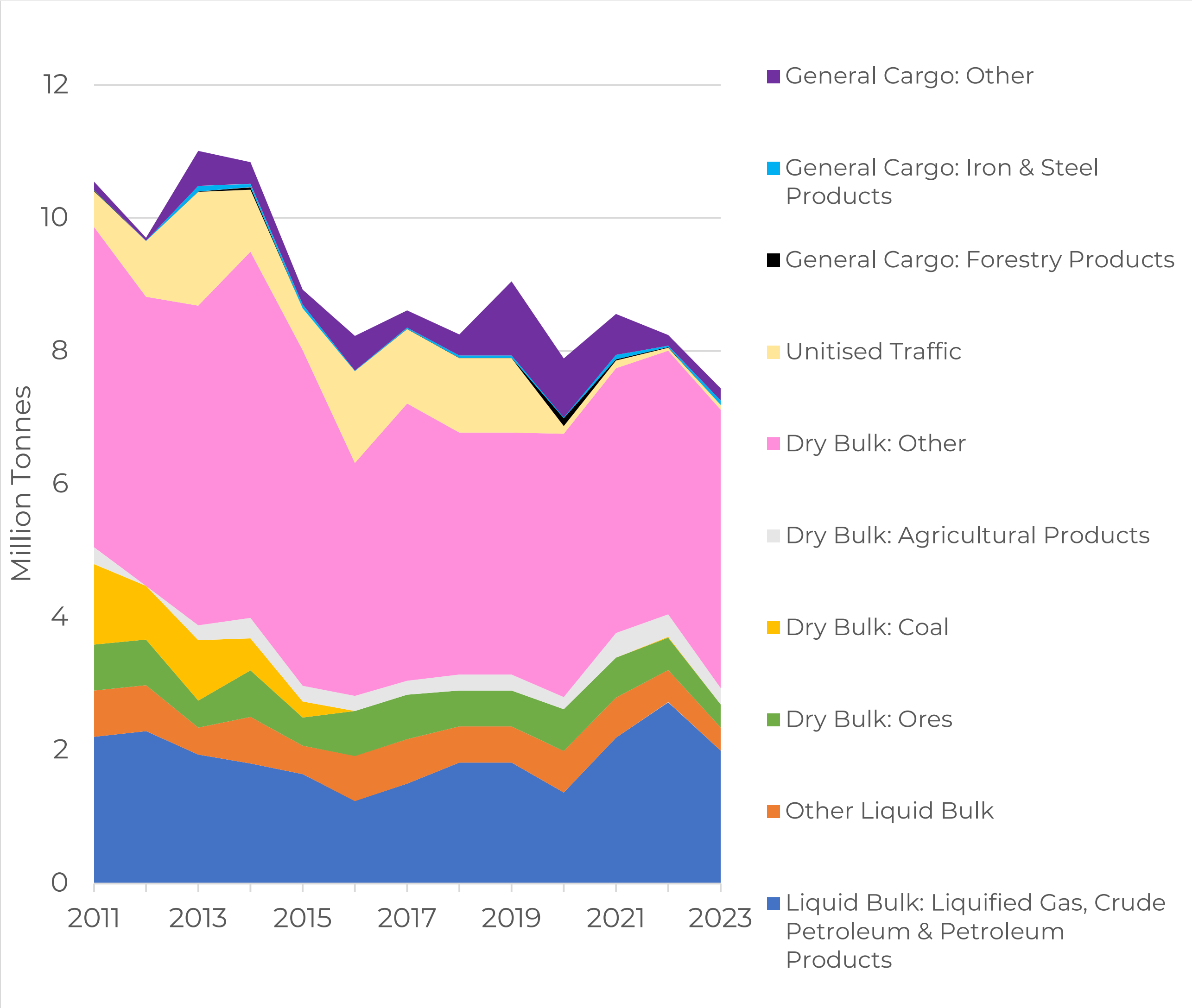
Nationally, waterborne freight accounts for a comparatively small amount of freight lifted compared to that moved by HGVs. Figure 1-2 shows waterborne freight volumes measured by total tonnes, HGV volumes is shown on a separate axis. On average, 157 times more domestic cargo is lifted by HGV than by water. Additionally, there is evidence of an overall decline in waterborne freight over the last decade.

Figure 1-2: National Freight Lifted by Waterborne & HGV. Source: (DfT, 2023h; DfT, 2023f)



Commodities which are already carried in large quantities by waterborne freight may be most suitable for shifting from HGVs. Figure 1-3 shows the annual amount carried by domestic waterborne freight in the UK, from 2011 to 2023, split by cargo type (DfT, 2023h). Because the DfT largely assess the cargo type based on information about the type of ship (e.g. container ship), the cargo categories are insufficiently granular to identify many specific commodities. This data limitation is discussed further in Section 5.4. Nonetheless, insight about the suitability of broad commodity groups can be gained. Figure 1-3 shows waterborne freight is dominated by just two types of cargo categories: dry bulk goods (metal ores, grain or construction raw materials) and liquid bulk goods (crude oil, petroleum products and chemicals). In 2023 dry and liquid bulk cargoes accounted for 63% and 32% of the freight carried.

Figure 1-3: Domestic Waterborne Cargo by Type. Source: (DfT, 2023h)



1.7 Current Situation: TfSE Waterborne Infrastructure & Activity

The TfSE area hosts a range of waterborne resources, as outlined in the supporting technical documents for the TfSE Freight Strategy (TfSE, 2022), see WP3 Freight Specific Infrastructure (WSP, 2021).

- **Major Ports:** There are six major ports in the TfSE area that handle more than 1 million tonnes of cargo a year, such as Southampton and Portsmouth,.
- **Minor Ports:** Minor ports that provide localised waterborne freight activity, as well as recreational and leisure facilities, such as the Isle of Wight.
- **The Solent Freeport:** Freeports have been created by the government to boost investment with imported goods exempt from taxes. The Solent Freeport was approved in 2022 and could lead to shifts in supply chain activity and maritime freight paths. Additionally, it could create over 30,000 jobs and thereby enable the levelling up of coastal communities.
- **IWW System:** Navigable routes within the TfSE area include the River Medway, River Arun and River Rother. The area also benefits from its proximity to the River Thames, the busiest IWW in the UK. The River Medway is identified as a significant natural watercourse outside of the River Thames that supports waterborne freight movements, with no other inland freight routes designated across the rest of the South East.

WP3 recognises that waterborne freight has the potential to grow across the UK and the South East, competing with road and rail transport (WSP, 2021). However, challenges are identified including:

- Development pressures along the River Thames and River Medway may conflict with retaining waterway and wharf infrastructure.
- The uptake of coastal shipping as a cost-effective transport method will likely be impacted by regulations and legislation related with planning consent for associated infrastructure.
- Narrow IWWs across the TfSE area may constrain freight movement.
- Significant resources and investment are needed for new handling equipment at ports and wharves.
- Collaboration is required among stakeholders, including freight and logistics companies, ports, and IWW service providers.

TfSE recognises there is a need to better understand the key considerations which impact the viability of the expansion of waterborne freight, and the types and scale of associated benefits. This study and report provide insight to address this need.

1.8 Report Structure

This Final Report is structured to align with the study purpose and scope:

- **Local Context & Waterborne Infrastructure Assessment:** Provides a general insight into the TfSE area's demographic factors, such as population and deprivation, and evaluates the availability of waterborne infrastructure within the TfSE area and its surrounding areas.
- **Freight Movements:** Detailed information on the TfSE area's current freight movements, including both road-based and waterborne freight. It highlights the proportion and types of goods transported within and outside of the area.
- **Future Trends & Forecasting Impacts:** Presents key data trends related to waterborne freight, and forecasts future trends and their anticipated impact on the area's freight movements.
- **Data Gap Analysis:** Discusses the data required to assess the feasibility of achieving substantial mode shift of freight from HGVs to waterborne vehicles, highlights the gaps and outlines recommendations.
- **Stakeholder Insights:** Presents the outcomes from the stakeholder engagement process, focusing on challenges, wider opportunities and place-based opportunities
- **Challenges & Opportunities:** Collates and analyses the challenges and opportunities identified throughout this study.
- **Key Findings, Conclusions & Next Steps:** Outlines the study's key findings, conclusions, recommendations and next steps.

2 Chapter Two – Local Context & Infrastructure Assessment

2.1 Overview

This Chapter provides an understanding of the TfSE area's socio-economic context, current infrastructure provision, geographical characteristics and connectivity with surrounding areas that may impact the area's ability to expand waterborne freight. This Chapter will inform this study by ensuring that recommendations are tailored to address locally specific challenges and lever local strengths. The factors explored include:

- **Socio-economic Factors:** The availability of suitable labour is essential for the operation and management of freight services. Understanding these factors is crucial for determining if the local workforce could support an expansion in waterborne freight provision. Additionally, identifying place-based opportunities for economic stimulation can help support equitable growth through identifying a correlation between opportunities for waterborne freight expansion and areas of deprivation. This was explored through analysing total population distribution across the area, deprivation levels and a high-level market sector analysis.
- **Current Infrastructure Provision:** Existing transport networks, such as roads and rail, port locations and supporting infrastructure, such as warehousing, enable the transfer and movement of goods across the area. The data has been mapped to show where infrastructure is currently located to identify preliminary challenges and opportunities for expanding existing waterborne freight services.
- **Geographical Characteristics:** The presence and availability of navigable waterways determine the feasibility and efficiency of waterborne freight routes and are therefore fundamental for expanding waterborne freight. IWW routes are mapped across the TfSE area to identify preliminary challenges and opportunities for expanding waterborne freight through IWW.
- **Connectivity with Surrounding Areas:** Due to the cross-boundary relationship of freight provision, it is critical to explore the infrastructure available in TfSE's neighbouring areas to understand how well waterborne freight systems and networks are linked across different regions. Exploring this connectivity helps identify untapped collaboration opportunities and ensures seamless integration with regional freight networks outside of the TfSE area. The same approach has been applied to understanding the TfSE area's infrastructure provision.

By thoroughly examining these factors, this Chapter seeks to ensure that study conclusions are tailored and grounded in a detailed understanding of local and regional contexts, providing a solid foundation into waterborne freights viability within the TfSE area.

2.2 Socio-Economic

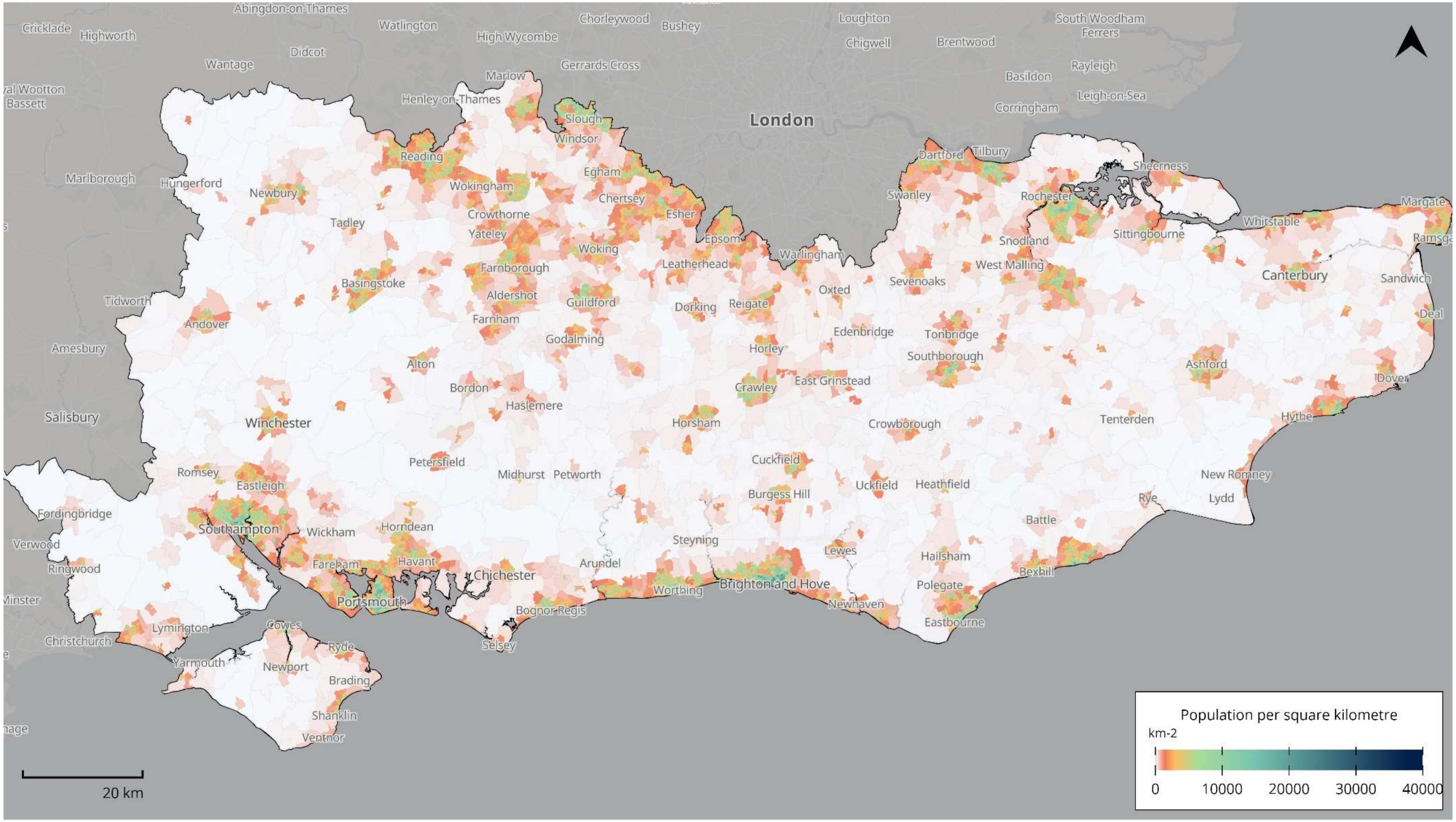
2.2.1 Population

Home to over 8 million people, the TfSE area is one of the UK's most populated areas. This significant population contributes to the high demand for goods movement into the region. Figure 2-1 indicates the spatial distribution of this population across the TfSE area, showing the density of the population in each Lower Layer Super Output Area (LSOA) (ONS, 2022a). LSOAs are standardised geographic areas that provide a consistent framework for collecting and presenting local area statistics. They are designed to have population sizes containing between 1,000 to 3,000 residents and are the smallest super output area available. This supports a granular analysis of census data, such as population density.

The results reveal that while large areas of TfSE are sparsely populated, there are notable coastal towns and cities with significant population densities. These include Southampton, Portsmouth, Brighton, Eastbourne and Dover, which align with key strategic waterborne infrastructure, such as ports, and activity. This presents a number of promising opportunities including that any expansion of port activity can be supported by a local workforce.

Whilst there are smaller pockets of higher levels of population through the centre of the TfSE area, typically correlating with towns or cities, there is a clear pattern of higher population density around the periphery of London, including areas, such as Medway, Dartford, Reading, Spelthorne and Slough. Higher population densities in these areas indicate a strong demand for goods. Integrating waterborne freight into the existing transportation network in these areas through IWW could support carbon reductions, and associated benefits such as improving air quality, and alleviate congestion both within the TfSE area and London.

Figure 2-1: Population Density. Source: (ONS, 2020) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].



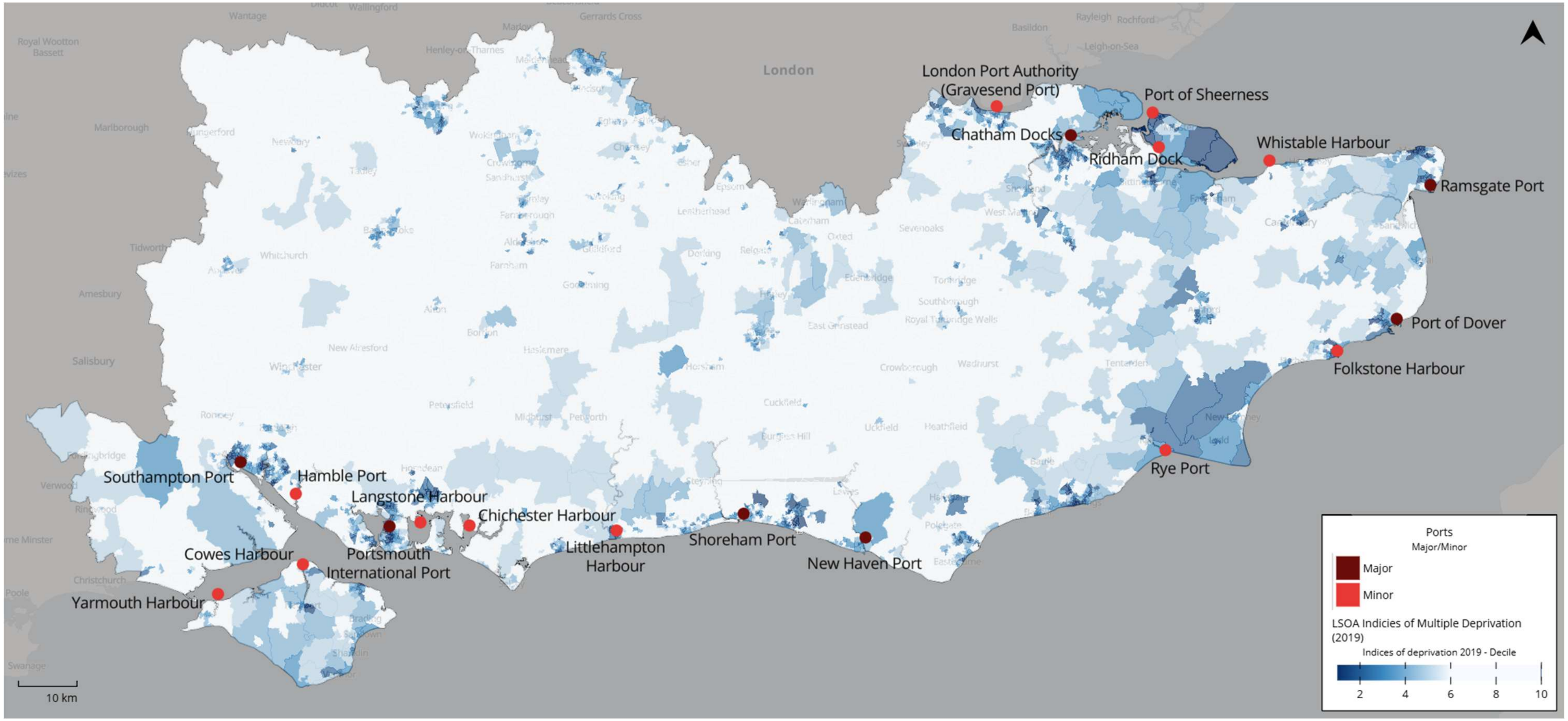
2.2.2 Deprivation

Deprivation is a key socio-economic characteristic that captures the multi-dimensional aspects of poverty and inequality within a population. Understanding local deprivation levels can support the identification of areas that could economically benefit from waterborne freight expansion, such as through stimulating the local coastal economy and providing additional job opportunities.

Figure 2-2 displays LSOA-level deprivation rankings (MHCLG, 2019) within the TfSE area alongside the locations of key port infrastructure (see Section 2.5.1 for further detail). The deprivation rankings are a nationally published dataset which rank LSOAs according to deprivation based on a range of metrics, such as income, employment, health, deprivation and disability, education, skills and training, crime, barriers to housing services and living environment. LSOAs are ranked within 10 equal groups (or deciles) according to their deprivation rank. Low values indicate greater levels of deprivation and are shown in dark blue, whereas high values indicate lower levels of deprivation and are shown in pale blue.

Large areas of TfSE contain LSOAs which are amongst the least deprived in the country, however there are some LSOAs which have high levels of deprivation, and these tend to be concentrated on the coast with many port locations coinciding with these pockets of greater deprivation. Introducing increased waterborne freight movements and the associated regeneration, such as port infrastructure and job creation, could help alleviative deprivation in these communities. This economic uplift could contribute to improved living standards, reduced poverty, and enhanced social outcomes for residents.

Figure 2-2: Indices of Multiple Deprivation (2019) Decile & Ports. Sources: (MHCLG, 2019), (UK-Ports, 2023) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].



2.2.3 Employment & Business

Expanding waterborne freight necessitates a skilled workforce with expertise and knowledge in elements, such as logistics, cargo handling, and port management. While population density offers an indication of the volume and distribution of the potential labour pool and deprivation levels highlight where economic stimulation could benefit communities, examining specific workforce categories provides a more nuanced understanding of the available expertise needed for expansion.

To explore the availability of relevant sectors and skills, the Business Register and Employment Survey (BRES) (ONS, 2022b) was sampled. The BRES provides data on the employment with geographical areas, segmented by industry classification. The following classifications were selected:

- Sea and Costal Freight Water Transport.
- Inland Freight Water Transport.
- Operation of Warehousing and Storage Facilities for Water Transport Activities.
- Service Activities Incidental to Water Transportation.
- Cargo Handling for Water Transport Activities.

Across all these categories, the total workforce within the TfSE area is 6,785 employees – this is approximately 0.2% of all employees in the area. Figure 2-3 displays this information spatially, outlining the total relevant workforce (as defined by the five relevant work categories above) per LSOA and their proximity to major or minor port infrastructure. Major ports are defined as those with cargo volumes of at least 1 million tonnes annually (DfT, 2023h). There are clear concentrations of activity surrounding port infrastructure in the Solent (Southampton and Portsmouth) and the Isle of Wight, as well as around the Thames Gateway and Medway. Some major port infrastructure, such as Shoreham and Newhaven Port are supported by smaller workforce populations.

In addition, there are pockets of skills inland, including north of Ashford, which could potentially coincide with supporting freight services, such as warehousing and logistics. These inland areas may play a crucial role in the broader supply chain, offering strategic locations for distribution centres that alleviate pressure on port-side operations.

Figure 2-3: Total Relevant Workforce per LSOA within TfSE Area. Source: (ONS, 2022b) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].

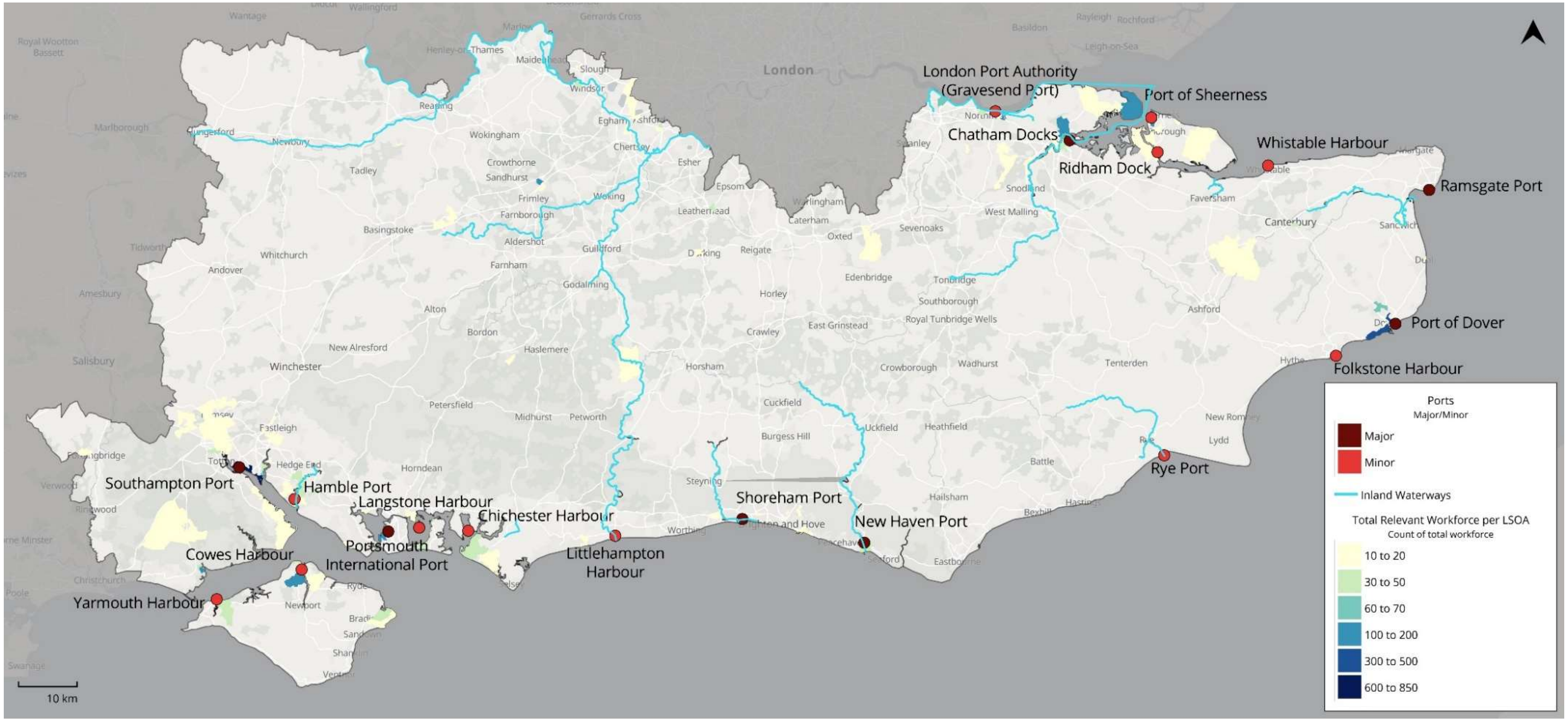


Table 2-1 outlines the total workforce within the TfSE area that is within a 5 km radius of port infrastructure. This proximity suggests a significant portion of the workforce is conveniently located to support port operations, potentially enhancing the efficiency and responsiveness of waterborne logistics and freight activities, such as reducing commuting distance. The high concentration of employees near the ports, such as Southampton, Dover, Cowes and Portsmouth, also underscores the strategic advantage of building on local skills for expanding waterborne freight capabilities within the area.

However, the dataset also highlights areas that may require additional support to promote and expand skills, ensuring the labour force is sufficiently prepared for any potential increase in waterborne activities. This could include locations, such as Ramsgate, Yarmouth, Chichester, Whitstable and Littlehampton, which all observe less than 100 employees within a 5 km radius.

Table 2-1: Ports (TfSE and Wider Area) & Total Workforce within 5 km Radius

Port Name	Waterborne Related Workforce within 5 km radius
Southampton Port	2,400
Port of Dover	920
London Port Authority	510
Port of Portsmouth	440
Port of Sheerness	340
Cowes Harbour	250
Ridham Docks	240
Langstone Harbour	230
Chatham Docks	220
Hamble Port	205
Shoreham Port	130
Newhaven Port	100
Ramsgate Port	70
Yarmouth Harbour	50
Chichester Harbour	40
Whitstable Harbour	20
Littlehampton Harbour	10

2.3 Transport Network

Waterborne freight does not operate in isolation; it requires efficient connections to other modes of transport to complete the logistics chain. Exploring existing transport infrastructure provision, such as the highways, rail, airports and warehouses, provides essential insights into where waterborne freight can complement existing transportation modes and alleviate pressure on road networks. More broadly, it can also provide insights into overall market accessibility and economic development opportunities.

2.3.1 Road Network

The Strategic Road Network (SRN) and the Major Road Network (MRN) are crucial for the movement of goods, providing accessibility to and from ports from inland destinations. The TfSE area is served extensively by the SRN (managed by National Highways), and the MRN (managed by the Local Transport Authorities). Collectively these form the backbone of the area's transport network. However, the transportation of goods often also involves numerous trucks and delivery vehicles, such as HGVs, which are major contributors to traffic congestion and pollution, as well as overall traffic volumes. By transporting goods via IWW or coastal routes, waterborne freight can significantly decrease the number of HGVs on the road, therefore alleviating congestion and reducing emissions. This is demonstrated well by the Cross River Partnership's work on their London Light Freight River Trial started in 2023(see Table 2-2).

