M42 Junction 6 Improvement
Scheme Number TR010027
Volume 6
6.1 Environmental Statement
Chapter 11 – Material Assets and Waste

Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

January 2019

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M42 Junction 6 Improvement Development Consent Order 202[ ]

6.1 Environmental Statement
Chapter 11 Material Assets and Waste

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11.1 Competent expert evidence

11.1.1 This chapter presents the results of an assessment of the likely significant effects of the Scheme in relation to material assets and waste, and considers the use of materials resources and the generation and management of waste associated with the Scheme.

11.1.2 The competent expert responsible for the assessment is an Associate Director within AECOM who holds the qualification of BSc Chemistry, and is a Chartered Chemist and a Member of the Royal Society of Chemistry.

11.1.3 They have 24 years of experience in waste and resource management and land quality consultancy. They contribute to, and manage, materials and waste impact assessments as part of environmental impact assessments (EIAs) and other projects. They possess a detailed knowledge of the materials and waste impact assessment process, as applied to linear infrastructure developments.

11.2 Legislative and policy framework

11.2.1 The following legislation and planning policy is of direct relevance to the assessment of material resources and waste, and has informed the assessment methodology.

11.2.2 Compliance with statute and policy relating to material assets and waste is addressed within the Planning Statement [**TR010027/APP/7.1**].

Waste (England and Wales) Regulations 2011

11.2.3 The Waste (England and Wales) Regulations 2011 [REF 11-1] (as amended) transpose the requirements of the European Waste Framework Directive 2008/98/EC (EWFD) [REF 11-2] in England and Wales, and require the Secretary of State to establish waste prevention programmes and waste management plans that apply the waste hierarchy (as defined in the EWFD [REF 11-2]).

11.2.4 The waste hierarchy prioritises waste prevention, followed by preparing for reuse, recycling, recovery and finally disposal to the management of waste.

11.2.5 The Regulations [REF 11-1] require businesses to apply the waste hierarchy when managing waste, and also require that measures[1] are taken to ensure that, by the year 2020, at least 70% by weight of non-hazardous construction and demolition waste is subjected to material recovery.

11.2.6 The assessment of waste within this chapter has taken account of the waste hierarchy in the management of waste, and of the targets for recovery of non-hazardous construction and demolition waste.

[1] These measures do not apply to naturally occurring materials within European Waste Code 17 05 04

Waste Management Plan for England

11.2.7 The Waste Management Plan for England [REF 11-3] fulfils the mandatory requirements of Article 28 of the EWFD [REF 11-2], and other required content as set out in Schedule 1 to the Waste (England and Wales) Regulations 2011 [REF 11-1].

11.2.8 The document has been considered within the assessment as it provides an analysis of current waste management practices in England, and evaluates the implementation of the objectives and provisions of the EWFD [REF 11-2]. In relation to demolition and construction waste, it also details how England is committed to meeting its target of recovering at least 70%, by weight, of non-hazardous construction and demolition waste by the year 2020.

National Policy Statement for National Networks

11.2.9 The National Policy Statement for National Networks (NPSNN) [REF 11-4] sets out policies in relation to waste management on transportation schemes.

11.2.10 This states that applicants should set out their arrangements for managing any waste produced, and should include information on the proposed waste recovery and disposal system for all waste generated by the development. It also states that applicants should seek to minimise the volume of waste produced and the volume of waste sent for disposal, unless it can be demonstrated that the alternative is the best overall environmental outcome.

11.2.11 The requirements of paragraphs 5.42 and 5.43 of the NPSNN [REF 11-4] in relation to minimising and managing waste have been taken into account as part of the design-development of the Scheme, and in developing the planned approach to its construction, as described within Chapter 3 The project.

11.2.12 The assessment has given regard to these requirements by estimating and assessing materials and waste associated with the Scheme, and through the identification of measures that would be implemented during construction of the Scheme to ensure both on-site and off-site waste is minimised, and managed and disposed of appropriately.

National Planning Policy Framework

11.2.13 The National Planning Policy Framework (NPPF) [REF 11-5] sets out the Government's planning policies for England, and acknowledges the importance of the sustainable use of minerals resources.

11.2.14 The NPPF [REF 11-5] states that minerals planning authorities should, as far as practicable, take account of the contribution that substitute or secondary and recycled materials and minerals waste would make to the supply of materials, before considering extraction of primary materials, whilst aiming to source minerals supplies indigenously.

11.2.15 The assessment has considered the impacts of using secondary and recycled materials, and the need to safeguard mineral resources.

National Planning Practice Guidance

11.2.16 The National Planning Practice Guidance (NPPG) for Minerals [REF 11-6] provides context to the NPPF [REF 11-5] and advises on the safeguarding of mineral resources.

11.2.17 The NPPG for Waste [REF 11-7] provides guidance on waste planning and implementing the waste hierarchy.

11.2.18 Both documents have been considered as part of the assessment of effects associated with material resources and waste management.

National Planning Policy for Waste

11.2.19 The National Planning Policy for Waste [REF 11-8] states that when considering planning applications for non-waste developments, local authorities should ensure that:

a. the likely impact of proposed, non-waste related developments on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the waste hierarchy and/or the efficient operation of such facilities; and

b. the handling of waste arising from the construction and operation of development maximises re-use/recovery opportunities, and minimises off-site disposal.

11.2.20 These statements have informed the development of the assessment methodology and the identification of the impacts of the Scheme on existing waste management facilities, with consideration also given to sites and areas allocated for waste management.

National and Regional Guidelines for Aggregates Provision in England 2005 to 2020

11.2.21 The National and Regional Guidelines for Aggregates Provision in England [REF 11-9] set out guidelines for aggregates provision in England for the period 2005 to 2020, including assumptions on the proportional contribution of alternative sources of aggregate (secondary and recycled aggregates) to the overall provision.

