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A report on the study supported by Research and Enterprise Funding

An investigation into the logistics and management of uncontaminated soil exchange in the Southern region of the UK

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Executive Summary

The aim of this research was to investigate the barriers in the transfer of uncontaminated soil directly between a site with surplus soil (donor site) and a site requiring the soil (recipient) site. The potential benefits of such transfer include; reduction in the cost, avoiding double handling of the soil and reduction in carbon footprint of organisations' involved in uncontaminated soil management.

The research was facilitated by three workshop meetings with attendance from 35 industry professionals from selected organisations operating across the supply-chain and industry sectors, i.e. civil engineering, house-building, ground-works contractors, and waste handlers/hauliers. Survey questionnaires were utilised to obtain soil exchange specific information, barriers and awareness of existing online exchange systems. The key barriers in the direct soil exchange included: Regulations/Legislation complexity; timing of soil availability and requirement and lack of visibility of supply chain (lack of information about the availability of soil and demand). Existing online soil exchange systems were regarded as having limited use due to complexities in data input, lack of auto-update of information and unavailability of right quantity at the right time. A common standard for identification of the suitability of uncontaminated soil in terms of both quality processes and chemical composition of soil is seen as essential.
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**List of Abbreviations**

1. CD&E – Construction, Demolition & Excavation
2. CDEW – Construction, Demolition & Excavation Waste
3. CEF – Construction Employers’ Federation
4. CL:AIRE – Contaminated Land: Applications In Real Environments
5. CoP - Code of Practice
6. Defra – Department for Environment, Food and Rural Affairs
8. EA – Environment Agency
10. LA – Local Authorities
11. MMP – Materials Management Plan
12. Mt – Million tonnes
13. NIEA – Northern Ireland Environment Agency
14. PPS – Planning Policy Statement
15. QP – Qualified Person
16. SWMP – Site Waste Management Plan
17. SECBE – South-East Centre for the Built Environment
18. SEPA – Scottish Environment Protection Agency
19. SRP – Soil resource Plan
INTRODUCTION

Background

1. Millions of tonnes of what is considered ‘uncontaminated soil’ from construction sites either goes to landfill or to transfer stations for unnecessary treatment and double handling. The UK Contractors Group (UKCG) suggests that up to 3 per cent of turnover is spent on soil management.

2. As of April 2011 ‘contaminated soil’ costs £56 per tonne for disposal, and will continue to increase by £8 per tonne every April up to and including 2014 where landfill tax will reach £80 per tonne. If uncontaminated soil can be identified early in the development process and demand for the soil identified, then rather than transporting soil to transfer stations (for storage and treatment, waiting demand) or to landfill, it can be directly transported to the demand site thereby avoiding double handling and unnecessary landfill costs. This would provide an opportunity to divert many millions of tonnes of uncontaminated soils away from landfill sites, changing their dynamic from a waste to a resource.

3. Literature suggested that a strong possibility exists for transporting uncontaminated soils directly between donor sites and recipient sites. CL:AIRE’s revised document the ‘Definition of Waste: Development Industry Code of Practice version 2’ will allow the direct transfer of clean, low to zero risk soils between sites without first obtaining Environment Agency permits. However, it is felt that compliance may prove costly and too protracted to be viable for small or fast-track construction sites.

4. Initial discussions with the South-East Centre for the Built Environment (SECBE) and Linden Homes (part of Galliford Try – one of the UK’s leading house building and construction companies) suggest that there is a possibility of developing a Southern region network “Earth Exchange”. This
together with Government objectives for the construction industry to reduce waste to landfill provided a real opportunity to research and investigate these possibilities.

5. By providing a forward systems thinking approach which provides for a secure and robust chain of custody straight from donor to recipient site, to reduce the costs of soil management together with a reduction in the carbon footprint, from double handling, is considered significant.

Aims

6. The aim of this investigation was to investigate prominent key factors and barriers, in the direct transfer of uncontaminated soils between construction sites and the subsequent cost and carbon emission reductions for stake holders in the soil management process.

Objectives

7. The objectives of this study were:

i. To identify key barriers to the direct transfer of uncontaminated soils between donor and recipient sites, i.e. regulation, legislation, soil tracking, etc.

ii. To investigate potential solutions to remove or alternatively, minimise the identified key barriers.

iii. To gather and publish supply and demand information regarding key soil specifics, i.e. type and volume arising from current and future construction projects.

iv. To establish reasons for the limited application of current ‘Online Exchange Systems’, i.e. the requirement for proactive planning and development of extensive databases.

v. To investigate supply-chain relationships between; developers, contractors and hauliers, etc. in the process of soil management, to develop an enabling environment to reduce soil volumes entering
landfill, subsequently reducing the construction industry’s environmental impact.

Research Methodology

Workshops

8. Three intensive half-day workshops in collaboration with SECBE with presentations from SECBE and the Environment Agency, generated extensive discussion involving a variety of professionals, representing companies selected from across the construction sector, i.e. house-building, civil engineering, waste handlers/hauliers, contractors, property developers, infrastructure, and site investigation. The workshop meetings were held in the South-East at venues in Reading, Southampton and Brighton.

Approximately 250 e-mail invitations to the workshop meetings were sent out to construction industry companies based in the South-East region of the UK. Invitations were sent to small, medium and large companies operating across all sectors of the construction industry, e.g. house-builders, contractors, site investigation specialists, waste handlers/hauliers, property developers, and consultants. This was considered key to obtaining quality information on soil management from a variety of perspectives.

A total of 28 (11% of total invitations) companies attended the workshop meetings.

Desktop study: Literature Review

9. A desktop study based literature review of key documents was undertaken, this took the form of web searches and included documentation of; legislation, national strategies, online exchange systems, industry reports, codes of practice and industry guidance papers. A review of existing Online Exchange Systems was carried out to establish and understand their strategy and operation.
**Questionnaire Survey**

10. The literature review facilitated the design of a tailored survey questionnaire consisting of open and closed questions, specifically targeted to obtain current industry data of both a qualitative and quantitative nature. These were distributed at each workshop to aid primary data collection. The main focus centred on; obtaining industry soil supply and demand figures; key barriers to the direct uncontaminated soil transfer; solutions to identified barriers; knowledge, attitudes and understanding of Online Exchange Systems; and any indicators regards such a system achieving the critical mass for it to be deemed feasible.

11. The questionnaire survey was designed to provide a perspective on current industry soil management procedures, indicating the potential benefits that this project could provide to the construction industry and its stakeholders. Of the 28 companies who attended the workshops, a total of 27 survey questionnaires were completed - a 96% completion rate.

**KEY LEGISLATION AND REGULATIONS**

**Waste Framework Directive (WFD) 2008/98/EC**

12. The Waste Framework Directive (WFD) is the official legislative framework encompassing all waste management processes including the collection, transport, recovery and disposal of waste, and prescribes a common definition of waste. The directive requires all Member States to take the necessary measures to ensure waste is recovered or disposed of without endangering human health or causing harm to the environment and includes permitting, registration and inspection requirements.

13. WFD also requires Member States to take appropriate measures to encourage firstly, the prevention or reduction of waste production and its harmfulness and secondly the recovery of waste by means of re-use,
recycling or reclamation (Department for the Environment, Food and Rural Affairs, 2011).

Article 1 – WFD 2008 states, ‘This Directive lays down measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use’.

Article 2(c) excludes from its scope;

‘Uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated’.

Article 3(1) ‘waste’ is defined as, ‘...any substance or object which the holder discards or intends or is required to discard’.

Article 4 identifies the ‘Waste Hierarchy’ which applies a priority order in waste management legislation:

a) Prevention

b) Re-use

c) Recycling

d) Recovery, and

e) Disposal.

Article 8(1) – ‘...in order to strengthen the re-use and the prevention, recycling and other recovery of waste, any natural or legal person who professionally develops, manufactures, processes, treats, sells or imports products has extended producer responsibility’.

Article 11(2)(b) states ‘by 2020, the re-use, recycling and recovery, of non-hazardous construction and demolition waste excluding naturally occurring
material defined in category ‘17 05 04’ in the ‘list of waste’ shall be increased to a minimum of 70% by weight’.

Article 14(1) – ‘In accordance with the polluter-pays principle, the costs of waste management shall be borne by the original waste producer or by the current or previous waste holders’.

Bearing in mind the project’s focus on uncontaminated soil and thus no need to treat the material, Article 23, ‘Permits’ states, ‘Any establishment or undertaking intending to carry out waste treatment are required to obtain a permit from the competent authority.’

Article 29(2) ‘Waste prevention programmes’ states, ‘The aim...shall be to break the link between economic growth and the environmental impacts associated with the generation of waste’.

**Environmental Protection Act (EPA) 1990 (Legislation.gov.uk, 1990)**

15. ‘Section 34 - Duty of Care etc. as respects waste’ of ‘Part II - Waste on Land’ of these regulations covers the legal requirements of England and Wales, stating, “...it shall be the duty of any person who imports, produces, carries, keeps, treats or disposes of controlled waste or, as a broker, has control of such waste, to take all such measures applicable to him in that capacity as are reasonable in the circumstances’ (to deposit, treat or dispose of waste lawfully).

The Environmental Protection (Duty of Care) Regulations 1991 detail the requirements to be met to legally comply with the Duty of Care.

**The Environmental Protection (Duty of Care) Regulations 1991**

16. These regulations implement the requirements of Section 34 of the EPA 1990 - the duty of care principle. Section 34(1) of the EPA 1990 imposes a duty of care on any person who imports, produces, carries, keeps, treats or disposes of controlled waste or, as a broker, has control of such waste.

Waste poses a threat to the environment and to human health if it is not managed properly and recovered or disposed of safely. The duty of care is
designed to be an essentially self regulating system which is based on good business practice. Breach of the duty of care is a criminal offence (Waste Management – The Duty Of Care – A Code of Practice, 1990).

17. Regulation 2 requires the transferor and the transferee to complete and sign a transfer note (identifies, the waste in question, e.g. clean naturally occurring soil or 17-05-04, quantity, how it is stored, time and place of transfer, name and address of transferor and transferee, whether the transferor is producer or importer of the waste, and certain additional information) at the same time as the written description of the waste is transferred.

18. Regulation 3 requires the written description of the waste and the transfer note or copies of them to be kept by the transferor and the transferee for two years from the transfer date. Further simplified detail is available from the ‘NetRegs’ website: http://www.environment-agency.gov.uk/netregs/businesses/construction/62413.aspx


19. This Act stipulated the set up of the Environment Agency (EA) in England and Wales and the Scottish Environment Protection Agency (SEPA) in Scotland, with the objective to protect the environment and manage resources. Part V of the Regulations sets out requirements for a waste strategy (Waste Strategy for England 2007) to be drawn up, covering both England and Wales, whilst SEPA must do likewise for Scotland (NetRegs, 2011).

The Waste (England and Wales) Regulations 2011

20. The regulations implement the revised EU Waste Framework Directive 2008/98, which sets requirements for the collection, transport, recovery and disposal of waste (NetRegs, 2011). These regulations require businesses to apply the waste management hierarchy as a priority order in waste
prevention and management policy. The documents’ overall objective is, ‘...to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving efficiency of such use’.

