



NFDC/IDE

DEMOLITION AND
REFURBISHMENT

RESOURCE PROTOCOL



IN PARTNERSHIP WITH THE INSTITUTE
OF DEMOLITION ENGINEERS



National Federation of Demolition Contractors
Voice of the UK Demolition Industry

DRG 116: 2016

NFDC/IDE

DEMOLITION AND REFURBISHMENT RESOURCE PROTOCOL

INTRODUCTION

This guidance has been produced by the NFDC to help the demolition industry maximise the value of material resource recovered during the demolition and refurbishment process. The aim of this guidance is to provide information on the benefits of undertaking a pre-

redevelopment audit prior to demolition or refurbishment and how to carry out the audit to ensure all opportunities for the reuse and recycling of materials are realised. The guidance is aimed at construction clients, architects, surveyors, principal contractors,

waste management contractors and demolition contractors and is relevant to refurbishment projects, soft-strip activities and complete demolition projects.

NFDC WORKING GROUP

HOWARD BUTTON
Chief Executive NFDC

HOLLY PRICE
Keltbray Group

STEPHEN MCCANN JNR
NDTG

STUART ACCLETON
Erith Group





CONTENTS

Background	3
Definition of Waste	4
End of Waste	4
What Are Pre-Redevelopment Audits?	6
Why Should You Carry Out an Audit?	6
Planning For Pre-Redevelopment Audits	13
Summary	20
Glossary	21

NFDC/IDE

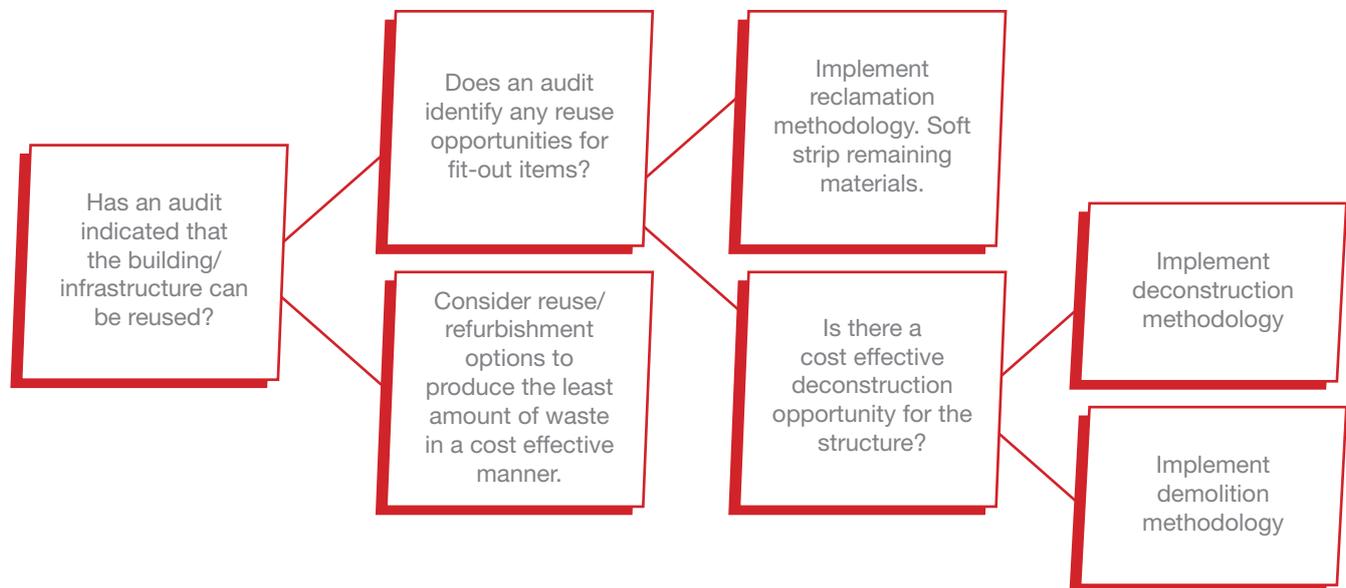
DEMOLITION AND REFURBISHMENT RESOURCE PROTOCOL

BACKGROUND

It is recognised that the demolition industry already recycle over 90% of materials produced during demolition and that over 50% of hardcore produced is reused on site¹. However, in order to maximise the value of materials present during refurbishment and/or demolition a detailed assessment of the amounts

and condition of these materials should be carried out to ensure opportunities for reuse and recycling are identified. The demolition industry may already prepare estimates of materials present in a building in order to help with costing and tendering for demolition projects. Enhancing these estimates

to produce a pre-redevelopment audit will help to improve reuse and recycling rates, minimise waste to landfill and so maximise the value of the resources present. The recommended process is shown in the flowchart below.



¹ NFDC recycling rate information from NFDC member survey.



DEFINITION OF WASTE

Waste is defined as:

Any substance or object which the holder discards or intends or is required to discard.