Table 2-2: Waterborne Efficiency & Mitigating HGV Impacts Case Study

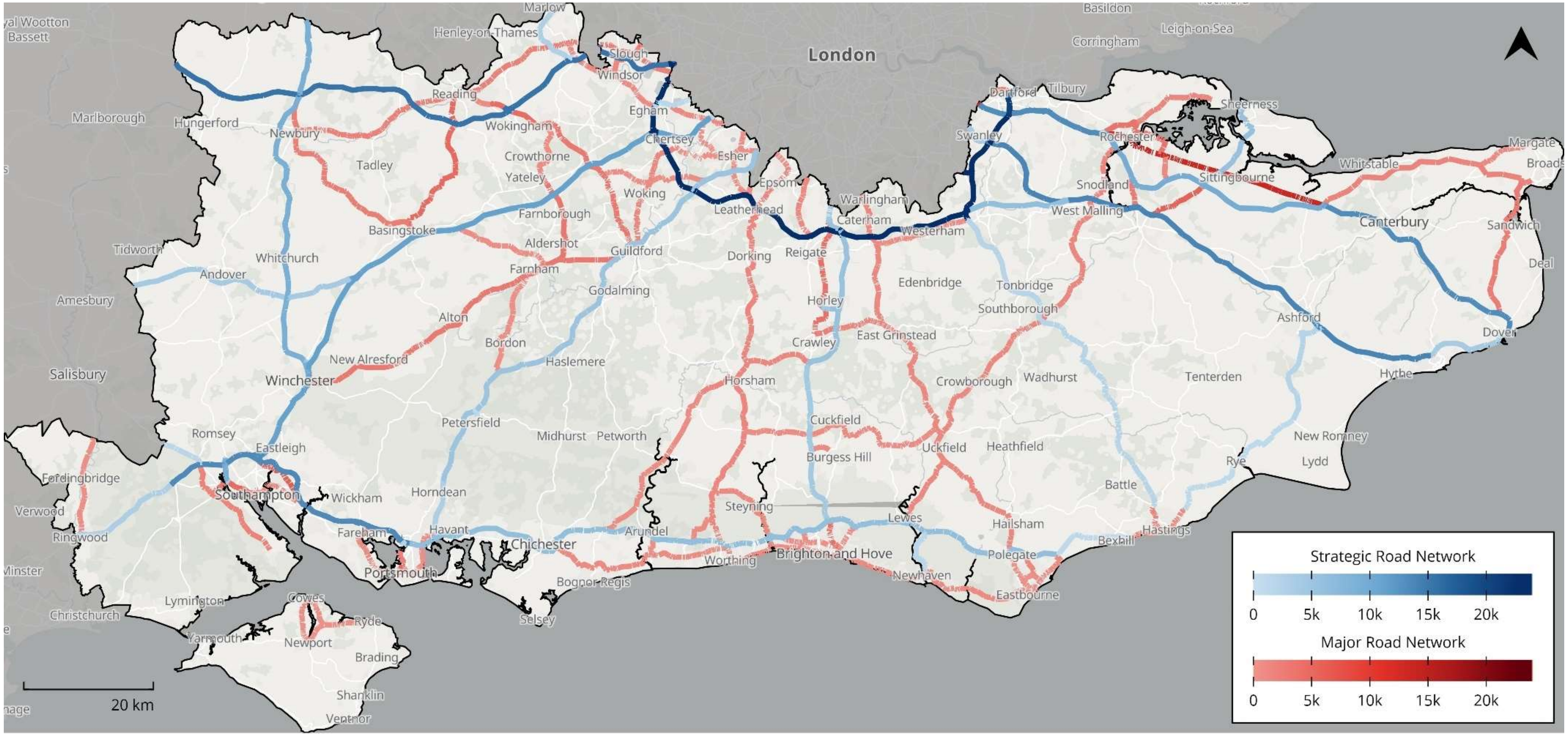
Case Study – Waterborne Efficiency & Mitigating HGV Impacts	
Key Stakeholders	
Dates	2023 – ongoing
Location	Dartford & London
Background	The Cross River Partnership has recently launched the London Light Freight River Trial, a significant initiative under the Defra-funded Clean Air Logistics for London project. Collaborating with key partners, such as the Port of London Authority, Lyreco UK & Ireland, Speedy Services, Thames Clippers Logistics, Grid Smarter Cities, and Pedal Me, the trial aims to showcase the River Thame's potential to facilitate rapid, efficient, and environmentally sustainable deliveries for the next-day delivery market, including return deliveries. Sustainable and low carbon transport modes have also been integrated into the trial, with goods being transported by cargo bikes and electric vehicles to the final destination.

Case Study – Waterborne Efficiency & Mitigating HGV Impacts	
Outcome	The study highlights the significant environmental benefits of utilising the River Thames and waterborne freight transport, noting that it emits less than half the carbon compared to road transport. Previous trials revealed staggering reductions of 78% in NO_x and 88% in CO_2 emissions compared to conventional road-based delivery methods. These reductions are primarily due to shorter journey mileage along the river and the displacement of diesel vehicles. For example, Lyreco UK & Ireland has successfully reduced its delivery vehicles on the roads, contributing to lower congestion and air pollution. However, the study highlights that if all road vehicles were fully electric, the environmental benefits regarding NO_x and CO_2 diminish. Despite this, particulate emissions would still be reduced. Additionally, fully electric HGVs are not currently mainstream due to their high cost.

Figure 2-4 illustrates 2022 HGV average annual traffic volumes on the MRN and SRN (DfT, 2022b). It identifies the busiest routes, based on traffic flows, as the M4 and M5 near Greater London. Significant traffic volumes are also observed on the M27 around Southampton and the A34 near Winchester, which provides a vital link that connects Hampshire to the Midlands and beyond. Other key routes are also identified that serve Dover, such as M20, M2 and A2. Dover is one of the UK's busiest ports, serving over 6 million passenger movements and 18 million tonnes of cargo in 2022 and is also one of Europe's busiest ferry ports, providing a vital international gateway for the movement of people and goods.

There is an opportunity for waterborne freight to reduce HGV movements on the road network within the TfSE area through offering an alternative route and transport mode for transporting freight. This could include rerouting goods by sea along the coast to support port-to-port journeys and through nearby IWWs, such as the River Medway. However, implementing this opportunity could potentially exacerbate congestion on the road networks surrounding port areas through creating, displacing and diverting road vehicle movements to these locations, such as from additional employees commuting and unloading, reloading and transferring increased levels of goods.

Figure 2-4: All HGV flows on SRN & MRN. Source: (DfT, 2022b) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].



2.3.2 Rail Network

Rail freight plays a vital role in transporting goods, accounting for 7% of domestic freight moved and 22% of inter-modal road freight journeys in 2022 (DfT, 2023i). The rail network provides critical transfer points, such as interchanges, for goods moving between ports and inland destinations as well as connecting directly to ports to support the loading and uploading of cargo from ships to trains.

2.3.2.1 Rail Freight Interchanges

Rail Freight Interchanges (RFIs) are facilities where cargo is transferred between different modes of transport, particularly between rail or road or rail and waterborne freight. RFIs are particularly suitable for bulky items that are less suitable for transportation by road due to weight and/or size, such as construction materials, industrial waste and bulk liquids, such as oil. As shown in Section 1.6, these goods are also often highly suitable for carrying by waterborne vehicles. This highlights the opportunity for connecting rail and waterborne freight transport. RFIs can also be used to transfer containerised goods between rail and waterborne, such as at the port of Southampton as part of DP World's modal shift programme (DP World, 2023). There is the potential to reduce HGV freight by simultaneously increasing the use of rail and waterborne freight – facilitated by increased connection between the two. Despite having good rail network coverage, the TfSE area only hosts three RFIs that are concentrated in and around the Solent, Southampton and Portsmouth, and the Medway Ports. There are three more RFI's north of the Thames Estuary however, these are outside of the TfSE area. Beyond these RFIs, rail connectivity between and at ports is largely limited, focusing on routes in and out of London. Exploring new avenues or routes to promote rail connectivity, could enhance the efficiency and competitiveness of waterborne freight provision. Considerations for developing capacity at existing RFIs include the cost of new infrastructure (rail tracks or terminals) and navigational constraints along IWW (ensuring sufficient depth and width for vessels to navigate effectively).

2.3.2.2 High Speed One

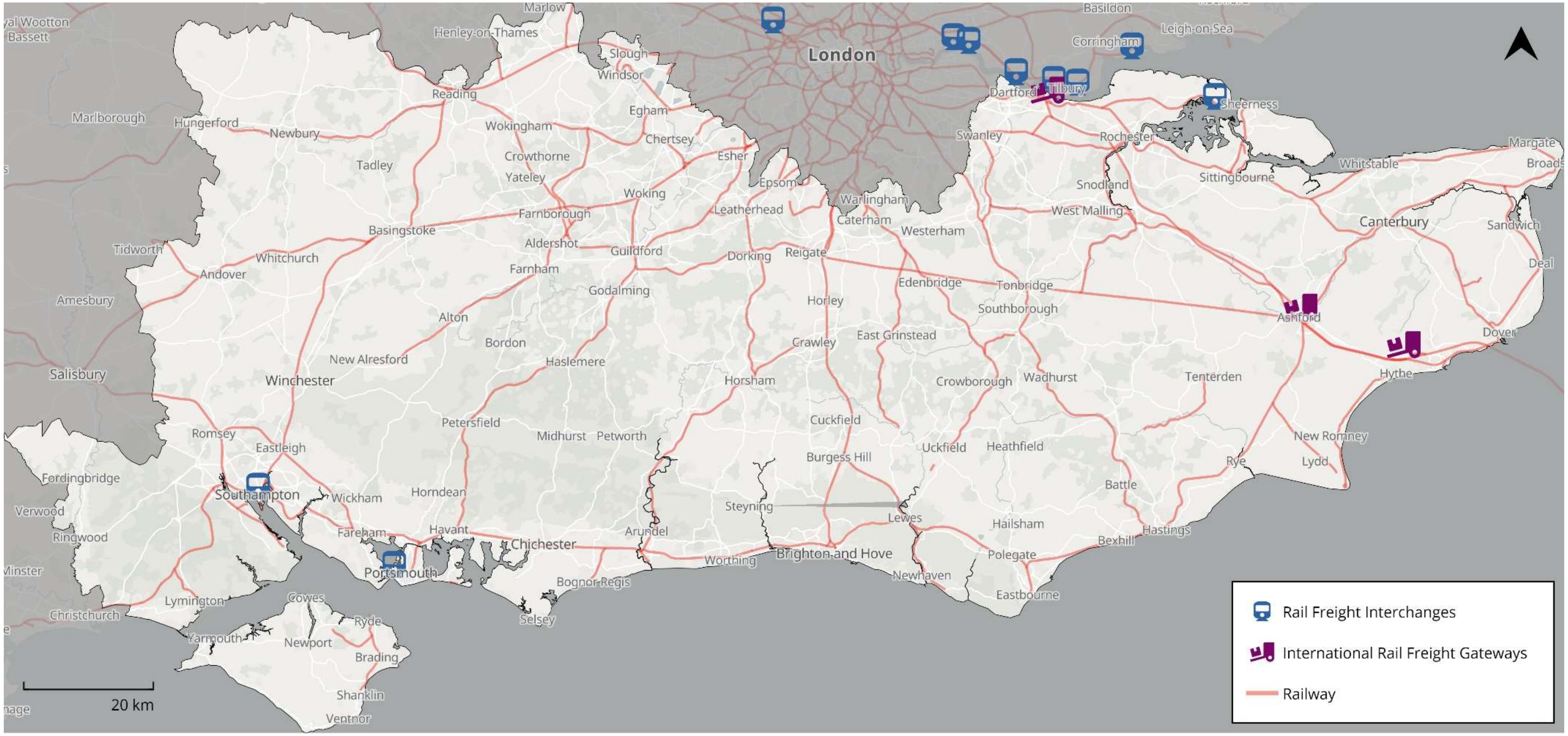
The TfSE area is home to the only high-speed rail link in the UK, High Speed 1 (HS1), which connects London with the Channel Tunnel, acting as a vital link for the movement of goods and people from the UK to mainland Europe. Of the 360 million tonnes of freight traded with the UK in 2021, over 14 million tonnes (4%) were transported through this link (DfT, 2022g). Along HS1, there are three international RFIs providing access to Europe via the Channel Tunnel Rail Link, which includes stations at Ebbsfleet International, Ashford International and Folkestone International. Since its opening in 1994, the Channel Tunnel has remained the quickest route for passengers and freight to mainland Europe. However, rail freight from Europe faces limited opportunities for onward travel as most of the rail network between Folkstone and London has not been updated since the early 1990s. It is therefore unable to accommodate standard European freight containers and wagons (Logistics UK, 2023). Potential solutions include track lowering, minor alterations to various structures and light track works to achieve the correct track gauge clearance to enable exchangeable freight containers to pass through (Logistics UK, 2023).

2.3.2.3 Future Growth

Figure 2-5 highlights that there is good rail network coverage in the TfSE area. Major lines used for freight include the South Eastern Line connecting London with Dover, Canterbury, Ashford and Folkstone; Brighton Main Line and South Western Main Line connecting London with towns, such as Guildford, Woking and Basingstoke. At a national level, there is growing momentum to boost the modal share of rail freight, with the DfT announcing ambitious targets to expand rail freight by at least 75% by 2050 (DfT, 2023g). The Rail Freight Forecasts published by Network Rail forecasts a 32% increase in tonnage moved annually in 2033, compared to 2016 levels, with intermodal freight at ports doubling (National Rail, 2020). It is worth noting that these figures do not take account of capacity constraints and assume the levels of service provided by the network in terms of end-to-end transit times remain constant, relative to the base year (2016/17). Similarly, the gauge clearance capability of the network is assumed to remain constant relative to the base year.

The rail network in the TfSE area offers the potential to contribute to an increase in the freight carried by waterborne vehicles and a decrease in the freight carried by HGVs. By connecting waterborne with rail, freight can be transferred to and from waterborne infrastructure in large quantities without the use of HGVs – extending the reach of HGV-less freight journeys away from waterborne infrastructure. However, there are challenges to realising this opportunity. The existing TfSE rail network provides essential connections between ports and inland destinations, but limitations remain such as the insufficient number and accessibility of RFIs. To maximise the potential of waterborne freight, strategic investments in rail connectivity and modernisation of facilities, such as enhancements in gauge clearance, are crucial. As national freight strategies increasingly prioritise sustainable transport options, utilising the rail network in the TfSE area could become essential for achieving these goals. Therefore, addressing existing challenges through proactive measures and infrastructural upgrades can significantly enhance the rail network's capacity to support and expand waterborne freight capabilities.

Figure 2-5: Railway, RFIs & International Rail Freight Gateways. Source: (Network Rail, 2021) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].



2.4 Warehouses

Transporting goods via waterborne freight often involves a mode or vehicle change and the storage of goods to enable them to be transported onwards to reach their destination inland. Therefore, there needs to be supporting infrastructure in place, such as warehousing, to facilitate potential expansions in waterborne freight. Warehousing provides essential infrastructure, services and logistical support, enhancing efficiency and reliability throughout the supply chain because it facilitates goods storage (dry and cold), consolidation (grouping shipments together to bring down transportation costs), and offers services, such as optimising inventory management and value-added packaging and labelling processes. Several types of warehousing land use types exist, such as:

- **Distribution Centres:** A place where finished goods are transferred from one vehicle to another in their journey to an end user.
- **Traditional Warehouses, Storage Depots & Cold Storage Warehouses:** Physical spaces designed to securely store and manage items, goods, or materials for a specified time period and specialised facilities that are equipped with refrigeration or freezing systems to store perishable goods, such as food and pharmaceuticals.
- **Liquid Bulk Storage Facilities:** Specialised facilities designed to safety store quantities of liquids, such as petroleum, chemicals, or food products, in tanks or containers.
- **Retail Warehouses:** Consumer-facing warehouses that hold significant inventories for direct purchasing by end users.
- **Place-Production Facilities:** Facilitates that produce unfinished or finished products that are likely to require use of a warehouse for temporary storage for onwards distribution.

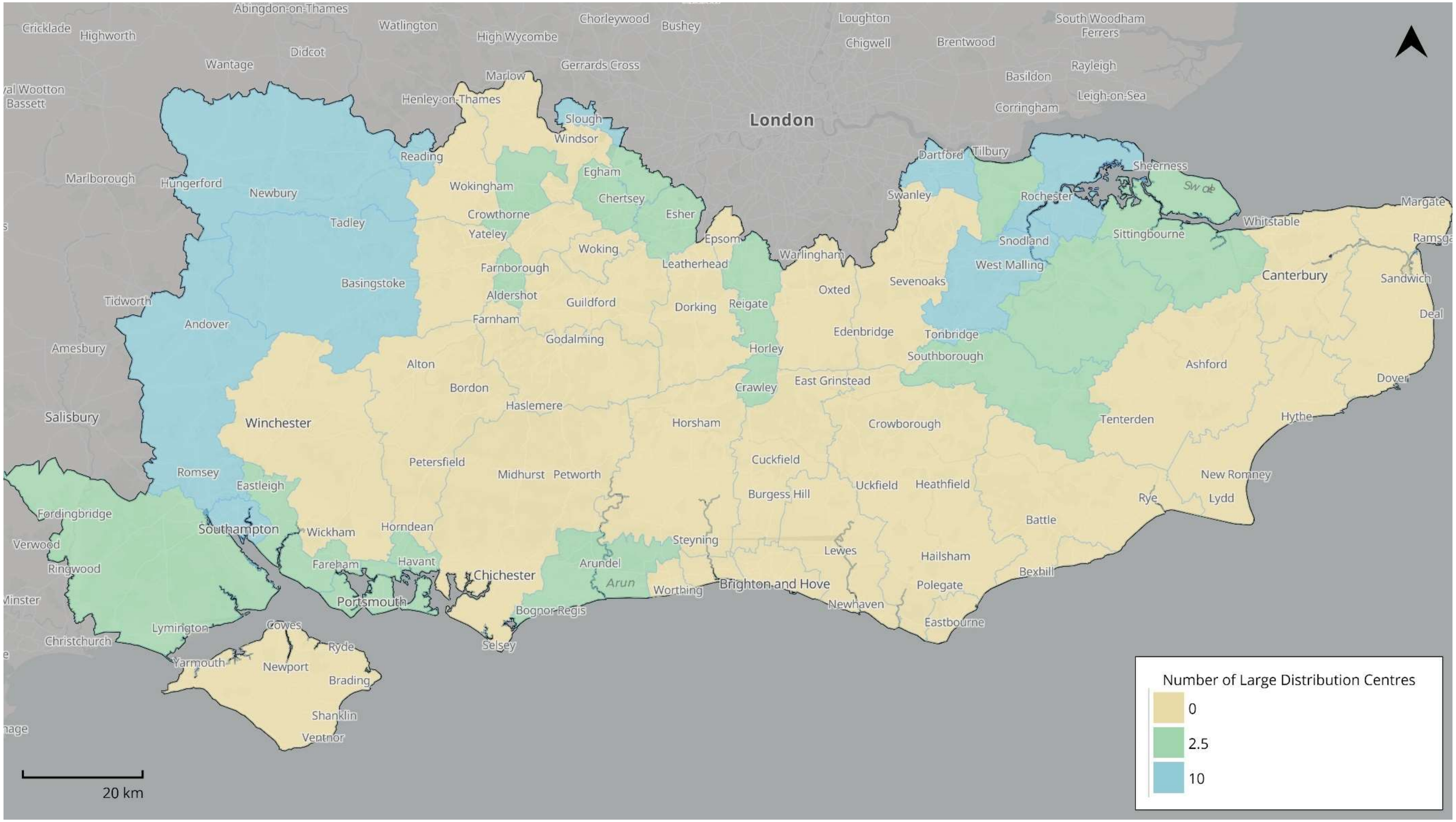
Distribution and logistics warehouses, such as distribution centres, can play a crucial role in supporting waterborne freight expansion. They can increase competitiveness by being strategically located, lever economies of scale and increase efficiencies through improved cargo handling processes. By exploring the current provision of distribution and logistics warehousing within the TfSE area, the study will identify if warehousing provision could be a possible constraint to waterborne freight expansion.

2.4.1 Distribution Centres

Figure 2-6 illustrates the number of Large Distribution Centres (LDCs) within each local authority district across the TfSE area as of 2023 (VOA, 2023). While a considerable number of local authorities have few LDCs, notable clusters emerge around the area's periphery, particularly in coastal cities and towns, such as Southampton and Portsmouth and near the River Thames.

The presence of warehouses near these locations presents an opportunity to support the storage and consolidation of goods arriving through SSS and IWW. Incoming cargo could be unloaded and stored at nearby warehouse facilities for consolidation with other shipments and to allow transfer/interchange between different transport modes. The strategic location of distribution centres near ports also fosters economic growth in the area through supporting businesses by enabling the provision and transportation of goods alongside wider employment opportunities for local communities.

Figure 2-6: Local Planning Authority-Level 2023 LDC Count. Source: (VOA, 2023) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].



However, due to the high volume of goods already passing through these locations, infrastructure availability may be limited, such as a lack of capacity at distribution centres, so more warehousing may be required to meet any future increases in demand, as waterborne freight is expanded.

Alongside specific challenges relating to waterborne expansion, as outlined in the Chapter 1, WP3 Freight Specific Infrastructure (WSP, 2021) additionally highlights key challenges that could restrict expanding warehousing provision if required, including:

- **Competing Land Uses:** Conflicts between the need for housing, commercial property, and transport infrastructure.
- **Regional Shifts:** Potential of warehousing and distribution space moving to other parts of the UK.
- **Online Retailing:** The rise of online retailing and the resulting pressure to meet increased demand for space.
- **Market Dominance:** The disproportionate influence of larger organisations that monopolise space and assets, driving up warehousing costs and creating difficulties for smaller organisations with warehousing needs.

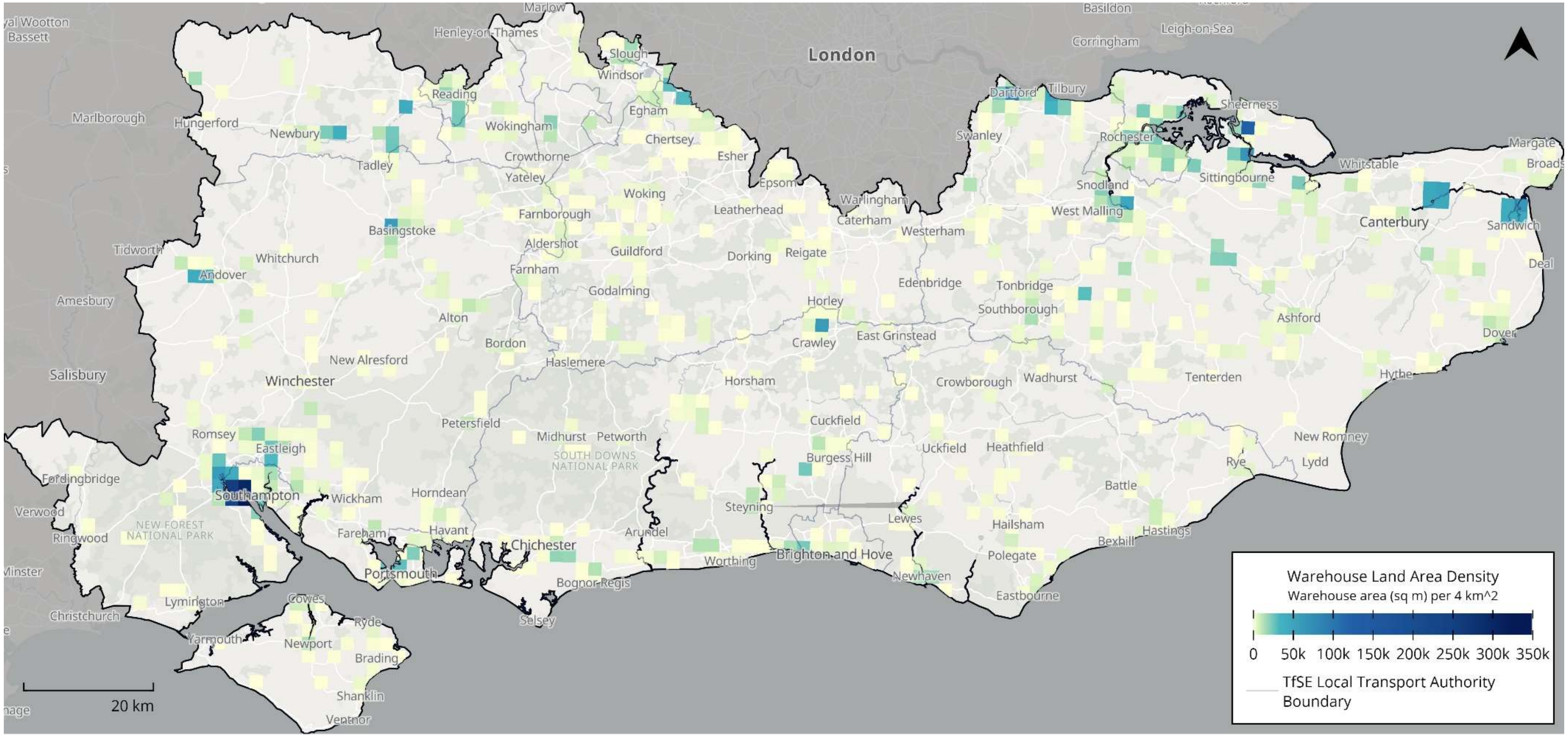
Investment in additional warehousing infrastructure is typically driven by the private sector. However, as outlined in WP5 Operational and Planning Considerations (WSP, 2022), public authorities, such as Local Planning Authorities, play a crucial role in shaping land use policy and designating land for warehousing provision. Therefore, it is essential for industry stakeholders and local authorities to collaborate, ensuring efficient identification and allocation of warehousing land and creating optimal conditions for the freight sector to operate effectively.

2.4.2 Warehousing Distribution

Figure 2-7 shows the TfSE area with a grid overlaid, providing insights into the spatial distribution of warehousing (ONS, 2023). The colour of each grid square represents the total floorspace of all the warehouses within that square. There are some areas without any warehouse provision, including more rural areas such as parts of the South Downs but a moderate distribution of warehouses in urban areas around the TfSE area's periphery, such as Sheerness and Spelthorne. Generally, grid squares that contain ports, such as Southampton, Portsmouth, Dover and Medway, can be seen to have a large amount of warehousing floorspace. Adoption of waterborne freight is likely to require warehousing in the areas surrounding ports, to accommodate the processing and sorting of goods either before or after they have been transferred by waterborne freight. This map indicates that there would likely be sufficient warehouse availability to support increased goods handling through these ports.

Although this study does not quantify land availability, Figure 2-6 and Figure 2-7 indicate that there is existing warehousing in many of the ports. These locations could provide essential infrastructure and services to enhance the efficiency and competitiveness of waterborne freight. As noted throughout this study, careful planning and investment will be necessary to address possible limitations, such as infrastructure upgrades and space constraints. For further insights into warehousing availability, please refer to the TfSE Warehousing Provision Freight Study due to be completed in Spring 2025.

Figure 2-7: Warehouse Land Area Density. Source: (ONS, 2023) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].



2.5 Waterborne Infrastructure Assessment

This section will comprehensively examine the geospatial distribution of existing waterborne infrastructure within TfSE and neighbouring areas, focusing on ports and IWWs. The goal is to determine whether there is a robust and sufficient network to support current and future waterborne freight activities. By analysing current operations, including the volume and type of sea cargo being transported, as well as infrastructure distribution and connectivity, the study will identify potential opportunities for expanding waterborne freight, building on existing activities and identifying potential expansion challenges.

2.5.1 Ports

The proximity of the area's coastline to major international shipping lanes and mainland Europe means that the TfSE area hosts numerous international gateways. Figure 2-8 illustrates the spatial distribution of port infrastructure across the TfSE area (UK-Ports, 2023), revealing a notable concentration around the Solent and Thames Estuary as well as along the south coast. Collectively the ports within the TfSE area, handle a significant proportion of the UK's cargo for both international and domestic distribution, totalling almost 69 million tonnes in 2020 (DfT, 2022c). Sea cargo is broadly segmented in the following categories as defined by the DfT (DfT, 2023d):

- **Liquid Bulk**: Liquid or liquid gas transported in a tank. Refers to the transportation of liquids, typically in large quantities, such as crude oil, petroleum products, chemicals, or liquefied natural gas. These goods are usually transported in specialised tankers.
- **Dry Bulk**: Is carried in the main cargo hold of bulk carrier vessels, for example coal, ores and scrap metal. These goods are typically transported in large quantities without packaging and are loaded directly onto vessels without the need for containers.
- **Lift-on/Lift-off (Lo-Lo)**: The method of cargo handling where goods are lifted onto and off the vessel using cranes or other lifting equipment. This method is commonly used for cargo that cannot be easily rolled on or off the vessel, such as heavy machinery or containerised cargo.
- **Roll-on/Roll-off (Ro-Ro):** Cargo that can be moved on to, or off, a vessel either by their own propulsion, such as a passenger car, or with assistance, such as an unaccompanied trailer. Ro-Ro vessels are usually equipped with specialised ramps and decks to facilitate the smooth loading and unloading of wheeled cargo.
- **General Cargo:** Refers to goods that are not categorised as liquid bulk, dry bulk, or containerised cargo and can be transported using various methods.