11.2.22 The assessment has considered the contribution that secondary and recycled materials would have as part of Scheme construction.

Solihull Local Plan: Shaping a Sustainable Future

11.2.23 The adopted Solihull Local Plan: Shaping a Sustainable Future [REF 11-10] contains policies covering materials and waste.

11.2.24 Policy P12: Resource Management identifies that new development will be promoted and controlled to prevent waste within the borough wherever possible, and where this is not possible, waste shall be treated as a resource to be reused or recycled, with disposal viewed as a last resort. The policy also notes that, for non-waste management developments, due regard will be given to any impacts on strategically important waste management sites and that such development will be required to accommodate facilities for the storage, sorting and presentation of waste arising from the development. Developers are also expected to demonstrate provision for waste management through a Site Waste Management Plan (SWMP).

11.2.25 The Solihull Local Plan Review [REF 11-11] was published for consultation in December 2016. Policy P12: Resource Management is broadly unchanged, although there are some revisions to the Local Plan Proposals Map which have been considered in the assessment.

Other waste legislation

11.2.26 The assessment has also taken account of other legislation relevant to waste including, but not limited to:

a. The Environmental Permitting (England and Wales) Regulations 2016 [REF 11-12];

b. Hazardous Waste (England and Wales) Regulations 2005 [REF 11-13] (as amended) ; and

c. Environmental Protection Act 1990 [REF 11-14] (as amended).

11.3 Assessment methodology

Scope of the assessment

11.3.1 A scoping exercise was undertaken in late 2017 to identify the matters to be covered by the materials assessment and agree the approach with relevant statutory bodies.

11.3.2 The outcomes of the scoping exercise were recorded in a scoping report [REF 11-15], which was consulted upon as part of a formal request to the Inspectorate for a scoping opinion. The scoping report included a summary of all assessment work undertaken as part of the design-development of the Scheme up to the point of its publication.

11.3.3 The Inspectorate's scoping opinion [REF 11-16] identified a number of additional overarching EIA and topic-specific matters that were subsequently brought into the overall scope of the assessment. These further considerations are detailed in Appendix 5.3 [**TR010027/APP/6.3**] and include responses to the points raised, and identify where the relevant information is presented within this chapter and elsewhere in this Environmental Statement.

11.3.4 In addition to the matters raised in the scoping opinion [REF 11-16], the final assessment scope has also been shaped by the following:

a. design changes made to the Scheme in respect of its form and extent;

b. the development of estimates for the likely materials requirements for the Scheme, and the volumes and types of waste that could be generated; and

c. the outcomes of further desk-based studies undertaken to establish the baseline conditions associated with materials and waste, and to inform the identification of the likely significant effects of the Scheme.

11.3.5 The assessment has been informed by the outcomes of an Excavated Material Options Study (see Appendix 11.1[**TR010027/APP/6.3**]), which has been undertaken to identify potential off-site locations suitable for the management of surplus excavated materials generated from construction of the Scheme.

11.3.6 As recorded within the scoping opinion [REF 11-16], material use and waste generation is expected to be very small during the operational phase of the Scheme. The consideration of effects associated with raw material extraction and manufacture, and the effects of waste arising during operation of the Scheme, have been scoped out of the assessment on the basis that the scale of such activities would be unlikely to generate significant effects.

11.3.7 Consideration was given to the activities associated with the future maintenance and management of the Scheme, and whether these have the potential to result in significant effects in relation to materials and waste. Following a review of the maintenance activities presented in Chapter 3 The project, it was concluded that these would be associated with routine and/or periodic operations, for example resurfacing, litter picking and gully cleaning. Waste arising from these activities is expected to be comparable (in both type and quantity) to that already generated across the existing road network, the management of which would be undertaken in accordance with established maintenance and management procedures. Accordingly, the effects associated with this phase of the Scheme were scoped out of the assessment as being unlikely to be significant, and are not considered further.

Assessment guidance

11.3.8 The following guidance has been used to inform the scope and content of the assessment, and to assist the identification and mitigation of likely significant effects. This builds upon the overarching EIA methodology and guidance presented in Chapter 5 EIA methodology and consultation.

Design Manual for Roads and Bridges: Volume 11

11.3.9 This assessment has applied the general assessment principles set out in Design Manual for Roads and Bridges (DMRB): Volume 11, Section 2, Part 1 – General Principles and Guidance of Environmental Impact Assessment [REF 11-17].

Design Manual for Roads and Bridges: Interim Advice Note 153/11

11.3.10 Guidance contained within Interim Advice Note (IAN) 153/11: Guidance on the environmental assessment of material resources [REF 11-18] has been applied in the assessment, which has focused on assessing effects relating to:

a. the use of material resources during construction of the Scheme, including primary, secondary, recycled and manufactured materials; and

b. the generation and management of waste during construction of the Scheme, including existing site materials associated with demolition waste or excavated materials from earthworks, and materials brought on to site but not used for the original purpose (for example off cuts, damaged or surplus materials).

11.3.11 The scoping report [REF 11-15] recorded that the assessment should be progressed to a 'simple' level of detail in line with IAN 153/11 [REF 11-18] guidance. However, due to the high construction value and complex nature of the Scheme, it was established part way into the assessment that a 'simple' level assessment would not adequately identify all potentially significant effects of the Scheme or any mitigation measures required. A decision was therefore made to progress the assessment to a 'detailed' level.

Establishment of the baseline conditions

11.3.12 Establishment of the baseline environment has involved a review of the data and information sources presented within Section 11.6, with reference made to the information requirements for material resources and waste set out within the assessment criteria presented within **Table 11.1**.

