



Reclaimed Building Materials in the Development of the Thames Gateway

A report by

BioRegional
ReClaimed

for

BioRegional
solutions for sustainability
www.bioregional.com

Nicole Lazarus and Richard Hillary, BioRegional Reclaimed, January 2006

This report is supported by:



a joint initiative:

BioRegional



One Planet Living

Ecological footprinting tells us that if everyone on the planet consumed resources the way we do in the UK, we would need three planets to support us.



The Three Planet Problem

BioRegional and their partners have been working to provide practical solutions and initiatives to make it easy for communities and individuals to reduce their ecological footprints in order to live sustainably within the carrying capacity of one planet. One of these initiatives, a joint venture with WWF, is One Planet Living (OPL). It aims to make sustainable living easy, attractive and affordable throughout the world.

One Planet Living: A world in which people everywhere can lead happy, healthy lives within their fair share of the Earth's resources.

The One Planet Living partnership between BioRegional and WWF aims to:

- Build a worldwide network of One Planet Living Communities to demonstrate One Planet Living in action
- Establish One Planet Living Centres in each OPL community as a focus for education and training
- Promote One Planet Living and its guiding principles to bring about change among governments, businesses and individuals.

One Planet Living has ten principles which form a holistic framework for sustainable living:

1	Zero Carbon	6	Sustainable Water
2	Zero Waste	7	Natural Habitats & Wildlife
3	Sustainable Transport	8	Culture & Heritage
4	Local & Sustainable Materials	9	Equity & Fair Trade
5	Local & Sustainable Food	10	Health & Happiness

More information about One Planet Living is available at www.bioregional.com or from Jane Durney, 020 8404 4898, jd@bioregional.com

CONTENTS

1	INTRODUCTION.....	2
2	OVERVIEW.....	4
2.1	Background of BioRegional Reclaimed.....	4
2.2	Reclaimed vs recycled.....	6
2.3	A “Blue Sky” vision for the future.....	7
2.4	Current market for reclaimed materials.....	8
2.5	Markets for construction materials.....	10
2.6	Current demolition practices.....	12
2.7	Drivers for the Increased Use of Reclaimed.....	13
2.8	Potential Market for Reclaimed Building Materials.....	15
2.9	Thames Gateway Development Area.....	16
2.10	Markets for Reclaimed Building Products.....	17
3	FINANCIAL MODELS.....	23
3.1	Introduction.....	23
3.2	Business scenarios.....	25
3.3	Results Summary.....	29
4	TRADING IN RECLAIMED BUILDING MATERIALS.....	30
4.1	Introduction.....	30
4.2	Estimating visits.....	31
4.3	Extraction work.....	31
4.4	Storage.....	32
4.5	Haulage.....	32
4.6	Packaging.....	33
4.7	Regulatory hurdles.....	34
5	MARKETING.....	35
5.1	Material-specific megayard.....	35
5.2	Virtual megayard.....	36
5.3	Medium-sized general yard.....	37
5.4	Facilitating volume deals between site and specialist retailers.....	38
6	APPENDIX A – THAMES GATEWAY.....	40
6.1	Development Activity and Materials Usage in the Thames Gateway Development Area to 2016.....	40
6.2	Projected development in the TGDA.....	41
7	APPENDIX B – PRODUCT PROFILES.....	44
7.1	Reclaimed timber joists.....	45
7.2	Timber flooring.....	52
7.3	Bricks.....	58
7.4	Doors.....	62
7.5	Electrical fixtures and fittings.....	69
7.6	Paving.....	72
8	APPENDIX C - THE ESTIMATING VISIT - A GUIDE TO THE PROCESS.....	78
8.1	Overview.....	78
8.2	Is a Visit Required?.....	78
8.3	Preparing for the Visit.....	79
8.4	On Site.....	79
8.5	Assessing the Data Collected.....	81

1 INTRODUCTION

This report concludes a six month investigation into the feasibility of widespread use of reclaimed materials in the construction industry, with particular reference to the rapid expansion of construction projects in the Thames Gateway region east of London. The widespread use of reclaimed materials in construction is considered to be one of a number of strategies that will be required if the UK is to reduce its environmental impact and reach a balance of sustainable activities across all sectors.

The report looks at the current state of the reclaimed materials industry and it investigates the potential for setting up of a series of large reclaimed materials facilities that can cater for high volumes and offer real convenient alternatives to virgin products.

The investigation has been carried out by BioRegional Reclaimed, a trading / consultancy company specialising in reclaimed construction materials. We work with construction professionals who wish to use reclaimed materials and we source and deliver those materials. We also work with demolition contractors and salvage companies building up supplies and supply chains of usable material.

BioRegional Reclaimed is a hybrid company in that we are both ethically and commercially driven. Our core reason for existing is ethical and environmental, to find practical and viable ways to increase the use of reclaimed and so reduce the environmental impact of our way of life. However, in order to deliver this, we need to be able to offer cost effective reclaimed solutions that compete successfully in the market place.

As such, we have approached this investigation from two perspectives. From our own commercial perspective, we have been looking at the potential for BioRegional Reclaimed to expand and establish a yard or yards to supply on a larger scale. From the wider perspective, acting more in a consultancy role, we have also looked at the broad potential for reclaimed materials to grow and be taken up by mainstream builders' merchants, building contractors and waste management companies. These companies would have a much greater capacity to bring about change than BioRegional Reclaimed and therefore would achieve greater environmental improvements quickly.

This report is designed to be read by anyone with an interest in this field but will be particularly relevant to:

- Policy makers at all levels of government interested in reducing the environmental impact of the construction sector.
- Local or regional authorities interested in setting up a central facility for reclaimable building materials
- Builders merchants looking at offering more sustainable products e.g. Travis Perkins already offer reclaimed bricks
- Construction teams who actively want to take on a reclaimed agenda on their project and wish to work with us or others from the salvage industry to achieve a high reclaimed % of materials used.
- Waste management and demolition professionals wishing to divert landfill and find high grade re-use for significant sectors of the waste stream

- “Change Bringers” such as the BioRegional Development Group or the Worldwide Fund for Nature (WWF) who are seeking ways to work with industry to make environmental improvements possible.

The study has looked at both supply and demand side, both in a very practical, hands on way. We have been sourcing, extracting, processing and supplying materials to real customers in many material categories. We have been building up on-going relationships with demolition contractors, haulage experts, salvage companies and customers. This report is based on our own experiences and lessons learnt.

Real costs and prices have been used to develop a series of business plan scenarios. A range of proposals are modelled from a virtual trading company with no storage facilities, through small scale mixed product yards right up to specialist mega yards with multi million pound turnovers and the ability to supply 10% of the Thames Gateway requirements. The study looks at both the commercial viability of these businesses and also the relative environmental benefits that these companies would generate.

The work has shown us quite clearly that for reclaimed materials to break into the mainstream and open up significant new markets, there will need to be major changes in construction procurement, in demolition practices and in the reclaimed supply chain.

Of the business scenarios studied, the greatest environmental benefits are derived from the steel and timber specialist mega yards which, as well as being profitable, can save an eco-footprint equivalent to over 4,600 people every year. This represents a reduction in the total impact of construction in the Thames Gateway of 0.8%.

To achieve the same eco-footprint reduction by other means would require some 3 million m² of photovoltaic solar panels (3,900 BedZEDs) costing £3 billion or else around 5,000 car club cars, each being used by 12 members who have all given up private car ownership.

2 OVERVIEW

2.1 Background of BioRegional Reclaimed

BioRegional Reclaimed is one of six trading companies that have grown out of the BioRegional Development Group, an independent environmental organisation formed in 1994. Working in housing, construction, forestry, paper, textiles, energy and food industries, the BioRegional group of companies work to create sustainable living solutions which enable us to live comfortably within our fair share of the Earth’s productive capacity.

BioRegional was instrumental in initiating the Beddington Zero Energy Development (BedZED), a 100 eco-home and office development in South London which has won multiple awards for innovation and sustainability. The experience gained on BedZED in successfully sourcing bulk quantities of reclaimed building materials led directly to the formation of BioRegional Reclaimed to develop commercial scale supply lines and trade in reclaimed building products.

Why Reclaim Building Materials?

Construction materials have a significant impact on UK sustainability. In the UK, they annually account for:

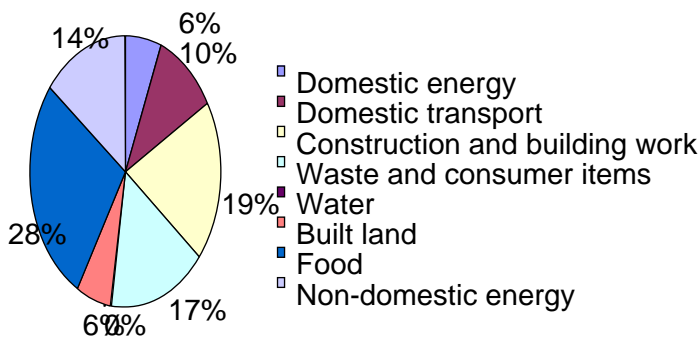
- 420 million tonnes of material consumption (7 tonnes per person)
- 20% of the total national ecological footprint
- 19% of the total national greenhouse gas emissions
- 30% of all road freight on UK roads

The embodied environmental impacts of these incredible quantities of material are generated during:

- extraction of raw materials
- processing and manufacture
- transportation

The pie chart below shows how the ecological impact of construction materials in the UK is second only to that of food:

Figure 1: UK ecological footprint



Source: Stockholm Environmental Institute

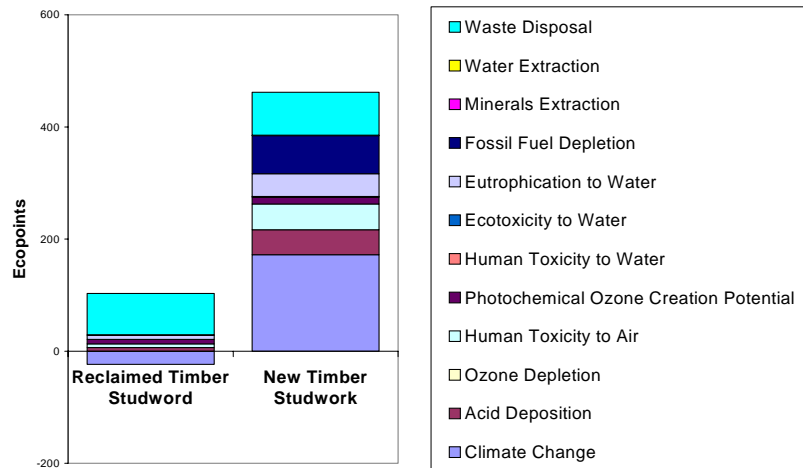
Direct substitution of reclaimed materials for new in any construction or building work will radically reduce the environmental impact of that particular item. It removes the need to extract more raw materials and it largely removes the need for processing and manufacture. Transportation impacts are usually reduced too as reclaimed materials tend to be sourced locally.

The Building Research Establishment (BRE) has undertaken life cycle analyses using their environmental profiling technique. Comparing reclaimed with virgin materials shows an environmental impact reduction of 96% when using reclaimed steel and 79% for reclaimed timber when compared with new.

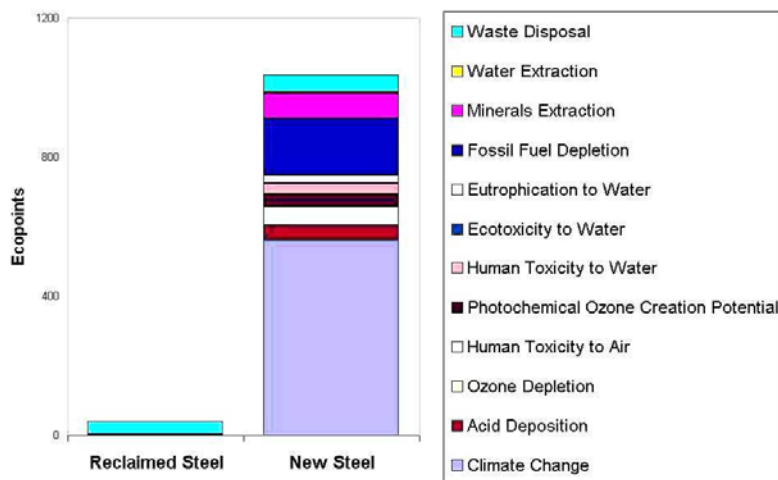
In the case of the steel comparison, the new steel has a recycled content of 40% i.e. 40% of the material melted down to be formed into sections is recycled scrap. However, the energy consumption and carbon emissions from re-melting the scrap are significant. The re-use of salvaged steel sections saves all the reprocessing energy and so has a 96% lower impact.

Figure 2: Ecopoint charts

Ecopoint chart for reclaimed/new timber studwork



Ecopoint chart for reclaimed/new steel



These environmental savings are often achieved with little or no additional expense, making reclaimed an extremely cost effective way of achieving environmental savings and cutting carbon emissions.

2.2 Reclaimed vs. recycled

It is helpful at this point to distinguish between reclaimed and recycled materials:

“Reclaimed”

These are any materials that have been used before either in buildings, temporary works or other uses and are re-used as construction materials without reprocessing. Reclaimed materials may be adapted and cut to size, cleaned up and refinished but they are being re-used fundamentally in their original form.

“Recycled”

Recycled materials are considered to be any materials that have been taken from the waste stream and reprocessed and remanufactured to form part of a new product.

Examples of reclaimed and recycled materials

Reclaimed

Re-used timber sections or floorboards

Bricks cleaned up and re-used

Steel sections shot-blasted and refabricated

Re-used glass panels or windows

Recycled

Panel products with chipped recycled timber

Crushed concrete or bricks for hardcore

Steel with a proportion of recycled content

Crushed glass recycled as sand or cement replacement

2.3 A “Blue Sky” vision for the future

The BioRegional Reclaimed vision is for reclaimed materials to make up at least 10% of all materials used in construction (measured by value)¹. This would be the case not just amongst niche environmental projects or historic refurbishment projects but in all medium and large new build contracts too.

In order to achieve this, we need robust supply chains, established stocks of materials and effective sales and delivery networks. We need incentives for developers and builders to use reclaimed and we need positive commitment from contractors and sub-contractors to making it work.

The demand for reclaimed materials will be serviced by a network of regional facilities for collecting, processing and batching salvaged materials. Retail and collection stations in key locations across the country will specialise in particular material types:

- steel and other metal products,
- reclaimed timber and timber products,
- stone and paving,
- brick and block centres and
- “widget yards” stocking all boxable reclaimed products such as electric fittings, door furniture, plumbing fittings etc.



All of these outlets will have excellent internet presence with online records of stocks and prices. In addition, they will also sell branded batches of reclaimed goods through the mainstream builders’ merchants so customers can see both options side by side for comparison.

Buildings will be designed from the start with reclaimed materials in mind, taking advantage of those that are widely available. Also, project teams will design for easy deconstruction and so be assuring the industry of future supplies.

In order to secure supplies now, all refurbishment and demolition works will be required by their planning authority to carry out a Reclamation Audit prior to demolition. Extraction and collection techniques for materials will get more and more cost effective as a network grows and economies of scale are achieved. Just as current steel scrap collections for recycling are very easy and even lucrative for any contractor, the collection of reclaimable materials will be prompt and will generate a worthwhile income for the site contractor.

At a policy level, reclaimed materials will be recognised as an important contribution towards sustainability. Proposals for reclamation facility sites will be considered favourably by planners. Indeed many local authorities will initiate such facilities by offering disused land and other support in return for a rebate on materials purchased.

Reclaimed materials will be widely accepted in the public consciousness as a good thing and better than new.

¹ This reclaimed target would be in addition to any targets set for materials with recycled content.

2.4 Current market for reclaimed materials

According to the BigRec survey carried out by Salvo in 1997, the total scale of the salvage market was around £1 billion/year. It included some 2,500 businesses with turnovers of around £400,000 each. An estimated 4.7 million tonnes of material were reclaimed and re-used each year and of this, 50-80% was bought by private individuals. Private homes, pubs and shops make up the biggest share of the customer base, achieving a certain “oldy” or “distressed” look through the use of reclaimed.

The market in reclaimed materials is divided into sectors defined by their nature, volume and unit price:

- *Architectural and Ornamental Antiques* – Whole elements of structure or fabric that usually pre-date 1920. Items range from door furniture to an entire church but are characterised by their age and uniqueness which commands higher prices.
- *Reclaimed Building Materials* – Materials released by careful extraction which are to be reused in their original purpose. Items include bricks, paving, timber and steel and tend to be of specific dimensions that are standard across the construction sector.
- *Demolition Materials* – Materials released into the supply chain by professional contractors but with minimal regard to reuse and are characterised by the large volumes released and comparatively low unit price.

There is a long established widespread market for architectural salvage through specialist outlets. They principally supply architectural features such as fireplaces, lighting and stoneware and cater for small scale domestic development and individual refurbishment projects. These materials are almost like antiques, some single items costing anything up to thirty thousand pounds. Clients tend to be members of the public or contractors looking for “something special” to top off a project. They do not tend to focus on bulk supply of standard building products.

Reclamation has at times suffered from a slightly disreputable image, the “rag and bone man” of Steptoe and Son, where products are seen as low quality and questionable provenance. The Salvo Code is tackling this and lays down principles by which traders can avoid dealing with stolen or questionable goods and many traders have signed up to this code.

Interior design and make-over television shows are bringing reclaimed materials more into the mainstream for individual buyers and we predict that this will continue to grow, especially as the public becomes more environmentally aware. At BioRegional Reclaimed, we get a lot of interest from projects building demonstration sustainability centres.



Markets in high volume reclaimed materials are difficult to identify. Bricks are perhaps the best example with large volumes traded by the thousand with an efficient and helpful retail side. Markets in most other reclaimed materials are fragmented and more difficult to build up uniform supplies. The trade works mainly with small to medium scale projects.

Prices of reclaimed materials can vary enormously depending on ease of extraction, haulage and storage. They also vary according to the amount of material available on the market at that time. Generally, it is difficult to offer reclaimed materials at a price that competes directly with cheap virgin imports. Although the material may be available for nothing, handling and haulage costs are significant and the real costs of reclaimed materials are highly dependant on specific circumstances. However, the quality and character of the material is often superior to the new equivalent, making it worth a premium. On some occasions, the material becomes available at the right time locally and can be made available very cheaply.