Using Maritime Data Statistics (DfT, 2022a), we have provided an overview of the TfSE area's main major ports below, defined as those with cargo volumes of at least 1 million tonnes annually (DfT, 2023a). This dataset does not provide a breakdown of the names and locations of ports within the UK that goods are distributed to.

- **Southampton**: The UK's second busiest container port in the UK trade (Highway Logistics , 2023) with over 31 million tonnes of cargo shipped to key destinations across Europe, North America, Asia and to other ports across the UK (DfT, 2022a). Over 60% of goods handled by the port are liquid bulk (DfT, 2022a), as well as handling over 900,000 vehicles annually making it the UK's largest automotive handling port (Associated British Ports, u.d). It is also a predominant passenger port, accommodating over 1.8 million passengers in 2022, primarily through cruise ship journeys (DfT, 2022a).
- **Portsmouth**: Handled over 2.9 million tonnes of cargo in 2022, in which nearly 70% is solely Ro-Ro vehicular based cargo (DfT, 2022a). The majority of this port's cargo transits to the EU with a smaller proportion being distributed to other UK ports (DfT, 2022a). The designation of the Solent Freeport in 2022, consisting of both the ports of Southampton and Portsmouth, as well as other inland locations, could lever in additional investment and associated port and freight-based activities (Solent Freeport, 2023). Portsmouth also accommodates large volumes of passengers, transporting over 1.2 million people in 2022, predominantly through short sea ferry trips (DfT, 2022a).
- **Medway Ports**: A number of port facilities located on the River Medway close to the Thames Estuary including Sheerness, Isle of Grain (including Thamesport), Chatham Docks, Ridham Dock, Otterham, Rochester, Queenborough, Oakham Ness and Kingsnorth Power Station. Collectively they form a major cargo hub on the eastern coast of the TfSE area which handled nearly 13.5 million tonnes of cargo in 2022 (DfT, 2022a). The majority of the goods handled are liquid and dry bulk, which are transported to North America, the EU and to other ports across the UK (DfT, 2022a).
- **Shoreham**: Solely a cargo port, handling nearly 1.6 million tonnes of cargo in 2022 of which 75% is dry bulk (DfT, 2022a). The majority of its cargo is distributed to other ports across the UK and the remainder is transported to the EU (DfT, 2022a).
- **Newhaven**: This port handled 1.1 million tonnes of cargo in 2022, broadly split between dry bulk and Ro-Ro (DfT, 2022a). The overwhelming majority of the port's cargo is either distributed to the EU or to other ports across the UK (DfT, 2022a). Nearly 0.4 million passengers' transit through the port annually, predominantly associated with short sea (ferry) movements (DfT, 2022a).
- **Dover**: As the principal cross-channel gateway to mainland Europe, this port handled over 18 million tonnes of cargo in 2022 in which over 95% is Ro-Ro – making it the largest Ro-Ro port globally (DfT, 2022a). The port also accommodated over 6.5 million passengers in the same year, the overwhelming majority being short-sea passengers to mainland Europe (DfT, 2022a).

As well as several major ports, the TfSE area is supported by various minor ports. These include Sheerness and Ridham (Swale), Gravesham (Port of London Authority) and Littlehampton (Arun). With pre-existing infrastructure in place, these sites could be optimal locations to explore potential expansion opportunities at a more localised level.

Certain minor ports hold historical significance in waterborne freight provision, such as Rye Port (Rother) and Folkestone (Folkestone & Hythe). Despite their historical importance, their relevance in the area has diminished over time due to shifts in trade routes, exemplified by developments like the Dartford Tunnel and the rise of larger port facilities. These locations present an opportunity to reassess freight traffic distribution to alleviate congestion and increase supply chain resilience using these historically significant routes.

On a broader scale, the port infrastructure within the TfSE area serves as a vital catalyst for the coastal economy, offering a diverse array of leisure boating, sailing events and services as well as acting as hubs for commercial, industrial and employment activity. Ports of this broader nature include Hamble (Fareham), Cowes (Isle of Wight), Whitstable (Canterbury), Langstone Harbour (Portsmouth), and Chichester (Chichester).

Figure 2-8: Major & Minor Port Locations in the TfSE Area. Source: (UK-Ports, 2023) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].

2.5.2 Neighbouring Port Infrastructure & Connectivity

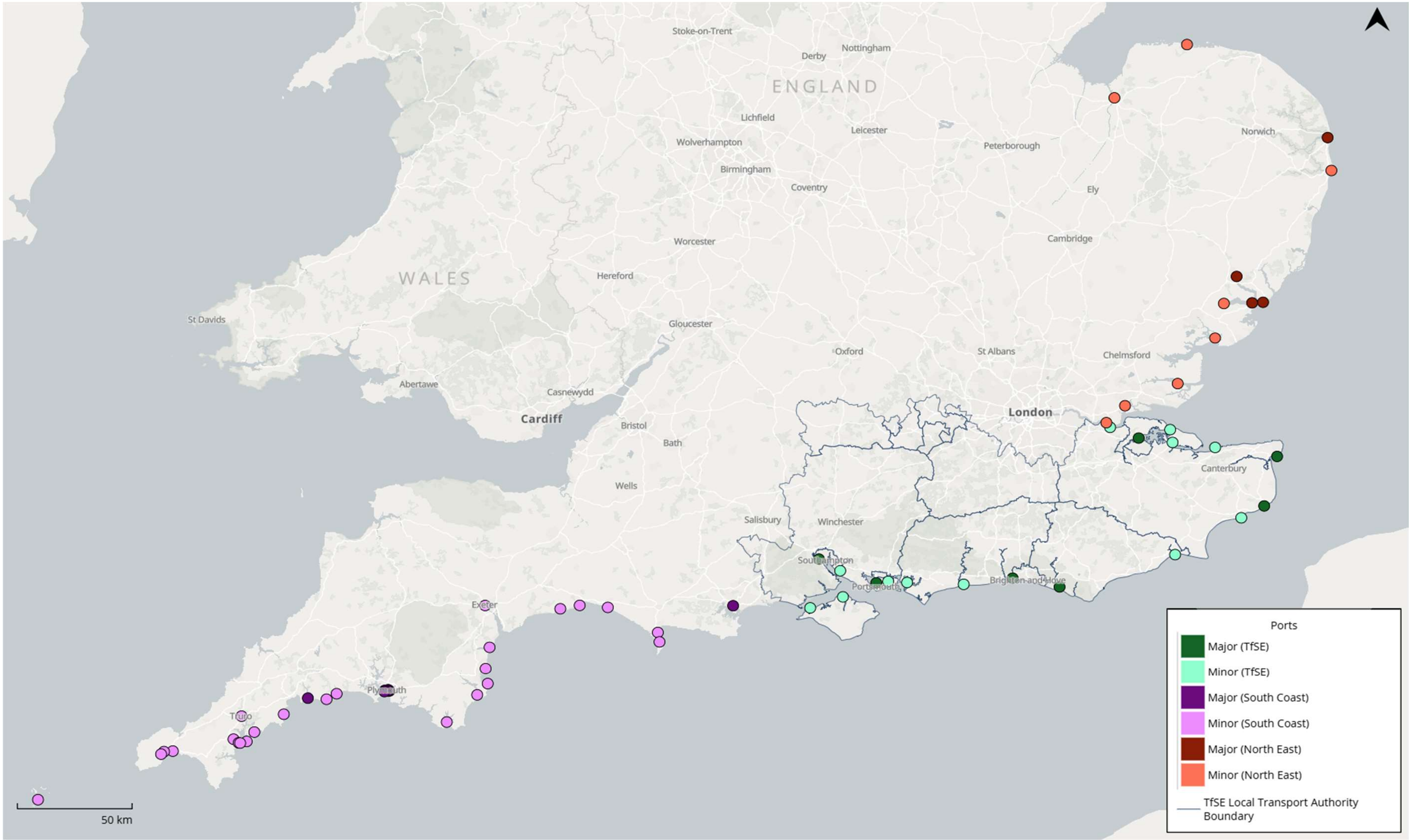
Waterborne freight inherently involves movement across various geographic and administrative boundaries. For example, a shipment might originate from a port in one region and be offloaded at a port in another, such as the Dover to Thames Gateway, which is a vital corridor for goods entering the UK due to Dover's proximity to mainland Europe, making it the closest UK port for European imports. Due to the dynamic and cross-boundary nature of waterborne freight, it is important to explore the port infrastructure located within neighbouring areas to the TfSE area to fully capitalise on regional capabilities and ensure that there is the necessary port infrastructure to receive any increases in cargo volumes generated by ports in the TfSE area.

Figure 2-9 identifies ports within the surrounding areas to TfSE, outlining high levels of major and minor port infrastructure and extensive coverage and capacity for waterborne freight operations. This includes 11 major ports with notable clusters, particularly around Plymouth and Felixstowe, which align with recently designated Freeport status (e.g. Freeport East and Plymouth and South Devon Freeport). Concentrated port activity in these areas signifies strategic hubs for cargo movement due to operational synergies, network efficiency due to higher density of transport links and fostering an environment of economic growth and innovation. This highlights several potential synergies and collaboration opportunities between ports in other neighbouring areas including:

- **Port of London Authority (including London Gateway & Port of Tilbury) & Sheerness:** The Port of London Authority manages several ports along the River Thames, including London Gateway and Port of Tilbury, which is in the Transport East (TE) area, while Sheerness in the TfSE area is also located in the Thames Estuary. Collaboration between these ports can enhance connectivity within the Thames Estuary, optimise navigation channels, and facilitate trade between TfSE and TE areas. To maximise success, joint efforts to develop navigational and transport infrastructure and dredging projects to accommodate larger vessels may be necessary, as well as successfully coordinating logistics solutions for efficient cargo movement along the Thames corridor.
- **Plymouth & Southampton:** Plymouth handled 2 million tonnes of freight in 2022, with almost half of this route to other locations in the UK. Liquid and dry bulk goods dominate the cargo mix, reflecting 1.1 million tonnes at 0.9 million tonnes respectively. Plymouth (located on the South Coast) and Southampton (one of the UK's busiest ports) could collaborate to strengthen maritime connectivity along the English Channel. Collaboration between Plymouth and Southampton can facilitate the exchange of best practices, optimise shipping routes, and enhance trade links with international markets.
- **Felixstowe & Thames Estuary:** The Port of Felixstowe on the east coast is the UK's largest container port, transporting approximately 22 million tonnes of cargo to Asia and Europe (DfT, 2022c). This is predominantly Lo-Lo cargo (18.3 million tonnes). By forging partnerships with ports located in and around the Thames Estuary (Sheerness and Medway), Felixstowe can play a pivotal role in streamlining the transportation of goods from London to international markets,

unlocking immense potential. In parallel, this could alleviate congestion in and around London as well as leverage the existing capacity of the River Thames.

Figure 2-9: Key Strategic Ports in the TfSE Area & Other Port Locations (TfSE & Wider Area). Source: (UK-Ports, 2023) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].



2.5.3 Inland Waterways

Figure 2-10 outlines the IWW routes within the TfSE area, highlighting limited and fragmented provision. However, three maritime waterways are currently used for IWW traffic including the River Medway, the River Ramsgate to the North East and Southampton Water in the South. These maritime waterways allow the transportation of freight over a relatively short-distance and do not connect to wider regions. There are currently very low levels of internal freight moved through IWW channels in the South East, however the River Medway stands out as a significant watercourse (outside of the River Thames) that currently supports waterborne freight movements (DfT, 2022f).

Figure 2-11 outlines that, although some waterways appear to provide routes across the TfSE area, they are currently undergoing restoration (Wey & Arun Canal in West Sussex and parts of the River Ouse). Waterway restoration initiatives (alterations to a canal or river to improve navigability) could be prioritised to improve connectivity to inland areas, such as Reading, Slough, Redhill, Sevenoaks and Maidstone. However, this may be costly and will require detailed surveys to understand if the network can accommodate appropriate vessel sizes.

Similar to port infrastructure, it is imperative to assess the availability of IWW outside of the immediate TfSE area to gain a holistic and comprehensive perspective on potential routes for waterborne freight expansion. Figure 2-12 illustrates the IWW network across the TfSE area and the neighbouring area, revealing current levels of fragmented infrastructure with a significant trunk route flowing from west to east. Moreover, several routes connect the TfSE area with neighbouring areas, such as the Grand Union Canal and the River Thames linking to Greater London, and the Kennet and Avon Canal connecting to the South West. Notably, the River Thames handled the majority (52%) of the UK's IWW freight in 2022 (DfT, 2023b), indicating the potential to coordinate activities and alleviate congestion within Greater London by optimising or increasing services along the River Thames in collaboration with the Port of London Authority (see work conducted by the Cross River Partnership in Table 2-2 for further detail).

Figure 2-10: Map of IWW within the TfSE Area. Source: (IWA, 2023) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].

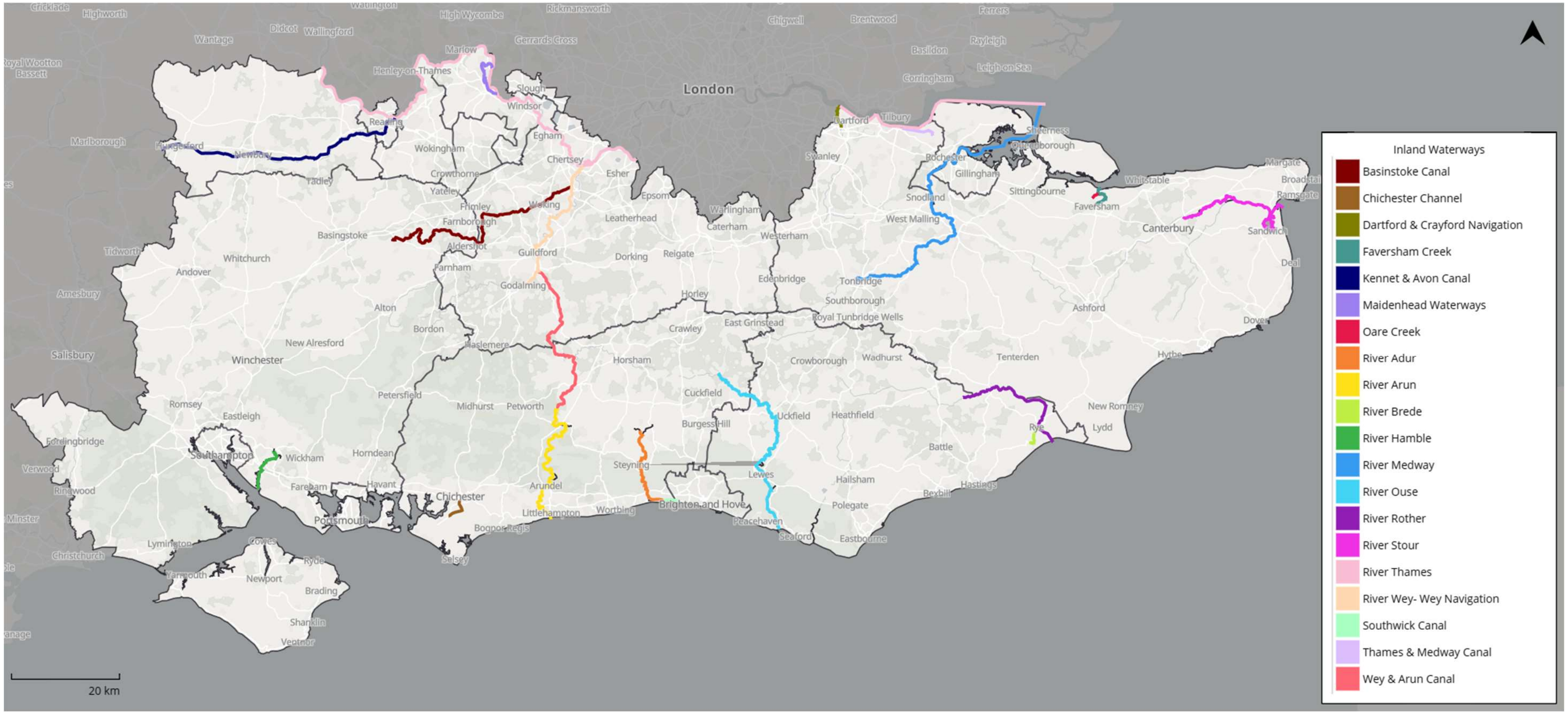
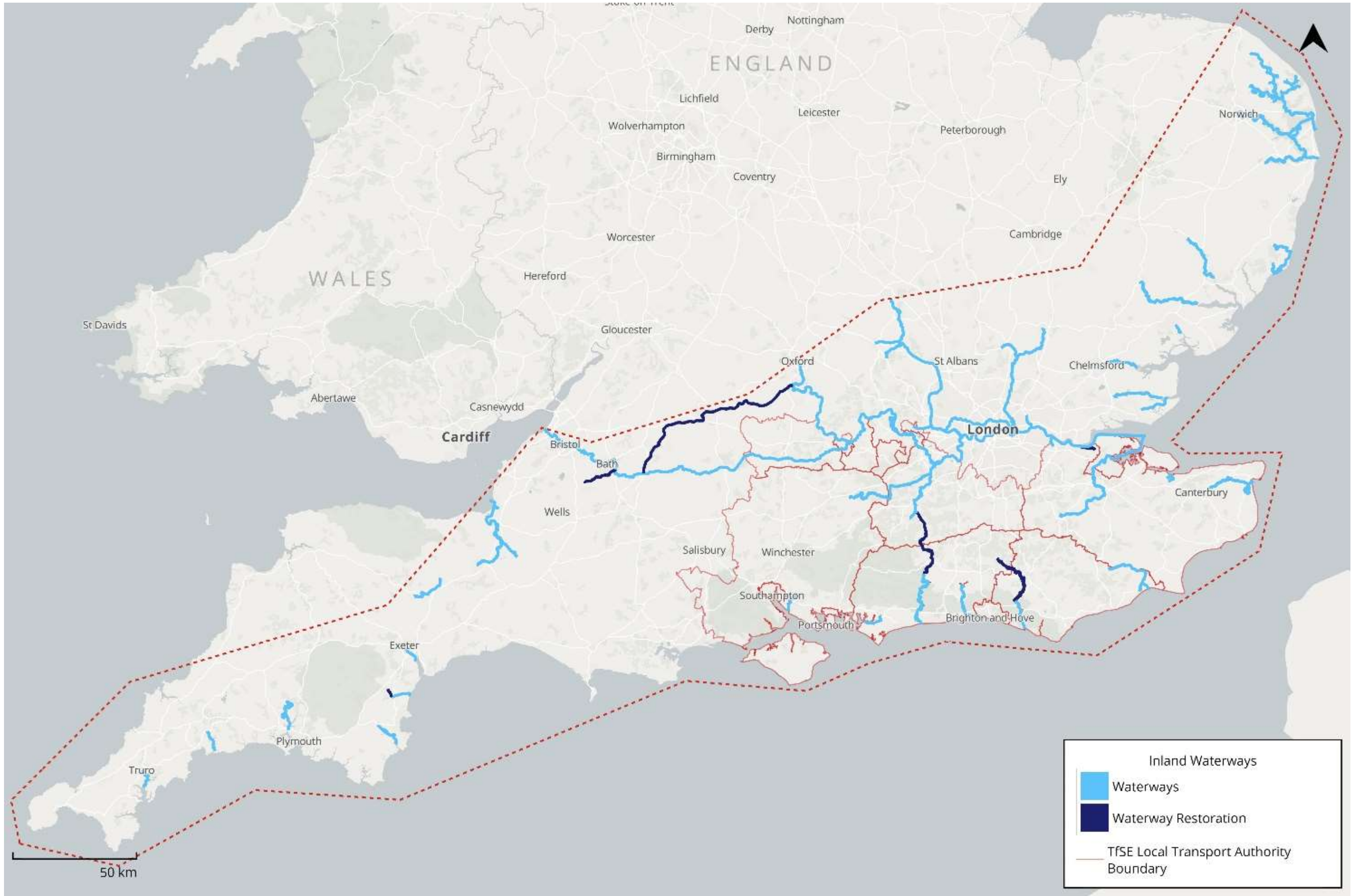


Figure 2-11: Map of IWW in the TfSE Area Undergoing Restoration. Source: (IWA, 2023) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].

Figure 2-12: Map of IWW within the TfSE Area (Solid Red Line) and Neighbouring Areas (Dotted Red Line). Source: (IWA, 2023) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].



2.6 Conclusion & Key Chapter Findings

This chapter has offered a comprehensive overview of the TfSE region's socio-economic landscape, infrastructure, geographical features, and connectivity with neighbouring areas, all of which influence the region's potential for expanding waterborne freight. While it does not directly address the study's core questions, it has 'set the scene' for the remainder of the study, ensuring that recommendations are grounded in the local context. Key chapter findings include:

- **Congestion Relief:** The TfSE area is served extensively by the SRN and MRN which experience high levels of HGV traffic flows on roads, such as the M4, M5, A27, A34 and M20. Given the heavy utilisation of highways by HGV traffic, particularly along coastal routes and radial routes around London, exploring the redistribution of some road freight to waterways could significantly relieve congestion on these critical corridors. However, such measures may concurrently heighten congestion around port and IWW locations.
- **Vibrant Port Activity:** The extensive presence of both major and minor ports within the TfSE area already supports a vibrant maritime economy equipped with the required workforce skills and infrastructure (cargo handling equipment, berths and quays, storage facilities and terminals) to facilitate the expansion of waterborne freight activities on both local and regional scales. Building-on current activity could stimulate economic growth, new jobs and investment in the local economy.
- **Reassessing Freight Distribution**: Several minor ports hold a historical significance in waterborne freight provision, such as Rye Port (Rother) and Folkestone (Folkestone & Hythe). These locations present an opportunity to reassess freight traffic distribution to alleviate congestion and enhance supply chain resilience by utilising previously established routes and infrastructure.
- **Warehousing Capacity:** The ports within the TfSE area have good access to warehousing facilities. However, due to the high volume of goods already passing through these locations, infrastructure availability may be limited. A lack of existing warehousing capacity may mean that more warehouses are required.
- **SSS Expansion:** Coastal hubs like Southampton, Portsmouth, Newhaven, and Dover, boast access to major ports, warehousing infrastructure, and dense populations, providing well suited locations to explore intercoastal SSS initiatives within the UK and England.

- **Enhancing Existing IWW Capacity:** Despite the limited and fragmented overall nature of IWW infrastructure across the TfSE and wider areas, strategic opportunities could be seized along heavily utilised routes such as the River Medway. These opportunities could include upgrading navigation channels and building additional terminals. Building capacity in these key areas could unlock potential for IWW traffic expansion. However, additional work may be required, such as dredging to increase navigability. In contrast, opportunities for IWW expansion from South to North are likely to be constrained due to the extent of waterway restoration efforts required.
- **Logistics Chain & Waterborne Freight**: Whilst the TfSE area boasts a significant amount of waterborne freight infrastructure, it is important to note that there are still large areas, particularly inland regions, that lack access to these waterborne routes and facilities. This means that for many logistics chains, completing the entire journey via waterborne freight is not feasible. However, waterborne freight can still be used to replace certain parts of the overall logistics chain. For a logistics chain with waterborne modes to be a viable option, it must be cost-effective, meaning it should be cheaper than any existing land-based chain. This is typically the case in two scenarios: firstly, when the logistics chain already includes routes that connect places with waterborne infrastructure and, secondly, when the land-based route is long. In the latter case, the cost of transporting the freight to the waterborne infrastructure could be offset by the savings gained from transporting goods over long distances in bulk.

Many populated areas in the TfSE region are near the coast and substantial ports. Many of these locations are well supported by the infrastructure required for waterborne freight, raising the potential for transferring freight between these places from road to waterborne modes. However, there are also substantial populations within the TfSE area, and beyond, which are inland and not near to any waterborne freight infrastructure (e.g. canals). Based on current infrastructure, waterborne would not be a suitable replacement for many of these inland freight journeys within the TfSE area.

While this analysis provides a strong foundational understanding of the region's characteristics, it does not yet offer detailed insights into the specific volumes and types of goods being transported. To address this, the next chapter builds on these findings by identifying which goods, and in what quantities, could be feasibly shifted from road to waterborne freight.

3 Chapter Three - Freight Movements

3.1 Overview

Section 1.6 has shown that, nationally, the majority of freight is carried by HGVs and so there is potential opportunity to shift freight to waterborne modes. As highlighted in Chapter 2, the TfSE area already boasts the necessary transport networks, major international gateways and necessary infrastructure to facilitate a potential expansion in SSS. However, opportunities for IWW opportunities may be constrained by the navigability of waterways for modern vessels. In this Chapter, we outline historical and current goods movements across HGVs, ports and along IWWs to understand current freight flows across the TfSE area and how an increase in waterborne freight may be able to support these patterns. This analysis includes identifying the types of goods being transported, the methods of transportation, and the origins and destination of these goods. This will enable us to determine which types of goods, and in what volumes, could potentially be shifted from HGVs to waterborne freight.

3.2 Methodology

To investigate the potential for modal shift of freight from HGVs to waterborne it is important to quantify:

- The amount of freight carried by HGVs which might be suitable for modal shift. To assess this requires an understanding of the type and volume of goods being carried by HGVs as well as its origin and destination.
- The amount of freight already handled by SSS and IWW infrastructure. To assess this requires an understanding of the amount of goods handled by port infrastructure and carried along IWW.

There is no single dataset available to inform this study. Consequently, four separate datasets have been analysed to investigate each of the aspects. These datasets are outlined in Table 3-1 along with the methodology applied for each analysis. The following subsections will outline the findings.

Table 3-1: TfSE Area Freight Movement Analysis Methodologies

Dataset	About	Methodology
HGV Freight Loaded & Unloaded	Tonnage of goods loaded and unloaded on to HGVs	We have analysed data on the quantities of goods picked up and dropped off by HGVs (EU, 2023), segmented by the good type. We selected and aggregated the data, whose reporting area aligned with the TfSE boundary. This provided the quantity of goods loaded and unloaded on to HGVs within the TfSE area.
HGV Freight Flows	Tonnage of goods transported	We have analysed the origin-destination pairings of goods carried by HGVs,

Dataset	About	Methodology
	between origin-destination pairs	aggregated for specific 'goods lifted' values (DfT, 2023f) to specific areas of relevance.
Waterborne Vehicle Freight Loading & Unloading	Tonnage of goods handled at each of ports within the TfSE area.	We have analysed the quantities of different cargo types loaded and unloaded at each of the ports within the TfSE area (DfT, 2023e). Loaded and unloaded quantities have been combined.
IWW Freight Quantities	Goods moved along IWW within the TfSE's area.	The reported tonnage of goods carried by IWW is presented for IWWs within the TfSE area (DfT, 2023e).

Throughout this analysis, datasets have been utilised that provide values for geographical areas, which are a disaggregation of the TfSE area. Key boundaries used for the disaggregation are those defined by the International Territorial Levels (ITLs) – ITL1, ITL2 and ITL3. The ITLs are a hierarchical classification of administrative areas implemented by the UK since leaving the European Union to support statistical analysis. The ITL3 areas are generally county sized or larger, whereas ITL2 group several counties together, with four ITL2 areas covering all the TfSE area. The ITL1 areas are region sized.

3.3 HGV Freight Loaded & Unloaded

This analysis investigates the quantity of goods loaded to or unloaded from HGVs within the TfSE area's constituent ITL3 areas and includes segmentation by different goods types. Some ITL3 areas incorporate multiple Local Transport Authorities, and vice versa. The HGV freight data, which is provided by the European Commission's Eurostat service (EU, 2023), only relates to the amount of freight loaded or unloaded. No information about the origin or destination of the associated HGV journey is included in the data, or the situation the freight is transferred from or to (e.g. another mode or a warehouse). Nonetheless, the dataset allows insight into the amount of freight being transported by HGV into or out of areas hosting waterborne freight infrastructure, and the breakdown of different goods types. Goods types are important because not all goods types are suitable for shifting to waterborne, such as food, which might require short transport times to ensure freshness.

To allow cross referencing between the ITL3 areas and Local Transport Authority boundaries, Table 3-2 lists the ITL3 areas whilst Figure 3-1 illustrates and names them.

Table 3-2: TfSE Local Transport Authorities & ITL3 areas

ITL3 Areas	Local Transport Authorities
Berkshire	Windsor & Maidenhead, Wokingham, West Berkshire, Bracknell Forest, Reading, Slough
West Sussex (North East), West Sussex (South West)	West Sussex
North, South & Central Hampshire	Hampshire
Medway	Medway
Kent Thames Gateway, East Kent, West Kent, Mid Kent	Kent
Brighton & Hove	Brighton & Hove
East Sussex	East Sussex
East Surrey, West Surrey	Surrey
Portsmouth	Portsmouth
Southampton	Southampton
Isle of Wight	Isle of Wight

.

