A417 Missing Link
TR010056

6.4 Environmental Statement
Appendix 2.1 EMP Annex E
Materials Management Plan

Planning Act 2008

APFP Regulation 5(2)(a)
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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A417 Missing Link

Development Consent Order 202[x]

6.4 Environmental Statement
Appendix 2.1 EMP Annex E Materials Management Plan

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Annex E: Outline Materials Management Plan

1 Introduction

1.1 Purpose

1.1.1 This document forms Annex E of Appendix 2.1 Environmental Management Plan (EMP) (Document Reference 6.4). Annex E is a Materials Management Plan (MMP) for the A417 Missing Link scheme (the scheme). It has been prepared to describe how material resources would be managed in accordance with best practice requirements. The contractor would use this MMP as a framework for producing the second iteration MMP (construction stage) for use during the construction of the scheme.

1.1.2 Annex E Materials Management Plan is secured by environmental commitment MAW1 in the Register of Environmental Actions and Commitments (REAC). The REAC described in Table 3-2 of Appendix 2.1 EMP (Document Reference 6.4) presents an initial register which has been developed using information presented in the ES. The EMP and its associated Annexes will be updated by the contractor when preparing the EMP (construction stage) and then 'as required' as the scheme progresses.

1.1.3 The purpose of the MMP is to describe the procedures by which material resources would be managed during the construction of the scheme. This includes the re-use and handling of site won materials which should be managed in accordance with Contaminated Land: Applications in Real Environments (CL:AIRE) code of practice[1]. The MMP would be used to demonstrate how the contractors are adhering to the Definition of Waste: Code of Practice (DoW:COP)[1].

1.1.4 The contractor will take all reasonable steps to ensure that materials are handled efficiently and managed appropriately. Procedures would be adopted by the contractor during construction to control the use of materials and further reduce the impact. A DoW:COP verification report would be produced to ensure compliance with MMP and record material use.

1.1.5 This MMP is Annex E to Environmental Statement (ES) Appendix 2.1 Environmental Management Plan (Document Reference 6.4). A Site Waste Management Plan (SWMP) is provided as Annex H of ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4) which describes how waste would be managed in line with best practice requirements.

1.2 Structure of the Materials Management Plan

1.2.1 This MMP includes:

- Section 1: provides an introduction, description of the purpose of this document and roles and responsibilities in its implementation.
- Section 2: details the estimated quantities of earthworks materials expected to be generated by the scheme and the material resources required for construction.
- Section 3: outlines how materials will be assessed to confirm they are suitable for use in the scheme.
- Section 4: details procedures for the management and tracking of materials.

1.3 Project team roles and responsibilities

1.3.1 This MMP provides the framework to be used as a basis from which to develop the MMP (construction stage). The contractor would confirm exact roles and responsibilities, however, key likely roles and responsible are summarised in Table 1-1.

Table 1-1 MMP roles and responsibilities during construction

Position	Responsibility
Contractor Project Manager	• Approval for sign off of the MMP for the relevant phase of works. • Ensure that all controls specified within the MMP are implemented by employees and sub-contractors.
Contractor Environmental Manager	• Undertake site inspections to monitor compliance with the environmental licences/consents for the works and the measures within the MMP. • Ensure that the scheme complies with all environmental legislation, consents, objectives, targets and other environmental commitments, including those arising from the ES throughout the relevant project phase.
Contractor Site Materials and Waste Manager	EMP responsibilities: • review of relevant sections of the EMP • ensuring that all materials and waste elements of the EMP are complied with during construction • ensuring that the MMP is updated Overall responsibilities: • for implementing the MMP throughout the construction of the scheme • for implementing the SWMP throughout the construction of the scheme
Suitable Qualified Person registered under CL:AIRE	• Responsible for implementing the MMP throughout the construction of the scheme and ensuring this is compliant with the CL:AIRE Definition of Waste: Code of Practice.

1.4 Design decisions

1.4.1 Decisions made in the design stages of the scheme will impact on the quantity and types of materials used.

1.4.2 In general, the following measures would be implemented during the design and construction phases of the scheme, where technically, financially and environmentally practicable:

- design-out and prevent waste arising
- re-use excavated earthworks materials within the scheme
- recycle demolition materials arising from the construction of the scheme
- divert unwanted material from landfill through offsite recycling and recovery
- use recycled and secondary materials in the construction of the scheme

1.4.3 Construction of the scheme would require excavation in places to form cuttings for the highway and this material would then be used to form embankments. The design aims to balance these ‘cut and fill’ requirements as far as practicable.

