

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 1 and Additional Provision 1 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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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 which forms part of Volume 5 of the Supplementary Environmental Statement 1 (SES1) and Additional Provision 1 Environmental Statement (AP1 ES).
- 1.1.2 This appendix should be read with the High Speed Rail (Crewe – Manchester) Environmental Statement (ES)¹ submitted to Parliament in January 2022 (the main ES).
- 1.1.3 This appendix should be read in conjunction with:
- SES1 and AP1 ES Volume 2, Community Area reports; and
 - SES1 and AP1 ES Volume 3, Route-wide effects.
- 1.1.4 In order to differentiate between the original proposals assessed as part of the main ES and subsequent changes, the following terms are used:
- ‘the original scheme’ – the Bill scheme submitted to Parliament in January 2022, which was assessed in the main ES;
 - ‘the SES1 scheme’ – the original scheme with any changes described in the SES1 that are within the existing powers of the Bill; and
 - ‘the AP1 revised scheme’ – the original scheme as amended by the SES1 changes and AP1 amendments.
- 1.1.5 Only the first and last terms are used in this appendix as waste and material resources were not separately assessed as part of the SES1 scheme and because the relevant information (i.e. waste forecasts) do not disaggregate between SES1 changes and AP1 amendments.
- 1.1.6 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 AP1 revised scheme has been undertaken on a route-wide and not a community area basis.
- 1.1.7 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 the SES1 and AP1 ES Volume 3, Route-wide effects, Section 15.

¹ High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement*. Available online at: <https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement>.

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- 1.1.8 Section 2 of this appendix provides detailed information concerning the environmental baseline, namely:
- the types, quantities and management routes of waste generated locally along the route of the AP1 revised 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).
- 1.1.9 Sections 3 to 17 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 AP1 revised scheme.
- 1.1.10 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.

1.2 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 AP1 revised scheme;
 - the estimated quantities of waste that will require off-site disposal to landfill during the construction and operation of the AP1 revised scheme;
 - the types, quantities and management routes of waste generated in the waste planning authority areas along the route of the AP1 revised scheme;
 - waste infrastructure capacity data for the waste planning authority areas along the route of the AP1 revised 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).

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 AP1 revised scheme passes, and the locality of off-route works, are shown in Table 1 for the year 2022 (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 AP1 revised 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 (2022) 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	638,951	88%	87,449	12%
	Cheshire West and Chester	351,600	263,700	75%	87,900	25%
	Warrington	245,485	199,641	81%	45,844	19%
	Greater Manchester	1,325,875	1,069,000	81%	256,875	19%
	Lancashire	4,127,029	3,920,678	95%	206,351	5%
	Cumbria	794,979	706,502	89%	88,477	11%
Scotland	Dumfries and Galloway Council ²	No data available	No data available	No data available	No data available	No data available

² No data is available regarding CDEW arisings in Dumfries and Galloway, and, therefore, it has not been possible to project CDEW arisings forward using a method consistent with the other regional areas.

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%
	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 ²	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 2022 (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 Report³.
- 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 2022 (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 would need to find additional landfill capacity and therefore the anticipated landfill diversion for materials may be slightly overestimated post 2035.

³ BPP Consulting for Cheshire East (2017), *Cheshire East Waste Needs Assessment 2017 – Main Report*. Available online at: <https://www.cheshireeast.gov.uk/pdf/planning/spatial-planning/waste/cheshire-east-wna-2018.pdf>.

Cheshire West and Chester

- 2.1.8 Total CDEW arisings for the years 2022 (baseline) and the period 2025 to 2038 (future baseline) are based on information taken from Cheshire West and Chester's Waste Management Needs Update⁴.
- 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 2022 (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.
- 2.1.10 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 2022 (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 2017⁵.
- 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 2022 (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.

⁴ 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.

⁵ Warrington Borough Council (2017), *Waste Arisings and Capacity Requirements Report 2017*. Available online at: https://www.warrington.gov.uk/sites/default/files/2019-09/waste_needs_assessment_final_report_may_2017_0.pdf.

Greater Manchester

- 2.1.14 Total CDEW arisings for the years 2022 (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 Document⁶.
- 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 2022 (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.

Lancashire

- 2.1.17 Total CDEW arisings for the years 2022 (baseline) and the period 2025 to 2038 (future baseline) are based on information taken from Appendix 5 of the Joint Lancashire Local Waste Assessment⁷. 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 2022 (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.

⁶ Association of Greater Manchester Authorities (2012), *Greater Manchester Joint Waste Development Plan Document*. Available online at: https://www.greatermanchester-ca.gov.uk/media/1994/greater_manchester_waste_plan_opt.pdf.

⁷ 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>.

Cumbria

- 2.1.20 Total CDEW arisings for the years 2022 (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 Assessment⁸. 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 2022 (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.
- 2.1.22 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 excavated waste arisings were disposed of to landfill in 2017. No forecasts of future CDEW 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

- 2.1.23 No CDEW arisings forecasts for Dumfries and Galloway are available. 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 within the defined study area are shown in Table 3 for the year 2022 (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 AP1 revised 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).

⁸ 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>.

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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 within this section.

Table 3: Baseline (2022) 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	255,638	249,722	98%	5,916	2%
	Cheshire West and Chester	474,071	356,330	75%	117,741	25%
	Warrington	163,344	114,380	70%	49,127	30%
	Greater Manchester	2,714,000	2,121,161	78%	592,839	22%
	Lancashire	2,288,000	1,761,760	77%	526,240	23%
	Cumbria	902,853	788,427	87%	114,426	13%
Scotland	Dumfries and Galloway Council ⁹	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data

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 ⁹	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data

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%

⁹ No data is available regarding C&I waste arisings in Dumfries and Galloway beyond 2018, and, therefore, it has not been possible to project C&I waste arisings forward using a method consistent with the other regional areas.

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Regional area	Local area	Total C&I arisings (tonnes)	Overall diversion from landfill		Disposal to landfill	
			Tonnes	Percentage	Tonnes	Percentage
	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 ⁹	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data

Cheshire East

- 2.1.27 Total C&I waste arisings for Cheshire East for the year 2022 (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 Report³.
- 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 2022 (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 2022 (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 Update³.
- 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 2022 (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 2022 (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 2017⁵.
- 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 2022 (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 2017⁵ 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 2022 (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 Plan⁶.
- 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 2022 (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)¹⁰, 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.