This definition has been in use for many years and is incorporated in the Waste Framework Directive (Directive 2008/98/EC, Article 3.1)².

Guidance on this definition has been produced by DEFRA³.

END OF WASTE

There are various situations when materials arising from construction and demolition activities are used to produce new products. If these materials meet the requirements of the EU End of Waste, then they are no longer considered waste. There are various ways of demonstrating that the requirements are met:

- Existing end-of-waste criteria are met. Currently these are in place for:
 - Iron, steel and aluminium scrap
 - Glass cullet
 - Copper scrap
- The end of waste test is met. This can be demonstrated by:
 - Complying with a quality protocol (see table 1)
 - Carrying out an end of waste test assessment and submitting to the appropriate agency. (In England this is done by submitting evidence to the Environment Agency either using the IsItWaste tool or using an end of waste submission form).

A summary of end-of-waste regulations and quality protocols relevant to the construction and demolition industry is shown in Table 1.

² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:EN:PDF>

³ Guidance on the legal definition of waste and its application Date: August 2012, Defra, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69590/pb13813-waste-legal-def-guide.pdf

⁴ http://ec.europa.eu/environment/waste/framework/end_of_waste.htm

NFDC/IDE

DEMOLITION AND REFURBISHMENT RESOURCE PROTOCOL

TABLE 1

Material	UK Wide / Regional	Guidance
Iron, steel and aluminium scrap	UK	EU End-of-waste criteria, Council Regulation (EU) No 333/2011 ⁵
Glass cullet	UK	EU End-of-waste criteria, COMMISSION REGULATION (EU) No 1179/2012 ⁶
Copper Scrap	UK	EU End-of-waste criteria, COMMISSION REGULATION (EU) No 715/2013 ⁷
Gypsum	England, Wales and Northern Ireland	Recycled gypsum from waste plasterboard: WRAP quality protocol ⁸
	Scotland	SEPA Policy Statement – Gypsum from Waste Plasterboard, 2010 ⁹
Inert waste	England, Wales and Northern Ireland	WRAP Quality Protocol: Aggregates from inert waste ¹⁰
	Scotland	SEPA Guidance, WST-G-033, 2013, Recycled aggregates from inert waste ¹¹
Flat glass	England and Wales	WRAP, The quality protocol for the production of processed cullet from waste flat glass ¹²
Soil	England and Wales (voluntary)	CL:AIRE (Contaminated Land: Applications in Real Environments), Definition of Waste: Development Industry Code of Practice (DoW CoP) ¹³
	Scotland	SEPA, Regulatory Guidance, Promoting the sustainable reuse of greenfield soils in construction, 2010 ¹⁴
	Northern Ireland	Northern Ireland Environment Agency (NIEA), Regulatory Position Statement, Guidance on the Regulation of Greenfield Soil in Construction and Development, 2015 ¹⁵

⁵ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011R0333&from=EN>

⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012R1179>

⁷ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0715>

⁸ http://www.wrap.org.uk/sites/files/wrap/Gypsum_Quality_Protocol_0.pdf

⁹ https://www.sepa.org.uk/media/154220/recycled_gypsum_from_waste_plasterboard.pdf

¹⁰ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296499/LIT_8709_c60600.pdf

¹¹ <https://www.sepa.org.uk/media/162893/production-of-recycled-aggregates.pdf>

¹² <http://www.wrap.org.uk/content/quality-protocol-production-processed-cullet-waste-flat-glass>

¹³ http://www.claire.co.uk/index.php?option=com_phocadownload&view=file&id=212&Itemid=230

¹⁴ https://www.sepa.org.uk/media/154233/reuse_greenfield_soils_construction.pdf

¹⁵ <https://www.doeni.gov.uk/sites/default/files/publications/doe/waste-guidance-regulation-greenfield-soil-construction-development-2015.pdf>



WHAT ARE PRE-REDEVELOPMENT AUDITS?

Pre-redevelopment audit is a generic term including pre-demolition and pre-refurbishment audits.

A pre-demolition audit is an assessment of the major elements in an existing building or structure (this may include foundations and landscaping) and their suitability for reuse or refurbishment. If reuse or refurbishment is not feasible, the audit will estimate the types and amounts of materials likely to arise from the demolition.

A pre-refurbishment audit is an assessment of the materials likely to be removed during refurbishment or strip-out of an existing building. For major refurbishment projects, this may include walls, staircases ceilings, etc. but audits can also be carried out on relatively simple fit-out projects such as shop-fitting. The audits will also include information about fixtures and fittings including furniture and IT equipment if present.

The audits can be carried out on

all types and sizes of buildings and infrastructure. As well as a breakdown of the types and amounts of materials likely to be produced, the audits should provide guidance on appropriate management routes for the building elements and materials in line with the waste hierarchy (reduce, reuse, recycle, recover, energy recovery, disposal).

WHY SHOULD YOU CARRY OUT AN AUDIT?