1.4.4 Opportunities will be sought to maximise the use of site won materials through the re-use, recycling and recovery of site won materials in line with the requirements of the waste hierarchy[2].

1.4.5 The earthworks strategy and scheme design allow for the materials which would be excavated on-site, to be re-used at areas of the site where materials are required, for example, to blend new highway embankments into the existing topography. This avoids and reduces the amount of material that is required from off-site sources in some cases.

1.4.6 From preliminary design figures, the fill would amount to 1,520,137m^3 which would be won from the scheme. As such no borrow pits would be required.

1.4.7 During the detailed design stage and construction of the scheme, the contractor would make decisions with regarding to efficient material resource use and management and record those decisions appropriately as described in Section 4 of this MMP.

2 Estimate of material resources to be used

2.1 Overview

2.1.1 A variety of different materials would be required for the scheme. The scheme has been and, through detail design will continue to be, designed to reduce the volumes of both the waste materials generated and the imported construction materials, where practicable, by reusing or recycling the available existing materials within the scheme.

2.1.2 This MMP provides estimates of:

- the types and quantities of materials required for the construction of the scheme
- the types and quantities of earthworks materials arising during construction of the scheme and the likely cut and fill balance and surplus requiring alternative management

2.1.3 The contractor will review, update and monitor these estimates throughout the detailed design and construction stages of the scheme, and incorporate these updates in the MMP during delivery of the scheme.

2.1.4 The contractor will ensure that the final MMP is updated to reflect current legal requirements and the waste management practices of the scheme as necessary both prior to and during the construction works. The Contractor will ensure all required authorisations are obtained.

2.2 Material resources

2.2.1 The main types and quantities of construction materials required for the construction of the scheme have been estimated based on the preliminary design. This is shown in Table 2-1. The contractor would adopt good practice approaches to maximise the recycled content of material used in the scheme.

2.2.2 Materials would be imported for construction of the scheme, including pavement, concrete and manufactured products. The regional recycled aggregates target, outlined in Design Manual for Roads and Bridges (DMRB) LA 110 Material assets and waste standards, states that the recycled content target for alternative materials in the south-west is 22%.

2.2.3 The contractor will ensure that re-used, recycled and secondary aggregates imported to site comply with all relevant technical and regulatory requirements. Imported aggregates, asphalt, concrete and manufactured products will be sourced locally, where possible.

2.2.4 The estimated material resources required for the project and the quantities and sourcing of materials has been listed in Table 2-1.

Table 2-1 Estimated material assets required

Project Activity	Material resources required for the project	Quantities of material resources required	Additional information on material resources
Site construction:			
Earthworks	General fill, including earth embankments (mainline and side roads) and earth bunds	Total fill – 1,520,137m^3 Surplus earthworks – 65,945m^3	Sourced from material won on-site
Installation of pavement	Mainline (including sub-base, base, binder course and surface course)	Sub-base – 85,612m^3 Base – 38,567m^3 Binder – 17,074m^3 Surface (including re-surfacing) – 14,871m^3 (including re-surfacing existing)	Potential to re-use site won materials. If not suitable or due to programme requirements, material would be sourced from local suppliers
	Central reserve (including sub-base, binder course and surface course)	Sub-base – 2,104m^3 Binder – 833m^3 Surface – 550m^3	
	Asphalt and bituminous material	111,430m^3	
	Other concrete pavement, footpaths or maintenance access	41,391m^2	
Installation of manufactured products	Steel restraint systems	17,844m	Sourced from local/national suppliers, dependent upon material required
	Drainage	Concrete (ready mixed) – 159,783m^3 Concrete channels – 10,825m length New concrete kerb – 14,012m length Vertical concrete barrier – 5.5km length Concrete drainage pipes – 45,131m length Concrete chambers – 714 units Concrete gully – 588 units Concrete headwalls – 70 units Concrete culvert – 1km length	
	Traffic signs (varying in size from 0.5m^2 to 25m^2)	290 units	