Paragraph 2 of these regulations sets out ‘re-use, recovery and recycling targets’ which states that, by 2020, measures should be taken to ensure at least 70% by weight of the construction and demolition waste (excluding hazardous waste and naturally occurring material falling within code ‘17 05 04’ in Schedule 1) is subjected to material recovery.

The List of Waste (England) Regulations 2005 No. 895

21. Schedule 1: Code number ‘17’ represents – Construction and demolition wastes (including excavated soil from contaminated sites).

Code number ‘17 05’ represents - Soil (including excavated soil from contaminated sites), stones and dredging spoil.

- ‘17 05 03’ soil and stones containing dangerous substances.
- Code number ‘17 05 04’ represents - Soil and stones other than those mentioned in 17 05 03’.

The Environmental Permitting (England and Wales) Regulations 2010

22. Waste recovery and disposal requires a permit under EU legislation with the principal objective of preventing harm to human health and the environment. This legislation also allows for exemptions from the need for a permit, providing general rules are laid down for each type of exempt activity, and the operation is registered with the relevant registration authority, e.g. the EA in England and Wales (Defra, 2011).
Environmental Permitting (Defra, 2010)

Permits

23. Permitting is now clearer and faster, reducing the administrative burden on businesses, the EA and others. The EA or Local Authority (LA) gives someone an environmental permit allowing them to carry out various activities which may have an impact on the environment and human health and states what conditions and restrictions there are to minimise damage and protect the environment and human health. There are two types of permit available:

1) **Standard Rules**: permit requiring the holder to abide by a set of standard rules. Standard permits are quicker to apply for, involve simpler processing and have clear guidance.
2) **Bespoke**: contains conditions specific to the activity the permit holder is performing. These take longer to process and costs are higher to attain them.

Exemptions

24. Some activities are exempt from permitting. Exempt activities are free and need to be registered with the EA. The waste exemption system has been revised, resulting in the old ‘Paragraph 9 & 19’ exemptions being withdrawn as of April 2010. The exemption now available is; ‘U1 - Use of Waste in Construction’ exemption. Alternatively, companies will have to apply for a permit (standard or bespoke) to carry out waste operations (Environment Agency, 2010). Further information is available on Waste Exemption Review, Getting Ready for Change.


25. This exemption allows the use of wastes for small scale construction instead of using virgin raw materials. e.g. importing soil for use in
landscape at a housing development. A duty to justify suitability for use, certainty of use and quantity of soil material is required. The exemption is free up to 1000 tonnes of 17-05-04 waste, valid for a 3 year period from the date of registration. Waste cannot be stored for longer than 12 months prior to use.

26. Related Permits – If more waste is needed than is allowed under this exemption then application for a permit is required. The alternative ‘Standard’ and ‘Bespoke’ Permits require more stringent regulation and compliance to carry out transfer of higher risk materials. Standard Rules permits are available for use of waste in construction not covered by this exemption up to 100,000 tonnes. The new exemption system replaces the obsolete (Expires in October 2011) exemptions of Paragraphs 9 & 19 (Environment Agency, 2009).

**Planning Policy Statements (PPS)**

27. Planning Policy Statements are prepared by the Government to explain statutory provisions and provide guidance to Local Authorities (LAs) on planning policy and the planning system. LAs must take their contents into account in preparing plans. (Communities and Local Government, 2011)

**PPS 10: Planning for Sustainable Waste Management**

28. The overall objective of Government policy on waste, as set out in the strategy for sustainable development, is to protect human health and the environment by producing less waste and by using it as a resource wherever possible. By more sustainable waste management, moving the management of waste up the ‘waste hierarchy’ of prevention, preparing for reuse, recycling, other recovery, and disposing only as a last resort, the Government aims to break the link between economic growth and the environmental impact of waste. This means a step-change in the way waste
is handled and significant new investment in waste management facilities. The planning system is pivotal to the adequate and timely provision of the new facilities that will be needed (Communities and Local Government, 2011).

Figure 1: The Waste Hierarchy
(Source: Communities and Local Government, Planning Policy Statement 10, 2010, p20)

Site Waste Management Plans (SWMP) Regulations 2008

29. The EA, LA and district or county councils are responsible for enforcing these regulations. UK construction sites create about one-third of all UK waste. Site waste management plans can help to reduce this waste, reduce the loss of expensive raw materials, cut the cost of disposal in landfills and eliminate the cost of reclassifying certain wastes (Business Link, 2011). SWMPs aim to reduce illegal waste activity, including fly-tipping,
encouraging a reduction in the amount of waste produced and improved resource efficiency. They require projects to forecast and monitor the amount of waste produced, re-used and recycled, and to promote the opportunities of reducing waste at source (Waste Strategy, Defra, 2007).

30. Any person intending to carry out a construction project with an estimated cost greater than £300,000 must prepare a SWMP; it is an offence by the client and principal contractor to start a project without a SWMP in place. SWMPs must:

- Describe each waste type expected to be produced in the course of the project
- Estimate the quantity of each different waste type expected to be produced, and
- Identify the waste management action proposed for each different waste type, including re-using, recycling, recovery and disposal.

31. All waste must be dealt with in accordance with the waste duty of care in section 34 of the Environmental Protection Act 1990 and the Environmental Protection (Duty of Care) Regulations 1991. On the removal of waste the principal contractor must record on the plan:

- The identity of the person removing the waste
- The waste carrier registration number
- A copy, or reference to, the written description of the waste required by Section 34 of the Environmental Protection Act 1990, and
- The site that the waste is being taken to and whether the operator of that site holds a permit or exemption under the Environmental Permitting (England and Wales) Regulations 2010.

**Waste, Resource and Action Programme (WRAP)**

32. The WRAP provides advice regarding SWMPs and a template with further guidance on Site Waste Management Plans (WRAP, 2008).
Constructing Excellence

33. A voluntary code of practice for construction contractors and clients on SWMPs is provided by Constructing Excellence (Constructing Excellence, 2004). The document states, “A system to help companies make cost savings by better managing materials supply, materials storage & handling and better managing waste for recovery or disposal”.

34. The Constructing Excellence continues, “Not only is waste becoming more and more expensive to dispose of, it also amounts to waste of valuable resources. And as landfill gets more scarce, we have to start being more innovative with what we do with our waste and look to manage it far more effectively”. The guidance makes detailed recommendations for best practice when managing uncontaminated soils:

- Reduce their arising in the first instance
- Re-use materials on-site for fill and/or landscaping if appropriate
- Re-use off site for fill and/or landscaping on nearby sites where suitability, certainty and quantity profiles match
- Recycle for use on site, add mixtures in the form of composts/fertilisers to enhance quality and suitability for its application
- Recycle for use off site and sale
- Send to recycling facility
- Send to Waste Management Licensed Exempt site
- Dispose of soils to landfill.

Landfill Tax (Her Majesty’s Revenue & Customs (HMRC), 2011)

35. The landfill tax is chargeable by weight, there are two rates:

- the lower rate applies to those less polluting wastes listed in the Landfill Tax (Qualifying Material) Order 2011. The rates currently stands at £2.50 per tonne.
the standard rate applies to all other taxable waste. The rate currently stands at £56 per tonne (see Figure 2. Rates of Landfill Tax below).

The following table (Figure 2) summarises the rates of tax since the introduction of the tax in October 1996:

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<th>Standard rate (£ per tonne)</th>
<th>Lower rate (£ per tonne)</th>
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<td>7</td>
<td>2</td>
</tr>
<tr>
<td>01.04.99</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>01.04.00</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>01.04.01</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>01.04.02</td>
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<td>2</td>
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</tr>
<tr>
<td>01.04.14 (see note 1)</td>
<td>80</td>
<td>To be announced</td>
</tr>
</tbody>
</table>

Figure 2. Rates of Landfill Tax
(Source: HMRC, 2011)

36. Budget 2010 announced that the standard rate of landfill tax would increase by £8 per tonne each year from 1 April 2011 until at least 2014.
There will be a floor under the standard rate, so that the rate will not fall below £80 per tonne from 2014-15 to 2019-20. To qualify for the lower rate the waste transfer note, which is required to accompany most movements of waste in the UK, must accurately describe the waste so that it can be related to the terms used in the Landfill Tax (Qualifying Material) Order 2011. The overarching document which further legislation is prescribed on Landfill operations is the; Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (Official Journal of the European Communities, 1999).

Landfill Tax (Qualifying Material) Order 2011 (Legislation.gov.uk, 2011)

37. The ‘Lower rate’ of tax is enforceable on:

- Group 1, Naturally Occurring Rocks and Soils, comprising only clay, sand and sub-soil. A notable emission from the list is ‘top-soil’.

NATIONAL STRATEGIES


38. The overarching aim of waste policy is ensuring the future:

‘Protection of human health and the environment by producing less waste and by using it as a resource wherever possible. Through more sustainable waste management – reduction, re-use, recycling and using waste as a source of energy – the Government aims to break the link between economic growth and the environmental impact of waste’.

39. Most regulation in the UK is derived from, and all has to comply with, European Commission legislation on waste. Much emphasis is placed on the ‘waste hierarchy’ and the actions of: prevention, re-use, recycling, recovery
and finally disposal (See Figure 1 – The Waste Hierarchy). The industry producing the most waste is construction (32 per cent), highlighted by Figure 3 below.

![Figure 3. Annual waste arisings, England – by sector](image)

(Source: Defra, 2007)

**Incentives**

40. The aim is to create incentives that reflect the waste hierarchy and create opportunities for the reduction, re-use, and recycling of waste, and recovery of energy from waste. The Government is therefore:

- Increasing the landfill tax escalator so that the standard rate of tax will increase by £8 per year from 2008 until at least 2014 to give greater financial incentives to business to reduce, re-use and recycle waste.

**Effective Regulation**

41. Regulation plays a crucial role in encouraging resource efficiency and ensuring sound environmental and public health protection. The Government is therefore:
- Simplifying the regulatory system; making it more proportionate and risk based, through waste protocols that clarify when waste ceases to be waste (and so not subject to regulation);  
- Reforms of the permitting and exemption systems and the controls on handling, transfer and transport of waste, (with cost savings to business and regulator, e.g. on permitting, at least £90million).

**The Landfill Tax and Efficient Resource Use**

42. The incentives will bring efficient resource use as the waste producers will have a greater incentive to avoid the burden of increased tax on landfill through diverting waste from landfill and by using separated waste collection services involving waste auditing and separation at source. These will become relatively cheaper, leaving only residual mixed wastes requiring disposal.

43. Waste auditing and segregation has environmental benefits as well as allowing businesses to see more clearly where their waste is produced and how it could be reduced.

44. Reducing waste avoids costs of waste treatment and also reduces costs through lower material consumption (eliminates the need for new materials).

**The Definition of Waste**

45. The Waste Framework Directive (WFD) currently defines waste as ‘*Any substance or object....which the discards, or intends, or is required to discard*’. Defra and the EA are responsible for implementing this current definition of waste.

46. The definition of waste is important, because the classification of substances or objects as waste is the basis for regulation required to protect public health and the environment when they are recovered or disposed of. However, regulation imposes a cost. It is therefore vital that waste
regulation is proportionate to the health and environmental risks it seeks to manage, and that regulation encourages, rather than discourages, waste prevention and the recovery of resources from waste.