¹⁰ Association of Greater Manchester Authorities (2012), *Joint Waste Development Plan Document - Needs Assessment update Report (March 2010)*. This report is no longer accessible online.

- 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 2022 (baseline) and the period 2025 to 2038 (future baseline) are based on information taken from Appendix 4 of the Joint Lancashire Local Waste Assessment⁷. 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 2022 (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 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 2022 (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 Assessment⁸. 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 2022 (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 2018. 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 2020, Waste Summary Tables^{11 12 13}. The data for Dumfries and Galloway has been obtained from the Scottish Environment Protection Agency's Waste sites and capacity tool¹⁴; 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 2020 (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	1,213,500	1,530,000	1,786,500	2,635,500	7,165,500	7,806,000

¹¹ Environment Agency (2005 – 2012), *Waste Management Data*. Available online at: <http://webarchive.nationalarchives.gov.uk/20140328145538/http://www.environment-agency.gov.uk/research/library/data/34169.aspx>.

¹² Environment Agency (2013 – 2016), *Waste Management Data*. Available online at: <https://www.gov.uk/guidance/how-to-access-waste-management-data-for-england>.

¹³ Environment Agency (2017 – 2020), *Waste Management Data*. Available online at: <https://environment.data.gov.uk/portalstg/home/gallery.html?view=grid&sortOrder=true&sortField=relevance&searchTerm=waste%20summary%20tables>.

¹⁴ 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/>.

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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)
Non-hazardous waste landfill	5,793,400	2,451,820	6,514,670	7,367,080	22,126,970	23,229,210
Hazardous waste landfill	6,391,500	0	0	3,016,500	9,408,000	9,408,000
Total landfill	13,398,400	3,981,820	8,301,170	13,019,080	38,700,470	40,443,210
Municipal solid waste, C&I waste incineration	1,100,000	0	127,100	0	1,227,100	1,227,100
Other incineration	280,000	0	13,884	175,428	469,312	792,812
Total incineration	1,380,000	0	140,984	175,428	1,696,412	2,019,912
Waste transfer	363,000	483,000	2,216,000	971,000	4,033,000	5,761,000
Waste treatment	2,194,000	1,170,000	7,272,000	3,050,000	13,686,000	17,653,000
Metal recycling	43,000	34,000	736,000	161,000	974,000	4,279,000
Total treatment and waste transfer	2,600,000	1,687,000	10,224,000	4,182,000	18,693,000	27,693,000
Total	17,378,400	5,668,820	18,666,154	17,376,508	59,089,882	70,156,122

Dumfries and Galloway

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

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 Agency¹¹ and the Scottish Environment Protection Agency¹⁴ 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')¹⁵, 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 2020 as reported by the Environment Agency¹¹ and for the period 2013 to 2019 (latest available published data) as reported by the Scottish Environment Protection Agency¹⁴. The average percentage change has then been applied to the reported 2020 permitted landfill capacity and projected forward to 2039.
- 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 AP1 revised 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.

¹⁵ Council 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>.

Future baseline waste treatment and recovery capacity

- 2.3.7 Permitted capacity data published by the Environment Agency¹¹ 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 AP1 revised 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 Agency¹¹ for the period 2005 to 2020 (latest available published data), and the Scottish Environment Protection Agency¹⁴ 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 2020 in England and the North West, and for the period 2013 to 2019 in Dumfries and Galloway. When determining the average, outliers have been removed.

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Table 8: National and regional inert waste landfill capacity trends, 2005 to 2020

Year	Regions through which the route of the AP1 revised 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	No data	79,445	No data
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%
2020	5,204	-5.33%	No data	No data	140,192	14.56%
Average capacity change 2005 to 2020	-	-2.01%	-	0.00%	-	4.52%

Landfill capacity projections

- 2.3.16 Table 9 presents permitted inert waste landfill capacity projections to 2039 based on latest available published data for 2020.
- 2.3.17 Projections for England and the North West have been derived by applying the average capacity change 2005 to 2020 (shown in Table 8) to the published inert waste landfill capacity for 2020 and for each year beyond to 2039. Projections for Dumfries and Galloway have been derived by applying the average capacity change for the period 2013 to 2019 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 2020 has been converted to tonnes using an inert waste landfill density conversion factor of 1.5 tonnes per cubic metre¹⁶. The purpose of this is to provide comparable information for use in this assessment (i.e. landfill

¹⁶ Department of the Environment (1995), *Waste Management Paper No. 26B: Landfill Design, Construction and Operational Practice*. Her Majesty's Stationary Office, London.

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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:

- 2020 (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	2020	2025	2029	2033	2038	2039
Region through which the route of the AP1 revised scheme passes	North West	7,806,000	7,052,971	6,503,198	5,996,279	5,417,831	5,309,017
Region in which off-route works are located	Dumfries and Galloway ¹⁷	0	0	0	0	0	0
National	England	210,288,000	262,334,429	313,103,507	373,697,827	466,188,303	487,269,842

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.

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 Agency¹¹ for the period 2005 to 2020 (latest available published data), and the Scottish Environment Protection Agency¹⁴ 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

¹⁷ No data is available regarding inert landfill capacity in Dumfries and Galloway in 2020. The inert landfill capacities for Dumfries and Galloway are estimated, therefore, to remain at zero until 2039, since the Scottish Environment Protection Agency reported there to be no inert landfill capacity in 2019 in this region.

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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 2020 in England and the North West. The annual percentage changes in non-hazardous waste landfill capacity in Dumfries and Galloway are shown for the period 2013 to 2019 and the average percentage change for the period 2017 to 2019.

