**TfN Freight Modelling and Analysis**

Freight Analysis Strategy

Over the past years, TfN worked on developing the freight modelling and analysis evidence to support TfN's Strategic Transport Plan and Northern Transport Charter. The focus has been to improve the quality of freight data and models, assess the multi-modal freight impacts and the freight factors external to the transport investment.

TfN has been creating an environment for local freight planning, modelling and appraisal, as well as building robust and consistent freight analysis for the North. TfN's Technical Assurance, Modelling and Economics (TAME) team has identified a two-layer freight modelling and analysis strategy as shown in Figure 1.

Figure 1 TfN Freight Modelling and Analysis Strategy
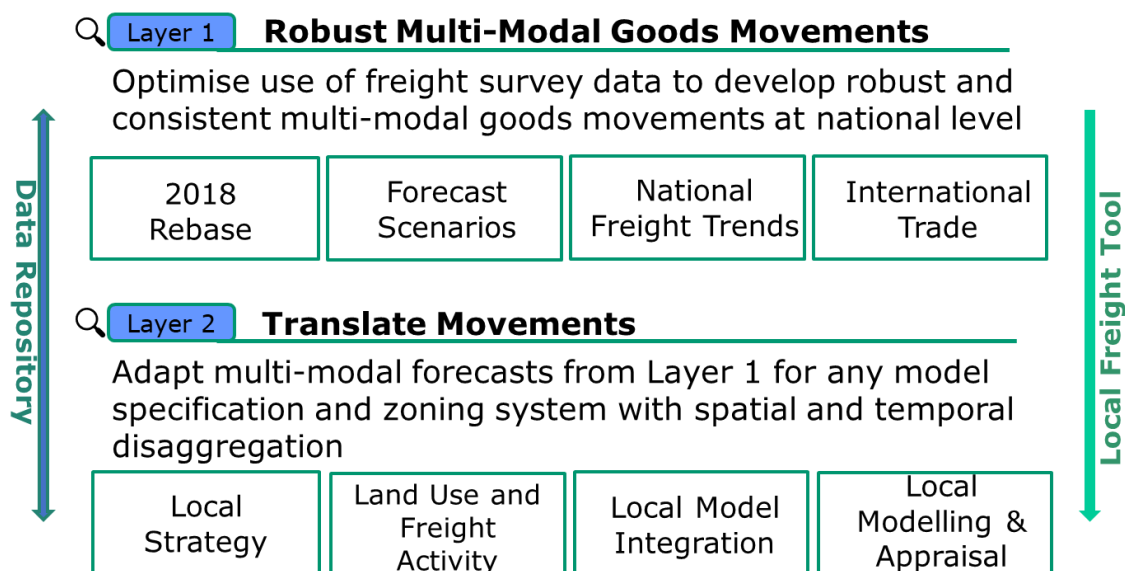
Layer 1 focuses on developing robust multi-modal annual movements. This layer maps a strong foundation for the local freight analysis for the North. Layer 2 undertakes freight analysis at the regional and below regional level. The freight data and models are integrated with the other TfN Analytical Framework models in this layer to support TfN Investment Programme studies and freight analysis requirements in the North.

TfN Freight Models

TfN is developing its freight modelling and appraisal capacity and aims to build a holistic freight analysis eco-system to support TfN investment programmes and freight strategy studies. TfN also has the objective of

supporting freight analysis requirements from Local Authority Partners and the other stakeholders, promoting efficiency and collaboration across public sector activities.

The models enable the multi-modal freight assessment across road, rail and maritime, allowing more focused temporal, spatial and logistical advances to be made. Table 1 lists the freight models that are used in TfN.

Table 1 TfN Freight Models

Model Name	Owner	Model Description
Great Britain Freight Model (GBFM)	MDS Transmodal	• Strategic four-stage freight model • Multi-modal (rail, road and water) freight choice model • Inclusion of domestic, European and non-European route choice and demand integration • Capable of comprehensive forecasting scenario testing
Local Freight Tool	Transport for the North (TfN)	• Annual tonnes to local freight traffic conversion by GV vehicle type and road type with spatial and temporal refinement • A dedicated van modelling tool (NLGV) • Dealing with misalignment of forecasting demand between different models • Flexibility of zoning and cost conversion
Freight Meta-Model	Transport for the North (TfN)	• Interpolation of freight forecasting demand for a range of policy query / dimensions • Current policy dimensions include unified change in road cost, population and employment growth and warehousing growth • Current development to take account of potential spatial variations
TfN Freight Data Repository (prototype stage)	Transport for the North (TfN)	• Open-source multi-modal freight data collection • Modelled data visualisation demonstrating more detailed spatial granularity • Online and offline data requests

In July 2020, TfN commissioned MDS Transmodal (MDST) to deliver a 2018 version of the GBFM model. The model adopted the most up to date input data for road, rail and maritime and focused on improving the accuracy of the output data and the robustness of the conversion process used in the model. This new model version has been installed on a TfN server.