Magnitude of impact and significance criteria

11.3.13 The magnitude of material resource impacts and the significance of their effects have been assessed by:

a. estimating the likely types and quantities (where appropriate to the assessment) of the main materials that would be required during construction;

b. estimating the likely proportion of non-hazardous construction and demolition waste arisings that would be recovered;

c. estimating the proportion of reused, recycled or secondary aggregate that would be imported to site for use during construction;

d. comparing the likely waste recovery rate and proportion of reused, recycled or secondary aggregate to the relevant national targets; and

e. identifying any direct impacts on mineral safeguard sites or peat resources within the Scheme's Order Limits.

11.3.14 The magnitude of waste impacts and the significance of their effects have been assessed by:

a. establishing the baseline for landfill capacity in the region in proximity to the Scheme;

b. estimating the likely types and quantities of waste that would be generated during construction;

c. estimating the recovery rates likely to be achieved for each waste type and the quantity of waste that may require off-site management or disposal;

d. comparing the likely waste arisings and the quantity requiring off-site disposal to the baseline landfill capacity and assessing the likely impact on that capacity; and

e. identifying any direct impacts on waste management infrastructure within the Scheme's Order Limits.

11.3.15 In relation to the above, estimates were quantified for the following aspects of the Scheme and its construction:

a. the types and quantities (where appropriate to the assessment) of materials required for the Scheme;

b. details of the sources of materials (where appropriate to the assessment);

c. the cut and fill balance;

d. the types and quantities of forecast waste arisings from the Scheme;

e. waste that requires storage on site prior to reuse, recycling or disposal;

f. materials and wastes to be pre-treated on site for reuse within the Scheme;

g. materials and waste requiring treatment and/or disposal off-site; and

h. the impacts that may arise from the issues identified in relation to materials and waste.

11.3.16 The assessment also identified and considered waste management infrastructure in proximity to the Scheme, specifically their capacity to accept construction waste for disposal.

11.3.17 The criteria used for assessing the magnitude of impacts and the significance of effects are detailed within **Table 11.1**.

Table 11.1: Magnitude of impact and significance of effect criteria for material resources and waste

Magnitude of impact	Significance of effect	Material resources criteria	Waste criteria
Neutral	Not significant	The Scheme achieves >99% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste (CDW), (excluding naturally occurring materials with Waste Code 17 05 04) to substitute use of primary materials; and aggregates required to be imported to site comprise >99% (by weight) reused, recycled or secondary content.	No reduction or alteration in the capacity of waste infrastructure at a regional scale.

Magnitude of impact	Significance of effect	Material resources criteria	Waste criteria
Slight	Not significant	The Scheme achieves 70-99% overall material recovery / recycling (by weight) of non-hazardous CDW (excluding naturally occurring materials with Waste Code 17 05 04) to substitute use of primary materials; and aggregates required to be imported to site comprise reused, recycled or secondary content in line with the relevant regional percentage target (by weight).	≤1% reduction or alteration in the regional capacity of waste infrastructure; and waste infrastructure has sufficient capacity to accommodate waste from the Scheme, without compromising the integrity of the receiving infrastructure (design life or capacity) within the region.
Moderate	Significant	The Scheme achieves <70% overall material recovery / recycling (by weight) of non-hazardous CDW (excluding naturally occurring materials with Waste Code 17 05 04) to substitute use of primary materials; and aggregates required to be imported to site comprise reused, recycled or secondary content below with the relevant regional percentage target (by weight).	>1% reduction or alteration in the regional capacity of waste infrastructure as a result of accommodating waste from the Scheme; and 1-50% of waste from the Scheme requires disposal outside of the region.
Large	Significant	The Scheme achieves <70% overall material recovery / recycling (by weight) of non-hazardous CDW (excluding naturally occurring materials with Waste Code 17 05 04) to substitute use of primary materials; and aggregates required to be imported to site comprise <1% (by weight) reused, recycled or secondary content; and the Scheme sterilises ≥1 mineral safeguarding site and/or peat resource.	>1% reduction or alteration in the regional capacity of waste infrastructure as a result of accommodating waste from the Scheme; and >50% of waste from the Scheme requires disposal outside of the region.
Very Large	Significant	No additional criteria.	>1% reduction or alteration in national capacity of waste infrastructure as a result of accommodating waste from the Scheme; or the Scheme would require new (permanent) waste infrastructure to be constructed to accommodate waste.

11.4 Assessment assumptions and limitations

Scheme design and limits of deviation

11.4.1 The assessment has been based on the Scheme description detailed within Chapter 3 The project, and has taken into account the lateral and vertical limits of deviation defined on the Works Plans [**TR010027/APP/2.3**] in order to establish a realistic worst case assessment scenario.

11.4.2 This scenario has identified and reported the effect that any lateral and vertical deviation would realistically give rise to. The material calculations and estimates have, for example, taken into account the potential for earthwork slopes to be modified slightly during the detailed design stage, and thereby alter the total quantity/volume of materials required in their construction.

11.4.3 Notwithstanding any potential deviation, all mitigation measures incorporated into the design of the Scheme, as described in Section 11.8, would still be deliverable within the limits of deviation and would still fulfil their intended function.

Warwickshire Gaelic Athletic Association

11.4.4 Using professional judgement, the illustrative reconfiguration design options for the Warwickshire Gaelic Athletic Association facility presented in **Figure 3.5a** to **3.5e [TR010027/APP/6.2]** were appraised to take account of the variation in the physical extents, pitch layout, buildings, fencing and lighting provision across the options.

11.4.5 The objective of the appraisal was to identify whether one option would potentially give rise to different effects than another, in order to then identify the worst case for the purposes of the assessment presented within this chapter.