47. The potential benefits are higher where recovered materials are of higher quality, material integrity can be maintained and the virgin material production is avoided – SOIL! Businesses must build resource efficiency and sustainable waste management into their business model affecting not only the waste they produce themselves but the design of the products and services they offer their customers, and what they purchase.

Construction

48. The sector accounts for 32% of waste arisings (See Figure 3) – approximately 1.7million tonnes, the largest component of which is 90 million tonnes of inert wastes suitable for reprocessing into aggregates.

49. There is good potential to increase resource efficiency in construction and reduce waste. Evidence suggests that contractors tend to underestimate the true cost of waste, neglecting the lost value of materials in skips (See point 50). The re-use and recycling of Construction, Demolition & Excavation waste suitable for reprocessing into aggregates has increased. Rates of landfill for site construction waste still appear to be high and there is scope for improved performance.


50. The construction industry is significant; its output is worth over £100 billion a year accounting for 7% of GDP and providing employment for around 3 million workers. The Strategy for Sustainable Construction represents a commitment from the construction industry to work towards
reducing its carbon footprint and its consumption of natural resources, while creating a safer and stronger industry by training and retaining a skilled and committed workforce.

51. This Strategy is a joint industry and Government initiative, and promotes leadership and behavioural change, as well as delivering substantial benefits to both the construction industry and the wider economy. The strategy identifies important key factors such as;

- Procurement
- Design
- Innovation
- People, and
- Better Regulation.

These are defined as the factors which will help achieve; by 2012, a 50% reduction in construction, demolition and excavation (CD&E) waste sent to landfill compared to 2008. And also, the materials used in construction have the least environmental and social impact as is feasible both socially and economically.

52. The strategy identifies ‘logistics’ as an important factor in the delivery of a construction project, with studies showing that improving logistics, e.g. product transport, handling, delivery and storage, can reduce up to 2.5% of a capital project cost and significantly reduce waste and transport carbon emissions.

**Context**

53. The construction industry in England uses around 400 million tonnes of materials every year. Around 90 million tonnes of CD&E inert waste is produced, with half of this recycled as aggregates, including at the site of production. A number of fiscal and legislative tools are already driving up resource efficiency in the construction sector and driving down waste production, i.e. landfill tax, SWMPs, the aggregates levy, and the Code for Sustainable Homes. In order to meet the challenging target of halving CD&E
waste to landfill by 2012, complimentary action and an integrated approach by industry will be needed through all elements of the supply chain to drive waste minimisation and recovery.

Construction Resources and Waste Roadmap (DEFRA, May 2008)

54. This “...presents a longer term perspective and vision for improving construction resource use and waste management, in line with Government objectives set out in the Waste Strategy for England 2007 (See point 38) and the Strategy for Sustainable Construction, 2008 (See point 50)”.

55. The construction sector has a particularly strong influence on the overall sustainability of the UK—not only because of its massive impact on the use and management of resources, but because of the amount of waste it generates, e.g. 380Mt of resources are consumed by the construction industry each year, and construction, demolition and refurbishment activities produce around 33% of all waste generated in England—with inert waste alone accounting for some 90 Mt.

56. The document puts forward recommendations for the industry to reduce its consumption—“...process improvements; new technologies, products and materials; and behavioural change; will together lead to greater efficiencies in all areas, including material resource use”.

57. When set against this background of change, the process of embedding resource efficiency in the construction industry is not simple. The setting of targets and measuring the impact of achieving these targets is one way of focusing efforts and allowing waste reduction, re-use and recycling to be considered throughout the supply-chain. With valuable, consistent data collected, benchmarks and performance indicators can be used for:

- Setting waste reduction targets
- Comparing performance at a site, company, regional and national level
- Estimating waste throughout a project
- Setting contractual clauses/conditions for a project
- Site waste management planning
- Support for planning applications
- Providing data for local and regional resource management planning.

58. The document outlines the leverage that Planning (Authorities) can have on construction industry performance:

- In each of the English regions a regional planning body is responsible for drawing up regional planning guidance, including a regional waste strategy.
- Planning is increasingly seen as an important mechanism for driving sustainability and resource efficiency. National, regional and local planning policies all have guidance relating to resources efficiency and a number of local authorities since 2008 have started to produce supplementary planning guidance focussing on construction and demolition waste, e.g. East Sussex and Brighton and Hove.
- More planning authorities are asking for targets and waste recovery methods within the planning application process. The use of checklists for sustainable development is also increasing. It is expected that this area will increase as a driver and will increasingly target house-builders.

Safeguarding our Soils – A Strategy for England (DEFRA, 2009)

59. This Soil Strategy outlines the Government’s approach to safeguarding our soils for the long-term. It provides a clear vision: By 2030, all England’s soils will be managed sustainably and degradation threats tackled successfully. This will improve the quality of England’s soils and safeguard their ability to provide essential services for future generations. It states succinctly, “Farmers and other land managers, developers, planners and construction companies must all play their part in managing soils sustainably and protecting soil functions”. 
60. A key section of this document is ‘Chapter 6 - Effective soil protection during construction and development’. This highlights that good quality soils in urban areas are vital in supporting ecosystems, facilitating drainage and providing urban green spaces for communities. Ensuring these functions are sufficiently understood and valued in the planning system and during construction is an essential part of achieving the vision. Three concise objectives are laid out by the strategy:

1) Ensure soil ecosystem services are fully valued in the planning process

2) Ensure appropriate consideration is given to the protection of good quality agricultural soils from development

3) Encourage better management of soils through all stages of construction.

Background

61. Poor construction practices during development can lead to severe soil degradation, e.g. compaction and pollution. The planning system provides a framework within which consideration can be given to the environmental, economic and social costs and benefits of development and land use. With this in mind, the Government has put in place a target for 60% of new homes to be built on brownfield sites by 2020, protecting greenfield sites from development. This is currently (2009) being exceeded, with 75% of homes built on brownfield land.

62. Over recent years Defra has developed its evidence base on the impact of construction and development on soil functions. This has shown that construction can lead to significant local soil degradation and soil is often not considered until the landscaping phase of a project, by which time most of the damage has already been done. Further information regarding the safeguarding of our soils can be found in the Soil Guidance section.
ROLE OF VARIOUS ORGANISATIONS


63. The EA’s principal aims are to protect and improve the environment, and to promote sustainable development. They play a central role in delivering the environmental priorities of Government through their functions and roles. Much of the environmental legislation that applies in England and Wales derives from European Directives. Government departments transpose these requirements into regulations and the EA have specific powers and duties to implement them (The Environment Act 1994).

64. The EA have changed how they handle certain aspects of the land development and remediation sector. These changes are laid out in the document ‘Contaminated Land: Applications In Real Environments - Definition of Waste: Development Industry Code of Practice’ (CoP) and their position statement (See point 57 further detail). The EA wish to encourage the remediation of brownfield land, and reduce the amount of material that is sent for disposal to landfill. Equally they have to ensure the necessary measures are in place to ensure the environment and health is protected.

Local Authorities

65. There are 410 local authorities in England and Wales employing over two million people who work to promote the social, economic and environmental well-being of their local areas and communities. Local authorities play a significant role in delivering positive responses on waste management, specifically soil management.

66. Local planning authorities prepare development plans which set the broad framework for acceptable development in their area. They are also responsible for assessing most applications for planning permission. The planning system helps ensure that development takes place in a way that is economically, socially and environmentally sustainable. It also has a role to
play in helping to cut carbon emissions, protect the natural environment and deliver energy security (Communities and Local Government, 2011).

Figure 4: The Planning Application Process Source: EA, N/ A)

CODES OF PRACTICE


67. The Contaminated Land: Applications In Real Environments, Definition of Waste: Development Industry Code of Practice (CL:AIRE DoW: DICO P) is a voluntary Code of Practice (CoP) applicable to England and Wales only and
was launched in September 2008 to provide a pragmatic solution to using excavated materials, including soils on development sites in a sustainable manner without getting tangled up in waste legislation.

Figure 5. Code of Practice Process Summary (Source: CL:AIRE CoP, March 2011)
67. Every project progressed under the CoP will follow one of the following routes:

Route A) Remediation Strategy

Route B) Design Statement (Direct transfer of uncontaminated soil scenario) (See Figure 4.)

68. The CoP Version 2 provides a clear, consistent and streamlined process enabling the legitimate re-use of materials on site or their movement between sites (Direct Transfer of naturally occurring soil materials, including elevated natural contaminants) with a significantly reduced regulatory burden. In many instances the CoP can provide an alternative to Environmental Permits or Waste Exemptions when seeking to re-use excavated materials.

| Scenario/ Material types | Site of Origin | Dredgings | Made ground | Ground based infrastructure | Stockpiled excavated materials | Source segregated aggregate *
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<tbody>
<tr>
<td>Site of Origin</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Direct Transfer (clean naturally occurring materials only)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Cluster Project (including STF)</td>
<td>✓</td>
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Note: * As described in paragraph 1.1.
** Not naturally occurring materials.
*** CoP only relates to excavated materials. In this version the scope has been formally extended to allow the reuse of source segregated aggregate material on the Site of Origin. Movement of demolition material to another site should be carried out under waste legislation, unless the WRAP Quality Protocol (2004) for the production of aggregates from inert waste applies or the material has otherwise met the end of waste test.

Figure 6: Material Types and CoP Scenarios (Source: CL:AIRE CoP, March 2011)

69. It is the responsibility of the holder of a material to form their own view on whether that material is waste or not. The CL:AIRE CoP allows the holder to come to that view and to demonstrate how they did so having regard to current law. This requires a degree of self-regulation and relies upon a high level of professional integrity. For this, a qualified person would be required as stated in section 72/ 77.
70. The CoP is directly applicable to those who commission earthworks, their appointed engineers, contractors, consultants and regulatory authorities. All of these parties have a role to play if a site is being developed under this CoP. It will be of particular interest to landowners and developers. Any movement of waste material from site to site will be subjected to control under Duty of Care regulations. If materials are dealt with in accordance with this CoP, the EA considers that those materials are unlikely to be waste if they are used for the purpose of land development (See point 71).

*Environment Agency – Position Statement (EA, March 2011)*

71. ‘If materials are dealt with in accordance with the CoP the EA consider that those materials are unlikely to be waste at the point when they are to be used for the purpose of land development. When the Declaration is provided to the EA by the Qualified Person (QP) demonstrating the materials are to be dealt with in accordance with the CoP they will take the view that the materials on the site where they are to be used will not be waste. The success of this approach requires a high level of professional integrity by those involved. If the EA find the CoP is being used improperly, so that human health and the environment is being put at risk, they will withdraw this position.

72. Good practice has three basic steps:

1) Ensuring that an adequate Materials Management Plan (MMP) is in place, covering the use of materials on a specific site

2) Ensuring that the MMP is based on an appropriate risk assessment, that underpins the Remediation Strategy or Design Statement (Uncontaminated Soil route), concluding that the objectives of preventing harm to human health and pollution of the environment will be met if materials are used in the proposed manner, and
3) Ensuring that materials are actually treated and used as set out in the MMP and that this is subsequently demonstrated in a Verification Report.