Table 10: National and regional non-hazardous waste landfill capacity trends, 2005 to 2020

Year	Regions through which the route of the AP1 revised 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	No data	No data	No data	549,895	No data
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	No data	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%
2020	27,987	13.51%	No data	No data	231,794	0.95%
Average capacity change 2005 to 2020	-	-3.72%	-	-0.06% ¹⁸	-	-5.53%

¹⁸ 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 2020.
- 2.3.25 Projections for England and the North West have been derived by applying the average capacity change 2005 to 2020 (shown in Table 10) to the published non-hazardous waste landfill capacity for 2020 and for each year beyond to 2039. Projections for Dumfries and Galloway have been derived by applying the average capacity change for the period 2017 to 2019 in Dumfries and Galloway 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 2020 has been converted to tonnes using a non-hazardous waste landfill density conversion factor of 0.83 tonnes per cubic metre¹⁹. 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:
- 2020 (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	2020	2025	2029	2033	2038	2039
Region through which the route of the AP1 revised scheme passes	North West	23,229,210	19,214,411	16,508,255	14,183,234	11,731,888	11,295,005
Region in which off-route works are located	Dumfries and Galloway ²⁰	414,450	413,191	412,186	411,184	409,935	409,686
National	England	192,389,020	144,729,235	115,254,277	91,782,068	69,045,253	65,224,239

¹⁹ 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>.

²⁰ No data is available regarding non-hazardous landfill capacity in Dumfries and Galloway in 2020; the capacity has therefore been determined using data from 2019 and projected forward using a method consistent with the other regional areas.

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 Agency¹¹ for the period 2005 to 2020 (latest available published data), and the Scottish Environment Protection Agency¹⁴ 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 2020 in England and the North West, and for the period 2013 to 2019 in Dumfries and Galloway. When determining the average, outliers have been removed.

Table 12: National and regional hazardous waste landfill capacity trends, 2005 to 2020

Year	Regions through which the route of the AP1 revised 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%
2020	6,272	1.98%	No data	No data	16,380	-15.02%
Average capacity change	-	-1.82%	-	0.00%	-	0.12%

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Year	Regions through which the route of the AP1 revised 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 to 2020						

Landfill capacity projections

- 2.3.31 Table 13 presents permitted hazardous waste landfill capacity projections to 2039 based on latest available published data for 2020.
- 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 projections of hazardous waste landfill capacity in the North West have been derived by applying the average national capacity change 2005 to 2020 (shown in Table 12) to the published hazardous waste landfill capacity for 2020 and for each year beyond to 2039. In Dumfries and Galloway, the projections have been derived by applying the average capacity change for the period 2013 to 2019 in Dumfries and Galloway 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 2020 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:
- 2020 (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	2020	2025	2029	2033	2038	2039
Region through which the route of the AP1 revised scheme passes	North West	9,408,000	8,581,883	7,973,533	7,408,307	6,757,783	6,634,700

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	Area	2020	2025	2029	2033	2038	2039
Region in which off-route works are located	Dumfries and Galloway ²¹	0	0	0	0	0	0
National	England	24,570,000	24,715,727	24,832,931	24,950,691	25,098,676	25,128,378

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 Agency¹¹ for the period 2010 to 2020 (latest available published data), and the Scottish Environment Protection Agency¹⁴ 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.

²¹ No data is available regarding hazardous landfill capacity in Dumfries and Galloway in 2020. The hazardous landfill capacities for Dumfries and Galloway are estimated, therefore, to remain at zero until 2039, since the Scottish Environment Protection Agency reported there to be no hazardous landfill capacity in 2019 in this region.

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Table 14: National and regional waste recovery infrastructure capacity trends, 2010 to 2020 (tonnes)

	Area	Capacity	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average unused capacity 2010 to 2020*
Region through which the route of the AP1 revised 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	2,019,912	-
		Unused capacity (tonnes)	280,856	296,421	302,280	354,269	304,243	441,051	228,752	369,410	443,377	534,059	576,572	-
		Unused capacity (%)	44.0%	46.5%	47.4%	55.5%	48.8%	30.1%	15.6%	22.9%	26.2%	26.4%	28.5%	35.6%
Region in which off-route works are located	Dumfries and Galloway ²²	Capacity (tonnes)	No data	No data	No data	210,000	210,000	210,000	750,000	750,000	750,000	750,000	No data	-
		Unused capacity (tonnes)	No data	No data	No data	147,789	140,959	140,794	676,113	668,828	682,171	678,252	No data	-
		Unused capacity (%)	No data	No data	No data	70.4%	67.1%	67.0%	90.1%	89.2%	91.0%	90.4%	No data	80.8%
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	21,891,001	-
		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	5,562,884	-
		Unused capacity (%)	33.8%	34.6%	29.9%	31.0%	27.9%	27.0%	24.8%	22.6%	26.2%	28.5%	25.4%	28.3%

²² The Scottish waste sites and capacity tool, published by the Scottish Environment Protection Agency (see footnote 14), includes data only for 2019 and for six 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 2020. 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 2020, shown in Table 14.
- 2.3.39 For ease of reference, waste recovery infrastructure capacity projections are shown for:
- 2020 (latest available published data);
 - 2025, 2029, 2033 and 2038 (four and five-year intervals between start and end of construction); and
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Table 15: National and regional waste recovery infrastructure capacity projections to 2039 (tonnes)

	Area	Capacity	2020	2025	2029	2033	2038	2039
Region through which the route of the AP1 revised scheme passes	North West	Capacity (tonnes)	2,019,912	2,010,532	1,997,561	1,986,293	1,972,917	1,970,242
		Unused capacity (tonnes)	719,686	716,344	711,722	707,707	702,942	701,989
Region in which off-route works are located	Dumfries and Galloway ²³	Capacity (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	Capacity (tonnes)	21,891,001	23,878,171	25,597,020	27,439,599	29,930,447	30,455,118
		Unused capacity (tonnes)	6,204,194	6,767,384	7,254,528	7,776,739	8,482,677	8,631,376

²³ 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 in 2020; it is therefore not possible to project capacity forward using a method consistent with the other regional areas.

Waste treatment capacity

Waste treatment infrastructure inputs trend data

- 2.3.40 Waste data published by the Environment Agency¹¹ 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 16 presents projections of waste received at permitted waste treatment infrastructure to 2039 based on latest available published data for 2020. 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 16 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 2020, shown in Table 14.
- 2.3.43 For ease of reference, waste treatment infrastructure capacity projections are shown for:
- 2020 (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).