Figure 3-1: TfSE ITL3 Areas & Waterborne Freight Infrastructure. Sources: (ONS, 2024b) (IWA, 2023) (UK-Ports, 2023) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].

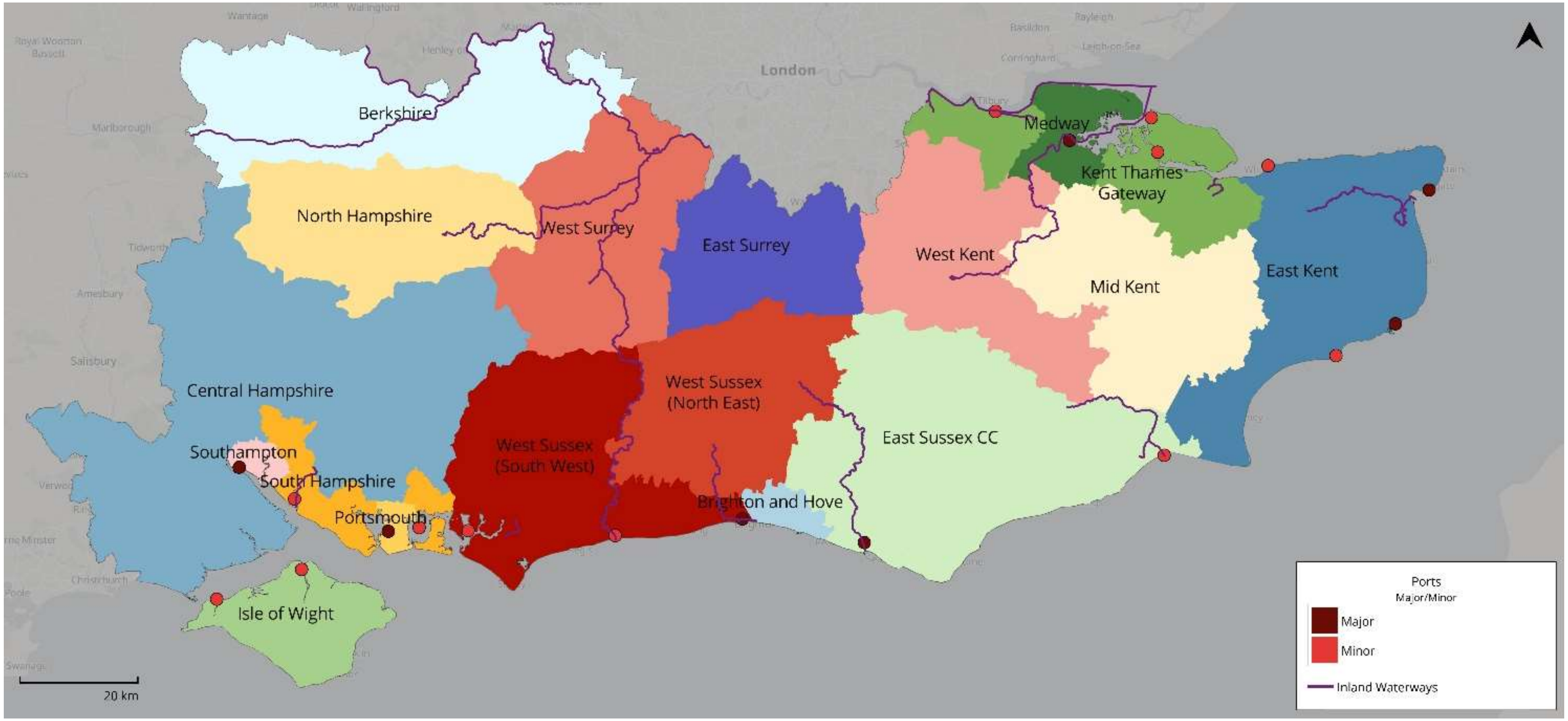


Figure 3-2 illustrates the ITL3 areas within the TfSE area and the amount of goods loaded to and unloaded from HGVs within each of these during 2019 (the latest year for which data are available). Figure 3-3 illustrates the same HGV freight data but provides a breakdown of the freight quantities between the goods types.

Overall, high volumes of goods are being loaded or unloaded within ITL3 areas with port infrastructure, with at least six areas observing the loading and unloading of more than 5 million tonnes.

The Kent Thames Gateway stands as a prominent location, loading and unloading over 25 million tonnes of goods (see Figure 3-3). This site covers broadly the area east of the M25, bounded to the north by the River Thames and to the south by the A2 and the Downs. The concentration of freight activity positions the area as a prime candidate for exploring the conversion of some traffic to waterborne freight, given its proximity to water routes. Similarly, a large volume of goods are loaded and unloaded to HGVs in Berkshire, which has IWW routes through it although this network currently has sections which cannot be traversed (see Section 2.5.3).

Notably, the Isle of Wight stands out as the sole ITL3 area with a port facility that exhibits extremely limited HGV loading and unloading activity. However, this is likely attributed to its limited nature and the scale of freight operations typically associated with island environments

Figure 3-2: 2019 Volume of Goods Loaded & Unloaded in the ITL3 Areas within the TfSE Area. Source: (EU, 2023) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].

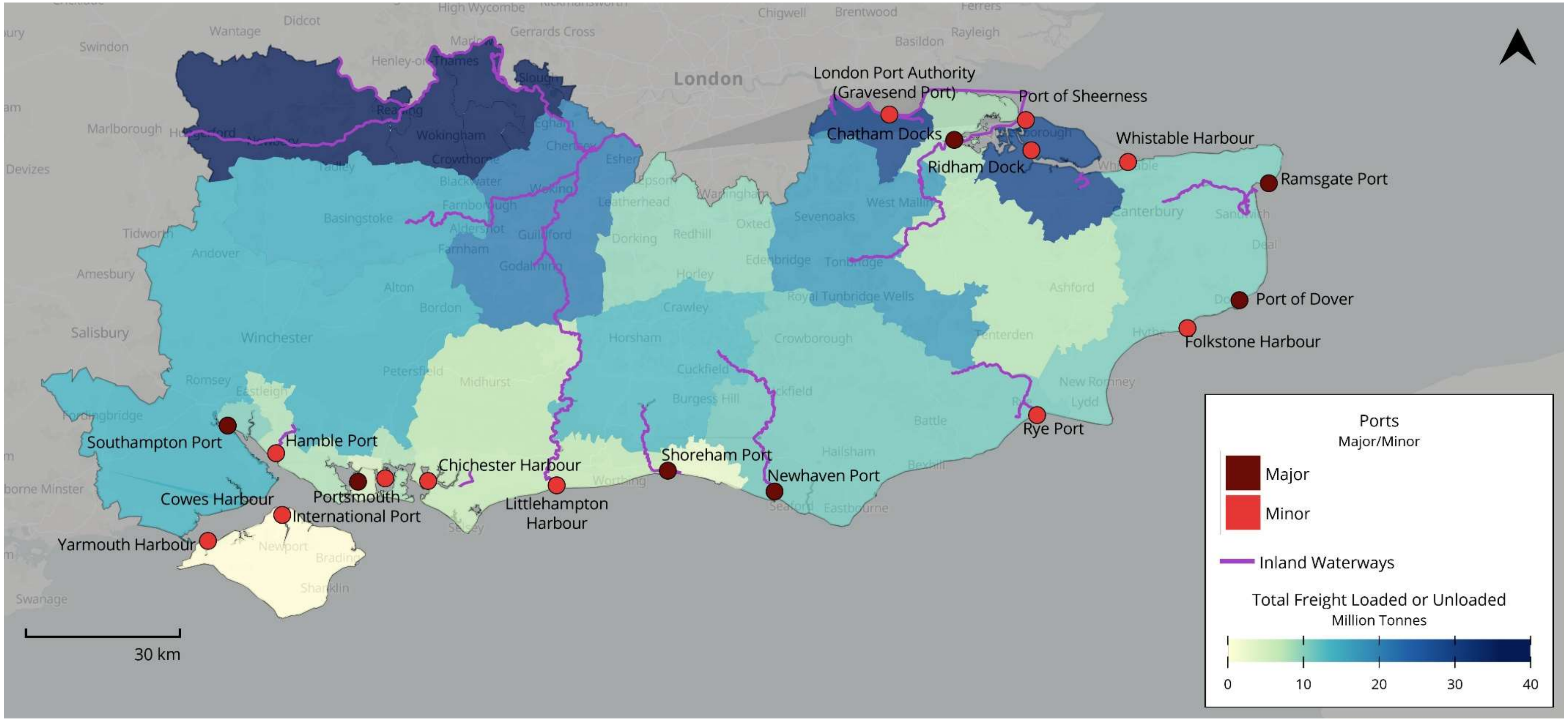


Figure 3-3: Goods Types Loaded & Unloaded in the ITL3 Areas within the TfSE Area. Source: (EU, 2023)

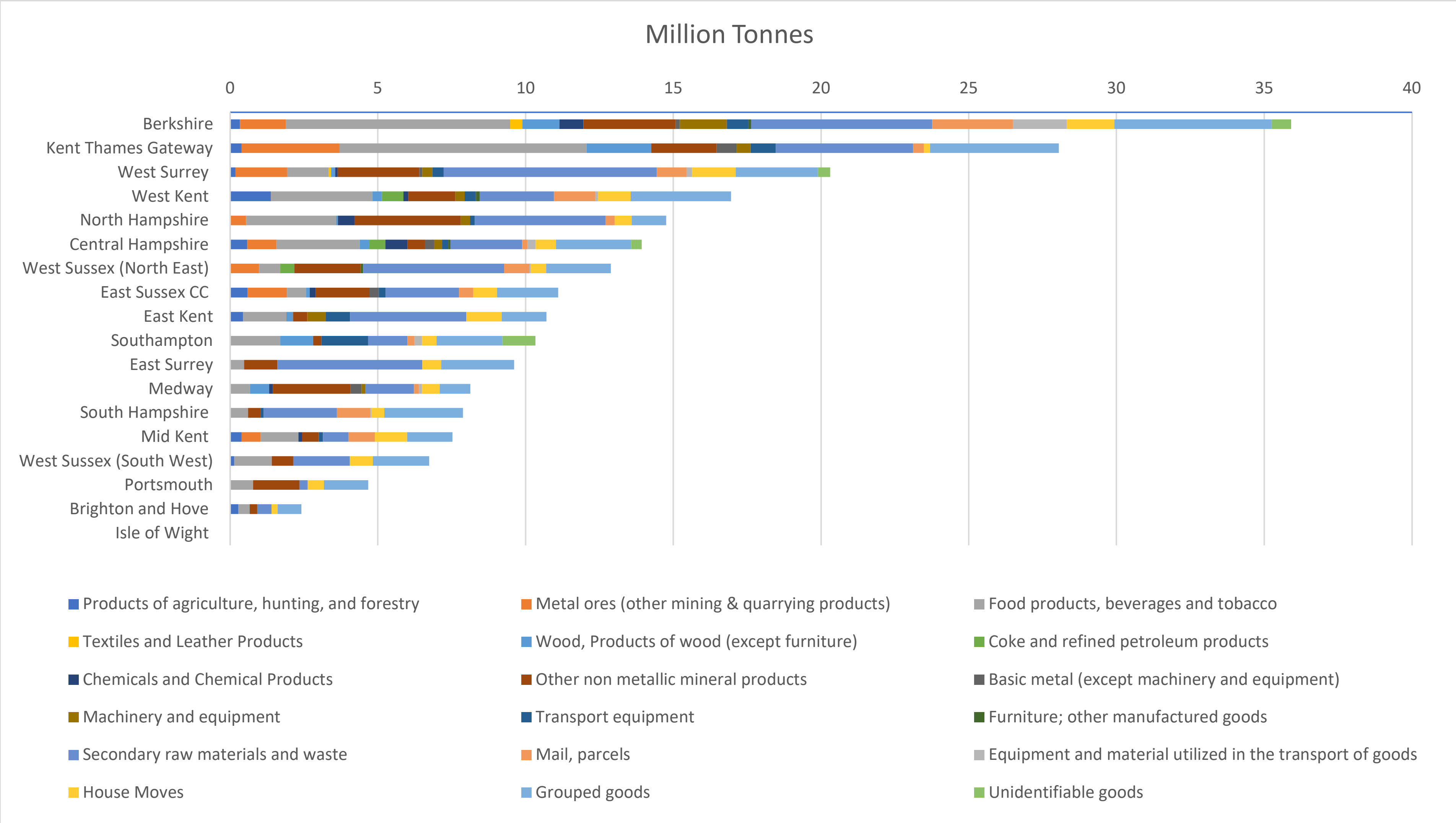


Figure 3-3 also provides an overview of the split between different types of goods by volume being loaded to and unloaded off HGVs within ITL3 areas. This can be cross referenced against Table 3-3, which presents a high-level analysis of which commodities are suitable for transport by waterborne freight. The commodities are ranked from high to low suitability.

- **High:** Commodities which are already carried by waterborne modes.
- **Medium:** Commodities for which there is some evidence suggesting their suitability is comparable to commodities already carried.
- **Low:** Commodities where legislative or practical difficulties (such as requiring new specialist vessels).

Together Table 3-3 and Table 3-2 inform that the key good types which currently have substantial (i.e. greater than 1 million tonnes in at least one ITL3 Area) volume carried by HGV and have evidence of being highly suitable for carrying by waterborne are:

- Metal ores (and other mining & quarrying products)
- Wood, products of wood (except wood furniture)
- Other non-metallic mineral products
- Products of agriculture, hunting and forestry

Commodities which account for substantial volume and have some evidence of being suitable are:

- Machinery and equipment
- Secondary raw materials and waste
- Other non-metallic mineral products
- Transport equipment
- Grouped goods
- Equipment and material utilised in the transportation of goods.

Waterborne freight potentially offers distinct advantages for these commodities, since they are transported in sufficient volumes for waterborne vehicles to present a cost-effective alternative to road transport and an attractive option for optimising freight logistics. However, careful consideration will be needed about whether the operational requirements of the supply chains of these will be compatible with a waterborne-based leg, which might be slower than its HGV-based counterpart.

Table 3-3: Analysis of Commodities Suitable for Waterborne Freight

Suitability for Waterborne	Commodity	Notes
High	Products of agriculture, hunting and forestry	Agricultural and Forestry products are already extensively shipped by waterborne transportation (see Figure 1-3). No additional legislative difficulties were identified.
	Metal ores (and other mining & quarrying products)	Ores are already transported using waterborne transport (see Figure 1-3) No additional future legislative barriers have been identified.
	Wood, products of wood (except wood furniture)	Wood and timber are categorised as dry bulk commodities and already extensively transported using waterborne transport (see Figure 1-3). No additional future legislative hurdles have been identified.
	Other non-metallic mineral products	This commodity is often already transported in dry bulk vessels and could benefit from the cost-efficiency and high capacity of waterborne transportation (Transportation Institute, 2019).
	Coke and refined petroleum products	Liquid bulk (including liquified gas, crude petroleum and petroleum products) is already extensively transported by waterborne transportation (see Figure 1-3). No additional future legislative hurdles have been identified.
	Basic metal (except machinery)	Iron and steel products are already transported by waterborne transportation (see Figure 1-3). No additional future legislative hurdles have been identified.
Medium	Textiles and leather products	These commodities are not currently shipped domestically but extensively shipped from international sources (The Alliance Project, 2015) in a Unitised Cargo fashion. It would benefit from the high capacity of waterborne transportation (Maritime Union, 2022).
	Machinery and equipment	Large machinery and equipment are well-suited for waterborne transportation due to their size and weight, which benefit from the

Suitability for Waterborne	Commodity	Notes
		high capacity and cost efficiency of this transport method (Transportation Institute, 2019).
	Secondary raw materials and waste	These materials are well-suited for waterborne transportation due to their size and weight, which benefit from the high capacity of waterborne transportation (Transportation Institute, 2019). Legislative issues do exist around certain types of waste however International Shipping of waste is already seen suggesting those are surmountable for domestic shipping (Defra, 2021b).
	Transport equipment	Transport equipment well-suited for waterborne transportation due to its size and weight, which benefit from the high capacity and cost efficiency of this transport method (Transportation Institute, 2019).
	Grouped goods	Definitions vary slightly between data sets relating to HGV and waterborne freight, but ‘unitised goods’ is broadly comparable to ‘grouped goods’. This category has been shipped in the past but is no longer suggesting it could be once again.
	Furniture; other manufactured goods	Waterborne transportation would be suitable for transporting these products as they can be transported in bulk, increasing cost efficiency. This commodity is less likely to be damaged during waterborne transportation due to the stable nature of shipping vessels (Maritime Union, 2022).
	Equipment and material utilised in the transportation of goods	Waterborne transportation is well-suited to transporting these commodities, due to the large size and weight of this type of equipment and material (Transportation Institute, 2019).
Low	Chemicals and chemical products	These products are less suitable for waterborne transportation given the high risk and regulations involved with transporting them (Maritime Union, 2022). Regulations

Suitability for Waterborne	Commodity	Notes
		would also require specialist vessels (IMO, 2024).
	House moves	House moves typically require rapid transportation to geographically diverse locations. They are not suitable for waterborne modes which are typically slower and have more restricted destinations.
	Mail, parcels	Due to the delivery of these commodities often being time-sensitive, waterborne transportation is less suitable for these commodities (International Transport Forum, 2022).
	Food products, beverages, and tobacco	Food Products have additional legislative hurdles and the logistics are often done in a just-in-time manner. Waterborne transportation is deemed less suitable for these commodities due to the slower speeds involved (International Transport Forum, 2022).
N/A	Unidentifiable goods	No assessment possible.

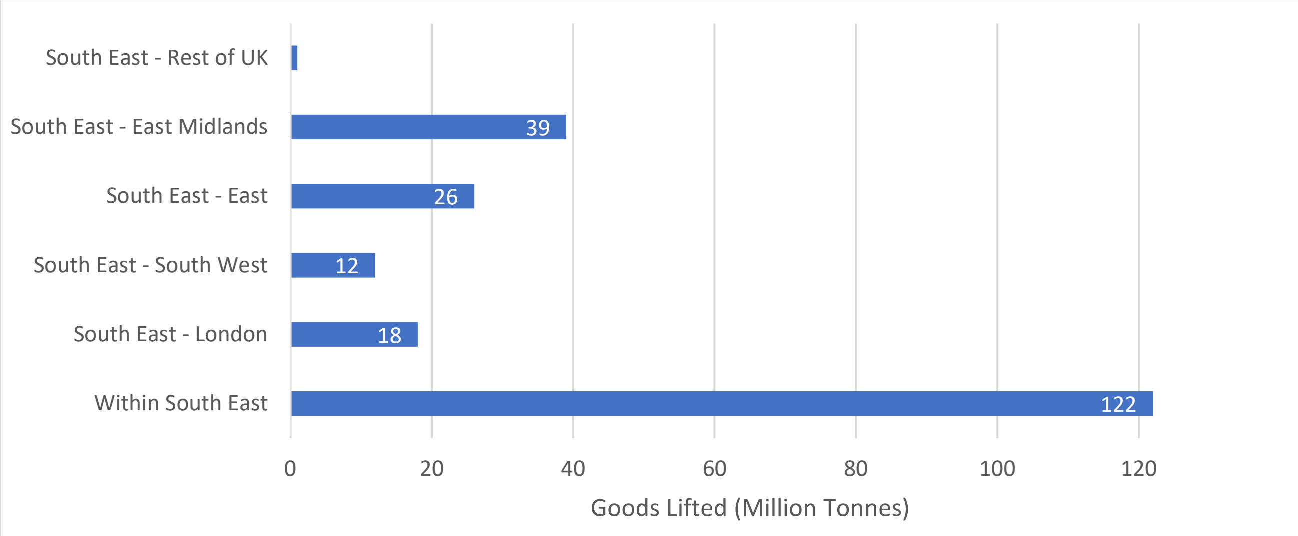
3.4 HGV Freight Flows

We have analysed the flow of goods transported by HGV between paired areas. Flows with trip ends which are connected by IWWs, or are close to ports, are likely to be more suitable for shifting to waterborne modes. Figure 3-4 illustrates the quantity of goods transported by HGV between paired geographic areas (DfT, 2023f). The areas are based on ITL1 boundaries, or agglomerations of them. The South East area includes the TfSE area, as well as Oxfordshire, Buckinghamshire and Milton Keynes, which are not within the TfSE area. Freight flows in both directions are counted.

The results show that the most significant volume of goods, in both directions, are transported within the South East, with more goods moved by HGV internally than to/from all other UK destinations/origins combined. This internal movement within the South East suggests an opportunity to convert some of these road-transported goods to waterborne freight, particularly through SSS and port-to-port journeys within the TfSE area. For example, from Medway to Southampton.

While the East Midlands emerges as the next largest pairing, reflecting its status as a major distribution hub within the UK, the potential for waterborne freight expansion in this region is limited due to geographical constraints, such as distance, lack of IWW routes and being landlocked. However, robust pairings with London and the East of England suggests an opportunity to build on these connections to further inter-regional trade and support waterborne freight expansion. Expanding waterborne freight could also strengthen supply chain resilience through providing an alternative route for transporting goods and minimising the impact of supply chain disruptions, such as Dartford Crossing closures, significant road congestion or rail strikes.

Figure 3-4: 2022 Origin-Destination Goods Flow (Either Direction). Source: (DfT, 2023f)



We have investigated the 'Within South East' freight flows in more detail by analysing flows HGVs between smaller geographies within the TfSE area. The data was provided by the DfT in 2019 (DfT, 2019) and supported a maximum geospatial granularity of ITL2 areas. The local authorities contained within each ITL2 area are listed in Table 3-4. Zone TLJ1 contains three substantial local authorities, which are not within the TfSE area.

*Table 3-4: ITL2 Areas s & Associated Local Transport Authorities (those denoted with a * are not within the TfSE area). Source: (ONS, 2024c)*

ITL2 Areas	Local Transport Authorities
TLJ1	Windsor & Maidenhead, Wokingham, Bracknell Forest, West Berkshire, Reading, Slough, Oxfordshire*, Buckinghamshire*, Milton Keynes*
TLJ2	Brighton and Hove, East Sussex, Surrey, West Sussex
TLJ3	Portsmouth, Southampton, Isle of Wight, Hampshire
TLJ4	Medway, Kent

Figure 3-5 outlines the flow of goods between these ITL2 areas, reaffirming the prevalence of the movement of goods internally across the TfSE area highlighting the robust economic activity and the interconnectedness of the area's internal markets. The substantial volumes of goods moving within the area serve as a clear indicator of economic activity, suggesting active production, distribution and consumption processes. This movement also reflects the engagement of businesses within these zones in trade, manufacturing and various services. Notably, there is a high flow of goods along the East-West axis, indicating the potential for goods to be transferred via coastal shipping between ports along the south coast.

Figure 3-5: Demand between ITL2 Areas within the TfSE Area and Neighbouring Area. Source: (DfT, 2019) Contains OS Data © Crown Copyright. To view an online interactive version of this map, click [here].

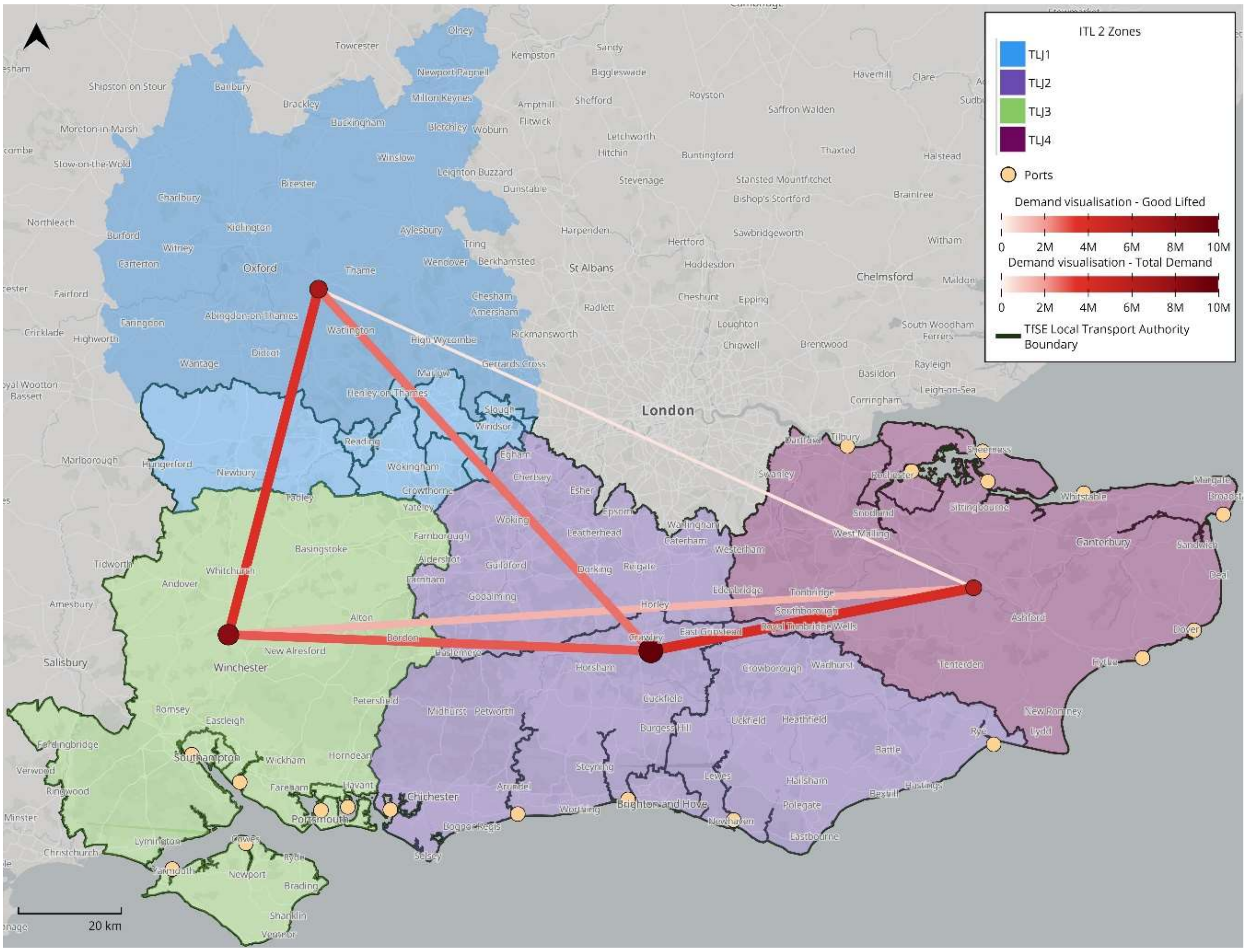


Figure 3-6 outlines a breakdown of the goods types by tonnage that are moved between ITL2 areas, which are typically agglomerations of counties. This reflects that high proportions of goods are moved internally within the same zones, with the most prominent activity seen in TLJ4 and TLJ3.