Project Activity	Material resources required for the project	Quantities of material resources required		Additional information on material resources
	Road markings – laying – continuous lines, raised rib lines and ancillary lines	39,907m length		
	Road markings – laying – intermittent lines	21,610m length		
	Environmental barrier fencing	900m length		
	Timber post and rail fencing	11,504m length		
	Rubble masonry/Cotswold stone walling (to site perimeter)	11,061m length		
		Dimension	Length	
Structures	Bat underpass east of Fly-up	3m x 3m (dim	55m	Local batching plants. Majority of precast factories in the UK are situated in the Midlands. Steel composite likely to be sourced from a national supplier, closest availability would be Somerset or South Wales
	Grove Farm underpass	4m (h) x 8m (w)	-	
	Cotswold Way crossing	65m span	-	
	Gloucestershire Way crossing	37m	70m	
	B4070 mammal culvert	0.6m +	37m	
	Shab Hill junction underbridge	To be confirmed during detailed design	To be confirmed during detailed design	
	Shab Hill Junction mammal culvert	0.75m +	112m	
	Cowley overbridge	11m wide	48m	
	Stockwell overbridge	11m wide	48m	
	Mammal culvert south of Stockwell overbridge	0.6m +	58m	
	Soil nailing works	2,160m^2		
	Rock fall netting	4,480m^2		
	Rock catch walls	2 sections with total of 1.628km length of concrete wall (1.5m height)		

3 Earthworks materials

3.1 Earthworks balance

3.1.1 The scheme has been designed to reduce the quantity of imported construction materials, alongside reducing the quantities of waste taken off-site by re-using or recycling the available existing materials.

3.1.2 Opportunities will be sought to maximise the use of site won materials through the re-use, recycling and recovery of site won materials in line with the requirements of the waste hierarchy[2].

3.1.3 The preliminary scheme cut, fill and surplus quantities which arise from the earthwork figures are outlined in Table 3-1.

Table 3-1 Preliminary scheme design earthworks estimates

Zone	Cut (m^3)	Fill (m^3)	Surplus (m^3)
Zone A	38,358	12,597	25,761
Zone B	77,516	374,428	-296,912
Zone C	184,101	13,021	171,080
Zone D	910,797	854,856	55,941
Zone E	304,079	179,061	125,018
Zone F	71,232	86,175	-14,943
Totals	**1,586,082**	**1,520,137**	**65,945**

3.1.4 From preliminary design figures, the fill would amount to approximately 1,520,137m^3 which would be won from the scheme.

3.1.5 An earthworks surplus of 65,945m^3 has been identified as outlined in Table 3-1. This material is comprised of three types of material including clay, mudstone and limestone. Measures would be taken to reduce this excess material to the point that no surplus material will remain after the required cut and fill construction operations. These measures include:

- highway alignment changes to reduce cut volumes;
- changes to landscape earthworks cross section and slope design to utilise site-won materials through detailed design;
- changes to cut slope design and cross sections at locations in deep cutting to reduce cut volumes;
- utilisation of excavated limestone materials in pavement construction.

3.1.6 The use of excavated materials within the scheme will be undertaken in line with the CL:AIRE DoW:CoP[1] and these materials would not be classified as waste.

3.1.7 CL:AIRE is the current management organisation for the DoW:CoP and sets out good practice for the development industry to use when:

- assessing on a site-specific basis whether excavated materials are classified as waste or not
- determining on a site-specific basis when treated excavated waste can cease to be waste for a particular use
- describing an auditable system to demonstrate that this DoW:CoP has been adhered to.

3.1.8 From preliminary design figures, 800m3 of earthworks material is classified as contaminated unacceptable U2 material requiring off-site disposal. Therefore, as a percentage of the total cut, the scheme is estimated to have a 99.9% material earthworks recovery rate.

3.2 Classification of materials

3.2.1 The Contractor shall develop a specification for suitable material to be used in construction, in accordance with the Specification for Highway Works[3]. Where appropriate, testing should be undertaken during construction to confirm that the materials used meet the specification requirements.

3.2.2 Should off-site disposal in relation to site won materials be required, the material will be characterised in accordance with the Environment Agency's Technical Guidance WM3[4]. The management of such waste will be governed by the SWMP and relevant waste management legislation.