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

	Area	Capacity	2020	2025	2029	2033	2038	2039
Region through which the route of the AP1 revised scheme passes	North West	Inputs (tonnes)	21,932,000	21,830,155	21,689,314	21,566,966	21,421,736	21,392,690
		Unused Capacity (tonnes)	13,521,466	13,458,677	13,371,846	13,296,416	13,206,880	13,188,972
Region in which off-route works are located	Dumfries and Galloway ²⁴	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)	101,151,000	110,333,049	118,275,276	126,789,217	138,298,591	140,722,922
		Unused Capacity (tonnes)	40,358,809	44,022,406	47,191,320	50,588,345	55,180,536	56,147,833

²⁴ 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; it is therefore not possible to project capacity forward using a method consistent with the 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 SES1 and AP1 ES Volume 1, Introduction and methodology, Section 5, the construction of the AP1 revised scheme is forecast to generate a total of 4,074,337 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 U1B²⁵ and U2²⁶, which is unsuitable for reuse within the AP1 revised scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in SES1 and AP1 ES 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	1,133,396	0
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	596,217	0
Agricultural subsoil	0	0

²⁵ Unacceptable material Class U1B is 'chemically' unsuitable as defined in the Department for Transport, (2016), *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>.

²⁶ 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>.

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Excavated material types	Estimated quantity of excavated material (tonnes)	Estimated quantity of surplus excavated material for disposal to landfill (tonnes)
Unacceptable material Class U1A	2,344,724	756,113
Unacceptable material Class U1B	0	0
Unacceptable material Class U2	0	0
Total	4,074,337	756,113

- 3.2.3 This part of the route primarily comprises the Crewe tunnel but also includes Crewe North Connection and the Crewe Rolling Stock Depot albeit most of the depot is located in the adjacent Wimboldsley to Lostock Gram area (MA02).
- 3.2.4 Approximately 3.48 million tonnes of excavated materials arise within community area MA01.
- 3.2.5 Approximately 2.34 million tonnes of excavated material that will be generated in MA01 is expected to comprise unacceptable material Class U1A²⁷. This is primarily derived from tunnel arisings comprising Mercia Mudstone and would not be suitable as engineered fill due to the mechanical working of the tunnel boring machines and the inclusion of water and additives during the tunnel boring processes (the water and additives dissipate whilst the materials settle).
- 3.2.6 The remaining excavated materials will be reused within the works.
- 3.2.7 It is proposed that borrow pits are provided locally in MA02 to source fill that will be required within the works and that approximately 1.54 million tonnes of Class U1A tunnel arising material is re-utilised in the restoration of the borrow pits.
- 3.2.8 Approximately 760,000 tonnes of Class U1A tunnelled material will be disposed of by rail via the rail sidings located in community area MA02. A further 49,000 tonnes of Class U1A material derived from MA01 non-tunnelled earthworks will be removed by road for disposal.
- 3.2.9 No borrow pits or local placement are proposed within community area MA01.
- 3.2.10 It is intended that all topsoil excavated from the works (approximately 600,000 tonnes) will be utilised locally but for the purposes of planning a designed thickness of 150mm has been utilised. Where topsoil cannot be utilised locally, the overburden will be redistributed throughout the route.
- 3.2.11 Excavated material falling into the unacceptable material Class U1A category may be suitable for environmental mitigation earthworks fill with/without treatment.

²⁷ Unacceptable material Class U1A is 'physically' unsuitable as defined in the *Specification for Highway Works*, (2016), Series 601 Classification, Definitions and Uses of Earthworks Materials sub-Clauses 2(i)(a) and 2(i)(b). Available online at: <https://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf>.

Demolition material and waste quantities

- 3.2.12 Types of building demolitions required within MA01 are listed in Table 18 together with estimated demolition material quantities.
- 3.2.13 Demolition material quantities have been estimated using the Waste & Resources Action Programme (WRAP) 'Demolition bill of quantities estimator'²⁸, using the basic dimensions and typology of buildings.
- 3.2.14 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	2,596	260
Residential property	206	21
Community amenity	246	25
Highways	0	0
Railways	0	0
Total	3,048	305

Construction waste quantities

- 3.2.15 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.
- 3.2.16 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).
- 3.2.17 The construction waste arisings are based on the overall cost of the AP1 revised scheme. It has not been possible to break this down by community area. The total construction waste

²⁸ WRAP has removed its legacy construction tools with immediate effect. Following a review of the resources including tools, research reports, case studies and good practice guides WRAP transferred the main knowledge base to CIRIA. This is not currently available online on the CIRIA website. Please refer to the following weblink for further detail on the Net Waste Tool:
https://www.ciria.org/Resources/REK/Training_materials/Net_Waste_Tool_user_guide.aspx.

arisings are presented in Table A4, Annex A of this report and SES1 and AP1 ES Volume 3, Route-wide effects.

Worker accommodation site waste quantities

- 3.2.18 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/year²⁹ and has been adjusted assuming an average working week of five and a half days.
- 3.2.19 Forecast waste quantities over the duration of the construction period are shown in Table 19.
- 3.2.20 A landfill diversion rate of 55% has been applied to worker accommodation site waste (see Table 19). 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 19: 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	74	400	180
Total	200	74	400	180

3.3 Operation

Forecast of waste quantities

- 3.3.1 Operational waste quantities for the AP1 revised 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 20.
- 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 BS5906:2005³⁰.

²⁹ 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.

³⁰ British Standards Institution (2005), *BS5906:2005 Waste Management in Buildings – Code of Practice*. Available online at: <https://www.rbkc.gov.uk/pdf/BS5906-2005.pdf>.

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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 20: 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	1,329	4
Ancillary infrastructure	15	5
Total	1,344	9

3.3.4 Railway station and train waste is reported as zero in Table 20 as there will not be any stations in MA01.

3.3.5 Rolling stock maintenance waste is reported as zero in Table 20 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 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 20.

3.3.7 It has been estimated that the AP1 revised scheme will generate a total quantity of 1,344 tonnes of operational waste per annum in MA01 when it becomes fully operational in 2039, of which 1,335 tonnes (99.3%) will be diverted from landfill.

