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HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 5: Appendix WM-001-00000

Waste and material resources

Route-wide waste and material resources assessment

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Department for Transport

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High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

A report prepared for High Speed Two (HS2) Limited:

ARUP+ ERM | FOSTER + PARTNERS | JACOBS
RAMBOLL | TYPSA | COSTAIN

MWJV
Mott MacDonald | WSP

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1 Introduction

1.1 Structure of this report

1.1.1 This report is an appendix to the route-wide waste and material resources assessment for the Proposed Scheme.

1.1.2 This appendix should be read in conjunction with:

- Volume 2, Community area reports;
- Volume 3, Route-wide effects;
- Volume 4, Off-route effects; and
- Volume 5, Appendices.

1.1.3 The assessment of the likely significant environmental effects associated with the off-site disposal to landfill of solid waste generated during the construction and operation of the Proposed Scheme has been undertaken on a route-wide and not a community area basis. Waste is often transferred across waste planning authority boundaries for treatment and disposal according to the type of waste and the nature of the waste management facility required. Therefore, to reflect this broader county and regional based approach to waste planning and management the assessment has been undertaken on a route-wide basis. The waste and material resources assessment is reported in Volume 3, Route-wide effects, Section 15.

1.1.4 Section 2 of this report provides detailed information concerning the environmental baseline, namely:

- the types, quantities and management routes of waste generated locally along the route of the Proposed Scheme;
- local waste infrastructure capacity baseline data; and
- source data, which has been used to inform the future baseline with respect to the landfill capacity projected to be available during the period 2025 to 2038 (construction period) and the year 2039 (first year of operation).

1.1.5 Sections 3 to 18 of this report provide supporting information on specific community areas and off-route works, and comprise:

- a description of the local assumptions and limitations;
- forecast waste and material quantities from the construction phase; and
- forecast waste and material quantities from operation of the Proposed Scheme.

1.1.6 This report includes two annexes which set out summary reporting tables for excavated material, demolition materials and waste, construction waste, worker accommodation site waste and operational waste.

1.1.7 In addition, a route-wide waste and material resources policy review and Building Research Establishment Ltd (BRE) construction waste benchmarks for railway projects are set out in HS2 Ltd, Background Information and Data (BID), report BID WM-002-00000[1].

1.2 Purpose and scope

1.2.1 The purpose of this report is to provide more detailed information in relation to:

- the types and quantities of materials and waste that will be generated during the construction and operation of the Proposed Scheme;
- the estimated quantities of waste that will require off-site disposal to landfill during the construction and operation of the Proposed Scheme;
- the types, quantities and management routes of waste generated in the waste planning authority areas along the route of the Proposed Scheme;
- waste infrastructure capacity data for the waste planning authority areas along the route of the Proposed Scheme; and
- source data, which has been used to inform the future baseline with respect to landfill capacity, and treatment and recovery infrastructure capacity projected to be available during the period 2025 to 2038 (construction period), and the year 2039 (first complete year of operation).

[1] High Speed Two Ltd (2022), *High Speed Rail (Crewe – Manchester), Background Information and Data, Route-wide policy review and benchmarks,* BID WM-002-00000. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

2 Environmental baseline

2.1 Local waste arisings and management

Construction, demolition and excavation waste

2.1.1 Construction, demolition and excavation waste (CDEW) arisings and waste management methods for the local areas within which the route of the Proposed Scheme passes, and the locality of off-route works, are shown in Table 1 for the year 2021 (baseline) and in Table 2 for the period 2025 to 2038 (future baseline).

2.1.2 Future baseline arisings for CDEW shown in Table 2 are shown as the sum of annual projections for each year within the proposed construction period of 2025 to 2038. This presentation method allows for direct comparison of the total quantity of CDEW that will be generated by the Proposed Scheme during this period.

2.1.3 Waste management performance (shown as overall diversion from landfill and disposal to landfill) is also based on data for each year within the period 2025 to 2038 (future baseline).

2.1.4 Latest available information published by waste planning authorities has been used to inform the local baseline and future baseline for CDEW arisings at the local level. Details of the sources of information used are provided within this section.

Table 1: Baseline (2021) CDEW arisings and management methods by local area

Regional area	Local area	Total CDEW arisings (tonnes)	Overall diversion from landfill		Disposal to landfill	
			Tonnes	Percentage	Tonnes	Percentage
North West	Cheshire East	726,400	631,718	87%	94,682	13%
	Cheshire West and Chester	350,800	263,100	75%	87,700	25%
	Warrington	245,188	199,400	81%	45,789	19%
	Greater Manchester	1,316,021	1,061,333	81%	254,688	19%
	Lancashire	4,080,635	3,876,604	95%	204,032	5%
	Cumbria	794,475	706,013	89%	88,462	11%
Scotland	Dumfries and Galloway Council	No data available	No data available	No data available	No data available	No data available

Table 2: Future baseline (2025 to 2038) CDEW arisings and management methods by local area

Regional area	Local area	Total CDEW arisings (tonnes)	Overall diversion from landfill		Disposal to landfill	
			Tonnes	Percentage	Tonnes	Percentage
North West	Cheshire East	10,169,586	9,837,562	97%	332,024	3%
	Cheshire West and Chester	5,028,800	3,771,600	75%	1,257,200	25%
	Warrington	3,465,656	2,818,451	81%	647,205	19%

Regional area	Local area	Total CDEW arisings (tonnes)	Overall diversion from landfill		Disposal to landfill	
			Tonnes	Percentage	Tonnes	Percentage
	Greater Manchester	19,872,854	16,007,438	81%	3,865,417	19%
	Lancashire	72,032,246	68,430,634	95%	3,601,612	5%
	Cumbria	11,208,039	9,967,012	89%	1,241,027	11%
Scotland	Dumfries and Galloway Council	No data available	No data available	No data available	No data available	No data available

Cheshire East

2.1.5 Total CDEW arisings for the years 2021 (baseline) and the period 2025 to 2038 (future baseline) are based on information obtained from Table 10 in Cheshire East's Waste Management Needs Assessment 2017 - Main Report[2].

2.1.6 Annual projections have been extrapolated using published CDEW arisings data for 2015 (723,285 tonnes), 2020 (726,400 tonnes), 2025 (726,399 tonnes) and 2030 (726,399 tonnes) to provide arisings data for the year 2021 (baseline) and the period 2025 to 2038 (future baseline). Arisings data for the years 2031 to 2038 were extrapolated using the same average annual growth rate that was calculated for the period 2026 to 2030.

2.1.7 CDEW arisings to landfill data was also extracted from the Waste Needs Assessment for the years 2015, 2020, 2025 and 2030. CDEW arisings to landfill data for the years 2031 to 2038 were extrapolated using the same average annual growth rate that was calculated for the period 2025 to 2030. As a result of this extrapolation, there is anticipated to be no landfill capacity available from 2035 onwards. For the purposes of the calculations, it is assumed at this stage that all materials will be diverted from landfill. In reality, it is likely that the authority will need to find additional landfill capacity and therefore the anticipated landfill diversion for materials may be slightly overestimated post 2035.

Cheshire West and Chester

2.1.8 Total CDEW arisings for the years 2021 (baseline) and the period 2025 to 2038 (future baseline) are based on information taken from Cheshire West and Chester's Waste Management Needs Update[2].

2.1.9 Annual projections have been extrapolated using published CDEW arisings data for 2015 (335,000 tonnes), 2020 (350,000 tonnes), 2025 (354,000 tonnes) and 2030 (358,000 tonnes) to provide arisings data for the year 2021 (baseline) and the period 2025 to 2038 (future

[2] Anthesis Consulting for Cheshire West and Chester Council (2016), *Cheshire West and Chester Waste Needs Assessment Update 2016*. Available online at: http://consult.cheshirewestandchester.gov.uk/portal/cwc_ldf/minerals_and_waste/wna?tab=files.

baseline). Arisings data for the years 2031 to 2038 were extrapolated using the same average annual growth rate that was calculated for the period 2026 to 2030.

2.1.10 The Waste Management Needs Update does not specify how much waste is sent to landfill. Figures are provided in the forecasts for different waste management fates, though waste sent to landfill is grouped with that sent for treatment or energy recovery. It is assumed, therefore, that any CDEW not identified as being recycled, reused or composted is sent to landfill. CDEW arisings to landfill data for the years 2031 to 2038 were extrapolated using the same average annual growth rate that was calculated for the period 2025 to 2030.

Warrington

2.1.11 Total CDEW arisings for the years 2021 (baseline) and the period 2025 to 2038 (future baseline) are based on information taken from Warrington Borough Council's Waste Arisings and Capacity Requirements Report 2017[3].

2.1.12 Annual projections have been extrapolated using published CDEW arisings data for 2015 (241,682 tonnes), 2020 (244,892 tonnes), 2025 (246,374 tonnes), 2030 (247,352 tonnes) and 2037 (248,453 tonnes) to provide arisings data for the year 2021 (baseline) and the period 2025 to 2038 (future baseline).

2.1.13 CDEW landfill arisings data could only be obtained for 2015 from the Waste Arisings and Capacity Requirements Report 2017. Close to 19% of CDEW arisings were disposed of to landfill in 2015.

Greater Manchester

2.1.14 Total CDEW arisings for the years 2021 (baseline) and the period 2025 to 2038 (future baseline) are based on information taken from Figure 7 and Figure 8 in the Greater Manchester Joint Waste Development Plan Document[4].

2.1.15 Annual projections have been extrapolated using forecasted CDEW arisings data expressed in graphical format for the years 2013 (1,237,188 tonnes) to 2028 (1,385,000 tonnes) to provide arisings data for the year 2021 (baseline) and the period 2025 to 2038 (future baseline). Arisings data for the years 2029 to 2038 were extrapolated using the same average annual growth rate that was calculated for the period 2013 to 2028.

2.1.16 CDEW arisings to landfill data was also extracted and extrapolated from graphs presented in the Joint Waste Development Plan.

[3] Warrington Borough Council (2017), *Waste Arisings and Capacity Requirements Report 2017*. Available online at: https://www.warrington.gov.uk/info/201368/local_plan_review/2347/local_plan_review_-_supporting_documents.

[4] Association of Greater Manchester Authorities (2012), *Greater Manchester Joint Waste Development Plan Document*. Available online at: https://secure.manchester.gov.uk/downloads/download/4804/greater_manchester_joint_waste_development_plan_documents.

Lancashire

2.1.17 Total CDEW arisings for the years 2021 (baseline) and the period 2025 to 2038 (future baseline) are based on information taken from Appendix 5 of the Joint Lancashire Local Waste Assessment[5]. Three scenarios are provided for CDEW growth: 1%, 2.3% and 5% increases. These relate to the following projections: the 2.3% growth rate reflects the average annual projection of economic growth for the construction industry, and the 5% growth rate relates to past trends in waste throughput. The Core Strategy planned for a 1% growth rate and therefore the CDEW forecasts have been based on this growth rate.

2.1.18 Annual projections have been extrapolated using published CDEW arisings data for 2012 (3,363,232 tonnes) to 2032 (5,180,765 tonnes) to provide arisings data for the year 2021 (baseline) and beyond. Arisings data for the years 2033 to 2038 were extrapolated using the same average annual growth rate that was calculated for the period 2026 to 2032. There was an error in the source data which involved the omission of data for the year 2021. For the year 2021, it has been assumed that the material generated is half the difference between that shown for 2022 and that shown for 2020.

2.1.19 CDEW arisings to landfill data was also extracted and extrapolated in the same manner from Appendix 5 of the Joint Lancashire Local Waste Assessment including the assumptions relating to the year 2021.

Cumbria

2.1.20 Total CDEW arisings for the years 2021 (baseline) and the period 2025 to 2038 (future baseline) are based on information taken from Tables 2 and 3 of the Joint Cumbria Waste Needs Assessment[6]. The growth/recycling scenario is the preferred scenario identified in the Waste Needs Assessment and has therefore been used for the CDEW arisings forecasts.

2.1.21 Annual projections have been extrapolated using published CDEW arisings data for 2017 (791,140 tonnes), 2020 (793,971 tonnes), 2025 (796,490 tonnes), 2030 (799,119 tonnes) and 2035 (803,044 tonnes) to provide arisings data for the year 2021 (baseline) and the period 2025 to 2038 (future baseline). Arisings data for the years 2036 to 2038 were extrapolated using the same average annual growth rate that was calculated for the period 2030 to 2035.

2.1.22 CDEW landfill arisings data could only be obtained for 2017 from the Joint Cumbria Waste Needs Assessment 2019. This information is presented separately for both construction and demolition (C&D) waste and excavation waste arisings. Approximately 3% of C&D waste arisings and 14% of excavation waste arisings were disposed of to landfill in 2017. No

[5] Lancashire County Council Blackpool Council and Blackburn with Darwen Borough Council, (2017), *Joint Lancashire Local Waste Assessment*. Available online at: https://www.lancashire.gov.uk/media/714234/local-waste-assessment-2016.pdf.

[6] Cumbria County Council and Lake District National Park Authority (2019), *Joint Cumbria Waste Needs Assessment*. Available online at: https://cumbria.gov.uk/elibrary/Content/Internet/538/755/1929/4379018936.PDF.

forecasts of future CDEW of landfill are provided and, therefore, it has been assumed that the percentage of waste sent to landfill remains the same every year from 2017 onwards.

Dumfries and Galloway

2.1.23 No CDEW arisings forecasts for Dumfries and Galloway are available beyond 2017. It has not been possible to forecast the future waste arisings for this region using a methodology consistent with other local areas.

Commercial and industrial waste arisings and management

2.1.24 Commercial and industrial (C&I) waste arisings and waste management methods for the local areas are shown in Table 3 for the year 2021 (baseline). Table 4 for the period 2025 to 2038 (future baseline for worker accommodation site waste during construction) and Table 5 for the year 2039 (future baseline for operation).

2.1.25 Future baseline arisings for C&I waste are shown in Table 4 as the sum of annual projections for each year in the proposed construction period of 2025 to 2038. This presentation method allows for direct comparison of the total quantity of C&I waste that will be generated by the Proposed Scheme during this period. Waste management performance (shown as diversion from landfill and disposal to landfill) is also based on data for each year in the period 2025 to 2038 (future baseline).

2.1.26 Latest available information published by the waste planning authorities has been used to inform the local baseline and future baseline for C&I waste arisings. Details of the sources of information used are provided further within this section.

Table 3: Baseline (2021) C&I arisings and management methods by local area

Regional area	Local area	Total C&I arisings (tonnes)	Overall diversion from landfill		Disposal to landfill	
			Tonnes	Percentage	Tonnes	Percentage
North West	Cheshire East	252,714	246,764	98%	5,950	2%
	Cheshire West and Chester	474,600	356,712	75%	117,888	25%
	Warrington	163,612	110,451	68%	53,242	32%
	Greater Manchester	2,723,400	2,128,508	78%	594,892	22%
	Lancashire	2,288,000	1,738,880	76%	549,120	24%
	Cumbria	907,009	792,038	87%	114,971	13%
Scotland	Dumfries and Galloway Council	No data available	No data available	No data available	No data available	No data available

Table 4: Future baseline (2025 to 2038) C&I arisings and management methods by local area

Regional area	Local area	Total C&I arisings (tonnes)	Overall diversion from landfill		Disposal to landfill	
			Tonnes	Percentage	Tonnes	Percentage
North West	Cheshire East	3,900,211	3,824,194	98%	76,017	2%
	Cheshire West and Chester	6,491,006	4,869,728	75%	1,621,278	25%
	Warrington	2,266,918	1,979,869	87%	288,269	13%
	Greater Manchester	36,799,000	28,760,724	78%	8,038,276	22%
	Lancashire	32,032,000	28,691,520	90%	3,340,480	10%
	Cumbria	12,136,555	10,600,993	87%	1,535,562	13%
Scotland	Dumfries and Galloway Council	No data available	No data available	No data available	No data available	No data available

Table 5: Future baseline (2039) C&I arisings and management methods by local area

Regional area	Local area	Total C&I arisings (tonnes)	Overall diversion from landfill		Disposal to landfill	
			Tonnes	Percentage	Tonnes	Percentage
North West	Cheshire East	294,944	289,955	98%	4,989	2%
	Cheshire West and Chester	453,445	339,361	75%	114,084	25%
	Warrington	161,298	145,168	90%	16,130	10%
	Greater Manchester	2,561,000	2,001,582	78%	559,418	22%
	Lancashire	2,288,000	2,288,000	100%	0	0%
	Cumbria	847,445	740,364	87%	107,081	13%
Scotland	Dumfries and Galloway Council	No data available	No data available	No data available	No data available	No data available

Cheshire East

2.1.27 Total C&I waste arisings for Cheshire East for the year 2021 (baseline), the period 2025 to 2038 (future baseline), and the year 2039 (future baseline for operation), are based on information taken from Table 10 in Cheshire East's Waste Management Needs Assessment 2017 - Main Report[2].