3.2.3 The scheme should re-use as much material as possible on-site and re-used material would be classified in accordance with the Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works, Series 600 Earthworks[5]. These are broadly classified as being acceptable or unacceptable for re-use as fill. Any material that does not meet this specification will be disposed of appropriately.

3.2.4 Estimated unacceptable materials (Class U1A, U1B and U2) are managed in the SWMP in Annex H of ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4).

3.2.5 The acceptability criteria (defined in Series 600 Earthworks specification) would be derived so the reused materials are suitable for their intended use and do not pose a significant risk to end site users or controlled water receptors. The earthworks specification would also set out a verification system ensuring that only materials found suitable for use would be classed as acceptable for construction works.

3.3 Land contamination

3.3.1 There is potential for unacceptable materials to be encountered during construction works due to levels of contamination. Details of areas of concern with respect to land contamination are presented in ES Chapter 9 Geology and soils (Document Reference 6.2). In addition, unexpected contamination may be encountered during construction.

Known areas of contamination

3.3.2 As noted in Section 3.2, the preliminary design includes 800m^3 of earthworks material classified as contaminated unacceptable U2 material requiring off-site disposal, based on the ground investigation undertaken.

3.3.3 The ground investigations and completed land contamination risk assessments have identified areas of concern with respect to measured concentrations of contaminants in either groundwater or soils. These areas of concern would be subject to a Tier 3: Detailed Quantitative Risk Assessment (DQRA) to confirm the risks, identify and delineate the sources and quantify the risks to identified receptors. Based on the results of the Tier 3: DQRA, a remediation strategy would be developed to permanently remove unacceptable risks, where required.

3.3.4 Remediation works, if required, would be undertaken during construction followed by a verification process set out in a remediation implementation and verification plan. Verification may involve monitoring or targeted investigations to confirm that the remediation works have achieved the objectives. On completion of the works, a verification report would be prepared. The remediation strategy, remediation implementation and verification plan and verification report would form part of the later iterations of the MMP and allow appropriate classification and management of contaminated materials.

Unexpected contamination

3.3.5 Areas of unexpected contamination may be encountered during construction. Therefore, a watching brief would be adopted to allow for appropriate management of contaminated materials to limit the risk to human health, controlled waters and allow for containment of contamination. An action plan would be developed to set out procedures and responsibilities and form part of the MMP. As a minimum the action plan should allow for assessment of encountered contamination in liaison with a suitably qualified land contamination specialist, revision of health and safety measures, identification of a designated storage area within the site compound, sampling and testing of the potentially contaminated materials part of materials classification process, verification process.

3.3.6 Management of made ground materials should also consider CIRIA C765[6] good practice site guide on management of asbestos in soil and made ground.

4 Materials management on site

4.1 Materials storage and segregation options

4.1.1 The contractor would store excavated soils and earthworks materials on site in stockpiles until required for use.

4.1.2 Demolition materials that are to be recycled for use onsite shall be separated at source and stored separately both before and after the recycling process.

4.1.3 Construction materials that are stored on site shall be in designated areas that are flat, accessible and secure in order to avoid damage or loss. Materials should be stored in appropriate conditions to avoid damage through, for example, water ingress, or vermin. Materials should be retained in their original packaging to protect them from damage.

4.2 Reporting and auditing

4.2.1 The effectiveness of the MMP (construction stage) depends upon the enforcement of its requirements on site by the nominated environmental manager and site materials and waste manager. Responsibility for the formal recording of material movements lies with the site materials and waste manager.

4.2.2 The contractor will maintain a record of all materials that come to site. The quantity of re-used, recycled and secondary aggregate should be recorded, alongside details of the supplier, the producing facility and records that demonstrate that the material meets all relevant technical and regulatory requirements. An example template for recording materials is provided in Table 4-1.

4.2.3 The contractor shall continually review the types of surplus materials being produced and amend the site set up to minimise wastage rates and maximise re-use or recycling.

Movement and Tracking Systems

4.2.4 The movement of materials within the site and between other development sites must be tracked throughout and evidence generated to provide an auditable trail. The tracking system must include:

- Annotated plans of the site identifying excavation areas, stockpile locations, any treatment areas and placement locations;
- inspection and testing procedures to verify materials are as anticipated from the site investigation information;
- tracking forms and control sheets to record the movement of materials, including delivery tickets if materials are moving between sites; and
- acceptance and testing procedures if materials are moving between sites.

