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1 Introduction

1.1 Remit

1.1.1 From opening in 1965 through to closure in 2013, Daw Mill Colliery produced up to 3¼ million tonnes of coal per annum, most of which was despatched by rail from site in up to 8 trains per day. Harworth Estates is now looking to develop a B2-based solution for the former colliery site, which would retain and exploit the existing rail access. The proposals are therefore not intended to compete for business with the much larger B8-driven Strategic Rail Freight Interchanges at Hams Hall or Birch Coppice/BIFT.

1.1.2 Intermodality has been retained to undertake an overview of the rail service opportunities, considering the broad range of potential industrial uses which might realistically exploit the rail access. This report sets out the main findings of work undertaken on the study.

1.2 About us

1.2.1 Intermodality is an independent consultancy established in 2002 to focus on rail freight and intermodal freight transport. The company has supported a number of property developers (including Harworth Estates, Helioslough, Kilbride, ProLogis, Roxhill, Severn Trent, Verdon) manufacturers and logistics companies (including Cemex, Eddie Stobart / Tesco, Hanson, Jaguar Land Rover, Marks & Spencer, Morrisons, Sainsburys, SITA UK, TNT Express) to switch freight from road to rail transport, through a series of new Rail Freight Interchange (RFI) schemes, from large Strategic RFI through to local satellite RFI. We also actively participate in the work of the Rail Freight Group and Freight Transport Association in promoting sustainable distribution across the freight industry.

1.2.2 Project experience includes redevelopment proposals on or adjacent to former colliery sites, including:

- Keresley, Coventry: redeveloped by ProLogis as a B8 distribution centre (194,000m²), where we helped secure a contract to move bottled water by rail from France to site;
- Markham Vale, Chesterfield: we supported Henry Boot and Derbyshire County Council in the redevelopment of the site for a range of industrial uses, with retention of rail access for future RFI use;
- Rossington, Doncaster: support to Helioslough in developing proposals for a large-scale Strategic RFI with 562,000m² of associated B8 warehousing development adjacent to the former Rossington Colliery site. The SRFI is now under construction;
- Parkside, Newton-le-Willows: we supported ProLogis prepare development proposals for a future large-scale Strategic RFI with 715,000m² of associated B8 warehousing development.
2 The renaissance of rail freight

2.1 Pre-privatisation decline

2.1.1 At the time of privatisation in the mid-1990’s, rail freight traffic levels had fallen to an all-time low (excluding the impact of the miner’s strike in 1984), from 36 billion tonne kilometres in 1954, when rail had a 40% share of all freight moved in the UK, to 13 billion by 1993 when rail’s share had fallen to just 6%\(^1\). By this time, most of the non-bulk traffic (eg manufactured goods, general merchandise and parcels) had stopped being carried by rail, with little or no traffic carried for manufacturers, retailers or logistics companies.

2.1.2 The reasons for the post-war decline in rail freight were varied, but major causes included structural decline in the core bulk markets (eg coal, steel and petrochemicals) and in domestic manufacturing, at a time of rapid expansion of the trunk road network and the road haulage industry, a period marked by consistent under-investment in the rail network, and rail freight services in particular.

2.1.3 The decline in rail freight traffic led to (and in some cases was led by) rationalisation of freight train services, particularly for non-bulk traffic such as manufactured goods. This traffic tended at the time to be carried in individual wagonloads, requiring time-consuming and costly shunting at each end between marshalling yards and small private rail terminals. Most of this traffic had disappeared by the time of privatisation in the 1990’s.

2.1.4 In parallel, the extensive network of rail freight terminals and marshalling yards (which previously fed a wide range of non-bulk and wagonload traffic into the rail system) saw continuous rationalisation from the 1950’s onwards, from 4,500 to less than 1,000 by the time of privatisation.

2.2 Post-privatisation growth

2.2.1 In the intervening years, Britain’s economy has become increasingly dependent on road haulage to distribute goods, both for long-distance ‘trunking’ and for local delivery. The sustainability of this approach is now being challenged commercially by road congestion and fuel prices, together with concerns from business and society about climate change. In response, the Corporate Social Responsibility (CSR) policies of major companies are now increasingly focussed on means to promote more sustainable business methods, such as Marks & Spencer’s ‘Plan A’.\(^2\)

2.2.2 The environmental impact of road-based distribution remains significantly higher than for rail. Therefore, a critical component of delivering sustainable distribution in recent years has been to seek alternative and more efficient means of transport (ie rail, coastal shipping and inland waterways).