There are various reasons for carrying out a pre-redevelopment audit:

MAXIMIZING VALUABLE RESOURCES FROM DEMOLITION AND REFINISHMENT

The central aim of the audits is to provide contractors and clients with information to ensure that where possible materials are reused or recycled in order to obtain maximum value from these materials. Initially the clients and designers can use the audit results to assess which elements could be incorporated in the new design, then other options for reuse should be considered. An example of reuse of building elements is shown in Box 1¹⁶. Guidance on the options available for reuse of waste materials on and off site is provided in the NFDC waste and permitting guidance¹⁷. The NFDC have also produced a range of Demolition and Refurbishment Information Data Sheets (DRIDS) which provide information for various groups of materials. This includes information as to likely location, removal processes, waste management and health and safety legislation. These encourage demolition contractors to remove these materials and find the best management routes. Further guidance on resource management is available in the CIRIA Environmental good practice on site pocketbook¹⁸.

Box 1: Whole building reuse - Tata Steel

An example of reuse of a whole structure is the recent construction of a bus terminal in Amsterdam Schipol airport. The steel structure has previously been in use from 1958 to 2015 as an aircraft hangar at Rotterdam airport and prior to that was in use for several years as a hangar for the Royal Airforce in London.

¹⁶ Can and Should we build with End of life in mind, Bauke Bonnema, Tata Steel, World Steel Resource 2016, [http://www.asbp.org.uk/uploads/documents/resources/World%20Steel%20Resource%202016%20v2\[5\].pdf](http://www.asbp.org.uk/uploads/documents/resources/World%20Steel%20Resource%202016%20v2[5].pdf)

¹⁷ NFDC, waste and permitting guidance, 2012 edition

¹⁸ CIRIA, Environmental good practice on site pocket book, fourth edition, <http://www.ciria.org/ItemDetail?iProductCode=C762&Category=B00K&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91>

NFDC/IDE

DEMOLITION AND REFURBISHMENT RESOURCE PROTOCOL

COSTS

The landfill tax currently (March 2016) stands at £82.60 per tonne for non-inert waste with a lower rate of £2.60 for qualifying materials such as rocks and soils or concrete^{19 20}. A pre-redevelopment audit will help to identify resources which can be reused or recycled and advise how to divert waste from landfill which will help to reduce the costs of waste management. An assessment of landfill tax savings achieved by the demolition industry based on information provided by NFDC members¹ is shown in Table 2. This indicates that over £200M was saved during 2015 by diverting waste from landfill.

TABLE 2

Material	Tonnes diverted from landfill (reused or recycled)	Landfill tax £/tonne	Cost saving (£M)
Hardcore	21,122,058	2.6	54.9
Other materials (metal, timber, gypsum, insulation and mixed non-hazardous waste)	2,195,947	82.6	181.4
		TOTAL	236.3

In addition to savings in landfill tax, there are other costs savings from reusing or recycling materials on site. The transport costs of waste removal will be reduced and reusing material on site means that fewer new materials will be required thereby reducing development costs.

SITE WASTE MANAGEMENT PLANS/RESOURCE MANAGEMENT PLANS

A pre-redevelopment audit can help with the preparation of Site Waste Management Plans (SWMP) or Resource Management Plans (RMP). Although SWMP are no longer a legal requirement, they are often required by clients or as part of BREEAM and other environmental standard requirements. The NFDC DRIDS website includes an online tool to help with producing SWMPs. A Resource Management Plan (RMP) aims to promote resource efficiency during a construction project.

BREEAM

A pre-redevelopment audit will help with achieving the waste credits available in BREEAM schemes. Credits are available in both BREEAM New Construction and BREEAM Non-domestic Refurbishment and Fit-out schemes for carrying out a pre-demolition or pre-refurbishment audit, waste minimisation and diversion of waste from landfill. These are summarised in Table 3.

¹⁹ <https://www.gov.uk/government/publications/excise-notice-lft1-a-general-guide-to-landfill-tax/excise-notice-lft1-a-general-guide-to-landfill-tax#summary-of-the-landfill-tax-qualifying-material-order-2011>

²⁰ <https://www.revenue.scot/scottish-landfill-tax>



TABLE 3 - Overview of material resource efficiency impacts within BREEAM Schemes²³