To confirm that steps 1 and 2 have been taken, a Qualified Person must review the relevant documents and provide a Declaration to the EA prior to the use of materials. In the Direct Transfer scenario, submission of the Declaration (one for each receiver site) to the EA must be completed and sent via post or e-mail, no later than one week prior to dispatch.

73. This version(2) of the CoP includes the Direct Transfer of clean naturally occurring soils and mineral materials from one site to another development site for use, without the need for waste legislation being applied, i.e. the receiving development site does not require an Environmental Permit or Waste Exemption.

“Clean natural occurring soil and mineral materials” includes – soil (topsoil and subsoil); Clays; silts; sands; gravels; and made ground consisting of the above materials only, e.g. embankment which is to be removed and is suitable for use without any processing.

74. The materials must be sourced from:

- Greenfield sites not subject to past contaminative uses, or
- Brownfield sites where the natural soils have been extensively characterised and proven to be clean.

Such materials must be capable of direct use without the need for treatment in line with the principles of no harm to human health or the environment, suitability for use, certainty of use and minimum quantity used. The suitability of soils for intended use should be established; for example compaction is a function of moisture content for clays, etc.

75. In excavating, storing and using topsoil or subsoil it is recommended that established good practice as set out in DEFRA’s “Construction Code of
Practice for the Sustainable Use of Soils on Construction Sites, September 2009*, is followed.

Table A1: Summary of Direct Transfer process – Minimum requirements.

<table>
<thead>
<tr>
<th>Direct Transfer Scenario</th>
<th>Requirement at Source site</th>
<th>Requirement at Receiving site</th>
<th>Qualified Person (specific to Direct Transfer – see also Box B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenfield site with</td>
<td>Desk Top Study; Visual and olfactory inspection during excavation; and Consider investigation / testing dependent upon confidence in desk top study.</td>
<td>Appropriate risk assessment (likely to be qualitative); Confirm that material is as expected; and Visual and olfactory inspection.</td>
<td>Satisfied that the source site has had no contaminative use on the basis of the information provided.</td>
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<tr>
<td>clean naturally</td>
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<td>occurring soils</td>
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<td>- No suspicion of</td>
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<td>contamination</td>
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<td>Greenfield or Brownfield</td>
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<td>sites)</td>
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<tr>
<td>Greenfield sites with</td>
<td>Adequate Site Investigation; and Visual and olfactory inspection during excavation</td>
<td>Adequate Site Investigation and appropriate risk assessment – Confirmation of comparable or higher naturally occurring elevated substances than those of the source site. Visual and olfactory inspection; and Confirmatory testing.</td>
<td>Satisfied that source site has had no contaminative use on basis of information provided and receiving site has comparable or higher levels of such substances.</td>
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<td>elevated naturally</td>
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<td>occurring substances</td>
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<td>sites)</td>
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<tr>
<td>Brownfield sites with</td>
<td>Adequate Site Investigation – Delineation of naturally occurring soils for Direct Transfer; and Visual and olfactory inspection during excavation.</td>
<td>Adequate Site Investigation; Appropriate risk assessment; Confirm that material is as expected; and Visual and olfactory inspection; and Confirmatory testing.</td>
<td>Satisfied that site as a whole or clearly defined area(s) has had no contaminative use on basis of information provided.</td>
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<td>clearly defined areas</td>
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<td>of clean naturally</td>
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<td>(for reuse at either</td>
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<td>Greenfield or Brownfield</td>
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<td>sites)</td>
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<tr>
<td>Other brownfield sites</td>
<td>Direct Transfer without an Environmental Permit or Waste Exemption not permitted (see Appendix 3).</td>
<td>Direct Transfer without an Environmental Permit or Waste Exemption not permitted (see Appendix 3).</td>
<td>Does not sign Declaration; and Advises client that not allowed under Direct Transfer scenario (other scenarios may apply).</td>
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<tr>
<td>and land affected by</td>
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<td>contamination</td>
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Figure 7: Process of Direct Transfer via CoP(Source: CL: AIRE, March 2011)

76. Clean soils with elevated levels of naturally occurring substances; provided that the representative concentrations of naturally occurring substances at the source site are comparable or below that of the receiving development site soils, transfer can take place. This will have to be demonstrated via adequate site investigation at both sites and appropriate risk assessment for use at the receiving development site. The principle should always be that the use of natural materials must not increase the level of risk to the environment that already exists at the site of use.
77. Use of excavated materials beyond the criteria set out above may be carried out under an Environmental Permit or Waste Exemption and therefore subject to a greater degree of regulatory scrutiny on a case by case basis. The Figure 8 outlines the process of directly transferring uncontaminated soils between source and receiver sites. This way, no permit or exemption is required and the Declaration by the Qualified Person outlines compliance with the Code of Practice and Waste Regulation.

(Source: CL:AIRE, March 2011)

Figure 8. Direct Transfer process diagram
78. Working to the CoP is considered less expensive than applying for, working under and formally surrendering an Environmental Permit. It also, “...provides a clear, consistent, systematic and more certain process”. The process is said to be, “...quicker to marshal information in to a MMP and have it reviewed by a QP than applying for a Standard Rules Environmental Permit or a Bespoke Environmental Permit”, resulting in, “...lower regulatory costs”.

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**Figure 9: Alternative Waste Regulatory Routes and Options (Source: WRAP via South-East Centre for the Built Environment, 2011)**

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79. Other options are available as opposed to using this CoP in excavating and re-using materials, for example:

- Waste Exemptions: U1 Use of waste in construction exemption; small volumes, non-hazardous waste classification
- Standard Rules Permit: replaces the traditionally used Waste Exemptions ‘Paragraph 9 & 19’ but can take several months to obtain the permit, and

- Bespoke Permit: greater volumes than standard rules permit, applicable to more waste streams but can take several months to obtain the permit.

80. There is no single factor that can be used to determine if something is a waste or when it ceases to be waste. However, in the context of excavated materials used on sites undergoing development the following factors are considered to be of particular relevance:

1: Protection of human health and the environment

2: Suitability for use, without further treatment

3: Certainty of use

4: Quantity of material including required end use characteristics.

**Demonstrating the Four Factors**

81. The MMP formally marshals all relevant information to demonstrate all the four factors will be met. The Qualified Person (QP) should sign the Declaration to certify all four factors have been met. Copies are submitted to the EA and to the person commissioning the excavation works.

**Verification Report**

82. Once the development has been completed in accordance with the MMP, a Verification Report must be produced, providing an audit trail to show that materials and wastes have gone to the correct destination, and any changes made to the MMP are included in the report.

**The Role of the Regulator (Environment Agency)**

83. Given that a project progressed under the CoP entails good practice and a high degree of professionalism, the EA should not need to enter into a debate over the status of the excavated materials being used, but obviously
reserves the right to do so in appropriate circumstances. The CoP (CL:AIRE, March 2011, Appendix 7 Table A2: Summary of various plans/documents, p43-44) provides comparison of materials management plans included in Site waste management plan (SWMP), CL:AIRE’s “Definition of Waste: Development Industry Code of Practice; DEFRA’s “Construction Code of Practice for the Sustainable Use of Soils on Construction Sites”; SEPA’s “Regulatory guidance – Promoting the sustainable reuse of greenfield soils in construction”; and Northern Ireland Environment Agency’s (NIEA) “Guidance on the Regulation of Greenfield Soil in Construction and Development” in terms of variables mainly: need for a permit, documentation, record keeping, area, status, purpose, materials, quantity limitations and applicable sites/usage.


86. Excess soils from development sites are generally regarded as a waste and their end use requires a waste management licence or a registered exemption. The Waste Framework Directive (Directive 2008/98/EC) makes it clear that this applies to the uncontaminated soils. However, in order to promote the sustainable re-use of uncontaminated greenfield soils, the Northern Ireland Environment Agency (NIEA) takes the view that if such soils are put to agreed, suitable end uses as described in the guidance, the soils will not be subject to the waste regulatory controls, meaning the NIEA will not regulate its use under waste legislation.

87. The guidance was produced as part of NIEA’s ‘Better Regulation’ programme to provide light-touch, risk based regulation which helps promote the sustainable re-use of uncontaminated, greenfield soils. Soil covered by this guidance include: soil from undeveloped, uncontaminated land; uncontaminated soil from agricultural and forestry land; uncontaminated soil from overburden from new mines and quarries;
Direct exchange of uncontaminated soil

greenfield soil may include vegetation removed as part of site preparation works, e.g. grass, turf, mulch and leaf debris but not tree stumps. Soils not covered by this guidance are contaminated land; made ground or ground with fly-tipping and invasive species.

**Off-site re-use**

88. Prior to beginning any excavation works, the person responsible for the excavation site must establish that there is an identified and certain end-use for the green field soil, in accordance with a current planning permission. To comply with the guidance and enable the transfer of uncontaminated soils to another site, the producer or receiver of the soil must satisfy the steps identified by Figure 10 below.
Figure 10. Greenfield Soil transfer flow diagram (Source: NIEA, June 2010)

Scottish Environmental Protection Agency – Regulatory Guidance –
Promoting the Sustainable Re-use of Greenfield Soils in Construction
(SEPA, March 2010 )

89. The guidance fulfils a commitment made by SEPA under its ‘Better Waste Regulation’ Action Programme to encourage quality uses of soil.
Excess soils from development sites are generally regarded as waste and so their use or disposal requires a waste management licence or a registered exemption under the Environmental Protection Act 1990 and the Waste Management Licensing Regulations 1994 (as amended). But, given the desire to promote the reuse of Greenfield soils, SEPA has adopted this regulatory position so that, in certain circumstances, it will not require a licence or exemption for the use of such soils.

90. If producers and users of Greenfield soil comply with this guidance, SEPA will not regulate its use under waste legislation. Although producers and users are not obliged to comply with this guidance, if they do not then Greenfield soil will be subject to the requirements of waste legislation.

91. This guidance relates solely to natural topsoil and subsoil from “Greenfield” (land that has not previously been developed and is uncontaminated) sites. A site investigation (SI) must be undertaken to demonstrate that the soil is covered by this guidance. The onus is on the person excavating the soil to ensure that investigation is carried out e.g. direct SI or the full monty of desk study (DS) etc.

92. The upper limits, 100-150 mm for topsoil and 300-450 mm for subsoil, must be followed for approved uses of soil in construction projects. Uses at depths greater than the limits should be carried out under a relevant exemption.

Allowed uses of the soils include: road and verge construction; landscaping; and Sustainable Urban Drainage systems (SUDs). In order to benefit from this regulatory position, the producer or receiver of the soil must follow Figure 11 - Greenfield Soil transfer flow diagram - prior to despatch of material to the receiver site.
Figure 11 - Greenfield Soil transfer flow diagram
(Source: SEPA, March 2010)

ONLINE EXCHANGE SYSTEMS

CL:AIRE Code of Practice & Register of Materials and Sites (June 2011)
93. CL:AIRE keeps a confidential register of materials and services which may fall within the Definition of Waste - Code of Practice. It aims to link material holders with organisations requiring materials in order to find project partners quickly and easily. Organisations involved in the management of development sites are urged to register key information on materials and services that fall within the CoP which will be held confidentially by CL:AIRE. 94. CL:AIRE will circulate all information submitted to the register amongst all members on a regular basis; if an entry is of interest to a member they notify CL:AIRE who will act to enable further discussions and information transfer to take place between donor and potential receiver.