3.3.8 The AP1 revised scheme in MA01 will generate an overall operational landfill disposal requirement of 9 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 SES1 and AP1 ES Volume 1, Introduction and methodology, Section 5, the construction of the AP1 revised scheme is forecast to generate a total of 4,046,870 tonnes of excavated material within MA02, as shown in Table 21.

4.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B²⁵ and U2²⁶, which is unsuitable for reuse within the AP1 revised scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in SES1 and AP1 ES Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 21.

Table 21: 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	2,768,352	0
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	494,823	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	783,695	0
Unacceptable material Class U1B	0	0
Unacceptable material Class U2	0	0
Total	4,046,870	0

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- 4.2.3 The route within this area is typified by the continuation of embankments with no material cuttings. MA01 and MA02 traverse the Cheshire Salt Plain and this requires the route to be placed mainly on embankments throughout this area.
- 4.2.4 Approximately 3.55 million tonnes of excavated materials arise within community area MA02. All materials that arise within MA02 are reutilised within MA02.
- 4.2.5 Most of the excavated material (except for topsoil) that will be generated in MA02 is expected to be Class 2³¹ cohesive material suitable for beneficial reuse as general engineering fill.
- 4.2.6 It is intended that all topsoil excavated from the works will be utilised locally but for the purposes of planning a designed thickness of 150mm has been utilised. Where topsoil cannot be utilised locally, the overburden will be redistributed throughout the route.
- 4.2.7 Approximately 1.54 million tonnes of fill utilised in MA02 will arise from three borrow pits that are immediately adjacent to the works. These borrow pits will be restored utilising tunnelled materials from MA01.
- 4.2.8 The demand for fill in MA02 is balanced by the redistribution of materials from MA01, MA03 and MA06.
- 4.2.9 There is an overall demand for approximately 4.29 million tonnes of various fill materials, that consist of approximately 1.62 million tonnes of Class 1³² and/or stabilised Class 2 Glacial Till, 370,000 tonnes of Class 2 cohesive material (Mercia Mudstone) and 1.54 million tonnes of materials utilised for environmental mitigation earthworks. There is an import requirement for Class 6³³ selected granular fill of approximately 770,000 tonnes for the starter layer and the prepared subgrade layer.
- 4.2.10 No Class 6 granular material is won from within the works and this material will need to be imported via the highway networks. Where site won materials need to be redistributed throughout the works, a large proportion of these materials 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) that cannot readily and/or economically be overcome.

³¹ Class 2 material is defined as cohesive material in the *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.

³² Class 1 material is defined as granular material in the *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.

³³ Class 6 material is defined as selected granular material in the *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.

- 4.2.11 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, no surplus excavated material is anticipated.
- 4.2.12 All non-tunnelled unacceptable material Class U1A category, totalling approximately 780,000 tonnes, are being reutilised within MA02 as environmental mitigation earthworks fill with and without treatment.

Demolition material and waste quantities

- 4.2.13 Types of building demolitions required within MA02 are listed in Table 22 together with estimated demolition material quantities.
- 4.2.14 Demolition material quantities have been estimated using the WRAP ‘Demolition bill of quantities estimator’, using the basic dimensions and typology of buildings.
- 4.2.15 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities (see Table 22). 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 22: 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	16,095	1,609
Residential property	6,531	653
Community amenity	1,088	109
Highways	0	0
Railways	0	0
Total	23,714	2,371

Construction waste quantities

- 4.2.16 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 23.
- 4.2.17 A landfill diversion rate of 90% has been applied to the estimated construction waste 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).
- 4.2.18 The construction waste arisings are based on the overall cost of the AP1 revised scheme. It has not been possible to break this down by community area. The total construction waste

arisings are presented in Table A4, Annex A and SES1 and AP1 ES Volume 3, Route-wide effects.

Worker accommodation site waste quantities

- 4.2.19 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/year²⁹ in 2015 and has been adjusted assuming an average working week of five and a half days.
- 4.2.20 Forecast waste quantities over the duration of the construction period are shown in Table 23.
- 4.2.21 A landfill diversion rate of 55% has been applied to worker accommodation site waste (see Table 23). 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 23: 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 1	70	94	178	80
A54 Middlewich Road satellite compound	80	58	125	56
Gad Brook viaduct north satellite compound	80	77	166	75
Total	230	229	469	211

4.3 Operation

Forecast of waste quantities

- 4.3.1 Operational waste quantities for the AP1 revised 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 24.
- 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 BS5906:2005³⁰.

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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 24: 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	35	12
Total	13,423	2,672

4.3.4 Railway station and train waste is reported as zero in Table 24 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 24. 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, 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 24.

4.3.7 It has been estimated that the AP1 revised scheme will generate a total quantity of 13,423 tonnes of operational waste per annum in MA02 when it becomes fully operational in 2039, of which 10,751 tonnes (80%) will be diverted from landfill.

4.3.8 The AP1 revised 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 SES1 and AP1 ES Volume 1, Introduction and methodology, Section 5, the construction of the AP1 revised scheme is forecast to generate a total of 2,832,408 tonnes of excavated material from MA03, as shown in Table 25.

5.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B²⁵ and U2²⁶, which is unsuitable for reuse within the AP1 revised scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in SES1 and AP1 ES Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 25.

Table 25: 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	1,802,546	0
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	342,939	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	686,923	0
Unacceptable material Class U1B	0	0
Unacceptable material Class U2	0	0
Total	2,832,408	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.

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- 5.2.4 The HS2 route through the MA03 area, which includes provision for the cut and fill requirements of Northern Powerhouse Rail, has a deficit of approximately 600,000 tonnes of engineering fill.
- 5.2.5 Approximately 570,000 tonnes of Class 6 High Grade granular fill will be required for construction of the HS2 route in the MA03 area.
- 5.2.6 The HS2 Manchester spur in MA03 has a deficit of approximately 120,000 tonnes of engineering fill and 3,000 tonnes of topsoil. This material requirement is balanced by the distribution of materials from MA06 and MA07.
- 5.2.7 There is an import requirement for Class 6 selected granular fill of approximately 68,000 tonnes.
- 5.2.8 All Class U1A unacceptable materials (approximately 690,000 tonnes) arising within MA03 are reutilised within MA03.
- 5.2.9 It is intended that all topsoil excavated from the works will be utilised locally but for the purposes of planning a designed thickness of 150mm has been utilised. Where topsoil cannot be utilised locally, the overburden will be redistributed throughout the route.
- 5.2.10 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.
- 5.2.11 No borrow pits or local placement areas are proposed in MA03.