Scheme	Relevant Criteria	Resource Efficiency Aspect
BREEAM New Construction 2014	Man03 Responsible Construction Practices	<ul style="list-style-type: none"> Use of reclaimed/reused timber (as part of legally harvested and traded timber)
	Wst01 Construction waste management	<ul style="list-style-type: none"> Where existing buildings are on site, a pre-demolition audit is required in order to achieve the waste minimisation credit (1 credit) Diversion of over 80% by volume or 90% by weight of demolition waste from landfill (1 credit)
	Wst02 Recycled aggregates	<ul style="list-style-type: none"> Use of recycled and secondary aggregates (1 credit)
BREEAM UK Refurbishment and Fit-out 2014, Non-domestic buildings	Man03 Responsible Construction Practices	<ul style="list-style-type: none"> Use of reclaimed/reused timber (as part of legally harvested and traded timber)
	Mat06 Material Efficiency	<ul style="list-style-type: none"> Optimising material efficiency through the design process which includes assessing whether existing elements can be reused
	Wst01 Project waste management	<ul style="list-style-type: none"> Pre-refurbishment audit (1 credit) Reuse and direct recycling of materials (up to 2 credits) Diversion of demolition materials from landfill (1 credit)
	Wst02 Recycled Aggregates	<ul style="list-style-type: none"> Use of recycled and secondary aggregates (1 credit)
BREEAM Refurbishment Domestic Buildings	Man03 Construction site impacts	<ul style="list-style-type: none"> Use of reclaimed/reused timber (as part of legally harvested and traded timber) Environmental materials policy including reuse of materials
	Mat02 Responsible sourcing of materials	<ul style="list-style-type: none"> Use of reclaimed/reused timber (as part of legally harvested and traded timber)
	Was02 Refurbishment Site Waste Management	<ul style="list-style-type: none"> Pre-refurbishment audit Diversion of non-hazardous demolition waste
BREEAM New Construction Infrastructure (Pilot)	Mat03 Reuse and recycling	<ul style="list-style-type: none"> Reuse of existing infrastructure on site based on pre-demolition audit (1 credit) Reuse and recycling of materials and elements (1 credit) Recycled aggregates (1 credit)
Home Quality Mark (Pilot)	Issue 18 Responsible sourcing of construction products	<ul style="list-style-type: none"> Use of reclaimed/reused timber (as part of legally harvested and traded timber)
	Issue 31 Site Waste	<ul style="list-style-type: none"> Pre-demolition audit Diversion of C&D waste from landfill

²³ <http://www.breeam.com/technical-standards>

NFDC/IDE

DEMOLITION AND REFURBISHMENT RESOURCE PROTOCOL

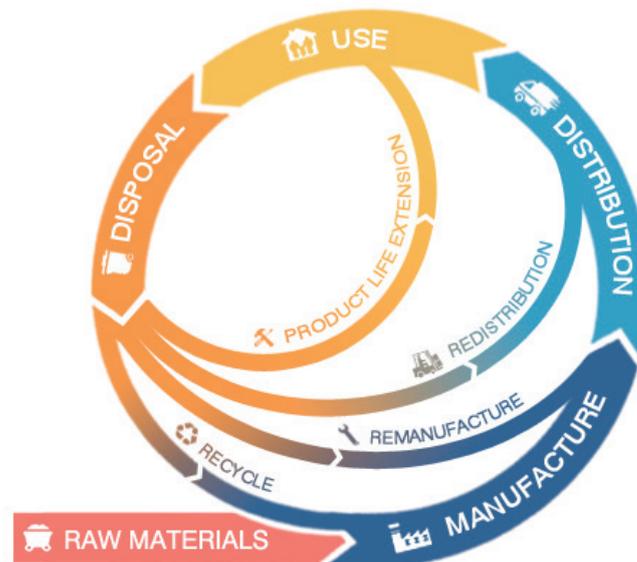
SKA

The SKA environmental assessment method is for non-domestic fit-out schemes and there are various good practice measures related to construction waste management. A pre-redevelopment audit will help to demonstrate achievement of these good practice measures.

PLANNING REQUIREMENTS

Pre-redevelopment audits may be required as part of the planning process or to demonstrate compliance with planning requirements. For example, in London, the Supplementary planning guidance of the London Plan states that 'Developers should maximise the use of existing resources and materials and minimise waste generated during the demolition and construction process through the implementation the waste hierarchy'²². A pre-redevelopment audit could be used to demonstrate that this guidance has been followed.

CIRCULAR ECONOMY



*Knowledge Transfer Network, Collaborations for a Circular Economy,
<https://connect.innovateuk.org/web/collaborations-circular-economy>*

A circular economy is an alternative to a traditional linear economy (make, use, dispose) aiming to use resources for as long as possible and at the end of the resources service life, it is recovered and used to produce products and materials. There is an increasing focus on working towards a circular economy model in the construction industry. The European Commission have adopted a Circular Economy Package which includes revised legislative proposals on waste. The package includes the EU Action Plan for the Circular Economy²³. For Construction and demolition there is an action to:

The Commission will take a series of actions to ensure recovery of valuable resources and adequate waste management in the construction and demolition sector, and to facilitate assessment of the environmental performance of buildings.

²² <https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/sustainable-design-and>

²³ Closing the loop – An EU action plan for the Circular Economy. http://eur-lex.europa.eu/resource.html?uri=cellar:8a8ef5e8-99a0-11e5-b3b7-01aa75ed71a1.0012.02/DOC_1&format=PDF



The demolition industry is a good example of a circular economy in some areas such as the management of inert material. A large proportion of inert material is reused on site or recycled to produce products for use on or off site. Other examples of the circular economy in the built environment are shown in Box 1. During a pre-redevelopment audit, opportunities to engage with these types of schemes should be highlighted.