4.3 Review of the MMP (construction stage)

4.3.1 The contractor shall update the MMP if there are any significant changes to the proposed type or quantities of materials required for construction of the scheme. The contractor shall review the MMP (construction stage) at least once every six months during the construction of the scheme to ensure that targets are being achieved and that realistic solutions are provided for unplanned events. These

reviews would involve the completion and submission of a monitoring report to relevant planning authority in an agreed format. Where undertaking works under the CIRIA CoP a verification report will be completed to demonstrate compliance.

4.4 Site inspections

4.4.1 The site manager or nominated deputy shall undertake a daily inspection of the construction areas including all areas used for materials management. Any issues shall be recorded in the daily log along with any corrective action taken.

Table 4-1 Materials imported to site

Material	Material density	Quantity required for construction	Quantity of imported to site		Supplier	Supplier facility	Recycled content
	(tonnes/m^3)	m^3	m^3	tonnes			(% by weight)

4.5 Training

4.5.1 The contractor will incorporate the MMP requirements into the site induction and provide on-site instruction of appropriate separation, handling, recycling, re-use and return methods to be used by all parties at all appropriate stages of the scheme.

4.5.2 The contractor will ensure that all personnel working on the site, including subcontractors, are inducted.

4.6 Best practice measures

4.6.1 The contractor will apply the principles of the waste hierarchy to ensure best practice on site and to achieve high levels of sustainability for the scheme.

4.6.2 The contractor would go beyond statutory compliance with best practice measures (BPM) set out in construction industry guidance to reduce the potential impacts from material resources. This may include, for example, guidance from the Crown Commercial Services (CCS), Waste & Resources Action Programme (WRAP) and CIRIA.

4.6.3 The contractor would adopt good practice in construction material resources management. The following approaches would be implemented, where practicable, to management material resources:

- agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme
- implementation of a ‘just-in-time’ material delivery system to avoid materials being stockpiled, which can increase the risk of damage and subsequent disposal as waste
- attention to material quantity requirements to avoid over-ordering and the generation of waste materials due to surplus
- re-use of materials onsite wherever feasible, e.g. re-use of excavated soil for landscaping, recycling of demolition materials into aggregates
- the materials would be sorted or processed and where necessary, treated. Where materials excavated on-site are initially unable to meet the re-use criteria, they would either be treated to make them suitable for use or, as a last resort, disposed off-site as waste;
- offsite prefabrication, where practical, including the use of prefabricated structural elements
- offsite re-use, recycling and recovery of materials where re-use onsite is not practical, e.g. through use of an offsite waste segregation or treatment facility or for direct re-use or reprocessing offsite

4.7 Supporting documentation

4.7.1 The following provides a list of the expected documentation requirements to support the completion of an MMP for the scheme:

- Invasive Species Management Plan
- Earthworks Strategy
- Land Contamination Management Strategy
- Remediation Strategy including a verification plan
- Earthworks Specification

- Cut/Fill requirements and earthworks movements plan
- Qualified Person Declaration
- Verification Report
- Soils Management Plan

4.7.2 The other supporting documentation referenced will be prepared separately and references incorporated into the MMP as regulator agreement is obtained. Material should not be excavated until agreement of the MMP from the Regulator has been obtained. The MMP will be reviewed and updated during detailed design of the scheme.

4.8 Summary

4.8.1 There is an intent to maximise the re-use of any materials won on-site for the construction of the scheme. There is a net surplus of materials with an intention to reuse these on site. Where residual materials arise, the contractor would be required to make arrangements for re-use through design and, if not, disposal.

References

[1] CL:AIRE. The Definition of Waste: Development Industry Code of Practice. Version 2. March 2011. Available at: www.claire.co.uk/projects-and-initiatives/dow-cop
[2] The Waste (England and Wales) Regulations 2011
[3] Manual of Contract Documents for Highway Works, Volume 1 - Specification for Highway Works.
[4] Environment Agency (May 2018) Waste Classification: Guidance on the classification and assessment of waste (1st Edition v1.1) Technical Guidance WM3. Accessed 17/02/2020 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/719394/Waste-classification-technical-guidance-WM3.pdf
[5] Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works, Series 600 Earthworks.
[6] CIRIA, Asbestos in soil and made ground good practice site guide, C765, 2017.