2.1.28 Annual projections have been extrapolated using published C&I waste arisings for 2015 (237,500 tonnes), 2020 (249,790 tonnes), 2025 (264,410 tonnes) and 2030 (275,315 tonnes) to provide arisings data for the year 2021 (baseline), the period 2025 to 2038 (future baseline), and the year 2039 (future baseline for operation). Arisings data for the years 2031 to 2039 were extrapolated using the same average annual growth rate that was calculated for the period 2025 to 2030.

2.1.29 C&I waste arisings to landfill data was also extracted from the Cheshire East's Waste Management Needs Assessment 2017 for the years 2015, 2020, 2025 and 2030. C&I waste

arisings to landfill data for the years 2031 to 2038 were extrapolated using the same average annual growth rate that was calculated for the period 2025 to 2030.

Cheshire West and Chester

2.1.30 Total C&I waste arisings for Cheshire West and Chester for the year 2021 (baseline), the period 2025 to 2038 (future baseline), and the year 2039 (future baseline for operation), are based on information taken from Cheshire West and Chester's Waste Management Needs Assessment Update[2].

2.1.31 Annual projections have been extrapolated using published C&I waste arisings for 2015 (452,221 tonnes), 2020 (475,130 tonnes), 2025 (472,482 tonnes) and 2030 (465,683 tonnes) to provide arisings data for the year 2021 (baseline), the period 2025 to 2038 (future baseline), and the year 2039 (future baseline for operation). Arisings data for the years 2031 to 2039 were extrapolated using the same average annual growth rate that was calculated for the period 2025 to 2030.

2.1.32 Cheshire West and Chester's Waste Management Needs Assessment Update forecasts C&I waste sent for energy recovery, landfill, and treatment as a whole, but no breakdown is provided for each waste management fate in the source data. However, performance targets of 25% were set for C&I waste to landfill in 2030, which is equivalent to the total forecasted figure for energy recovery/landfill/treatment in addition to that for the 'don't know' category. Therefore, the addition of these two totals has been taken to represent the total C&I waste sent to landfill.

Warrington

2.1.33 Total C&I waste arisings for Warrington for the year 2021 (baseline), the period 2025 to 2038 (future baseline), and the year 2039 (future baseline for operation), are based on information taken from Warrington Borough Council's Waste Arisings and Capacity Requirements Report 2017[3].

2.1.34 Annual projections have been extrapolated using published C&I waste arisings for 2015 (165,234 tonnes), 2020 (163,880 tonnes), 2025 (162,541 tonnes), 2030 (162,015 tonnes) and 2037 (161,457 tonnes) provide arisings data for the year 2021 (baseline), the period 2025 to 2038 (future baseline), and the year 2039 (future baseline for operation).

2.1.35 Forecasts for C&I waste to landfill arisings were derived from information presented in Table 11 of Warrington Borough Council's Waste Arisings and Capacity Requirements Report 2017[3] in which two recycling scenarios were introduced: the baseline, and the increased recycling scenario. The latter scenario, which was used for the waste arisings projections, forecasts 35% of C&I waste being disposed of to landfill by 2020 and 10% by 2030. The annual percentage of C&I waste arisings sent to landfill in the years 2031 to 2039 was assumed to be the same as that for 2030.

Greater Manchester

2.1.36 Total C&I waste arisings for Greater Manchester for the year 2021 (baseline), the period 2025 to 2038 (future baseline), and the year 2039 (future baseline for operation), are based on information taken from the Greater Manchester Joint Waste Development Plan[4].

2.1.37 Annual projections have been extrapolated using published C&I waste arisings for 2009 (2,854,000 tonnes), 2012 (2,761,000 tonnes), 2017 (2,761,000 tonnes), 2022 (2,714,000 tonnes) and 2027 (2,669,000 tonnes) to provide arisings data for the year 2021 (baseline), the period 2025 to 2038 (future baseline), and the year 2039 (future baseline for operation). Arisings data for the years 2028 to 2039 were extrapolated using the same average annual growth rate that was calculated for the period 2022 to 2027.

2.1.38 Forecasted C&I waste to landfill are not provided in the Joint Waste Development Plan. A figure for 2009 was obtained from the Needs Assessment Update Report (2010)[7], therefore it has been assumed that the annual percentage of waste disposed of to landfill for the years following 2009 is the same as that for 2009.

2.1.39 The authorities of Trafford, Wigan, and Manchester City are included within the figures for Greater Manchester, so have not been assessed separately.

Lancashire

2.1.40 Total C&I waste arisings for the years 2021 (baseline) and the period 2025 to 2038 (future baseline) are based on information taken from Appendix 4 of the Joint Lancashire Local Waste Assessment[5]. Three scenarios are presented for C&I waste growth: -4.2%, 0% and 2.3%. These relate to the following projections: the -4.2% waste growth reflects waste arising trends since 2003, and 2.3% waste growth reflects the average annual projection of economic growth for the construction industry. The Core Strategy planned for a 0% growth rate, this growth rate has, therefore, been used to estimate the C&I waste arisings forecasts.

2.1.41 Annual projections have been extrapolated using published C&I waste arisings data for 2012 (2,288,000 tonnes) to 2032 (2,288,000 tonnes) to provide arisings data for the year 2021 (baseline) and the period 2025 to 2038 (future baseline). Arisings data for the years 2032 to 2039 were extrapolated using the same average annual growth rate that was calculated for the period 2026 to 2030.

2.1.42 C&I waste arisings to landfill data were also extracted and extrapolated for the same period from Appendix 4 of the Joint Lancashire Local Waste Assessment.

2.1.43 Extrapolating the landfill data, by assuming that the amount sent to landfill continues to decrease, has led to a prediction that no materials will be sent to landfill from 2037. In reality, this is unlikely to materialise. Other alternative approaches could include maintaining the quantum or percentage of C&I waste predicted to be deposited to landfill in 2032 for all

[7] The Association of Greater Manchester Authorities (April 2012), *Joint Waste Development Plan Document – Needs Assessment update Report (March 2010)*.

subsequent years. However, either of these alternative approaches would reverse the trend for significantly reducing waste to landfill. The approach used follows the trend set within the Local Waste Assessment.

Cumbria

2.1.44 Total C&I waste arisings for the years 2021 (baseline), and the period 2025 to 2038 (future baseline) are based on information taken from Table 2 and 3 of the Joint Cumbria Waste Needs Assessment[6]. The growth/recycling scenario was utilised for the C&I waste arisings forecasts as this was identified as being the preferred scenario in the Waste Needs Assessment.

2.1.45 Annual projections have been extrapolated using published C&I waste arisings data for 2017 (932,920 tonnes), 2020 (911,164 tonnes), 2025 (890,387 tonnes), 2030 (867,945 tonnes) and 2035 (856,556 tonnes) to provide arisings data for the year 2021 (baseline) and the period 2025 to 2038 (future baseline). Arisings data for the years 2036 to 2038 were extrapolated using the same average annual growth rate that was calculated for the period 2030 to 2035.

2.1.46 C&I waste to landfill arisings data could only be obtained for 2017 from the Joint Cumbria Waste Needs Assessment 2019. This information is presented separately for both commercial and industrial waste arisings. Approximately 12% of commercial waste arisings and 13% of industrial waste arisings were disposed of to landfill in 2017. No forecasts of future C&I waste arisings to landfill are provided and, therefore, it has been assumed that the percentage of waste sent to landfill remains the same every year from 2017 onwards.

Dumfries and Galloway

2.1.47 No C&I waste arisings forecasts for Dumfries and Galloway are available beyond 2017. It has not been possible to forecast the future waste arisings for this region using a methodology consistent with other local areas.

2.2 Baseline waste infrastructure capacity

Data sources

2.2.1 Baseline waste infrastructure capacity data in the following sections has been derived from the Environment Agency Waste management data for England 2019, Waste Summary Tables[8]. The data for Dumfries and Galloway has been obtained from the Scottish

[8] Environment Agency (2014), *Waste Management Data* (years 2005 – 2012). Available online at: http://webarchive.nationalarchives.gov.uk/20140328145538/http://www.environment-agency.gov.uk/research/library/data/34169.aspx. And (2013 – 2016): https://www.gov.uk/guidance/how-to-access-waste-management-data-for-england. And (2017 – 2019): https://environment.data.gov.uk/portalstg/home/gallery.html?view=grid&sortOrder=true&sortField=relevance&searchTerm=waste%20summary%20tables.

Environment Protection Agency's Waste sites and capacity tool[9]; the latest year for which data was available was 2019.

2.2.2 Data published by the Environment Agency relating to waste treatment and transfer infrastructure is limited to inputs (waste received) only.

North West

2.2.3 Table 6 provides baseline waste infrastructure capacity data for Cheshire, Cumbria, Greater Manchester, Lancashire (described as the sub-region) and overall for the North West region (sub-region and Merseyside).

Table 6: Baseline waste infrastructure capacity by county and region in 2019 (North West)

Facility type	Cheshire capacity (tonnes)	Cumbria capacity (tonnes)	Greater Manchester capacity (tonnes)	Lancashire capacity (tonnes)	Sub-regional total capacity (tonnes)	North West region capacity (tonnes)
Inert waste landfill	1,140,000	1,576,500	2,088,000	2,670,000	7,474,500	8,245,500
Non-hazardous waste landfill	6,325,430	2,548,930	4,795,740	6,795,210	20,465,310	20,465,310
Hazardous waste landfill	6,433,500	0	0	2,791,500	9,225,000	9,225,000
Total landfill	13,898,930	4,125,430	6,883,740	12,256,710	37,164,810	37,935,810
Municipal solid waste, C&I waste incineration	1,100,000	0	127,000	0	1,227,000	1,227,000
Other incineration	280,000	0	14,000	175,000	469,000	793,000
Total incineration	1,380,000	0	141,000	175,000	1,696,000	2,020,000
Waste transfer	423,000	395,000	2,301,000	1,196,000	4,315,000	6,185,000
Waste treatment	1,880,000	1,161,000	7,210,000	3,090,000	13,341,000	17,513,000
Metal recycling	50,000	50,000	709,000	243,000	1,052,000	2,760,000
Total treatment and waste transfer	2,353,000	1,606,000	10,220,000	4,529,000	18,708,000	26,458,000
Total	**17,631,930**	**5,731,430**	**17,244,740**	**16,960,710**	**57,568,810**	**66,413,810**

Dumfries and Galloway

2.2.4 Table 7 provides baseline waste infrastructure capacity data for the Dumfries and Galloway in Scotland.

[9] Scottish Environment Protection Agency (2013-2019), *Waste sites and capacity tool*. Available online at https://www.sepa.org.uk/data-visualisation/waste-sites-and-capacity-tool/.

Table 7: Baseline waste infrastructure capacity by county and region in 2019 (Dumfries and Galloway)

Facility type	Dumfries and Galloway capacity (tonnes)
Inert waste landfill	0
Non-hazardous waste landfill	414,702
Hazardous waste landfill	0
Total landfill	**414,702**
Municipal solid waste, C&I waste incineration	750,000
Other incineration	0
Total incineration	**750,000**
Waste transfer	141,818
Waste treatment	91,573
Metal recycling	25,550
Total treatment and waste transfer	**258,941**
Total	**1,423,643**

2.3 Future baseline waste infrastructure capacity

General

2.3.1 This section presents the source data that has been used to inform the future baseline with respect to the quantity of landfill, waste recovery and waste treatment capacity projected to be available during the period 2025 to 2038 and the year 2039.

2.3.2 Permitted capacity data published by the Environment Agency[8] and the Scottish Environment Protection Agency[9] has been used to provide data for each category of waste treatment, recovery and disposal. Capacity for each class of landfill is as defined by Council Directive 1999/31/EC (the 'Landfill Directive')[10], i.e. for inert, non-hazardous and hazardous waste landfills.

Methodology

Future baseline landfill capacity

2.3.3 Projected landfill capacity is based on the average percentage change in permitted landfill capacity for the years 2005 to 2019 as reported by the Environment Agency[8]. The average percentage change has then been applied to the reported 2019 permitted landfill capacity and projected forward to 2039.

[10] The Council of the European Union *(1999), Directive 1999/31/EC of the European Parliament and of the Council of 26 April 1999 on the landfill of waste.* Available online at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:31999L0031.

2.3.4 This method assumes that the average percentage change in permitted capacity for each class of landfill remains constant. Use of an average value taken from historical data provides a reasonable allowance for potential future increases in permitted capacity for each class of landfill and takes account of waste generation trends driven by development in the respective regional areas.

2.3.5 This approach is considered to provide a reasonable scenario with respect to future landfill capacity within the North West region through which the route of the Proposed Scheme passes, and which takes into account future drawdown and increases in permitted capacity, as well as government policy measures to divert waste from landfill and the requirement for waste planning authorities to provide for future landfill capacity needs.

2.3.6 It should be noted that whilst calculating the average changes predicted for future baselines, outliers have been removed.

Future baseline waste treatment and recovery capacity

2.3.7 Permitted capacity data published by the Environment Agency[8] has been used to provide an indication of projected waste recovery capacity for the future baseline.

2.3.8 Data published by the Environment Agency relating to waste treatment infrastructure is limited to inputs (waste received) only; to derive projections of waste treatment infrastructure capacity, it has been assumed that the relationship between inputs and capacity matches that found in the waste recovery data published by the Environment Agency.

2.3.9 Waste infrastructure responds to market demands, and historical trends show that infrastructure is added, or removed, not least to cope with changes in waste generation and management. The waste treatment and recovery infrastructure capacity has been projected forward by aligning growth in capacity with the respective forecast regional and national C&I waste growth rates. The average unused capacity has been taken from the Environment Agency data over the years, for which consistent data is available, and has been applied to the projected capacity.

2.3.10 This method assumes that the quantity of unused waste treatment and recovery infrastructure capacity as a proportion of the total capacity remains constant and assumes that waste treatment and recovery infrastructure capacity will grow in direct proportion to the waste generation rates in the respective regions.

2.3.11 The information presented is considered to be a reasonable scenario with respect to future waste treatment and recovery infrastructure capacity within the North West region through which the route of the Proposed Scheme passes.

2.3.12 It should be noted that whilst calculating the average changes predicted for future baselines, outliers have been removed.

Inert waste landfill capacity

Historic landfill capacity trend data

2.3.13 Table 8 presents permitted inert waste landfill capacity data published by the Environment Agency[8] for the period 2005 to 2019 (latest available published data), and the Scottish Environment Protection Agency[9] for the period 2013 to 2019 (latest available published data).

2.3.14 Inert waste landfill capacity is shown in thousands of cubic metres as published by the Environment Agency. Data for 'national' inert waste landfill capacity relates to England only.

2.3.15 Also shown in Table 8 are the annual percentage changes in inert waste landfill capacity and the average percentage change for the period 2005 to 2019.