Demolition material and waste quantities

- 5.2.12 Types of building demolitions required within MA03 are listed in Table 26 together with estimated demolition material quantities.
- 5.2.13 Demolition material quantities have been estimated using the WRAP ‘Demolition bill of quantities estimator’, using the basic dimensions and typology of buildings.
- 5.2.14 A landfill diversion rate of 90% has been applied to the estimated demolition material quantities (see Table 26). 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 26: 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	15,735	1,573
Residential property	6,877	688
Community amenity	0	0
Highways	0	0

Type of structure	Estimated demolition material quantities (tonnes)	Estimated demolition waste for disposal to landfill (tonnes)
Railways	0	0
Total	22,612	2,261

Construction waste quantities

- 5.2.15 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 27.
- 5.2.16 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 27). 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).
- 5.2.17 The construction waste arisings are based on the overall cost of the AP1 revised scheme. It has not been possible to break this down by community area. The total construction waste arisings are presented in Table A4, Annex A and SES1 and AP1 ES Volume 3: Route-wide effects.

Worker accommodation site waste quantities

- 5.2.18 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/year²⁹ and has been adjusted assuming an average working week of five and a half days.
- 5.2.19 Forecast waste quantities over the duration of the construction period are shown in Table 27.
- 5.2.20 A landfill diversion rate of 55% has been applied to worker accommodation site waste (see Table 27). 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 27: 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	50	108	49
Total	80	50	108	49

5.3 Operation

Forecast of waste quantities

- 5.3.1 Operational waste quantities for the AP1 revised 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 28.
- 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 BS5906:2005³⁰.
- 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 28: 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	226	34
Ancillary infrastructure	19	7
Total	245	41

- 5.3.4 Railway station and train waste is reported as zero in Table 28 as there will not be any stations in MA03.
- 5.3.5 Rolling stock maintenance waste is reported as zero in Table 28 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 28.

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- 5.3.7 It has been estimated that the AP1 revised scheme will generate a total quantity of 245 tonnes of operational waste per annum in MA03 when it becomes fully operational in 2039, of which 204 tonnes (83%) will be diverted from landfill.
- 5.3.8 The AP1 revised scheme in MA03 will generate an overall operational landfill disposal requirement of 41 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 The construction of the AP1 revised scheme is forecast to generate zero tonnes of excavated material within MA04, as the works in MA04 have been removed.
- 6.2.2 Any materials destined for use in MA04 have been reallocated to the remaining sections of the AP1 revised scheme and the distribution of materials have been rebalanced.

Demolition material and waste quantities

- 6.2.3 Zero tonnes of demolition waste arisings are anticipated to be generated as the works in MA04 have been removed.

Construction waste quantities

- 6.2.4 Zero tonnes of construction waste arisings are anticipated to be generated as the works in MA04 have been removed.

Worker accommodation site waste quantities

- 6.2.5 The works in MA04 have been removed and, therefore, no worker accommodation sites are proposed in MA04 and no worker accommodation site waste will be produced.

6.3 Operation

Forecast of waste quantities

- 6.3.1 Zero tonnes of operational waste arisings are anticipated to be generated as the works in MA04 have been removed.

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 The construction of the AP1 revised scheme is forecast to generate zero tonnes of excavated material within MA05, as the works in MA05 have been removed.
- 7.2.2 Any materials destined for use in MA05 have been reallocated to the remaining sections of the AP1 revised scheme and the distribution of materials have been rebalanced.

Demolition waste quantities

- 7.2.3 Zero tonnes of demolition waste arisings are anticipated to be generated as the works in MA05 have been removed.

Construction waste quantities

- 7.2.4 Zero tonnes of construction waste arisings are anticipated to be generated as the works in MA05 have been removed.

Worker accommodation site waste quantities

- 7.2.5 The works in MA05 have been removed and, therefore, 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 Zero tonnes of operational waste arisings are anticipated to be generated as the works in MA05 have been removed.

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 SES1 and AP1 ES Volume 1, Introduction and methodology, Section 5, the construction of the AP1 revised scheme is forecast to generate a total of 5,584,053 tonnes of excavated material within MA06, as shown in Table 29.

8.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B²⁵ and U2²⁶, which is unsuitable for reuse within the AP1 revised scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in SES1 and AP1 ES Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 29.

Table 29: 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	19,611
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	566,306	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	257,523	106,771
Unacceptable material Class U1B	0	0
Unacceptable material Class U2	0	0
Total	5,584,053	126,382

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- 8.2.3 Most of the excavated material that will be generated in MA06 is expected to be Class 2³¹ 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 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 6³³ selected granular fill. The material surplus is expected to be widely distributed by road to MA02, MA03, MA04 and MA05, with approximately 20,000 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 U1A²⁷ unacceptable materials of approximately 260,000 tonnes, approximately 110,000 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 30 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 30). 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 30: 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	76,820	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 BRE.
- 8.2.11 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities. 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).
- 8.2.12 The construction waste arisings are based on the overall cost of the AP1 revised scheme. It has not been possible to break this down by community area. The total construction waste arisings are presented in Table A4, Annex A and SES1 and AP1 ES Volume 3: Route-wide effects.

Worker accommodation site waste quantities

- 8.2.13 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 AP1 revised 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.
- 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 BS5906:2005³⁰.
- 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 31: 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	848	13
Ancillary infrastructure	17	6
Total	1415	211

- 8.3.4 Manchester Airport Station is located in MA06 and thus railway station and train waste in relation to this is reported in Table 31.
- 8.3.5 Rolling stock maintenance waste is reported as zero in Table 31 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 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 31.
- 8.3.7 It has been estimated that the AP1 revised scheme will generate a total quantity of 1,416 tonnes of operational waste per annum in MA06 when it becomes fully operational in 2039, of which 1,204 tonnes (85%) will be diverted from landfill.
- 8.3.8 The AP1 revised 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 SES1 and AP1 ES Volume 1, Introduction and methodology, Section 5, the construction of the AP1 revised scheme is forecast to generate a total of 3,937,533 tonnes of excavated material within MA07, as shown in Table 32.