The Local Freight Tool and Freight Meta-Model build an interface to translate the mainline GB freight activities and annual freight demand into a format that can be used for the local freight policy analysis. The Local Freight Tool focuses on improving the spatial and temporal accuracy of the annual tonnage to local freight traffic conversion process. The Freight Meta-Model is a policy scenario testing tool, which interpolates freight forecasting demand for a series of policy dimensions.
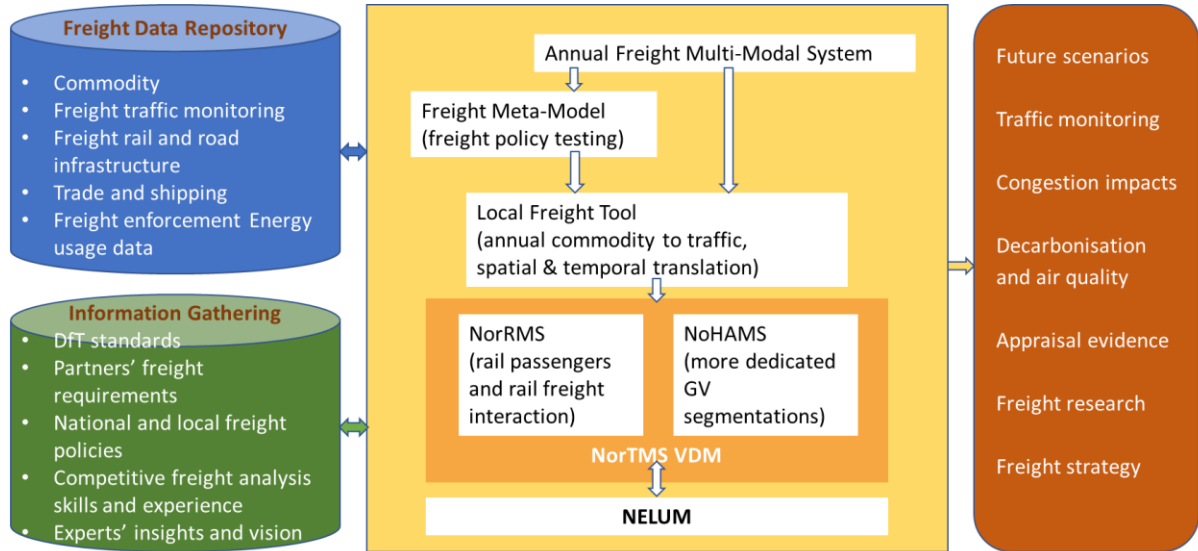
The Freight Data Repository is a collection of structural freight data that is presented in a data monitoring and maintenance system. During the development discovery stage, TfN has identified a number of key freight data challenges, including:
- The general lack of detailed freight data, both in terms of the specific origins / destinations, freight routes taken, position in the supply-chain and commodities carried;
- Data 'patchiness' and the lack of depth/inconsistency of data across regions, modes and sectors;
- Over reliance on small sample/data set sizes to accurately represent the wider freight system (and deficiencies in accuracy / relevance as result of this in existing key data sets); and
- The lack of consistent data models and standards; and the ability to usefully link data sets between different sectors and freight transport modes.

The Freight Data Repository aims to tackle the freight data challenges, deliver a convenient approach for users to easily search, query and download open source data. The Freight Data Repository also maintains the freight demand and traffic data produced using TfN models. The modelled data provides more disaggregated segmentations in terms of vehicle type, area type, spatial distribution and time profile.

Figure 2 provides a high-level overview of TfN freight analysis operating model.

Figure 2 TfN Freight Analysis Operating Model

Freight Data Repository

- Commodity
- Freight traffic monitoring
- Freight rail and road infrastructure
- Trade and shipping
- Freight enforcement Energy usage data

Information Gathering

- DfT standards
- Partners' freight requirements
- National and local freight policies
- Competitive freight analysis skills and experience
- Experts' insights and vision

Annual Freight Multi-Modal System

Freight Meta-Model (freight policy testing)

Local Freight Tool (annual commodity to traffic, spatial & temporal translation)

NorRMS (rail passengers and rail freight interaction)

NoHAMS (more dedicated GV segmentations)

NorTMS VDM

NELUM

Future scenarios

Traffic monitoring

Congestion impacts

Decarbonisation and air quality

Appraisal evidence

Freight research

Freight strategy

TfN Freight Analysis

TfN is working collaboratively with internal and external stakeholders and delivers evidence base to support freight economic and environmental studies.

Figure 3 provides a summary of TfN modelling and analysis activities. In the coming year, TfN will continuously upgrade its freight models and promote its freight analysis on a wider spectrum. TfN will focus on the freight analysis pipeline being identified through TfN Freight Strategy and work closely with partners to deliver multi-modal freight business cases.

Figure 3 TfN Freight Modelling and Analysis Activities