Table 8: National and regional inert waste landfill capacity trends, 2005 to 2019

Year	Regions through which the route of the Proposed Scheme passes		Regions in which off-route works are located		National	
	North West		Dumfries and Galloway		England	
	Capacity (,000 m³)	Annual change (%)	Capacity (tonnes)	Annual change (%)	Capacity (,000 m³)	Annual change (%)
2005	12,299		No data	No data	79,445	
2006	20,772	68.89%	No data	No data	95,730	20.50%
2007	13,881	-33.18%	No data	No data	119,512	24.84%
2008	13,478	-2.91%	No data	No data	109,522	-8.36%
2009	18,826	39.68%	No data	No data	126,354	15.37%
2010	14,029	-25.48%	No data	No data	117,828	-6.75%
2011	13,885	-1.03%	No data	No data	121,316	2.96%
2012	13,881	-0.03%	No data	No data	111,412	-8.16%
2013	14,679	5.75%	0	0.00%	131,060	17.64%
2014	8,276	-43.62%	0	0.00%	126,666	-3.35%
2015	6,292	-23.97%	0	0.00%	132,579	4.67%
2016	6,680	6.17%	0	0.00%	147,775	11.46%
2017	5,827	-12.77%	0	0.00%	125,182	-15.29%
2018	4,690	-19.51%	0	0.00%	124,531	-0.52%
2019	5,497	17.20%	0	0.00%	122,375	-1.73%
Average capacity change 2005 to 2019		-1.77%		0.00%		3.81%

Landfill capacity projections

2.3.16 Table 9 presents permitted inert waste landfill capacity projections to 2039 based on latest available published data for 2019.

2.3.17 Projections have been derived by applying the average capacity change 2005 to 2019 (shown in Table 8) to the published inert waste landfill capacity for 2019 and for each year beyond to 2039.

2.3.18 In Table 9, the published inert waste landfill capacity for 2019 has been converted to tonnes using an inert waste landfill density conversion factor of 1.5 tonnes per cubic metre[11]. The purpose of this is to provide comparable information for use in this assessment (i.e. landfill void space and quantity of waste requiring off-site disposal to landfill are both expressed in tonnes).

2.3.19 For ease of reference, inert waste landfill capacity projections are shown for:

- 2019 (latest available published data converted to tonnes);
- 2025, 2029, 2033 and 2038 (four- and five-year intervals between start and end of construction); and
- 2039 (first full year of operation).

Table 9: National and regional inert waste landfill capacity projections to 2039 (tonnes)

	Area	2019	2025	2029	2033	2038	2039
Region through which the route of the Proposed Scheme passes	North West	8,245,500	7,407,148	6,896,156	6,420,415	5,871,622	5,767,626
Region in which off-route works are located	Dumfries and Galloway	0	0	0	0	0	0
National	England	183,562,500	229,666,514	266,669,587	309,634,466	373,202,083	387,403,029

2.3.20 There is no inert landfill capacity within Dumfries and Galloway. The Annandale depot is close to the boundary between Dumfries and Galloway, and Cumbria; based on proximity, and the strength of available transport connections to the site, it is considered likely that all inert waste generated by the Annandale depot works will be disposed of to inert landfills in Cumbria. Other authorities within the North West region are considered to be too remote from the point of material arising.

[11] Department of the Environment, (1995), *Waste Management Paper No. 26B: Landfill Design, Construction and Operational Practice*, HMSO, London.

Non-hazardous waste landfill capacity

Historic landfill capacity trend data

2.3.21 Table 10 presents permitted non-hazardous waste landfill capacity data published by the Environment Agency[8] for the period 2005 to 2019 (latest available published data), and the Scottish Environment Protection Agency[9] for the period 2013 to 2019 (latest available published data).

2.3.22 Non-hazardous waste landfill capacity is shown in thousands of cubic metres as published by the Environment Agency, with the exception of Dumfries and Galloway which is shown in tonnes, as published by the Scottish Environment Protection Agency. Data for 'national' non-hazardous waste landfill capacity relates to England only.

2.3.23 Also shown in Table 10 are the annual percentage changes in non-hazardous waste landfill capacity and the average percentage change for the period 2005 to 2019.

Table 10: National and regional non-hazardous waste landfill capacity trends, 2005 to 2019

Year	Regions through which the route of the Proposed Scheme passes		Regions in which off-route works are located		National	
	North West		Dumfries and Galloway		England	
	Capacity (,000 m³)	Annual change (%)	Capacity (tonnes)	Annual change (%)	Capacity (,000 m³)	Annual change (%)
2005	75,208	n/a	No data	No data	549,895	n/a
2006	70,963	-5.64%	No data	No data	544,361	-1.01%
2007	62,975	-11.26%	No data	No data	504,928	-7.24%
2008	55,657	-11.62%	No data	No data	484,812	-3.98%
2009	54,210	-2.60%	No data	No data	431,108	-11.08%
2010	53,308	-1.66%	No data	No data	429,143	-0.46%
2011	52,447	-1.61%	No data	No data	407,667	-5.00%
2012	46,179	-11.95%	No data	No data	376,266	-7.70%
2013	43,288	-6.26%	816,576	n/a	361,040	-4.05%
2014	42,342	-2.19%	896,576	9.80%	335,819	-6.99%
2015	39,716	-6.20%	816,576	-8.92%	319,711	-4.80%
2016	39,335	-0.96%	416,150	-49.04%	297,132	-7.06%
2017	31,283	-20.47%	416,150	0.00%	277,236	-6.70%
2018	31,296	0.04%	432,702	3.98%	260,218	-6.14%
2019	24,657	-21.21%	414,702	-4.16%	229,607	-11.76%
Average capacity change 2005 to 2019	n/a	-5.16%	n/a	-0.06%*	n/a	-6.00%

** Average capacity change for Dumfries and Galloway only includes capacity change data from 2017 to 2019.*

Landfill capacity projections

2.3.24 Table 11 presents permitted non-hazardous waste landfill capacity projections to 2039 based on latest available published data for 2019.

2.3.25 Projections have been derived by applying the average capacity change 2005 to 2019 (shown in Table 10) to the published non-hazardous waste landfill capacity for 2019 and for each year beyond to 2039. When determining the average capacity change outliers have been removed.

2.3.26 In Table 11, with the exception of Dumfries and Galloway for which data is presented at source in tonnes, the published non-hazardous waste landfill capacity for 2019 has been converted to tonnes using a non-hazardous waste landfill density conversion factor of 0.83 tonnes per cubic metre[12]. The purpose of this is to provide comparable information for use in this assessment (i.e. landfill void space and quantity of waste requiring off-site disposal to landfill are both expressed in tonnes).

2.3.27 For ease of reference, non-hazardous waste landfill capacity projections are shown for:

- 2019 (latest available published data converted to tonnes);
- 2025, 2029, 2033 and 2038 (four- and five-year intervals between start and end of construction); and
- 2039 (first full year of operation).

Table 11: National and regional non-hazardous waste landfill capacity projections to 2039 (tonnes)

	Area	2019	2025	2029	2033	2038	2039
Region through which the route of the Proposed Scheme passes	North West	20,465,310	14,892,822	12,048,957	9,748,144	7,479,757	7,093,827
Region in which off-route works are located	Dumfries and Galloway	414,702	413,191	412,186	411,184	409,935	409,686
National	England	190,573,810	131,492,949	102,674,351	80,171,769	58,846,527	55,317,267

[12] Environment Agency (2011), *Calculation of Landfill Life for Non-Hazardous Wastes*. Available online at: http://webarchive.nationalarchives.gov.uk/20140328115738/http://www.environment-agency.gov.uk/research/library/data/142777.aspx.

Hazardous waste landfill capacity

Historic landfill capacity trend data

2.3.28 Table 12 presents permitted hazardous waste landfill capacity data published by the Environment Agency[8] for the period 2005 to 2019 (latest available published data), and the Scottish Environment Protection Agency[9] for the period 2013 to 2019 (latest available published data).

2.3.29 Hazardous waste landfill capacity is shown in thousands of cubic metres as published by the Environment Agency. Data for 'national' hazardous waste landfill capacity relates to England only.

2.3.30 Also shown in Table 12 are the annual percentage changes in hazardous waste landfill capacity and the average percentage change for the period 2005 to 2019. When determining the average, outliers have been removed.

Table 12: National and regional hazardous waste landfill capacity trends, 2005 to 2019

Year	Regions through which the route of the Proposed Scheme passes		Regions in which off-route works are located		National	
	North West		Dumfries and Galloway		England	
	Capacity (,000 m³)	Annual change (%)	Capacity (tonnes)	Annual change (%)	Capacity (,000 m³)	Annual change (%)
2005	5,923		No data	No data	17,204	
2006	5,880	-0.73%	No data	No data	15,656	-8.99%
2007	5,878	-0.03%	No data	No data	18,752	19.77%
2008	5,702	-2.99%	No data	No data	18,929	0.94%
2009	5,479	-3.91%	No data	No data	18,128	-4.23%
2010	5,330	-2.73%	No data	No data	17,398	-4.03%
2011	5,244	-1.60%	No data	No data	17,823	2.44%
2012	5,094	-2.86%	No data	No data	17,760	-0.35%
2013	5,004	-1.77%	0	0.00%	19,031	7.15%
2014	4,906	-1.96%	0	0.00%	21,885	15.00%
2015	4,832	-1.50%	0	0.00%	18,468	-15.61%
2016	6,631	37.23%	0	0.00%	20,014	8.37%
2017	6,559	-1.10%	0	0.00%	19,466	-2.74%
2018	6,461	-1.49%	0	0.00%	19,820	1.82%
2019	6,150	-4.81%	0	0.00%	19,275	-2.75%
Average capacity change 2005 to 2019		-2.11%		0.00%		1.20%

Landfill capacity projections

2.3.31 Table 13 presents permitted hazardous waste landfill capacity projections to 2039 based on latest available published data for 2019.

2.3.32 The relatively low capacity of hazardous waste landfill, and the small number of sites within each region, mean that the average annual change in capacity on which the future baseline projections are based is susceptible to producing unrealistic trends. For this reason, the regional projections of hazardous waste landfill capacity have been derived by applying the average national capacity change 2005 to 2019 (shown in Table 12) to the published hazardous waste landfill capacity for 2019 and for each year beyond to 2039.

2.3.33 In Table 13, the published hazardous waste landfill capacity for 2019 has been converted to tonnes using a hazardous waste landfill density conversion factor of 1.5 tonnes per cubic metre. The purpose of this is to provide comparable information for use in this assessment (i.e. landfill void space and quantity of waste requiring off-site disposal to landfill are both expressed in tonnes).

2.3.34 For ease of reference, hazardous waste landfill capacity projections are shown for:

- 2019 (latest available published data converted to tonnes);
- 2025, 2029, 2033 and 2038 (four- and five-year intervals between start and end of construction); and
- 2039 (first full year of operation).

Table 13: National and regional hazardous waste landfill capacity projections to 2039 (tonnes)

	Area	2019	2025	2029	2033	2038	2039
Region through which the route of the Proposed Scheme passes	North West	9,225,000	8,115,000	7,450,235	6,839,926	6,146,858	6,016,910
Region in which off-route works are located	Dumfries and Galloway	0	0	0	0	0	0
National	England	28,912,500	31,056,946	32,574,230	34,165,640	36,264,677	36,699,713

Waste recovery capacity

Historic waste recovery infrastructure capacity trend data

2.3.35 Table 14 presents permitted waste recovery infrastructure capacity data published by the Environment Agency[8] for the period 2010 to 2019 (latest available published data), and the Scottish Environment Protection Agency[9] for the period 2013 to 2019 (latest available published data).

2.3.36 Also shown in Table 14 is the unused waste recovery infrastructure capacity, which comprises the permitted capacity, less the quantity of waste accepted at the respective waste recovery infrastructure in the same year (inputs). The unused capacity is also presented as a proportion of the permitted capacity.

Table 14: National and regional waste recovery infrastructure capacity trends, 2010 to 2019 (tonnes)

	Area		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average unused capacity 2010 to 2019*
Region through which the route of the Proposed Scheme passes	North West	Capacity (tonnes)	638,098	638,098	638,098	638,098	623,098	1,466,412	1,466,412	1,613,410	1,693,428	2,020,000	
		Unused capacity (tonnes)	280,856	296,421	302,280	354,269	304,243	441,051	228,752	369,410	443,377	534,059	
		Unused capacity (%)	44.01%	46.45%	47.37%	55.52%	48.83%	30.08%	15.60%	22.90%	26.18%	26.44%	36.34%
Region in which off-route works are located	Dumfries and Galloway[13]	Capacity (tonnes)	No data	No data	No data	210,000	210,000	210,000	750,000	750,000	750,000	750,000	
		Unused capacity (tonnes)	No data	No data	No data	147,789	140,959	140,794	676,113	668,828	682,171	678,252	
		Unused capacity (%)	No data	No data	No data	70.38%	67.12%	67.04%	90.15%	89.18%	90.96%	90.43%	80.75%
National	England	Capacity (tonnes)	8,962,779	10,090,129	10,103,269	10,855,052	11,918,302	14,226,696	15,481,566	16,790,460	19,444,210	21,396,246	
		Unused capacity (tonnes)	3,032,415	3,487,230	3,020,080	3,360,790	3,326,318	3,847,886	3,842,156	3,798,178	5,092,843	6,099,768	
		Unused capacity (%)	33.83%	34.56%	29.89%	30.96%	27.91%	27.05%	24.82%	22.62%	26.19%	28.51%	28.63%

[13] The Scottish waste sites and capacity tool, published by the Scottish Environment Protection Agency (see footnote 9), includes data only for the current baseline year and for four previous years. No public domain data is available regarding waste infrastructure capacity in Dumfries and Galloway prior to 2013.

Waste recovery infrastructure capacity projections

2.3.37 Table 15 presents permitted waste recovery infrastructure capacity projections to 2039 based on latest available published data for 2019. The waste recovery infrastructure capacity has been projected forward by aligning growth in capacity with the respective forecast regional and national C&I waste growth rates. Insufficient data regarding C&I waste growth for Dumfries and Galloway is available on which to forecast future arisings; it has therefore not been possible to produce projections of waste recovery infrastructure capacity in the region.

2.3.38 Also shown in Table 15 are projections of the unused waste recovery infrastructure capacity, which comprises the share of the projected permitted capacity expected to remain unused, based on the average proportion of unused capacity between 2010 and 2019, shown in Table 14.

2.3.39 For ease of reference, waste recovery infrastructure capacity projections are shown for:

- 2019 (latest available published data);
- 2025, 2029, 2033 and 2038 (four- and five-year intervals between start and end of construction); and
- 2039 (first full year of operation).

Table 15: National and regional waste recovery infrastructure capacity projections to 2039 (tonnes)

	Area		2019	2025	2029	2033	2038	2039
Region through which the route of the Proposed Scheme passes	North West	Capacity (tonnes)	2,020,000	2,009,029	1,996,067	1,984,808	1,971,442	1,968,769
		Unused capacity (tonnes)	734,029	730,042	725,332	721,241	716,384	715,413
Region in which off-route works are located	Dumfries and Galloway[14]	Capacity (tonnes)	750,000	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
		Unused Capacity (tonnes)	678,252	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
National	England	Capacity (tonnes)	21,396,246	24,056,115	26,010,624	28,123,932	31,008,634	31,620,152
		Unused capacity (tonnes)	6,126,656	6,888,289	7,447,948	8,053,078	8,879,091	9,054,195

[14] Projections of growth in waste recovery infrastructure capacity are based upon the forecast growth in C&I waste arisings in the region. No data is available regarding C&I waste arisings in Dumfries and Galloway; there is, therefore, insufficient data available to project capacity forward whilst remaining consistent with the methodology used for other regional areas.

Waste treatment capacity

Waste treatment infrastructure inputs trend data

2.3.40 Waste data published by the Environment Agency[8] regarding waste treatment infrastructure, is limited to the quantity of waste received at permitted facilities (inputs). It is not possible to gain an understanding of the proportion of capacity, which is unused from the available data, and so no historic trend data is presented for waste treatment infrastructure.

Waste treatment infrastructure capacity projections

2.3.41 Table 15 presents projections of waste received at permitted waste treatment infrastructure to 2039 based on latest available published data for 2019. The waste treatment infrastructure capacity has been projected forward by aligning growth in capacity with the respective forecast regional and national C&I waste growth rates. Insufficient data regarding C&I waste growth for Dumfries and Galloway is available on which to forecast future arisings; it has therefore not been possible to produce projections of waste treatment infrastructure capacity in the region.