2.2.3 The latest DEFRA data\(^3\) indicates that the combined emissions of greenhouse gases\(^4\) for freight moved by rail is 0.02721 kg CO2e per tonne-km, compared to 0.105456 kg CO2e per tonne-km for articulated lorries and 0.147624 kg CO2e per tonne-km for all lorries. Rail therefore generates no more than a quarter of the equivalent level of emissions of road haulage, which also reflects relative fuel consumption.

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\(^1\) Collated DfT and ORR statistics
\(^2\) Marks & Spencer website
\(^3\) 2013 Guidelines to Defra / DECC’s GHG Conversion Factors for Company Reporting – Annex 7
\(^4\) Includes Direct emissions of CO2, CH4 and N2O from the combustion of fuel from owned/controlled transport, and indirect emissions associated with the extraction and transport of primary fuels as well as the refining, distribution, storage and retail of finished fuels
2.2.4 As the main alternative mode of inland transport to road haulage, the rail freight industry has during the last 50 years moved from being the dominant mode of freight transport, to near extinction, to a dramatic turnaround in fortunes. In considering the significant growth in freight traffic moved by rail since privatisation, this is in part related to a public policy framework creating conditions favourable to development of rail freight services and infrastructure, to which industry is now responding.

2.2.5 Reflecting these policies, rail freight traffic has now grown by more than 60% since the mid-1990’s, and after rapid and substantial investment, the industry structure is now consolidating and maturing, to the extent that a number of major industrial customers now use rail as an integral part of their supply chains.

2.2.6 Despite the recent economic downturn, total rail freight volumes (excluding Network Rail internal maintenance traffic) have grown by 16% between 2002-3 and 2012-3. The table below shows the breakdown of traffic:

**Table 1 Rail freight traffic (billion tonne-km), source DfT / ORR**

<table>
<thead>
<tr>
<th>Year</th>
<th>Coal</th>
<th>Metals</th>
<th>Construction</th>
<th>Oil &amp; Petroleum</th>
<th>Channel Tunnel</th>
<th>Domestic intermodal(^6)</th>
<th>Other</th>
<th>Total</th>
<th>Infrastructure(^7)</th>
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<td>4.5</td>
<td>2.1</td>
<td>2.1</td>
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<td>2.4</td>
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<td>2.6</td>
<td>18.1</td>
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<td>2002-03</td>
<td>5.7</td>
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<td>2.5</td>
<td>1.2</td>
<td>0.5</td>
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<td>2.7</td>
<td>18.5</td>
<td>1.2</td>
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<td>2003-04</td>
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<td>2.7</td>
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<td>4.0</td>
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<td>20.3</td>
<td>1.3</td>
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<tr>
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<td>2.2</td>
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<td>1.0</td>
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<td>1.9</td>
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<tr>
<td>2012-13</td>
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<td>3.1</td>
<td>1.2</td>
<td>0.4</td>
<td>6.3</td>
<td>1.2</td>
<td>21.5</td>
<td>1.7</td>
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</table>

\(^5\) Collated DfT and ORR statistics
\(^6\) Includes domestic and deepsea port container services
\(^7\) Non-commercial Network Rail internal maintenance traffic
2.2.7 Bulk traffic (primarily coal, construction materials, iron and steel, petrochemicals) continues to represent the majority (63%) of freight carried by rail. Further new traffic growth has arisen in the non-bulk sector of the market, particularly in traffic for major supermarkets and third-party logistics companies (3PLs), where rail is increasingly used between ports and inland distribution centres (DC) as well as between inland DCs.

2.2.8 The Network Rail Freight Market Study (2013) describes current and forecast levels of rail freight traffic. Overall, since 1995 rail has increased its market share of domestic freight moved in Great Britain to 11%. Average haul length per train has increased in recent years and average payload per train has increased by about 19% since 2005, a significant improvement in productivity.