Within the reclamation trade there is also a significant influx of both cheap imported reclaimed goods from Eastern Europe and also of cheap imitation reclaimed goods from such countries as India and Thailand. Neither of these categories are acceptable from an environmental point of view and BioRegional Reclaimed will not trade in these products.

2.5 Markets for construction materials

DTI figures show that some £92 billion is spent each year in the construction sector. Nearly half of the value of the contracts awarded within the industry is for repairs and maintenance to existing infrastructure. The other half is for new build and major refurbishment.

According to WRAP, the construction industry spends around £22 billion each year on products and materials for new build. This equates to half the contract values in this category. Repairs and maintenance contracts will have a higher proportion spent on labour. So the total spend on materials is estimated at around £30 billion per year.



Material procurement strategies are defined by the nature and size of project and the contractor undertaking the work. Large contractors undertaking multi-million pound commercial and residential developments have departments of professionals dedicated to purchasing materials in huge quantities. They negotiate detailed supply contracts for specific materials at set prices and delivery timetables scheduled to fit in with construction programmes. Material is delivered to site and used within days or hours to reduce the need for storage on site. Contractors expect strict standards of uniformity and quality of product.

Because of this purchasing power they can negotiate unit cost prices way below anything that could be reasonably achieved by smaller scale suppliers, achieving up to 60% discounts compared with normal trade prices. This is going to be an incredibly difficult market for reclaimed material suppliers to break into.

Medium sized contractors working on projects of the range of £100k to £2m will tend to purchase materials from a list of retained suppliers and will negotiate prices as and when the materials are required. Operators in this area tend to be conservative in their choice of materials and perceive problems with using reclaimed. Contracts have significant penalties for time overruns and contractors shy away from anything that may delay their work.

This sector does procure some reclaimed material but this tends to be on specific “eco projects” where it is written into the construction brief or at the behest of environmentally aware clients who insist on the use of reclaimed as part of the contract conditions.

There is significant scope for targeting clients and contractors in this sector and increasing the use of reclaimed. Order sizes in this sector match the levels of stock we consider can be generated through an effectively built supply chain. Marketing can be targeted at both the client and the contractor so there is a double opportunity to influence purchasing decisions. The principal obstruction in this sector is contractor perception of reclaimed and this will require sound strategies to overcome.

Small contractors and members of the public undertaking their own building work are far more open to purchasing reclaimed materials. Reclaimed markets itself on age and character and clients tend to gravitate towards the high value/low volume products. For many of their materials, clients research potential suppliers through the internet, magazines and word of mouth. They then phone round to confirm availability and price before visiting retail premises to make their purchases.

Though this sector is already established as a significant user of reclaimed there is still scope for a lot of growth. Use of more standard materials is still limited and this could increase. Very ordinary reclaimed components such as skirting or lintels could be marketed on their environmental credentials but they would need to compete with B&Q on simplicity and convenience. Pressure on contractors from clients to use reclaimed is easier to bring about as clients are more in touch with the day to day progress of projects.



2.6 Current demolition practices

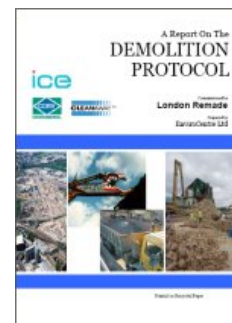
Demolition practices and methodologies have changed significantly in the last 15 years, driven by legislation and rising costs of waste disposal. There has been a massive drive for recycling and, whereas 15 years ago only 5% of aggregates were recycled, now the figure stands at 50%. In the past, contractors had little regard for waste segregation but now many sites employ thorough sorting arrangements which save them large sums of money on disposal.



According to Salvo and many in the trade, however, this movement has had an adverse affect on the rate of reclamation. Materials that used to be extracted and sold for reuse are now skipped and downgraded. Steel is chopped, shredded, cubed and shipped abroad to be melted down, bricks are crushed and used for bunding around landfill sites, timber sections are chipped and combined with glues to make particle board. All of these destructive processes are labelled recycling and they detract from the need to re-use materials as they are, simply and locally. Smaller demolition contractors used to run in-house salvage yards selling off materials extracted. These are now tending to be shut down with materials being sent for recycling instead.

Recycling is, of course, a better environmental option than landfill. However, reprocessing in any of the examples above has much higher energy investments and environmental impacts than reclamation. The push for higher recycling rates, although good in principle, has put a strain on the supply side of the reclamation industry and could well have an overall negative effect on the environment.

The *Demolition Protocol* is a system developed by the Institute of Civil Engineers (ICE), the Chartered Institute of Waste Management (CIWM). It is a methodology for resource management for demolition projects, identifying the potential for recycling and reclaiming materials and finding destinations for them before the project begins. It offers a framework for designing some of those materials into the new build development that will follow on the same site. It is also a tool for planning authorities to measure these materials and make a judgement on the sustainability of a proposed development. The Demolition Protocol is currently being implemented by the London Borough of Brent on a number of projects and results are eagerly awaited.



Dismantling for reuse is more time consuming and therefore more expensive than demolition for recycling or landfill. In the short term, we therefore need to make the value of reclaimed materials such that it is financially worthwhile to deconstruct carefully. On site techniques for extraction can also improve in efficiency with multiple repetition and appropriate tools. In the longer term, we need to take deconstruction issues on board at design stage and build new buildings from which materials can easily be extracted and reused. The guide by Chris Morgan and Fionn Stevenson called "Design and Detailing for Deconstruction" must be widely adopted.

2.7 Drivers for the Increased Use of Reclaimed

Greater reuse of building materials is being helped to a greater or lesser degree by a number of different factors:

Climate change

Governments have set targets for action to reduce carbon emissions and are investing in technologies and processes that help to achieve these targets. More reclamation on a massive scale would certainly help cut carbon emissions from the construction sector.

Landfill availability

Waste minimisation is a significant driver for reclamation especially on a local level. For example, the GLA has a target to stop all exports of waste from its boundaries for landfill by 2015. Sites suitable for landfill are being used up and costs are rising. The Landfill Tax has encouraged recycling and reuse and BioRegional Reclaimed would welcome any increase to this tax as this would further encourage progressive systems of reuse.

EcoHomes

The “Million Sustainable Homes Initiative” by the Worldwide Fund for Nature is campaigning for a million new homes with a BRE EcoHomes rating of “Very Good”.

The EcoHomes rating gives some incentive for using reclaimed materials. After the weighting system is taken into account, there are 12.5 percentage points in the materials section for material choices of which a maximum of 4.5 could be claimed for using reclaimed timber throughout and there could be a further 8 points from all other material choices which could include some reclaimed elements. However, reclaimed elements other than timber would require a bespoke assessment from BRE and would incur a fee in order to achieve the extra points. So, at best and with payment of a fee, the extensive use of reclaimed materials on a project could earn an extra 6-7 percentage points.



EcoHomes and the associated Green Guide is currently being reviewed and BioRegional would hope to encourage greater recognition of reclaimed in the new version.

National Green Specification

The National Green Specification currently being developed is an information resource about sustainable building products for designers, builders and contractors. The NGS is designed to sit alongside the existing National Building Specification which details specifications and uses for all building products. NGS plans to offer downloadable specification clauses that can be spliced in with standard NBS clauses to improve the environmental performance of a construction project. BioRegional

Reclaimed have been working with them to produce clauses and guidance notes for reclaimed materials.

Demolition Protocol

See Section 2.6 of this report.

Developer opportunities

The concept of building “eco homes” is growing amongst residential developers. In the current market where property prices are static or falling in South London, prices for homes at BedZED appear to be holding or even rising. This could be to do with their scarcity at present, lower running costs or perhaps because people considering purchasing them do so for positive reasons. Using reclaimed is one of the features that can be used to justify calling a home an “eco home”.

Consumer demand

Public interest in and concern for the environment is growing. Green issues can be found across all sections of the media on a daily basis and there are television shows dedicated to reclamation or the reuse of materials in home DIY. As the public gets more exposure to green ideas they will naturally take more notice and start to implement them on a domestic basis.

Internet

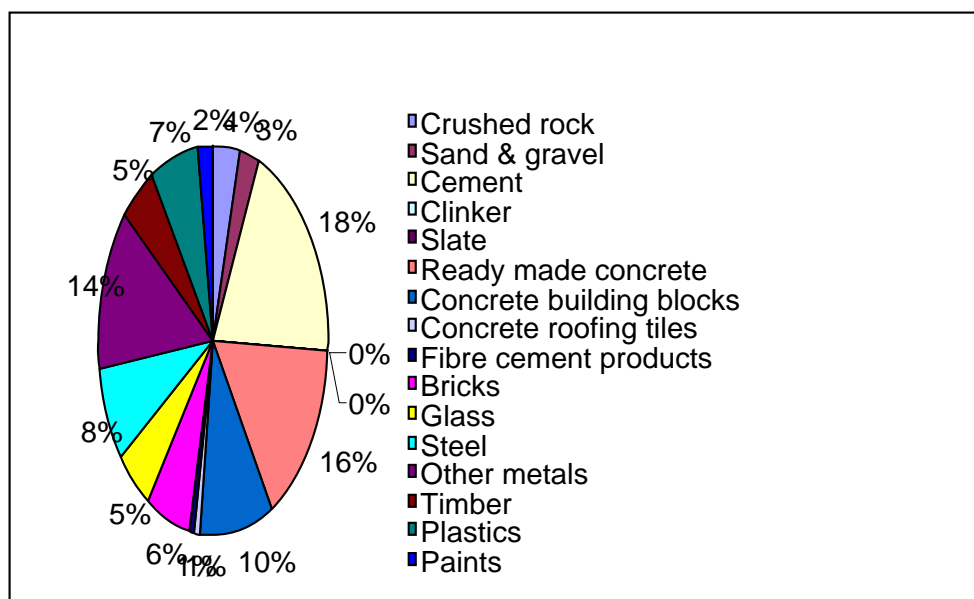
The internet is a significant tool in the development of the market in reclaimed materials. Potential buyers can look at the range of reclaimed products available and compare them with new materials for quality and price. Digital images and information exchanges all give buyers immediate access to what are currently quite disparate supplies.

2.8 Potential Market for Reclaimed Building Materials

Total consumption of building materials in the UK is around 340 million tonnes and annual costs for building materials are somewhere in the region of £30 billion. The salvage industry claims to account for around £1 billion of this.

Opinions vary on the potential for reclaimed content in construction. New build major projects tend to have much lower reclaimed content. Most reclaimed materials get used in refurbishments and individual homes, pubs and shops.

Figure 3: Breakdown of Construction Materials by Environmental Impact



Best practice in reclaimed content can probably be targeted at 20% by value. Good practice could be set at 10% by value. So to meet good or best practice targets, there could be a market for some £3-6 billion worth of reclaimed materials each year.

The average reclamation yard has a turnover of around £400,000. There are 2,500 such businesses in the UK. To achieve “good practice” across the whole UK industry would require a massive increase in supply. It would require another 5,000 reclamation businesses of a similar nature. Alternatively, if a company half the size of Travis Perkins could be established overnight dealing only in reclaimed, they would achieve this increased level of supply in one step.

This study is looking particularly at potential for reclaimed in the Thames Gateway Development Area. The section below looks at the potential demand for reclaimed in that region with a 10% “good practice” target. The data and calculations are laid out in Appendix A.

2.9 Thames Gateway Development Area

In 2002, 4% of all UK house building and 7.4% of all UK commercial development took place in the TGDA. Weighting these two percentages appropriately, we find that in 2002 around 5.5% of all construction activity in the UK took place in the TGDA.

Material	%	UK Consumption '000 tonnes	TGDA estimated consumption '000 tonnes
Crushed rock	37.4	126,568	6,961
Sand & gravel	24.4	82,539	4,540
Cement	3.3	11,072	609
Clinker	3.0	10,146	558
Slate	0.0	78	4
Ready made concrete	15.8	53,494	2,942
Concrete building blocks	10.2	34,644	1,905
Concrete roofing tiles	0.8	2,568	141
Fibre cement products	0.0	158	9
Bricks	2.2	7,409	407
Glass	1.0	3,349	184
Steel	0.7	2,500	138
Other metals	0.3	850	47
Timber	0.6	1,925	106
Plastics	0.2	550	30
Paints	0.1	410	23
		338,260	18,604

Annual housing completions in the TGDA will increase over the next 10 years and commercial development construction will decrease. Overall, the demand for building materials in the TGDA will continue at 15-20m tonnes each year.

In value, this is around £1.65 billion worth of material. To meet the “good practice” 10% reclaimed target would require supplies worth £165 million. This would either require the equivalent of 400 existing reclamation businesses or else it could be met from the establishment of a number of “megayard” reclamation facilities each trading in £10-20 million worth of material each year.

The business models in the following section include mega-yards at this scale and examine their commercial viability.

2.10 Markets for Reclaimed Building Products

Steel	Current Markets	Potential Markets
Domestic / Individual	Little or no market for structural steel. Specific items of architectural salvage are traded but not as bulk products.	
Small Contractor	<p>Builders' beams are often reused within a project or bought as seconds or reclaimed. Common section sizes with no fabrication requirements make this an easy application for reclaimed.</p> <p>Reuse of whole reclaimed portal frame buildings is also a busy and lucrative market.</p>	A yard with regular stocks of certified sections could cut to length on demand and compete with new suppliers.
Large Contractor	Virtually no use of reclaimed.	<p>A large scale supplier of reclaimed structural sections could break into the volume market. Structural integrity can be assured. Steel frame buildings must be dismantled not demolished.</p> <p>Possibly, the best way to bring this about is through willing fabricators and steel sub-contractors.</p>
Recycled	Almost 100% recycling rate. Most steel is scrapped bringing good financial returns. The scrap is shredded, baled and shipped to China or India for melting down.	
Waste	~ 0% - Very little steel is wasted as the mechanisms and incentives are in place for recycling.	

Timber	Current Markets	Potential Markets
Domestic / Individual	<p>Large existing market for reclaimed timber flooring or joists reprocessed for flooring. High prices achieved for oak, pine and many species. Beams and architectural features regularly reused.</p> <p>Good established market in reclaimed panel doors which sell on quality and appearance.</p>	<p>Large potential market increase here. As supplies increase, sales and marketing will reach more individuals. Internet will help.</p> <p>Studwork, skirting and bulk standard structural timbers could break into this market.</p>
Small Contractor	<p>Currently pressure from clients results in some use of reclaimed.</p>	<p>The expansion of the eco homes concept will result in more reuse as structural products. Doors could be supplied in volume through specialist stockists though reprocessing costs must be reduced.</p> <p>Reclaimed flooring has great potential here. Also timber frame companies could find ways to work with reclaimed and so break into a significant new market for reclaimed.</p>
Large Contractor	<p>No acknowledged use of reclaimed.</p>	<p>To bring reclaimed into this market will require a step change in the supply chains and in contractors' perception of reclaimed. The attitude of joinery sub-contractors will be key.</p> <p>Minimal potential for reclaimed timber use in commercial developments. Much more scope for incorporation into volume residential developments as structural timber, studwork, flooring and smaller cuts like battens and skirting.</p> <p>Widespread use of reclaimed doors will require some sort of bespoke fire certification.</p>
Recycled	<p>Timber waste segregation is getting more common although far less lucrative than steel.</p> <p>There is a large market in</p>	

products made from recycled wood, including panel board from chip, furniture and increasingly packaging.

Waste

Significant quantities of wood are still wasted due to contamination.

More careful demolition methods could improve reclamation levels and segregation a little but financial incentives are needed. Design for deconstruction will help in the long term.

Stone & Paving	Current Markets	Potential Markets
Domestic / Individual	Architectural stone items and paving are in great demand amongst high income customers.	Increasing supplies and public friendly yards can tap into this more and extend the use of reclaimed to more mundane items and to lower income groups.
Small Contractor	Limited current use.	Dedicated suppliers could build up stocks of uniform products and so compete with builders merchants, particularly on quality products such as granite, marble, York stone and limestone.
Large Contractor	No acknowledged use of reclaimed except local authorities who reuse paving and kerbing internally where possible.	Large scale reuse of paving materials for landscaping will be possible with dedicated suppliers. However it is difficult to compete on cost with such low value materials as paving slabs. Quality stones such as marble or granite could be used as kitchen tops or flooring where appropriate.
Recycled	Segregation and recycling are increasing in these materials. They are crushed down and sorted into various grades of hardcore and fill.	The market in recycled aggregates is expected to increase as specifications improve and the industry becomes more accustomed to its use.
Waste	Significant quantities still entering the waste stream.	This may continue to reduce as techniques improve and reprocessing methods advance.

Bricks & Tiles	Current Markets	Potential Markets
Domestic / Individual	Currently a limited requirement from the public even though stocks are held at salvage yards.	The growth in build your own homes may mean the domestic market increases and volumes rise. Making salvage yards more “public friendly” may encourage reuse for domestic DIY and garden use.
Small Contractor	Well established suppliers have built significant business with small contractors, again mainly at the clients behest.	Development of national supply chains through material wholesalers, e.g. Travis Perkins, will expand use as confidence in products increases. Danger of oversupply from Eastern European sources.
Large Contractor	Very few examples of reclaimed bricks in this category.	Large scale use is still limited as price for new remains low. Expansion of reclaimed will only occur through coercion with virgin materials tax or planning specification. This is probably the prime market for expansion as potential supplies are not being taken up even though demolition is releasing prime materials.
Recycled	When they are not reclaimed, bricks and tiles are disposed of with the rest of the demolition rubble. They are crushed down and sorted into various grades of hardcore and fill.	Recycling rates for these materials are likely to continue increasing.
Waste	Significant quantities of bricks and tiles are still going for landfill but this is expected to reduce.	