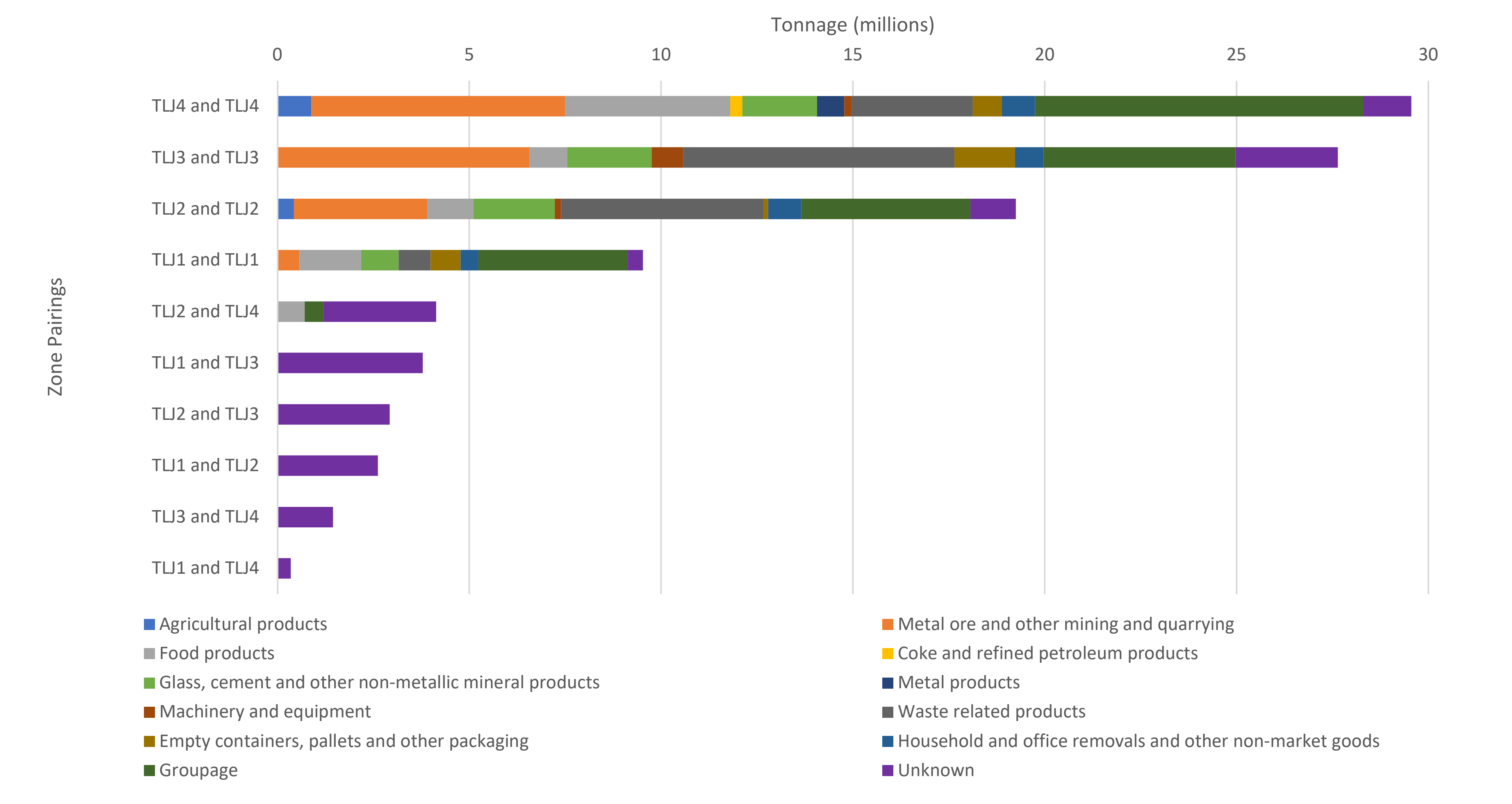
This reflects that high proportions of goods are moved internally within the same zones, with the most prominent activity seen in TLJ4 and TLJ3.

- **TLJ4 - Medway and Kent:** The River Medway offers a crucial opportunity as a potential route for transporting goods within this area due to its location and current levels of pre-existing freight capacity with access to supporting infrastructure.
- **TLJ3 - Portsmouth, Southampton, Isle of Wight and Hampshire:** Contains high levels and good access to significant port infrastructure. It is crucial to determine the proportion of these movements related to supply chain activities that could potentially be facilitated by port-to-port journeys.

'Metal ore and other mining and quarrying' emerges as a key commodity type, which is considered a bulk good. Bulk goods are typically large quantities of raw materials that are not packaged but are transported in loose form. The transport efficiency benefits associated with waterborne freight, such as cost-effectiveness, efficient handling, flexibility, reduced environmental impact, storage facilities and reliability, make it an attractive option for moving heavy and bulky commodities like metal ore, which could be supported by waterborne freight. However, the limited suitability of the specialisation in specific types of goods also highlights one of the constraints of waterborne freight. While it excels in transporting bulk commodities, its applicability to a broader range of goods is limited.

Whilst there is detailed segmentation regarding the goods lifted within the same zones, it is important to note that there is a lack of data regarding the types of goods being lifted between the different zones. These goods are categorised as 'Unknown'. This is a key data gap and indicates a need for improved methods of recording and tracking commodity types at these locations. Enhancing data collection and analysis techniques would provide a more accurate insight into trade patterns and facilitate better-informed decision-making regarding waterborne freight expansion initiatives.

Figure 3-6: Goods Lifted Between ITL2 Areas in the TfSE Area. Source: (DfT, 2019)



3.5 Waterborne Vehicle Freight Loading & Unloading

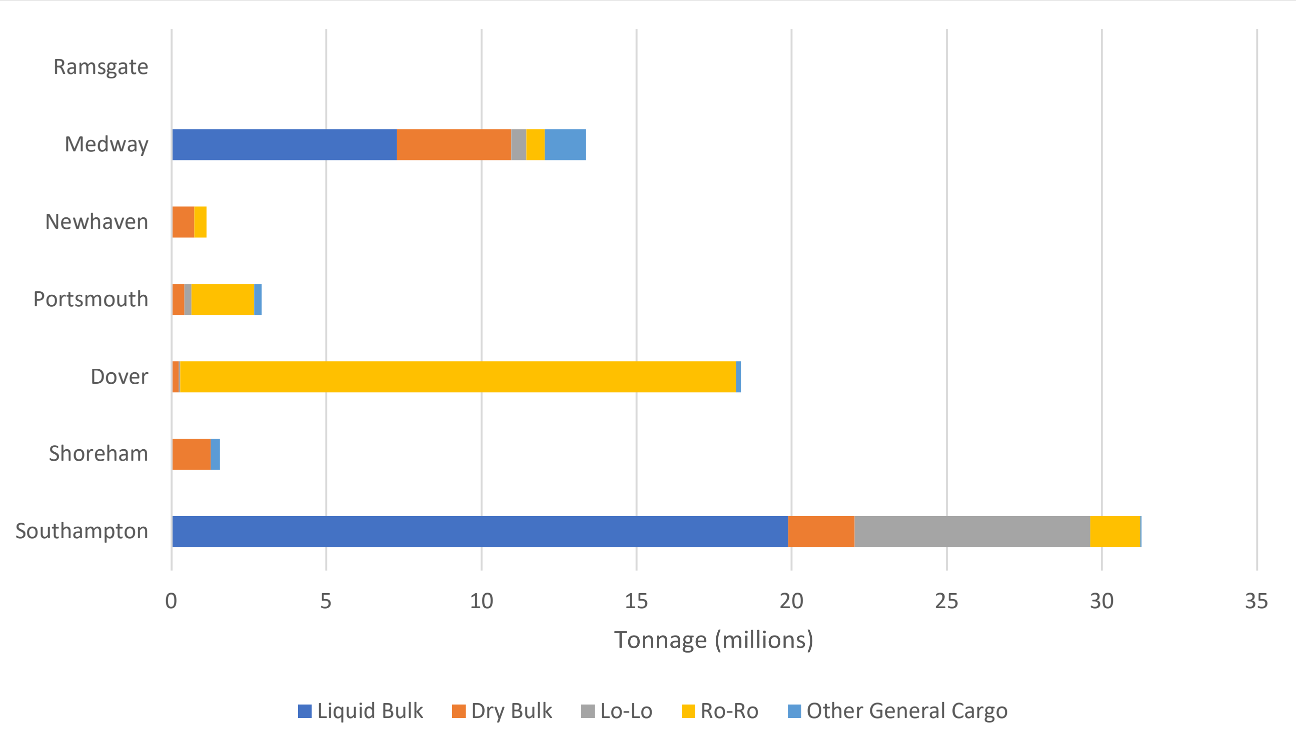
We have analysed the freight throughput at ports within the TfSE area to understand their capacity to accommodate additional freight owing to a shift from HGVs to waterborne modes.

As discussed in Chapter 2, the TfSE area is home to several major ports that support a vibrant maritime economy. Figure 3-7 illustrates the quantity of freight loaded to and unloaded from waterborne freight vehicles at port locations, including segmentation by cargo categorisations including:

- Liquid Bulk
- Dry Bulk
- Lo-Lo
- Ro-Ro
- General Cargo

Figure 3-7 highlights that Southampton has the highest tonnage in both directions at 31 million tonnes, followed by Dover and Medway with 18 and 13 million tonnes respectively.

Figure 3-7: Freight in Both Direction for Ports within the TfSE Area (2022). Source: (DfT, 2023e)



The volume of freight being transported at these ports is substantial, indicating the presence of existing key infrastructure that, depending on condition and availability, may be able to accommodate an increased proportion of the goods moved by HGVs. Additionally, there could be an opportunity for collaboration and knowledge-sharing between larger ports and those currently handling lower levels of cargo, such as Shoreham, Portsmouth, and Newhaven, to bolster intercoastal SSS freight activity within UK ports.

Figure 3-8 illustrates the percentage change in goods handled at major ports since 2016, showing the historical trends and supporting a comprehensive analysis of port activity over recent years. The figure highlights a notable upward trend in freight at Medway and Newhaven (both of which are smaller major ports) with them observing increases of 146% and 142%, respectively from 2016. These increases highlight the opportunity to build upon the usage of these ports for freight transport. Ramsgate is another smaller major port, but it has experienced the greatest decline in freight traffic (61%). This decline is possibly linked to the decommissioning and removal of berths in 2020, which significantly reduced the port's capacity to handle freight. However, recent investments from the Levelling Up Fund in 2021 aim to improve services and potentially revitalise the port's operations (The Isle of Thanet News, 2022).

There is a stable pattern of activity within larger major ports such as Dover, Southampton and Portsmouth until 2019. These ports maintained consistent traffic volumes, suggesting well-established operational capabilities and steady demand for their services. However, from 2019 onwards, a decline in freight traffic is observed, which is likely attributed to the combined impacts of the UK's departure from the European Union and the COVID-19 pandemic, both of which disrupted supply chains. Despite these challenges, Figure 3-7 demonstrates that these ports continue to handle substantial freight tonnage, highlighting resilience and capacity to manage significant cargo volumes even amid broader market disruptions. This ongoing capacity indicates that, historically, these port locations have handled larger volumes of freight than current levels, suggesting they possess the necessary facilities and infrastructure to respond to an increase in waterborne freight to, at a minimum, pre-2019 levels.

Figure 3-7 also outlines the range of cargo types across these ports. This identifies the need for tailored and bespoke solutions to optimise port operations and explore the feasibility of expanding current activities within ports that handle similar goods types. This range is evident even in neighbouring ports like Portsmouth and Southampton, which, despite their geographical proximity, have distinct variations in cargo handling. Each cargo type has unique infrastructure requirements and operational needs, requiring different approaches to ensure efficient handling:

- **Liquid Bulk:** Liquid bulk cargo requires specialised facilities, such as tank farms, pipelines, and storage tanks to ensure safe handling and storage.
- **Ro-Ro:** Ro-ro operations need specific berths, ramps, and terminal facilities to facilitate the smooth loading and unloading of wheeled cargo.
- **Mixed Cargo:** The mix of cargo types at ports like Medway necessitates flexible infrastructure that can accommodate a wide range of commodities, including liquid bulk, dry bulk, and general cargo.

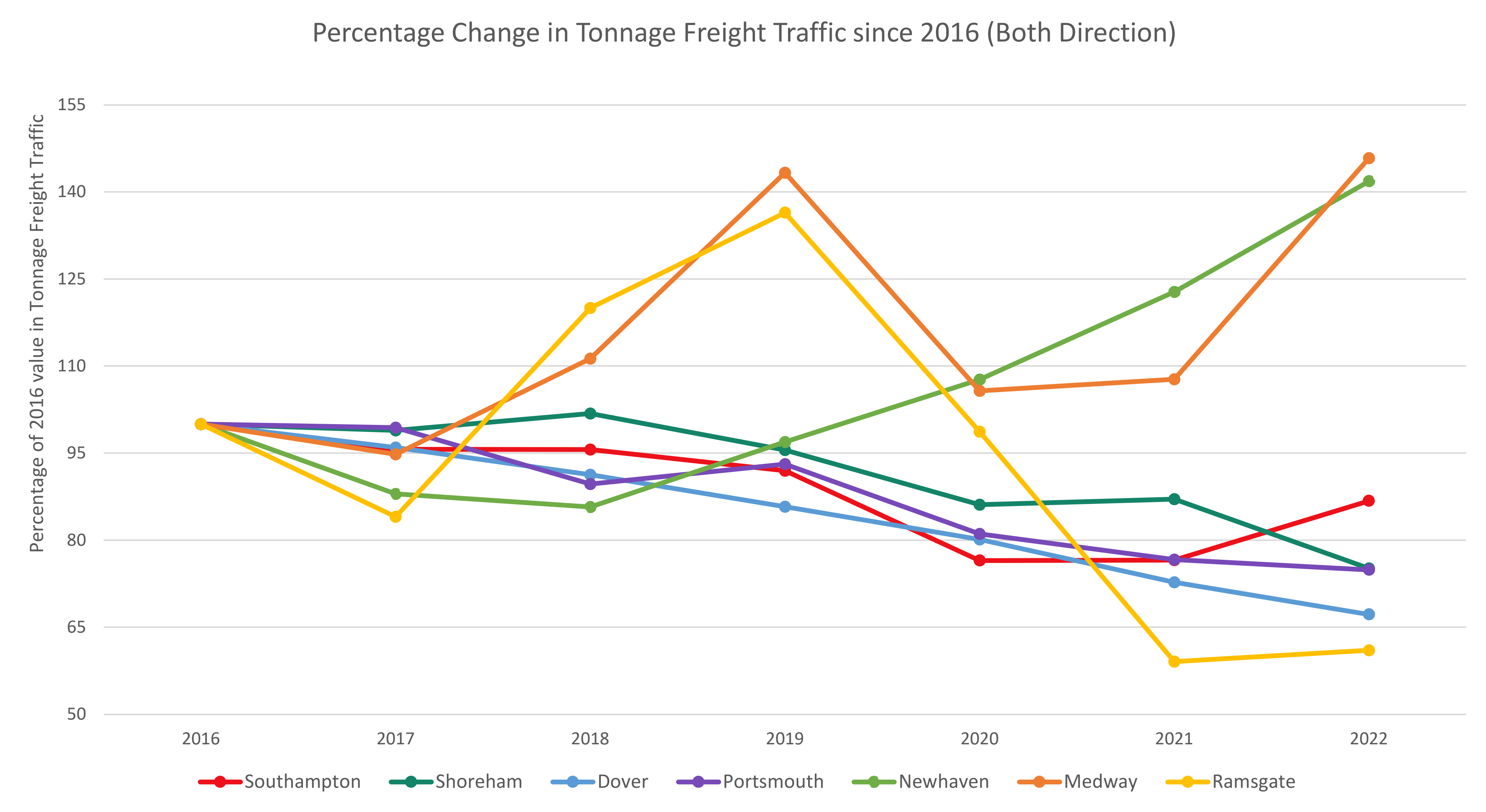
The need for specialised infrastructure and operations tailored to each cargo type is another key constraint of waterborne freight because it could limit the viability of journeys between ports that specialise in different types of cargo.

Currently, national datasets do not capture goods movements at minor port locations. As such, no datasets are available on the freight activities of the area's 11 minor ports, which are:

- Rye Port (Rother)
- Hamble (Fareham)
- Cowes (Isle of Wight)
- Sheerness (Swale)
- Port of London Authority (Gravesham)
- Ridham (Swale)
- Whitstable (Canterbury)
- Folkstone (Folkestone & Hythe)
- Langstone Harbour (Portsmouth)
- Littlehampton (Arun)
- Chichester (Chichester)

Gaining insights into the specific types of freight activities occurring at these ports is essential for strategic planning and resource allocation. Therefore, efforts to capture and analyse data related to freight movements at minor ports is paramount for informed decision-making and the sustainable development of the TfSE area's maritime infrastructure.

Figure 3-8: Percentage Change in Tonnage Freight Traffic in Major Ports in the TfSE Area. Source: (DfT, 2023e)



3.6 IWW Freight Quantities

We have analysed data on existing IWW freight movements, to provide insight on the existing utilisation of this mode. The DfT categories the UK into port groups containing strategic freight waterways. Two of these port groups overlap with TfSE area boundaries including Thames & Kent and Sussex & Hampshire. The volume and type of goods lifted is provided in Table 3-5. '0' represents an absolute value of zero and LOW means the value is less than half the smallest unit displayed and different from a real zero. Table 3-5. highlights the dominance of IWW traffic within the Thames & Kent Port Group, reflecting the current capacities of the River Thames and River Medway. In contrast, Sussex & Hampshire exhibits comparatively lower levels of movement, attributed to the current limitations in IWW infrastructure capacity, despite the presence of several rivers including the River Hamble, Arun, Adur, Ouse, Rother, Brede and Chichester Channel (IWA, 2023).

Table 3-5: Summary of Goods Lifted by Internal IWW Traffic. Source: (DfT, 2023e)

	Goods Lifted by Region & Cargo Type (million tonnes) 2022				
Region (within / overlapping the TfSE area)	**Liquid Bulk**	**Dry Bulk**	**Unitised Traffic**	**General Cargo**	**Total**
Thames & Kent	0.2	1.7	LOW	LOW	1.9
Sussex & Hampshire	0.0	0.0	0.0	LOW	LOW

The DfT data (2023h) further defines IWW traffic into two categories:

- **Non-Seagoing Traffic:** Internal traffic that remains entirely within IWW.
- **Seagoing Traffic:** Referring to traffic that crosses into IWW from the sea.

Figure 3-9 outlines the total volume of goods lifted by major IWWs within the TfSE area over the last 30 years, including the River Thames and River Medway. The River Thames had 24 million tonnes of total traffic in 2022, of which 1.7 million tonnes was non-seagoing traffic. Over the last three decades, the total traffic carried on the River Thames has varied significantly, with current levels comparable to those in 1993. There was a steady increase in activity from 2009 to 2019, but a sharp decline from 2019 to 2020, likely due to the impacts of the COVID-19 pandemic. Notably, the current volume of traffic is similar to the goods being moved through some of the key ports in the area, and in some case substantially more, demonstrating the importance of exploring the expansion of IWW transportation.

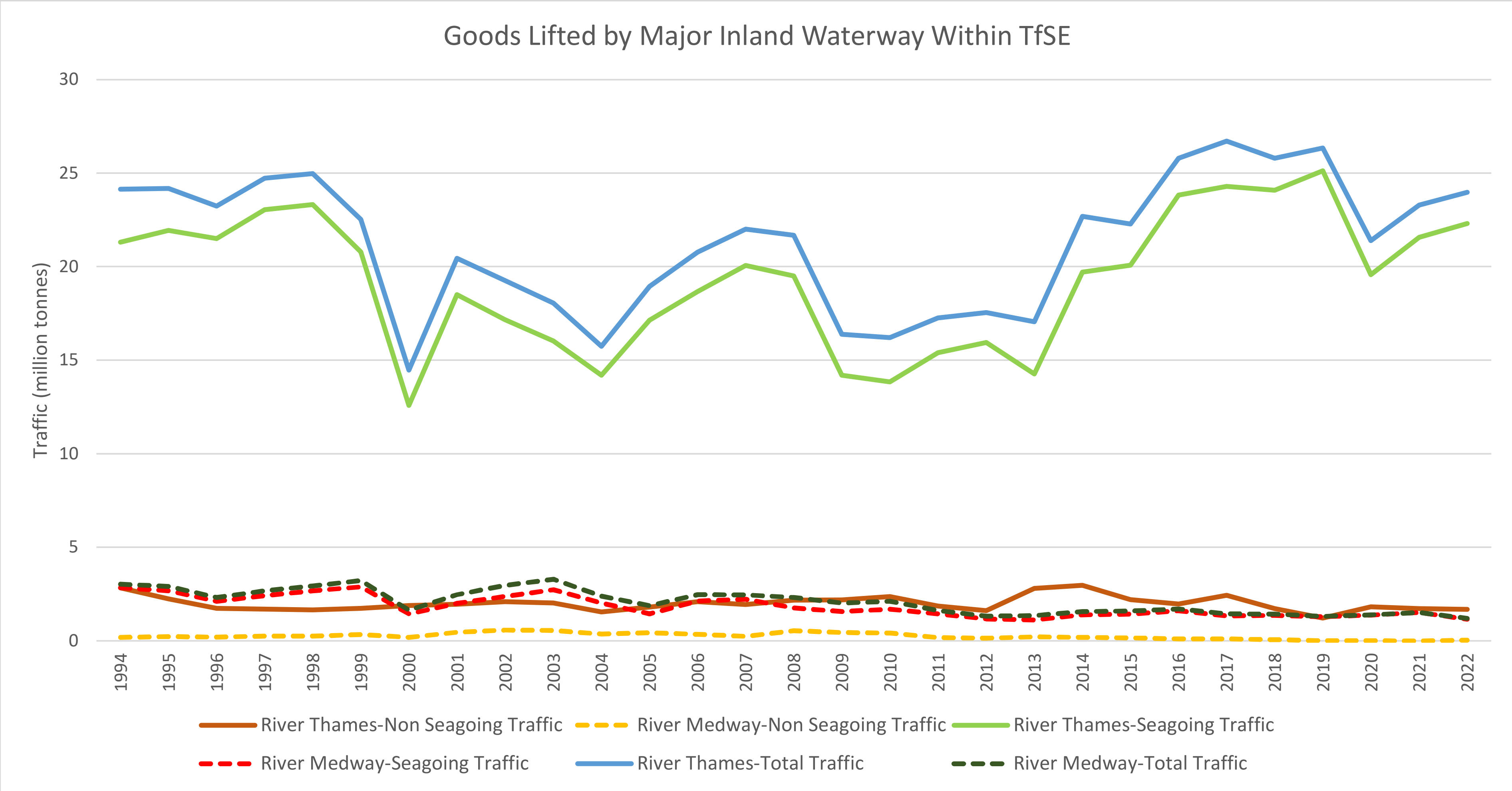
The River Thames carries significantly more freight than the River Medway due to several factors including:

- **Geographic Location & Access:** The River Thames runs from Thames Head in Gloucestershire through London and to the Thames Estuary, where it flows into the North Sea. The River Thames provides direct access to the heart of the UK's economic and commercial centre, London, facilitating the movement of goods to and from major markets.
- **Port Infrastructure:** The Port of London, located on the River Thames, is one of the UK's largest ports. It has extensive facilities for handling various types of cargo, including containers, bulk goods, and specialised freight. The port's infrastructure supports high-capacity operations and efficient logistics.
- **Economic Activity:** The economic activity along the River Thames is higher due to the presence of numerous industries, businesses, and commercial centres in and around London, which generates a greater demand for freight transport.
- **Historical Significance:** The River Thames has been a crucial trade route for centuries, contributing to the development of robust trade and transport networks. Its longstanding significance has led to the establishment of extensive facilities and services.

The River Medway demonstrates lower levels of total traffic at 1.3 million tonnes in 2022 and has remained relatively stable throughout the last 30 years. Despite lower levels of total traffic, the River Medway remains a valuable asset to the TfSE area to support the transportation of goods. Opportunities exist to improve and protect the existing infrastructure along the riverbanks, such as wharves, terminals, and loading facilities, to enhance efficiency and accommodate increased cargo volumes. Additionally, utilising the River Medway as a freight corridor presents an opportunity to strengthen regional connectivity within the TfSE area (particularly for locations along the river and with London).

Although Figure 3-9 highlights the volume of goods being transported, it does not provide segmentation by goods types. This limitation prevents us from gathering detailed insight in the specific categories of goods being transported beyond what is presented in Figure 3-9. Enhancing data collection methods to include goods type segmentation would enable us to identify journeys that are most suitable to transfer to waterborne, which would in turn help us identify opportunities to transfer goods from HGVs to waterborne.

Figure 3-9: Goods Lifted by Major IWW in the TfSE Area. Source: (DfT, 2023e)



3.7 Conclusion & Key Chapter Findings

This chapter explored in detail historic and current freight flows in the TfSE area focusing on the methods of transport, such as HGVs, ports and IWW, good types, origin and destinations of these goods and overall volumes of freight being transported. This analysis identified what goods types and in what volumes could potentially be shifted from HGVs to waterborne freight. Key chapter findings include:

- **Goods Types:** Goods handled within the TfSE area by HGVs that lend themselves to be transported efficiently in bulk are concentrated in key commodity types, such as metal ore and other mining and quarrying. Waterborne freight is an efficient, cost-effective, and reliable mode of transport for bulk goods, highlighting an opportunity for waterborne freight to support more of these movements. However, the specialisation in specific types of goods also highlights the constraints of waterborne freight. While it excels in transporting bulk commodities, its applicability to a broader range of goods is limited. This limitation should be a focal point for further studies, aiming to identify ways to diversify the types of goods that can be effectively transported via waterborne freight.
- **Utilising Existing Infrastructure:** The prevalence of Ro-Ro and bulk cargo freight in current ports demonstrates the operational efficiency and cost savings available at major ports in the area due to existing infrastructure that facilitate quicker loading/unloading procedures and the transportation of larger volumes of goods. However, limitations including cargo diversity, specific infrastructure needs (dredging operations to accommodate larger vessels) and space constraints (needing additional storage or consolidation centres) could impede expansion efforts as well as port-to-port journeys between ports specialising in different cargo types.
- **Short Distance Movements:** Most goods moved by HGV within the TfSE area travel a relatively short distance, staying within a local authority and its nearest neighbours. It will be important to understand what proportion of these goods movements are associated with supply chain movements, which could be supported through port-to-port journeys.
- **East-West Movements**: There are medium sized HGV freight flows (to the order of approximately 1 to 5 million tonnes annually) running East to West within the TfSE area. These present a promising opportunity for shifting to waterborne freight for two reasons. First, if the distances involved between the freight origin and destination are large enough that there is an opportunity for waterborne freight to be cost-effective. Compared to the overall distance of the journey, any extra HGV kilometrage incurred by transporting the freight to a port would be insubstantial. Second, there are regular ports along the coast that are connected. Whilst there are also

reasonable flows in the North to South direction, the IWW network connecting these is fragmented.

- **National Distribution Networks:** Whilst half of goods loaded or unloaded onto HGVs within the TfSE area have a paired trip end within TfSE, the other half have a corresponding trip end outside of the region. Key paired locations include the East Midlands and Greater London, highlighting the national significance of the area. It also emphasises the importance of ensuring a stable and resilient freight supply chain. Waterborne freight could provide an alternate route to transporting goods, such as secondary raw materials and grouped goods, through east to west movements (Southampton to Dover to Medway) strengthening overall supply chains.
- **Data Availability and Reporting:** Enhanced data reporting, both across regions and at a finer granularity within minor ports, would provide invaluable insights into the types of goods being transported within the TfSE area and current trade patterns. This detailed information would not only facilitate a comprehensive understanding of freight movement patterns whilst also providing insight on the capacity of existing infrastructure to support waterborne expansion at a localised level, informing better decision making regarding waterborne freight expansion initiatives.

This chapter has primarily focused on analysing historical and current freight flows, identifying key market segments and goods types currently in use. It has found that there are some HGV goods movements within the TfSE area which are suitable for transferring to waterborne. In particular, longer length journeys of large or bulk materials. With these segments identified, the next step involves addressing a core study question: projecting the future trajectory of these market segments to assess potential impacts from increased HGV use, such as congestion and pollution. This will help determine if these impacts are expected to increase and if waterborne freight could be prioritised in certain areas to mitigate these impacts.

4 Chapter Four – Current & Forecast HGV Use

4.1 Overview

One of the key motivators for converting freight movement from HGVs to waterborne freight is to reduce the volume of HGVs on the road and their associated impacts, such as air pollution and congestion, and to support the decarbonisation of the freight sector. In this Chapter we present insights into current and future forecasts of HGV use to understand:

- If the negative impacts associated with HGVs are likely to increase, decrease or remain stable. If forecasts predict an increase in HGV traffic, the urgency and potential benefits of expanding waterborne freight become more significant.
- What areas have experienced high volumes of HGV traffic to inform a targeted approach to promoting waterborne freight in areas where it will have the greatest impact.