Figure 1 Rail freight tonnes moved by sector (Network Rail)

2.2.9 The scale of this growth is all the more significant given it has been achieved against a background of major unforeseen events, eg: the introduction of heavier 44-tonne goods vehicles; the aftermath of the Hatfield derailment in 2000 (which led to blanket speed restrictions on train services) and the Channel Tunnel security crisis around the same time (which led to a decline in cross-Channel rail freight services); structural changes in the rail industry and its customer base; and the recent economic downturn.

2.3 Rail freight services

2.3.1 Within the freight market, (excluding intermodal services for deepsea containers, handled at existing SRFI such as Hams Hall and Birch Coppice), rail is used to move traffic between rail-served production and/or distribution sites – current examples include:

- Aggregates, cement and bulk minerals between quarries and local distribution centres;
- Biomass and other feedstock to power stations as a replacement / alternative fuel to coal;
- Bottom ash from power stations to distribution centres for use as secondary aggregate;
- Gypsum from power stations (a by-product of flue gas desulphurisation) to plasterboard factories;
Concrete building blocks from factory to local distribution centres;

Fast-moving consumer goods between factories, distribution centres and stores;

Steel from factories to local stockholding and distribution centres;

Timber from forests to chipboard factories.

2.3.2 Two principal forms of rail freight operation are used for such movements, namely:

- Conventional wagons, used for moving specific commodities by rail, the design of the wagon tailored to suit the traffic. Loading and unloading is undertaken by fixed or mobile handling equipment;

- Intermodal, where containers and swap bodies are carried on flat rail wagons. Loading and unloading is undertaken by overhead or mobile handling equipment.

2.3.3 The observed take-up of these services by leading manufacturers, retailers, logistics companies and shipping lines demonstrates how such companies now embrace rail within their own supply chains. This reflects the growing constraints on using road for trunk haulage, with a congested and unstable road network, steep increases in fuel prices and a shortage of drivers, compounded by the introduction of the Working Time Directive in 1998 which further limited road haulage drivers’ productive time. Rail freight services can carry significant volumes of freight with a single driver and locomotive, and circumvent congested parts of the road network, with conventional wagon services operating at up to 60mph and intermodal services up to 75mph.

2.3.4 Although rail prices themselves have fallen in real terms since privatisation (noting that rail freight services are largely charged only the marginal costs of track access compared to passenger services) and can provide savings on trunk hauls compared to road between two points, the need for ‘last mile’ road haulage at one or both ends can significantly impact on the overall viability of a rail-based service. Providing rail-served manufacturing, storage and distribution facilities can help minimise the need for the additional handling and road haulage costs which might otherwise be incurred.

2.4 Industry growth forecasts

2.4.1 It is apparent that the factors driving demand for rail freight in the years immediately following privatisation, including the provision of modern RFI in suitable locations, have taken longer to realise than originally expected. This has undoubtedly impacted on the rate of growth anticipated by Government in those early years. The former Strategic Rail Authority developed policy strategies on freight and RFI to help industry achieve 80% growth in rail freight between 2000 and 2010. Whilst overall traffic growth over the same period was closer to 6%, nearly 70% growth was then achieved in the decade between 1995 and 2005 (62% between 1995 and 2013).

2.4.2 A joint report produced in May 2009 by Network Rail in association with the passenger and freight train operators associations (ATOC and RFOA) noted that despite economic conditions, demand for passenger and rail freight services is expected to double over the next 30 years and possibly triple beyond that. The report set out a vision for rail increasing its market share to 20% of surface freight.

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8 Planning Ahead, Network Rail/ATOC/RFOA 2009, pages 1 and 7
In terms of forecast onward growth, Network Rail has stated in its latest forecasts (excluding intermodal services for deepsea containers):

- For the construction materials sector, growth of approximately 1% per annum to 2043 in tonne kilometres is forecast. This reflects growth in the total (road and rail) market for construction materials and an improvement in the competitiveness of the rail industry;

- For the metals, petroleum, chemicals, industrial minerals and automotive sectors, growth of between 0.5-1% per annum to 2043 in tonne kilometres is forecast, reflecting improvements in the competitiveness of rail. No change in the total market is forecast for these sectors;

- For the other sectors, iron ore, non-power station coal and domestic waste, changes to markets may take place but the volume of business carried on rail is not expected to vary significantly.