Fixtures and fittings	Current Markets	Potential Markets
Domestic / Individual	Well established market amongst high income groups for a wide variety of fixtures and fittings. E.g. light fittings, fireplaces, radiators, timber panelling, unusual staircases and balustrades etc. Sources for this market are from both residential and non-residential buildings.	Wider availability, good marketing and some lower cost product ranges would increase this market enormously. The current media focus on reuse and reclamation will also help.
Small Contractor	Current market limited.	<p>Potential for huge expansion in use of standard products such as electrical fittings, water fittings and door furniture if stock levels can be raised to sufficient levels.</p> <p>For commercial developments, internal structures such as suspended ceiling systems, partitions and raised floors would be viable and marketable.</p>
Large Contractor	Very little current reuse.	<p>The purchasing power of large contractors and also client expectations makes this a difficult market to break into. However, the potential in this category is enormous. Components are quickly and cheaply extracted and easily stored and handled. The relative environmental benefits per tonne of reclaiming a light fitting, for example, are far higher than any of the other material categories.</p> <p>There are also regulatory hurdles to overcome.</p>
Recycled	Many fittings are now separated in the soft strip process of demolition and scrapped for their material value.	More segregation and recycling could take place if scrap values provide enough incentive.
Waste	Huge quantities are still wasted through fast, mass demolition practices.	

3 FINANCIAL MODELS

3.1 Introduction

A range of scenarios for general and specialist yards have been developed to examine potential viability. The scenario spreadsheets are on an accompanying CD and are summarised here. The yards range in size from a small local yard up to the sort of mega yards that would be needed to meet the 10% TGDA target. All the scenarios are shown in spreadsheet files on an accompanying CD but are summarised here below.

12 products were selected for the models. They were selected either on the basis of what BioRegional Reclaimed have had most success at, or else those products that we feel have the most commercial potential. In practice there would be numerous sub-categories under each product heading but this would require an inappropriate level of detail for this stage of assessment.

The 12 products are:

Product	Description
Structural steel	This is the product we have done most work in and also the one we feel has most potential for both commercial viability and environmental gains. It consists of universal beams and columns for structural uses.
Other steel	This product also appears to have good commercial potential although we have less experience in it. It consists of ranges of steel channels, angles, square and circular sections, steel plate, tubes and rods.
Floorboards (pre-existing)	Hardwood and softwood floorboards that have been taken up and are resold as floorboards.
Studwork	2x4's and 3x4's for internal studwork. Low profit margin but simple products, widely consumed and widely available.
Joists	Softwood timber joists
Doors	Batches of office doors and domestic panel doors.
Paving	York stone or limestone paving is traded in the smaller yard scenarios. Concrete pavers are traded in the mega-yard.
Bricks	For the smaller yard scenarios, the bricks are bought direct from reclaimed brick specialists. BioRegional act as sales agents. For the mega-yard, bricks are taken direct from demolition.
Electric fittings	Covers a wide range. Mainly plug sockets, light switches and light fittings.
Door furniture	Handles, locks, closers, push plates
Stone cladding	Marble or granite to be used for flooring or worktops
Setts and cobbles	Paving materials

Throughput sales for each scenario are based on levels of orders the business could realistically achieve and also on how much stock the yard could hold given certain turn around times. Marketing budget and staffing levels are set to match the predicted turnover levels. On the larger yards, brokers are employed to maintain supplies and to service customers.

Storage space requirements are calculated assuming stacking systems up to 3 pallets high. Areas are tripled to allow for access and vehicle turning spaces. Additional area is also added for processing zones and office accommodation. Turnaround times are set at 3 months for the smaller yards and 1 month for the mega-yards.

Sales prices are based on rates we currently achieve or else on rates that are currently achieved by others in the trade. Material costs are again based on real BioRegional deals. They vary in some scenarios according to the business model to reflect whether we are buying from salvage traders or direct from demolition.

The models also incorporate eco-footprint savings for each product and so inform us on the environmental benefits of each scenario.



Potential site for mega-yard in Dagenham

3.2 Business scenarios

3.2.1 Scenario 1 – Local small mixed yard

This model is based on a 600m² (20mx30m) mixed product salvage yard located in one of the South London Boroughs.

The yard principally trades in steel, timber, stone and paving and also stocks quantities of standard reclaimed electrical fittings and widgets.

The turnover estimates are based on one good supply deal a month for each product. Materials are sourced from local (within 100 miles) small to medium scale demolition projects and other specialist suppliers.

There is an element of 'virtual trading' in steel and other bulk products that are supplied direct to the client from source without going through the yard.

Target markets are small to medium sized refurbishment and building contractors undertaking developments and renewal of one or a number of properties. Members of the public are also targeted for direct sales.

This scenario shows the yard breaking even at the beginning of year 5 with repayment on investment over 10 years. Property costs are the biggest factor in the Year 1-3 period. A partnership with a local authority to provide low cost accommodation on spare land could be made in return for discount materials for local authority needs and a degree of waste diversion to help bring down Council costs. This is examined further in Scenario 2.

The environmental impact savings increase with time as trading volumes rise. Eco-footprint savings in year 11 are equivalent to the eco-footprint of 430 UK residents per year.

3.2.2 Scenario 2 – Local authority partners, local small mixed yard

This yard is similar to Scenario 1, being a mixed product local yard but without stocking loss making products such as stone cladding. An extra member of staff is employed to undertake in-house reprocessing and so external reprocessing costs have been removed and machinery costs have been increased. In year 2 a fourth member of staff is employed to deal with the predicted doubling of orders.

The most significant change, though, is the peppercorn rent for the first 5 years of property occupation.

As we can see, the yard breaks even in the third year of trading and repays investment within 6 years. The environmental impact savings are the same as for scenario 1.

3.2.3 Scenario 3 – Local authority partners, medium sized, local semi-mixed yard

This scenario is for a slightly larger 1,000m² (20mx50m) yard specialising in the bulkier reclaimed materials such as steel, stone, paving and timber. The focus on

specific materials combined with the larger yard allows more materials to be stored and traded and volumes have been increased by 50%.

As orders are larger, sales prices have been reduced by between 10-30% to reflect a different customer base. Material costs have also been reduced by up to 10% to reflect the larger purchases and economies of scale that can be made.

Running costs for the yard have been increased proportional to size but the subsidised rent period is still set for the first five years.

As this scenario relies on higher trading volumes, it would be vital to set up supply contracts with local medium scale materials clients to succeed. It would probably be essential to have firm supply contracts with local Councils to ensure profitability in the first 5 years.

As with scenario 2, there are 3 members of staff initially to include a warehouseman. This is increased in years 2 and 3 to include another 2 warehousemen to deal with the increased volumes and add value to products through reprocessing.

This scenario shows a profit in year 3 with investment repayment in year 5. The environmental impact savings increase as trading volumes rise to the equivalent of 600 UK residents per year in year 11.

3.2.4 Scenario 4 – Specialist steel yard

This scenario shows a specialist reclaimed steel yard of around 1,200m² (20mx60m) based in the Midlands. The accommodation costs reflect lower rent levels in this area but are increased to take into account the larger site. As a specialist steel yard, the business would not be directly targeting local waste minimisation so local authority support would be unlikely so the rent reduction period is removed.

Sales prices have been lowered by another 10% to reflect the even higher volume deals as have cost prices on materials, which have been reduced by about 8%. Volumes are at twice the level of the mixed product yard and again it is envisaged that a certain proportion of this will be made up by virtual trading, though less than with a mixed yard.

Reprocessing will again happen in house with an additional member of staff joining in every other year from year 4 to cover increased workloads. Average salaries have also been increased above inflation every 2 years to reflect increasing responsibilities.

The rent quoted at £50/m² equates to those in the area and salaries have been reduced marginally compared with earlier models based in the South East.

Other marketing costs have been increased significantly in the first 2 years. A new company specialising in a particular product will need to break into the market in a more forceful manner. This is reflected in a larger advertising and printing budget, as well as additional cover for entertaining.

In year 3 as the yard moves to profitability, haulage will be transferred back in house from external contracts. £40,000 has been allowed for purchasing a vehicle and for conversion to biodiesel or some other greener fuel. An additional member of staff has been budgeted for to carry out collections and deliveries.

Break even point is reached in year 3 with investment pay back within 6 years. The potential for profit growth in this scenario is better than with those discussed previously. Cost benefits can be gained through efficiencies when focussing on specific materials. The environmental impact savings made increase as trading volumes rise to the equivalent of 680 UK residents per year in year 11.

3.2.5 Scenario 4a – Steel megayard

This scenario shows a specialist steel stockist in a 3,000m² (30mx100m) yard in the Thames Gateway area. The company is sized to supply 10% of all the steel needs of the TGDA. It has a throughput of 14,000 tonnes / year and an annual turnover of £8 million.

The site has 3 office staff and 4 staff processing and handling material. It has a fleet of 3 trucks with hiab cranes and 3 drivers. We have also employed 4 steel brokers to generate sources and sales. Salaries are increased to reflect responsibilities. Milling and shot-blasting equipment is significantly increased as are all overheads and marketing expenses.

The company shows annual profits of £1.75 million from the start. The environmental impact savings are equivalent to 2,330 UK residents per year.

3.2.6 Scenario 5 – Timber megayard

This scenario features a 5,000m² specialist timber yard based in the TGDA. It is sized to supply 10% of all the timber needs of the TGDA in the form of milled timber sections (joists and studwork) and flooring. It has a throughput of 20,000m³ of timber products / year and an annual turnover of £6 million.

The company supports 3 office staff, 6 brokers, 4 site staff and 4 drivers. Two of the site staff are qualified stress graders. As for scenario 4a, considerable resources are needed to secure supplies and service the customer base. This is reflected in the salary levels, travel expenses and marketing budget.

Sales prices are lower than for the smaller yards to reflect the bulk prices that large contractors are accustomed to paying.

The company breaks even in the first year and starts making annual profits of around £400,000 until year 5 when a rent revue reduces profits to £170,000. These are very low profits of 5-6% reducing to 1%. The environmental impact savings are equivalent to 2,310 UK residents per year.

Interestingly, there is a reclaimed timber yard in the TGDA of around this same size. However, they do not have the same levels of staffing, brokering or marketing. We are not able to comment on their throughput, turnover or profit.

3.2.7 Scenario 6 – Brick / paving megayard

This plan is for a 7,500m² yard located in the TGDA specialising in paving solutions, stonework and bricks. Sized to meet 10% of the TGDA requirements, the company trades in 20 million bricks, 16,500 m² of paving and 5,000 tonnes of stonework per year. The annual turnover of the company is £6 million.

The company breaks even in the second year and then generates annual profits of £100,000-£150,000. When the rent increases in year 6, losses of £200,000 ...?

However, this is dependant on sourcing bricks at £150/thousand and selling at £250/thousand. New bricks currently cost from £180-280/thousand so this sales price may be achievable. But sourcing at this rate would only be possible from Eastern Europe. Reclaiming bricks within the UK costs at least £300/thousand. This business would therefore require a subsidy or payment for removing bricks. The environmental impact savings are equivalent to 2,770 UK residents per year.

This company needs 7 delivery lorries and drivers. It also supports 18 members of staff of which 3 are office based, 7 drivers, 4 site staff and 4 brokers.

3.2.8 Scenario 7 – Virtual steel yard

This scenario shows figures for a virtual yard specialising in trading steel. This would operate from an office and involve two brokers being on the road for much of the time matching suppliers to client requirements and organising deliveries.

Accommodation costs have been reduced massively but travelling and communication expenses increased by a larger percentage. As principally a sales role, salary costs have been increased significantly on a 2 yearly basis to eventually bring them more in line with the sales sector.

Cost and sales prices have been reset to the levels of specialist suppliers and bulk purchasers and volumes lowered from those set when physically trading from a yard. More deals can be completed if a stock is held as matching supply and demand is more difficult to arrange when timing is of the essence.

Reprocessing costs have been reintroduced and at a higher rate than are currently paid. This is to allow for the varying nature of material that will be sourced initially. This will level off as supply chains are built and modified, and sources present more uniform material for purchase. As volumes increase reprocessing rates should fall as well and this is shown as a drop from £60/tonne in Year 1 to £45/tonne in year 3. This is still above the £40 a tonne that is being quoted in 2005.

Profitability is reached in Year 4 and investment paid back over the first 6. The environmental impact savings made increase as trading volumes rise to the equivalent of 680 UK residents per year in year 11.

Scenario 7 is likely to be run in conjunction with a yard trading in materials physically, a brokerage service running from the offices of a mixed product yard, for example. Accommodation costs could be shared by both businesses and cross selling opportunities generated.

3.3 Results Summary

Scenario	Trading Profit Achieved	Investment Pay Back Achieved	Average Annual Environmental Impact Saving
1 – Local small mixed yard	Year 5	Year 10	250 UK Residents
2 – Local Authority partnered small mixed yard	Year 3	Year 6	250 UK Residents
3 - Local authority partners, medium sized, local, semi-mixed yard	Year 3	Year 5	350 UK Residents
4 - Specialist steel yard	Year 3	Year 6	405 UK Residents
4a – Specialist steel mega-yard	Year 1	Year 1	2330 UK Residents
5 – Specialist timber mega-yard	Year 1	Year 1	2310 UK Residents
6 – Specialist brick/paving mega-yard	Never	Never	2770 UK Residents
7 - virtual steel yard	Year 4	Year 6	405 UK Residents

Small local mixed yards are only viable in the South East if they have assistance in the form of reduced land rent or a grant. Yards become more profitable if they specialise in one material type or if they move out of the South East.

The steel and timber mega-yards look to be profitable ventures from the start but they would need enormous strategic commitment at all levels to achieve both the supplies and the customers. Compulsory pre-demolition audits and compulsory 10% reclaimed targets across all construction work would create the market that these mega-yards would need. The establishment of these mega-yards would require technical, sales and marketing expertise from large scale traders and material stockists.

4 TRADING IN RECLAIMED BUILDING MATERIALS

4.1 Introduction

This section looks at the practicalities of sourcing and supplying reclaimed materials. Sourcing

Building up reliable and regular supplies of reclaimed materials is half the challenge of bringing about widespread use. Building materials can be reclaimed from a number of sources:

- Demolition or refurbishment projects
- Over-ordered or temporary material on construction projects, e.g. façade supporting structures
- Specialist reclamation yards
- Company or organisation rationalisations, e.g. closing of a council works facility
- Direct from waste stream, from local authority collection stations
- Other reclamation or recycling companies

In order to secure streams of material, advertising is essential. Potential sources and suppliers must be aware that the materials are required and in what condition.

Techniques for reaching new suppliers:

- Wanted Bulletin - an A4 sheet distributed to demolition and construction contractor.
- Material Postcards – a simple postcard with an image of the material required on the face and specifications and contact details on the reverse. To be mailed to large and small contractors, local authority waste and works departments, specialist reclaimers and recyclers.
- Websites – Wanted pages on the company website and advertising requirements on external websites such as Salvo.
- Telephone canvassing initiatives – programme of calls to potential suppliers identifying materials contact and advising them of requirements. Target lists can often be based on trade association membership lists.
- Local demolition reviews – identify projects planned in the area through the local authority and contact the contractor undertaking the work.
- News items – identify local projects through news and local media that may release materials and contact developers or contractors.

Most supplies will come from existing relationships. The likelihood of repeat business from suppliers is good as long as they have experienced no problems or delays with previous reclamations. Key concerns amongst demolition contractors are that reclamation will

- Delay projects
- Divert manpower
- Require site space

All three will impact on the contractor's ability to complete projects to contract. It is vital to manage a reclamation exercise to minimise these effects.

4.2 Estimating visits

The first stage in any extraction project is the estimating visit. Estimating the amount of material to be released from a site is an important exercise in determining the project's viability. Wastage and finished quality after extraction need to be discussed and agreed with the demolition contractor and assessed accurately. This requires experience and is critical to the final value of the material.

BioRegional Reclaimed have over estimated quantities on a number of occasions to their cost, due to lack of experience and not foreseeing wastage or damage. On other occasions, we have over estimated the finished quality and have been forced to spend more time processing or sell the material on at a lower value.

The estimating visit involves taking digital photos, collecting samples and gathering detailed information about the dimensions and specification of the material. Appendix D offers a detailed procedure for an estimating visit with advice about equipment needed and questions to answer.

Test extractions should be undertaken on the estimating visit to give a firm idea of how long each product takes to remove and what tools are required for efficient extraction.

The estimating visit should be undertaken and findings analysed before any commitment is made to extracting materials.

4.3 Extraction work

Extraction work can be carried out by the contractor and the materials sold as extracted. Alternatively a specialist extraction team can work on behalf of the reclamation company. Extraction teams are likely to take more care of the material but will need to fit in with the demolition contractor's programme and access restrictions. There are advantages and disadvantages to both approaches depending on specific situations.

There are key stages in the demolition process where a reclamation company can make a significant impact on the quantity of materials retrieved from a site. At tender stage, a pre-demolition audit could reveal reclaimable materials that would have been overlooked and these may generate extra revenue for the contractor.

There is usually a period when the building is unoccupied between tenants vacating and demolition work commencing. Fixtures and fittings are best taken out at this point as doors, door furniture and other items get damaged early on. Access at this time is often simpler and safer, with lighting and perhaps lifts still in operation.

The "soft strip process" is where the demolition contractor removes all non-structural materials and segregates them for disposal or recycling. Structural items such as steel frame require specialist skills to dismantle and need to be extracted in conjunction with the main demolition process.

Items should be sorted and packaged carefully for transport. Items may also benefit from being labelled at source. Estimates on time and resources required for extracting specific materials are given in the product profiles in Appendix C.

4.4 Storage

Ideally there will be some area for storing reclaimed materials on site for periodic collection though this is often not feasible. Space is a valuable commodity on most sites.

If undertaking a pre soft strip extraction it will probably be possible to store materials on site for the period of the work and arrange a single collection. This reduces transport costs.

If there is no storage available, material must be extracted on a daily basis. Sometimes it is most efficient to be met on site by the haulage vehicle towards the end of the day. Loading can then be done in one concentrated period which limits movements around the site and preferable to the contractor as it is safer.

If contractors are undertaking extraction it will be important to check the material for wastage before transporting. It is therefore suggested that they store the material on site for inspection visits and collection. Wherever possible, any damaged material should be left for the contractor to dispose of. Transport costs for moving damaged materials may make the difference between a viable extraction and one that makes a loss. The condition of materials that will be collected should always be agreed with the contractor at the outset so rejections do not cause offence.