DESSO CRADLE TO CRADLE CARPET TILES²⁴

Desso operates a take-back scheme for all types of carpet (except those containing PVC). The yarn and backing materials are separated and the yarn is manufactured into new fibres for carpets and the bitumen is reused in road and roofing industries. Other carpet manufacturers such as Shaw²⁵ and Interface²⁶ also offer take-back schemes to divert carpet from landfill

ARMSTRONG CEILING TILE RECYCLING²⁷

Armstrong offer an acoustical ceiling tile recycling programme for demolition, construction and renovation projects. Recycled materials are then used in the production of new tiles. In addition, Armstrong were the first ceiling tile manufacturer in Europe to obtain Cradle to Cradle® certification.

RECOFLOOR FOR VINYL FLOORING²⁸

Recofloor is a national vinyl take-back scheme which collects post-installation vinyl flooring and recycles it into new flooring.

IMPROVE MANAGEMENT OF “DIFFICULT” DEMOLITION MATERIALS

Carrying out a pre-redevelopment audit will help to identify where “difficult” demolition materials may be present. Difficult demolition materials are those that are difficult to recover due to their material composition, ease of removal, contamination or low value. They include products such as insulation or composite products containing ozone-depleting substances, smoke alarms, polystyrene fill, carpet underlay and Structural Insulated Panels (SIPs)²⁹. If the presence of difficult demolition materials is identified early, methods for removal and their management can be investigated.

ENVIRONMENTAL IMPACTS

Reusing and recycling material from demolition and refurbishment projects will help to reduce resource use which is particularly important in areas where resources may be scarce in future. For example, aggregates have been identified as a potential issue due to planning restrictions³⁰. Reusing materials will reduce the carbon impacts of a project by reducing the virgin material used and reducing transport impacts of materials deliveries.

²⁴ http://www.wrap.org.uk/sites/files/wrap/Desso%20WRAP%20case%20study%20FINAL_PF120806.pdf

²⁵ <http://www.shawcontractgroup.com/Html/EnvironmentalReclamationRecycling>

²⁶ http://www.interfaceafrica.net/web/our_services/tile_take_back

²⁷ http://www.armstrong.co.uk/commlgeu/eu1/uk/gb/environment_recycling_program.html

²⁸ <http://www.recofloor.org/about-us/>

²⁹ Dealing with difficult demolition wastes, A guide. Katherine Adams, Gilli Hobbs and Christopher Yapp, FB54, BRE, 2013. <http://www.brebookshop.com/details.jsp?id=327123>

³⁰ Resource Security Action Plan: Making the most of valuable materials, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69511/pb13719-resource-security-action-plan.pdf

NFDC/IDE

DEMOLITION AND REFURBISHMENT RESOURCE PROTOCOL

BENEFITS FOR CONTRACTOR

Overall, carrying out a pre-redevelopment audit will be beneficial to demolition contractors even if not required by the client. The audit will help with project planning and provide sustainability information to include in tenders. There will be also be financial benefits from diverting waste from landfill and maximising reuse and recycling.

PLANNING FOR PRE-REDEVELOPMENT AUDITS

TIMING OF AUDIT

Carrying out the pre-redevelopment audit as early as possible in the project will provide more opportunities for reuse of materials in the new development and allow time to find suitable reuse and recycling options for those materials that cannot be reused on site.

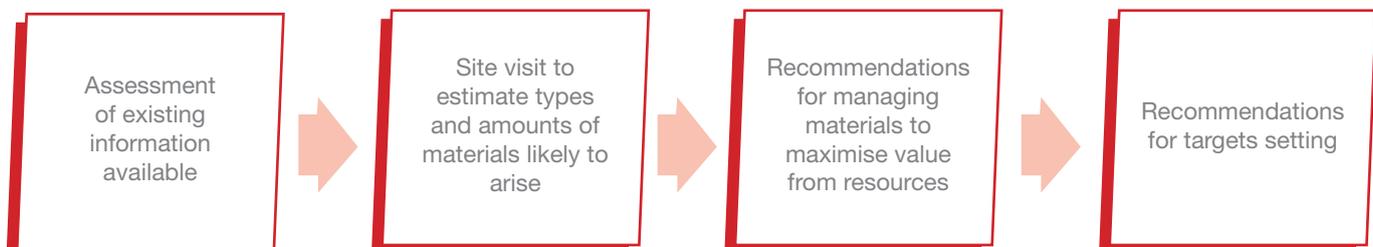
Where a site is being redeveloped or a building is to be refurbished, a client should commission a pre-redevelopment audit at the beginning of the project and use the audit results in the design for the new development. Ideally, the audit will be carried out at RIBA Plan of Work Concept Design Stage as recommended in BS 8895-2:2015 Designing for material efficiency in building projects³¹. If buildings are to be demolished before the redevelopment is planned the opportunities for reuse and recycling on site are limited. However, the pre-demolition audit should be carried out as early as possible to allow targets for reuse and recycling to be agreed with the demolition contractor.