Overall forecast freight growth (including intermodal) is expected to increase significantly, with total tonne kilometres growing at 2.9% per annum to 2043, compared to 2.5% per annum since the mid 1990s.

**The Strategic Freight Network**

In 2007 the Government White Paper on the Railways set out a long-term ambition for a railway capable of handling double the level of passenger and freight traffic.

To cater for this growth, the Government committed to create a Strategic Freight Network (SFN), a core network of routes to be enhanced for freight traffic, linking together a network of inland interchanges, ports and the Channel Tunnel. Daw Mill sits towards the centre of the SFN (see Appendix A).

**The role of Rail Freight Interchanges (RFI)**

Moving freight by rail will inevitably require interchange with other modes, and whilst most of the UK’s major ports, power stations, quarries etc are enhancing use of their rail links, most of the inland rail freight interchanges which served manufacturing and logistics have been lost to redevelopment during the past 50 years, or no longer suit the requirements of modern industry.

The growth in rail freight traffic has in part been fostered by new Rail Freight Interchanges (RFI) within the UK, a combination of larger ‘Strategic’ RFI (SRFI) developments with rail facilities integrated into large distribution parks, as well as smaller satellite RFI. In order to support further growth in rail freight and the associated benefits of modal shift (eg reduced long-distance HGV traffic and emissions), there is a need to invest in further RFI capacity to increase modal shift.

Government policy acknowledges that in order to increase access to rail freight services in other parts of the country, the network of interchanges will need to be expanded, as much in a small number of SRFI as in complementary local satellite RFI. Evidence from regions such as the Midlands demonstrates that even when in relatively close proximity, RFI and SRFI (eg the Freightliner RFI in Birmingham, alongside the SRFI at Hams Hall and Birch Coppice) can still grow their respective traffic flows without significant abstraction.

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9 Delivering a Sustainable Railway, Department for Transport, July 2007
3 Use of rail transport by industry

3.1 Introduction

3.1.1 This section is focussed on the use of rail transport within industrial processes falling within class B2, ie:

Uses for the carrying on of an industrial process other than one falling within class B1 [ie not affecting the amenity of a residential area] or B8, an industrial process being a Process for or incidental to any of the following purposes:

- The making of an article or part of any article (including ship or vessel, or a film, video or sound recording);
- The altering, repairing, maintaining, ornamenting finishing, cleaning, washing, packing, canning, adapting for sale, breaking up or demolition of any article; or
- The getting, dressing or treatment of minerals.

in the course of any trade or business other than agriculture, and other than a use carried out in or adjacent to a mine or quarry.

3.2 Concrete block manufacturing

3.2.1 Concrete blocks are moved by rail on a daily basis (1-2 trains per day) from a factory in Yorkshire (Heck) to RFI at Biggleswade (Bedfordshire) and Bow (East London) for local storage and onward distribution. At the factory, blocks are moved by road vehicles from the point of manufacture to the adjacent RFI, where they are loaded onto trains using either forklifts or truck-mounted cranes (see Figure below).

**Figure 2 Concrete block factory (RFI highlighted), Great Heck, Yorkshire**
3.3 Plasterboard manufacturing

3.3.1 Rail is used to move gypsum in bulk containers from UK and continental power stations (gypsum being a by-product of flue gas desulphurisation) to factories at Kirkby Thore (Cumbria), Mountfield (East Sussex) and East Leake (Nottinghamshire). The containers are unloaded at the factories using mobile cranes to transfer the bulk containers onto internal road vehicles (see Figure below). East site handles 1-2 trains of gypsum per day through a dedicated RFI. The factory at Kirkby Thore has also used rail for movement of outbound finished product to Scotland, again in containers. Another plant at Kemsley (Kent), which previously used its own rail link, is considering use of rail again for import of gypsum to site and/or transport of finished product.
3.4 Wood panel manufacturing

3.4.1 Rail is used in the manufacture of wood panels (e.g., chipboard, MDF and OSB\textsuperscript{10}), moving timber from forestry areas in Devon, Wales and Scotland to a factory in North Wales. Timber is delivered by road to satellite RFI close to the forests and transferred to rail using truck-mounted cranes (see Figure below) for onward movement by train to the factory (1-2 trains per day) where the timber is unloaded on site.