9.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B²⁵ and U2²⁶, which is unsuitable for reuse within the AP1 revised scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in SES1 and AP1 ES Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 32.

Table 32: 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	209,130
Environmental mitigation earthworks fill	0	0
Coal	0	0
Topsoil	1,118	0
Agricultural subsoil	0	0
Unacceptable material Class U1A	3,312,134	3,312,134
Unacceptable material Class U1B	179,768	179,768
Unacceptable material Class U2	0	0
Total	3,937,533	3,701,032

9.2.3 This area comprises the Manchester Tunnel which will generate approximately 3.3 million tonnes of Class U1A²⁷ unacceptable material, of which approximately 1.4 million tonnes will be removed via the South Portal and 1.9 million tonnes via the North Portal. The Class U1A material is expected to be disposed of to landfill.

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- 9.2.4 There is a surplus of approximately 370,000 tonnes of engineering fill in MA07, of which approximately 200,000 tonnes of Class 2 material are expected to be disposed of off-site. The remaining surplus is anticipated to be reused within the AP1 revised scheme. In addition, there is a deficit of approximately 9,000 tonnes of Class 6 selected granular fill and 1,000 tonnes 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 33 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 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 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	83,815	8,382

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.
- 9.2.11 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities. 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).

9.2.12 The construction waste arisings are based on the overall cost of the AP1 revised scheme. It has not been possible to break this down by community area. The total construction waste arisings are presented in Table A4, Annex A and SES1 and AP1 ES Volume 3: Route-wide effects.

Worker accommodation site waste quantities

9.2.13 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 AP1 revised 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 34.

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 BS5906:2005³⁰.

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 34: 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	1,476	0
Ancillary infrastructure	19	6
Total	1,493	6

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- 9.3.4 Railway station and train waste is reported as zero in Table 34 as there will not be any stations in MA07.
- 9.3.5 Rolling stock maintenance waste is reported as zero in Table 34 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 34.
- 9.3.7 It has been estimated that the AP1 revised scheme will generate a total quantity of 1,493 tonnes of operational waste per annum in MA07 when it becomes fully operational in 2039, of which 1,487 tonnes (99.6%) will be diverted from landfill.
- 9.3.8 The AP1 revised 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 SES1 and AP1 ES Volume 1, Introduction and methodology, Section 5, the construction of the AP1 revised scheme is forecast to generate 1,044,603 tonnes of excavated material within MA08 as shown in Table 35. 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 U1B²⁵ and U2²⁶, which is unsuitable for reuse within the AP1 revised scheme. The overall balance of excavated material is presented in Annex A; the total quantity of surplus excavated material requiring disposal is presented in SES1 and AP1 ES Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 35.

Table 35: 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	930,338
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	963,118

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 970,000 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 6³³ selected granular 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 36 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 36). 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 36: 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.
- 10.2.10 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities. 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).
- 10.2.11 The construction waste arisings are based on the overall cost of the AP1 revised scheme. It has not been possible to break this down by community area. The total construction waste

arisings are presented in Table A4, Annex A and SES1 and AP1 ES Volume 3: Route-wide effects.

Worker accommodation site waste quantities

10.2.12 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 AP1 revised 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 37.

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 BS5906:2005³⁰.

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 37: 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	292	0
Ancillary infrastructure	2	1
Total	4,746	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 37.

10.3.5 Rolling stock maintenance waste is reported as zero in Table 37 as there will not be any rolling stock maintenance depots in MA08.

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- 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 37.
- 10.3.7 It has been estimated that the AP1 revised scheme will generate a total quantity of 4,746 tonnes of operational waste per annum in MA08 when it becomes fully operational in 2039, of which 3,187 tonnes (67%) will be diverted from landfill.
- 10.3.8 The AP1 revised 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 SES1 and AP1 ES Volume 1, Introduction and methodology, Section 5, the construction of the AP1 revised scheme is forecast to generate a total of 1,321,647 tonnes of excavated material from off-route works, as shown in Table 38.
- 11.2.2 The estimated quantity of surplus excavated material for disposal only includes the quantity of unacceptable material classes U1B²⁵ and U2, which is unsuitable for reuse within the AP1 revised scheme. The overall balance of excavated material is presented in Annex B; the total quantity of surplus excavated material requiring disposal is presented in SES1 and AP1 ES Volume 3, Route-wide effects, Section 15 and therefore it is not included in Table 38.

Table 38: 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

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- 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 4³⁴ 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 39.
- 11.2.9 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 the Annandale depot off-route works

Type of construction	Estimated construction waste quantities (tonnes)	Estimated construction waste for disposal to landfill (tonnes)
Annandale depot	37,092	3,709
Total	37,092	3,709

³⁴ Class 4 material is defined as selected granular material in the 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.

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/year²⁹ 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 40.
- 11.2.12 A landfill diversion rate of 55% has been applied to worker accommodation site waste (see Table 40). 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 40: 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 AP1 revised 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 41.
- 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 BS5906:2005³⁰.
- 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%;

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

Table 41: 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 41 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 41. 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 AP1 revised 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 AP1 revised 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 42.
- 12.2.4 A landfill diversion rate of 90% has been applied to the estimated construction waste 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 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	4,875	488
Total	4,875	488

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 AP1 revised 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 43.
- 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 BS5906:2005³⁰.
- 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 43: 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 43.
- 12.3.5 Rolling stock maintenance waste is reported as zero in Table 43 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 AP1 revised 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 AP1 revised 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 44.
- 13.2.4 A landfill diversion rate of 90% has been applied to the estimated construction waste quantities (see Table 44). 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 44: 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	6,983	698
Total	6,983	698

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 AP1 revised 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 45.
- 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 BS5906:2005³⁰.
- 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 45: 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 45.
- 13.3.5 Rolling stock maintenance waste is reported as zero in Table 45 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 AP1 revised 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 AP1 revised 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 the Glasgow Central 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 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 AP1 revised 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 46.
- 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 BS5906:2005³⁰.