95. Information required will already exist: site details, materials information, e.g. analysis data, and reuse criteria. CL:AIRE will not amend any submissions, the information contained on the register remains the responsibility of the submitting organisation for its accuracy.

96. To submit details to the register costs nothing. Should CL:AIRE successfully assist the development of project partnerships, they will request a discussion with project partners upon successful completion to agree a possible financial donation appropriate to the benefits gained by the project.

**Earth Exchange**

97. *Earth Exchange* is a secure website (Figure 12) which, as stated in the website, utilises the latest technology and accurate mapping to resolve soil, aggregate and building material needs for construction projects across the UK. By entering current or future construction site details and material needs and/or surpluses, *Earth Exchange* aims to immediately locate and connect with the nearest suitable sites who need surplus materials or which can provide the materials needed—all at a time to suit.

98. Earth Exchange highlights the benefits of soil exchange, as:
- Saving on the cost of needless landfill tax disposal
- Reduction in the need to purchase expensive virgin materials
- Simplify the procurement of local recycled materials
- Reduction of haulage distances and requirements
- Increase in revenue from unwanted materials
- Reduction of carbon footprint

99. Earth Exchange provides details of local sites that can directly provide materials required or need materials currently held. This leaves members free to exchange materials directly on their own terms without the need for a middle man.

100. Earth Exchange aims to provide flexible, interactive and automated and will automatically notify members:

- When an existing site meets specified criteria. Contact details and even haulage routes and distances are provided.
- When new sites meeting specified criteria are entered on Earth Exchange - meaning that members do not have to keep 'logging in' other than to update site specific details.

101. Subscription is currently (at June 2011) offered at ‘12 months free of charge - Membership Fee’ following Special Offer Period; Annual subscription charges apply. .

National Industrial Symbiosis Programme (NISP, 2005)

102. The National Industrial Symbiosis Programme (NISP), funded by Government, matches one operator’s waste with another’s raw material needs. In the first two year of its operation, in the region of 1.7million tonnes of materials have been diverted from landfill with £70 million of cost savings (Defra, 2007).
103. NISP is focussed on engaging on traditionally separate industries and other organisations in a network to foster innovative strategies for more sustainable resource use. Through the network, business opportunities are identified that lead to mutually advantageous transactions between companies resulting in innovative sourcing of required inputs for industrial processes, and value added destinations for non-product outputs. The network also provides organisations with access to best practice and knowledge transfer, resulting in cultural and process changes.

104. NISP’s vision is to change the way business thinks. Operating at the forefront of industrial symbiosis thinking and practice, the programme is aimed to help companies to take a fresh look at their resources. This is done by working closely with members; combining expertise and enthusiasm, helping to create commercial opportunities through the exchange of all resources, including materials, energy, and water, sharing assets, logistics and expertise.

105. By bringing together companies of all sizes from all business sectors, NISP vision is to enable thousands of businesses to change how they practice and become more resource efficient. Membership to the programme is free. NISP have a network of 12 regional teams across England, Scotland, Wales and Northern Ireland, each with a team of dedicated industrial symbiosis practitioners who work closely with members to drive genuine business opportunities.

106. The challenge to become more resource efficient has never been more prominent for UK businesses. NISP highlights that every day thousands of its members are benefiting from the programme and reaping the rewards of taking positive and proactive steps towards meeting their business and environmental challenges.
107. Waste-a-base is an online platform for waste and materials brokerage, facilitating trade between registered waste producers and waste receivers via a simple user interface. Waste or excess material details are posted by the producer with a quotation period specified. Receivers are notified and then given the opportunity to quote.

108. Producers and receivers get their own home page where they can directly track, manage, store, access, exchange, and download various information with other producer and receiver members, avoiding any miscommunication or discrepancy in understanding, i.e. original waste description, whilst ensuring legal compliance, e.g. Duty of Care. This facility is completely free to receiver sites. Waste and materials producers are charged a percentage commission on contracted waste and materials only.

109. An article by Waste-a-base discusses landfill disposal statistics, “…figures from the HMRC show a significant increase in low rate inert disposal to landfill in Q2 of 2010 compared to Q2 2009. This could be indicative of an increase in the prevalence of inert waste materials or may be greater effort is applied at the site of waste production to segregate and treat more hazardous materials in the face of the ever increasing taxes” (Waste-a-base, nd).

110. Another article highlights, “…statistics from HMRC show that Standard Rate Waste, i.e. general waste that has the current £48 per tonne tax, continues to decline. Despite the overall increase in landfill in 2010 (up 1 per cent), Standard Rate waste saw a decline of nearly 5 per cent whilst Inert (Lower) Rate waste shot up by 98 per cent. A combination of factors are occurring:

- Waste producers and waste facilities have worked hard to pre-treat material before it reaches landfill;

- More waste is going to treatment or recovery sites;
A cynic may suggest waste may be selectively reclassified to avoid the Standard Rate tax” (Waste-a-base,).

Soil Exchange (Construction Employers Federation, 2011)

111. The online exchange system for Northern Ireland based on the Construction Employers Federation (CEF) website provides a national platform for those with a surplus of uncontaminated soil to advertise, e.g. material; location, type, available date, material amount and contact details (Figure 12). Those requiring such advertised materials are then encouraged to make contact in order to carry out the exchange.

![Soil Exchange](image)

**Figure 12. Soil Exchange (Northern Ireland) (Source: CEF, 2011)**
SOIL GUIDANCE

Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (DEFRA, September 2009)

112. This CoP enables the construction sector to better protect soil resources on site whilst also achieving cost savings on projects. This defines soil as: ‘Soil is a fundamental and ultimately finite resource that fulfils a number of functions and services for society which are central to sustainability. Some of the most significant impacts on this resource occur as a result of activities associated with construction activity, yet it appears that there is a general lack of awareness and understanding of this need within the construction industry’.

Key stages in managing soils:

Pre-construction planning
113. This stage includes the following activities.

- Have a Soil Resource Survey carried out by a suitably qualified and experienced scientist and incorporate the results into SWMPs or MMPs prior to any earthwork operations.

- Ensure full compliance with waste legislation and regulation, e.g. duty of care, environmental permitting, SWMPs.

Soil Management during Construction
114. This stage includes the following activities.

- Prepare a Soil Resource Plan showing the areas and types of topsoil and subsoil to be stripped, haul routes, the methods to be used, and the location, type and management of each soil stockpile.

Landscape, habitat and garden creation
115. This stage includes the following activities.
- Safeguard and utilise on-site soil resources where possible. If importing soils, establish the source of the soil and ensure it is suitable for the intended use.

116. Although planning approval is a pre-requisite to all development proposals and consideration of the impact on soil is an integral part of the environmental assessment process, there is no specific direct planning control on the sustainable use and management of soil resources on construction sites or a requirement for the monitoring of soil protection and sustainable reuse.

117. The construction industry is the largest single source of waste arising in England, producing 90 million tonnes of inert waste annually, some of it is soil. Production and reuse of soil is fundamental to initiatives of reducing such waste. Essential to the reuse of soil from construction sites or redevelopment projects is the initial determination of whether the material in question is regarded as waste within the legal definition of the term. There is no definitive list of what is and is not waste. In determining whether surplus soil is or is not a waste, a number of tests have to be used to determine whether the material is being, is required to be, or is intended to be, discarded.

**Strategic Objectives**

118. The Government is seeking to avoid the disposal of soil to landfill through recycling incentives and less onerous regulation of low-risk processes. The reuse of soil is an important factor in the Waste Strategy 2007 and will consequently contribute to breaking the link between economic growth and waste growth, with the dual benefits of reduced environmental impact and the preservation of natural resources.
**Regulation**

119. The Environment Agency is responsible for enforcing Waste Management Legislation in England and Wales (SEPA - in Scotland & NIEA - in Northern Ireland) and regulation is discharged under the terms of the European Union - Waste Framework Directive. It is usually an offence to undertake waste disposal or recovery operations without being in possession of an **Environmental Permit** (regulate higher risk activities) in England and Wales.

120. Permits are more complex to apply for and operate than to register an exemption. They require an annual subsistence charge proportional to the degree of risk the process presents, are closely monitored during physical inspections by the Environment Agency to ensure compliance, and require the presence of an appropriately qualified ‘Technically Competent Manager’ in order to continue in operation.

121. Waste Exemptions are intended to provide a *lighter touch* form of regulation than a Permit and need to be registered with the EA. Their purpose is to encourage reuse or recycling of low-risk materials in a controlled manner without causing pollution of the environment or harm to human health. **Figure 13** displays the complementary hierarchical relationship between Site Waste Management Plans (SWMPs), Material Management Plans (MMPs) and Soil Resource Plans (SRPs); highlighting the ways to meet legal requirements and ensure best practice is enforced in the management of soils before, during and after projects.
122. Defra also produced a series of training ‘Toolbox Talks’ which describe scenarios and procedures required to ensure best practice in the management of soils on construction sites, thus minimising environmental impact of projects on natural soil resources and the cost of rectifying poor practice.
BS3882: 2007 – British Standard specification for topsoil and requirements for use

123. This British Standard specifies requirements for topsoils that are moved or traded. It provides advice on the sourcing, sampling, handling, storage, and receptor site preparation to ensure the integrity and quality of soil is maintained during these unavoidable construction activities.

124. Topsoil is a dynamic and fragile material, which when managed appropriately, fulfils its function, but is easily damaged by mishandling. It is important that topsoil is lifted, transported, stored and spread carefully over a non-compact substrate. Damage during handling can result in a rapid deterioration in the functions topsoil provides. Topsoil is classified in two ways, as ‘Multipurpose topsoil’ (suited to most situations where topsoil is required) or ‘Specific purpose topsoil’ (not appropriate for general landscaping projects); both types can be natural topsoil or manufactured topsoil.

Sourcing topsoil
125. Any source of topsoil (including soils to be retained on site), whether natural or manufactured, shall be investigated carefully with respect to its suitability for the intended use.

Sampling and analysis
126. Natural topsoil that has not yet been stripped shall be sampled to its full depth. A separate topsoil sample shall be taken from each of the different soil areas delineated by a specialist soil resource survey (not geotechnical or geo-environmental survey) and from sub-areas of contrasting land use within them.
Handling
127. Soils generally gain strength and become more resistant to damage as they lose moisture; they shall thus be handled only in the appropriate conditions of weather and soil moisture, and with suitable machinery. To minimize risks, whenever possible, soil shall be moved directly from where it is stripped or manufactured to the receptor land.

Storage
128. The stockpiling of soils shall be avoided whenever possible. Where stockpiling is unavoidable, heaps shall be tipped loosely and the surface firmed and shaped to shed water. Stockpiles shall be sited so as to avoid any risk that muddy water runs off directly or indirectly into watercourses.