If storing materials at a yard for resale, it is vital to include some form of storage cost in the price to be achieved for the material. Each product profile includes comment and estimates for storage.

Storage and the related transport to and from is the most significant cost in terms of money and the environment involved in the supply of reclaimed building materials. If the timing can be right, the best deal is direct transport from the site of extraction to the site of reuse.

4.5 Haulage

Along with storage, haulage is the principal cost involved with the supply of reclaimed building materials. Haulage costs can determine the viability of a reclamation project with the simple maxim that “the more you can move in one journey the cheaper, both financially and environmentally, it will be”.

Certain materials should only be moved in larger quantities as costs outweigh prices achieved at low volumes. The table below gives estimates of the price per tonne per journey of an average of 100 miles for various differing load sizes. This includes staffing as well as vehicle and fuel costs

Load Size	£/tonne/100 mile
1 tonne transit load BR organised	300
1 tonne transit load by courier	150
1 tonne load by pallet company	60
3 tonne by haulage contractor	66
10 tonne load by haulage contractor	40
20 tonne load by haulage contractor	25
30 tonne load by haulage contractor	20

The loads equate to the use of a transit, flat bed truck, lorry with hi-ab, and lorry with hi-ab and trailer. We are principally focussing on a volume trading operation rather than supply to the public. Bearing this in mind, the table below shows different reclaimed materials and a judgement as to the best method of transport along with the most suitable packing solution.

Material	Packaging	1 tn load	3 tn load	20 tn load	30 tn load
Timber	Bundled and strapped	No	Acceptable	Ideal	Unusual
Stone & Paving	Pallet	No	Just acceptable	Profitable	Highly profitable
Steel	Stacked for strapping access	No	No	Profitable	Highly profitable
Fixtures and fittings	Sorted and boxed	Usual and profitable	Possible on larger jobs and highly profitable	Unusual	Unusual
Bricks & Tiles	Pallet	No	Acceptable	Profitable	Highly Profitable

BioRegional Reclaimed currently believe that haulage is best left to the experts wherever possible. They have already made the investment in personnel and machinery to do the job and the variety of contractors means that prices are competitive. As the company grows, we would hope to develop some green haulage solutions such as a biodiesel company van or by using an environmental haulage contractor. By nature, delivery companies are as efficient as possible, combining journeys and using the most appropriate vehicles.

When developing the plans for larger scale specialist megayards where transport volumes will be higher we will incorporate all forms of potential transport. Rail freight only really becomes economically viable when dealing with loads over 100 tonnes.

When developing the plan for local salvage yards, we will investigate the possibility of vehicle sharing with a local organisation that has fleets of vehicles. Local authorities are known to develop partnerships with companies to use their vehicles when not required. BioRegional Reclaimed would like to investigate this with both Sutton and Merton Councils to see if suitable vehicles are available to undertake local collection runs for commercial building waste. This is a way to reduce the need for initial investment in machinery and as local authorities tend to be implementing greener vehicle management will be utilising less harmful transport methods more fully.

4.6 Packaging

Packaging should be reduced to the practical minimum when trading in reclaimed building materials. BioRegional Reclaimed keeps a store of packaging products that have been retained following deliveries. We use this material wherever possible rather than purchase new packaging.

The table above shows the best method of packaging for different building materials. Packaging such as pallets can be useful in an extraction project as they protect more delicate materials such as tiling and allow the material to be batched into readily resalable lots. A pallet will hold one tonne of stone or paving material on average for example. Pallets are also acceptable to all haulage companies for loading and are

consequently cheaper to move than other methods for loads up to about 10 tonnes. Pallets and any other packaging that BioRegional Reclaimed purchases will always be from sustainable sources. We go into more detail about packaging for specific materials in the product profiles.

4.7 Regulatory hurdles

The drive for standardisation and certification of building materials is a major barrier to the reuse of some reclaimed products. Structural quality issues must be suitably dealt with. There are also other regulatory factors such as fire and electrical certification that prevent the easy reuse of manufactured products such as doors and electrical fittings.

The effects are not uniform across the range of reclaimed products. Reclaimed paving and stone suffers little from certification barriers.

For structural steel, some customers require structural certification by a qualified engineer. This is comparatively easy to undertake and costs can be easily absorbed on all but the smallest batches.

Timber requires some certification if reused in a building structure, though again this can be supplied by a certified tester and there are a number of courses available to qualify as a timber stress grader.

Manufactured building materials such as doors, fixtures and fittings can be more difficult. Fire safety standards cannot be easily transferred when an item is moved from one location to another. Fire re-certification of reclaimed products is much more difficult to achieve for doors and we do not yet know of an economic solution to this barrier. BioRegional Reclaimed has made a couple of approaches to the BRE and ODPM to investigate solutions with no response to date. We will continue to try to raise this issue with the relevant bodies to look for a solution.

One possible answer would be a certificate of standards relating to extraction procedures. If we can document the correct procedures for the safe removal, testing and re-installation of reclaimed products and test operatives against these standards, it may be possible to agree the transfer of certification with the product.

5 MARKETING

Traditionally, most bulk reclaimed building materials have been marketed direct from site or else through salvage yards. Materials are sold for reuse in their original form with minimum reprocessing. Salvage yards hold stocks of timber, stone, doors, metal work in reasonable quantities at yards of between 1-2,000m² in industrial and post industrial zones, normally around larger towns and cities.

A flourishing market in architectural salvage has developed with specialist yards selling antique or unique items at significantly higher prices, though in much lower volumes. The materials will be reclaimed and then processed to add value. Flooring will be cleaned and possibly cut down, stone may be cleaned, metalwork cleaned and coated. These yards normally incorporate a showroom for displaying finished products. They are often situated in a distinctive building such as a deconsecrated church or old industrial site such as a brewery.

The development of the internet and the increased popularity of DIY and styling in home decoration has led to a boom in the market for these high value materials. Specialist yards now advertise products directly over the internet and customers are out there looking to source items themselves, both members of the public and smaller refurbishment and renovation contractors.

The internet has also facilitated the market in medium volume reclaimed materials with the introduction Material Information Exchanges such as the Salvo website. MIEs have given smaller contractors and traders a marketplace to advertise their materials to a wider audience.

Although there is more information available about products, prices and sources now the market has not managed to break into the larger volume sales required to satisfy larger commercial customers. A search on Salvo will show that there are volumes of a specific material available but that the sources are spread around the country and the specifications of the material may well vary dramatically. Materials can be sourced very cheaply but the administration involved puts off the purchasing departments of the larger contractors unless they have a very compelling reason to source reclaimed.

How can reclaimed materials be brought to the larger volume markets that the big construction contractors and public organisations such as local authorities offer?

5.1 Material-specific megayard

A sourcing exercise recently undertaken has shown that volumes of potentially reclaimable structural steel are available from specialist scrap steel stockists around the UK. This is material that tends to be diverted into the recycling stream unless a quick sale can be made for reuse. Ashwells reclaimed timber yard in Essex is good example of this concentration of material in one place for reuse.

Steel mini mega yards already exist for small-medium scale supply.

The formation of a megayard to accept structural steel to certain specifications, e.g. straightness, would create a ready market for this material for the scrap yards and divert it for reuse. The differential between the £50-100 per tonne for steel scrap and

the £250+ per tonne for steel for reuse makes it an attractive option for the scrap yards, if they can get a quick deal. There is a volume turnover led market.

There are over 150 members of the British Metal Recycling Association (BMRA) of which about 100 trade in scrap steel and 25 in reclaimed steel. The 25 members when recently surveyed held stocks of over 2,000 tonnes with high volume input of about 500 tonnes per week. If 10% of this material were diverted to a megayard for resale this would be sufficient to supply construction of two 500m² 3 storey office buildings per week with a potential turnover of between £50,000 and £100,000.

The steel megayard would be a 3,000m² facility focussed on the preparation, storage and movement of steel. Most sources for reclaimable steel are still focussed in the Midlands and further North. Most potential customers for reclaimed will tend to be focussed in the South with the massive expansion planned to prepare for the Olympics. The yard should be located between the 2 markets in an area of comparative under development.

The business model for this mega-yard looks profitable.

5.2 Virtual megayard

Perhaps the first step to a physical megayard would be the creation of a virtual megayard. This is an information service aimed at architects and contractors which would show stocks of reclaimable steel at the 25 BMRA members identified in our survey.

BioRegional Reclaimed can develop a simple database holding information on the steel, dimensions, condition, stock levels and price for each of the members that sign up. This information will be made available via a website and telephone service and advertised to medium and large construction contractors, architects, local authorities, and quantity surveyors.

Enquiries regarding specific products can be channelled through the website and an additional brokerage service offered for more complex orders.

The development of the website would be inexpensive, up to about £15,000, when compared with a physical yard, where costs would be well over £100,000. This solution would also test the market for larger volume reclaimed. The drawbacks are that the material is still dissipated around the country and members of the scheme may not initially see the benefit of their investment of time in supplying stock levels.

The site would require manning by at least one person initially, to develop the stock information, advertise the site and operate the phone service.

Funding could be sought from the BMRA, BMRA members or other waste reduction initiatives.

5.3 Medium-sized general yard

A significant volume of building materials are used in smaller quantities for renovation and refurbishment projects. 50% of construction contracts relate to refurbishment works with a significant proportion being small to medium scale, 2-20 properties. Order sizes tend to be larger than those for the domestic market as a number of properties are worked on at one time. Though individual orders could not be considered high volume their overall effect could be deemed so.

This market could be catered for with the creation of a number of 500-1,000m² reclaimed materials yards stocking a variety of products that can be used in refurbishment. These yards would mirror those salvage yards that already trade in their stocks and levels but would focus on making the materials more available to customers with better yard layout and detailed product profiling and advertised pricing. Materials would be sourced and supplied locally.

Materials stocked would include timber, stone, steel sections, and fixtures and fittings. Stocks would also be represented on the yards website in a similar database to their large virtual yard and advertised to refurbishment contractors and small to medium sized builders.

Visitors would be encouraged to see the quality of material available in the same way that virgin material suppliers present products to clients.

If a chain of these yards can be developed to service local clients and sources, the stocks could be combined via a virtual yard to satisfy larger volume orders. Jewsons do exactly this. If they don't have a material at the local yard they bring it in from another branch.

The emphasis would be very much on the environmental benefits of using reclaimed materials with ecopoint ratings assigned to products and quantifiable benefits supplied with materials. This will distinguish these yards from the straight salvage yards that exist at present and hopefully make the yards more approachable to clients in general.

Local authority waste targets are soon to shift emphasis from domestic recycling to commercial waste minimisation. There is a very creditable link between the development of smaller local recycling yards and the diversion of local trade waste, such as paving or stone, for reuse. This link can potentially be exploited by a commercial reclamation operator developing a relationship with the local authority to supply land for a site in return for the contribution to waste minimisation targets that the reclaimer will make to the area. BioRegional Reclaimed will be developing existing links with Sutton Council to explore this proposal further.

Trade Supplier Tie Ups

The large volume suppliers of building materials such as Screwfix, Trademate and B & Q do not generally supply reclaimed materials. There are some reclaimed bricks advertised but these tend to be from Eastern European sources and are consequently more environmentally destructive because of haulage that using virgin products manufactured locally.

There are some reclaimed products such as limestone and sandstone paving which are increasingly difficult and expensive to buy as virgin material. They tend to be

retailed to individuals as patio packs in limited slab sizes up to 600x450mm. The high prices that can be achieved, up to £150 per m², means that there may be sufficient margin to offer the choice of reclaimed. Sourcing sufficient quantities will always be the major hurdle.

BioRegional Reclaimed is to investigate the business model devised by BioRegional for the supply of regionally produced charcoal to B & Q on a national scale. This model may be tailored to suit the supply of specific reclaimed materials, and we would suggest starting with paving or stone, from regional sources for supply to local outlets.

If stone and paving are used as lead products, weight will necessitate delivery on most orders. It may also be possible to offer a showroom service at the retail outlet linked to a green delivery service direct from the supplying yard. This would cut down haulage from yard to store to customer by one journey.

Again the materials will be marketed on their quality, price and environmental benefit over using virgin. An ecopoint rating for each material will be sought as a tangible measurement of environmental benefit that purchasers can appreciate.

As supply will be the principal barrier for the larger retails this initiative may have to be explored on a regional basis initially linked to the development of a specialist megayard or perhaps a virtual megayard.

Discussions with likely partners could be started by looking at the high value products they stock and the volumes currently sold. This will determine potential stock levels required and give an estimated sourcing radius. These figures can be used to test the financial and environmental viability of each product before further development of the range.

5.4 Facilitating volume deals between site and specialist retailers

A vast amount of potentially reclaimable material is still be lost at small to medium sized demolition sites. There is a potentially profitable role for BioRegional Reclaimed to act as facilitator to deals where material is sold directly from site to a specialist reprocessing or retailing company.

BioRegional Reclaimed will advertise to small and medium sized contractors for specific materials through telephone contact, direct mail and the website. We will identify material required, pine joists for example, condition and price range payable where appropriate. The material when offered will be offered directly to specialist retailers for reprocessing, principally cleaning, as a batch.

Recent experiences have shown that the facilitator's role should be kept to a minimum. However, the material must be purchased from the source before offering for resale to prevent gazumping. Material should be offered as extracted with a unit price to match and transport undertaken by the purchasing company.

Any company bidding for the material should be encouraged to undertake a site visit to check quality. Samples should be extracted to facilitate offers. More detail for this process is shown in our estimating visit chapter.

The key advantages to this sort of deal are that they are quick, move medium volumes directly from source to reprocessing and sale site and divert potentially

useful waste. They encourage financial rewards to contractors for reclamation and generally build the supply chain.

Disadvantages are that material costs remain low and most profit on the deal is retained by the retailer. There is the possibility of gazumping or losing valuable sources direct to retailers. The quality of the product must be agreed before supply as retailers must accept the responsibility for reprocessing costs which will rise as quality falls.

BioRegional Reclaimed will continue to develop these deals wherever possible until a yard is developed to accept and reprocess the materials sourced.

Developing Materials Consultancy with Public Sector Bodies

BioRegional Reclaimed has developed a relationship with the London Borough of Lambeth to advise on reclaimed materials and their use. We would like to develop this relationship along with others with other publicly funded bodies to offer advice and source materials. Councils and other bodies such as Groundwork use significant quantities of building materials each year. We intend to approach these organisations with a proposal to undertake a material survey. This survey will analyse the building materials purchased each year, quantities ordered and actually used, and current sources. We will then offer advice on where to potentially source reclaimed from both waste generated within the organisation or external suppliers.

We will probably offer this service free to the first two “test” organisations, initially identified as the London Borough of Sutton and Groundwork Merton, to hone down the process and the market the survey on a fee paying basis.

This will not only open up the organisation to the possibilities of reuse on a practical level but generate potential business for BioRegional Reclaimed through sourcing specific products.

6 APPENDIX A – THAMES GATEWAY

6.1 Development Activity and Materials Usage in the Thames Gateway Development Area to 2016

As the basis for the feasibility study into a commercial reclaimed building materials facility in the Thames Gateway, it is necessary to estimate the total potential market for these materials for the foreseeable future.

To determine this we have looked at the proportion of UK development that took place in the TGDA in 2002 and used this ratio in conjunction with total materials usage for that year to calculate the amounts of materials used in the TGDA in that year. We have then determined planned development in the TGDA until 2016 and can predict annual materials requirements to satisfy these plans.

The data used to determine these figures and calculations are laid out below.
Construction Activity in 2002

The *LDA Housing Provision Report 2004* shows housing completions in the TGDA boroughs as 6800 in 2002.

The *House building in the UK 1999-2004 Report* from the ODPM/ONS shows housing completions of 169,100 for the whole of the UK in 2002.

Therefore in 2002, 4% of all UK house building took place in the TGDA.

For commercial activity we have looked at the *ODPM Commercial Floorspace Statistics 2004* and analysed the figures for 2002.

Total commercial floor space development in the UK in 2002 was 9,165,000 m².

Total commercial floor space development in the TGDA boroughs was 678,000 m².

Therefore in 2002, 7.4% of all UK commercial development took place in the TGDA.

Residential and commercial development account for similar percentages of total development activity so we feel we can weight the percentages evenly and say that the TGDA accounted for some 5.5% of all UK development in 2002.

Building Materials Usage

Building materials usage figures for 2002 are taken from data supplied by the DTI and CIRIA. Using the development ratio calculated above we can estimate the materials usage in the TGDA in 2002 to be around 18.5m tonnes (see table below).

Material	%	'000 tonnes	TGDA Usage '000 tonnes
Crushed rock	37.4	126,568	6961
Sand & gravel	24.4	82,539	4540
Cement	3.3	11,072	609
Clinker	3.0	10,146	558
Slate	0.0	78	4
Ready made concrete	15.8	53,494	2942
Concrete building blocks	10.2	34,644	1905
Concrete roofing tiles	0.8	2,568	141
Fibre cement products	0.0	158	9
Bricks	2.2	7,409	407
Glass	1.0	3,349	184
Steel	0.7	2,500	138
Other metals	0.3	850	47
Timber	0.6	1,925	106
Plastics	0.2	550	30
Paints	0.1	410	23
	100.0	338,260	18604

6.2 Projected development in the TGDA

Development planned in the TGDA to 2016 is well documented. It has been split into 3 4-year phases and housing and commercial development targets have been specified. Housing Targets are featured in the *Thames Gateway Development & Investment Framework* published by the LDA. The residential development figures for each region and phase are as follows:

TGDA Zone of Change	Housing Targets in Units			
	2002-2006	2007-2011	2012-2016	Total
Isle of Dogs	4380	2350	1060	7790
Deptford & Lewisham	3470	5580	750	9800
Greenwich Peninsular	1890	5660	2450	10000
Stratford	0	1860	5440	7300
Lower Lea	1450	10320	3630	15400
Royal Docks	1510	6760	2030	10300
Barking Town Centre	530	1870	1310	3710
London Riverside	260	2590	15040	17890
Woolwich TBE	4430	3390	990	8810
Total	17920	40380	32700	91000
Average per year	4480	10095	8175	7580

These annual figures can be compared with the 2002 figure of 6800.