2.3.42 Also shown in Table 15 are projections of the unused waste treatment infrastructure capacity, which comprises the share of the projected permitted capacity expected to remain unused, based on the average proportion of unused capacity developed from the waste recovery infrastructure data between 2010 and 2019, shown in Table 14.

2.3.43 For ease of reference, waste treatment infrastructure capacity projections are shown for:

- 2019 (latest available published data);
- 2025, 2029, 2033 and 2038 (four- and five-year intervals between start and end of construction); and
- 2039 (first full year of operation).

Table 16: National and regional waste treatment infrastructure capacity projections to 2039 (tonnes)

	Area		2019	2025	2029	2033	2038	2039
Region through which the route of the Proposed Scheme passes	North West	Inputs (tonnes)	20,273,000	20,162,891	20,032,807	19,919,803	19,785,666	19,758,838
		Unused Capacity (tonnes)	12,938,682	12,868,409	12,785,386	12,713,264	12,627,655	12,610,533
Region in which off-route works are located	Dumfries and Galloway[15]	Inputs (tonnes)	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
		Unused Capacity (tonnes)	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
National	England	Inputs (tonnes)	99,315,000	111,661,320	120,733,566	130,542,914	143,932,840	146,771,324
		Unused Capacity (tonnes)	40,205,280	45,203,389	48,876,069	52,847,147	58,267,735	59,416,827

[15] Projections of growth in waste treatment infrastructure capacity, are based upon the forecast growth in C&I waste arisings in the region. No data is available regarding C&I waste arisings in Dumfries and Galloway; there is, therefore, insufficient data available to project capacity forward whilst remaining consistent with the methodology used for other regional areas.

3 Hough to Walley's Green area (MA01)

3.1 Local assumptions and limitations

3.1.1 There are no local assumptions and limitations specific to the Hough to Walley's Green area (MA01).

3.2 Construction

Forecast of material and waste quantities

Excavated material quantities

3.2.1 Applying the integrated engineering earthworks design approach, described in Volume 1, Introduction and methodology, Section 5, the construction of the Proposed Scheme is forecast to generate a total of 3,800,060 tonnes of excavated material within MA01, as shown in Table 17.

3.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B[16] and U2[17], which is unsuitable for reuse within the Proposed Scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 17.

Table 17: Forecast excavated material quantities in MA01

Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Selected granular fill	0	0
General engineering fill	845,282	0
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	569,385	0
Agricultural subsoil	0	0

[16] Unacceptable material Class U1B is 'chemically' unsuitable as defined in the Department for Transport, (2016), *Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works*, Series 601 Classification, Definitions and Uses of Earthworks Materials sub-Clause 2(ii)(a). Available online at: http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf.

[17] Unacceptable material Class U2 'hazardous waste', as described in the Department for Transport, (2016), *Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works*, Series 600 Earthworks, Clause 601 Classification, Definitions and Uses of Earthworks Materials sub-Clause 3(i). Available online at: http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf.

Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Unacceptable material Class U1A	2,385,392	566,540
Unacceptable material Class U1B	0	0
Unacceptable material Class U2	0	0
Total	**3,800,060**	**566,540**

3.2.3 This part of the route is dominated by the Crewe tunnel but also includes the Crewe Rolling Stock Depot albeit the majority of which is located in the adjacent Wimboldsley to Lostock Gralam area (MA02).

3.2.4 The majority of excavated material that will be generated in MA01 is expected to comprise unacceptable material Class U1A[18]. This material, totalling approximately 2.4 million tonnes, is primarily derived from tunnel arisings comprising Mercia Mudstone and would not be suitable as an engineered fill. However, approximately 22% of all the excavated material could be used as general engineering fill material, while approximately 15% will be topsoil and could be used either within this area or elsewhere along the route.

3.2.5 There is a deficit of engineering fill of approximately 620,000 tonnes. There is also a 1.4 million tonne import requirement for Class 6[19] selected granular fill and approximately 500,000 tonnes of surplus topsoil material.

3.2.6 It is proposed that borrow pits are provided locally in MA02 to source the required fill, with the Crewe tunnel arisings being used to backfill the borrow pits during restoration. No borrow pits or local placement areas are proposed within MA01, however.

3.2.7 Excavated material falling into the unacceptable material Class U1A category may be suitable for environmental mitigation earthworks fill without treatment and potentially as engineering fill with treatment.

Demolition material and waste quantities

3.2.8 Types of building demolitions required within MA01 are listed in Table 18 together with estimated demolition material quantities.

[18] Unacceptable material Class U1A is 'physically' unsuitable as defined in the Department for Transport, (2016), *Manual of Contract Documents for Highway Works, Volume 1* the *Specification for Highway Works*, Series 601 Classification, Definitions and Uses of Earthworks Materials sub-Clauses 2(i)(a) and 2(i)(b).

[19] Class 6 material is defined as selected granular material in the in the Department for Transport, (2016), *Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works*, Series 600 Earthworks, Clause 601 Classification, Definitions and Uses of Earthworks Materials, Table 6/1.

3.2.9 Demolition material quantities have been estimated using the Waste and Resources Action Programme (WRAP) 'Demolition bill of quantities estimator'[20], using the basic dimensions and typology of buildings.

3.2.10 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities (see Table 18). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth Line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 18: Forecast demolition waste quantities in MA01

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Utilities	0	0
Industrial units	0	0
Commercial property	3,474	347
Residential property	639	64
Community amenity	246	25
Highways	0	0
Railways	0	0
Total	**4,359**	**436**

Construction waste quantities

3.2.11 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark performance data published by the BRE. The construction waste forecast for MA01 is given in Table 19.

3.2.12 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 19). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth Line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 19: Forecast construction waste quantities in MA01

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Earthworks	13,550	1,355
Retaining walls	10,746	1,075
Bridges	1,876	188
Viaducts	18,531	1,853
Roadworks	52	5
Footpaths/tracks	506	51

[20] Waste and Resources Action Programme, *Net Waste Tool.* Available online: http://nwtool.wrap.org.uk/ToolHome.aspx.

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Railworks	0	0
Watercourse diversion	0	0
Fencing	1,758	176
Drainage	126	13
Landscaping	2,932	293
Utilities	18,535	1,853
Construction compound	3,029	303
Tunnels	108,959	10,896
Ventilation shafts	18,092	1,809
Other structures	5,177	518
Railways systems	1,701	170
Total	**205,571**	**20,557**

Worker accommodation site waste quantities

3.2.13 Worker accommodation site waste has been forecast based on a waste generation rate of 27kg per worker per month, according to the number of workers to be accommodated and the duration of occupation. This waste generation rate was derived from an average annual household waste generation of 407kg/person/year[21] and has been adjusted assuming an average working week of five and a half days.

3.2.14 Forecast waste quantities over the duration of the construction period are shown in Table 20.

3.2.15 A landfill diversion rate of 55% has been applied to worker accommodation site waste (see Table 20). Waste generated by occupants of a worker accommodation site will be similar in composition to household waste. As such, the landfill diversion rate is based on a review of national waste targets for England and Wales and considers the published performance data for household waste and local authority collected waste in England.

Table 20: Forecast waste quantities from worker accommodation sites in MA01

Location	Worker numbers in accommodation	Duration (months)	Estimated worker waste quantity (tonnes)	Estimated worker waste for disposal to landfill (tonnes)
Crewe tunnel north main compound	200	73	394	177
Total	**200**	**73**	**394**	**177**

[21] Department for Environment Food and Rural Affairs (2017), *Digest of Waste and Resource Statistics – 2017 Edition*. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/607416/Digest_of_Waste_and_Resource_Statistics__2017_rev.pdf.

3.3 Operation

Forecast of waste quantities

3.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 21.

3.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

3.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 21: Operational waste forecast in MA01

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	0	0
Rolling stock maintenance	0	0
Track maintenance	1,024	15
Ancillary infrastructure	15	5
Total	**1,039**	**20**

3.3.4 Railway station and train waste is reported as zero in Table 21 as there will not be any stations in MA01.

3.3.5 Rolling stock maintenance waste is reported as zero in Table 21 as there will not be any rolling stock maintenance depots in MA01.

3.3.6 Track maintenance waste and ancillary infrastructure waste has been estimated using an average waste generation rate per kilometre length of total track and has been reported for each area along the route. The waste generation rate for slab track maintenance waste has been formulated on the basis that the slab itself is effectively maintenance free, but that in

[22] British Standards Institution (December 2005), *BS5906:2006 Waste Management in Buildings – Code of Practice.* Available online at: https://www.rbkc.gov.uk/pdf/BS5906-2005.pdf.

any given operational year, the rails and clips along the full length of track may be replaced. Track maintenance waste and ancillary infrastructure waste generation for MA01 is shown in Table 21.

3.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 1,039 tonnes of operational waste per annum in MA01 when it becomes fully operational in 2039, of which 1,019 tonnes (98%) will be diverted from landfill.

3.3.8 The Proposed Scheme in MA01 will generate an overall operational landfill disposal requirement of 20 tonnes per annum.

4 Wimboldsley to Lostock Gralam area (MA02)

4.1 Local assumptions and limitations

4.1.1 Approximately one third of the area of the transfer nodes in the Crewe North rolling stock depot will be used for temporary office, parking and general compound space. It is assumed, therefore, that the rolling stock maintenance arisings will be generated in these areas for both transfer nodes.

4.2 Construction

Forecast of material and waste quantities

Excavated material quantities

4.2.1 Applying the integrated engineering earthworks design approach, described in Volume 1, Introduction and methodology, Section 5, the construction of the Proposed Scheme is forecast to generate a total of 5,847,714 tonnes of excavated material within MA02, as shown in Table 22.

4.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B[16] and U2[17], which is unsuitable for reuse within the Proposed Scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 22.

Table 22: Forecast excavated material quantities in MA02

Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Selected granular fill	0	0
General engineering fill	4,562,466	0
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	500,928	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	784,320	0
Unacceptable material Class U1B	0	0
Unacceptable material Class U2	0	0
Total	**5,847,714**	**0**

4.2.3 The majority of excavated material that will be generated in MA02 is expected to be Class 1[23]/Class 3[24] and Class 2[25] cohesive material suitable for beneficial reuse as general engineering fill material and topsoil for use either within this area or elsewhere along the route.

4.2.4 The construction of the Proposed Scheme within MA02 assumes that acceptable Class 2 cohesive material will be brought in by road haulage, via export and import transfer nodes, from the Pickmere to Agden and Hulseheath area (MA03), and Hulseheath to Manchester Airport area (MA06).

4.2.5 The route within this area is typified by the continuation of embankments with no material cuttings. MA01 and MA02 traverse the Cheshire Salt Plains and this requires the route to be placed mainly on embankments throughout this area. As a result, there is a deficit of various fill material of approximately 4.2 million tonnes, due primarily to a 3.5 million tonne deficit in environmental mitigation earthworks. The shortfall in fill material is met by using all of the Class 1 material from the granular borrow pit in MA02 while all of the Class 2 material deficits will be obtained from three cohesive borrow pits in MA02. In addition, there is an import requirement for Class 6 selected granular fill of approximately 780,000 tonnes and a topsoil surplus of approximately 180,000 tonnes.

4.2.6 All granular material, and some of the cohesive material will have to be transported on local A class roads in order to avoid obstructions either natural (e.g. stream, valley, river) or man-made (e.g. dual carriageway, motorway, ship canal) that cannot readily and/or economically be overcome.

4.2.7 The other key feature in this area is the Crewe Rolling Stock Depot. This is likely to require the import of large quantities of granular sub-base material. Based on the current level of design, some surplus excavated material is also anticipated.

4.2.8 There is expected to be a surplus of non-tunnelled Class U1A unacceptable materials of approximately 780,000 tonnes. Excavated material falling into the unacceptable material Class U1A category may be suitable for environmental mitigation earthworks fill without treatment and potentially as engineering fill with treatment.

[23] Class 1 material is defined as 'granular material' in the Department for Transport, (2016), *Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works*, Series 600 Earthworks, Clause 601 Classification, Definitions and Uses of Earthworks Materials, Table 6/1.

[24] Class 3 material is defined as 'chalk' in the Department for Transport, (2016), *Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works*, Series 600 Earthworks, Clause 601 Classification, Definitions and Uses of Earthworks Materials, Table 6/1.

[25] Class 2 material is defined as 'cohesive material' in the Department for Transport, (2016), *Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works*, Series 600 Earthworks, Clause 601 Classification, Definitions and Uses of Earthworks Materials, Table 6/1.

Demolition material and waste quantities

4.2.9 Types of building demolitions required within MA02 are listed in Table 23 together with estimated demolition material quantities.

4.2.10 Demolition material quantities have been estimated using the WRAP 'Demolition bill of quantities estimator', using the basic dimensions and typology of buildings.

4.2.11 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities (see Table 23). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 23 : Forecast demolition waste quantities in MA02

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Utilities	0	0
Industrial units	0	0
Commercial property	16,785	1,678
Residential property	6,531	653
Community amenity	1,088	109
Highways	0	0
Railways	0	0
Total	**24,404**	**2,440**

Construction waste quantities

4.2.12 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark performance data procured from the BRE. The construction waste forecast for MA02 is given in Table 24.

4.2.13 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 24). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 24: Forecast construction waste quantities in MA02

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Earthworks	45,573	4,557
Retaining walls	3,997	400
Bridges	9,732	973
Viaducts	46,215	4,621
Roadworks	9,507	951
Footpaths/tracks	1,135	113

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Railworks	0	0
Watercourse diversion	0	0
Fencing	3,258	326
Drainage	1,895	190
Landscaping	6,907	691
Utilities	70,418	7,042
Construction compound	19,631	1,963
Tunnels	0	0
Ventilation shafts	0	0
Other structures	6,981	698
Railways systems	1,921	192
Total	**227,169**	**22,717**

Worker accommodation site waste quantities

4.2.14 Worker accommodation site waste has been forecast based on a waste generation rate of 27kg per worker per month, according to the number of workers to be accommodated and the duration of occupation. This waste generation rate was derived from the average annual household waste generation of 407kg/person/year in 2015[21] and has been adjusted assuming an average working week of five and a half days.

4.2.15 Forecast waste quantities over the duration of the construction period are shown in Table 25.

4.2.16 A landfill diversion rate of 55% has been applied to worker accommodation site waste (see Table 25). Waste generated by occupants of a worker accommodation site will be similar in composition to household waste. As such, the landfill diversion rate is based on a review of national waste targets for England and Wales and considers the published performance data for household waste and local authority collected waste in England.

Table 25: Forecast waste quantities from worker accommodation sites in MA02

Location	Worker numbers in accommodation	Duration (months)	Estimated worker waste quantity (tonnes)	Estimated worker waste for disposal to landfill (tonnes)
Crewe rolling stock depot south satellite compound	70	94	178	80
A54 Middlewich Road satellite compound	80	37	80	36
Gad Brook viaduct north satellite compound	80	15	32	14
Total	**230**	**146**	**290**	**130**

4.3 Operation

Forecast of waste quantities

4.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 26.

4.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

4.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 26: Operational waste forecast in MA02

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	0	0
Rolling stock maintenance	13,052	2,610
Track maintenance	336	50
Ancillary infrastructure	34	12
Total	**13,422**	**2,672**

4.3.4 Railway station and train waste is reported as zero in Table 26 as there will not be any stations in MA02.

4.3.5 Rolling stock maintenance waste has only been reported for areas along the route in which these facilities will be located. The Crewe North rolling stock depot will be located in MA02, hence rolling stock maintenance waste is reported in Table 26. Rolling stock maintenance waste in the Crewe North rolling stock depot will arise in two transfer nodes, the areas of which are 2.7ha and 10.5ha, respectively. As identified in Section 4.1.1, the quantity of waste has been determined based on one third of these areas.

4.3.6 Track maintenance waste and ancillary infrastructure waste has been estimated using an average waste generation rate per kilometre length of total track and has been reported for each area along the route. The waste generation rate for slab track maintenance waste has

been formulated on the basis that the slab itself is effectively maintenance free, but that in any given operational year, the rails and clips along the full length of track may be replaced. The route is double-tracked throughout except at the Crewe North connection where there are four tracks. Track maintenance waste and ancillary infrastructure waste generation for MA02 is shown in Table 26.