11.4.6 The appraisal concluded that the design variation between the options would not be of a level that would result in different types or significance of effect in relation to material assets and waste management.

Baseline data

11.4.7 This assessment has been based on available construction information and phasing details provided by Highways England's appointed buildability advisor, as presented within Chapter 3 The project.

11.4.8 Information on the current permitted regional and national landfill capacity, and inputs to landfill, is provided in **Table 11.2** and **Table 11.4**. There is no available collated and published information on any potential changes to this permitted capacity by the time that construction of the Scheme is planned (year 2020 to 2023).

11.5 Study area

11.5.1 The study area for material resources used in the construction of the Scheme, and for the consideration of the potential sterilisation of mineral safeguard sites and/or peat resources, comprises the extents of the Scheme's Order Limits.

11.5.2 The study area for waste arising from the construction of the Scheme also comprises the area defined by the Scheme's Order Limits.

11.5.3 The study area for waste management comprises the wider region within which waste management infrastructure is located and is defined based on professional judgement and informed by consideration of the proximity principle and value for money. The study area comprises the West Midlands region and the bordering counties within the East Midlands region (comprising Northamptonshire, Leicestershire and Derbyshire). These extents have been defined on the basis that the location of the Scheme falls within the eastern part of the West Midlands region, and therefore waste arising from the construction of the Scheme could potentially be managed by facilities in either region.

11.6 Baseline conditions

Material resources

11.6.1 The baseline target for the recovery of non-hazardous construction and demolition waste is at least 70% by 2020, as set out in the EWFD [REF 11-2], as transposed by the Waste (England and Wales) Regulations 2011 [REF 11-1] (as amended), and the Waste Management Plan for England [REF 11-3].

11.6.2 Uncontaminated excavated soil and stones (Waste Code 17 05 04) are specifically excluded from this target.

11.6.3 The baseline target for alternative aggregate materials (comprising secondary aggregates recovered from industrial and mining operations, and recycled aggregates produced from inert waste) are set out in the National and Regional Guidelines for Aggregates Provision in England 2005 to 2020 [REF 11-9]. These are summarised in **Table 11.2**, and the relevant target for the Scheme is the 27% guideline for the West Midlands region.

Table 11.2: National and regional guidelines for aggregates provision

Region	Total aggregate provision (million tonnes)	Alternative materials targets (secondary and recycled aggregates)
East	382	31%
East Midlands	784	14%
London	197	48%
North East	193	26%
North West	392	30%
South East	502	26%
South West	656	22%
West Midlands	370	27%
Yorkshire & The Humber	431	31%
England (total)	**3,908**	**25%**

11.6.4 The Mineral Products Association [REF 11-19] estimated that sales of aggregates in Great Britain in 2017 totalled 250.5 million tonnes, of which 74.4 million tonnes (30%) were recycled and secondary aggregates.

11.6.5 The Solihull Local Plan [REF 11-10] defines a mineral safeguard area/area of search on land bounded by the M42 motorway to the west, the A452 to the north east, and the A45 and East Way to the south. The Solihull Local Plan Review [REF 11-11] retains the mineral safeguard area/area of search but also identifies this area, plus the area bounded by the A45 and East Way, as a preferred option for mixed use development in line with the development of High Speed 2 railway and interchange station.

11.6.6 The British Geological Survey's Geoindex Onshore [REF 11-20] does not identify any peat resources located within Scheme's Order Limits.

Waste

11.6.7 There are no existing waste management facilities located within the Scheme's Order Limits.

11.6.8 The Solihull Local Plan [REF 11-10] and the Solihull Local Plan Review [REF 11-11] do not identify any existing or proposed areas for waste management facilities within the Scheme's Order Limits.

11.6.9 One waste management facility (Bickenhill Household Waste Recycling Centre) is located immediately to the east of the Scheme's Order Limits, south of the A45 Coventry Road.

11.6.10 The Environment Agency's waste management data for England 2017 [REF 11-21] provides the most recent collated and published information on the remaining permitted landfill capacity and waste disposed of in landfill in 2017. Data for the West Midlands region and the bordering counties within the East Midlands region (comprising Northamptonshire, Leicestershire and Derbyshire) and for England is summarised in **Table 11.3** and **Table 11.4**.

Table 11.3: Remaining permitted landfill capacity in 2017 ('000s m^3)

Landfill type	West Midlands region	East Midlands region(1)	West Midlands and East Midlands total(1)	England
Hazardous Merchant	0	948	948	18,759
Hazardous Restricted	535	0	535	708
Non Hazardous with SNRHW cell(2)	10,010	18,072	28,082	82,855
Non Hazardous	32,360	3,616	35,976	168,597
Non Hazardous Restricted	108	0	108	25,784
Inert	14,377	4,476	18,854	125,182
Total	**57,390**	**27,112**	**84,502**	**421,884**

(1) The East Midlands region comprises data from Northamptonshire, Leicestershire and Derbyshire only.
(2) Some non-hazardous sites can accept some Stable Non Reactive Hazardous Wastes (SNRHW) into a dedicated cell, but this is usually a small part of the overall capacity of the site)

Table 11.4: Landfill inputs in 2017 ('000s tonnes)

Landfill type	West Midlands region	East Midlands region[1]	West Midlands and East Midlands total[1]	England
Hazardous Merchant	0	144	144	501
Hazardous Restricted	0	0	0	21
Non Hazardous with SNRHW cell[2]	1,719	661	2,380	7,565
Non Hazardous	1,370	975	2,345	20,074
Non Hazardous Restricted	0	0	0	306
Inert	2,954	1,900	4,854	16,951
Total	**6,043**	**3,680**	**9,723**	**45,419**

(1) The East Midlands region comprises data from Northamptonshire, Leicestershire and Derbyshire only.
(2) Some non-hazardous sites can accept some Stable Non Reactive Hazardous Wastes (SNRHW) into a dedicated cell, but this is usually a small part of the overall capacity of the site.