Commercial development figures are available in terms of jobs created. In order to translate them into floor space, we have had to assume that each job created will require an average of 19 m² of space to support it. This is an average figure from across a range of business uses.

Growth estimates for areas, jobs and therefore floor space were released by the GLA in the *London Plan 2003*.

Opportunity Area	Area (ha)	New Jobs to 2016	Floorspace requirement for new jobs (@ 19sqm per person)	Average per year
Bishopsgate/South Shoreditch	35	16,000	304,000	25,333
Whitechapel/Aldgate	31	14000	266,000	22,167
Isle of Dogs	100	100000	1,900,000	158,333
Deptford & Lewisham	72	5500	104,500	8,708
Greenwich Peninsular	104	15000	285,000	23,750
Stratford	124	30000	570,000	47,500
Lower Lea	250	8500	161,500	13,458
Royal Docks	368	11000	209,000	17,417
Barking Town Centre	210	200	3,800	317
London Riverside	418	4000	76,000	6,333
Woolwich TBE	363	6500	123,500	10,292
Ilford	56	0	0	0
Total	2,131	210,700	4,003,300	333,608

This annual figure of 333,608m² is less than the 2002 figure of 678,000 m² but in the same ball park.

Annual housing completions will increase over the next 10 years and commercial development construction will decrease. Overall therefore, we predict that demand for building materials in the TGDA will be in the range of 15-20m tonnes each year.

Opinions vary on the potential for reclaimed content in construction. New build major projects tend to have much lower reclaimed content than the national average for all building projects. Most reclaimed materials tend to get used in refurbishments and individual homes. Despite this, Salvo claim that reclaimed materials account for some 10% of the national expenditure on construction materials.

Best practice in reclaimed content can probably be targeted at 25% by value. Good practice could be set at 15% by value. So to meet good or best practice targets, there could be a market for some 2–5m tonnes of reclaimed materials each year.

Building Materials Manufacture and Supply Data

The Office of National Statistics produces extensive information about the manufacture and supply of many building products. They report sales by value and volume in most cases. It is possible to use these figures in conjunction with our development ratio previously calculated to determine potential demand in the TGDA for specific materials in more detail.

Here is a selection of materials with information about supply in 2002, growth rates and estimates of market size in the TGDA.

Material	PCC Code	2000 Net UK Supply (£000)	2001 Net UK Supply (£000)	2002 Net UK Supply (£000)	2003 Net UK Supply (£000)	Avge Growth 2000- 2003	TGDA Market 2002 (£000)
Timber Doors & their frames & thresholds	203011150	784138	797762	893747	831208	2%	49156
Flooring Parquet panels of wood for flooring	20301219	68170	86430	61625	63177	-2%	3389
Construction Shuttering for Concrete	20301230	676	681	236	1124	22%	13
Construction Railway Sleepers not impregnated	20101010	2111	3483	889	1860	-4%	49
Railway Sleepers impregnated	20103200	4584	5068	4617	3680	-7%	254

These are sample materials to illustrate the volume of data available. Individual market profiles will be included in the material profiles being produced as part of this project.

7 APPENDIX B – PRODUCT PROFILES

7.1 Reclaimed timber joists

7.1.1 Introduction

Timber joists are regularly reclaimed from small to medium sized demolition projects for reuse or reprocessing into flooring. The principal species that enter the market are pine and oak in the form of floor joists, roof rafters and supporting beams. Other timbers such as maple and teak also become available.

The principal source of timber joists is the demolition of period, 18th to early 20th century, residential and small commercial buildings. These can provide significant quantities of material in batches of regular dimensions and condition. Over 25% of oak beams now sold in the UK are sourced from Europe, mainly France.

As with bricks, there is an established market for reclaimed joists and demolition contractors adjust demolition methodologies to reclaim material knowing they will receive a financial return for their efforts.

Salvage yards hold significant stocks of joists sorted by dimension and length, although batches do get mixed and uniformity suffers. Higher unit prices can be achieved for uniform batches from a single source as these can be reprocessed more efficiently if required.

As with all reclaimed timber, care should be exercised when dealing with material that has been previously treated as current Health & Safety regulations now ban some of these previously used treatments.



7.1.2 Prices for New & Reclaimed

Prices for joists are usually quoted by volume or linear length. The imperial standard of cubic or linear foot is still regularly used amongst the trade though metric is much more easily calculated. It is usually worth recording all quantities in both feet and metres when dealing with timber.

There is a hierarchy of prices for different timber joists with oak and teak at the top of the range, through elm and pine in the mid range to pitch pine at the lower end of the scale. Some rare woods come onto the market but prices for these fluctuate significantly depending on specification and current demand.

The prices achieved for reclaimed joists increase with size and length as a rule. 100x50mm pitch pine will start at about £0.30 per m for 3m length up to £80-100 per m for 300x300mm oak beams of the same lengths.

This table gives some examples of the new and reclaimed products available and links to suppliers and their websites.

Product	Specification	Supplier	Price	Link
Oak/Elm/Chestnut beam reclaimed	Variety of 4x3 and 5x2 to clear yard	Cox's Architectural	£15 per cu m	Various Beams & Joists
Laminated Pine Beams reclaimed	6 x 22'x15.5"x4.5" beams	Bures Reclamation	£360 or £2.50 per ft	Pine Beams
Old Oak Beams	Up to 12"x12"x20'	Ransfords	£25 per cu ft	Oak Beams
Huge Oak Beam	9.5mx10"x12"	Beeston Reclamation	£1291 of £40 per cu ft	Solid straight oak beam
Reclaimed pine beams	30+x8"x2"x20'+	Chris Humphries	£0.65 per ft	Reclaimed pine
Pitch Pine Beams and Baulks reclaimed	12"x12" and 12"x6" up to 28'	Hargreaves Reclaimed Flooring	£12 per cu ft	Pitch Pine Beams
Planed Softwood New	4"x4" timber not specified	Merton Timber	£9.36 per m	
Planed Hardwood New	4"x4" PAR hardwood	Merton Timber	£18.83 per m	

7.1.3 Salvageability

Timber joists are regularly salvaged from small to medium sized demolition projects cost effectively for both the contractor and the client. Demolition techniques for 2-3 storey brick built properties lend themselves to timber extraction and wastage rates can be kept low with efficient contractors.

Short term storage is usually available on out of town demolition sites. Timber extraction takes place at a specific stage of the demolition which means the material becomes available over a short period. This cuts down the problem of demolition contractors having to store materials for lengthy periods as they can batch the material quickly for collection.

Beams are usually extracted with little or no damage. Joists will usually have been attached at each end which can lead to small amounts of nail damage on extraction. It is usual to allow up to 60cm wastage at each end of a joist.



7.1.4 Extraction Costs

Timber joists and beams will in most cases be offered extracted with a batch price that incorporates the contractor's costs. It is sometimes possible to negotiate a price for the timber denailed though the quality of the denailing will vary with the contractor and further reprocessing may be required.

The estimating visit will determine a likely volume of timber to be released and the batch price can be negotiated from this. However, the actual price paid on extraction should depend on the quantities of material actually released. Batches should be measured on collection and any adjustment made for undersupply.

Batch prices sought by demolition contractors for joists are usually between 25-33% of the current unit price for the relevant material in a tidied up state from a wholesaler.

7.1.5 Handling & Haulage

Beams and joists are comparatively easy to handle and transport. They can be batched into dimensions and lengths and moved by hand or with lifting machinery. As with all materials, the larger the volume moved, the lower the price per mile.

On a project recently we loaded up to about 3 tonnes, 300m or 100 No. 250x75mm pine joists by hand in about an hour and a half with two people onto a 7.5 tonne truck. Lengths were limited to about 6 metres on this vehicle. With a delivery of 50 miles and a cost per load of £200, this equated to £0.7 per m on this trip.

Quantities over 3 tonnes should be moved on larger vehicles with integrated lifting machinery. This relies on having unfettered access to the batch but can bring transport prices down to about £500 for a 10 tonne load of 1000m of joists or £0.5 per m.

7.1.6 Storage Space Requirements

Timber is much less dense than other materials so volume is an issue with storage. Timber is also supplied in long lengths that can be difficult to incorporate onto a site. Timber joists in salvage yards are often stored on end in batches by dimension and length. This means each joist takes up the minimum floor space though height becomes an issue if the yard has a roof. On end stacking is used when timber is stored outside as the material absorbs less moisture from rain.

Our estimates show that 30 joists of 200x75mm (whatever the length) can be stored in a square metre allowing for space to view and move. If the average joist is taken as 4m long with our standard £100m² pa property costs, it equates to a cost of around £0.85 per linear metre per annum.

Reprocessing & Cleaning

The condition of the timber on extraction will determine the uses it can be put to in the future. Beams often need little or no reprocessing as they will be reused for the same purpose and it is the aged effect of the timber that is sought after by potential purchasers.

If extracted joists are going to be reused as supporting timbers it may only be necessary to denail the edge that has been attached to flooring in the past to produce a smooth surface before resale. Previous projects show that about 200 linear metres of 200x75 mm timber can be denailed in a day by one person. With a charge rate of £120 per day this equates to £0.6 per linear metre. This figure will vary considerably according to the condition of the timber.

Where timber is to be reprocessed into flooring or furniture, more preparation is required. If selling timber on as a batch to a company for reprocessing, it is simplest

to agree a price as extracted. The reprocessing company will know the condition required for effective reprocessing and passing on the responsibility for achieving this prevents future difficulties with respect to specification.

It can sometimes be more effective to remove areas affected with nails rather than denail though it does increase wastage. This should always be discussed with potential clients as an option.

Timber can often be treated before milling by kilning for a short period of time to remove excess moisture and kill any worm infestation.

Milling costs for transforming joists and beams into flooring equate to about £5-10/m² for fully denailed timber. If there are any nails or other impediments left in the timber this figure can rise significantly as a typical milling yard will charge £60 per hour for labour including denailing or for the cost of blades and delays caused by the nails. Any form of denailing in the yard can raise milling cost by a factor of 2 to 3 making it cost effective for only prime materials such as oak which can command up to £200/m² at retail prices.

7.1.7 Ease of Specification

Joists are usually available in standard dimensions still used today. The measurements may be imperial with standard sizes of 6x2 inch rising to 12x4 inch. These can often be seamlessly incorporated into new structures and makes them suitable for bulk volume supply, if the materials can be gathered in sufficient volumes.

Beams are often more varied but then so are the uses they are put to. This means they fit less well into the bulk volume market as they will often be purchased as “one offs” as a feature in a residential renovation.

Joists are providing significant volumes of material for reclaimed flooring sales. Dimensions allow the production of wider boards up to 30cm. These are more sought after and command premium prices.

7.1.8 Structural Certification & Quality

There are key barriers in the way of the extended use of reclaimed and recycled timber products in developments.

- Performance – strength grading testing may be costly as timber may require preparation.
- Chemical Contamination – Previous treatments unknown may hamper chemical testing.
- Species – May be unknown or difficult to identify.
- Aesthetic – Colour and texture may not be suitable for new purpose.
- Delivery – Requirements as to origin may have been stipulated.
- Physical Contamination – Removal of fixings and cleaning.

The standards and barriers associated with reclaimed timber are:

Standard No.	Title	Barrier
BS 5268-5:1989	Structural use of timber. Code of practice for the preservative treatment of structural timber	Species specific
BS EN 460:1994	Durability of wood and wood based products. Natural durability of solid wood. Guide to the durability requirements for wood to be used in hazard classes	Species specific
BS 373	Testing methods for small clear timber specimens	Requires that timber should be tested in green and seasoned condition.
BS 4978	Softwood visual strength grading	Specified method of strength grading is not possible on reclaimed wood.
BS 5756	Hardwood visual strength grading	Requires visual grading
BS 6446	Manufacturing specifications for glued structural components	Specifies that the species or type and strength class shall be those specified in the design of the component.
BS EN 386	Performance and production requirements for glued laminated timber	Timber should be defined by its strength class or strength properties and to be strength graded against European standards.
BS EN 518	Structural timber visual strength grading	Visual strength grading of timber.
BS 5268 – 2	Structural use of timber code of practice	Requires strength grading
BS 5268 – 3	Trussed rafter roofs code of practice	Requires strength grading
BS 5268 – 6.2	Timber frame walls code of practice, buildings other than dwellings	Requires strength grading
BS 5268 – 7.1	Domestic floor joists	Requires strength grading
BS 1297	Tongue and groove flooring softwood flooring specification	Species
BS 8000 – 5	Workmanship on building sites code of practice	Species, grade and preservative used should be shown on delivery.
BS EN 975 – 1	Hardwoods appearance grading	Appearance grading
BS EN 1611 – 1	Softwoods appearance grading	Appearance grading
BS 8103 – 3:1996	Structural design of low rise buildings. Code of practice for timber floors	Performance

BS 476 – 23/1987	and roofs for housing. Fire tests on building materials and structures. Methods for determination of the contribution of components to the fire resistance of a structure	Chemical
BS 585 – 1:1989	Wood stairs. Specification for stairs with closed risers for domestic use, including straight and winder flights and quarter and half landings.	Aesthetics

Timber requires visual inspection before it can be reused in structural support situations. This involves assessing condition, structural integrity and previous treatments.

Stress grading, undertaken by a qualified assessor, will normally be required for large scale use of reclaimed structural timber. This is a more detailed survey which can be undertaken by external consultants but the size of the batch has to be large enough to justify the additional expense incurred. A stress grading specialist will typically charge £500-750 a day and will be able to assess most sizes of batch in this time.

Other quality issues with reclaimed timber relate to rot and worm. Worm is acceptable in most reclaimed timber as long as structural integrity is not affected. Wood can be heat treated to kill any worm and material reused. Rot is far more serious and affected areas should be removed on extraction to prevent spread.

There could be other potential problems with infestations; Death Watch Beetle for example, though it is highly unlikely that any infected building will be demolished with a view to reclamation and the material does not enter the market.
 Potential Market

The market for reclaimed beams is principally focussed on residential development or refurbishment. Items are seen as one offs and are purchased as features rather than for use across the project. A good quality old oak beam can start at £500 which makes it good economic sense to reclaim and reuse these products.

Larger scale reuse of both boards and roof joists does not happen often perhaps because of perceived problems with the specification of reclaimed in general. It should be viable to reuse the complete flooring system but it is mainly restricted to just the boards at present.

As stocks of joists are spread around a number of suppliers it is a significant barrier to their large scale reuse. Purchasers cannot be bothered to chase a number of leads to build bigger orders. The timber yard stocking all dimensions of virgin material is a quicker option. There are sufficient quantities of reclaimed available to supply medium scale construction projects but a mechanism of combining and advertising these is needed if purchases from big contractors are to be generated.

There still seems to be a big gap in the market between the demolition contractors and the reclaimed timber suppliers and a lot of material is still being burnt or wasted. This would seem to indicate that there is room in the market for new reclaimed timber

specialists though our business scenarios show it would be difficult to run a business on the profits from reclaimed joists and beams alone and some reprocessing into higher value products would be required.

7.2 Timber flooring

7.2.1 Introduction

The market for timber flooring has expanded rapidly in the last 15 years. Some of this has been driven by the introduction of new manufactured solid and laminate wooden flooring systems and some by the influence of make over shows making the public more aware of their interior design and increasing the desire for authentic reclaimed quality timber flooring.

In the past there was a trend to strip down timber flooring to reveal the original boards and fill damaged areas with reclaimed products. Nowadays, clients are making positive decisions to replace poor quality originals boards with better quality or more sought after wood.

There are a number of specialist suppliers of reclaimed flooring that range from the salvage yard format, supplying unprocessed product, to architectural antique outlets providing cleaned and milled boards at a premium price.



About 9 million square metres of flooring is reclaimed each year in the UK. 30% of this is converted from structural timber with the remainder reclaimed original flooring. Of this remaining 6.5 million m², 78% is pine boards, 6% oak boards, 5% temperate hardwood strip, 2% tropical hardwood strip, 4% temperate hardwood block, 2% tropical hardwood block, and 2% parquet. Prices for New & Reclaimed

Prices tend to be quoted in £ per square metre though some new flooring systems are sold in packs of between 1m² to 2.5m².

Of the woods varieties, reclaimed Oak and tropical hardwoods command the highest prices, with maple and beech in the mid range and pine at the low end. This is replicated in the costs for new floor products.

Prices also vary given the dimensions of the boards. Wider boards from 20-30cm command a significant premium over more standard 15cm boards. Most modern boards are also between 15-20mm deep with the cheaper end of the range going down to as low as 10mm. The length of the board does have some impact on price though this is not a key issue, unless the lengths are consistently less than 2m when a discounted unit price has to be considered.



Product	Specification	Supplier	Price	Link
New Oak Strip Flooring	English Oak Character Flooring EX 5" U/V Lacquer PK 2.0m ² ENG5PF (555125)	Trademate	£53.33m ²	New 5" Oak Strip - Trademate
New Oak Contract Flooring	Atkinson & Kirby Contract Flooring Oak 130mm PK 1.716m ² (723538)	Trademate	£79.78m ²	130mm Oak Flooring Kit - Trademate
Plain new Oak Flooring	Jackwood 20X152mm Unfinished Oak Prime Flooring 1.95m ² (535419)	Trademate	£65m ²	Unfinished Oak Strip - Trademate
Basic Oak Veneer Flooring	B & Q basic flooring pack no mention of depth	B & Q	£19.50m ²	Basic Oak Flooring - B & Q
Standard solid Oak boards	14mm solid wood with clip assembly system	Flooring Supplies	£47.50m ²	Red Oak Classic Boards - Flooring Supplies
Unfinished Oak T & G Boards	20x140mm unfinished various lengths	Wonderful Hardwood Flooring	£28.95m ²	Unfinished 140mm Oak - Wonderful Hardwood Flooring
Reclaimed Antique Oak Flooring	19 Century Oak random width	Drummonds Architectural Antiques	£95-£200m ²	19C Oak flooring - Drummonds
Reclaimed Rustic Oak Boards	130mm pre-finished random lengths 400mm to 1800mm	Cronin's Reclaimed - Salvo	£27.50m ²	Oak Flooring - Cronin's
Oak Flooring	Oak flooring, solid European oak, end matched, sanded and filled	Salvo	£14m ²	Oak Flooring - Salvo Admin
Wide Victorian Oak Floorboards	quantity 17sqyd, widths 5.5"-9.5", thickness 1",	Kate Phillips, Kent - Salvo	£100m ²	Victorian Oak Boards - Salvo
Antique Oak Floorboards	Wide	Cox's Architectural	£125m ²	Reclaimed Flooring - Cox's
Reclaimed Pine Flooring	Range of pine products	Chauncey's	£21-65m ²	Chauncey's Reclaimed Flooring

This is a small selection of the companies that supply reprocessed reclaimed flooring. Most salvage yards will keep stocks of unprocessed boards of varying quality and consequently sell at lower prices. The large DIY operators do not quote reclaimed boards in their stock lists.