4.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 13,422 tonnes of operational waste per annum in MA02 when it becomes fully operational in 2039, of which 10,750 tonnes (80%) will be diverted from landfill.

4.3.8 The Proposed Scheme in MA02 will generate an overall operational landfill disposal requirement of 2,672 tonnes per annum.

5 Pickmere to Agden and Hulseheath area (MA03)

5.1 Local assumptions and limitations

5.1.1 There are no local assumptions or limitations specific to MA03.

5.2 Construction

Forecast of material and waste quantities

Excavated material quantities

5.2.1 Applying the integrated engineering earthworks design approach, described in Volume 1, Introduction and methodology, Section 5, the construction of the Proposed Scheme is forecast to generate a total of 5,502,693 tonnes of excavated material from MA03, as shown in Table 27.

5.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B[16] and U2[17], which is unsuitable for reuse within the Proposed Scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 27.

Table 27: Forecast excavated material quantities in MA03

Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Selected granular fill	0	0
General engineering fill	4,229,437	0
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	494,934	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	778,322	0
Unacceptable material Class U1B	0	0
Unacceptable material Class U2	0	0
Total	**5,502,693**	**0**

5.2.3 Most of the excavated material that will be generated in MA03 is expected to be suitable for beneficial reuse as engineering fill material, either within this area or elsewhere along the route.

5.2.4 The West Coast Main Line (forming one element of the Proposed Scheme) in MA03, which includes provision for the cut and fill requirements of Northern Powerhouse Rail, is typified by large cuttings leading to a current surplus of approximately 1.28 million tonnes of engineering fill, which is used in MA02, MA04 and for partial backfilling of the granular borrow pit in MA02. There is also expected to be a 320,000 tonne surplus of topsoil and an import requirement for Class 6[19] selected granular fill of approximately 660,000 tonnes.

5.2.5 The HS2 Manchester spur in MA03 has a deficit of approximately 120,000 tonnes of engineering fill and a surplus of 3,000 tonnes of topsoil. There is an import requirement for Class 6 selected granular fill of approximately 70,000 tonnes.

5.2.6 There is expected to be a surplus of non-tunnelled Class U1A[18] unacceptable materials of approximately 720,000 and 60,000 tonnes for the West Coast Main Line and the HS2 Manchester spur respectively. Excavated material falling into the unacceptable material Class U1A category may be suitable for environmental mitigation earthworks fill without treatment and potentially as engineering fill with treatment.

5.2.7 No borrow pits or local placement areas are proposed in MA03.

Demolition material and waste quantities

5.2.8 Types of building demolitions required within MA03 are listed in Table 28 together with estimated demolition material quantities.

5.2.9 Demolition material quantities have been estimated using the WRAP 'Demolition bill of quantities estimator', using the basic dimensions and typology of buildings.

5.2.10 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities (see Table 28). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 28: Forecast demolition waste quantities in MA03

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Utilities	0	0
Industrial units	0	0
Commercial property	16,796	1,680
Residential property	8,235	824
Community amenity	0	0
Highways	0	0
Railways	0	0
Total	**25,031**	**2,504**

Construction waste quantities

5.2.11 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark performance data procured from the BRE. The construction waste forecast for MA03 is given in Table 29.

5.2.12 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 29). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 29: Forecast construction waste quantities in MA03

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Earthworks	26,513	2,651
Retaining walls	8,334	833
Bridges	5,318	532
Viaducts	5,296	530
Roadworks	1,975	198
Footpaths/tracks	1,221	122
Railworks	0	0
Watercourse diversion	0	0
Fencing	1,713	171
Drainage	429	43
Landscaping	4,706	471
Utilities	26,328	2,633
Construction compound	11,930	1,193
Tunnels	0	0
Ventilation shafts	0	0
Other structures	22,733	2,273
Railways systems	474	47
Total	**116,970**	**11,697**

Worker accommodation site waste quantities

5.2.13 Worker accommodation site waste has been forecast based on a waste generation rate of 27kg per worker per month, according to the number of workers to be accommodated and the duration of occupation. This waste generation rate was derived from the average annual household waste generation of 407kg/person/year[21] and has been adjusted assuming an average working week of five and a half days.

5.2.14 Forecast waste quantities over the duration of the construction period are shown in Table 30.

5.2.15 A landfill diversion rate of 55% has been applied to worker accommodation site waste (see Table 30). Waste generated by occupants of a worker accommodation site will be similar in composition to household waste. As such, the landfill diversion rate is based on a review of national waste targets for England and Wales and considers the published performance data for household waste and local authority collected waste in England.

Table 30: Forecast waste quantities from worker accommodation sites in MA03

Location	Worker numbers in accommodation	Duration (months)	Estimated worker waste quantity (tonnes)	Estimated worker waste for disposal to landfill (tonnes)
A50 Warrington Road main compound	80	49	106	48
Total	**80**	**49**	**106**	**48**

5.3 Operation

Forecast of waste quantities

5.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 31.

5.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

5.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 31: Operational waste forecast in MA03

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	0	0
Rolling stock maintenance	0	0
Track maintenance	338	51
Ancillary infrastructure	28	10

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Total	**366**	**61**

5.3.4 Railway station and train waste is reported as zero in Table 31 as there will not be any stations in MA03.

5.3.5 Rolling stock maintenance waste is reported as zero in Table 31 as there will not be any rolling stock maintenance depots in MA03.

5.3.6 Track maintenance waste and ancillary infrastructure waste has been estimated using an average waste generation rate per kilometre length of total track and has been reported for each area along the route. The waste generation rate for slab track maintenance waste has been formulated on the basis that the slab itself is effectively maintenance free, but that in any given operational year, the rails and clips along the full length of track may be replaced. The route is double-tracked throughout except at the Hoo Green junction, on the HS2 Manchester spur, where there are four tracks. Track maintenance waste and ancillary infrastructure waste generation for MA03 is shown in Table 31.

5.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 366 tonnes of operational waste per annum in MA03 when it becomes fully operational in 2039, of which 305 tonnes (83%) will be diverted from landfill.

5.3.8 The Proposed Scheme in MA03 will generate an overall operational landfill disposal requirement of 61 tonnes per annum.

6 Broomedge to Glazebrook area (MA04)

6.1 Local assumptions and limitations

6.1.1 There are no local assumptions or limitations specific to the Broomedge to Glazebrook area (MA04).

6.2 Construction

Forecast of material and waste quantities

Excavated material quantities

6.2.1 Applying the integrated engineering earthworks design approach, described in Volume 1, Introduction and methodology, Section 5, the construction of the Proposed Scheme is forecast to generate a total of 931,905 tonnes of excavated material within MA04, as shown in Table 32.

6.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B[16] and U2[17], which is unsuitable for reuse within the Proposed Scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 32.

Table 32: Forecast excavated material quantities in MA04

Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Selected granular fill	0	0
General engineering fill	437,509	0
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	296,603	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	183,629	0
Unacceptable material Class U1B	14,164	14,164
Unacceptable material Class U2	0	0
Total	**931,905**	**14,164**

6.2.3 This part of the route has significant lengths of embankment and minimal cuttings, the combination of which create an overall fill deficit. Most of the excavated material that will be generated in MA04 is expected to be Class 2[25] cohesive and suitable for beneficial reuse as

engineering fill, and topsoil material for use either within this area or elsewhere along the route.

6.2.4 There is an import requirement for approximately 500,000 tonnes of Class 6[19] selected granular fill and a deficit of 2,000,000 tonnes of general engineering fill. There is also a surplus of approximately 110,000 tonnes of topsoil. It is intended that about one third of the material required to satisfy the general fill deficit will be brought in from MA03 and two thirds from MA06.

6.2.5 There is expected to be a surplus of non-tunnelled Class U1A[18] unacceptable materials of approximately 180,000 tonnes. Excavated material falling into the unacceptable material Class U1A category may be suitable for environmental mitigation earthworks fill without treatment and potentially as engineering fill with treatment.

6.2.6 A proportion of the excavated material in MA04 is likely to be unacceptable for use within the engineering works due to the presence of contaminated materials (i.e. the unacceptable material Class U1B that is not suitable for use as fill when treated). As a worst-case scenario it has been assumed that this material will be disposed of to landfill.

6.2.7 No borrow pits or local placement areas are proposed in MA04.

Demolition material and waste quantities

6.2.8 Types of building demolitions required within MA04 are listed in Table 33 together with estimated demolition material quantities.

6.2.9 Demolition material quantities have been estimated using the WRAP 'Demolition bill of quantities estimator', using the basic dimensions and typology of buildings.

6.2.10 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities (see Table 33). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 33: Forecast demolition waste quantities in MA04

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Utilities	0	0
Industrial units	0	0
Commercial property	0	0
Residential property	2,726	273
Community amenity	0	0
Highways	1,956	196
Railways	0	0
Total	**4,682**	**468**

Construction waste quantities

6.2.11 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark performance data procured from the BRE. The construction waste forecast for MA04 is given in Table 34.

6.2.12 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 34). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth Line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 34: Forecast construction waste quantities within MA04

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Earthworks	16,285	1,629
Retaining walls	715	72
Bridges	1,554	155
Viaducts	32,353	3,235
Roadworks	1,002	100
Footpaths/tracks	498	50
Railworks	0	0
Watercourse diversion	0	0
Fencing	1,425	142
Drainage	121	12
Landscaping	3,297	330
Utilities	29,464	2,946
Construction compound	10,122	1,012
Tunnels	0	0
Ventilation shafts	0	0
Other structures	1,004	100
Railways systems	197	20
Total	**98,037**	**9,804**

Worker accommodation site waste quantities

6.2.13 Worker accommodation site waste has been forecast based on a waste generation rate of 27kg per worker per month, according to the number of workers to be accommodated and the duration of occupation. This waste generation rate was derived from the average annual household waste generation of 407kg/person/year[21] and has been adjusted assuming an average working week of five and a half days.

6.2.14 Forecast waste quantities over the duration of the construction period are shown in Table 35.

6.2.15 A landfill diversion rate of 55% has been applied to worker accommodation site waste (see Table 35). Waste generated by occupants of a worker accommodation site will be similar in composition to household waste. As such, the landfill diversion rate is based on a review of national waste targets for England and Wales and considers the published performance data for household waste and local authority collected waste in England.

Table 35: Forecast waste quantities from worker accommodation sites in MA04

Location	Worker numbers in accommodation	Duration (months)	Estimated worker waste quantity (tonnes)	Estimated worker waste for disposal to landfill (tonnes)
Manchester Ship Canal viaduct north main compound	70	51	97	44
Total	**70**	**51**	**97**	**44**

6.3 Operation

Forecast of waste quantities

6.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 36.

6.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

6.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 36: Operational waste forecast in MA04

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	0	0
Rolling stock maintenance	0	0
Track maintenance	121	18
Ancillary infrastructure	10	4

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Total	**131**	**22**

6.3.4 Railway station and train waste is reported as zero in Table 36 as there will not be any stations in MA04.

6.3.5 Rolling stock maintenance waste is reported as zero in Table 36 as there will not be any rolling stock maintenance depots in MA04.

6.3.6 Track maintenance waste and ancillary infrastructure waste has been estimated using an average waste generation rate per kilometre length of total track and has been reported for each area along the route. The waste generation rate for slab track maintenance waste has been formulated on the basis that the slab itself is effectively maintenance free, but that in any given operational year, the rails and clips along the full length of track may be replaced. The route that traverses MA04 is double-tracked and ballasted throughout. Track maintenance waste and ancillary infrastructure waste generation for MA04 is shown in Table 36.

6.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 131 tonnes of operational waste per annum in MA04 when it becomes fully operational in 2039, of which 109 tonnes (83%) will be diverted from landfill.

6.3.8 The Proposed Scheme in MA04 will generate an overall operational landfill disposal requirement of 22 tonnes per annum.

7 Risley to Bamfurlong area (MA05)

7.1 Local assumptions and limitations

7.1.1 There are no local assumptions or limitations specific to the Risley to Bamfurlong area (MA05).

7.2 Construction

Forecast of material and waste quantities

Excavated material quantities

7.2.1 Applying the integrated engineering earthworks design approach, described in Volume 1, Introduction and methodology, Section 5, the construction of the Proposed Scheme is forecast to generate a total of 2,704,067 tonnes of excavated material within MA05, as shown in Table 37.

7.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B[16] and U2[17], which is unsuitable for reuse within the Proposed Scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 37.

Table 37: Forecast excavated material quantities in MA05

Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Selected granular fill	0	0
General engineering fill	1,787,704	0
Environmental mitigation earthworks fill	272,925	0
Coal	0	0
Topsoil	384,626	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	220,670	104,592
Unacceptable material Class U1B	38,143	38,143
Unacceptable material Class U2	0	0
Total	**2,704,067**	**142,735**

7.2.3 Most of the excavated material that will be generated in MA05 is expected to be Class 2[25] cohesive and suitable for beneficial reuse primarily as engineering fill, or topsoil material for use either within this area or elsewhere along the route.

7.2.4 There is an import requirement for approximately 630,000 tonnes of Class 6[19] selected granular fill, and a deficit of 200,000 tonnes of general engineering fill. There is a surplus of approximately 210,000 tonnes of topsoil. The shortfall of acceptable material means that approximately 100,000 tonnes will be brought in by road from MA06.

7.2.5 There is expected to be a surplus of non-tunnelled Class U1A[18] unacceptable materials of approximately 220,000 tonnes, approximately 105,000 tonnes of which will be disposed of off-site. Excavated material falling into the unacceptable material Class U1A category may be suitable for environmental mitigation earthworks fill without treatment and potentially as engineering fill with treatment.

7.2.6 There is expected to be a surplus of Class U1B unacceptable materials of approximately 38,000 tonnes which is likely to be unacceptable for use within the engineering works due to the presence of contaminated materials. This material is unlikely to be suitable for use as fill when treated, therefore as a worst-case scenario it has been assumed that this material will be disposed of to landfill.

7.2.7 No borrow pits or local placement areas are proposed in MA05.

Demolition material and waste quantities

7.2.8 Types of building demolitions required within MA05 are listed in Table 38 together with estimated demolition material quantities.

7.2.9 Demolition material quantities have been estimated using the WRAP 'Demolition bill of quantities estimator', using the basic dimensions and typology of buildings.

7.2.10 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities (see Table 38). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 38: Forecast demolition waste quantities in MA05

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Utilities	0	0
Industrial units	0	0
Commercial property	68,253	6,825
Residential property	11,596	1,160
Community amenity	2	0
Highways	0	0
Railways	0	0
Total	**79,851**	**7,985**

Construction waste quantities

7.2.11 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark performance data procured from the BRE. The construction waste forecast for MA05 is given in Table 39.

7.2.12 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 39). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 39: Forecast construction waste quantities in MA05

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Earthworks	21,986	2,199
Retaining walls	1,617	162
Bridges	9,466	947
Viaducts	14,752	1,475
Roadworks	4,134	413
Footpaths/tracks	839	84
Railworks	0	0
Watercourse diversion	0	0
Fencing	2,242	224
Drainage	636	64
Landscaping	6,082	608
Utilities	25,794	2,579
Construction compound	12,053	1,205
Tunnels	0	0
Ventilation shafts	0	0
Other structures	4,413	441
Railways systems	998	100
Total	**105,013**	**10,501**

Worker accommodation site waste quantities

7.2.13 No worker accommodation sites are proposed in MA05 and no worker accommodation site waste will be produced.

7.3 Operation

Forecast of waste quantities

7.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 40.

7.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

7.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 40: Operational waste forecast in MA05

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	0	0
Rolling stock maintenance	0	0
Track maintenance	209	31
Ancillary infrastructure	18	6
Total	**227**	**37**

7.3.4 Railway station and train waste has is reported as zero in Table 40 as there will not be any stations in MA05.

7.3.5 Rolling stock maintenance waste is reported as zero in Table 40 as there will not be any rolling stock maintenance depots in MA05.