4.2 Methodology

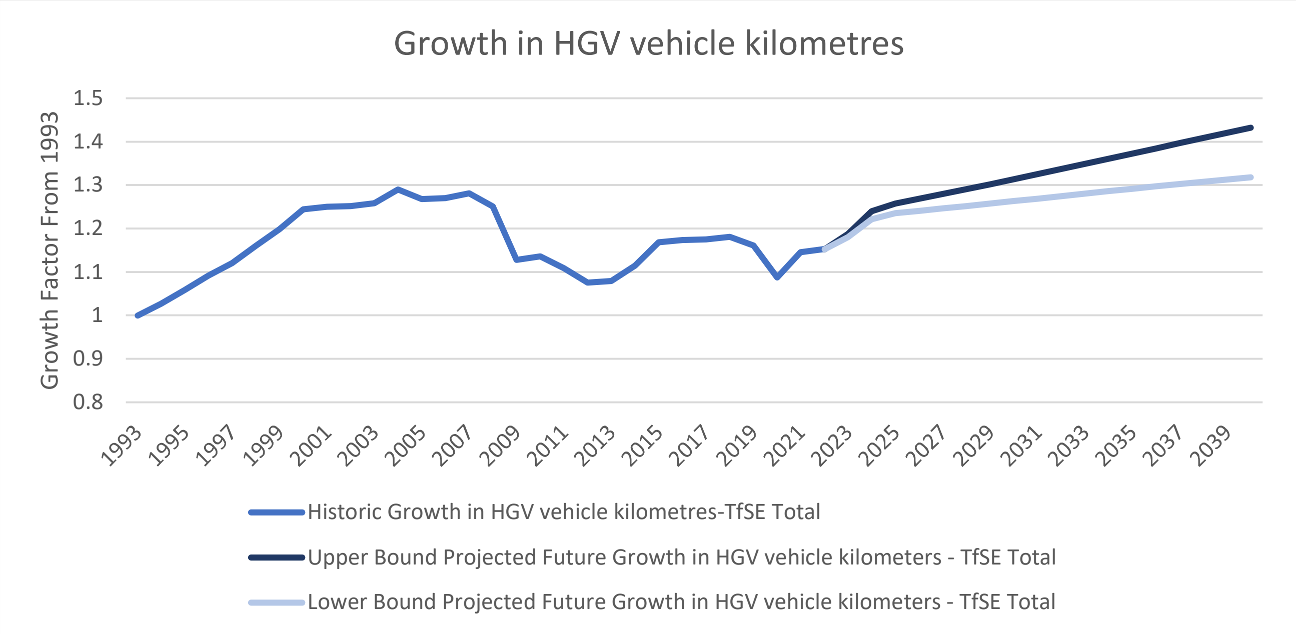
The annual kilometrage of HGVs, and all other vehicle types, for every local authority is provided at year intervals from 1993 to 2022 (DfT, 2023c). The HGV kilometrage for each local authority were then compared. DfT regional-level road traffic forecasts (DfT, 2022d) have been analysed, focusing on the TfSE area. The forecasts are provided in terms of percentage growth for different vehicle types, under different scenarios relating to future technology, behaviours, and economy. Two scenarios have been selected which result in the maximum and minimum future-year HGV traffic. The forecast HGV growth factors were applied to the observed HGV vehicle kilometrage in 2022 (DfT, 2023f) – the latest year for which data was available.

4.3 Results

Figure 4-1 illustrates the yearly growth factors for HGVs since 1993, for historic and forecast years. Historic results show that HGVs follow a steady growth with some fluctuation. The forecasts show this growth continuing until 2040 with the upper and lower bound of forecast HGV kilometrage being respectively 17% and 28% greater than 2022.

Figure 4-2 illustrates the vehicle kilometres travelled annually by HGVs in each of the local authorities within the TfSE area. The total across the TfSE area has consistently ranged between 3 billion and 3.5 billion kilometres per year over the past three decades. This shows the deeply ingrained nature of road-freight movements in the area, posing potential challenges to the movement of freight away from HGVs freight traffic to alternative transport modes, such as waterborne freight. However, it highlights the need for strategic interventions (subsidies, incentives and national and local government policy), fostering collaboration with stakeholders and raising awareness of the environmental benefits of waterborne freight to encourage this modal shift.

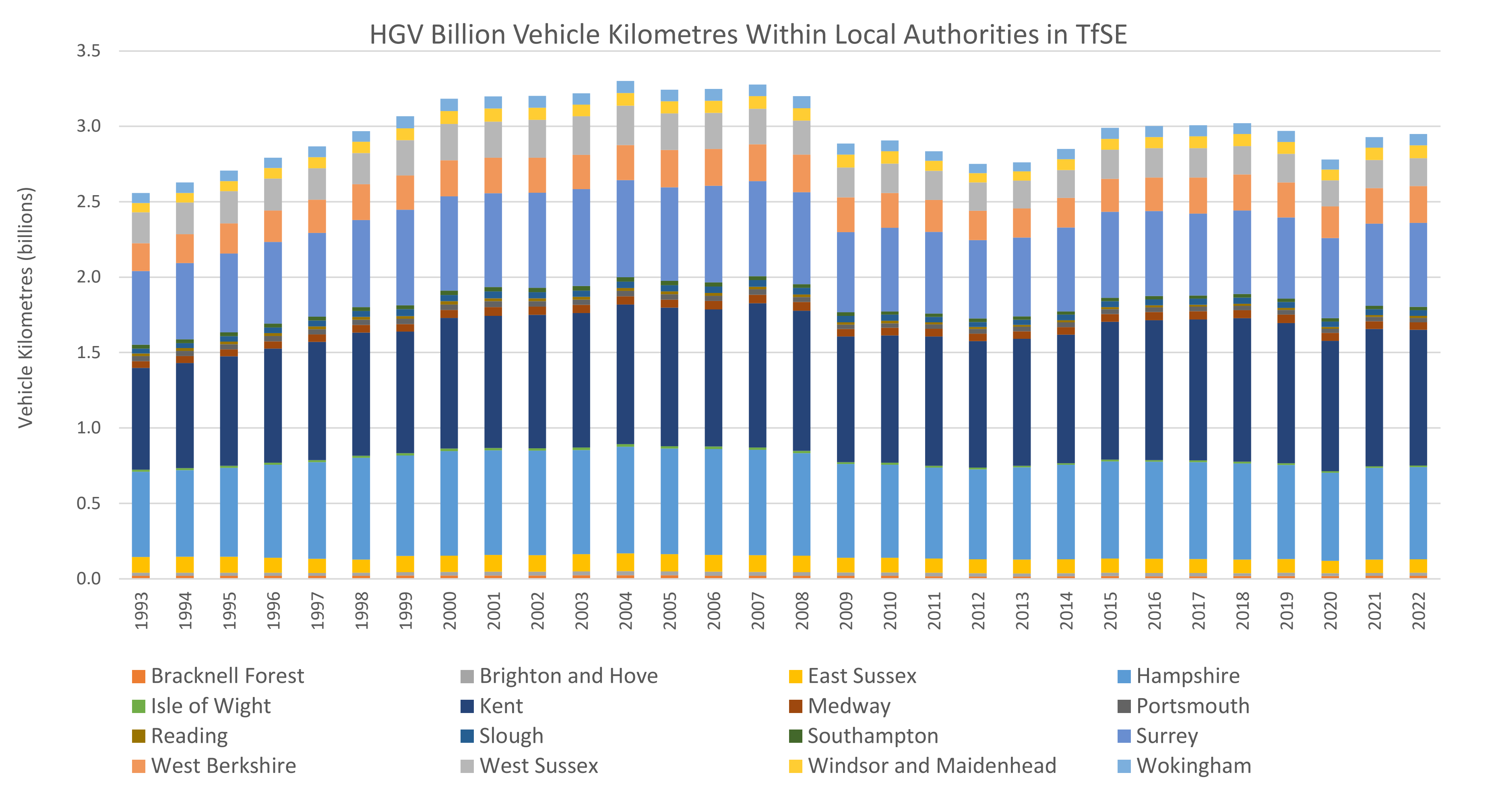
Figure 4-1: Forecast Growth in HGV Vehicle Kilometres. Sources: (DfT, 2022 & 2023)



Kent, Hampshire and Surrey emerge as the local authorities with the region's greatest HGV traffic. This could be attributed to their strategic locations, bordering major economic hubs like London, and boasting key transport infrastructure, such as the SRN, and significant port infrastructure, such as Southampton and Dover. Kent, in particular, has also witnessed the joint second-largest increase in traffic since 1993, at 33%, potentially fuelled by the opening of infrastructure like the Channel Tunnel and Dartford Tunnel bridge and its strategic positioning for trade with continental Europe. The presence of robust waterborne infrastructure in these areas presents an opportunity to divert some of these vehicle movements to more sustainable waterborne methods, thereby mitigating concerns related to increased HGV traffic, such as road congestion and air pollution.

Windsor & Maidenhead has seen the largest overall increase in traffic at 40%, followed by West Berkshire also at 33%, which could be attributed to a combination of population growth, economic development and enhancements to the transportation network. Both local authorities are also intersected by the M4, a major route carrying a significant proportion of vehicle movements into and around London. Medway, Slough, Surrey and Wokingham have also experienced relatively sizeable increases (between 12-15%) highlighting that the demand for freight goods have increased steadily across the region. In contrast, several key local authorities along the south coast that have direct access to key port infrastructure have seen a decrease in HGV movement including the Isle of Wight (29%), Portsmouth (15%), East Sussex (15%), Southampton (12%) and West Sussex (11%). In the cases of Portsmouth, West Sussex, and Southampton, this reduction in HGV movement aligns in most cases to the reduction in the quantity of goods loaded to and unloaded from waterborne vehicles (described in Section 3.5). It should also be noted, however, that in Southampton this could also be related to the modal shift project being run by DP World which has seen a number of road trips replaced by rail journeys. In the case of East Sussex, there has been a reduction in HGV movements, whilst concurrently also seeing an increase in the quantity of goods loaded to and unloaded from waterborne vehicles the major port contained within it - Newhaven (described in Section 3.5). Factors which could be contributing to this include an increase in waterborne-to-waterborne cargo transfers at the port, and a reduction in HGV movements in East Sussex which are not interacting with Newhaven.

Figure 4-2: HGV Billion Vehicle Kilometres Within Local Authorities in the TfSE Area. Source: (DfT, 2023c)



4.4 Segmented Trajectory Predictions

Table 4-1 lists assessments of demand trajectories for freight transport. This is done on a commodity-by-commodity basis for those identified in Table 3-3 as medium or high suitability for modal shift to waterborne freight. To determine the trajectory, historical HGV goods movement data (DfT, 2023f) has been assessed in combination with likely changes due to new policies or future trends. National level HGV goods movement data has been used owing to the lack of suitable data specific to the TfSE area.

Table 4-1: Emerging Trends of Freight Moved by Cargo Type

Commodity	Trajectory Prediction	Predicted Future Trend
Products of agriculture, hunting and forestry	Remained stable over the last few decades and would be expected to grow. Government strategies to encourage more local and domestic food production and consumption (Defra, 2021a) could drive down demand for transport however environmental instability will likely increase the need for movement of raw food goods to mitigate emerging gaps in productive regions (Defra, 2022; IPCC, 2019). Additionally, population growth is also expected which would increase the demand for transport of food (ONS, 2024a).	Growing
Secondary raw materials and waste	This cargo type has already seen growth in transport demands and that is expected to continue. Legislation is increasingly targeting proper disposal of different types of waste (e.g. electronic waste), which will likely require specialist facilities which would push to increase transport demand (Defra, 2021b). Conversely, policies towards reuse would act to reduce transport volumes of waste whilst likely increasing other categories of transport.	
Grouped goods	Grouped goods refers to all goods that are shipped in sub-container units and can be made up of any of the other types. Methodological changes in government accounting make it very difficult to detect trends. Pursuing efficiencies and sustainability in logistics will likely see a growth of groupage with government policy attempting to make it easier (Cabinet Office, 2023).	

Commodity	Trajectory Prediction	Predicted Future Trend
Machinery and equipment	Machinery represents a steady demand for transport and is expected to grow. The UK is committed to increased building and a decarbonisation transition that will require new machinery and equipment to be manufactured and distributed across the country (DESNZ, 2023).	Slightly Growing
Other non-metallic mineral products	A growing cargo type that is expected to either plateau or continue to grow. A prioritisation for new built environments will likely see an increase in demand for raw building materials, such as sand and quarried materials (Homes England, 2023). Alternatively, more reuse in construction could mitigate this trend.	Stable or Growing
Textiles and leather products	Whilst a small cargo type it has been stable and is expected to remain so in the future. Recent methodological changes in accounting lead to low confidence in assessing the trend. Fast fashion demand has grown significantly in the UK which is linked to increases in transport requirements (Environmental Audit Committee, 2019). Policies against fast fashion with increased reuse would likely hold transport demand steady as reduction in new goods transport compensated by more waste being redirected back into this category for reuse (DfT, 2017).	Stable
Metal ores (and other mining & quarrying products)	Metal ores have shown to generate a steady demand for transport and no change is anticipated. An increasing focus on sustainability and recycling could see a reduction in the transport of raw materials like metal ores but is likely to be matched by overall growth in demand (BEIS, 2022b).	
Transport equipment	Primarily made up of automative vehicles this cargo type has seen steady demand and that is expected to continue. High uncertainty due to the extent to which an electrification versus modal shift strategy is pursued for decarbonisation of the transport sector. Electrification without high modal shift would result in continued demand for	

Commodity	Trajectory Prediction	Predicted Future Trend
	the transport of new vehicles. Government policy would currently map to this outcome (DfT, 2022d).	
Equipment and material utilised in the transportation of goods	Highly fluctuating type of cargo with future trends hard to discern. Increased focus on sustainability is likely to drive down the raw volume of packaging required which would see demand fall (Defra, 2021b).	Stable or Declining
Wood, products of wood (except wood furniture)	A declining cargo type of transport demand that is expected to fall further. It is made equally between paper goods and non-furniture wood products. A continued digitisation of media will likely influence a continued decline in demand for printed goods.	Declining
Coke and refined petroleum products	Steady demand for transport is observed but is expected to decline in the future. A successful transition to a low-carbon economy should see this category collapse in the medium to long term. In the short to medium term however, petroleum products could simply replace each other (e.g. oil being replaced by LPG), or the transition could falter overall (BEIS, 2022a).	
Basic metal (except machinery)	Basic metal is expected to continue to reduce in significance. Increased sustainability could see lower levels of demand for raw materials which would a reduction in demand however that is highly dependent on the degree of which items are reused as opposed to recycled and the locations of the recycling facilities (BEIS, 2022b).	
Furniture; other manufactured goods	Transport of these goods has significantly declined over the last decade and no major changes to this trend are anticipated. Increasing reuse would likely see a further reduction in demand given goods are likely to be reused in the local area rather than any extensive redistribution occurring (Defra, 2021b).	

4.5 Conclusion & Key Chapter Findings

This chapter has offered valuable insights into both the future trajectory of HGV usage and the current levels of activity across the TfSE area, alongside projections for the key market segments identified in Chapter 3. The key findings are as follows:

- **High HGV Movements:** Total HGV vehicle kilometres across the TfSE area has consistently ranged between 3 and 3.5 billion kilometres per year over the past three decades. This shows the deeply ingrained nature of road-freight movements in the area and highlights the significant impacts of such high-traffic levels including congestion, poor air quality and increased carbon emissions. These factors collectively highlight an opportunity for alternative sustainable transport modes for freight, such as waterborne.
- **Increased Growth in HGV Movements:** There is a forecasted substantial growth in HGVs on the TfSE area's roads, with increases ranging from 17% to 28% depending on the forecast scenario. This increase will potentially compound existing challenges relating to HGV use. This finding also strengthens the case for transferring some freight movements to waterborne modes, since it will contribute to alleviating these issues.
- **Key HGV Freight Growth Segments:** Of the ten types of commodity that are identified as having some evidence of feasibility for modal shift to waterborne as well as contributing a substantial amount to demand for road freight (identified in Section 3.3), nine of them are expected to experience growth or stable demand in the future. Only 'Wood, products of wood (except wood furniture)' is expected to experience a decline in demand for transport. 'Other non-metallic mineral products' and 'Products of agriculture, hunting and forestry' are assessed as highly suitable for transfer to waterborne freight and have substantial HGV demand which is expected to grow into the future – these are priority opportunities for shifting to waterborne modes.
- **Data Challenge:** No commodity-level forecasts of HGV freight demand are available in the public domain. Furthermore, the robustness of dataset for determining historical trends is limited. This is because DfT historical observations of HGV freight, published by the DfT (2023f), for the years 2023 and 2022 are not comparable with the years prior to 2022 – according to DfT recommendations.

This chapter has concluded that, left unchecked, there will be a growth trend in the demand for movement of goods by HGVs – driven in part by increasing population. Many of the freight market segments identified in previous chapters as being suitable for transfer to waterborne freight are included in this. It is likely that acting now to try to reduce reliance on HGVs for freight for these segments would also be beneficial for the future.

Data gaps and availability have consistently posed challenges throughout this study, affecting the ability to fully address key research questions. The following chapter details our approach to tackling these issues and provides recommendations to mitigate these challenges going forward.

5 Chapter Five – Data Gap Analysis

5.1 Overview

Addressing the key study questions (as set out in Chapter 1) has been impacted by the availability of suitable data. This Chapter sets out the data dependent questions and the data limitations. It then discusses the data required to assess the feasibility of achieving substantial mode shift of freight from HGVs to waterborne vehicles. These requirements are compared against currently available to data. Recommendations are made for addressing the identified data gaps.

Table 5-1 sets out the study questions that were largely dependent on analytical data. It also describes our approach to addressing each question, and the key data limitations.

Table 5-1: Relevant Study Questions & their Data Limitations

Relevant Study Questions	Our Approach	Data Limitation
1. Understand the segmentation of the freight market suitable for transferring to waterborne transport methods.	The domestic waterborne that is already carried has been analysed at a national level to identify key commodity types and volumes. This is alongside a literature review. Findings will be supplemented through stakeholder engagement as presented in Chapter 6 of this report.	Publicly available data on waterborne cargo does not provide sufficient cargo type segmentation, or sufficient segmentation on trip length and origins and destination. Understanding the volumes transported within each of these segments will provide a richer understanding of the existing waterborne freight activities. Additionally, there are no publicly available forecasts for the volumes which could be carried by waterborne freight in the future.
2. Assess whether there is a substantial volume of freight, currently reliant on road	Data on the quantity of freight loaded and unloaded from HGVs within the TfSE area has been analysed, segmented by commodity type. This is supplemented with analysis of the quantity of	There is insufficient granularity on the geospatial and commodity segmentation of HGV freight. Whilst reasonable granularity can be achieved for one of these

Relevant Study Questions	Our Approach	Data Limitation
networks, that could be efficiently shifted to waterborne transportation	freight transported by HGVs between different origin and destinations – for all commodities combined.	individually, the granularity of both combined is insufficient.
3. Project the future trajectories of relevant market segments.	We have produced future trajectories for HGV traffic (all commodities combined) within the TfSE area. This is supplemented by qualitative appraisal of the future demand for movement of key commodities.	No commodity-level forecasts of HGV freight demand are available in the public domain. Furthermore, there is no suitable dataset for determining historical trends - which could be extrapolated to give a forecast.

The remaining three study questions (as outlined below) are explored through the stakeholder engagement process (see Chapter 6):

4. Evaluate the viability and competitiveness of establishing a coastal shipping service connecting ports along the coast.
5. Identify necessary infrastructure enhancements and modifications essential for facilitating a seamless transition to waterborne freight transportation.
6. Investigate the economic sustainability of this transition, potentially attracting participation from private sector operators.

5.2 Data Limitations

Close collaboration with TfSE and stakeholders (e.g. Network Rail) ensured that the best available data has been used to assess the feasibility of shifting freight from HGVs to waterborne modes in the TfSE area. Analysis of data from sources including the DfT, Network Rail, Office for National Statistics (ONS), and Ordnance Survey, has been conducted to understand the following insights for the TfSE area:

- Contextual information on the key locations.
- Workforce availability.
- Infrastructure capacity for waterborne freight.
- The amount of freight loaded and unloaded from HGVs.
- Key origins and destinations for HGV journeys.
- The amount of freight already carried by IWW.
- The amount of freight being handled already at port locations.

5.3 Waterborne Freight Feasibility Themes

We have identified the following data-led themes as key for determining the feasibility of waterborne freight:

- **Freight Demand:** The amount of freight that could or would be shifted to waterborne modes (both now and in the future) needs to be determined, including information about the origins and destinations of its supply chain, quantity, and goods type. Owing to the uncertainty about how supply chains might adapt to the introduction of waterborne freight, this assessment should be done under a range of scenarios reflecting different assumptions. For example, whether distribution centre locations are based near to waterborne infrastructure.
- **Waterborne Freight Infrastructure:** The infrastructure required to facilitate the increase in freight demand needs to be determined and compared to existing infrastructure. There is an interplay between freight demand and infrastructure requirements, so a range of scenarios should be assessed.
- **Operational Factors:** Other factors which will be important for the feasibility of waterborne freight include the transport and loading times, capacity and, running costs of the waterborne vehicles, as well as the availability of suitable personnel in areas surrounding loading and unloading infrastructure.

5.4 Gap Analysis & Recommendations

Table 5-2 presents the assessment of the required data under each of the feasibility themes, compares this to what is currently available and outlines recommendations on how any data ‘gap’ might be filled.

Table 5-2: Data Gap Analysis & Recommendations

Theme	Data Requirement	Data Currently Available	Recommendation
Freight Demand	HGV flows including information on quantity of freight, origin and destination, and goods type.	Data on each of the required aspects is published separately by DfT and has been presented in Chapter 3. Because they are separate, they give a fragmented and incomplete picture of HGV freight movements, additionally data for some flows is not revealed.	DfT holds data that sufficiently fulfils the data requirements, but it is restricted due to commercial sensitivity. Highlighting that this data would be an enabler in achieving freight mode shift from HGVs is recommended. Additionally, development of a multi-modal freight model (see below) would meet this data requirement. This could also be used for forecasting.
	Domestic waterborne freight flows including information on quantity of freight, origin and destination, and goods type.	DfT publish information on the amount of goods unloaded and loaded from waterborne vehicles at ports (as presented in Section 3.5). Insufficient information is available to identify the origin and destination port of domestic waterborne freight, along with cargo type.	Highlight to DfT that publishing domestic level origin-destination paired waterborne freight flows, segmented by cargo type, would be an enabler in achieving freight mode shift from HGVs. Additionally, development of a multi-modal freight model (see below) would meet this data requirement. This could also be used for forecasting.
	The location, size and use class of warehouses.	Fragmented data is currently available from ONS and the	Highlight to the VOA that releasing more granular versions of the data

Theme	Data Requirement	Data Currently Available	Recommendation
		Value Office Agency (VOA) (as presented in Section 2.4), however this does not give the complete picture owing to insufficient granularity on the location or type of warehouse.	they hold would be an enabler in achieving freight mode shift from HGVs. Private suppliers, such as Savills, may be able to provide additional data.
	The quantity of freight flowing between origins and destinations, forecast for the future under a range of scenarios, segmented by mode and goods type.	No publicly available datasets are suitable to investigate this requirement, however there are privately owned models which could be adapted.	Investigate the cost associated with developing a freight model (based on existing models) which can be used for forecasting under a range of different future scenarios.
Waterborne Infrastructure	The quantity and type of goods already handled in each port.	Data is available for major UK ports, as presented in Section 3.5. No data is available for minor ports.	Highlight to DfT that expanding this data release to minor ports is desirable.
Operational Factors	Transport times, loading times, capacity and, running costs of the waterborne vehicles.	No datasets have been found in the public domain.	Engage with vessel operators to obtain high-level estimates for this information.
	Number of available personnel to staff increased freight handling around waterborne freight infrastructure.	Section 2.2.3 discussed the number of people already employed in waterborne freight related activities.	The available data provides a sufficient evidence base for suggesting that there is likely a suitably skilled workforce base in the areas of waterborne freight operations. It could be enhanced through specific employment

Theme	Data Requirement	Data Currently Available	Recommendation
			market modelling to examine what workforce could become available in the area (e.g. through retraining) if waterborne freight increased.

5.5 Conclusion & Key Chapter Findings

A summary of key chapter findings is provided below:

- **Limited Freight Data:** The lack of suitable freight data is a challenge for understanding the feasibility of modal shift to from HGVs to waterborne freight. Existing data is fragmented, making it difficult to identify freight flows suitable for this shift. Government departments hold many of the datasets required, but do not readily share them owing to the risk of sharing commercially sensitive information.
- **HGV Freight Data:** Critical data includes the volume of freight moved between origin and destinations (represented at a local authority level of granularity, or smaller), segmented by goods type and mode of transport. This should be available for a range of future scenarios.
- **Waterborne Data:** Improved data on existing waterborne freight activities would provide better understanding about the types of goods that are suitable for waterborne freight. Greater granularity of good types, particularly cargo currently classified as 'grouped', and origin and destination information would be highly beneficial.
- **Adaptive Logistic Chains:** The introduction of additional SSS and IWW waterborne freight services might cause existing logistics chains to dramatically alter, as they take advantage of any benefits waterborne freight might offer. The introduction of waterborne freight services between an origin and destination might induce additional demand for freight transport between that origin and destination, beyond what is already carried by HGVs. For a given origin and destination, predictions of waterborne freight usage based on existing HGV freight volumes might be an underestimate.
- **A New Model:** Model output data can address both of the challenges described above. Model data can be used to provide the data granularity and segmentation to understand current HGV freight flows and identify those which might be suitable for shifting to waterborne freight. A model can also be used for investigating potential future scenarios, including ones in which logistics chains adapt owing to the availability of waterborne freight options.

The best publicly available data has been used and analysed by this study. However, in most cases, additional data sets would enhance the analysis and conclusions that can be drawn – allowing the study questions to be more fully answered or answered with a greater degree of certainty. Additional data would ideally combine greater granularity and measurements of factors more specific to the study question. In most cases, no known datasets are available to achieve this. Acquiring better data would involve gathering new source data, combining existing disparate data sets, or developing a new model – the latter of these likely being the most achievable. These datasets would be highly beneficial and allow a range of high value insights but would require substantial resources.

6 Chapter Six – Stakeholder Insights

6.1 Overview

In parallel to the data analysis outlined in the previous chapters, a series of engagement activities were conducted. These were used to understand trends, issues and opportunities that might not be apparent in the data, to validate findings and provide local insights. This information was key to addressing study objectives, such as, assessing the viability and competitiveness of establishing a coastal shipping service, identifying required infrastructure enhancements and evaluating the economic sustainability of the transition.

To capture diverse perspectives, a wide range of key stakeholders were engaged, including local authorities, port operators, national government bodies, and other relevant industry players. Each stakeholder group brought unique expertise and viewpoints, from regulatory and infrastructure considerations to operational and economic concerns. Table 6-1 provides an overview of the engagement activities conducted, the purpose and the organisations represented. The interactive platform Miro was used to gather insights (see Appendix A – Stakeholder Insights).

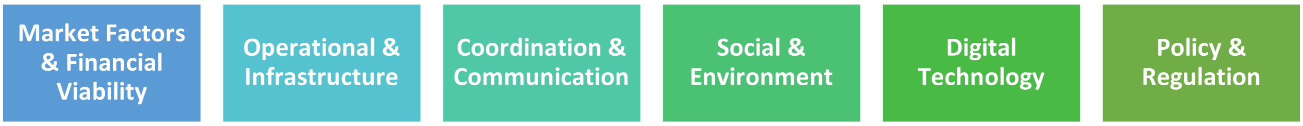
Table 6-1: Overview of Stakeholder Engagement Process

Engagement & Purpose	Organisations Represented	
Workshop 1 – Challenges & Opportunities: Identify initial challenges and opportunities for expanding waterborne freight.	• Southampton • Portsmouth • DfT • AB Ports • Portsmouth Port	• Portsmouth Port • Port of London Authority • Amazon • TfSE
1 x 1-1: Gain a more detailed, case by case insight that explores waterborne expansion including challenges and opportunities experienced by the organisation.	• Logistics UK	
Workshop 2 – Key Findings & Local Insights: Present and discuss initial study findings and continue to draw out key local opportunities, short-term priorities and to discuss next steps.	• Brighton & Hove Council • Solent Transport • AB Ports • Portsmouth City Council • Portico Shipping • Amazon	• Logistics UK • DfT • Shoreham Port • Road Haulage Association (RHA) • Southampton City Council • TfSE

6.2 Approach

The findings from the multiple engagement sessions have been categorised under key themes, see Figure 6-1. A brief summary of each theme is outlined below.

Figure 6-1: Key Discussion Themes



- **Market Factors & Financial Viability:** Examines the economic challenges and competitive dynamics that impact the cost-effectiveness and financial sustainability of waterborne freight.
- **Operational & Infrastructure:** Addresses the physical and logistical requirements for waterborne transport, including port infrastructure, vessel availability, and the facilities needed to efficiently move freight.
- **Coordination & Communication:** Focuses on the collaboration and information-sharing needed across stakeholders, including freight operators, ports, and authorities.
- **Social & Environment:** Considers the social impacts and environmental benefits of waterborne freight, such as reduced emissions and traffic congestion.
- **Digital Technology:** Highlights the role of digital tools and systems.
- **Policy & Regulation:** Covers the policies, regulatory frameworks, and government incentives necessary to support and expand waterborne freight.

6.3 Key Insights

6.3.1 Market Factors & Financial Viability

6.3.1.1 Key Challenges

- **Freight Competitiveness:** Highlighted as one of the biggest challenges to waterborne freight expansion. Ports continually review commercial opportunities for coastal shipping, however, it frequently struggles to complete with road freight, due its geographical extensiveness, flexibility and lower operating costs. Stakeholders noted that if waterborne options were more commercially viable, they would already be pursued by the private sector. For example, many viable sea journeys run parallel to faster and more efficient road and rail networks. This, in combination with most freight designations from international ports heading inland, limits port-to-port SSS waterborne opportunities within the TfSE area, with few exceptions, such as the Isle of Wight.
- **Infrastructure Investment & Funding:** Expanding waterborne freight requires significant investment, with high port infrastructure costs leading to

a funding stalemate amongst stakeholders, as none can bear the costs alone. Additional handling expense and high shipment volumes are also required to make waterborne transport competitive.