Company

Cox's Architectural
Reclaimed Timber Specialists
Retrouvius

Chaunceys

Product Range

Reclaimed Flooring. Possible customers
 Flooring

Posh Reclamation, possible customers if flooring is
 antique

Cleaned and denailed reclaimed flooring oak and
 pine. Possible customers

7.2.2 Salvageability

Floor boards are long and comparatively thin and are therefore prone to damage on extraction. Unless the extraction process is carefully planned and managed a lot of timber is wasted. This can be as much as 50% for some Victorian boards fitted with a tongue and groove.

When estimating the quantity of boards that can be released from a demolition project it is advisable to test the extraction process on a number of sample areas. This allows for a more accurate estimate to be made. A price for reclaimed flooring should be agreed with the demolition contractor based on an area to be extracted. If less is taken out the price paid should be reduced accordingly.



A significant quantity of reclaimed flooring is made from timber joists taken from demolitions. The joists are sliced to produce 2 boards and then trimmed, squared and tongue and grooved to the required width.

Nails in old joists present a problem when milling for flooring. They tend to have deteriorated when in situ and can be difficult to remove as they are rusted and break easily. It is advisable to try to work out reuse solutions that involve the removal of the affected areas rather than denailing. Denailing is never 100% accurate and stray nails cause disproportionate problems and increased milling costs.

7.2.3 Extraction Costs

On smaller demolition projects the contractor will usually extract the timber and offer as a job lot. This is especially true in older residential properties where timber can be separated relatively simply and there is a small established market for the product. As contractors know there is a market for the product they are willing to commit the manpower to release it.

The danger with this is that the contractors' priorities may differ from the person buying the reclaimed timber supplier. More material is damaged and therefore wasted. Costs for timber extracted by the contractor range from the equivalent of £1-3m² before wastage.



If undertaking extraction, a team of at least three is required. Lengths can be up to 8m long and at ceiling height so mobile variable height platforms are also required for safety.

A team would be able to remove an estimated 25-30m² of flooring and joists in a day from a site. This is enough to produce about 50-60m² of flooring after processing. This equates to an extraction cost alone of about £10m² of useable timber.

Perhaps the most cost effective solution is for the demolition contractor to undertake extraction with the reclaimed material consultant attending on the first day to work to discuss technique, observe workmanship and most vitally minimise and accurately estimate wastage.

7.2.4 Handling & Haulage

Timber flooring is comparatively easy to handle and store as it tends to be long and flat. When dealing with large quantities it should be sorted into batches by species, dimensions and length after extraction and processing.

Most big batches of reclaimed timber will fulfil a number of orders. Having a segregated stock allows clients to easily identify the product they require and makes it simple to build orders and package them for transport.

Flooring can be banded into bundles of 1-3m² with the exact number of boards varying by dimension. As an example, 1 15x300x2cm board has an area of 0.45m², an average room of 5x4m would require 45 boards. These can be banded into 9 bundles of 5 boards for transport in a small transit size van.

7.2.5 Storage Requirements

Cool, dry and well ventilated storage is required for all timber products. Boards should be sorted by timber species, dimensions and length and stored in racking to make viewing easy. As shown above an average board will be 0.45m², if stood on end it should be possible to fit about 100-125 boards or 45-50m² in 1m² of storage.

Storage costs = 1m² = £40 per year. 1 m² of board = £1 per year = £0.1 per month.

7.2.6 Repair & Preparation

Most reclaimed flooring will require some preparation before sale. This may range from a simple brush down with a stiff bristled brush to remove surface dirt which can be done on extraction, through to the milling of joists to make boards.

Contractors tend not to denail on extraction. Denailing is comparatively easy with modern boards but can be very difficult in Victorian or older boards where nails have deteriorated.

Denailing a test area is advised before deciding on the processing of the remainder of the batch. It may prove more cost effective to remove areas affected by nails rather than to denail older timber.

Damaged areas of board should be trimmed off before storage. In fact this is probably best done on the extraction site if possible, to prevent transporting waste.

Unless the surface is in a very poor state most boards should be cleaned and stored as extracted. A significant proportion of clients are buying reclaimed flooring because of the character of the timber. Excessive cleaning or sanding can remove this character and reduce the price clients are prepared to pay. The client should be offered the board in its current state and further processing discussed.

7.2.7 Ease of Specification

Timber has been used in specific dimensions for many years. Everyone will have heard of 4 by 2s referring to the 4 inch by 2 inch sections and there are many other regularly used dimensions.

This means that timber used in constructing floors 150 years ago can often be reused for exactly the same purpose now without reprocessing. The only potential change is that measurements may now be quoted in metric units. Indeed the dimensions used in the past, with boards up to 10 inches (23cm) wide, are often very sought after now as standard modern flooring tends to be restricted to 6 inches (15cm) wide.

With flooring made from reprocessing joists and other structural sections specifications are less important as the boards can be milled exactly to the clients' requirements.

7.2.8 Certification & Quality

There are key barriers in the way of the extended use of reclaimed and recycled timber products in developments.

- Performance – strength grading testing may be costly as timber may require preparation.
 - Chemical Contamination – Previous treatments unknown may hamper chemical testing.
 - Species – May be unknown or difficult to identify.
 - Aesthetic – Colour and texture may not be suitable for new purpose.
 - Delivery – Requirements as to origin may have been stipulated.
- Physical Contamination – Removal of fixings and cleaning.

The standards and barriers associated with reclaimed timber flooring are:

Standard No.	Title	Barrier
BS 5268 – 7.1 BS 1297	Domestic floor joists Tongue and groove flooring softwood flooring specification	Requires strength grading Species
BS 585 – 1:1989	Wood stairs. Specification for stairs with closed risers for domestic use, including straight and winder flights and quarter and half landings.	Aesthetics

7.2.9 Potential Market

There is a huge potential market for reclaimed flooring amongst domestic customers and small contractors as more and more people take an active role in maintaining and improving their properties.

Older hardwoods with large dimensions can command premium prices way above that that would be achieved for new.

A significant proportion of reclaimed flooring is produced by milling reclaimed structural timber. Perhaps the most effective way to do this is to maintain stocks of joists in various dimensions with examples of the boards that can be created from each. The client can then examine these and determine the species, size and length of board that they require. The boards can then be milled from the stock to order.

The potential to supply medium and large scale clients is more limited and specification becomes more exact on larger projects and quality issues that may not affect a small project become more significant.

7.3 Bricks

7.3.1 Introduction

Bricks are used in huge quantities in both residential and commercial development both in construction of buildings but also infrastructure. The UK net supply of non-refractory clay brick in 2003 was around 3,000 million bricks. The market was worth £630m with an average unit price of £0.18.

Bricks principally tend to be employed in developments below 30m height.

Bricks are also in plentiful supply through demolition with over 2.5bn available each year. Only 5% of these bricks are reclaimed, about 50% or 1.2bn are crushed and used for landscaping. The reclaimed brick market is mature compared with other products with the large quantities encouraging big trade suppliers like Trademate to offer extensive ranges.

Reclaimed bricks tend to be either handmade or wire cut or less often machine pressed. This is because the first two are seen as premium products which are more difficult and expensive to source nowadays or in some cases no longer available.

7.3.2 Prices for New & Reclaimed

The price of a new standard house building bricks can be as low as £0.15 each. This makes brick reclamation uneconomic if competing at this end of the market. Alternative selling points must be identified if reclaimed is to make a significant impact on the overall virgin brick consumption.

Brick products vary by colour, size (standard sizes are 65mm and 73mm high) and method of production. Reclaimed bricks are readily available from large trade suppliers, Travis Perkins, for example, at a premium of up to 100% for specialist handmade bricks but only about 10-20% for standard 73mm red bricks.

The price of reclaimed is falling quickly as plentiful new supplies come on stream from countries in the East of Europe which are undergoing massive regeneration at present which is releasing large quantities of brick.

Product	Specification	Supplier	Price	Link
Standard house brick	New to all specifications	Trademate	£0.50-	Trademate Bricks Range
			£1.20 each	
Standard house brick	Reclaimed to many specifications	Trademate	£0.60-£2.00	Trademate Bricks Range

7.3.3 Suppliers

List of manufacturers and suppliers of new and reclaimed bricks

Company	Product Range
<u>Cawarden</u>	Large supplier of reclaimed with stocks of up to 500,000 of particular specs.
<u>Penny Bricks & Timber Ltd</u>	Medium scale supplier with stocks of up to about 100,000 of particular specs.
<u>Antique Buildings Ltd</u>	Small scale suppliers of specialist “antique” hand made specs.
<u>The Brick Business</u>	Suppliers of “fake” reclaimed Harmony range.
<u>Ibstock</u>	Huge UK suppliers with no mention of reclaimed on website
<u>Michelmersh Group</u>	Large specialists brick suppliers including Blockleys, Charnwood & Duntons brands.
<u>Carlton Brick</u>	Medium sized manufacturers producing about 35m units pa of standard specs.
<u>Capital Brick Specialists Ltd</u>	Reclaimed brick and paving supplier with a range of about 15 handmade and wirecuts.

7.3.4 Salvageability

The Demolition Protocol states that bricks have a recovery potential of 10%, though with some buildings this may rise to 100%. It is recognised that in the majority of cases this rate will not be practical where the mortar is made from Ordinary Portland Cement. Older buildings where lime mortars were used make recovery more straightforward.

To give an indication of the current market: A requirement was imposed on the contractors on the Channel Tunnel Rail Link to salvage the bricks produced from demolitions. This initiative was not widely successful due to lack of a market for the reclaimed brick.

Smaller demolition contractors regularly reclaim brick on a large scale from projects. They will often reduce the cost of a demolition project on this basis.

Contractors have devised specific demolition techniques to reclaim a higher proportion of bricks. Instead of smashing walls down, they pull at them and then break up the fallen segments. The resale value makes this extra care worthwhile.
 Extraction Costs

Unless undertaken by one of the few large reclaimed brick yards, extraction will be done by the contractor. They will clean the bricks to the required standard and package them on pallettes for collection.

The contractor will use their own personnel to clean the bricks in the slower periods of the demolition project. This means they get the double benefit of utilising the significant amounts of downtime that can occur for staff in site, and generate income from the materials.

7.3.5 Handling & Haulage

Bricks extracted by contractors will be cleaned, sorted and packaged onto palettes. Transport costs will vary but will be in the region of £40 for each palette movement. As a palette would hold about 400 bricks this equates to £0.10 per brick for each movement.

7.3.6 Storage Requirements

Bricks are simple to store though they tend to be held in large stock volumes so take up significant quantities of space. Fork lifts are required so additional space for access is required. Stocks can generally be held outside with no detrimental affect to the bricks.

The average reclaimed brick stockist holds about 60,000 bricks at any one time. We estimate that this equates to approximately 200m² of palette space and can be doubled to allow for access. Using our standard storage cost of £40 per m² per year this adds up to about £16,000 pa or about £1,250 per month.

This equates to £0.26 per brick per year. For reclaimed brick companies that are based in areas with high property occupancy costs, cities or London and the South East for example, they may consider holding much reduced stocks on site and to store the majority of bricks on sites where rent and rates are less.

7.3.7 Repair & Preparation

The principal objection to the reuse of bricks comes from bricklayers who are paid by the number of bricks that they lay in a day. Anything that delays them impacts directly on their pockets. It is therefore very important to agree the condition in which bricks will be accepted before agreeing a price per unit. Clients will not purchase bricks that still have mortar attached.

7.3.8 Ease of Specification

Bricks come in standard sizes and makes and are very easy to classify and specify.

The reclaimed brick market has developed because certain sought after specifications such as handmade or London, are no longer available new in sufficient quantities

7.3.9 Structural & Quality Issues

The vast majority of reclaimed bricks, 95%, are sold without BS3921 certification. This is because the certification is based on the manufacturing process and this is impossible to determine for reclaimed bricks.

Some UK suppliers have achieved the quality management standard ISO9002 for reclaimed brick supply but this is not always sufficient for some clients' requirements where detailed standards have been written into the materials specifications for the project.

7.3.10 Potential Market

In a market where over 3bn units are sold each year and 2.5bn are released through demolition, the 5% reuse rate initially looks poor. There are no reliable figures for how much of the remainder is actually suitable for reuse, but the drive for recycling has meant that some 50% of the bricks released are being crushed for hardcore and fill.

Potential supplies of reclaimed bricks are limited to demolition of buildings built before the 1940s, when bricks became machine made and fixed with harder mortars. This means that in the long term the supply lines may gradually shrink as these buildings become scarcer. However, what is certain is that the current potential supplies of these are not all being taken up and reused.

Reclaimed dealers typically hold volumes that would satisfy less than 3 months demand, which means that stock levels are low. This is probably due to two factors, storage and having to make a quick return on the labour invested in extraction. There is some scope therefore for suppliers to increase levels to try to attract larger supply contracts.

Supply chains, as with most other reclaimed products, are still very much top down. A source releases a bulk volume of material and this is then sold in lots to smaller clients. It is difficult to envisage a situation where orders for millions of units, that would be required to develop a 300 house estate for example, could ever be supplied using one specification of reclaimed brick. There is also the very significant barrier of the perceived difficulties with laying reclaimed amongst the profession.

Perhaps the key target market should be the small to medium sized development where up to 500,000 units are required. This would involve coordination of stocks amongst a number of suppliers in some cases and a brick exchange mechanism would assist potential buyers in this process by giving them access to a central source information on current prices and availability.

By tapping further into the SME portion of the construction sector and by building on the already expanding demand from the public there is potential to easily expand brick reclamation beyond the BioRegional Reclaimed target of reclaiming 10% by volume of a specific material released into the waste stream.

7.4 Doors

7.4.1 Introduction

This product profile concentrates on internal and external doors for residential and commercial use that are made of timber. Door made of other materials such as PVC and metal are coming into the waste stream but not in the quantities of those made of wood. The small quantities means there is no real established market in these for reuse though materials may be diverted for recycling.

Fire certification determines whether a door can be for Internal or external use. Fire certification criteria will also vary depending on the type of the building they are installed in, such as office, factory, home etc. Fire certification is the major potential barrier to reclamation of doors.



The design of doors for residential and commercial use differ so much that there is little cross over, though some office doors would be ideal for reuse as a external residential doors. Fire certification is not an issue in this circumstance.

The information collected also includes door fittings and furniture. These products have the advantage of being small, easily extracted and available in high volumes.

There are certain basic rules that need to be followed to make a door extraction project as profitable as possible:

- Get onto site as early as possible to retrieve as many undamaged doors as possible.
- Do not remove damaged doors unless they are of high specification or made from specific quality hardwood.
- Retain all fixtures and fittings with each door.
- For high value doors consider taking the frame as well.
- Remove and retain all fixtures and fittings from any damaged door.
- Clean, measure and code all doors on extraction.
- Package doors suitably to prevent damage in transit and storage.

7.4.2 Prices for New & Reclaimed

There are sample specifications and prices for new and reclaimed doors and furnishings listed below. It is difficult to compare precisely as specifications vary but where exact matches are not found the best equivalent has been quoted.

Product	Specification	Supplier	Price	Link
Interior Door	Standard non fire-rated	B & Q	£25-110	B&Q Standard Door
Interior Door	Selection of fire rated doors.	Travis Perkins / Trademate	£25-220	Trademate Fire Doors
Interior Door	Panel doors	Ebay	£10	
Reclaimed Doors	Selection of reclaimed doors	Salvo	£25-500	Salvo Door Search
Door Frames	Premade frames and architrave	Distinctive Doors	£17-70	Internal Frames & Architrave
Ryobi D3550 Universal Door Closer	Fully adjustable, size 2 - 5 Universal Door Closer with back check, low opening force and delayed action. Size 3 on minimum power will close insulated fire doors. EN 1154 (inc. EN 1634 pt 1). Door weight: 100kg	Screwfix	£109.99	Ryobi D3550 Universal Door Closer
93 Series Silver Door Closer	Size 2-4 reversible closer with parallel arm bracket. Incorporates 4 valve power adjustment. Back check and delayed action tested to 1,000,000 opening / closing cycles and 1 hour fire tested. Includes screws and 10 year manufacturer's guarantee. BS EN 1154. Door weight 85kg	Screwfix	£64.99	93 Series Door Closer Silver
Standard Door Closer	Dual handed. Fire tested to BS EN 1154. Includes screws. Door weight: 60kg	Screwfix	£14.99	Standard Door Closer - Screwfix
Door Closer – Briton 2003 range	As extracted from NSS.	Diytools.co.uk	£47.00	Briton Door Closers Shop
Door Closer – Dorma range	As extracted from NSS	Locksonline.co.uk	£81.00	LocksOnLine : Dorma Door Closers
Door closer – floor mounted spring	Similar to extracted from NSS. Must be variable rate closers to qualify for fire safety.	Locksonline.co.uk	£400-500	LocksOnLine : Floor Mounted Door Closers (Spring)
Door Handles	Variety of new and antique look	Screwfix	£6-25 per pair	Classic Door Furniture
Door Handles	Commercial D handles	Screwfix	£15-33	Commercial Door Furniture
Door Handles	Commercial range	Screwfix	£15-30	Archt Door Furniture
Door Hinges	Brass architectural hinges	Screwfix	£4-10 per pair	Archt Brass Hinges

Door Hinges	Standard Selections	Screwfix	£2-25 per pair	Hinges
Locks	Push Button	Screwfix	£40-90	Push Button Locks
Knobs	Standard Selection	Screwfix	£2-13	Traditional Knobs

Bulk suppliers of new fire rated doors are very reluctant to release specific unit prices. They hope to deal with large orders in big developments and therefore prefer to quote against a potential requirement rather than give a set price.