11.6.11 The data within **Table 11.3** and **Table 11.4** does not include waste received by closed landfills for restoration purposes.

Future baseline

11.6.12 There is no published information on any potential changes to the regional or national permitted landfill capacity for the period within which the Scheme would be constructed.

11.6.13 Accordingly, the current baseline is assumed to apply between the planned commencement of Scheme construction (year 2020) through to its opening (year 2023).

11.7 Potential impacts

Construction

11.7.1 Construction of the Scheme is likely to result in the following impacts on material assets and waste:

a. impacts to the availability and use of reused, recycled and secondary aggregate materials; and

b. impacts from on-site generated materials (e.g. excavated materials and soils) and waste arisings on the existing capacity of waste management infrastructure.

11.8 Design, mitigation and enhancement measures

11.8.1 The Scheme has been designed, as far as possible, to avoid and minimise impacts and effects relating to material assets and waste through the process of design-development (see Chapter 4 Scheme history and alternatives), and by embedding measures into the design of the Scheme.

11.8.2 A number of standard measures have been identified, which would be implemented by the Contractor to reduce the impacts and effects that construction of the Scheme would have on material assets and waste.

11.8.3 No additional mitigation measures over and above measures identified in the following sections would be required to reduce the significance of effects reported in Section 11.9, and no compensation or enhancement measures have been identified as being required.

Embedded mitigation measures

11.8.4 The design of the Scheme, and the planned approach to its construction, have been developed to achieve efficiencies in materials and waste, the main objectives being to reuse and recycle site-won materials on-site wherever possible, to minimise the need to import construction materials to site, and to reduce the quantity of waste to be exported off-site.

11.8.5 The following principles have been considered when designing the Scheme and developing the approach to its construction (see Chapter 3 The project):

a. reuse of excavated materials and the recycling of demolition materials within the Scheme;

b. managing waste in accordance with the waste hierarchy, with a focus on designing-out and preventing waste arising where possible, and diverting waste from landfill through off-site recycling and recovery; and

c. using other recycled and secondary materials during construction, where practicable.

11.8.6 The retention of existing highways infrastructure within the design at the following locations formed a key consideration in the design-development process (see Chapter 4 Scheme history and alternatives), which has accordingly avoided the need to demolish and remove components that would have contributed to the total materials and waste generated by the Scheme:

a. East Way bridge structure – this structure was originally identified for demolition and replacement within the design presented at the Preferred Route Announcement stage; however, further design work concluded that this could be retained and accommodated within the Scheme design;

b. Clock Interchange – by undertaking widening and junction modifications, the design has retained the existing form and layout of the interchange and has avoided the need to replace this with a new junction configuration; and

c. M42 motorway – works required along the M42 motorway, north and south of M42 Junction 6, include the retention of several existing overhead gantries and emergency refuge areas.

11.8.7 The Scheme has been designed to facilitate the reuse, where possible, of acceptable material arisings from earthworks cuttings and other excavations. These include materials won from the earthworks to position the mainline link road in cutting, which would be utilised to form the earthwork embankments for M42 Junction 5A and Barber's Coppice Roundabout.

11.8.8 The design of the Scheme includes earthworks that are predominantly of 1 in 2.5 and 1 in 3 gradient, the narrower footprint of which has reduced the volume of materials generated from cuttings and that required to form embankments. Earthworks comprising soil nailing have also been incorporated into the design at specific locations, further reducing the need for excavations.

11.8.9 Underpass structures incorporated into the design of the Scheme have been designed to be precast, in order to minimise waste generated on site.

11.8.10 In calculating the overall quantities of materials and waste for the Scheme, the approach to construction incorporates the on-site reuse or recycling of approximately 75% of the total hard demolition arisings, comprising concrete, brick and block and asphalt planings generated from the required demolition of an existing building, bridge and sections of road, and aggregates from temporary works. These materials would be used within the Scheme for ground improvements, within sub-bases, and for temporary works, and would be processed on-site. Approximately 25% of hard demolition arisings are expected to arise at the end of the construction programme and these materials are expected to be recycled on-site or off-site for subsequent use off-site on the open market. A small proportion (approximate 5%) of hard demolition arisings are expected to be unsuitable for recovery.

Standard mitigation measures

11.8.11 The Outline Environmental Management Plan (OEMP) [**TR010027/APP/7.2**] details the measures that would be undertaken during construction of the Scheme to mitigate effects relating to material assets and waste, and sets the following performance targets for material resources and waste:

a. at least 27% (by weight) of aggregates imported to site for use within the Scheme should comprise reused, recycled or secondary aggregates, for those applications where it is technically and economically feasible to substitute these alternative materials for primary aggregates; and

b. recovery of at least 70% (by weight) of non-hazardous construction and demolition waste (excluding naturally occurring materials with Waste Code 17 05 04).

11.8.12 The OEMP [**TR010027/APP/7.2**] contains a framework SWMP which has been prepared to facilitate good practice in material resources and waste management. This includes the following measures and procedures for the storage, handling and management of material resources and waste (including hazardous waste) that would be implemented by the appointed Contractor throughout the construction period:

a. the damping down of surfaces during spells of dry weather and brushing/ water spraying of heavily used hard surfaces/access points across the site as required;

b. the burning of waste or unwanted materials would not be permitted on-site;

c. all hazardous materials including fuels, chemicals, cleaning agents, solvents and solvent containing products to be properly sealed in containers at the end of each day prior to storage in appropriately protected and bunded storage areas;

d. all demolition and construction workers would be required to use appropriate personal protective equipment whilst performing activities on-site;

e. any waste effluent would be tested and, where necessary, disposed of at a correctly licensed facility by a licensed specialist contractor(s); and

f. materials requiring removal from the site would be transported using licensed carriers, and records would be kept detailing the types and quantities of waste moved and the destinations of this waste, in accordance with the relevant regulations.