- **Economic & Market Constraints:** High costs and longer transit times further limit competitiveness. Many end users prioritise cost, and without incentives to test or pilot waterborne freight, industries are hesitant to shift from established land transport modes. Additionally, unless distribution centres are located near waterways, justifying waterborne freight remains difficult, which will require additional investment.
- **Sustainability & Collaboration Goals vs. Cost:** Although interest in sustainable transport is rising, cost remains a key factor. Shared transport, such as integrating passenger and freight services like Hovertravel, could reduce costs, but current infrastructure lacks adequate multi-user support for collaboration.

6.3.1.2 Key Opportunities

- **Shared Transport Solutions:** Multiple operators could work together to utilise existing networks to reduce costs, improve efficiency, and attract broader customer bases. For example, integrating passenger and freight services, where vessel costs can be offset by passenger fares, with smaller contributions from freight operators could support making waterborne freight more competitive. Additionally, it would help make higher frequencies and longer operating hours more viable than if these services operated to serve foot passenger demand alone. Alongside collaboration, it requires careful management of journey times to maintain a positive customer experience.
- **Growth at Smaller Ports:** There is an opportunity for expansion at smaller ports that have redundant quayside space. These facilities can be revitalised to handle increased freight volumes, particularly for niche markets. For example, the Tipner Site in Portsmouth was cited as has having some accessible waterfront/quay that could be used for the maritime industry. However this is limited to supporting activities such as boat maintenance and construction, marine infrastructure and research.
- **Value-Added Services:** Vessel operators can enhance their competitiveness by offering third-party freight handling services, such as warehousing or order fulfilment, which would streamline logistics by reducing the complexity of the supply chain and attract more customers seeking integrated solutions.

6.3.2 Operational & Infrastructure

6.3.2.1 Key Challenges

- **Limited Infrastructure & Slow Transit:** The absence of suitable IWW to carry cargo and the slower speeds of waterborne freight compared to other modes pose logistical challenges, particularly for high-frequency, time-sensitive shipments. This issue is compounded by seasonal/weather disruptions and planned/unplanned outages. For example, one stakeholder mentioned that, within the Solent there is a lack of IWW due to them deprioritised in the 19th and 20th Century as rail and road transport became more prevalent.

- **Last-Mile & Warehousing Gaps:** Stakeholders expressed that many piers and ports are not located near warehousing facilities, making last-mile delivery complex and costly. The limited availability of vessels suited for last-mile logistics and the need for specialised infrastructure, such as ro-ro capabilities, further hinder operational feasibility.
- **Complexity & Capacity Issues:** Capacity limitations and the high capital cost required for infrastructure upgrades limit scalability and efficiency. Due to sizing limitations, there is also a lack of availability of smaller boats to support expansion at smaller ports.
- **Supply Chain Complexities:** Waterborne freight requires additional supply chain handling 'touchpoints' compared to road freight, such as a party to manage the freight on board the vessel, between the warehouse and last-mile delivery. This further increases transit times and costs.
- **Port Specialisation:** Whilst the geography of ports along the south coast of the TfSE area indicates that SSS could be a viable option, each port tends to specialise in specific cargo which means that growth is limited to the transportation of goods due to the specific infrastructure required. To enable SSS, ports would need to align in handling similar cargo types.

6.3.2.2 Key Opportunities

- **Integration with Last-Mile Solutions:** Whilst ports are reluctant to allow bike and micro-mobility options on-site, there is a significant potential to link waterborne freight with these emerging last-mile solutions, that do not rely on road transport, to unlock end-to-end sustainable parcel deliveries.
- **Investment in Infrastructure:** New infrastructure, such as port recharge facilities for short-distance electric ro-ro shipping, could support the growth of sustainable waterborne freight. Upgrading existing ports to increase capacity and capability, as well as ensuring sufficient berth space, would facilitate enhanced operations.
- **Synergistic Rail-Waterway Movements:** Establishing synergies between rail and waterway movements could optimise logistics and enhance the attractiveness of waterborne transport as a viable option.
- **Multi-Use Infrastructure:** Exploring the multi-use potential of existing infrastructure and landing points can lead to greater efficiencies and reduced costs. Designing piers with space for light freight operations, such as e-cargo bikes, could further facilitate this integration.
- **Coastal Wharfs:** There is potential to revitalise small wharfs on coastal waterways, generating construction and operational employment opportunities outside of larger ports. Although economic viability will be a key concern.

6.3.3 Coordination & Communication

6.3.3.1 Key Challenges

- **Collaboration Challenges:** Freight operators are often hesitant to hand over consignments to third parties due to concerns about reliability, control and standards, which acts a barrier for efficient multi-operator networks. Uncertainty around whether to adopt a single-operator versus multi-operator models adds to the challenge.
- **Awareness Gaps:** Many industry players and local authorities lack an understanding of waterborne freight's benefits and requirements, that include the ability to operate 24-hours a day, unlike road freight where drivers need regular breaks.
- **Resource & Expertise Limitations:** Limited waterborne freight knowledge at local authorities often leads to resistance towards this mode. Shifting established practices requires significant resources and stakeholder buy-in.

6.3.3.2 Key Opportunities

- **Public Campaign & Awareness:** A targeted campaign promoting the shift from road to water freight could drive support for waterborne expansion by showcasing benefits like an overall reduction in HGV traffic and lower emissions. Effective messaging could engage the public and businesses, building momentum for investment and policy adjustments.

6.3.4 Social & Environment

6.3.4.1 Key Challenges

- **Planning:** Housing development and other competing land pressures compete with freight infrastructure, limiting space for freight operations and resulting in a lack of site allocations. The proximity of ports and wharves to environmentally protected areas adds complexity, while access and maintenance of wharves are also key challenges. It was highlighted that, in areas like the Solent, competition from marinas, leisure, and residential projects further restricts waterfront development for coastal shipping.
- **Congestion & Air Quality:** To support the transfer of goods on and off ships, waterborne may increase HGV traffic into ports, which could increase congestion and air quality pollution at port locations.

6.3.4.2 Key Opportunities

- **Reducing Emissions:** Emphasising the positive environmental impact of waterborne transport, such as reduced CO_2 emissions compared to road freight, could support gaining public and industry support for the transition. Additionally, shifting freight from road to water could free up road space for sustainable transport options, such as public transport.
- **Traffic Mitigation & Resilience:** Shifting more freight from road to water could ease congestion on key roadways, improving traffic flow and reducing emissions. Additionally, increasing the viability of additional transport modes,

such as waterborne, could increase supply chain reliability in the event of disruptions, such as rail strikes or fuel shortages.
- **Job Creation:** Revitalising smaller ports and terminals could create employment opportunities in areas with historically high unemployment.

6.3.5 Digital Technology

6.3.5.1 Key Challenges

- **Tracking & Liability Issues:** Effective waterborne logistics need digital systems for tracking, liability, and customs to ensure transparency and timely updates on goods' location, status, and availability, in order to be competitive with other modes, such as road transport.
- **Challenges with Last-Mile Logistics:** Digital solutions are critical for managing last-mile logistics in waterborne freight, as delays must be addressed immediately to meet customer expectations for speed and reliability.

6.3.5.2 Key Opportunities

- **Autonomous Shipping:** These technologies could also reduce operational costs and improve the competitiveness of waterborne freight.
- **Data:** There is a need for national government to collect higher quality data regarding goods and demand. Improved data collection on goods movement and demand patterns across the UK would provide crucial insights for optimising freight strategies.

6.3.6 Policy & Regulatory Barriers

6.3.6.1 Key Challenges

- **Urban Restrictions:** Local authorities often resist increases in industrial traffic through urban areas, making it difficult to secure necessary licenses and regulatory approvals for new waterborne freight services.
- **Limited Government Support:** Although government incentives, like the DfT freight mode shift grants, aim to make waterborne freight more competitive than road transport, they may not fully cover the full spectrum of support needed for expansion and pilot projects to demonstrate success.
- **Absence of Growth Targets:** The absence of national growth targets for waterborne freight indicates it is not a government priority. This is in contrast to other modes, like rail, which have clear expansion goals, leading to inconsistent support.
- **Regulatory Gaps:** The lack of standardised regulations for handling Dangerous Goods across IWWs requires individual assessments by Marine Coastguard Agency representatives. Working practices approved on one waterway, such as the River Thames, may not be permitted on others, such as the River Tyne, creating operational and compliance challenges.

6.3.6.2 Key Opportunities

- **Safeguarding Sites:** It is essential to safeguard existing waterborne infrastructure in planning policies to ensure they remain viable for future freight activities. It would be useful if local plans could support modal shift from HGVs to waterborne freight by acknowledging the role of any IWW and SSS opportunities in their area. This would also enable the protection of existing infrastructure where it exists especially when planning for nearby residential developments..
- **Government Incentives:** Central government grants and subsidies can promote shifts to waterborne transport, encouraging decisions beyond just cost. This financial support can drive investment in necessary infrastructure and services. For example, the Freight Facilities Grant by Transport for Scotland supported the additional development at the Carrs Flour Mill in Kirkcaldy Harbour (Transport for Scotland , 2021). The harbour has moved over 1 million tonnes of wheat by SSS and saved over 70,000 truck journeys in and out of the Kirkcaldy Mill (Forth Ports, 2023).
- **Consistent Communication:** Establishing a cross-departmental team led by a dedicated Minister for Logistics could streamline communication and accountability in government for freight operations, including those for waterborne.
- **Regulatory Clarity for E-commerce:** Establishing clear regulations for handling dangerous goods on IWW would support the growth of last-mile e-commerce logistics, expanding the market for waterborne freight.

6.4 Place-based Opportunities

As part of engagement activities, stakeholders were asked to suggest specific locations that may be suitable to support expansion of waterborne activities. These were collated and are outlined below:

- **Southampton & Solent Area:** Sites like the Marchwood Industrial Estate, Solent Gateway, and the Port of Southampton's Strategic Land Reserve offer strategic locations for freight and logistics operations. Southampton and the Solent area could test autonomous vessel solutions already operating in the area, such as Ocean Infinity, and short-distance electric ferries, which could serve as sustainable models for regional freight movement.
- **Southampton & Rail:** Ports such as Southampton are rail connected and aspire to increase rail's market share to 40% by 2026 (BBC, 2024), offering a potential opportunity for multi-modal integration. Building on work already conducted in the region when exploring this opportunity, such as the Solent to Midlands Rail Freight Study (Network Rail, 2021), will be important.
- **London Gateway & Port of Tilbury:** The continued expansion at London Gateway and the Port of Tilbury supports the need for feeder port services,

strengthening goods connections entering the TfSE area and reducing congestion at key points.
- **Expansion along the River Thames:** The River Thames offers a vital channel for expanding waterborne freight, particularly for materials like construction waste. Collaborations with Kent-based terminals could increase cargo volumes along the River Thames and support routes from Dartford to central London. Utilising electric vessels and light freight services along the River Thames could further reduce the load on road networks and create resilient logistics solutions.
- **Portsmouth & the Isle of Wight:** Developing off-site facilities near Portsmouth International Port could offer support for increased waterborne expansion. Enhanced cargo movement between the Isle of Wight, Fawley, and Portsmouth could lower transport costs and alleviate regional disparities. Small parcel services, such as Hoverparcels operated by Hovertravel, also present an efficient model for handling lightweight freight between these areas.
- **Gravesham:** As a key cargo hub within the Port of London, Gravesham offers strong potential for small-scale freight transport, particularly through Clipper passenger services from Gravesend into London. This could support parcel distribution, reduce road reliance, and streamline last-mile logistics. However, there are housing development pressures in close proximity, necessitating strategic planning to ensure sustained cargo handling capacity alongside urban growth.

6.5 Conclusion & Key Chapter Findings

This Chapter has provided critical stakeholder insights to understand the current level of support and feasibility of expanding waterborne freight in the TfSE area. Key findings are outlined below:

- **Competitiveness:** Crucially, stakeholders state that if waterborne options were currently commercially viable, they would already be more widely adopted by the private sector. However, whilst economic viability remains a central concern, engagement has indicated that there is support to explore waterborne freight expansion at specific sites within the TfSE area, provided they can compete effectively with established road and rail freight networks. These locations include Southampton, London Gateway, the River Thames, Portsmouth and the Isle of Wight.
- **Infrastructure & Investment:** Investment in waterborne freight infrastructure is challenging due to high costs, with ports lacking the financial capacity to undertake necessary upgrades independently.
- **Combined Transport Options:** A key opportunity lies in hybrid models, such as combined passenger and freight services, which could offset operational costs through passenger fares. Additionally, exploring the expansion of

waterborne freight should also be considered alongside sustainable freight modes such as rail and micromobility options.

- **Policy & Regulation:** Targeted government incentives and clearer regulations will be essential, such as establishing growth targets for waterborne freight and increased funding. Close collaboration with local authorities will also be key to safeguarding waterborne infrastructure within urban planning.
- **Coordination & Knowledge Gaps:** Building cross-sector partnerships and increasing the knowledge of waterborne freight and local authority issues so that port operators, and freight companies could help support pilot projects to increase awareness of its long-term environmental and operational benefits.

7 Chapter Seven – Key Challenges & Opportunities

7.1 Overview

In this Chapter, we assess the key challenges and opportunities that have emerged during development of this study and assess their ability to influence the expansion of waterborne freight in the TfSE area.

7.2 Approach

Chapters 2 to 6 were thoroughly reviewed to identify the key challenges and opportunities. To avoid duplication, where relevant, similar challenges and opportunities have been grouped together and combined. The themes have been informed by the categorisation framework used in Chapter 6. The impact and viability assessments have been informed by the evidence outlined in this report.

7.3 Key Challenges

Table 7-1 summarises the key challenges identified during development of this study. Each one has been assessed for its impact on expanding waterborne freight using the following scale:

- **High Impact:** Challenges that have a significant impact.
- **Medium Impact:** Challenges that have a notable influence.
- **Low Impact:** Challenges that exert a minor influence.

The table also includes the supporting rationale for each assessment.

Table 7-1: Key Challenges and Mitigating Actions

Challenge	Impact	Rationale	Potential Mitigation Actions
Market Factors & Commercial Viability			
Competing land pressures.	High	Competing land uses (housing, commercial development, etc.) near ports and waterways can drive up costs for land, making the expansion of waterborne freight more expensive.	Safeguard existing waterborne infrastructure via Local Plans policies to protect port land from repurposing for non-freight uses.
Commercial viability of waterborne against other modes.	High	Waterborne freight often struggles to compete with the flexibility, speed, and geographic coverage of road freight, particularly in time-sensitive industries.	Requires incentives and funding to mitigate investment costs and make it a more commercially viable option.
Limited goods types.	Medium	Not all goods are suitable to shift to waterborne freight, such as time-sensitive deliveries. This narrows and restricts the opportunities available to waterborne freight to certain goods.	Prioritise goods that are suitable for waterborne freight and focus efforts in those sectors.
Operational & Infrastructure			
Geographically constrained IWWs.	Medium	Expansion is constrained by the navigability of waterways for modern vessels, such as shallow waters, narrow channels and overall limited connectivity across the TfSE area.	Focus expansion efforts on regions where IWW are already navigable, such as the River Medway, or where can be feasibly upgraded.
Capacity constraints in and around ports.	High	Limited port capacity creates competition for land, increases costs, and hinders the potential for expanding waterborne freight.	Safeguard and allocate port land through planning policies and long-term development plans.
Low coastal rail connectivity and insufficient RFIs.	High	Limits the potential for effective multimodal transport systems.	Develop evidence base to secure investment to expand coastal rail connectivity and RFIs.

Challenge	Impact	Rationale	Potential Mitigation Actions
		Policy & Collaboration	
Limited waterborne freight knowledge.	Medium	Lack of awareness about the benefits of waterborne freight can lead to resistance from stakeholders, such as local authorities, businesses, and the public.	Awareness raising and increasing knowledge, particularly within the public sector (e.g. local authorities) and freight logistics operators).
Waterborne freight is not a priority mode.	High	Often overlooked due to a lack of growth targets and prioritisation. Without funding and clear policy support, waterborne freight fails to gain momentum, especially in comparison to road or rail transport.	Advocate for government prioritisation by establishing clear national targets, policies and incentives.
		Social & Environmental	
Increasing HGV movements.	High	Projected increases in HGV movements (17-28%) will exacerbate road congestion, carbon emissions, and pressure on infrastructure, making the need for alternative modes like waterborne freight more urgent.	Continue to promote waterborne freight as a sustainable solution to reduce road congestion and emissions.
		Data for Decision Making	
Geospatial and commodity data lacks granular insights.	Medium	A lack of granular data on freight flows and commodity types hinders the ability to identify specific opportunities. Without this data, it is difficult to create effective business cases for waterborne freight expansion.	Enhance current geospatial data and commodity flow mapping through collaboration between the public and private sectors.

7.4 Key Opportunities

7.4.1 Broader Opportunities

The broader opportunities were assessed based on their viability and the scale of potential benefits:

- **Viability:** Considers the likelihood or ease of implementing the opportunity.
- **Impact:** Relates to how much freight could be moved from HGVs to waterborne transport.

These assessments were combined to produce an overall RAG rating, reflecting the cumulative impact of both factors:

- **Red:** Low impact and low viability.
- **Amber:** High impact with low/medium viability or medium/low impact with high viability.
- **Green:** High impact and high viability.

The results of this assessment and supporting rationale are outlined in Table 7-2.

Table 7-2: Enabling Opportunities Impact & Viability Assessment

Opportunity	Viability	Scale of Impact	Rationale	RAG
Market Factors & Commercial Viability				
Develop shared transport solutions for example providing combined freight and passenger transport services.	Medium	Low	The success of combined freight and passenger transport in the TfSE area shows that shared solutions are feasible in specific, high-demand routes with established infrastructure. This opportunity may be financially viable for routes where there is a high demand for passenger travel. In most cases, travel by land will be quicker and more attractive to passengers. Therefore, it could provide incremental, but limited overall, support for freight expansion.	
Support value added services such as vessel operators providing logistics services.	Medium	Low	It would be challenging for vessel operators to outcompete established service providers – indicating an uncertain financial viability. Additionally, the goods most suited to waterborne freight transport are less in need of these services, reducing customer demand and making the overall impact likely minimal.	
Operational & Infrastructure				
Focus on shifting Bulk & Aggregate Goods from HGV to waterborne.	High	High	Bulk & Aggregate Goods are highly suitable for waterborne transport due to their volume and relatively low time-sensitivity and the proven financial viability of transporting goods of this type by waterborne freight (between suitable locations). However, the viability of this shift depends on confirming suitable HGV flows exist within the TfSE area. If there are suitably large	

Opportunity	Viability	Scale of Impact	Rationale	RAG
			quantities of freight identified, shifting these to waterborne transport will have direct benefit.	
Expand IWW network by creating new IWW connections.	Low	High	The construction of new IWW connections faces substantial challenges, primarily high infrastructure costs and complex local planning restrictions. Financial viability of such projects would require long-term guarantees of sufficient freight volumes to recoup investment. However, an expanded IWW network could substantially increase the reach of waterborne freight solutions.	
Create RFIs at both ports and locations which produce or consume freight suitable for waterborne freight.	Medium	High	Whilst some ports already connect to the rail network, expanding these connections at other strategic sites could be constrained by the significant infrastructure investments required, potential space limitations at ports, and existing rail network capacity issues in the TfSE area. The financial viability of this depends on ensuring demand is sufficient to justify upgrades. Linking waterborne and rail provides the potential to remove a large amount of freight from HGVs.	
Integrate waterborne freight with last mile solutions, warehousing and other services.	Low	Low	Integrating waterborne freight for consumer goods is challenging due to the slower transit times, which do not align with the fast delivery demands typically required by consumers – compromising the financial viability of this opportunity.. As a result, the potential impact is relatively low.	

Opportunity	Viability	Scale of Impact	Rationale	RAG
Invest in infrastructure to allow operations of electric vessels.	Medium	Low	Feasible with adequate funding (medium viability of obtaining this) and supports environmental goals. However, this investment is unlikely to significantly boost freight volumes, as electric vessels don't address primary challenges in waterborne freight expansion, such as speed, cost-competitiveness, and the limited suitable good types.	
Invest in increasing port capacity and capability.	Medium	Medium	Feasible with sufficient funding and could facilitate waterborne freight if there is unmet demand due to current capacity limitations. However, there is limited evidence that port capacity and capability are significant constraints to the expansion of waterborne freight in the TfSE area. Therefore, its overall impact is likely to be limited unless there is clear evidence of demand being hindered by existing port infrastructure. May be financially viable if this demand growth is confirmed.	
Regenerate and rebuild coastal wharves on small waterways.	Medium	Low	Feasible with sufficient funding but presents challenges in terms of justifying the investment due to limited demand and capacity. Unlikely that wharves of this size will be able to accommodate freight volumes required to make a meaningful reduction in HGV use. Financial viability would require a clear case for sufficient demand to support such investments.	
Policy & Collaboration				

Opportunity	Viability	Scale of Impact	Rationale	RAG
Engage with stakeholders such as vessel operators, port operators, local authorities.	High	Medium	Many stakeholders are willing to engage. While engagement is essential to fostering cooperation and aligning objectives, the actual impact will be limited unless other core challenges—such as the financial viability of waterborne freight, infrastructure constraints, and regulatory barriers—are addressed.	
Increase the prioritisation of waterborne freight with central and local government. Possibly leading to financial incentives, clear growth ambitions and priority within planning policy.	High	High	Emphasising how the use of waterborne freight can complement some of central government's key strategic objectives, such as decarbonisation and alleviating congestion, will strengthen the case for prioritisation. Central government impact, in particular financial incentives, could provide stimulus to improve the financial viability of waterborne freight.	
Work with neighbouring STBs to identify opportunities for transferring HGV freight to waterborne. This will also	Medium	High	Collaboration is feasible and viable, however identifying specific flows for shifting to waterborne transport will likely be difficult owing to lack of data. If there are suitably large quantities of freight identified, shifting these to waterborne transport will have direct benefit.	

Opportunity	Viability	Scale of Impact	Rationale	RAG
strengthen the business case with regards to economies of scale.				
Safeguard existing waterborne infrastructure in planning policies to ensure they remain viable for future freight activities.	Medium	High	Local authorities can achieve this through planning documents like Local Plans, though competing land development pressures may make such allocations challenging though financially viable. Safeguarding existing waterborne infrastructure is critical for maintaining waterborne freight operations. The overall impact is significant, as it ensures the continued use of vital infrastructure that could otherwise be repurposed for non-freight activities.	
Improve regulatory clarity for e-commerce such as regulations for handling dangerous goods on IWW.	Medium	Low	While regulatory improvements may make it easier to handle certain types of freight, the financial viability of e-commerce transport via waterborne modes remains limited. This is due to the fundamental mismatch between the slower transit speeds of waterborne freight and the time-sensitive nature of e-commerce. As a result, the overall impact of shifting consumer goods to waterborne transport is likely to be limited.	
Social & Environment				
Raise awareness in benefits of waterborne freight, building	High	Medium	Public sector and stakeholder understanding could improve support. This opportunity is likely to be financially viable, especially if communication is conducted through existing forums. However the	

Opportunity	Viability	Scale of Impact	Rationale	RAG
momentum for investment.			actual impact on increasing waterborne freight volumes is likely to remain medium unless some of the challenges to waterborne freight's financial viability can be overcome.	
Data for Decision Making				
Increase and enhance the data available from government sources (e.g. DfT and VOA).	Medium	High	Increasing and enhancing the availability of data from government sources is financially feasible but may be constrained by confidentiality concerns. Effective data would be crucial for overcoming barriers to expanding waterborne freight, especially by identifying and quantifying suitable freight flows.	
Develop a new freight model which fills the data gaps identified in this report.	Medium	Medium	New national freight models have been developed and could be adapted for the TfSE area. This presents a financially viable opportunity, given the existing models and the significant benefits they offer. These models could help identify specific HGV flows for transfer to waterborne freight, allowing for a more accurate identification of opportunities.	

7.4.2 Site-Specific Opportunities

During development of this study, it has become evident that certain sites/ports are more viable for waterborne freight expansion that others. To provide an insight on which sites should be considered for future prioritisation we have assessed the viability and impact of the sites/ports using the same framework for the broader opportunities. These findings will inform the study's recommendations.

Table 7-3: Site Specific Opportunity Assessment

Opportunity	Viability	Scale of Impact	Rationale	RAG
Collaborate with Kent-based terminals to increase freight transferred along the River Thames.	High	Low	Collaboration is financially viable, as existing resources can be utilised, making cost a minimal barrier. Stakeholders have also highlighted this as a promising opportunity. The impacts will be more localised to the Kent area, with modest reductions in HGV use within that region, such as on the routes like the M2. However, it is unlikely to significantly reduce freight congestion or emissions across the broader TfSE region.	
Increase the use of small ports (e.g. Rye Port and Folkstone).	Low	Low	Small ports could help expand the waterborne network, although there may be limitations in the types of freight that these ports can accommodate, as they may not handle the volume of freight needed for large-scale impacts. Financial viability depends on identifying niche markets or freight types that make these ports cost-effective.	
Southampton and Solent Area.	High	Medium	Identified as suitable for expansion with regards to SSS, with new technologies already being tested. The area's existing industrial capacity offers potential, however, the focus on finished goods rather than Bulk & Aggregate Goods may reduce the demand. Financial viability is promising given the region's industrial strengths, but success	

Opportunity	Viability	Scale of Impact	Rationale	RAG
			depends on sustained demand for waterborne freight.	
Increase combined passenger and freight transport in the Isle of Wight and Solent.	High	Medium	Could utilise existing vessels and operational frameworks and services e.g. Red Funnel, minimising the need for new infrastructure. Financial viability is supported by shared operational costs and the strong demand for passenger transport in this area, but sustained demand for combined services is essential. Although the impact will be localised, the initiative could serve as a model for similar projects in the area.	
Increase the amount of freight transferred to the port by rail at Southampton.	High	Medium	Southampton Port has a rail connection and aims to expand its rail freight share, with many other freight producers across the country also connected to rail. This creates potential to transfer some freight from rail to waterborne for part of the journey. However, it's unclear how many journeys are better suited for rail-water transport versus rail alone. The financial viability of this opportunity depends on whether such transfers provide cost advantages over rail-alone solutions.	
Expand waterborne freight in TfSE locations to feed into London Gateway & Port Tilbury	High	High	Multiple opportunities for increasing the size and capacity of ports in the TfSE area have already been discussed. London Gateway and Port of Tilbury expansion will likely increase additional	

Opportunity	Viability	Scale of Impact	Rationale	RAG
– which are experiencing an increase in freight traffic.			demand for waterborne freight at feeder ports. This opportunity is likely to be financially viable, as these locations can benefit from existing demand drivers and economies of scale.	
Develop off-site facilities to support increased waterborne freight at Portsmouth International Port.	Low	Low	Highlighted as viable by stakeholders, although it is unknown whether these facilities would be suitable for waterborne freight. Financial viability is contingent on proving demand and operational feasibility, which are currently unclear.	
Develop parcel services from Gravesend into London.	High	Medium	This concept was proposed by stakeholders as passenger services are already in operation, highlighting this opportunity is financial viability. Waterborne freight might offer quicker transit times into London, where congestion is an issue, but waterborne transport is generally not ideal for parcels due to slower transit times. The proportion of HGVs involved in parcel movements is small, so the impact of the intervention of HGV numbers would be moderate at best.	

7.5 Conclusion & Key Chapter Findings

This Chapter has analysed the challenges and opportunities identified throughout this study to identify actions which would enable an increase in the amount of freight shifted from HGVs to waterborne freight. Findings from this assessment offer valuable insights into the viability and potential impact of each identified opportunity. This analysis will serve as a basis for prioritising locations and providing recommendations on the key steps needed to increase the use of waterborne freight. The recommendations and priority locations are outlined in Chapter 8.

8 Chapter Eight – Key Findings, Conclusions & Next Steps

8.1 Overview

This Chapter outlines this study's key findings, conclusions and next steps and outlines a series of recommendations that could support waterborne freight expansion in the TfSE area.

8.2 Key Findings

The study findings are extensive. We have therefore summarised the key findings into the themes outlined below.