Preparation of the receptor site and spreading
129. The depth of topsoil spread shall not normally exceed 300 mm. Suitable (loosened) subsoil shall provide the remainder of the minimum rooting depth. The minimum rooting depth shall be normally 450 mm for grass, 600 mm for shrubs and 900 mm for trees.

Further Reading available:
130. Further documents related to the top soil include:

- ‘BS4428: 1989 - British Standard code of practice for general landscape operations (excluding hard surfaces)’.

- ‘Good practice guide for handling soils (MAFF 2000)’.

- ‘Prevent soil damage during construction projects’ (Business Link, 2011)
REPORTS

Summary of key findings of Capita Symonds project CON900-001 on Construction, Demolition & Excavation Waste data for England in 2008

131. A full copy of the Final Report - Construction, demolition and excavation waste arisings, use and disposal for England 2008 - is available (WRAP, April 2010). This report analysed the construction, demolition and excavation waste (CDEW) stream to gain an understanding of the elements recovered, beneficially re-used, and discarded to landfill in England in 2008.

132. The analysis of individual waste streams is dependent on the detail provided through the system of waste codes in reporting to the EA under Environmental Permitting and Landfill Regulations. Where these codes are specific to a type of waste, e.g. soil and stones, as well as the sector generating the waste, e.g. construction, a good understanding of recovery and disposal patterns can be deducted.

133. Two waste codes represent a considerable proportion of the waste streams going to transfer/treatment and landfill. These codes are ‘17 09 04 - mixed construction and demolition waste’ and ‘19 12 12 - other waste (including mixtures of materials) from mechanical treatment of wastes’. CDEW that is beneficially used, e.g. landfill engineering, landfill capping and the restoration of sand and gravel quarries, is exempt from Landfill Tax. Approximately 10.6 Million Tonnes of landfill tax exempt waste entered landfills in England in 2008.

134. Figure 14 - indicates large volumes of CDEW materials remaining in landfills in 2008; approximately 11.8 Million tonnes (Mt) in total. The figure also indicates that approximately 16.3 Mt of ‘Inert Soils’ entered landfill in 2008, of which approximately 8.4 Mt was put to ‘beneficial use’, 291 tonnes was ‘Non-hazardous’ and 382,000 tonnes was ‘Hazardous’, meaning that, of
the total 11.8 Mt remaining in landfills in 2008, approximately 8.3 Mt of this was ‘Soils’, equivalent to 70.45% overall.

Figure 15 - indicates that 74.45% of all CDEW sent for disposal at landfill in 2008 were ‘Soils’. Mixed CDEW is the second highest percentage being at 6.58% The report investigates the makeup of ‘mixed CDEW’, a significant proportion of which is confirmed as soils/fines.

![Summary of CDEW remaining in England landfills 2008 (tonnes)](image)

(Source: South-East Centre for the Built Environment, 2011)

*Figure 14: Summary of CDEW remaining in landfills in 2008 (tonnes)*
Figure 15. England: all CDEW to landfill in 2008 (Source: South-East Centre for the Built Environment, 2011)

135. One key conclusion of the report states, “Soils remain the dominant waste stream entering landfills. Soils include a wide range of mostly inorganic inert sub soils and clays. The reduction of soils to landfill will be dependent upon better resource use in construction through designing out waste by cut and fill, soil stabilisation, and Geosystems”. Uncontaminated topsoil: A technical report on the use of both naturally occurring and manufactured uncontaminated topsoil (WRAP and EA, 2009)

136. The report states, “The EA consider (2009) that all uncontaminated topsoil, other than topsoil used where it was produced without needing further treatment, remains ‘waste’ until the point at which it is fully recovered and is suitable for an agreed use without posing a risk to the environment”.
137. The aim of the report was set out sufficient information to determine the point at which uncontaminated topsoil might be considered to have ceased to be waste. However, this report did not clearly determine the point during this project. The report concluded:

- “There is a continuing and growing market for both naturally occurring and manufactured topsoil”.
- “…there is a lack of detailed, systematic information about the content of topsoil products, their input materials, and about how they are used. Efforts to obtain more of this information from industry met with disappointing results. The lack of a single trade association covering the topsoil industry and the low level of awareness in parts of the industry that topsoil is currently regarded as waste may have contributed to the difficulties encountered”.
- “The lack of data prohibited the development of a quality protocol in the short-term...whilst individual companies may hold data, this information is not available to the wider industry and they need to work together to identify and collect adequate data in the future”.

The review of Codes, reports and initiatives described above provide status of direct soil exchange in the UK, the regulations and complexities in the processes involved. The following section presents the views of the companies involved in the management of uncontaminated soils in their business processes.

QUESTIONNAIRE SURVEY ANALYSIS

Question 1 – Please state your job function

138. To obtain views from different cross-section of people involved in the soil exchange process, the workshop invitations were targeted at; professionals in lower, middle and higher job functions (Directors, Site/Project Managers, and Foremen) working for companies in the supply
chain mainly house-builders, civil engineering firms, ground-works contractors and hauliers.

Figure 16: Job function of respondent

139. Figure 16 shows the survey results indicate responses from a wide range of industry professionals. The majority of respondents (59%) were senior managers i.e. Director (26%) and Environmental Manager (33%). This shows the involvement of senior level managers in making decisions regarding soil management on projects.
Question 2 – Please circle the box which reflects your company’s relative size

140. This question was aimed to identify the proportion of large, medium or small companies who have dealing with uncontaminated soil. Figure 17 shows that majority (48%) participation was from large companies and then medium sized companies (37%) and small companies (15%). The small companies who participated in this study are mainly hauliers. This suggests that the companies that deal with large quantities of soil exchange mainly medium to large companies.

![Figure 17: Size of Companies participated in the Survey](image)

Question 3 – Please circle the construction sector(s) within which your company operates

141. This question was aimed at obtaining quality, demand and supply data on uncontaminated soil arisings, workshop meeting invitations were forwarded to companies operating in the various sectors of the construction industry.
142. Figure 18 depicts the sectors the surveyed companies operate in. Contractor and Consultancy firms had more representation in the study. The other firms operating in the Property Development sector, Rail/Building and Materials & Soil Testing were least represented in the study. As the study was focussed on South East of the UK, it was not feasible to get balanced representation in the study. Further studies should include the least represented sector to develop more holistic understanding of the soil management. More detailed study of civil engineering companies who are major players in movement of soil, on-site, off-site and to landfill is seen essential.

143. The questionnaire responses also revealed that many companies had business operations in multiple sectors within the construction industry. Table 1 summarises the sectors represented in the study.
Table 1: Simplifying Respondent/Company operations

<table>
<thead>
<tr>
<th>Company Size</th>
<th>One sector OR Multiple sectors?</th>
<th>Operational sectors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>One sector</td>
<td>Contractor</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Civil Engineering</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consultancy</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waste Handler/ Haulier</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Housebuilder</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Multiple sectors</td>
<td>Civil Engineering and Contractor</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site Investigation, Contractor, Consultancy, Groundworks, Housebuilder (social), Civil Engineering, Rail/ Building</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consultancy, Groundworks, Waste Handler/ Haulier, Civil Engineering, Infrastructure</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site Investigation, Consultancy, Civil Engineering, Infrastructure</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Infrastructure, Contractor</td>
<td>1</td>
</tr>
<tr>
<td>Medium</td>
<td>One sector</td>
<td>Waste Handler/ Haulier</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contractor</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Housebuilder</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Multiple sectors</td>
<td>Contractor, Groundworks, Property Developer</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site Investigation, Consultancy, Materials &amp; Soils testing</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contractor, Civil Engineering</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Groundworks, Civil Engineering</td>
<td>1</td>
</tr>
<tr>
<td>Small</td>
<td>One sector</td>
<td>Consultancy</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waste Handler/ Haulier</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Multiple sector</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>
Question 4 – Please indicate (circle) your company’s main involvement (soil management procedures) with soil.

144. This question aimed to establish the process of and the stakeholders to, soil management on construction projects. Figure 19 significantly indicates the survey samples’ main involvement with soil is in its ‘Excavation and Removal’ (44%), and with its ‘Importation’ (18%), whilst 9% are involved in the Transportation of soils.

![Figure 19: Companies involvement in the soil related activities](image)

145. A 44% majority of respondents carry out ‘Excavation and Removal’ (supply) activities, with 18% ‘Importing’ (demand) soils. This may be explained by the efforts made in re-using and mass balancing supply and
demand before removing surplus materials off-site or importing a deficit of materials onto site, whilst companies also seek to effectively ‘design in’ materials, e.g. noise bunds and landscaping features for what might otherwise be deemed ‘waste’ for removal. This utilisation of excavated material may be the reason for a low percentage of respondents importing soil, reducing costs and impact on the environment.

146. As the majority of companies perform mainly ‘excavation and removal’ roles, they are more concerned with removal of soil (supply side) than importation (demand) of soil. This was evident by the statement made by an attendee in one of the workshops who highlighted that the company concerned had to rethink foundation design thereby minimising the need to excavate and remove soil from the site. As opposed to traditional foundations, the company reverted to piled foundations, which not only loadbearing capacity of the foundation was improved, but also produced a minimal volume of excavated soil in comparison to traditional foundations. Although the cost of foundation was increased, but the savings on soil management were higher leading to significant reduction in project costs and the companies environmental impact was minimised.

**Question 5 – Approximately, how many tonnes of uncontaminated soil does your company deal with annually? Please state approximate tonnages.**

147. This question was aimed to gain a perspective of soil volumes dealt with annually on construction projects, to develop and improve understanding of the benefits that direct uncontaminated soil transfer could have for companies and the construction industry in their drive toward improving environmental performance.
148. A total of 19 (of 27) respondents quoted a value. Those that did not provide a value operate as consultancies and site investigation specialists, and as such do not deal directly (e.g. excavation and removal) with uncontaminated soil on projects. However, one survey respondent stated, “Unknown; as a business we centrally collate construction waste figures but not Demolition & Excavation as yet”. A wide range of values have been stated; from ’10,000 tonnes’ to ‘several million tonnes’ (Figure 20).

\[\text{Table 2: Tonnages quoted, in relation to company size}\]

<table>
<thead>
<tr>
<th>Uncontaminated Soil activity</th>
<th>Large (tonnes)</th>
<th>Medium (tonnes)</th>
<th>Small (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>1,000,000</td>
<td>1,000,000</td>
<td></td>
</tr>
<tr>
<td>10,000</td>
<td>10,000</td>
<td>55,000</td>
<td></td>
</tr>
<tr>
<td>20,000</td>
<td>20,000</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>100,000</td>
<td>20,000</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>17,000</td>
<td>30,000</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
100,000 | 60,000 | -
900,000 | 10,000 | -
213,821 | 45,000 | -
- | Several million | -

= 560,821 = 1,195,000 (+ several million) = 1,055,000

149. Table 2 shows that the companies dealing with the largest volumes of uncontaminated soils are of ‘Medium’ size. Approximate tonnages of 1.2Mt were quoted with a medium civil engineering company dealing with ‘several million tonnes’ as soil is all their operations deal with. Larger companies according to Table 2 deal with the smallest volumes of soil annually. More information in this regard is required to have conclusive evidence. The responses given, if taken in isolation may be said to be a little on the conservative side. For instance, one ground workers feedback stated they deal with approximately 10,000 tonnes of uncontaminated soil per year. That seems very conservative given the majority of work carried out in this occupation is excavating and removing and importing soil on a regular basis.