11.8.13 Construction of the Scheme would be subject to measures and procedures defined within a Construction Environmental Management Plan (CEMP). The CEMP would be produced prior to the commencement of construction by the appointed Contractor and would be based on, and incorporate, the requirements of the OEMP [**TR010027/APP/7.2**] and other industry standard practice and control measures, including the approach to waste management on site.

11.8.14 The CEMP would require that the appointed Contractor is competent in the storage, handling and management of material resources and waste. The Contractor would be responsible for ensuring compliance with all legal requirements, both on-site and off-site, including Duty of Care.

11.8.15 The CEMP would require the appointed Contractor to adopt good practice in construction material resources and waste management through the implementation of the following approaches, where practicable, to minimise the quantity of waste arising and requiring disposal:

a. implementing agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme;

b. implementing a ‘just-in-time’ material delivery system to avoid materials being stockpiled, which can increase the risk of damage and subsequent disposal as waste;

c. reviewing material quantity requirements to avoid over-ordering and the generation of waste materials due to surplus;

d. the reuse of materials on-site wherever feasible, for example the reuse of excavated soil for landscaping, recycling of demolition materials into aggregates;

e. undertaking off-site prefabrication, where practical, including the use of prefabricated structural elements;

f. the segregation of waste at source, where practical, to facilitate a high proportion and high quality recycling; and

g. the off-site reuse, recycling and recovery of materials and waste where reuse on-site is not practical, for example through use of an off-site waste segregation or treatment facility or for direct reuse or reprocessing off-site

11.8.16 The CEMP would include a SWMP based on the content of the framework SWMP contained within the OEMP [**TR010027/APP/7.2**], which would set out a procedure for recording forecast and actual performance against the above targets in order to confirm the assessment.

11.9 Assessment of likely significant effects

11.9.1 The prediction of impacts and the assessment of effects has taken account of the embedded and standard mitigation measures identified within Section 11.8.

Construction

11.9.2 **Table 11.5** summarises the types of material resources that would be used and wastes that are likely to be generated during the construction of the Scheme.

Table 11.5: Estimated types of material resources required and waste arising from the construction of the Scheme

Activity	Material resources required for the Scheme	Waste arising from the Scheme
Site remediation/ preparation earthworks	Fill material for construction purposes. Primary/secondary/recycled aggregates for ground stabilisation. Topsoil and subsoil for landscaping and restoration.	Surplus excavated materials. Surplus topsoil and subsoil. Unsuitable and contaminated soils and excavated materials. Vegetation/wood from site clearance. Clearance of redundant highway infrastructure, including lighting columns, camera poles, emergency telephones, electrical cabinets, marker posts.
Demolition	Materials are not required for demolition works.	Waste arisings from the required demolition of existing buildings, infrastructure and structures, including: • asphalt planings; • concrete; • brick and block; • aggregates; • steel; • timber; and • other materials, from strip out of buildings and structures.
Site construction	Main construction materials including: • aggregates (including well graded materials, structural fill, pipe bedding and drainage media); • asphalt and bituminous materials; • in-situ cast concrete (structures and piles); • precast concrete products (structural components, kerbs, drainage pipes,	Packaging from materials delivered to site. Excess, offcuts and broken/ damaged construction materials. Existing highway infrastructure and technology removed during works. Construction worker wastes from offices and rest areas/canteens.

Activity	Material resources required for the Scheme	Waste arising from the Scheme
	chambers and channels); • structural steelwork (bridges and gantries); and • steel reinforcing bar (for reinforced concrete). Other construction materials and construction products including: • geotextile; • plastic pipework (drainage, filter drains, ducting); • timber (fencing, formwork); • safety barriers/road restraint system; • pedestrian guard rails and handrails; • traffic signs, road markings, road studs, lighting columns; • electrical distribution infrastructure (cable ducts, cable, chambers); • communications infrastructure (cable ducts, cable, chambers, equipment); • pavement tack coat; • steelwork corrosion protection; • waterproofing to concrete structures; • bridge bearings; • bridge expansion joints (high modulus asphaltic plug); and • storm water tanks.	Waste oils from construction plant.

11.9.3 The estimated main types and quantities of aggregate anticipated to be used during construction are shown in **Table 11.6**. For the proportion of aggregates required to be imported to site, an estimate of the likely recycled content (comprising reused, recycled or secondary materials) is shown.

Table 11.6: Estimated main types and quantities of aggregates used during the construction of the Scheme and likely proportion of recycled content

Material category	Material subcategory	Material density[1]	Quantity required for construction	Quantity to be imported to site[2]		Recycled content (% by weight)[3]
		(tonnes/ m^3)	m^3	m^3	tonnes	
Unbound aggregates	Type 1 aggregate	1.9	58,000	58,000	110,200	50
	Class 6F aggregate	1.9	44,000	11,000	20,900	50
	Structural fill (class 6N and 6I/6J)	1.9	26,000	26,000	49,400	50
	Filter drain material	2.2	20,000	20,000	44,000	0
	Drainage pipe bedding	2.2	2,500	2,500	5,500	0
Asphalt	Asphalt	2.4	49,000	49,000	117,600	25
In-situ concrete	In-situ structural concrete	2.4	17,000	17,000	40,800	16
Total			**216,500**	**183,500**	**388,400**	**32.5% (126,178 tonnes)**

(1) Data on the bulk density of materials has been used to convert quantities between volume (m^3) and weight (tonnes). Information on the typical bulk density of materials was sourced from WRAP's Designing Out Waste Tool for Civil Engineering [REF 11-22].
(2) Approximately 75% of the required Class 6F aggregate is assumed to be sourced through the on-site recycling of demolition materials.
(3) The estimated recycled content for each material is based on the "good practice" recycled content rates from WRAP's Designing Out Waste Tool for Civil Engineering [REF 11-23]. The total recycled content is calculated as a percentage by weight.