Salvageability

Doors, along with their furnishing, are easily and potentially profitably salvaged. They have the advantages of:

- Being easily removed, packaged and stored.
- Possible to reclaim in significant numbers of similar units at the same time
- High unit value for quality items.
- Furnishings can be salvaged from damaged doors.
- Broad potential market.
- Wide range of products available with buildings of all ages being redeveloped.
- High quality products are released from major redevelopments of old office properties.



In some cases the economics of salvaging a particular batch of doors will be determined by the numbers that are available on the site.

Specialist doors or those made of sought after woods, mahogany and oak for example, are probably worth reclaiming even in small batches of up to 10. Internal office doors made with frame and panels are probably only worth reclaiming in batches of 20 or above.

Metal framed and security doors probably should not be reclaimed unless for a specific requirement.

7.4.3 Extraction Costs

Timing is vital when extracting doors. If extraction can take place before other demolition work has started, it is a simple process to remove doors and their frames and more can be reclaimed undamaged. Door extraction does not affect the building structure and therefore does not impact on other demolition tasks. Indeed it may help the contractor by segregating potential wood waste.

The principal costs involved with extracting doors are for labour and packaging. No specialist equipment is required to remove a door though the time taken for each unit will vary depending on site conditions.

Time taken and therefore costs incurred also vary depending on the extent of the extraction. The simple removal of a door with hinges can take 30 minutes, including packaging and loading. The removal of architrave, frame and any additional furniture will take longer.

Example A

We extracted a set of large double doors from the entrance to an office from a stairwell. The doors were removed with floor springs but without frame. The doors were unscrewed and packaged at each end with cardboard, packing tape and cling wrap. The doors were carried to the vehicle.

Total time spent on operation: 2 people for 1 ¼ hours. 2 ½ hours

Total packaging costs: £1

Total extraction cost: £51

Example B

We extracted the entrance door, architrave and frame from a single door in the entrance to a lavatory. The door and frame were packaged at each end with cardboard, packing tape and cling wrap. The doors were carried to the vehicle.

Total time spent on operation: 1 person for 1 hour, 1 person for ½ hour. 1 ½ hours

Total packaging costs: £1

Total extraction cost: £31

We have concluded that it is probably only worth extracting the architrave and frame if they have some particular merit in terms of design or timber. Standard architraves and frames can be purchased at very low cost.

Time spent extracting frame and architrave: 1 person for ½ hour = £10.

Total packaging cost: £1

Total extraction cost: £11

Doors should be superficially cleaned, photographed, measured and labelled on extraction before packaging.

With higher quality doors it is also worth considering removing the frames as well as this may add significant value to the product overall and justify the extra effort involved. If extracting the frame and hinges, it is vital to remove all fittings including floor springs and any recessed fixings/attachments as well. Any missing items will significantly reduce the price that can be charged for the unit as a whole.

Door furnishings and fittings are quick simple to extract with an electric screwdriver. Again, it is well worth removing all door closers and specialist fittings from damaged doors that are otherwise going to be scrapped.

7.4.4 Handling & Haulage

A standard fire door weighs about 50kg and can be carried by 2 people.

Their size, 2000 x 750mm on average, means that vehicles must be transit sized or bigger to move them in bulk. 18-20 can be moved in a standard van in one trip and this is a days work for 2 people.

Door furniture and fittings are more easily moved. They should be sorted into boxes on extraction and transported on trolleys.

Time to load and unload 20 doors on a van: 2 people for 3 hours. 6 hours = £120 = £6 per door

Transport cost per mile: £2.30 per mile per van/20 doors per van = 11.5p per mile per door.

Total cost per door per trip. £6 + 11.5p per mile.

7.4.5 Storage Requirements

Doors should be stored in cool, dry and well ventilated conditions. The doors should be stacked vertically or horizontally on an edge rather than flat to prevent potential warping. Doors should be sorted into batches by type with a cleaned up best example kept out for displaying to potential clients.

It is possible to fit about 5 doors with fittings attached in 1m² of storage space.

Storage costs = £100/m² pa. 5 doors per m² = £20 per door per year = £1.66 per month.

7.4.6 Repair & Preparation

In most cases it is not worth extracting damaged doors or frames. Doors being sold on a commercial scale do not command the sort of unit prices that warrant the time and effort involved in repairing them. Any damage can also have a potential impact on the fire certification and this again makes them uneconomic.

When dealing in higher volumes, it is not necessary to prepare the doors beyond the superficial cleaning on extraction. It is worth holding one example that is fully cleaned to use as a display model but as doors will be handled a lot on fitting they will need cleaning when in place.



For higher specification doors, those that will command unit prices of £150 and above, and doors with quality furnishings, it is probably worth spending some time in renovation, minor repairs and thorough cleaning. Shiny, original brass fittings can potentially add 25% to the basic cost of a door, and make it easier to sell, and this justifies the additional effort involved.

7.4.7 Ease of Specification

A very wide variety of doors are available for reclamation given the diverse nature of the building stock being demolished. The difficulty is in matching the stock to the various specifications and clients' taste. Doors do not tend to be marked with a manufacturer's name or code, this makes them difficult to categorise. There are four main criteria that are worth focussing on to determine the specification for reclaimed doors.

- Timber species

- Dimensions
- Design (panelled or plain, glazed or part glazed)
- Previous use

It is also worth noting if the door was previously fire rated. This will not be transferable but does give an idea of previous specification.

7.4.8 Structural & Quality Issues

Whether a door is suitable for internal or external reuse depends on its fire certification. Fire certification is a major potential barrier to reclamation of doors. Retaining the structural integrity of a reclaimed door is vital if there is to be any chance of retaining a fire rating.

Fire certification for reclaimed doors is an ongoing issue. We have contacted the BRE and ODPM to discuss the issue but have had no significant response to date. Our thoughts are that a door could retain its certification if extracted and reinstalled by qualified personnel to certain standards. Extensive discussions and further investigation is required by all three parties if this is to be taken further. As we stand at present, it is not possible to transfer fire certification and is uneconomic to get an extracted door recertified.

The RIBA Product Directory also allows searching on fire door information and suppliers.

7.4.9 Potential Market

It is very difficult to achieve wide scale use of reclaimed doors in large scale new build development. The principal factors against their use on this scale are:

The numbers required to satisfy customers purchasing on such a large scale. A 100 unit apartment block may require over 1,000 doors in a similar range with varying specification.

The quality and freshness required to fit in with the look of a new build may be lacking with reclaimed.

Bulk purchasing on the scale required allows Purchase Managers to secure price deals on doors that reclaiming cannot match.

The most likely market for reclaimed doors is small to medium scale residential and commercial refurbishment. It should be possible to reclaim batches of 50-100 doors from demolition/refurbishment sites that will satisfy the requirements on this size of project.

Example

The refurbishment of a 16 flat 4 floor local authority block will require an average of 5 internal and 2 external doors per flat with an additional 4 doors per floor for communal areas. The doors should be solid and fire rated but no timber species is specified. This is a total of 80 internal and 32 external doors for the project with 8 sets of doubles and the rest singles. This requirement could be satisfied by extractions from 4 floors of an office block.

Extraction Costs

96 single doors @ £31 each = £2976
8 sets of doubles @ £51 each = £408
Total = £3384

Transport Costs

112 doors transported to store then to clients total of 100 miles = $(2 \times £6) + (100 \times 0.115) = £2632$

Storage Costs

112 doors for 6 months = $112 \times £1.66 \times 6 = £1115$

Total reclamation cost = £7131

Cost per reclaimed door = £63.67 Cost for new = £75-250

7.5 Electrical fixtures and fittings

7.5.1 Introduction

There are a range of electrical fixtures and fittings that cost enough new to make reclamation cost effective. Sufficient quantities though have to be available from a site to create release enough units to make resale attractive to buyers on a commercial scale. Items such as sockets, switches and light fittings can be removed from office demolitions in bulk and sold on at prices that are competitive with new products.



Some items such as flush floor sockets costing over £20 each new and are worth extracting in whatever volumes are available from each site. Any fittings with metal surfaces, such as brass, chrome or stainless steel also command resale prices that justify extraction.

Other more specialist items such as consumer units and smoke alarms may also justify careful extraction and resale where safety certification does not present a major issue.

Electrical cabling is another product that can be reclaimed from leftovers. We have identified spare cabling in offices on the majority of extraction projects that have been undertaken.

7.5.2 Prices for New & Reclaimed

It is not possible to quote prices for reclaimed electrical fittings as few are currently offered for sale. We have selected a number of items and researched prices for new units to help decide if a particular unit is viable to reclaim. Given the time taken to extract a unit it appears that any unit that costs over £5 new is worth reclaiming. This excludes pretty much all products made of plastic unless they have a specific fire safety or security function. These are probably not feasible to extract anyway as recertification is difficult or impossible to achieve.

It is always important to include casings or fittings as well as the actual unit into the financial equation as these can add to unit prices.

Product	Specification	Supplier	Price	Link
Chrome effect single switch	91x91mm 1 gang 2 way	B & Q	£6.47	Satin chrome light switch
Chrome effect single socket	91x91mm 1 gang switched	B & Q	£8.78	Satin chrome single socket
Chrome effect double socket	151x91mm 2 gang switched	B & Q	£10.98	Satin chrome double socket
Cooker socket	151x91mm cooker control switched 13 & 45a	B & Q	£32.98	Cooker socket
3 Comp Cavity floor box	214x180mm including double switch	Screwfix	£20.99	Floor Box

Brushed stainless 2 dimmer switch	2G 2W 250W dimmer	Screwfix	£14.60 (up to £30)	Dimmer switch
Cabling	Variety of specifications	Screwfix	£0.05-£1.20 per metre	Cable

7.5.3 Salvageability

If carefully selected, electrical fixtures can be extracted from large scale demolition sites economically. If site access can be gained after the electrical services have been turned off in the building but before the soft strip process, which damages electrical fittings, a specialist team armed with electric screwdrivers can extract sufficient numbers of items to justify the effort.



As an example, an office floor of approximately 450m² may on average hold 150 wall and 50 floor sockets that could be extracted. With an efficient process and the correct tools, an individual should be able to extract these in a day. Items can be sorted by type on extraction and stored in boxes for transport back to the yard. This would yield approximately £500 worth of stock if selling reclaimed at about 25% of the new price.

7.5.4 Extraction Costs

Extraction costs for electrical fittings are principally labour charges. If an estimated 200 electrical sockets can be removed in a day and the standard labour cost is £200 per day then each socket costs £1.00 to extract.
Handling & Haulage

Smaller electrical fixtures and fittings can be easily handled and transported. They can be sorted and stored in cardboard boxes in volumes up to 100. Boxes can be transported in any vehicle. Electrical fittings can be used to “make up the load” when moving other materials when extracted to help minimise costs.

If moved solely, it is estimated that a box of sockets would cost about £10 each journey based on about 20 boxes per load. This makes the cost of transporting a socket to be about £0.10 per movement.

Storage Requirements

As items can be stored in batches in boxes which can be stacked it is estimated that 8 boxes can be stored in each m². With storage charge rate of £100/m² pa this equates to £0.13 per socket per year.

7.5.5 Repair & Preparation

Most electrical fittings will require a surface clean. These can be wiped down and any paint drips etc. removed. Any wires attached should be removed and all screws checked and set in a fixed but loose position for storage.

Any damaged fittings should be discarded. Most units will also require electrical safety testing which is discussed further below.

7.5.6 Ease of Specification

There are numerous manufacturers of electrical fittings. Crabtree, Marbo, MK, Volex and Wylex all have extensive ranges featured in the Screwfix catalogue. All produce a similar range of fittings in varying styles.

Potential buyers of larger volumes of reclaimed electrical fittings are principally concerned that the fittings are safe and of a similar style so they can be matched into the design of the new office or home. They will require a range of units including one and two gang sockets, switches and junction boxes and to successfully compete with suppliers of new these will have to be held in stock.

7.5.7 Structural & Quality Issues

Most fittings will adhere to the current British Safety Standards, these specify the requirements from a unit such as a two gang socket, BS1363 relates to electric sockets in detail.

When an extraction is planned from an older building it is vital to check that fixtures to be removed conform to current standards as well as those in place when fitted. This can be done by identifying the manufacturer and model number and looking on the manufacturer's website for the relevant certification.

There is an electrical appliance safety certification course and examination that can be taken to qualify as a licensed tester. This allows the holder to guarantee fittings following inspection. If retailing electrical fittings it is essential to have at least one certified tester on staff.

7.5.8 Potential Market

Unit prices for standard plastic electrical fittings are low and wholesalers have well established relationships with bulk purchasers for high volume low cost deals. It is impossible to compete in this market where a company may be fitting out a 10 storey 10,000m² office block that requires 8,000 wall sockets and 2,000 floor sockets.

The principal potential market for mid volume deals on reclaimed fittings are the small to medium sized design and fit out companies that refurbish a single floor of a larger building with a requirement for 100 wall and 20 floor sockets. In the residential sector this would be a medium sized residential refurbishment or development company dealing with between 10 and 50 properties in one project.

Prices charged for reclaimed electrical fittings can be competitive with those of new for anything but the most basic plastic units.

Significant stocks of a range of units are required to break into medium scale supply of reclaimed electrical fittings. A couple of test extractions on significant office demolition projects are required to test extraction times and resale opportunities.

7.6 Paving

7.6.1 Introduction

This is a summary of paving products including flagstones, blocks, setts, concrete pavers, kerbs and some manufactured composite products. Some reference is made to other paving solutions such as tarmac for cost comparisons.



Products are typically made of limestone, sandstone, granite or pressed from cement. The market has a turnover of around 2.5m m² per annum and reclaimed stone fares a little better than other materials with commercial customers making up over 15% of the market. This may be because there is more confidence in the specifications available and reclaimed can be incorporated into larger projects without undue concerns over quality and performance.

7.6.2 Prices for New & Reclaimed

There are a wide variety of suppliers of reclaimed stone amongst the 600 companies in the market. As a comparatively easy product to extract and specify stocks are held by most general salvage merchants as well as reclamation specialists.

This creates large fluctuations in prices for materials as these can depend on what is in stock at present, whether a supply is expected soon or even just whether the yard needs to create some space at the time.

Because of its density, transport costs become a significant factor in the economics of using stone. These are detailed further below.

To illustrate price variations between new and reclaimed we have identified 5 products to compare - limestone paving, manufactured blocks, granite setts, concrete pavers and York stone slab. We have also included some prices for other paving solutions.

Product	Specification	Supplier	Price	Link
Reclaimed Bath stone floor slabs	625x600x50	Salvo	£70/m ²	Bath Stone - Wiltshire
Reclaimed Yorkshire paving	No details	3A Roofing Ltd	£40/sq y	Yorkshire Paving
Reclaimed York flagstone	50-75mm thick. To be bought in 2 batches of 200 sq y.	Jon Lawrence, Essex	£40/sq y	York Flagstone
Reclaimed Portland Limestone Flags	600x600x40 200 pieces. 600x300x40 100 pieces	Coxs Architectural	£125psm	Portland Limestone

Reclaimed Bath stone flags	600x600x50 120m ² weathered	Sue Howlett – Wiltshire	£35psm	Weathered bath stone
Reclaimed York stone flags	Variety of dimensions	In Situ - Manchester	£35psm	York stone
Reclaimed Granite Setts	7 tonnes of 100x100x100	Peter Mullis – Warwickshire	£170 per tonne	Granite Setts
Reclaimed Granite and Lime Setts	Various sizes 500 tonnes available	Phoenix Stone - Somerset	£90 per tonne	Granite & Lime Setts
Reclaimed Sandstone Paving	Various dimensions 360m ² available	IBS Reclaim Ltd	£14/sq y + VAT	Natural Sandstone Paving
Reclaimed Saxon Paving slabs	Prefabricated 450x450x50 buff/red/grey	Kayser (UK) Ltd Trademate for new	£1.50 per slab for full load. 50 per pallet. £4.60 each new	Saxon Paving Slabs New Saxon Paving Slabs
Reclaimed Crazy York stone paving	Variety of shapes and sizes	Kevin Colby – East Yorkshire	£15/sq y	Crazy York stone paving
Reclaimed Terracotta floor tiles	150x150x25 36sq y	Heritage Stone (North Yorkshire) Ltd	£35/sq y	Terracotta floor tiles
New Tavertine paving kit	7.2m ² in 4 sizes 10 and 20mm thick	Screwfix	£628 incl VAT	Tavertine Paving
Cobble Circle set	2.4m diameter circle various sized pieces	Screwfix	£159 inc VAT	Cobble Circle
Marshalls Block Paving	Pressed concrete blocks 200x200x65	Trademate	£0.43 +VAT	Marshalls Block Paving
Marshalls Paving Slab	Pressed concrete 450x450x32	Trademate	£2.46 +VAT	Marshalls Paving Slab
Marshalls Heritage Paving	Fake York stone slab made of concrete 600x600x38	Trademate	£15.46 +VAT	Marshalls Heritage York stone paving
New Terracotta tiles	400x400	Trademate	£7.13 +VAT	Marshalls Light Terracotta Tiles
New Concrete Pavers	50mm block red pavers	Trademate	£19.62/m ² +VAT	Concrete Block Paving

7.6.3 Salvageability

Stone is tough and durable and therefore comparatively easy to reclaim in a condition that is suitable for reuse in its original function with little or no reprocessing.

Paving slabs and setts can normally be raised simply and with minimal wastage or chipping though cracking happens occasionally, particularly with concrete pavers. Machinery can often be used to lift and load paving which saves time and effort and increases extraction rates.

The principal difficulty with reclaiming stone is weight. Granite has a density of around 4 tonnes per cubic metre. Given that paving slabs for instance can be up to 40mm thick, a square metre weighs about 0.2 of a tonne. Orders for tens of square metres can soon add up in weight, making transport a significant economic and environmental factor.