AUDITOR REQUIREMENTS

The audit should be carried out by someone who is independent of the client or consultants appointed by the client (design team, project consultant, principal contractor). The auditor should have a basic understanding of construction and demolition processes and a good understanding of how materials are generated and available management options.

PRE-REDEVELOPMENT AUDIT PROCEDURE

The main steps of a pre-redevelopment audit are:



³¹ BS 8895-2:2015 Designing for material efficiency in building projects – Part 2: Code of practice for Concept Design and Developed Design, <http://shop.bsigroup.com/ProductDetail/?pid=000000000030296208>



ASSESSMENT OF EXISTING INFORMATION

Any existing information about the building to be refurbished or demolished should be reviewed. This could include; asbestos surveys, structural condition surveys, existing plans and photographs as well as any other information the building owners or clients may have.

In many cases where a pre-redevelopment audit is undertaken, an asbestos survey will already be available. Under the Control of Asbestos Regulations (2012) there is a 'duty to manage' asbestos and where the premises, or part of it, need upgrading, refurbishment or demolition an asbestos Refurbishment/ demolition survey is required³².

In some cases, particularly for refurbishment projects, a structural condition survey may have been carried out. This may include information about the construction of the building and the condition of those elements that are to be removed during the refurbishment project.

Plans of the existing building are usually available although these vary in detail. For demolition projects, the information from the plans can be quite limited and plans can often be outdated. For refurbishment projects, updated plans of the existing building are often prepared and there are also plans for the proposed project. These can be compared to identify what elements are to be removed as part of the refurbishment project.

All available information should be reviewed prior to the site visit to help understand the age of the building, the construction methods used and where more details are needed from the site visit. Reference to the information used should be made in the audit report.

SITE VISIT

The site visit should be carried out as early as possible in the project to ensure the information can be used in the design of any new development and maximise the resource available from the project. However, it is also preferable to visit the site when vacant to gather as much information as possible from all areas. If the building is still occupied and access is limited, additional information can be sought from the building owners or facility managers and this should be highlighted in the audit report.

Health and safety requirements:

- A method statement should be produced prior to the site visit. This should describe who will be carrying out the audit and how the audit will be done.
- A risk assessment should be prepared prior to the site visit to assess site specific risks. This will include an assessment of any risks highlighted by the asbestos survey and any other information provided by the person requesting the audit regarding hazardous materials or access constraints.
- A site induction should be provided to those carrying out the audit. This should be done by the person requesting the audit, the principal contractor or the building operator.
- Based on information in the risk assessment and the site induction, the appropriate person protective equipment (PPE) should be used. This is likely to include as a minimum hard hat, safety shoes and high-visibility jacket/vest but may also include other PPE required by the site induction.

³² <http://www.hse.gov.uk/asbestos/surveys.htm>

NFDC/IDE

DEMOLITION AND REFURBISHMENT RESOURCE PROTOCOL

AUDIT REPORT

The pre-redevelopment audit should include details of the types and amounts of materials present, recommendations for how these materials should be managed and targets.

Estimating types and amounts of materials:

- During a site visit, measurements of the elements present should be recorded with details about the type of material used and the condition of the material. This will include internal and external walls, floors, ceilings, staircases, windows, doors, lighting, fixtures and fittings as well as floor slabs, roofs, foundations, structural steel and hard landscaping.
- For a pre-refurbishment audit site visit, the existing and proposed plans should be used to identify the elements that are to be removed as part of the refurbishment project. These elements might include partition walls, staircases, ceilings, flooring, lighting, sanitaryware and heating and ventilation equipment. These should be measured and the type of material and condition of the material assessed.
- Information on fixtures and fittings including lighting, furniture and computer equipment should be recorded.
- Photographs should be taken where possible

Based on the measurements taken on site (or from detailed site drawings), the total volume of each element to be removed from the building should be calculated. These volume figures can then be converted to tonnages using conversion factors for the material types based on the density of the material or from product manufacturers. The total tonnage of each material type can then be calculated. An example of these calculations is shown in Table 4.