7.3.6 Track maintenance waste and ancillary infrastructure waste has been estimated using an average waste generation rate per kilometre length of total track and has been reported for each area along the route. The waste generation rate for slab track maintenance waste has been formulated on the basis that the slab itself is effectively maintenance free, but that in any given operational year, the rails and clips along the full length of track may be replaced. The route that traverses MA05 is double-tracked and ballasted throughout. Track

maintenance waste and ancillary infrastructure waste generation for MA05 is shown in Table 40.

7.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 227 tonnes of operational waste per annum in MA05 when it becomes fully operational in 2039, of which 190 tonnes (84%) will be diverted from landfill.

7.3.8 The Proposed Scheme in MA05 will generate an overall operational landfill disposal requirement of 37 tonnes per annum.

8 Hulseheath to Manchester Airport area (MA06)

8.1 Local assumptions and limitations

8.1.1 There are no local assumptions or limitations specific to the Hulseheath to Manchester Airport area (MA06).

8.2 Construction

Forecast of material and waste quantities

Excavated material quantities

8.2.1 Applying the integrated engineering earthworks design approach, described in Volume 1, Introduction and methodology, Section 5, the construction of the Proposed Scheme is forecast to generate a total of 5,584,053 tonnes of excavated material within MA06, as shown in Table 41.

8.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B[16] and U2[17], which is unsuitable for reuse within the Proposed Scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 41.

Table 41: Forecast excavated material quantities in MA06

Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Selected granular fill	0	0
General engineering fill	4,760,224	28,327
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	566,306	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	257,523	21,790
Unacceptable material Class U1B	0	0
Unacceptable material Class U2	0	0
Total	**5,584,053**	**50,117**

8.2.3 Most of the excavated material that will be generated in MA06 is expected to be Class 2[25] cohesive, and suitable for beneficial reuse primarily as engineering fill, and topsoil for use either within this area or elsewhere along the route.

8.2.4 There are some large cuttings that lead to Manchester Airport High Speed station in MA06, resulting in a surplus of approximately 2.35 million tonnes of engineering fill and 260,000 tonnes of topsoil. There is also an import requirement for approximately 640,000 tonnes of Class 6[19] selected granular fill. The material surplus is expected to be widely distributed by road to MA02, MA03, MA04 and MA05, with approximately 30,000 tonnes of Class 2 material expected to be disposed of off-site.

8.2.5 There is expected to be a surplus of non-tunnelled Class U1A[18] unacceptable materials of approximately 260,000 tonnes, approximately 20,000 tonnes of which will be delivered off-site for disposal. Excavated material falling into the unacceptable material Class U1A category may be suitable for environmental mitigation earthworks fill without treatment and potentially as engineering fill with treatment.

8.2.6 No borrow pits or local placement areas are proposed in MA06.

Demolition material and waste quantities

8.2.7 Types of building demolitions required within MA06 are listed in Table 42 together with estimated demolition material quantities.

8.2.8 Demolition material quantities have been estimated using the WRAP 'Demolition bill of quantities estimator', using the basic dimensions and typology of buildings.

8.2.9 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities (see Table 42). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 42: Forecast demolition waste quantities in MA06

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Utilities	104	10
Industrial units	0	0
Commercial property	57,759	5,776
Residential property	18,956	1,896
Community amenity	0	0
Highways	0	0
Railways	0	0
Total	**76,819**	**7,682**

Construction waste quantities

8.2.10 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark performance data procured from the Buildings Research Establishment (BRE). The construction waste forecast for MA06 is given in Table 43.

8.2.11 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 43). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 43: Forecast construction waste quantities in MA06

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Earthworks	15,896	1,590
Retaining walls	29,163	2,916
Bridges	12,526	1,253
Viaducts	11,058	1,106
Roadworks	7,397	740
Footpaths/tracks	774	77
Railworks	113,395	11,340
Watercourse diversion	0	0
Fencing	1,386	139
Drainage	979	98
Landscaping	5,314	531
Utilities	7,609	761
Construction compound	18,556	1,856
Tunnels	5,950	595
Ventilation shafts	0	0
Other structures	16,831	1,683
Railways systems	3,285	328
Total	**250,118**	**25,012**

Worker accommodation site waste quantities

8.2.12 No worker accommodation sites are proposed in MA06 and no worker accommodation site waste will be produced.

8.3 Operation

Forecast of waste quantities

8.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 44.

8.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

8.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 44: Operational waste forecast in MA06

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	550	192
Rolling stock maintenance	0	0
Track maintenance	861	13
Ancillary infrastructure	17	6
Total	**1,428**	**211**

8.3.4 Manchester Airport High Speed station is located in MA06 and thus railway station and train waste in relation to this is reported in Table 44.

8.3.5 Rolling stock maintenance waste is reported as zero in Table 44 as there will not be any rolling stock maintenance depots in MA06.

8.3.6 Track maintenance waste and ancillary infrastructure waste has been estimated using an average waste generation rate per kilometre length of total track and has been reported for each area along the route. The waste generation rate for slab track maintenance waste has been formulated on the basis that the slab itself is effectively maintenance free, but that in any given operational year, the rails and clips along the full length of track may be replaced. The route that passes through MA06 is slab-tracked and double-tracked throughout, except at Manchester Airport High Speed station, where there are four slab tracks, and at the Hoo Green junction to Manchester spur section of the track, which is ballasted. Track

maintenance waste and ancillary infrastructure waste generation for MA06 is shown in Table 44.

8.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 1,428 tonnes of operational waste per annum in MA06 when it becomes fully operational in 2039, of which 1,217 tonnes (85%) will be diverted from landfill.

8.3.8 The Proposed Scheme in MA06 will generate an overall operational landfill disposal requirement of 211 tonnes per annum.

9 Davenport Green to Ardwick area (MA07)

9.1 Local assumptions and limitations

9.1.1 There are no local assumptions or limitations specific to the Davenport Green to Ardwick area (MA07).

9.2 Construction

Forecast of material and waste quantities

Excavated material quantities

9.2.1 Applying the integrated engineering earthworks design approach, described in Volume 1, Introduction and methodology, Section 5, the construction of the Proposed Scheme is forecast to generate a total of 3,937,533 tonnes of excavated material within MA07, as shown in Table 45.

9.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B[16] and U2[17], which is unsuitable for reuse within the Proposed Scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 45.

Table 45: Forecast excavated material quantities in MA07

Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Selected granular fill	0	0
General engineering fill	444,514	37,043
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	1,118	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	3,312,134	2,843,595
Unacceptable material Class U1B	179,768	179,768
Unacceptable material Class U2	0	0
Total	**3,937,533**	**3,060,406**

9.2.3 This area comprises the Manchester tunnel which, at almost 13km in length, will generate approximately 3.3 million tonnes of Class U1A[18] unacceptable material, of which approximately 40% will be removed via the South Portal and 60% via the North Portal. Whereas most of these tunnel arisings are scheduled to be taken to off-site disposal facilities

by road and rail, it is proposed that approximately 480,000 tonnes of material emerging from the South Portal will be hauled by road to granular borrow pit 4a in MA02 for use as a backfill material. A total of 2.8 million tonnes of Class U1A material is expected to be disposed of to landfill.

9.2.4 There is a surplus of approximately 370,000 tonnes of engineering fill in MA07, of which approximately 40,000 tonnes are expected to be disposed of off-site. The remaining surplus is anticipated to be reused within the Proposed Scheme. In addition, there is a deficit of approximately 10,000 tonnes of selected fill and a 1,000 tonne surplus of topsoil.

9.2.5 There is expected to be a surplus of Class U1B unacceptable materials of approximately 180,000 tonnes which is likely to be unacceptable for use within the engineering works due to the presence of contaminated materials. This material is unlikely to be suitable for use as fill when treated, therefore as a worst-case scenario it has been assumed that this material will be disposed of to landfill.

9.2.6 No borrow pits or local placement areas are proposed in MA07.

Demolition material and waste quantities

9.2.7 Types of building demolitions required within MA07 are listed in Table 46 together with estimated demolition material quantities.

9.2.8 Demolition material quantities have been estimated using the WRAP 'Demolition bill of quantities estimator', using the basic dimensions and typology of buildings.

9.2.9 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities (see Table 46). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 46: Forecast demolition waste quantities in MA07

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Utilities	122	12
Industrial units	0	0
Commercial property	80,545	8,054
Residential property	3,142	314
Community amenity	7	1
Highways	0	0
Railways	0	0
Total	**83,816**	**8,381**

Construction waste quantities

9.2.10 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark

performance data procured from the BRE. The construction waste forecast for MA07 is given in Table 47.

9.2.11 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 47). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 47: Forecast construction waste quantities in MA07

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Earthworks	9,020	902
Retaining walls	4,561	456
Bridges	329	33
Viaducts	0	0
Roadworks	27	3
Footpaths/tracks	84	8
Railworks	0	0
Watercourse diversion	0	0
Fencing	32	3
Drainage	56	6
Landscaping	1,095	109
Utilities	10,843	1,084
Construction compound	615	62
Tunnels	166,426	16,643
Ventilation shafts	42,825	4,282
Other structures	5,989	599
Railways systems	1,141	114
Total	**243,044**	**24,304**

Worker accommodation site waste quantities

9.2.12 No worker accommodation sites are proposed in MA07 and no worker accommodation site waste will be produced.

9.3 Operation

Forecast of waste quantities

9.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 48.

9.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

9.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 48: Operational waste forecast in MA07

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	0	0
Rolling stock maintenance	0	0
Track maintenance	1,453	0
Ancillary infrastructure	18	6
Total	**1,471**	**6**

9.3.4 Railway station and train waste is reported as zero in Table 48 as there will not be any stations in MA07.

9.3.5 Rolling stock maintenance waste is reported as zero in Table 48 as there will not be any rolling stock maintenance depots in MA07.

9.3.6 Track maintenance waste and ancillary infrastructure waste has been estimated using an average waste generation rate per kilometre length of total track and has been reported for each area along the route. The waste generation rate for slab track maintenance waste has been formulated on the basis that the slab itself is effectively maintenance free, but that in any given operational year, the rails and clips along the full length of track may be replaced. The route that passes through MA07 is slab-tracked and double-tracked throughout. Track maintenance waste and ancillary infrastructure waste generation for MA07 is shown in Table 48.

9.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 1,471 tonnes of operational waste per annum in MA07 when it becomes fully operational in 2039, of which 1,465 tonnes (99.6%) will be diverted from landfill.

9.3.8 The Proposed Scheme in MA07 will generate an overall operational landfill disposal requirement of six tonnes per annum.

10 Manchester Piccadilly Station area (MA08)

10.1 Local assumptions and limitations

10.1.1 There are no local assumptions or limitations specific to the Manchester Piccadilly Station area (MA08).

10.2 Construction

Forecast of material and waste quantities

Excavated material quantities

10.2.1 Applying the integrated engineering earthworks design approach, described in Volume 1, Introduction and methodology, Section 5, the construction of the Proposed Scheme is forecast to generate 1,044,603 tonnes of excavated material within MA08 as shown in Table 49. The route through MA08 is predominantly on viaducts and therefore limited earthworks activities will be required.

10.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B[16] and U2[17], which is unsuitable for reuse within the Proposed Scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 49.

Table 49: Forecast excavated material quantities in MA08

Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Selected granular fill	0	0
General engineering fill	1,011,823	930,022
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	0	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	32,780	32,780
Unacceptable material Class U1B	0	0
Unacceptable material Class U2	0	0
Total	**1,044,603**	**962,802**

10.2.3 Whereas this section of the route is predominantly on viaducts, it also incorporates provisions for the Metrolink Box (part of Manchester's tramline network), which will generate

approximately 960,000 tonnes of excavated material which is scheduled to be taken by rail to off-site disposal facilities.

10.2.4 There is an import requirement for approximately 5,000 tonnes of Class 6[19] selected granular fill, and a surplus of approximately 970,000 tonnes of general engineering fill.

10.2.5 No borrow pits or local placement areas are proposed in MA08.

Demolition material and waste quantities

10.2.6 Types of building demolitions required within MA08 are listed in Table 50 together with estimated demolition material quantities.

10.2.7 Demolition material quantities have been estimated using the WRAP 'Demolition bill of quantities estimator', using the basic dimensions and typology of buildings.

10.2.8 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities (see Table 50). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 50: Forecast demolition waste quantities in MA08

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Utilities	22	2
Industrial units	0	0
Commercial property	263,491	26,349
Residential property	0	0
Community amenity	2,726	273
Highways	0	0
Railways	0	0
Total	**266,239**	**26,624**

Construction waste quantities

10.2.9 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark performance data procured from the BRE. The construction waste forecast for MA08 is given in Table 51.

10.2.10 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 51). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 51: Forecast construction waste quantities in MA08

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Earthworks	9,177	918
Retaining walls	2,715	272
Bridges	0	0
Viaducts	27,304	2,730
Roadworks	3,485	348
Footpaths/tracks	3	0
Railworks	176,137	17,614
Watercourse diversion	0	0
Fencing	29	3
Drainage	192	19
Landscaping	1,016	102
Utilities	38,531	3,853
Construction compound	0	0
Tunnels	0	0
Ventilation shafts	0	0
Other structures	2,005	200
Railway systems	115	12
Total	**260,709**	**26,071**

Worker accommodation site waste quantities

10.2.11 No worker accommodation sites are proposed in MA08 and no worker accommodation site waste will be produced.

10.3 Operation

Forecast of waste quantities

10.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 52.

10.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

10.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;

- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 52: Operational waste forecast in MA08

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	4,452	1,558
Rolling stock maintenance	0	0
Track maintenance	302	0
Ancillary infrastructure	3	1
Total	**4,757**	**1,559**

10.3.4 Manchester Piccadilly High Speed station is located in MA08 and therefore railway station and train waste in relation to this train station is reported in Table 52.

10.3.5 Rolling stock maintenance waste is reported as zero in Table 52 as there will not be any rolling stock maintenance depots in MA08.

10.3.6 Track maintenance waste and ancillary infrastructure waste has been estimated using an average waste generation rate per kilometre length of total track and has been reported for each area along the route. The waste generation rate for slab track maintenance waste has been formulated on the basis that the slab itself is effectively maintenance free, but that in any given operational year, the rails and clips along the full length of track may be replaced. The route through MA08 will be slab-tracked and double-tracked throughout, except at Manchester Piccadilly High Speed station, where there will be four tracks. Track maintenance waste and ancillary infrastructure waste generation for MA08 is shown in Table 52.

10.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 4,757 tonnes of operational waste per annum in MA08 when it becomes fully operational in 2039, of which 3,198 tonnes (67%) will be diverted from landfill.

10.3.8 The Proposed Scheme in MA08 will generate an overall operational landfill disposal requirement of 1,559 tonnes per annum.

11 Annandale depot off-route works

11.1 Local assumptions and limitations

11.1.1 There are no local assumptions and limitations specific to the Annandale depot off-route works.

11.2 Construction

Forecast of material and waste quantities

Excavated material quantities

11.2.1 Applying the integrated engineering earthworks design approach, described in Volume 1, Introduction and methodology, Section 5, the construction of the Proposed Scheme is forecast to generate a total of 1,321,647 tonnes of excavated material from off-route works, as shown in Table 53.

11.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B[16] and U2, which is unsuitable for reuse within the Proposed Scheme. The overall balance of excavated material is presented in Annex B; the total quantity of surplus excavated material requiring disposal is presented in Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 53.

Table 53: Forecast excavated material quantities in the Annandale depot off-route works

Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Selected granular fill	0	0
General engineering fill	196,838	0
Environmental mitigation earthworks fill	653,600	169,334
Coal	0	0
Topsoil	275,099	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	196,110	196,110
Unacceptable material Class U1B	0	0
Unacceptable material Class U2	0	0
Total	**1,321,647**	**365,444**

11.2.3 The majority of excavated material that will be generated as part of the off-route works for the Annandale depot is expected to be Class 4[26] environmental mitigation earthworks fill, most of which will be suitable for beneficial reuse only as landscaping fill within this area or elsewhere along the route.