However, stone products are comparatively easy to store on pallets or in gabions in specific quantities, normally a tonne per unit, and can mostly be kept in the open with no significant damage. Marble is an exception as it is porous and can absorb water which leads to staining.



7.6.4 Extraction Costs

For products such as setts or cobbles, extraction can be undertaken with machinery as part of the normal demolition process and costs kept to a minimum. Demolition contractors will offer setts as extracted and help load using site machinery which again save time and money.

More care and therefore more labour is required with lifting sheet paving products to retain quality and minimise wastage. This again can be undertaken by the demolition contractors. However, when bidding for a batch the price should be agreed by area removed with minimum dimensions per piece. It is uneconomic to pay for damaged or small slabs and these will often be “thrown in” by the contractor if removed with the area to be paid for.

The need to move the material around the site to prepare for collection is another factor that should be included when assessing extraction costs. If a material has to be moved any distance on site it can add significant time to the extraction process.

Extraction teams are made up of 2 pairs of workers, one pair concentrating on extracting the material and the other on moving and packaging. This increases costs but maximises the amount that can be removed in a given period.

For larger volumes of material on more practically organised sites we estimate an extraction cost of between £5-10 per m² of paving.

7.6.5 Handling & Haulage

Stone though durable and dense can require some delicacy when moving. Setts and kerbs are pretty indestructible but tiles and slabs can crack and break when transported.

We recommend the use of pallets for transporting stone products. For setts and cobbles, a wire cage is attached to the pallet and filled to the required weight.

For flat products, a pallet is used and layers of slabs laid down with reclaimed cardboard used as padding. This allows material to be batched into simple quantities as each layer on a standard pallet equates to about 1 m².

If a slab shifts on its palette during transport is likely to cause some breakage. Cracks which were not obvious on extraction break with these jolts. Material movements should be kept to a minimum for this reason as well as to reduce environmental impact.

One palette can be loaded with up to a tonne of stone which equates to between 5-8m² of limestone paving. Setts and cobbles are normally sold by the tonne so these can be loaded by weight. Palettes should be loaded with standard amounts that will be relevant to future sales volumes to minimise the amount of repacking required when filling orders.

Demolition contractors often run fleets of vehicles to remove waste from sites and therefore have lower transport costs. It may often be possible to negotiate a price that includes transport to the yard for any materials bought though wastage rates are likely to be higher for material packed and loaded by contractors.

The larger the load the cheaper the haulage cost per tonne so when transporting stone vehicles taking 20 tonnes with integral lifting machinery are the most effective method. This mirrors the deliveries from standard builders' merchants and reduces labour charges to a minimum. Alternatively, fork lifts will be required at either end of the journey.

The standard estimated cost per palette movement is about £40. As a palette holds from 8 to 5 sq m this equates to a cost of £5-8 per m². For bigger loads, transporting 20 palettes on an average 150 mile trip costs around £500, this reduces the rate to £3-5 per m².

On a recent project, 330m² of granite kerbs were reclaimed from a council depot in London. The material was repackaged onto palettes and transported to Cornwall. The project took 5 days and costs were £5,200. Labour and materials accounted for £800; the remainder was the price for 10 lorry loads from London to Cornwall from a haulage company. This equates to extraction and transporting costs of about £15 per m².

7.6.6 Storage Requirements

Most stone products can be stored in the open with no detrimental effect. Marble should be kept under cover to prevent water staining but weathering is not an issue with most products.

Stone should be stored on palettes or in gabions for ease of movement and this will require a forklift vehicle at the storage site. Forklift access can add up to 100% to the space requirement for storing stone. Thought should be given to the layout of materials to maximise access but minimise "corridors". Stacking is possible with some materials or if a sufficiently strong shelving system is in place but care should be taken when stacking flat products as they stress and crack.

A standard palette of 1.2m² holds about a tonne of material. Using the standard storage cost rate of £100m²/pa, this equates to around £10/m² for 20mm deep slabs and £12-20/m² for deeper 40mm paving. Setts and cobbles at these rates cost about £100 per tonne per year to store.

This shows storage and transport to be hugely significant cost factors when dealing in reclaimed paving. The ideal deal is an extraction from one site and delivery direct to the customer for reuse. This minimises costs and reduces environmental impacts.

7.6.7 Repair & Preparation

Most stone products, if suitably extracted, will need little or no preparation before reuse.

Flags will be supplied in all shapes and sizes and trimming is probably not worth it in most cases as the irregularity of material is one of the features that market the product.

7.6.8 Ease of Specification

Again, stone products are easy to specify.

Setts, blocks and kerbs are made to standard dimension ranges and tiles to specific sizes. Paving slabs vary in depth but this is acceptable to clients who are likely to make purchasing decisions on the quality of the material rather than varying dimensions. This is because laying non-prefabricated paving is not a standard task and lots of other variables have to be accommodated.

Quality Issues

Solid products such as kerbs, setts and pavers lose none of their integrity with extraction and movement. Flatter items such as slabs should not be purchased if excessively damaged.

Most stone products do not deteriorate significantly with age in fact some become more desirable, weathered is the term that is used.

Potential Market

The principal turnover in the current market for reclaimed stone is in architectural pieces, which we have deliberately not covered in this chapter.

The market for higher volume standard products is growing well and is in a prime position to try to break into the large contract sector if sufficient supply chains can be put in place. Purchasers from the larger contractors are more willing to consider reclaimed stone as they find less quality issues when specifying reclaimed than with other materials such as steel.

Supplies may be restricted at present due to the pressures to recycle aggregates pulling in more materials from demolitions for crushing rather than reuse.

Cobble and setts are now recognised as established reclaimed products and more granite kerbs are being extracted to use as high quality paving.

Though the market is more open for commercial scale purchasing, 85% of turnover still comes from the private or small contractor market. Addressing this imbalance will involve the development of high volumes of stocks of specific products to illustrate to purchasers that quantity is not an issue when filling large orders.

These stocks may well exist in the current market but be spread across a number of small to medium sized suppliers. A mechanism could be devised to centrally register

materials and stock quantities and make this information accessible to buyers from large contractors.

The prices achieved for quality paving will always make it cost effective to reclaim if stocks can be turned around quickly to minimise storage costs.

8 APPENDIX C - THE ESTIMATING VISIT - A GUIDE TO THE PROCESS

8.1 Overview

Leads generated to a potential supply of reclaimed building material will usually require a site visit to estimate the quality and quantity of the materials available. The information gathered on this site visit is essential:

- to determine whether the extraction project is financially viable
- to identify the dimensions, quantity and quality of material available
- to identify other potential reclamation possibilities
- to agree extraction methods and likely wastage with contractor
- to assess access, storage and potential reprocessing space on site
- to discuss timetables and availability of materials with contractor.

The information gathered on site is taken back to the office for assessment to determine potential products, clients and prices for the project.

8.2 Is a Visit Required?

Leads to reclaimed materials may arise from anywhere across the UK. A site visit involves time and travel. The material on offer must be of a quality and quantity to justify a visit. It is essential to gather as much information when first in contact with the supplier to assess whether a visit is required.

Any visit of over 100 miles will take a day and shorter visits at least half a day. Writing up a visit can add another 2-4 hours depending on complexity. This means that leads that will produce less than £1,000 worth of material at resale value will probably not qualify for a visit, unless they are very local.

An alternative is to schedule visits so they can be undertaken in a batch. For example, if 5 visits can be carried out in a 2 day period, costs are reduced. There is a danger though with delaying visits as the contractor may then offer the materials to other clients. As with most business, economies are gained with scale and the more visits undertaken the more cost effective they become. Developing leads is discussed in the Sourcing section of this report.

If a visit is not justified it may still be possible to agree a deal with the supplier. If the contractor can supply suitable images and samples of the material available they could be considered. However, most would prefer to have seen the materials before purchase and care should always be taken if agreeing to purchase materials unseen.



8.3 Preparing for the Visit

A range of equipment is required for any site visit to ensure that all details are recorded and that sample may be taken of any materials available.

Equipment Check List

Recording	Extraction Tools	Health & Safety
Camera	Hammer	Hi visibility vest
Notepad	Pliers	Steel toe capped boots
Pens	Screwdrivers	Hard hat
Pencils	Wrecking bars	Goggles
Tape Measure	Chisels	Gloves
	Denailing tools	Ear plugs
	Saw	Face mask

Any site visit should be agreed with the contractor beforehand. Active sites are dangerous places and Health & Safety rules are strict. To qualify under the contractors' site accident insurance visitors must be invited on site and have undergone any H&S training required.

Locate the Site Office, as they can be difficult to find on large sites, and check whether parking is available and if any roads are blocked by the development, if visiting by car.



8.4 On Site

On arrival at the site ensure that all protective clothing is worn and report to the site office to see the named contact.

The principal questions to be answered when on site are:

- Has the material been extracted yet?
- If not, what method will be used and how much can be expected to be retrieved?
- Which areas of the site will the material be extracted from, make a note of each area to record on images taken and for a guide when measuring?
- What is the overall condition of the material, has it been extracted from a complete building or been exposed to the elements?
- Are there any particular areas of concern where more damage may have occurred?
- What are the dimensions and quantities of material potentially available from each area of the site?
- What is the timetable for the project and when will the materials be available from?
- What condition will the material be supplied in?
- Is there a reprocessing or storage area available on site?
- Is there free access to the site, if not, what restrictions will this put on transport?
- What the contractor expects to receive for the material?

- What discount will be given for undersupply?
- Any other things that the contractor may mention that may affect extraction and collection?

8.4.1 Images & Measurement

In order to be able to answer these questions and assess the information on returning to the office it is essential to see all areas that the material will be extracted from. These areas should be measured to determine material available and photographed, see examples below.



If access is not available to some areas for extraction the dimensions and quantities suggested by the contractor should be taken under advisement. Any negotiation on price for the materials should be weighted to take account of materials not personally verified with the provision that an additional amount will be offered if more is extracted.

Measurements should be taken for each specification of material available. In the case of timber joists, each dimension should be noted for each area with the number of joists available and the length of each. Material that cannot be measured directly should be estimated and this should be noted when quantifying the project deliverables.

Images of any potential problem areas of extraction should also be taken. These will allow for better estimates for wastage later.

8.4.2 Material Condition

Along with detailed measurement and images an assessment of the condition of the material should be made. Material in a poor condition should not be considered and should be excluded from measured amounts. There are other factors that determine condition though including how clean the material is, whether there is other material attached, nails and screws, etc.

An opinion should be taken on condition and any particular factors, such as how easy it is to remove screws and nails for example, noted.

Additional Materials

A significant method of boosting income and turning a potentially unviable project into profit is to identify other materials that could be reclaimed. A contractor may have provided a lead for one particular material without realising the potential of others.

Before leaving the site, ask to look at anything else that may be of interest. Measure and take images as before and ascertain whether these materials can be included in a project price. Additional material reclaimed will potentially save the contractor waste charges, and will be more cost effective to transport.

8.4.3 Gathering Samples

In order to market the material effectively it is vitally important to collect samples of any product to be reclaimed. The samples collected should be large enough to allow to be broken down into 6 representative pieces for distribution to potential clients. Most clients will want to see samples before considering purchase.

Where there are a number of dimensions for each product try to get a sample of each. Also, where there are areas of damage or potential damage to the material endeavour to get samples to assess later.



Gathering sample is also a good way to test extraction methods and to gauge potential wastage figures. Make sure that you are given the time to take the samples as contractors will often try to rush you onto the next item. Before Leaving the Site

Ask all questions that come to mind whilst on site. It is much more difficult to ascertain answers over the phone later and further visits are costly. Check that your notes to make sure you fully understand the figures you're taken. Try to visualise each area of extraction so that you can recall it in future and if you can't picture it go back for another look. Ensure that you speak to the contractor and let them know your next move.

8.5 Assessing the Data Collected

A successful site visit will provide all the information required to assess the project for financial viability and identify products and potential markets.

The spreadsheet below has been developed to record the data gathered on site for assessment. This example shows pine joists available from the demolition of a nursing home in the New Forest. The design can be easily adapted for other materials such as steel sections or paving and stone by changing dimensions and units used. Key elements to remember with stone and paving are weight and area.

It is usual to record dimensions in metric units. However, when dealing with most of the demolition, construction and wholesaling industries imperial measurement are still widespread and are easier to translate into recognisable prices.

The spreadsheet shows the potential product broken down by area, for identification, and by size for pricing. It also shows a unit price per linear foot for each dimension of product. These figures have been gathered through previous deals and with reference to general wholesaler prices. More details of how to price materials can be found in our Marketing Materials chapter.

This project is also of note as the material was to be sold in two batches, after processing as floor boards and the excess material extracted as a job lot to a wholesaler for stock.

It is also important to measure not just the standard dimensions of a product, breadth and depth with timber, but also length or unit size. Longer lengths of timber command

higher unit prices, as do steel sections and paving slabs. On the spreadsheet products have been split by dimension and length to assess more accurately.
 Assessing Potential Wastage

Wastage is inevitable in any extraction project. In most circumstances when larger quantities of material are being reclaimed the contractor will undertake the extraction. Contractors do not like other personnel on site for any extended period of time. This means the purchaser has little control over methods used and therefore wastage.

Where materials have already been extracted wastage is not a problem as it has already taken place and estimates are made on actual material available.

Where material is still to be extracted, figures gathered from the site visit should be weighted before assessing the viability of a project. This table identifies some key wastage factors, suggested reductions to amounts extracted and when to apply them.

Wastage Factor	Reduction (%)	When to apply
General Extraction	25	Each project
Exposed Condition	25	Timber
Inaccessible Material	Up to 40	Each area encountered
Damaged/Rotten Material	100	Each area encountered
Contractor Viability	Up to 25	Each project

The general extraction reduction and contractor viability should be applied to each project where material is still to be released.

The contractor viability rating is subjective and based on the priority they give to reclamation. This can be judged by speaking with them on the site visit. Other indicators can be got by looking at other materials they have or will be extracting and the machinery and conditions on site at present. An impression of their priorities can also be gained when talking about timescales as if the contractor is rushing to complete they will take less time to extract.

Key things to consider with wastage are:

- Minimum 25% reduction should be applied to all figures gathered on the visit.
- Damaged or rotten material should never be included in the figures.
- Care should be taken when materials are not accessible.
- The priorities of the contractor should always be considered.

Wastage is therefore a significant factor when determining the viability of a project. When an agreement is made with the contractor to purchase materials it is important to include a proviso that the price is based on the figures estimated and agreed. Under and over supply will be reflected in an increase or reduction in the overall amount paid.

The significant impact of wastage is felt at the other end of the deal in the sales or material available for reprocessing. The minimum wastage factor should be reflected in a similar increase in the unit price to maintain profitability.

Conclusion

Once the materials have been assessed, measured, imaged and samples gathered the process of determining uses for the materials and potential markets can begin.

Ideally, the materials will be transported from site to the client directly. Any cleaning and processing should take place on site to prevent the need for additional transportation. Where materials are to be reprocessed, turning joists into flooring for example or shot blasting steel sections, they should move to the processor for their work, then on to the client.

Methods of marketing building materials are covered in the marketing chapter of this report.

Available Timber – Pine Joists from Sway Place, New Forest											
Room	Width (ins)	Depth (ins)	Length (ft)	No	Total Length (ft)	Length/Width (ft)	Length required for flooring	Length Available	Length/Width (ft)	Price per linear foot (£)	Total price (£)
1 to 2	11.75	2	10	10	100		0	100		1.0	100
2	11.75	2	12	9	108		108	0		1.0	0
3	11.75	2	12	15	180		180	0		1.0	0
2 to 3	11.75	2	13	16	208		208	0		1.0	0
5	11.75	2	13	4	52		52	0		1.0	0
2	11.75	2	15.5	11	170.5		0	171		1.1	187.55
2 to 3	11.75	2	18	10	180		0	180		1.1	198
Outside	11.5	2	18	15	270	1268.5	0	270	721	1.1	297
4	10	2.5	15	7	105		0	105		0.9	94.5
Out Building	10	2	15	20	300	405	0	300	405	0.9	270
1	9.75	1.75	15	15	225		0	225		0.7	157.5
Outside	9	4	9	3	27		0	27		0.8	21.6
Outside	9	4	11	1	11		0	11		0.8	8.8
Outside	9	3	8	1	8	271	0	8	271	0.8	6
Outside	8.75	2	16	4	64	64	0	64	64	0.7	44.8
Outside	7	3	17	1	17		0	17		0.7	11.9
Outside	6	2.5	17	13	221		0	221		0.6	132.6
Outside	6	2	16	6	96		0	96		0.4	38.4
Outside	6	2	12	5	60	394	0	60	394	0.4	24
Outside	5.5	3.75	9	1	9		0	9		0.4	3.6
Outside	5.5	3.75	14	1	14	23	0	14	23	0.4	5.6
					2425.5	2425.5		1878	1878		1601.85
The order for 80m ² of flooring will require 435 linear feet of 11.75 inch wide board. This has been taken out of the 12 and 13 foot lengths for consistency											
Prepared by Richard Hillary Bioregional Reclaimed 020 8641 9882											

This report has been produced by BioRegional Reclaimed for BioRegional Development Group.

The production of this report has been supported by:



No part of this report may be reproduced and/or published by print, photocopy, microfilm or by any other means, without the prior written permission of BioRegional Development Group; nor may they be used, without such permission, for any purposes other than that which they were produced.

BioRegional
ReClaimed

BioRegional Reclaimed
17 Dunster Way
Wallington
Surrey
SM6 7BZ

t: +44 (0) 20 8404 0647
f: +44 (0) 20 8404 4893
e: info@bioregional-reclaimed.com
www.bioregional-reclaimed.com

BioRegional Reclaimed is a trading company that has grown out of BioRegional Development Group, a visionary environmental organisation dedicated to developing practical solutions for sustainable living.

BioRegional
solutions for sustainability
www.bioregional.com

BioRegional Development Group
BedZED Centre
24 Helios Road
Wallington
Surrey
SM6 7BZ

t: +44 (0) 20 8404 4880
f: +44 (0) 20 8404 4893
e: info@bioregional.com
www.bioregional.com

Registered Charity No. 1041486
A company limited by guarantee
registered in England And Wales
2973226