**Question 6a) – Does your company implement stringent soil management procedures?**

150. This question was aimed at generating understand how companies are tackling the management of soil on their projects. As presented in Figure 20, 44% of respondents excavated and removed soils from site, while only 18% import soil onto projects. It was seen essential to understand whether a standard strategy/procedure is used or any specific strategies are utilised to deal legitimately with soil arisings.
Figure 21: Companies stringent management of soil

151. The vast majority (68%) of respondents declared ‘Yes’ to implementing stringent soil management procedures on projects, with 25% declaring ‘No’ (Figure 21). Awareness of the potential savings to be made by effectively and efficiently managing ‘waste’ soils on projects must be pursued and promoted. More to the point, all projects costing £300,000 or above are legally required to produce a Site Waste Management Plan (SWMP) in-line with SWMP Regulations 2008.

152. Most companies referred to the fact that the companies sub-contract the ground works package to the ground works subcontractors, the management of soil was mainly the responsibility of the subcontractors and the soil management strategies are pretty much their discretion. However, awareness of ‘duty of care’ and primary contractor responsibility is somewhat of a concern and would require further investigation. The role of main contractor in managing soil matters in early stages of the projects is essential to increase transparency and effective management of the soil.

Question 6b) – If ‘Yes’ above, please briefly outline the current process by which your company manages uncontaminated soils on projects

Direct exchange of uncontaminated soil
This question asked for outlines of the soil management procedures implemented by companies on their projects, and may indicate the steps available to manage soils legitimately on construction projects. The main points highlighted include:

a) All identification at design stage.

b) Through good design practice, quality and environmental systems and sustainability assessment.

c) SWMP where appropriate. Identifies subcontractor actions and requirements.

d) CL:AIRE Code of Practice.

e) Processed to quality protocol, i.e. screened and batch tested to BS3882 with a full chemical analysis test at recycling centre (waste handler/ haulier).

f) Initial soil investigation reports to identify soil classification and testing.

g) Generally left with sub-contractors contract package at present. However, the soil exchange project has highlighted the need to review our approach to the management of soils.

h) Segregate topsoil and subsoil, locate alternative off-site receiver (exempt/ permitted site), transport, record (MMPS) if re-used, if possible, re-define cut and fill, etc. to retain on-site.

i) Currently aim to find exempt sites to receive soil or will apply for exemption if appropriate for a new site. Always try to avoid landfill.

j) Re-use where possible but predominantly removal as waste.

k) Strict application of waste hierarchy.
154. In summary, the companies from across the sector manage soils in a variety of ways. The reasoning behind this is not clear, however, particular attention should be paid to educating and increasing awareness of opportunities and development of ways of systematic management of the soils such as direct soil exchange.

**Question 7 – Approximately, how much is spent ‘managing soils’ on your company’s projects? Please state approximate figures.**

155. Only 17 out of 28 respondents provided data for this particular question. It may be fair to state that the companies who did not provide the cost information either were not aware or able to estimate the amount of money spent in terms of productive time and manpower as well as landfill tax, haulage and removal costs, etc. This is also highlighted by the large number of respondents who answered the question but chose ‘unknown’ as their response. This suggests that research studies are essential to establish the cost of soil management as soil excavation is performed on a majority of construction projects as a means to placing foundations, forming basements, redefining the landscape, etc. Therefore, having an appreciation of what current costs of such operations would provide a baseline for companies to be involved in the soil management initiatives and make savings through proactive management of soils.

![Figure 22: Annual Soil Management Expenditure](image-url)
Many attendees in the workshops remarked that the ‘groundworks package’ is sub-contracted out, with a tender price submitted by many contractors and the most suitable company being given the go ahead to perform their portion of the works. Very little time or effort was placed in this area which could potentially provide a means to reducing costs tied up in soil management at present. Values quoted by other representatives ranged largely from £60,000, to £55,000,000 (Figure 22). A rather precise value of £4,276,620 was provided which indicates that this company and their representative have a better grasp on soil costs than most others. Considering the fact that only few companies were able to provide costs, it can be argued that a comprehensive record keeping of soil management costs and activities is essential to establish the extent of soil management costs and opportunities to reduce their cost.

**Question 8a)** – Do you feel there are barriers which prevent a more cost-effective and sustainable process of managing soil arisings on projects?

*Figure 23: Are there barriers preventing more cost-effective soil management?*
157. A resounding majority, 96% of respondents answered ‘Yes’ (Figure 23) that there are barriers preventing a more cost-effective and sustainable process of soil management on projects. As expected, none of the respondent answered ‘No’ to this question whilst 4% were not sure.

**Question 8b) – If ‘Yes’ to 8a), please list 3 KEY BARRIERS – outlining KEY reasons for each KEY BARRIER identified, e.g. legislation, supply-chain, etc.**

![Figure 24: Main barriers](image)

158. This question was designed as ‘open’ and qualitative to elicit the barriers that respondents would highlight as they perceive rather than providing any standard choices. The responses were later grouped into different categories such as supply chain visibility, regulations etc. as shown in Figure 24.
As shown in Figure 24, the main key barrier identified by the respondents was ‘Regulation/Legislation complexity’, e.g. The Waste Framework Directive, Site Waste Management Plans and the legal framework Duty of Care. It is felt that current European and Government legislation is too complex, costly and very difficult to understand, and therefore perform soil management procedures concisely to legal requirements. A key aspect of such difficulty was the confusion over ‘waste’. The classification of waste is very much influenced by interpretation of the definition while confirming when a waste ceases to be waste and becomes a resource once fully recovered is also very confusing.

The voluntary CL:AIRE document – ‘Definition of Waste: Development Industry Code of Practice version 2’ goes some-way to simplifying this misunderstanding and complexity. However, as this document is purely voluntary at present, as opposed to the Health and Safety Executive legislation which is legally binding, it is not felt to carry much weight and general consensus is if it was legally binding every company would know exactly where they stood. The CL:AIRE document works closely alongside legislation, its guidance is aligned with the legal requirements of documents such as the WFD, SWMPs and the Duty of Care and so compliance with the DoW: DCoP will mean operation within the law when dealing with waste materials both contaminated and uncontaminated.

It was - unanimously agreed that ‘prosecution is simply not an option’ and companies would always endeavour to avoid court cases. This being the case, rather than face any legal proceedings and subsequent negative publicity, companies would much rather excavate and remove material off-site regardless of where it is going, and pay the fees as opposed to managing soil sustainably. This was mainly attributed to the lack of standard and proven practices in the supply chain as well as the need to deal with some malpractices.
162. Another issue under ‘regulation’ which some respondents highlighted was ‘Planning’. Planning authorities impose unnecessary requirements onto developments and redevelopments which are viewed as prohibitive to the sustainability agenda. Tough planning conditions, constraints and a distinct lack of innovation and flexibility on the planners’ behalf which prevents companies from designing in features which utilise excess soils and thus increase costs and carbon footprints as a result of removal off-site and journeys to another destination and process. However, it was not the case with all the planning authorities; some authorities provided positive responses regarding their forward thinking approach toward the utilisation of soils on projects. However, it was realised that a more uniform and standardised approach to planning requirements should be devised to allow companies to operate more sustainably and cost effectively, saving the entire supply-chain lots of added expense in the management of excavated soil. Current tonnage limits for new exemptions are prohibitive and the legislation treats clean soil as a waste rather than a useable material. Some expressed concerns on too much red tape in obtaining licences.

163. The Environment Agency is responsible for enforcing Waste Management Legislation in England and Wales. Discussions with attendees highlighted some concerns suggesting that a very cautious approach is taken; at times difficult to obtain information from the agency and lack of consistency and uniformity in the advice given.

164. The second barrier identified by respondents is ‘Timing’. This relates to the timing of projects that match a donor and recipient site sufficiently close enough geographically (to make the transportation cost effective), have a surplus of and a requirement for such suitable material simultaneously, have the correct documentation in place and have agreed fees, etc. in order for a successful exchange of suitable materials to take place.
165. The problems raised relating to timing issues evolved around a lack of match-making certainty between donor and recipient sites. The risk (\( \text{RISK} = \text{COST} \)) posed to companies is such that if an exchange cannot be initiated or it falls through and soil is no longer demanded, that project then requires another recipient site to accept that material, or the donor site then has to pay a fee to have the material removed quickly so that the project isn’t held up, which may result in project delays and thus penalties. One respondent highlighted that companies would much rather factor in at tender stage ‘muck-away’ and charge a premium as opposed to the uncertainty that comes with the exchange vision.

166. A closely linked factor relating to timing is that of ‘supply-chain: visibility and communication’. Companies, contractors in particular felt that the variance and uncertainty in ‘lead-in times’ (from tender submission) to projects, e.g. notification of successful tender and thus project commencement ranges from weeks to months. This was said to affect the visibility and realisation of the types and volumes of materials to arise on projects, meaning that the time-frame to arrange material transfer is too short and so the only option is to ‘muck-away’ surplus and absorb the costs. On the other hand, companies who operate property developers were seen as ideal candidates who should have knowledge of soil specifics leading up to projects. The lead-in times of such development projects are longer and thus the visibility and certainty of soils to arise from projects was would be available in good times to enable direct soil exchange.

177. There appears to be evidence that a lack of foresight and visibility regarding soil specifics, i.e. types and volumes, is inherent in the operations of most construction companies in the industry. The lack of foresight and proactive effort directly prevents the visibility of materials becoming more apparent at earlier stages of projects which would allow information to be released earlier in order to produce a match and the successful transfer of materials directly between sites. The details and accuracy of information included in SWMPs at the early stages of projects with a value of £300,000
or more should be looked alongside with ‘Soil Resource Surveys and Plans’. ‘SWMPs’ if completed fully would provide a detailed information regarding the soil produced by projects and therefore, an end-use can also be identified to make the most cost-effective use. The size of the site to store soil during excavation was also raised. Some sites do not have any space to store the excavated soil therefore disposed off initially and new soil is brought to the site when needed for re-fill. This requires careful thinking in the early stages, project planning and design as well as site evolution to minimise the double handling of excavated soils.

178. The other barrier identified was ‘Commercial benefits’ of the direct soil exchange vision. The benefits of direct soil exchange are not realised by the whole supply-chain. The current waste framework directive legislative endorses ‘Producer Pays Principle’. In practice, this means that those sites that can use the soil to fill charge for the removal of soil from the donor sites as the donor sites will avoid landfill charges. To be fair, it may be necessary to split the cost in order for the supply-chain to effectively have ‘win-win’ situation in dealing with the soil arising. Due to the lack of cost data on soil management, this study could not establish any viability/feasibility to share/split the costs between donor and recipient sites. Furthermore, the costs of using online earth exchange systems required to enable direct soil exchange would need to be properly accessed. Companies were found reluctant to commit resources to the utilisation of any online earth exchange systems until significant savings are guaranteed. A fully informed business case is required to demonstrate the benefits of direct soil exchange and hence the use of online earth exchange system.