11.2.4 There is a deficit of engineering fill of approximately 290,000 tonnes and a surplus of 650,000 tonnes of environmental mitigation earthworks fill.

11.2.5 There is expected to be a surplus of non-tunnelled Class U1A unacceptable materials of approximately 200,000 tonnes, all of which will be delivered off-site for disposal. Approximately 370,000 tonnes of excavated material generated off-route are not acceptable for reuse as engineering fill. These materials will be used as environmental mitigation earthworks fill without treatment where practicable and where surpluses arise these materials will require off-site disposal.

11.2.6 No borrow pits or local placement areas are proposed in the Annandale depot off-route works.

Demolition material and waste quantities

11.2.7 No demolition is proposed in the Annandale depot off-route works and no demolition material and waste will be produced.

Construction waste quantities

11.2.8 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark performance data published by the BRE. The construction waste forecast for off-route works is given in Table 54.

11.2.9 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 54). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth Line, London 2012 Olympics and the Thames Tideway Tunnel).

[26] Class 4 material is defined as 'selected granular material' in the Department for Transport, (2016), *Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works*, Series 600 Earthworks, Clause 601 Classification, Definitions and Uses of Earthworks Materials, Table 6/1.

Table 54: Forecast construction waste quantities in the Annandale depot off-route works

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Annandale depot	36,313	3,631
Total	**36,313**	**3,631**

Worker accommodation site waste quantities

11.2.10 Worker accommodation site waste has been forecast based on a waste generation rate of 27kg per worker per month, according to the number of workers to be accommodated and the duration of occupation. This waste generation rate was derived from the average annual household waste generation of 407kg/person/year[21] and has been adjusted assuming an average working week of five and a half days.

11.2.11 Forecast waste quantities over the duration of the construction period are shown in Table 55.

11.2.12 A landfill diversion rate of 55% has been applied to worker accommodation site waste (see Table 55). Waste generated by occupants of a worker accommodation site will be similar in composition to household waste. As such, the landfill diversion rate is based on a review of national waste targets for England and Wales and considers the published performance data for household waste and local authority collected waste in England.

Table 55: Forecast waste quantities from worker accommodation sites associated with the Annandale depot off-route works

Location	Worker numbers in accommodation	Duration (months)	Estimated worker waste quantity (tonnes)	Estimated worker waste for disposal to landfill (tonnes)
Main compound to depot and stabling sidings	60	43	70	31
Total	**60**	**43**	**70**	**31**

11.3 Operation

Forecast of waste quantities

11.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 56.

11.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

11.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 56: Operational waste forecast in the Annandale depot off-route works

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	0	0
Rolling stock maintenance	6,044	1,209
Track maintenance	422	63
Ancillary infrastructure	36	12
Total	**6,502**	**1,284**

11.3.4 Railway station and train waste is reported as zero in Table 56 as there will not be any stations in the Annandale depot off-route works.

11.3.5 Rolling stock maintenance waste for the Annandale depot is reported in Table 56. These are anticipated to arise in the depot buildings, which have an approximate area of 2ha.

11.3.6 It has been estimated that the Proposed Scheme will generate a total quantity of 6,502 tonnes of operational waste per annum from the Annandale depot off-route works when it becomes fully operational in 2039, of which 5,218 tonnes (80%) will be diverted from landfill.

11.3.7 The Proposed Scheme will generate an overall operational landfill disposal requirement of 1,284 tonnes per annum from the Annandale depot off-route works.

12 Preston Station off-route works

12.1 Local assumptions and limitations

12.1.1 There are no local assumptions and limitations specific to the Preston station off-route works.

12.2 Construction

Forecast of material and waste quantities

Excavated material quantities

12.2.1 No excavation is proposed in the Preston station off-route works and no excavation materials will be produced.

Demolition material and waste quantities

12.2.2 No demolition is proposed in the Preston station off-route works and no demolition material and waste will be produced.

Construction waste quantities

12.2.3 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark performance data published by the BRE. The construction waste forecast for off-route works is given in Table 57.

12.2.4 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 57). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth Line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 57: Forecast construction waste quantities in the Preston station off-route works

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Preston station	4,632	463
Total	**4,632**	**463**

Worker accommodation site waste quantities

12.2.5 No worker accommodation sites are proposed in the Preston station off-route works and no worker accommodation site waste will be produced.

12.3 Operation

Forecast of waste quantities

12.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 58.

12.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

12.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 58: Operational waste forecast from the Preston Station off-route works

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	788	276
Rolling stock maintenance	0	0
Track maintenance	51	8
Ancillary infrastructure	4	2
Total	**843**	**286**

12.3.4 Railway station and train waste from the Preston Station off-route works has been reported in Table 58.

12.3.5 Rolling stock maintenance waste is reported as zero in Table 58 as there will not be any rolling stock maintenance depots as part of the Preston station off-route works.

12.3.6 It has been estimated that the Proposed Scheme will generate a total quantity of 843 tonnes of operational waste per annum from the Preston Station off-route works when it becomes fully operational in 2039, of which 557 tonnes (66%) will be diverted from landfill.

12.3.7 The Proposed Scheme will generate an overall operational landfill disposal requirement of 286 tonnes per annum from the Preston Station off-route works.

13 Carlisle Station off-route works

13.1 Local assumptions and limitations

13.1.1 There are no local assumptions and limitations specific to the Carlisle Station off-route works.

13.2 Construction

Forecast of material and waste quantities

Excavated material quantities

13.2.1 No excavation is proposed in the Carlisle Station off-route works and no excavation materials will be produced.

Demolition material and waste quantities

13.2.2 No demolition is proposed in the Carlisle Station off-route works and no demolition material and waste will be produced.

Construction waste quantities

13.2.3 Construction waste has been forecast based on a waste generation rate of 26.4 tonnes per £100,000 of construction value. This rate has been derived from industry-wide benchmark performance data published by the BRE. The construction waste forecast for off-route works is given in Table 59.

13.2.4 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 59). The landfill diversion rate has been selected based on a review of industry good practice landfill diversion rates of other large-scale infrastructure projects in the UK (e.g. the Elizabeth Line, London 2012 Olympics and the Thames Tideway Tunnel).

Table 59: Forecast construction waste quantities in the Carlisle Station off-route works

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Carlisle station	6,757	676
Total	**6,757**	**676**

Worker accommodation site waste quantities

13.2.5 No worker accommodation sites are proposed in the Carlisle Station off-route works and no worker accommodation site waste will be produced.

13.3 Operation

Forecast of waste quantities

13.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 60.

13.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

13.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 60: Operational waste forecast from the Carlisle Station off-route works

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	309	108
Rolling stock maintenance	0	0
Track maintenance	31	5
Ancillary infrastructure	3	1
Total	**343**	**114**

13.3.4 Railway station and train waste from the Carlisle Station off-route works has been reported in Table 60.

13.3.5 Rolling stock maintenance waste is reported as zero in Table 60 as there will not be any rolling stock maintenance depots as part of the Carlisle Station off-route works.

13.3.6 It has been estimated that the Proposed Scheme will generate a total quantity of 343 tonnes of operational waste per annum from the Carlisle Station off-route works when it becomes fully operational in 2039, of which 229 tonnes (67%) will be diverted from landfill.

13.3.7 The Proposed Scheme will generate an overall operational landfill disposal requirement of 114 tonnes per annum from the Carlisle Station off-route works.

14 Glasgow Central Station off-route passenger increases

14.1 Local assumptions and limitations

14.1.1 There are no local assumptions and limitations specific to the Glasgow Central Station off-route passenger increases.

14.2 Construction

Forecast of material and waste quantities

Excavated material quantities

14.2.1 No excavation is proposed associated with the Glasgow Central Station off-route passenger increases and no excavation materials will be produced.

Demolition material and waste quantities

14.2.2 No demolition is proposed associated with the Glasgow Central Station off-route passenger increases and no demolition material and waste will be produced.

Construction waste quantities

14.2.3 No construction is proposed associated with the Glasgow Central Station off-route passenger increases and no construction waste will be produced.

Worker accommodation site waste quantities

14.2.4 No worker accommodation sites are proposed associated with the Glasgow Central Station off-route passenger increases and no worker accommodation site waste will be produced.

14.3 Operation

Forecast of waste quantities

14.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 61.

14.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

14.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 61: Operational waste forecast from the Glasgow Central Station off-route passenger increases

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	142	50
Rolling stock maintenance	0	0
Track maintenance	0	0
Ancillary infrastructure	0	0
Total	**142**	**50**

14.3.4 Railway station and train waste from the Glasgow Central Station off-route passenger increases has been reported in Table 61. The figures shown for Glasgow Central Station are indicative of the passenger increases only compared to the 'do minimum' forecasts.

14.3.5 Rolling stock maintenance waste is reported as zero in Table 61 as there will not be any rolling stock maintenance depots associated with the Glasgow Central Station off-route passenger increases.

14.3.6 Track maintenance waste and ancillary infrastructure waste has been reported as zero in Table 61 as there will be no track or ancillary infrastructure associated with the Glasgow Central Station off-route passenger increases.

14.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 142 tonnes of operational waste per annum from the Glasgow Central Station off-route passenger increases when the Proposed Scheme becomes fully operational in 2039, of which 92 tonnes (65%) will be diverted from landfill.

14.3.8 The Proposed Scheme will generate an overall operational landfill disposal requirement of 50 tonnes per annum from the Glasgow Central Station off-route passenger increases.

15 Crewe Station off-route passenger increases

15.1 Local assumptions and limitations

15.1.1 There are no local assumptions and limitations specific to the Crewe Station off-route passenger increases.

15.2 Construction

Forecast of material and waste quantities

Excavated material quantities

15.2.1 No excavation is proposed associated with the Crewe Station off-route passenger increases and no excavation materials will be produced.

Demolition material and waste quantities

15.2.2 No demolition is proposed associated with the Crewe Station off-route passenger increases and no demolition material and waste will be produced.

Construction waste quantities

15.2.3 No construction is proposed associated with the Crewe Station off-route passenger increases and no construction waste will be produced.

Worker accommodation site waste quantities

15.2.4 No worker accommodation sites are proposed associated with the Crewe Station off-route passenger increases and no worker accommodation site waste will be produced.

15.3 Operation

Forecast of waste quantities

15.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 62.

15.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

15.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 62: Operational waste forecast from the Crewe Station off-route passenger increases

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	76	27
Rolling stock maintenance	0	0
Track maintenance	0	0
Ancillary infrastructure	0	0
Total	**76**	**27**

15.3.4 Railway station and train waste from the Crewe Station off-route passenger increases has been reported in Table 62. The figures shown for Crewe Station are indicative of the passenger increases only compared to the 'do minimum' forecasts.

15.3.5 Rolling stock maintenance waste is reported as zero in Table 62 as there will not be any rolling stock maintenance depots associated with the Crewe Station off-route passenger increases.

15.3.6 Track maintenance waste and ancillary infrastructure waste has been reported as zero in Table 62 as there will be no track or ancillary infrastructure associated with the Crewe Station off-route passenger increases.

15.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 76 tonnes of operational waste per annum from the Crewe Station off-route passenger increases when it becomes fully operational in 2039, of which 49 tonnes (64%) will be diverted from landfill.

15.3.8 The Proposed Scheme will generate an overall operational landfill disposal requirement of 27 tonnes per annum from the Crewe Station off-route passenger increases.

16 Milton Keynes Central off-route passenger increases

16.1 Local assumptions and limitations

16.1.1 There are no local assumptions and limitations specific to the Milton Keynes Central off-route passenger increases.

16.2 Construction

Forecast of material and waste quantities

Excavated material quantities

16.2.1 No excavation is proposed associated with the Milton Keynes Central off-route passenger increases and no excavation materials will be produced.

Demolition material and waste quantities

16.2.2 No demolition is proposed associated with the Milton Keynes Central off-route passenger increases and no demolition material and waste will be produced.

Construction waste quantities

16.2.3 No construction is proposed associated with the Milton Keynes Central off-route passenger increases and no construction waste will be produced.

Worker accommodation site waste quantities

16.2.4 No worker accommodation sites are proposed associated with the Milton Keynes Central off-route passenger increases and no worker accommodation site waste will be produced.

16.3 Operation

Forecast of waste quantities

16.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 62.

16.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

16.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 63: Operational waste forecast from the Milton Keynes Central off-route passenger increases

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	126	44
Rolling stock maintenance	0	0
Track maintenance	0	0
Ancillary infrastructure	0	0
Total	**126**	**44**

16.3.4 Railway station and train waste from the Milton Keynes Central off-route passenger increases has been reported in Table 62. The figures shown for Milton Keynes Central are indicative of the passenger increases only compared to the 'do minimum' forecasts.

16.3.5 Rolling stock maintenance waste is reported as zero in Table 62 as there will not be any rolling stock maintenance depots associated with the Milton Keynes Central off-route passenger increases.

16.3.6 Track maintenance waste and ancillary infrastructure waste has been reported as zero in Table 62 as there will be no track or ancillary infrastructure associated with the Milton Keynes Central off-route passenger increases.

16.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 126 tonnes of operational waste per annum from the Milton Keynes Central off-route passenger increases when it becomes fully operational in 2039, of which 82 tonnes (65%) will be diverted from landfill.

16.3.8 The Proposed Scheme will generate an overall operational landfill disposal requirement of 44 tonnes per annum from the Milton Keynes Central off-route passenger increases.

17 Lancaster Station off-route passenger increases

17.1 Local assumptions and limitations

17.1.1 There are no local assumptions and limitations specific to the Lancaster Station off-route passenger increases.

17.2 Construction

Forecast of material and waste quantities

Excavated material quantities

17.2.1 No excavation is proposed associated with the Lancaster Station off-route passenger increases and no excavation materials will be produced.

Demolition material and waste quantities

17.2.2 No demolition is proposed associated with the Lancaster Station off-route passenger increases and no demolition material and waste will be produced.

Construction waste quantities

17.2.3 No construction is proposed associated with the Lancaster Station off-route passenger increases and no construction waste will be produced.

Worker accommodation site waste quantities

17.2.4 No worker accommodation sites are proposed associated with the Lancaster Station off-route passenger increases and no worker accommodation site waste will be produced.

17.3 Operation

Forecast of waste quantities

17.3.1 Operational waste quantities for the Proposed Scheme have been forecast on an annual basis and using an assumption that maximum capacity will be achieved in the first full year of operation (2039). These quantities are shown in Table 62.

17.3.2 Operational waste has been forecast based on waste generation data received from Network Rail and standard waste generation rates provided in British Standard BS5906:2005[22].

17.3.3 The following landfill diversion rates have been applied to the estimated operational waste quantities:

- railway station and trains: 65%;
- rolling stock maintenance: 80%;
- track maintenance:
  - ballast track: 85%;
  - slab track: 100%; and
- ancillary infrastructure: 65%.

Table 64: Operational waste forecast from the Lancaster Station off-route passenger increases

Waste source	Estimated quantity of waste per annum (tonnes)	Estimated quantity of waste for off-site disposal to landfill per annum (tonnes)
Railway stations and trains	38	13
Rolling stock maintenance	0	0
Track maintenance	0	0
Ancillary infrastructure	0	0
Total	**38**	**13**

17.3.4 Railway station and train waste from the Lancaster Station off-route passenger increases has been reported in Table 62. The figures shown for Lancaster Station are indicative of the passenger increases only compared to the 'do minimum' forecasts.

17.3.5 Rolling stock maintenance waste is reported as zero in Table 62 as there will not be any rolling stock maintenance depots associated with the Lancaster Station off-route passenger increases.

17.3.6 Track maintenance waste and ancillary infrastructure waste has been reported as zero in Table 62 as there will be no track or ancillary infrastructure associated with the Lancaster Station off-route passenger increases.

17.3.7 It has been estimated that the Proposed Scheme will generate a total quantity of 38 tonnes of operational waste per annum from the Lancaster Station off-route passenger increases when it becomes fully operational in 2039, of which 25 tonnes (66%) will be diverted from landfill.

17.3.8 The Proposed Scheme will generate an overall operational landfill disposal requirement of 13 tonnes per annum from the Lancaster Station off-route passenger increases.