TABLE 4 - Example of element listing for pre-redevelopment audit

Element/ Component	Material	No.	Length (m)	Depth (m)	Height/ Width (m)	Actual Volume	Conversion factor (tonnes/ m3)	Tonnes	Comments
Stairs	Concrete	7	1.40	0.3	0.3	8.82	2.40	21.17	7 treads of 1.4 m long
External cladding	Steel	1	14.50	0.003	6.00	0.17	7.83	1.36	3 mm steel cladding
Column	Concrete	5	2.50	0.30	0.05	0.19	2.40	0.45	
External cladding support	Steel	16	14.5	0.00	0.05	0.03	7.83	0.27	Assume steel horizontals at each joint
External cladding insulation	Insulation	1	14.50	0.05	6.00	4.35	0.05	0.22	
Internal door	Timber	2	2.25	0.05	0.62	0.14	0.75	0.10	Doors in good condition
Windows	Glass	2	0.58	0.01	1.10	0.01	2.46	0.02	
Windows	Steel	1	11.80	0.05	0.003	0.002	7.83	0.01	
Windows	Glass	2	0.30	0.01	1.10	0.003	2.46	0.01	

The actual volumes of materials present can be used to help estimate the bulk volume to estimate the number and size of containers required to remove material from site.



Recommendations for material management

For each material, an assessment of the best management options in line with the waste hierarchy should be carried out based on the type, amount and condition of the material.

When considering reuse of materials, the condition and accessibility will also need to be considered to assess whether the value of the material justifies the effort taken to remove it from the building. There are various sources of information that can help with identifying the appropriate management method for the materials and provide information on the value of the materials:

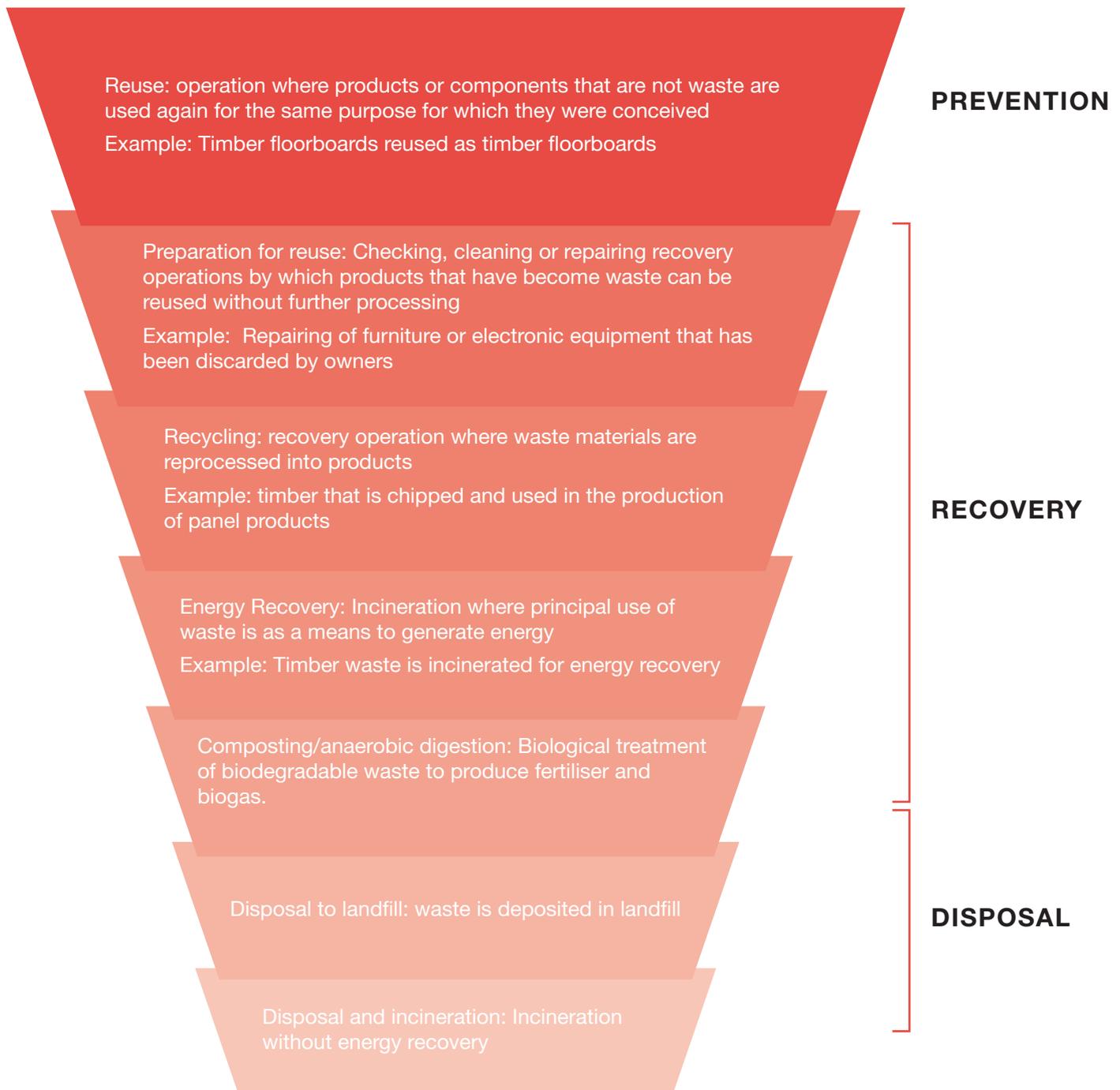
- Demolition and Refurbishment Information Data Sheets (DRIDS) for the materials present can be reviewed. These provide information about reuse, recycling and recovery options for the different materials.
- Resource Efficiency Action Plans (REAPs) which provide information about how to achieve improved resource efficiency and higher diversion of waste from landfill³³.
- Community reuse schemes such as the Community Wood Recycling³⁴ or local Community Resource Network
- Waste management contractors
- Reuse networks such as Salvo (www.salvo.co.uk) and Recipro (www.recipro-uk.com) can provide information on reuse opportunities and can be used to advertise materials for reuse.