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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 46: 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 46. 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 46 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 46 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 AP1 revised 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 AP1 revised scheme becomes fully operational in 2039, of which 92 tonnes (65%) will be diverted from landfill.

14.3.8 The AP1 revised 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 AP1 revised 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 47.
- 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 BS5906:2005³⁰.

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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 47: 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 47. 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 47 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 47 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 AP1 revised 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 AP1 revised 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 AP1 revised 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.
- 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 BS5906:2005³⁰.

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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 48: 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 48. 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 48 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 48 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 AP1 revised 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 AP1 revised 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 AP1 revised 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 49.
- 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 BS5906:2005³⁰.

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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 49: 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 49. 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 49 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 49 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 AP1 revised 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 AP1 revised 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 A1: 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	898,762	234,634	0	2,344,724	0	0	0	0	3,478,120
MA02	Wimboldsley to Lostock Gralam	0	0	1,872,759	895,593	0	783,695	0	0	0	0	3,552,047
MA03	Pickmere to Agden and Hulseheath	0	0	1,040,520	762,026	0	686,923	0	0	0	0	2,489,469
MA04	Broomedge to Glazebrook	0	0	0	0	0	0	0	0	0	0	0
MA05	Risley to Bamfurlong	0	0	0	0	0	0	0	0	0	0	0
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	384,006	9,012,648	2,524,200	0	7,417,779	0	179,768	0	0	19,518,401

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Route-wide waste and material resources assessment

Table A2: Forecast engineering and environmental mitigation earthworks fill requirements, 2025 to 2038

Community area		Forecast quantities of fill required (tonnes) ³⁵							
Number	Name	Backfill (CL1/3/6) ³⁶	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	176,610	1,376,123	753,126	16,475	102,001	522,644	0	2,946,981
MA02	Wimboldsley to Lostock Gralam	928,777	769,216	1,617,485	1,104,503	823,126	1,207,615	1,538,374	7,989,096
MA03	Pickmere to Agden and Hulseheath	708,282	635,718	1,400,967	757,966	17,558	349,202	0	3,869,693
MA04	Broomedge to Glazebrook	0	0	0	0	0	0	0	0
MA05	Risley to Bamfurlong	0	0	0	0	0	0	0	0
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	2,042,497	3,433,697	4,423,247	1,965,571	2,024,398	2,790,403	1,538,374	18,218,188

³⁵ 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

³⁶ Class 3 material is defined as chalk in the *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.

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Route-wide waste and material resources assessment

Table A3: 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	508,364	87,853	0	4,975	36,555	0
MA02	Wimboldsley to Lostock Gralam	402,450	92,372	0	224,444	97,641	0
MA03	Pickmere to Agden and Hulseheath	306,678	36,261	0	96,061	29,432	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	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	1,689,472	311,930	0	547,414	245,469	0

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Route-wide waste and material resources assessment

Table A4: Forecast demolition and construction material and waste quantities, 2025 to 2038

Community area		Demolition			Construction ³⁷		
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	3,048	305	2,743	NA	NA	NA
MA02	Wimboldsley to Lostock Gralam	23,714	2,371	21,343	NA	NA	NA
MA03	Pickmere to Agden and Hulseheath	22,612	2,261	20,350	NA	NA	NA
MA04	Broomedge to Glazebrook	0	0	0	NA	NA	NA
MA05	Risley to Bamfurlong	0	0	0	NA	NA	NA
MA06	Hulseheath to Manchester Airport	76,820	7,682	69,138	NA	NA	NA
MA07	Davenport Green to Ardwick	83,815	8,382	75,434	NA	NA	NA
MA08	Manchester Piccadilly Station	266,239	26,624	239,615	NA	NA	NA
	Total	476,247	47,625	428,622	1,587,226	158,723	1,428,504

³⁷ The construction waste arisings are based on the overall cost of the AP1 revised scheme. It has not been possible to break this down by community area.

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Waste and material resources

Route-wide waste and material resources assessment

Table A5: 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	74	400	180	220
MA02	Wimboldsley to Lostock Gralam	230	229	469	211	258
MA03	Pickmere to Agden and Hulseheath	80	50	108	49	59
MA04	Broomedge to Glazebrook	0	0	0	0	0
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	510	353	977	440	537

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Waste and material resources

Route-wide waste and material resources assessment

Table A6: 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

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Waste and material resources

Route-wide waste and material resources assessment

Table A7: 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	1,329	4	1,325	15	5	10
MA02	Wimboldsley to Lostock Gralam	336	50	286	35	12	22
MA03	Pickmere to Agden and Hulseheath	226	34	192	19	7	12
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	849	13	837	17	6	11
MA07	Davenport Green to Ardwick	1,474	0	1,474	19	6	12
MA08	Manchester Piccadilly Station	292	0	292	2	1	2
	Total	4,507	101	4,406	106	37	69

Annex B – Off-route works waste and material resources

Table B1: Forecast excavated material quantities, 2025 to 2038

Name	Forecast quantities of excavated material available before use (tonnes)										Total
	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	
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

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Waste and material resources

Route-wide waste and material resources assessment

Table B2: Forecast engineering and environmental mitigation earthworks fill requirements, 2025 to 2038

Name	Forecast quantities of fill required (tonnes) ³⁸							Total
	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)	
Preston Station	0	0	0	0	0	0	0	0
Carlisle Station	0	0	0	0	0	0	0	0
Annandale depot	196,110	0	196,838	196,838	0	288,025	0	680,972
Total	196,110	0	196,838	196,838	0	288,025	0	680,972

³⁸ 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

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Route-wide waste and material resources assessment

Table B3: 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

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Waste and material resources

Route-wide waste and material resources assessment

Table B4: 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

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Route-wide waste and material resources assessment

Table B5: 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

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Table B6: 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	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 Station (passenger increases only)	38	13	25	0	0	0
Total	1,479	517	961	6,044	1,209	4,835

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Table B7: 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 Station (passenger increases only)	0	0	0	0	0	0
Total	505	76	429	42	15	28

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