Annex A – Community area waste and material resources

Table A 1: Forecast excavated material quantities, 2025 to 2038

Community area		Forecast quantities of excavated material available before use (tonnes)										
Number	**Name**	**Selected fill (CL6)**	**General railway fill (CL1/3)**	**General railway fill (CL2)**	**General highway fill (CL2)**	**Environmental mitigation earthworks fill (CL4)**	**Unacceptable material (U1A)**	**Unacceptable material (U1B)**	**Unacceptable material (U1B) for disposal as non-hazardous waste**	**Unacceptable material (U2) for disposal as hazardous waste**	**Coal**	**Total**
MA01	Hough to Walley's Green	0	0	587,514	257,768	0	2,385,392	0	0	0	0	3,230,674
MA02	Wimboldsley to Lostock Gralam	0	1,915,341	1,759,332	887,793	0	784,320	0	0	0	0	5,346,786
MA03	Pickmere to Agden and Hulseheath	0	0	3,312,261	917,176	0	778,322	0	0	0	0	5,007,759
MA04	Broomedge to Glazebrook	0	102,729	227,022	107,758	0	183,629	0	14,164	0	0	635,302
MA05	Risley to Bamfurlong	0	86,486	1,417,622	283,595	272,925	220,670	0	38,143	0	0	2,319,441
MA06	Hulseheath to Manchester Airport	0	238,144	3,980,796	541,284	0	257,523	0	0	0	0	5,017,747
MA07	Davenport Green to Ardwick	0	4,406	421,591	18,517	0	3,312,134	0	179,768	0	0	3,936,415
MA08	Manchester Piccadilly Station	0	141,457	798,220	72,147	0	32,780	0	0	0	0	1,044,603
Total		**0**	**2,488,562**	**12,504,358**	**3,086,038**	**272,925**	**7,954,770**	**0**	**232,074**	**0**	**0**	**26,538,728**

Table A 2: Forecast engineering and environmental mitigation earthworks fill requirements, 2025 to 2038

Community area		Forecast quantities of fill required (tonnes)[27]							
Number	**Name**	**Backfill (CL1/3/6)**	**Selected fill (CL6)**	**General railway fill (CL1/3)**	**General railway fill (CL2)**	**General highway fill (CL2)**	**Environmental mitigation bund fill (CL2)**	**Environmental mitigation landscape fill (CL4)**	**Total**
MA01	Hough to Walley's Green	247,033	1,375,932	773,917	25,836	102,001	563,912	0	3,088,632
MA02	Wimboldsley to Lostock Gralam	935,728	779,741	1,699,868	1,140,803	575,618	1,123,473	3,453,715	9,708,946
MA03	Pickmere to Agden and Hulseheath	798,608	726,053	1,786,976	842,596	44,399	399,927	0	4,598,560
MA04	Broomedge to Glazebrook	272,536	495,222	1,043,418	1,134,140	128,435	148,198	0	3,221,948
MA05	Risley to Bamfurlong	208,251	625,115	838,035	483,205	311,791	358,136	0	2,824,533
MA06	Hulseheath to Manchester Airport	221,983	638,649	560,247	86,627	1,053,773	710,942	0	3,272,222
MA07	Davenport Green to Ardwick	4,044	9,314	73,977	0	0	0	0	87,335
MA08	Manchester Piccadilly Station	2,800	4,676	17,446	0	27,939	0	0	52,861
Total		**2,690,984**	**4,654,702**	**6,793,884**	**3,713,207**	**2,243,956**	**3,304,589**	**3,453,715**	**26,855,037**

[27] The abbreviations for excavated material refer to soil classifications outlined in the Department for Transport Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works. Available online at: http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/index.htm

CL1 Class 1
CL2 Class 2
CL3 Class 3
CL4 Class 4
CL5 Class 5
CL6 Class 6
U1A Unacceptable Material Class U1A
U1B Unacceptable Material Class U1B
U2 Unacceptable Material Class U2

Table A 3: Forecast topsoil and agricultural subsoil quantities available and required, 2025 to 2038

Community area		Topsoil and agricultural subsoil available (tonnes)			Topsoil and agricultural subsoil required (tonnes)		
Number	Name	Topsoil for engineering	Topsoil for environmental mitigation	Agricultural subsoil for environmental mitigation	Topsoil for engineering	Topsoil for environmental mitigation	Agricultural subsoil for environmental mitigation
MA01	Hough to Walley's Green	504,399	64,986	0	7,293	60,428	0
MA02	Wimboldsley to Lostock Gralam	408,556	92,372	0	225,095	99,569	0
MA03	Pickmere to Agden and Hulseheath	439,968	54,965	0	137,689	44,393	0
MA04	Broomedge to Glazebrook	267,280	29,323	0	163,081	26,196	0
MA05	Risley to Bamfurlong	318,239	66,388	0	115,611	59,047	0
MA06	Hulseheath to Manchester Airport	470,862	95,445	0	221,246	81,841	0
MA07	Davenport Green to Ardwick	1,118	0	0	344	0	0
MA08	Manchester Piccadilly Station	0	0	0	344	0	0
Total		**2,410,421**	**403,479**	**0**	**870,703**	**371,474**	**0**

Table A 4: Forecast demolition and construction material and waste quantities, 2025 to 2038

Community area		Demolition			Construction		
Number	Name	Estimated demolition material quantities (tonnes)	Estimated demolition waste for off-site disposal to landfill (tonnes)	Estimated demolition waste diverted from landfill (tonnes)	Estimated construction waste quantities (tonnes)	Estimated construction waste for off-site disposal to landfill (tonnes)	Estimated construction waste diverted from landfill (tonnes)
MA01	Hough to Walley's Green	4,359	436	3,923	205,571	20,557	185,014
MA02	Wimboldsley to Lostock Gralam	24,404	2,440	21,963	227,169	22,717	204,452
MA03	Pickmere to Agden and Hulseheath	25,031	2,503	22,528	116,970	11,697	105,273
MA04	Broomedge to Glazebrook	4,682	468	4,214	98,037	9,804	88,233
MA05	Risley to Bamfurlong	79,851	7,985	71,866	105,013	10,501	94,512
MA06	Hulseheath to Manchester Airport	76,820	7,682	69,138	250,118	25,012	225,106
MA07	Davenport Green to Ardwick	83,815	8,382	75,434	243,044	24,304	218,740
MA08	Manchester Piccadilly Station	266,239	26,624	239,615	260,709	26,071	234,638
Total		**565,201**	**56,520**	**508,681**	**1,506,631**	**150,663**	**1,355,968**

Table A 5: Worker accommodation site waste quantities, 2025 to 2038

Community area		Worker accommodation site waste				
Number	**Name**	**Average number of workers in accommodation site**	**Duration of accommodation site (months)**	**Estimated worker accommodation site waste quantity (tonnes)**	**Estimated worker accommodation site waste for off-site disposal to landfill (tonnes)**	**Estimated worker accommodation site waste diverted from landfill (tonnes)**
MA01	Hough to Walley's Green	200	73	394	177	217
MA02	Wimboldsley to Lostock Gralam	230	146	290	130	159
MA03	Pickmere to Agden and Hulseheath	80	49	106	48	58
MA04	Broomedge to Glazebrook	70	51	97	44	53
MA05	Risley to Bamfurlong	0	0	0	0	0
MA06	Hulseheath to Manchester Airport	0	0	0	0	0
MA07	Davenport Green to Ardwick	0	0	0	0	0
MA08	Manchester Piccadilly Station	0	0	0	0	0
Total		**580**	**319**	**887**	**399**	**488**

Table A 6: Railway station and train, and rolling stock maintenance waste, 2039

Community area		Railway station and train waste			Rolling stock maintenance waste		
Number	Name	Estimated station and train waste quantity per annum (tonnes)	Estimated station and train waste for off-site disposal to landfill per annum (tonnes)	Estimated station and train waste diverted from landfill per annum (tonnes)	Estimated rolling stock maintenance waste quantity per annum (tonnes)	Estimated rolling stock maintenance waste for off-site disposal to landfill per annum (tonnes)	Estimated rolling stock maintenance waste diverted from landfill per annum (tonnes)
MA01	Hough to Walley's Green	0	0	0	0	0	0
MA02	Wimboldsley to Lostock Gralam	0	0	0	13,052	2,610	10,441
MA03	Pickmere to Agden and Hulseheath	0	0	0	0	0	0
MA04	Broomedge to Glazebrook	0	0	0	0	0	0
MA05	Risley to Bamfurlong	0	0	0	0	0	0
MA06	Hulseheath to Manchester Airport	550	192	357	0	0	0
MA07	Davenport Green to Ardwick	0	0	0	0	0	0
MA08	Manchester Piccadilly Station	4,452	1,558	2,894	0	0	0
Total		**5,002**	**1,751**	**3,251**	**13,052**	**2,610**	**10,441**

Table A 7: Track maintenance and ancillary infrastructure waste quantities, 2039

Community area		Track maintenance waste			Ancillary infrastructure waste		
Number	Name	Estimated track maintenance waste quantity per annum (tonnes)	Estimated track maintenance waste for off-site disposal to landfill per annum (tonnes)	Estimated track maintenance waste diverted from landfill per annum (tonnes)	Estimated ancillary infrastructure waste quantity per annum (tonnes)	Estimated ancillary infrastructure waste for off-site disposal to landfill per annum (tonnes)	Estimated ancillary infrastructure waste diverted from landfill per annum (tonnes)
MA01	Hough to Walley's Green	1,024	15	1,009	15	5	10
MA02	Wimboldsley to Lostock Gralam	336	50	286	34	12	22
MA03	Pickmere to Agden and Hulseheath	338	51	287	28	10	18
MA04	Broomedge to Glazebrook	121	18	103	10	4	7
MA05	Risley to Bamfurlong	209	31	178	18	6	11
MA06	Hulseheath to Manchester Airport	861	13	848	17	6	11
MA07	Davenport Green to Ardwick	1,453	0	1,453	18	6	12
MA08	Manchester Piccadilly Station	302	0	302	3	1	2
Total		**4,643**	**178**	**4,465**	**142**	**50**	**92**

Annex B – Off-route works waste and material resources

Table B 1: Forecast excavated material quantities, 2025 to 2038

Name	Forecast quantities of excavated material available before use (tonnes)										
	Selected fill (CL6)	General railway fill (CL1/3)	General railway fill (CL2)	General highway fill (CL2)	Environmental mitigation earthworks fill (CL4)	Unacceptable material (U1A)	Unacceptable material (U1B)	Unacceptable material (U1B) for disposal as non-hazardous waste	Unacceptable material (U2) for disposal as hazardous waste	Coal	Total
Preston Station	0	0	0	0	0	0	0	0	0	0	0
Carlisle Station	0	0	0	0	0	0	0	0	0	0	0
Annandale depot	0	196,838			653,600	196,110	0	0	0	0	1,046,548
Total	**0**	**196,838**			**653,600**	**196,110**	**0**	**0**	**0**	**0**	**1,046,548**

Table B 2: Forecast engineering and environmental mitigation earthworks fill requirements, 2025 to 2038

Name	Forecast quantities of fill required (tonnes)[28]							
	Backfill (CL1/3/6)	Selected fill (CL6)	General railway fill (CL1/3)	General railway fill (CL2)	General highway fill (CL2)	Environmental mitigation bund fill (CL2)	Environmental mitigation landscape fill (CL4)	Total
Preston Station	0	0	0	0	0	0	0	0
Carlisle Station	0	0	196,838			288,025	0	680,972
Annandale depot	196,110	0	196,838			288,025	0	680,972
Total	**196,110**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

[28] The abbreviations for excavated material refer to soil classifications outlined in the Department for Transport *Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works*. Available online at http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/index.htm

CL1 Class 1
CL2 Class 2
CL3 Class 3
CL4 Class 4
CL5 Class 5
CL6 Class 6
U1A Unacceptable Material Class U1A
U1B Unacceptable Material Class U1B
U2 Unacceptable Material Class U2

Table B 3: Forecast topsoil and agricultural subsoil quantities available and required, 2025 to 2038

Name	Topsoil and agricultural subsoil available (tonnes)			Topsoil and agricultural subsoil required (tonnes)		
	Topsoil for engineering	Topsoil for environmental mitigation	Agricultural subsoil for environmental mitigation	Topsoil for engineering	Topsoil for environmental mitigation	Agricultural subsoil for environmental mitigation
Preston Station	0	0	0	0	0	0
Carlisle Station	0	0	0	0	0	0
Annandale depot	275,099		0	275,099		0
Total	**275,099**		**0**	**275,099**		**0**

Table B 4: Forecast demolition and construction material and waste quantities, 2025 to 2038

Name	Demolition			Construction		
	Estimated demolition material quantities (tonnes)	Estimated demolition waste for off-site disposal to landfill (tonnes)	Estimated demolition waste diverted from landfill (tonnes)	Estimated construction waste quantities (tonnes)	Estimated construction waste for off-site disposal to landfill (tonnes)	Estimated construction waste diverted from landfill (tonnes)
Preston Station	0	0	0	4,632	463	4,169
Carlisle Station	0	0	0	6,757	676	6,081
Annandale depot	0	0	0	36,313	3,631	32,682
Total	**0**	**0**	**0**	**47,702**	**4,770**	**42,932**

Table B 5: Worker accommodation site waste quantities, 2025 to 2038

Name	Worker accommodation site waste				
	Average number of workers in accommodation site	Duration of accommodation site (months)	Estimated worker accommodation site waste quantity (tonnes)	Estimated worker accommodation site waste for off-site disposal to landfill (tonnes)	Estimated worker accommodation site waste diverted from landfill (tonnes)
Preston Station	0	0	0	0	0
Carlisle Station	0	0	0	0	0
Annandale depot	60	43	70	31	38
Total	**60**	**43**	**70**	**31**	**38**

Table B 6: Railway station and train, and rolling stock maintenance waste, 2039

Name	Railway station and train waste			Rolling stock maintenance waste		
	Estimated station and train waste quantity per annum (tonnes)	Estimated station and train waste for off-site disposal to landfill per annum (tonnes)	Estimated station and train waste diverted from landfill per annum (tonnes)	Estimated rolling stock maintenance waste quantity per annum (tonnes)	Estimated rolling stock maintenance waste for off-site disposal to landfill per annum (tonnes)	Estimated rolling stock maintenance waste diverted from landfill per annum (tonnes)
Preston Station	788	276	512	0	0	0
Carlisle Station	309	108	201	0	0	0
Annandale depot	0	0	0	6,044	1,209	4,835
Glasgow Central Station (passenger increases only)	142	50	92	0	0	0
Crewe Station (passenger increases only)	76	27	50	0	0	0
Milton Keynes Central (passenger increases only)	126	44	82	0	0	0
Lancaster (passenger increases only)	38	13	25	0	0	0
Total	**1,479**	**518**	**962**	**6,044**	**1,209**	**4,835**

Table B 7: Track maintenance and ancillary infrastructure waste quantities, 2039

Name	Track maintenance waste			Ancillary infrastructure waste		
	Estimated track maintenance waste quantity per annum (tonnes)	Estimated track maintenance waste for off-site disposal to landfill per annum (tonnes)	Estimated track maintenance waste diverted from landfill per annum (tonnes)	Estimated ancillary infrastructure waste quantity per annum (tonnes)	Estimated ancillary infrastructure waste for off-site disposal to landfill per annum (tonnes)	Estimated ancillary infrastructure waste diverted from landfill per annum (tonnes)
Preston Station	51	8	43	4	2	3
Carlisle Station	31	5	27	3	1	2
Annandale depot	422	63	359	36	12	23
Glasgow Central Station (passenger increases only)	0	0	0	0	0	0
Crewe Station (passenger increases only)	0	0	0	0	0	0
Milton Keynes Central (passenger increases only)	0	0	0	0	0	0
Lancaster (passenger increases only)	0	0	0	0	0	0
Total	**505**	**76**	**429**	**42**	**15**	**28**

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High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA
Freephone: 08081 434 434
Minicom: 08081 456 472
Email: HS2enquiries@hs2.org.uk