³³ Resource Efficiency Action Plans, <http://www.wrap.org.uk/content/resource-efficiency-action-plans>

³⁴ <http://www.communitywoodrecycling.org.uk/>

NFDC/IDE

DEMOLITION AND REFURBISHMENT RESOURCE PROTOCOL



Recommendations for target setting

Based on the information about the amounts of materials present and the recommended management methods for these materials, targets can be set. These can include:

- Overall targets for diversion of material from landfill
- Targets for reuse on or off site in original form
- Targets for recycled on or off site
- Targets for specific material types

An example of targets for a project are shown in Table 5.

TABLE 5 - Example of targets for materials management

Material	% Reuse	% Recycled directly	% diverted from landfill (reuse, recycling, recovery and energy recovery)
Concrete	0	100	100
Bricks/blocks	0	100	100
Metal	0	100	100
Timber	25	25	100
Overall	No target set	No target set	93

Reporting of pre-redevelopment audits

To ensure maximum benefit from carrying out an audit it should be communicated to the appropriate people.

- Where audits have been carried out at an early stage of the project, the audit results should be made available to the client and design team so that opportunities for retaining materials on the project can be assessed.
- The audit information can be used by the client or principal contractor and demolition contractor to agree targets as part of the demolition contract.
- Information on the actual amounts of materials arising during the demolition stage of the project and how these materials were managed should be included in the SWMP or RMP. This information should be compared with the forecasts and recommendations to see whether targets for reuse, recycling and diversion from landfill have been achieved. If the targets have not been achieved, the reasons for this should be investigated.

NFDC/IDE

DEMOLITION AND REFURBISHMENT RESOURCE PROTOCOL

SUMMARY

A pre-redevelopment audit should be carried out at an early stage in the project (preferably by RIBA Plan of Work Concept Design Stage).

The audit will consist of:

- Site visit
- Assessment of types, amounts and conditions of materials
- Recommendations for managing these materials
- Recommendations for materials management targets

The results of the audit should be shared with:

- The client, designers and architects to ensure possibilities for reuse on site are investigated.
- the principal contractor.

Targets for materials management can be incorporated into contracts

The actual materials arising should be compared with those forecast and the amounts of materials reused, recycled and diverted from landfill should be compared with targets.

Any barriers to reuse and recycling should be investigated and this information used to inform future projects.



GLOSSARY

Circular economy: A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life.³⁵

Closed loop recycling: Reuse of a component following processing into the same component e.g. carpet tile take back scheme

Diversion of waste from landfill: Materials management options other than landfill

End-of-waste: EC Regulation to determine when materials are no longer considered to be a waste and waste controls will no longer apply

Energy recovery: Incineration of waste to provide energy

Landfill: Disposal of waste at registered landfill site

Open loop recycling: Reuse of the component following processing into a different component e.g. shredding of pallets to produce wood chips for particle board

Preparing for reuse: Cleaning, checking and repairing used products which have become waste so that they can be used again

Quality protocol: Explain when a waste derived material can be regarded as a non-waste produce and no longer subject to waste controls

Recovery: Includes preparing for reuse, recycling, energy recovery and other forms of recovery such as backfilling

Recycling: Reuse of a component following processing

Resource Management Plan: A plan to demonstrate that procedures and commitments are in place to minimise, monitor and manage waste

Reuse: Reuse of a component without further processing

Site Waste Management Plan: A plan to demonstrate how site waste will be minimised and managed

³⁵ WRAP and the circular economy, <http://www.wrap.org.uk/content/wrap-and-circular-economy>

NFDC

DEMOLITION AND REFURBISHMENT

RESOURCE PROTOCOL

Produced by the National Federation of Demolition Contractors in partnership with the Institute of Demolition Engineers.

Requests to copy or reproduce any part of this publication should be made to:

**National Federation of Demolition
Contractors**

Paradise

Hemel Hempstead

Hertfordshire

HP2 4TF

Tel: 01442 217144

Fax: 01442 218268

www.demolition-nfdc.com



IN PARTNERSHIP WITH THE INSTITUTE
OF DEMOLITION ENGINEERS



National Federation of Demolition Contractors
Voice of the UK Demolition Industry

Resurgam House
Paradise
Hemel Hempstead
Hertfordshire, HP2 4TF
Tel: 01442 217144
www.demolition-nfdc.com