8.2.1 Market Factors & Commercial Viability

- **High Freight Volumes:** A significant volume of freight is loaded and unloaded from HGVs within the TfSE area, including commodity types well-suited for waterborne transport, such as aggregates, metals, and petroleum products. These goods are ideal for bulk shipping due to their non-time-sensitive nature and cost efficiency.
- **Road Freight Dominance:** Despite high freight volumes, road freight remains dominant due to its flexibility, established network, and the speed demanded by consumers.
- **Cost Competitiveness:** While stakeholders are supportive of expanding waterborne freight, cost competitiveness remains the primary challenge. For waterborne freight to grow, it must become more commercially viable than road and rail options.
- **Hybrid Models:** Hybrid models, such as combining passenger and freight services or integrating waterborne with rail, could improve viability by sharing costs. However, the limited rail connectivity in the TfSE area would need to be enhanced to support this integration.

8.2.2 Operational & Infrastructure

- **Logistical Challenges:** Expanding waterborne freight in the TfSE area faces logistical challenges and high infrastructure costs, particularly for upgrading port facilities to handle increased cargo and warehousing needs.
- **Fragmented IWW Network:** The fragmented IWW network limits continuous freight movement and would require significant investment to enable viable alternatives to road transport, resulting in SSS having more potential.
- **SSS Potential:** While the geography of southern ports suggests potential for SSS, most ports specialise in specific cargo types, limiting growth to specific goods categories.

8.2.3 Policy & Collaboration

- **Lack of Incentives:** The absence of government incentives and long-term regulatory frameworks impedes the challenge of making waterborne freight competitive with other modes, such as established road and rail networks.
- **Supportive Policies:** Supportive policies could counteract some of the challenges by offering stability. For instance, growth targets could support the prioritisation of waterborne freight, planning policies could protect waterborne infrastructure from competing land use, and financial incentives could enable pilot projects, thereby building momentum for the adoption of waterborne freight. National government is responsible for setting this strategic direction, developing the necessary policies and regulations, and offering financial support and incentives.
- **Knowledge Sharing:** Increasing knowledge and expertise of waterborne freight will be imperative, particularly within the public sector so that the benefits and opportunities of waterborne freight are understood and inform decision making, including the pursuit of cross-sector partnerships.
- **Regional Level:** TfSE plays a crucial role in offering strategic direction, ensuring that waterborne freight initiatives align with regional transport and economic goals.

8.2.4 Social & Environment

- **Environmental & Social Impacts:** The heavy reliance on road freight in the TfSE area contributes to congestion, air pollution, and carbon emissions, affecting urban and coastal communities. Shifting a portion of freight to waterborne modes could help mitigate these environmental and social impacts.
- **Localised Congestion:** Increased port activity could add localised congestion near port areas.
- **Job Creation:** Expanding waterborne freight could also create additional and new job opportunities.

8.2.5 Data for Decision Making

- **Data Gaps:** Data gaps, particularly in goods type and origin-destination details, limit the ability to assess the feasibility of shifting HGV freight to waterborne modes. Detailed data on current freight movements, such as the types of goods being transported, their exact routes, and specific origin-destination point, would help provide a more detailed evidence base to inform feasibility.
- **Confidentiality Concerns:** Developing robust freight modelling systems could address these gaps, although data limitations would remain. For instance, confidentiality concerns mean that the freight and logistics sector are not open to data sharing, which will continue to impede public sector planning and decision-making.

8.3 Priority Locations for Expanding Waterborne Freight

This study has identified a number of priority locations for waterborne expansion (see Table 7-3).

8.3.1 Isle of Wight & Solent

- **Existing Infrastructure:** This region could utilise existing vessels and operational frameworks to build on this successful model, minimising the need for extensive new infrastructure.
- **Impact:** While the impact may be localised, this initiative could serve as a scalable model for similar projects.

8.3.2 Southampton

- **Rail Connectivity:** With established rail connectivity, Southampton Port is positioned to expand its rail freight share. There may also be opportunities to use waterborne freight as part of these additional rail journeys where potential destinations are accessible via both rail and port connections, however more research is needed.
- **Impact:** It is currently unclear how many journeys are better suited for rail-water transport versus rail alone.

8.3.3 Port of London Authority

- **Gateway for Expansion:** Whilst outside of the TfSE area, London Gateway and Port of Tilbury are actively expanding, creating opportunities to increase the demand for waterborne freight at smaller feeder ports. This could include posts such as Chantham Docks and the Port of Sheerness, however these options will need investigating further and validated with stakeholders.
- **Impact:** Expansion here could attract a greater volume of bulk and containerised goods for redistribution within the TfSE area. Investment in supporting infrastructure and intermodal links at these ports will be essential.

8.4 Study Conclusion

This study has demonstrated that there is some potential for shifting some road freight to waterborne modes within the TfSE area. However, there are a number of key challenges including:

- **Data:** Improved availability and use of data will enable better identification and optimisation of suitable goods and routes for waterborne freight.
- **Cost Competitiveness:** Waterborne freight must become more cost-competitive compared to road and rail transport.
- **Infrastructure Development:** Ports and intermodal connections require significant investment to accommodate increased freight volumes.
- **Policy & Incentives:** Financial incentives, long-term regulatory frameworks and targeted investments that foster collaboration between public and private stakeholders are needed. to promote a fundamental shift away from

road freight. Without these, waterborne options frequently lack the commercial appeal necessary for broad private sector adoption.

Despite these challenges there are opportunities and potential benefits:

- **Bulk Goods & Port Access** Shifting specific types of goods, such as bulk commodities, and in regions with well-established port access such as Southampton, the Solent and the Port of London Authority.
- **Environmental & Economic Benefits:** Transitioning freight from road to waterborne modes can reduce congestion and air pollution as well as support job creation, particularly in port-related activities and associated supply chains.

8.5 Recommendations

To build on the study findings, several recommendations have been identified that can help support the future increase in the use of waterborne freight as outlined below.

Table 8-1: Recommendations

Stakeholder	Recommendation
TfSE	• TfSE to liaise with the DfT about possibility of widening data collection in relation to waterborne freight to obtain more detailed information on freight volumes and inter-coastal UK routes which can offer a greater granularity to guide the further investigation of using waterborne freight as a viable alternative to both road and rail. • Encourage knowledge sharing between freight and logistics, waterborne freight operators and local authorities through the Freight Awareness Programme, possibly using memoranda of understanding to protect commercial sensitivity. • Where appropriate, support coordination across local authorities, businesses, and stakeholders to maximise the identification of opportunities and to create a cohesive approach. • Where applicable, support engagement and further discussions with key stakeholders to continue to explore waterborne freight expansion at identified priority expansion sites.
Local Planning Authorities	Where appropriate we suggest local planning authorities explore: • How and where waterborne freight can be integrated into local planning and land-use policies. This could include, where relevant, safeguarding existing waterborne infrastructure and providing opportunities in

Stakeholder	Recommendation
	local plans to increase the provision of waterborne infrastructure. • Opportunities to improve knowledge on the benefits and issues related to waterborne freight, such as through engagement with TfSE's Freight Awareness Programme.
Local Transport Authorities	Where appropriate we suggest local transport authorities explore: • Improved access for freight at local ports and/or other waterborne freight infrastructure, such as wharves, when updating local transport plans • Opportunities to improve knowledge on the benefits and issues related to waterborne freight, such as through engagement with the Freight Awareness Programme.
Ports & Harbour Authorities	Where relevant we suggest port and harbour authorities: • Continue to maintain and upgrade port facilities to support waterborne freight operations as funding allows. • Work with other transport bodies and freight operators to improve multi-user access for freight operators to improve cost-effectiveness and usage. • Continue to coordinate with local authorities on environmental regulations, such as air quality management, and operational regulations, such as health and safety.
Industry Representatives e.g. RHA & Logistics UK	• Continue to advocate for policy support and funding for waterborne freight within the sector. • Where possible, provide industry guidance on best practices for integrating waterborne freight with other transport modes. • Support data-sharing initiatives to improve efficiency and optimise logistics such as sharing data on freight, flows and routes, to support infrastructure business cases, planning and policymaking.
Freight Operators & Logistic Providers	• Consider exploring opportunities to develop and adapt logistics operations to integrate waterborne freight into supply chains where feasible. • Through representative organisations collaborate with other operators for shared transport solutions and efficiencies where relevant. • Where applicable, support data-sharing initiatives. • Where possible, actively engage with stakeholders to align efforts, support shared goals, and address sector

Stakeholder	Recommendation
	challenges collaboratively, such as through the Wider South East Freight Forum.
Warehousing Providers	• Where relevant, and as funding allows, develop and/or expand warehousing infrastructure in proximity to key waterborne transport hubs.

As a result of these challenges, the study has not been able to demonstrate that increasing the volume of waterborne freight in the TfSE area is currently financially viable. The report makes a number of recommendations about what would be needed to improve financial viability. However, even if it was found to be viable, it is unlikely to have significant impact on carbon emissions, road traffic congestion and economic growth and would deliver negligible returns for the scale of investment anticipated. Any further work would be reliant on obtaining better data on which to assess its potential in greater detail, and in the current economic climate, the significant financial investment needed for infrastructure improvements at the ports and inland waterways is unlikely to be forthcoming. Therefore, there is little prospect of the stakeholders taking the actions necessary to support an increase in the viability of waterborne freight in the TfSE area in the near future

9 Appendix

9.1 Appendix A - Stakeholder Insights

Figure 9-1: Potential Challenges for Waterborne Freight (Miro Insights)

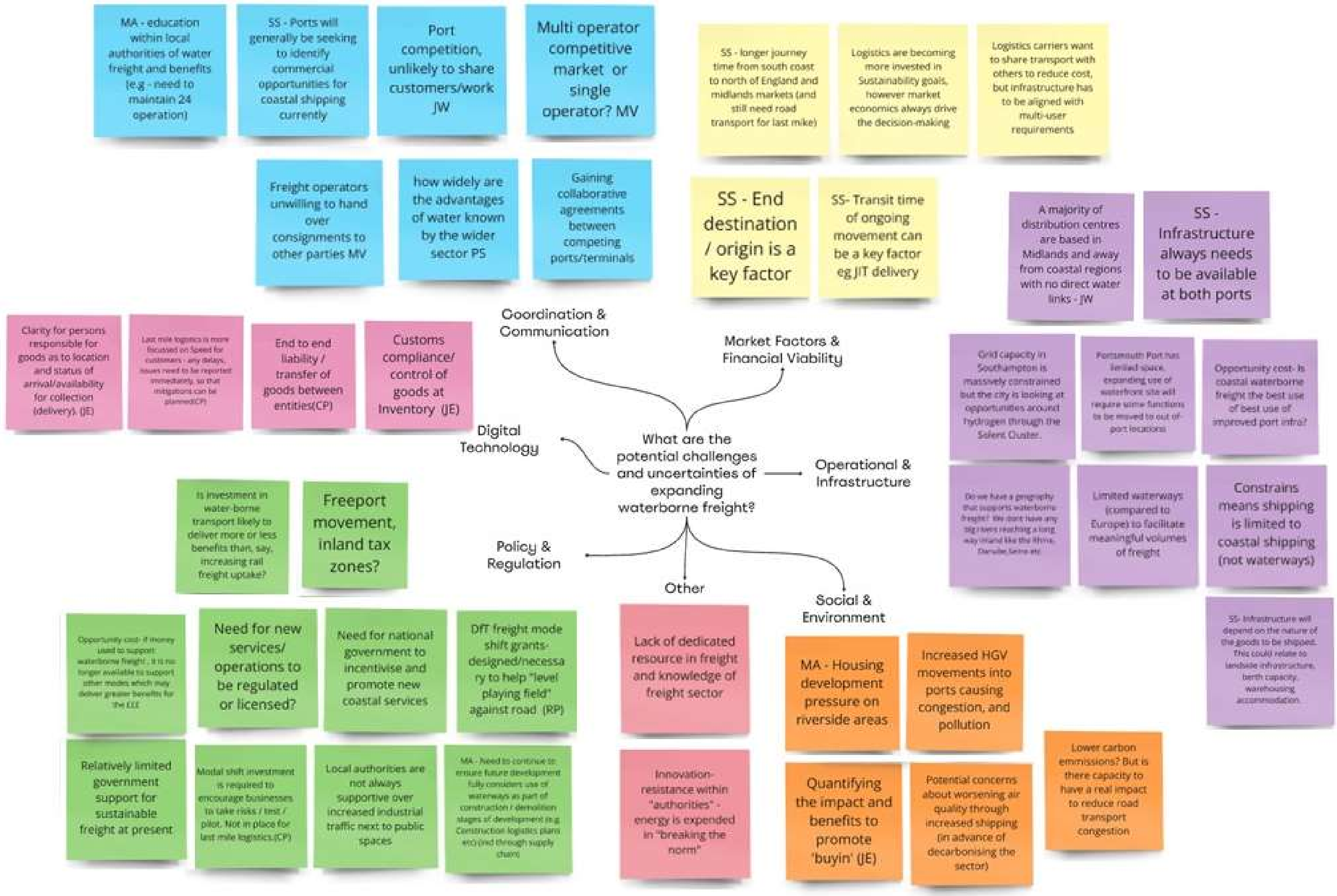
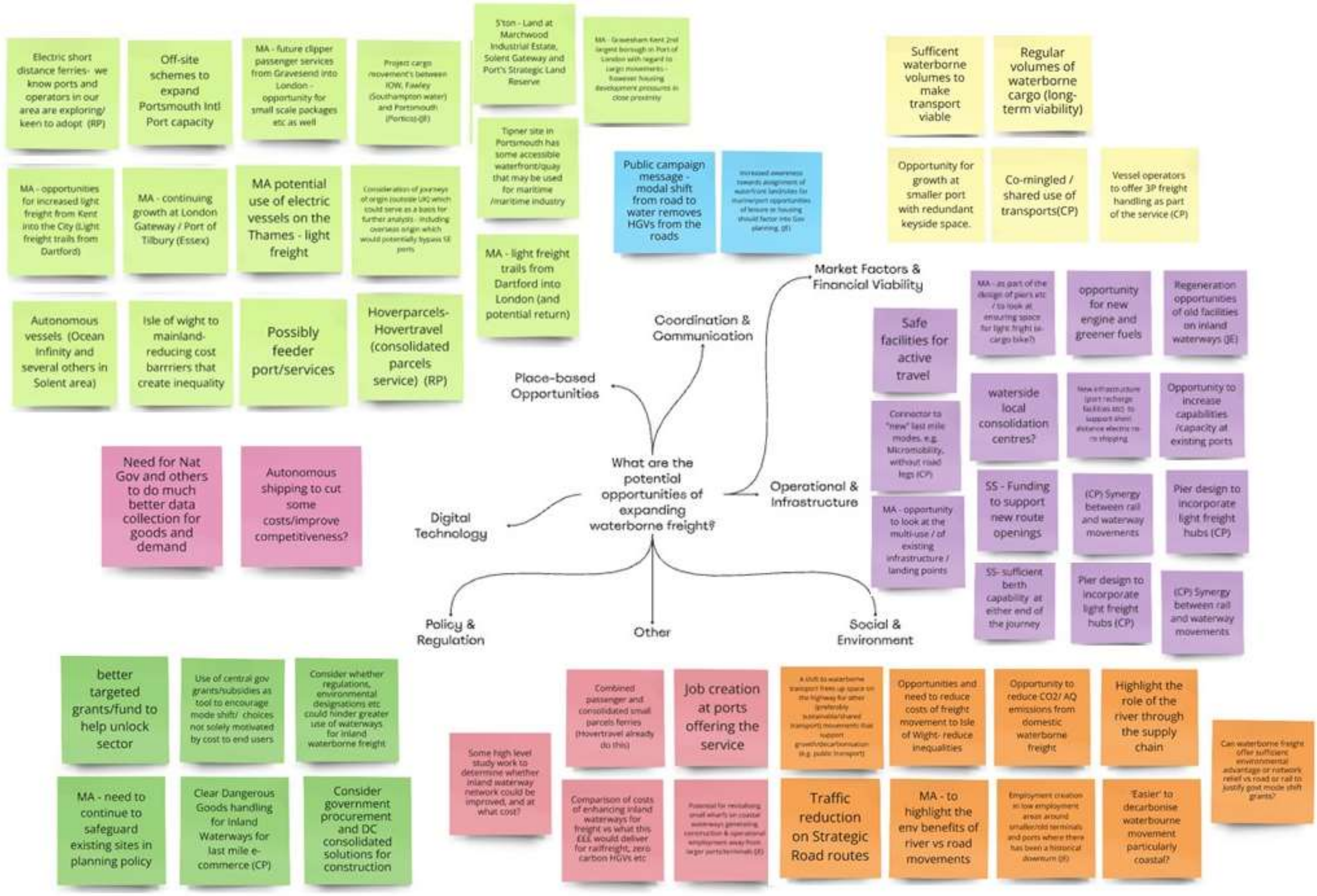


Figure 9-2: Potential Opportunities for Waterborne Freight (Miro Insights)



Bibliography

Associated British Ports. (u.d). *Southampton.* Retrieved from https://www.abports.co.uk/locations/southampton/#:~:text=Southampton%20is%20the%20UK%27s%20number%20one%20vehicle,handling%20port%2C%20processing%20900%2C000%20vehicles%20per%20year.

BBC. (2024). *Port's cash offer to get freight on rail extended*. Retrieved from https://www.bbc.co.uk/news/articles/c511p1gn746o

BEIS. (2022a). *British Energy Security Strategy.* Retrieved from https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy

BEIS. (2022b). *Resilience for the Future: The UK's Critical Minerals Strategy.* Retrieved from https://www.gov.uk/government/publications/uk-critical-mineral-strategy

Cabinet Office. (2023). *The Border Target Operating Model: August 2023.* Retrieved from https://www.gov.uk/government/publications/the-border-target-operating-model-august-2023

Cross River Partnership. (2022). *River Freight Pilot Case Study.* Retrieved from https://crossriverpartnership.org/wp-content/uploads/2022/11/River-Freight-Pilot-Case-Study-Summer-2022-1.pdf

Defra. (2021a). *National Food Strategy for England.* Retrieved from https://www.gov.uk/government/publications/national-food-strategy-for-england

Defra. (2021b). *Waste Management Plan for England.* Retrieved from https://assets.publishing.service.gov.uk/media/60103f71d3bf7f05bc42d294/waste-management-plan-for-england-2021.pdf

Defra. (2022). *UK Climate Change Risk Assessment 2022.* Retrieved from https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2022

DESNZ. (2023). *UK Net Zero Research and Innovation Framework: Delivery Plan 2022 to 2025.* Retrieved from https://www.gov.uk/government/publications/uk-net-zero-research-and-innovation-framework-delivery-plan-2022-to-2025

DfT. (2017). *Transport Statistics Great Britain: 2017 Notes and Definitions: Freight.* London: Department for Transport. Retrieved from https://assets.publishing.service.gov.uk/media/5b7c294aed915d14e1fe34f3/dwf-technical-note-2017.pdf

DfT. (2019). *Continuing Survey of Road Goods Transport (GB): Respondents section*. Retrieved from https://www.gov.uk/government/statistics/continuing-survey-of-road-goods-transport-gb-respondents-section

DfT. (2022a). *Maritime statistics: interactive dashboard.* Retrieved from https://maps.dft.gov.uk/maritime-statistics/index.html

DfT. (2022b). *Annual Average Daily Flows (Major Road Network and Strategic Road Network) 2022.* Retrieved from https://roadtraffic.dft.gov.uk/downloads

DfT. (2022c). *Maritime statistics: interactive dashboard.* Retrieved from https://maps.dft.gov.uk/maritime-statistics/index.html

DfT. (2022d). *National road traffic projections.* Retrieved from https://www.gov.uk/government/publications/national-road-traffic-projections

DfT. (2022e). *Port freight annual statistics 2021: Route information and domestic waterborne freight.* Retrieved from https://www.gov.uk/government/statistics/port-freight-annual-statistics-2021/port-freight-annual-statistics-2021-route-information-and-domestic-waterborne-freight

DfT. (2022f). *Table PORT0703: Internal Inalnd waters traffic: goods lifted & moved, by region & cargo category*. Retrieved from https://www.gov.uk/government/statistical-data-sets/port-and-domestic-waterborne-freight-statistics-port

DfT. (2022g). *Transport Statistics Great Britain: 2022 International Travel and Freight*. Retrieved from www.gov.uk: https://www.gov.uk/government/statistics/transport-statistics-great-britain-2022/transport-statistics-great-britain-2022-international-travel-and-freight#international-freight

DfT. (2023a). *Port freight statistics: notes and definitions*. Retrieved from https://www.gov.uk/government/statistics/port-freight-annual-statistics-2022/port-freight-statistics-notes-and-definitions

DfT. (2023b). *Port and domestic waterborne freight statistics*. Retrieved from https://www.gov.uk/government/statistical-data-sets/port-and-domestic-waterborne-freight-statistics-port#port-and-domestic-waterborne-freight-table-index

DfT. (2023c). *Road traffic statistics (TRA)*. Retrieved from www.gov.co.uk: https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra

DfT. (2023d). *Port freight annual statistics 2022: Cargo information*. Retrieved from https://www.gov.uk/government/statistics/port-freight-annual-statistics-2022/port-freight-annual-statistics-2022-cargo-information

DfT. (2023e). *Port Freight Statistics*. Retrieved from https://www.gov.uk/government/collections/maritime-and-shipping-statistics

DfT. (2023f). *Domestic road freight activity (RFS01)*. Retrieved 3 27, 2024, from https://www.gov.uk/government/statistical-data-sets/rfs01-goods-lifted-and-distance-hauled

DfT. (2023g). *Government sets ambitious target to grow rail freight by at least 75%*. Retrieved from https://www.gov.uk/government/news/government-sets-ambitious-target-to-grow-rail-freight-by-at-least-75

DfT. (2023h). *Port freight statistics: notes and definitions*. Retrieved from https://www.gov.uk/government/statistics/port-freight-annual-statistics-2022/port-freight-statistics-notes-and-definitions

DfT. (2023i). *Transport Statistics Great Britain: 2022 Freight*. Retrieved from https://www.gov.uk/government/statistics/transport-statistics-great-britain-2023/transport-statistics-great-britain-2022-freight

DP World. (2023). *Modal Shift Programme*. Retrieved 10 10, 2024, from https://www.dpworld.com/southampton/supply-chain/modal-shift-programme

Environmental Audit Committee. (2019). *Fixing Fashion: Clothing Consumption and Sustainability*. Retrieved from https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1952/report-summary.html

EU. (2023). *National road freight transport by region of unloading (NUTS 3) and type of goods (t) - annual data (from 2008 onwards)*. Retrieved 3 27, 2024, from EU Eurostat: https://ec.europa.eu/eurostat/databrowser/view/road_go_na_ru3g/default/table?lang=en&category=road.road_go.road_go_nat

European Community Shipowners' Associations. (2020). *How shipping, including short sea shipping, compares favourably to other modes of transport on CO2 emissions*. Retrieved from https://www.ecsa.eu/sites/default/files/publications/2020%20CO2%20Performance%20of%20Shipping.pdf

Forth Ports. (2023). *One million tonne wheat delivery milestone for Kirkcaldy Harbour*. Retrieved from https://www.forthports.co.uk/latest-news/one-million-tonne-wheat-delivery-milestone-for-kirkcaldy-harbour/

Highway Logistics . (2023). *The UK's Top 5 Busiest Shipping Ports.* Retrieved from https://www.highway-logistics.co.uk/the-uks-top-5-busiest-shipping-ports/#:~:text=The%20UK%E2%80%99s%20Top%205%20Busiest%20Shipping%20Ports%201,of%20Liverpool%20...%205%205.%20Port%20of%20Immingham

Homes England. (2023). Homes England strategic plan 2023 to 2028. Retrieved from https://www.gov.uk/government/publications/homes-england-strategic-plan-2023-to-2028

IMO. (2024). *Carriage of Chemicals by Sea*. Retrieved from International Marine Organization: https://www.imo.org/en/OurWork/Environment/Pages/ChemicalPollution-Default.aspx

International Transport Forum. (2022). *Mode Choice in Freight Transport.* Retrieved from International Transport Forum: https://www.itf-oecd.org/mode-choice-freight-transport

IPCC. (2019). *Special Report: Climate Change and Land.* WG5. Retrieved from https://www.ipcc.ch/srccl/chapter/chapter-5/

IWA. (2023). *UK Canal Map*. Retrieved from https://waterways.org.uk/waterways/uk-canal-map

Logistics UK. (2023). *Unblocking Channel Tunnel could deliver faster future for UK rail freight.* Retrieved from October: https://logistics.org.uk/logistics-magazine-portal/logistics-magazine-features-listing/auto-restrict-folder/19-10-23/unblocking-channel-tunnel-could-deliver-faster-fut

Maritime Union. (2022). *Advantages of Maritime Transport.* Retrieved from https://maritime-union.org/what-are-the-advantages-and-disadvantages-of-maritime-transport/

MHCLG. (2019). *English indices of deprivation 2019.* Retrieved from https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019

National Rail. (2020). *Rail freight forecasts: Scenariosfor 2033/34 & 2043/44*. Retrieved from https://www.networkrail.co.uk/wp-content/uploads/2020/08/Rail-freight-forecasts-Scenarios-for-2033-34-and-2043-44.pdf

Network Rail. (2021). *Network Rail Rail Freight Map Intermodal Sector* . Retrieved from https://www.networkrail.co.uk/wp-content/uploads/2022/02/Network-Rail-freight-map-intermodal-sector.pdf

Network Rail. (2021). *Solent to the Midlands Rail Freight Study* . Retrieved from https://www.networkrail.co.uk/wp-content/uploads/2021/07/Solent-to-the-Midlands-Multimodal-Freight-Strategy-Phase-1-June-2021.pdf

ONS. (2020). *Population density 2020*. Retrieved from https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/lowersuperoutputareapopulationdensity

ONS. (2021). *Local Authority Districts (LADs) 2021.* Retrieved from https://geoportal.statistics.gov.uk/datasets/ons::local-authority-districts-december-2021-gb-bgc-1/about

ONS. (2022a). *Census 2021 geographies.* Retrieved from https://www.ons.gov.uk/methodology/geography/ukgeographies/censusgeographies/census2021geographies

ONS. (2022b). *NOMIS*. Retrieved from https://www.nomisweb.co.uk/query/construct/components/stdListComponent.asp?menuopt=3&subcomp=120

ONS. (2023). *OS National Geographic Database, with theme Land Use*. Retrieved from https://docs.os.uk/osngd/data-structure/land-use

ONS. (2024a). *National Population Projections: 2021-based interim*. Retrieved from https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2021basedinterim

ONS. (2024b). *Open Geography Portal*. Retrieved from https://geoportal.statistics.gov.uk/

ONS. (2024c). *Local Authority District (December 2020) to LAU1 to ITL3 to ITL2 to ITL1 (January 2021) Lookup in United Kingdom v2*. Retrieved 3 27, 2024, from https://geoportal.statistics.gov.uk/documents/cdb629f13c8f4ebc86f30e8fe3cddda4/about

Solent Freeport. (2023). *FREEPORT TIMELINE*. Retrieved from https://solentfreeport.com/?trk=public_post-text

TfSE. (2020). *Transport Strategy for the South East*. Retrieved from https://transportforthesoutheast.org.uk/app/uploads/2020/09/TfSE-transport-strategy.pdf

TfSE. (2022). *Freight Logistics and Gateways Strategy: Full Report*. Retrieved from https://transportforthesoutheast.org.uk/app/uploads/2022/05/TfSE_FLAGS_Report_v1.71.pdf

The Alliance Project. (2015). *Repatriation of UK Textile Manufacture*. Retrieved from https://ukft.s3.eu-west-1.amazonaws.com/wp-content/uploads/2018/05/13115441/Repatriation-of-UK-textile-manufacture-The-Alliance-Project-Report.pdf

The Isle of Thanet News. (2022). *Thanet council looks at reviving ferry operations at Ramsgate with help of Levelling Up cash*. Retrieved from https://theisleofthanetnews.com/2022/09/10/thanet-council-looks-at-reviving-ferry-plans-for-ramsgate-with-help-of-levelling-up-cash/

Transport for Scotland . (2021). *Freight Facilities Grant*. Retrieved from https://www.transport.gov.scot/news/freight-facilities-grant/

Transportation Institute. (2019). *Jones Act*. Retrieved from https://transportationinstitute.org/jones-act/

UK-Ports. (2023). *UK Ports Map*. Retrieved from https://uk-ports.org/uk-ports-map/

VOA. (2023). *Non-domestic rating: stock of properties collection*. Retrieved 3 27, 2024, from https://www.gov.uk/government/collections/non-domestic-rating-stock-of-properties-collection

WSP. (2021). *Work Package 3: Freight Specific Infrastructure - Technical Support*. Retrieved from https://transportforthesoutheast.org.uk/our-work/freight-and-logistics/#technical-documents

WSP. (2022). *Work Package 5: Operational and Planning Considerations*. Retrieved from https://transportforthesoutheast.org.uk/our-work/freight-and-logistics/#technical-documents