\textbf{Figure 6 Fibreboard factory (RFI highlighted), Chirk, Flintshire}

\textsuperscript{10} Medium Density Fibreboard (MDF) and Oriented Strand Board (OSB)
3.5 Glass manufacturing

3.5.1 Rail is used to move sand from Middleton Towers (Norfolk) to factories at Goole (East Riding of Yorkshire), Kirk Sandall (Doncaster) and Monk Bretton (Barnsley). Each factory receives 2-3 trains per week of sand in bulk hopper wagons, which are automatically discharged on arrival at the factory into fully-enclosed under-track receiving hoppers (see Figure below):

Figure 8 Glassworks (RFI highlighted), Goole, East Riding of Yorkshire
3.6 Traction and rolling stock maintenance

3.6.1 A network of depot facilities across Great Britain receive, maintain and despatch traction (ie locomotives) and rolling stock (ie passenger coaches and freight wagon). The majority of train movements will be undertaken by rail, supplemented by road deliveries of components, as well as individual rail vehicles which are unable to be moved on the rail network itself (eg due to wheelset failure or damage). Facilities on site will typically include stabling sidings, train washing plant and maintenance sheds (see Figure below).

Figure 9 Passenger train maintenance depot, Barton under Needwood, Staffordshire

3.7 Scale of rail-related activities

3.7.1 Table 2 below provides examples of the above types of use, providing an indication of the site coverage and level of weekly rail services, noting that not all trains run every day.

3.7.2 The Table also provides a high-level indication of the equivalent level of heavy goods vehicle (HGV) traffic that each train would represent, assuming an average train payload of 510 tonnes (source Network Rail) and an average HGV payload of 9.7 tonnes (source DfT). This indicates the level of road traffic which each train would remove from the highway network, but also provides a proxy as to the potential level of HGV traffic which will then be generated from the site at the other end of the industrial process. It should be noted that other traffic related to these uses (including empty inbound or outbound trips) may be moved to and from site by road, so the rail-related figures may not necessarily equate to total road vehicle traffic generation.

3.7.3 With regard to maintenance-related uses for railway rolling stock, the rail vehicles will arrive and depart in their tare condition (ie not carrying any passengers or freight) for maintenance to be undertaken. Maintenance components and consumables will tend to arrive by road.
Table 2 Examples of existing rail-related uses

<table>
<thead>
<tr>
<th>Site</th>
<th>Area</th>
<th>Use</th>
<th>Coverage (Ha)</th>
<th>Traffic</th>
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<td></td>
<td></td>
<td>Site of which RFI</td>
<td></td>
<td>Trains per week</td>
</tr>
<tr>
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4 Rail freight facilities at Daw Mill

4.1 Main line rail access

4.1.1 The site is connected to the Birmingham to Nuneaton main line rail network, the route forming part of the Government’s Strategic Freight Network (see Appendix A) as described earlier in the report. The route is cleared to W10 loading gauge, allowing the movement of taller “high cube” containers on standard-height railway wagons.

4.1.2 The main line connections allow trains to operate to and from Daw Mill in both directions of travel, maximising the onward route opportunities for trains to/from the east or west.

4.2 On-site rail infrastructure

4.2.1 The schematic layout below shows the current arrangement of the main line connections and internal trackwork on site. The site has two main line arrival / departure sidings which can each hold a train of up to 310m long, but with scope to extend this to c.450m without the need to alter the position of the two main line connections. Scope also exists to bring trains longer than 450m to and from the site via the western main line connection, splitting each train between the handling sidings and reception / departure sidings.

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11 Equivalent HGV loads, based on each train having an average payload of 510 tonnes and each HGV having an average payload of 9.7 tonnes
4.3  Rail operations

4.3.1  From opening in 1965 through to closure of the colliery in 2013, the site produced up to 3¼ million tonnes of coal per annum, generating a considerable number of coal trains from the site. Around 8 trains per day were despatched every weekday with additional trains operating on Saturdays and Sundays. Rail services continued to remove stockpiled coal from the site through to March 2013.