11.9.4 The main types and quantities of excavated materials estimated to arise during construction of the Scheme are shown in **Table 11.7**. This includes the estimated cut and fill balance and the surplus materials requiring management.

Table 11.7: Estimated main types and quantities of excavated materials arising and used during the construction of the Scheme

Earthworks material	Cut (m^3)	Fill (m^3)	Surplus (m^3)	Possible management route for surplus
Acceptable fill material	895,635	259,711	635,924	Off-site beneficial use or disposal (unknown location).
Unacceptable fill material	90,905	0	90,905	Off-site treatment, beneficial use or disposal (unknown location).
Topsoil	181,207	125,013	56,193	On-site or off-site permanent storage, reuse, recovery or disposal (unknown location).
Total	**1,167,747**	**384,724**	**783,022**	

11.9.5 A number of materials that would arise from the clearance of existing highway infrastructure during construction have been identified for off-site storage pending reuse, including lighting columns, camera poles, emergency telephones, electrical cabinets and marker posts. These materials are considered to be reused and do not become waste.

11.9.6 The estimated main types and quantities of waste arising during the construction of the Scheme and the potential management routes and recovery rates are presented in **Table 11.8**.

Table 11.8: Estimated quantities of waste arising during the construction of the Scheme (excluding excavated materials) including potential management routes and estimated recovery rates

Activity	Waste type	Waste classification	Waste density[1]	Quantity		Potential management route	Recovery rate (% by weight)[2]
			(tonnes/ m^3)	Tonnes	m^3		
Site remediation /preparation/ earthworks/ tunnelling	Vegetation and wood from site clearance	Non-hazardous	0.7	4,375	6,250	Off-site composting or other recovery.	90%
Demolition	Asphalt planings	Non-hazardous	2.4	52,367	21,820	Material recycled for use within the Scheme.	95%
	Concrete	Non-hazardous	2.4	3,134	1,306	Material recycled for use within the Scheme.	95%
	Brick and block	Non-hazardous	2.4	119	50	Material recycled for use within the Scheme.	95%
	Aggregates from temporary works	Non-hazardous	1.9	37,798	19,894	Material recycled for use within the Scheme where the construction programme allows. Part of the temporary works material is expected to arise at the end of construction. This surplus is expected to be recycled on-site or off-site for subsequent use off-site on the open market.	95%
	Timber	Non-hazardous	0.7	8	11	Off-site recycling or recovery.	90%
	Steel	Non-hazardous	7.85	507	65	Off-site recycling.	100%

Activity	Waste type	Waste classification	Waste density[1]	Quantity		Potential management route	Recovery rate (% by weight)[2]
			(tonnes/ m^3)	Tonnes	m^3		
Site construction	Aggregates/ inert	Non-hazardous	2.4	39	16	Off-site recycling or recovery.	95%
	Soil	Non-hazardous	1.44	4	3	Off-site reuse, recycling or recovery.	95%
	Timber	Non-hazardous	0.7	580	828	Off-site recycling or recovery.	90%
	Metals	Non-hazardous	7.85	276	35	Off-site recycling.	100%
	Plastic	Non-hazardous	1.4	183	131	Supplier packaging take back scheme for reuse, or off-site recycling, recovery or disposal.	80%
	Cardboard/ Paper	Non-hazardous	0.7	74	106	Supplier packaging take back scheme for reuse, or off-site recycling, recovery or disposal.	85%
	Food	Non-hazardous	1	3	3	Off-site recycling, recovery or disposal.	50%
	Office / Canteen	Non-hazardous	1	5	5	Off-site recycling, recovery or disposal.	50%
	Other	Non-hazardous	1	59	59	Off-site recycling, recovery or disposal.	50%
	Hazardous	Hazardous	1	11	11	Off-site recycling, recovery or disposal.	50%
Totals		**Non-hazardous**		**99,532**	**50,581**	**Total non-hazardous waste recovery rate**	**94.7%**
		Hazardous		**11**	**11**	**Total hazardous waste recovery rate**	**50%**

(1) Data on the bulk density of waste types has been used to convert waste quantities between weight (tonnes) and volume (m^3). Information on the typical bulk density of waste/materials was sourced from WRAP's Designing Out Waste Tool for Civil Engineering [REF 11-22]. Where data was not available, professional judgement was used.
(2) The estimated recovery rate for each waste type is based on the "good practice quick win" recovery rates published by WRAP [REF 11-23]. The total non-hazardous waste recovery rate is calculated as a percentage by weight.

Material resources

11.9.7 The Scheme would set a target of 27% for the use of recycled and secondary aggregates, for those applications where it is technically and economically feasible to substitute these alternative materials for primary aggregates. This target is in accordance with the regional guidelines for the West Midlands region.

11.9.8 The Scheme would be located in proximity to major urban areas, and therefore there is expected to be a good supply of alternative aggregate materials. The Mineral Products Association [REF 11-19] estimated that, in 2017, 30% of aggregate sales in Great Britain were recycled and secondary aggregates, and **Table 11.6** indicates that this target is likely to be achievable.

11.9.9 The magnitude of impacts relating to material resources are therefore assessed as being slight, resulting in an effect that is not significant.

11.9.10 By applying good industry practice to the management of the waste arising from the construction of the Scheme, it is anticipated that an overall recovery/recycling rate (by weight) of non-hazardous construction and demolition waste (excluding naturally occurring materials with Waste Code 17 05 04) of over 90% may be achieved, as shown in **Table 11.8**.

11.9.11 This exceeds the Government's target of 70% and the magnitude of impacts are therefore assessed as being slight, resulting in an effect that is not significant.

Excavated materials

11.9.12 Excavated materials, including acceptable fill materials and topsoil, would be used within the construction of the Scheme.

11.9.13 It is estimated that the construction of the Scheme would utilise approximately 260,000m^3 of site-won acceptable fill material and 125,000m^3 of site-won topsoil, as shown in **Table 11.7**. This material would be used in accordance with a Materials Management Plan, a framework for which is presented within the OEMP [**TR010027/APP/7.2**] prepared under the CL:AiRE Definition of Waste: Code of Practice [REF 11-24] and would not be classified as waste.

11.9.14 **Table 11.7** indicates that the construction of the Scheme is estimated to generate a surplus of excavated materials requiring alternative management arrangements. The total quantity of surplus excavated materials is estimated to be approximately 783,000m^3, comprising, 636,000m^3 of acceptable fill material, 91,000m^3 of unacceptable fill material and 56,000m^3 of topsoil.

11.9.15 As a worst-case scenario, if the surplus excavated materials are assumed to be disposed of to landfill, then the 783,000m^3 of material would utilise approximately 0.93% of the permitted regional landfill capacity (defined as the West Midlands region and the bordering counties within the East Midlands region), as indicated in **Table 11.3**, or 0.19% of the permitted landfill capacity in England.

11.9.16 The magnitude of impacts are therefore assessed as being slight, resulting in an effect that is not significant.

11.9.17 Off-site management routes for surplus excavated materials are currently unknown and will be the responsibility of the Contractor. As such, it is likely that off-site reuse or recovery options would be identified for part or all of the surplus excavated materials, thus further reducing the quantity requiring disposal in landfill.

11.9.18 The Excavated Material Options Assessment (see Appendix 11.1 [**TR010027/APP/6.3**]) identifies sites that may be able to utilise excavated materials for restoration or beneficial use.

Waste

11.9.19 Construction of the Scheme is expected to generate approximately 99,532 tonnes (50,581m^3) of non-hazardous construction and demolition waste, of which an estimated 26,571 tonnes (18,280m^3) is expected to require management off-site, as shown in **Table 11.8**.

11.9.20 Based on a worst-case assumption that all of the non-hazardous construction and demolition waste requiring management off-site is disposed of to landfill, then the 18,280m^3 of waste would utilise approximately 0.02% of the permitted regional landfill capacity (defined as the West Midlands region and the bordering counties within the East Midlands region) as shown in **Table 11.3**.

11.9.21 In practice a large proportion of waste from the Scheme is likely to be recycled or recovered rather than disposed of to landfill, as shown in **Table 11.8**, further reducing the overall quantity of waste for disposal.

11.9.22 The Scheme would result in less than 1% reduction or alteration in the regional capacity of waste infrastructure, and there is adequate disposal capacity within the region to accommodate all the waste from the Scheme (although in practice a high proportion of waste would be recycled or recovered rather than requiring disposal).

11.9.23 The magnitude of impacts are therefore assessed as being slight, resulting in an effect that is not significant.

11.9.24 In relation to the Bickenhill Household Waste Recycling Centre, the assessment has concluded that the Scheme would not impact the continued operation of this existing facility.

11.10 Monitoring

11.10.1 The assessment has recorded that no significant effects would arise from construction of the Scheme on material assets and waste. Accordingly, there would be no requirement to monitor the effects of the Scheme during this phase.

11.10.2 The OEMP [**TR010027/APP/7.2**] sets out monitoring to be undertaken during the construction of the Scheme to ensure that the embedded and standard mitigation measures are appropriately implemented.

11.11 References

REF 11-1	The Waste (England and Wales) Regulations 2011. The Stationary Office (2011). http://www.legislation.gov.uk/uksi/2011/988/contents/made
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REF 11-4	National Policy Statement for National Networks. HMSO (2014). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf
REF 11-5	National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2018). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf
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REF 11-8	National Planning Policy for Waste. Department for Communities and Local Government (2014). https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/364759/141015_National_Planning_Policy_for_Waste.pdf
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REF 11-13	Hazardous Waste (England and Wales) Regulations 2005. The Stationary Office (2005). http://www.legislation.gov.uk/uksi/2005/894/contents/made
REF 11-14	Environmental Protection Act 1990. The Stationary Office (1990). https://www.legislation.gov.uk/ukpga/1990/43/contents
REF 11-15	M42 Junction 6 Improvement Scheme: Environmental Impact Assessment Scoping Report. Highways England (2017). https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010027/TR010027-000016-M42%20Junction%206%20Improvement%20Scheme%20-%20EIA%20Scoping%20Report.pdf
REF 11-16	Scoping Opinion: Proposed M42 Junction 6 Improvement Scheme. Planning Inspectorate (2017). https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010027/TR010027-000013-42J6%20-20Scoping%20Opinion.pdf
REF 11-17	Design Manual for Roads and Bridges: Volume 11, Section 2, Part 1 – General Principles and Guidance of Environmental Impact Assessment. Highways Agency (2008). http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section2/ha20108.pdf
REF 11-18	Design Manual for Roads and Bridges: Interim Advice Note 153/11 Guidance on the environmental assessment of material resources. Highways Agency (2011). http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian153.pdf
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