4.3.2  An inbound empty coal train to site would arrive into one of the two reception / departure sidings, from where the train would then be shunted into the main site, either to a concrete loading pad, where coal would be loaded by mechanical shovel into the rail wagons, or through overhead loading bunkers which would discharge coal into the wagons below. The process would then be reversed for outbound trains. This method of working would be retained for the proposed redevelopment of the site.

4.3.3  Data provided by Network Rail indicates that the national Working Timetable (WTT) shows 150 passenger and freight trains scheduled to operate along this route (broadly 75 in each direction). Of these, around 20% operate on an “as required” basis, therefore the actual level of rail traffic on this route is considerably lower than the total might otherwise imply.

4.4  Proposed facilities on site

4.4.1  The proposed redevelopment seeks to create some 41,000m² of B2 floorspace on around 50% of the total 44.25 Ha site area. The indicative layout would include three large buildings and associated open storage areas. The existing rail infrastructure would be retained to provide two reception / departure sidings, linked to a number of handling sidings to service the occupier requirements. Trains would operate to and from the site using the same method of working as applied to the previous coal train operations.
5 Conclusions

5.1.1 The rail industry has seen a dramatic reversal of fortunes over the last twenty years, with the end of the continued post-war decline in traffic replaced by 60% growth, with Network Rail indicating substantial growth potential over the next thirty years.

5.1.2 Achievement of this potential for further rail freight traffic is inextricably linked to the provision of rail freight interchange (RFI) facilities, to allow freight to be transferred between the railway, storage and processing facilities and road vehicles.

5.1.3 The considerable post-war rationalisation of RFI facilities now creates a considerable challenge to secure suitable locations for RFI, in particular those with existing rail connections, given the significant cost and lead time of creating new connections in the national rail network.

5.1.4 The challenge is acknowledged by Government transport and planning policy, which has introduced specific policies to address the need for new Strategic RFI, but which also recognise the role that other types of RFI will play, in support of the overall objective of increasing mode shift of freight from road to rail.

5.1.5 Daw Mill represents one of a declining number of large brownfield sites within Great Britain which retains main line rail access in both directions of travel (which might otherwise cost c.£5-10m and 2-3 years to install), towards the geographic centre of the Strategic Freight Network. Network Rail continues to maintain the main line connections to allow rail freight services to operate to and from the site, through a Connection Agreement with the landowner.

5.1.6 Whilst the existing rail infrastructure is not capable of supporting the operation of a larger Strategic RFI development such as Hams Hall or Birch Coppice, it can nevertheless create opportunities to support a wide range of industrial uses (and associated employment), which would benefit from access to both rail and road networks. Rail transport can then be exploited to help reduce the volume of HGV loads which might otherwise be associated with industrial development on a site of this scale. Little or no reconfiguration of the rail sidings or main line access would be required to unlock these opportunities.

5.1.7 The main line passing the site carries broadly the same level of third-party passenger and freight traffic as in the latter years of the Daw Mill colliery operations, which despatched up to 8 trains per day from the site. As it is unlikely that any new use of the site would generate such a large volume of freight trains, sufficient main line capacity should therefore exist to handle new rail freight traffic generation anticipated to and from the site.

5.1.8 In summary therefore, Government policy and commercial interest supports the development of rail-linked sites for industrial use, to reduce the burden and dependency on road transport. As suitable rail-linked sites are in short supply, the existence of the brownfield Daw Mill site within the manufacturing centre of the Midlands, and at the centre of the Strategic Freight Network, represents a significant opportunity for B2 industrial use and associated employment. The main line has latterly provided capacity for a much larger volume of freight trains traffic from the site than would be anticipated from any new B2 uses. The existing main line connections complement the other existing utility connections into site, whilst the on-site sidings can support a range of B2 industrial uses with little or no reconfiguration.
Appendix – map of Strategic Freight Network (SFN)
Annex A Map 1: The proposed Strategic Freight Network

Key

- **Proposed routes**
  - Core trunk routes: gauge cleared to at least W10
  - Diversionary routes: Gauge cleared to at least W10
  - Core trunk and diversionary routes, less than W10

Dotted lines denote reopened routes

Network Rail