179. The study also highlighted a distinct lack of industry education and awareness regarding legislation, best practice and professionalism. This has contributed to the lack of confidence and trust between companies in the supply chain and lack of collaboration between the parties. It is felt a common soil management process is required to standardise proceedings and thus simplify the process of soil management on projects. CL:AIRE CoP
is aimed to fulfil such propose. It is felt a lack of awareness of CL:AIRE CoP, waste legislations and compliance requirements etc.

180. The issue of trust (lack of confidence) is a huge factor in the construction industry it appears. The liability attached if the process of transferring uncontaminated soil between construction sites is abused is seen as a major concern to the companies. Owing to the lack of confidence in the professionalism of the industry, companies would prefer to deal with materials immediately and concisely than get entangled in a process where the implications are felt to be too big should the process be abused at some point along the supply-chain. An example that was used was that of the ‘hub and cluster arrangement’ in the CL:AIRE CoP; the mixing/blending of several sources of materials and then their redistribution to other sites in the arrangement, credibility is questioned constantly, with duplication a real cost issue to prove the suitability of materials via site and soil investigations at both the donor and recipient sites.

**Question 9a) – Are you aware of any existing ‘Online Exchange System(s)’ which facilitate the exchange of materials?**

181. To investigate the current knowledge and experience of respondents to existing ‘online exchange systems’ these questions were posed to gauge such awareness and opinion. As shown in Figure 25, exactly half of the sample responded ‘Yes’ that they were indeed aware of existing ‘online exchange systems’. This is questionable however as the workshops provided identification, information and run through of such systems including: Earth Exchange, Waste-a-base, NISP as well as the CL:AIRE register. A lowly 4% admitted this fact that they had come across these systems directly as a result of them attending these workshops. Also 7% failed to answer this question possibly indicating a lack of awareness of such systems and their capabilities and potential benefits for companies.
A large percentage, some 39% responded ‘No’ to being aware of such systems and their availability (so, a 50/50 split in essence). If this sample of respondents were to be considered reflective of the entire industry, these online systems would not be reaching nearly enough companies and providing any benefits which they could possibly have on companies bottom lines and the environmental impact of current processes. Therefore, further development of online systems and activities to increase their awareness is seen essential to enable the direct soil exchange.

**Question 9b) – If ‘Yes’ to Question 9b) please list these**

As shown in Figure 26, the most recognised online exchange system was Earth Exchange, the website and demonstration which was used to highlight the current working of online exchange systems available for use. NISP (was mentioned by 23% of respondents, and as part of Government initiatives alongside WRAP they seek to ‘...bring together traditionally separate industries and organisations from all business sectors with the aim of improving cross industry resource efficiency and sustainability; involving
the physical exchange of materials, energy, water and/or by-products together with the shared use of assets, logistics and expertise'.

184. Awareness of Waste-a-base was relatively small at 18% indicating the marketing and commercial push of these systems has been somewhat limited and unsuccessful. Either that or the uptake by companies has been limited because feelings toward its benefits for business have not been successful.

185. Knowledge of the ‘CL:AIRE Register’ was also very limited. This is to be expected as it is currently in early development stages since version 2 of the CoP was released.

**Question 9c** – If ‘Yes’ to 9a), how often does your company utilise the above listed ‘Online Exchange System(s)’?

186. A conclusive 79% (Figure 27) and majority of respondents have never used the online exchange systems available to them. This may be due to the lack of awareness and education on the systems available, as well as a lack of evidence regarding their performance and relative success. It suggests
that a robust online exchange system could lead the efficient transfer of uncontaminated soils between construction sites.

Figure 27: Online Exchange system utilisation

Question 10 – Please identify and outline 3 KEY LIMITATIONS of ‘Online Exchange System(s)’

187. The limitations as highlighted by the respondents based their knowledge of such systems such as Earth Exchange, Waste-a-base, GIS ‘Ebay’ system etc. are presented in Figure 28. The key limitations include the lack of ability to provide information about supply and demand in a timely manner; lack of confidence in the use of such systems and no proven business case. The points are discussed in detail in the following section.
Figure 28: Online Exchange System Limitations

Figure 29: Key limitations in the existing online systems
188. The main limitations highlighted by the respondents are presented in Figure 29. These are further detailed to clarify the points.

1) Timing/ Time

- The ability of systems to match-make sites effectively in order for donor and recipient sites to exchange materials at precise times as margins to do this are fine.

- Certainty of exchange is a big concern also with companies taking on big risk to export and import materials off and on site, with such a large risk being taken, the cost of failure is large regarding project penalties.

2) Lack of Critical mass/ confidence/ awareness

- Having not achieved the critical mass of users, companies are sceptical about the benefits of such systems. Awareness of such systems was also a concern.

3) Cost/ commercial benefits/ confidentiality/ risk

- The confidentiality of information and documents entered onto such systems is a major concern as companies, compromising this could jeopardise future earnings and damage the company much more if information is not treated confidentially and professionally.

4) Lack of suitable material

- The right quantities of suitable material are not available in large enough volumes. Although large quantities of unsuitable clay materials are available but their applicability to certain functions is not a good enough quality and so the only avenue for such materials is probably landfill or cut and fill projects of non-residential developments.
5) Highly detailed process:
   - The systems are difficult to use and complicated to input the data.

6) Duplication of data entry
   - The current systems require a great deal of information and detail to increase the probability of finding a match. Respondents highlighted that online exchange systems must update themselves and take out the hassle of form filling for their companies, and then separately having to log-in to systems and re-enter the same information again and again. The suggestion is that information on soil specifics becomes clearer as projects clearer and so auto-updates would ensure the online system was kept current and could therefore be trusted by those searching for available soil resources.

7) Legal issues
   - The compliance of such systems with waste legislation and regulation has also been raised because companies are not willing to risk prosecution, a credible and full-proof system must be provided to generate trust and confidence.

8) Supply-chain communication
   - The systems should embrace the ease of communications amongst the key supply chain partners.
CONCLUSIONS AND RECOMMENDATIONS

189. Mainly medium to large companies are found to be the major players in dealing with excavated soil. Small companies who play a main role are the hauliers. The main activities related to soil management included: Excavation and Removal, Design, Testing, Assessment, Feasibility Studies, Environmental Statements, Consultancy, Importation, Transportation, Specification, Contracts and Recycling. Almost all of the companies who participated in the study agreed that there are barriers to the direct exchange of uncontaminated soils.

190. Majority of the companies did not have clear idea on the costs involved in the management of the soil on their projects. Also the data on quantity of soil dealt by the companies per annum varied significantly. There is a need for further research to establish an accurate scenario in terms of the quantities, costs and the business case for direct exchange of soils on construction sites.

191: The current practices prevailed varied across the companies. Some companies identified all soil arising at design stage and carried out audits of destination. Many companies left the management of the soil to the subcontractors. The companies surveyed included one or more of the following:

- The use of MMPs and SWMPs, custom Environmental management systems (EMS), sustainability assessment and quality systems, application of waste hierarchy and mass balance diagrams.
- Screen & Test to BS3882.
- Exemption: find exempt sites to receive soil or will apply for exemption if appropriate for a new site and endeavour to try to avoid landfill.
- Initial soil investigation reports to identify soil classification and testing. Monitoring of waste carrier & auditing of destination.
- Segregate top/subsoil, locate alternative off-site receiver (exempt/permitted site), transport, records (MMPS) if re-used, if possible, redefine cut/fill etc. to retain on-site.
- Rigorous soil assessment and compliance testing.
- Re-use where possible, but predominantly removal as waste.
- Use of Qualified Person at the recycling centre.
- Left to the Subcontractors.

**Key barriers on direct soil exchange**

192. One of the key objectives of this study was to identify the barriers to the direct transfer of uncontaminated soils between donor and recipient sites. Several barriers to the direct soil exchange were identified in this study.

1) **Timing:** The timing of the soil availability and the requirement is often mismatched. There is a lack of reliable information early enough to enable the direct exchange to take place. If an exchange cannot be initiated or it falls through and soil is no longer demanded, that project then requires another recipient site to accept that material, or the donor site then has to pay a fee to have the material removed quickly so that the project isn’t held up, which may result in project delays and thus risky to the companies.

2) **Commercial viability/Cost:** The benefits of direct soil exchange are not realised by the whole supply-chain. The current waste framework directive legislative endorses ‘Producer Pays Principle’. The recipient sites, who can use the soil to fill on-sites, charge donor sites for the removal of soil. It may be necessary to split the cost in order for the supply-chain to effectively have ‘win-win’ situation in dealing with the soil arising. Largest cost to process of soil transfer is the haulage itself. Reducing/sharing
these costs may be integral to the success of establishing direct soil exchange benefitting the entire supply-chain.

3) **Supply-chain- visibility, communication:** There is a lack of mechanism to identify/obtain a suitable partner for exchange. Companies, contractors in particular felt that the variance and uncertainty in ‘lead-in times’ (from tender submission) to projects, e.g. notification of successful tender and thus project commencement ranges from weeks to months. This was said to affect the visibility and realisation of the types and volumes of materials to arise on projects, meaning that the time-frame to arrange material transfer is too short and so the only option is to ‘muck-away’ surplus and absorb the costs. The different sites/companies are not aware of sites needing soil or sites which have soil to transfer due to lack of sharing of information.

4) **Regulation/Legislation complexity:** Several regulations such as Waste Framework Directive, Site Waste Management Plans and the legal framework Duty of Care need to be complied. It is felt that current European and Government legislation is too complex, costly and very difficult to understand, and therefore perform soil management procedures concisely to legal requirements. A key aspect of such difficulty was the confusion over ‘waste’. Planning authorities are also seen as imposing tough requirements onto developments and redevelopments which are viewed as prohibitive to the sustainable management of the soil. Current tonnage limits for new exemptions are prohibitive and the legislation treats clean soil as a waste rather than a useable material. Some expressed concerns on too much red tape in obtaining licences.

5) **Liability:** Companies would much rather excavate and remove material off-site regardless of where it is going, and pay the fees as opposed to managing soil sustainably rather than face any legal proceedings and subsequent negative publicity.
6) **Lack of Site Storage**: The size of the site to store soil during excavation was also seen as a limiting factor. Some sites do not have sufficient space to store the excavated soil therefore disposed off initially and new soil is brought to the site when needed for re-fill. This requires careful thinking in the early stages, project planning and design as well as site evolution to minimise the double handling of excavated soils.

7) **Lack of Awareness/Education**: A distinct lack of industry education and awareness regarding legislation, best practice and professionalism. The awareness of various code of practices and regulations such as CL:AIRE CoP, waste legislations and compliance requirements etc. amongst the companies was limited.

8) **Industry behaviour i.e. reliability of the service**: Fear of some malpractices prevailing in the industry and consequences if something goes wrong in the soil exchange process, which is attributed to the lack of standard and proven practices in the supply chain, was also highlighted in the study.

9) **Lack of Confidence**: The issue of trust (lack of confidence) is a huge factor. The liability attached if the process of transferring uncontaminated soil between construction sites is abused is seen as a major concern to the companies.

10) **Sub-contracting of Ground-works**: As ground-works are subcontracted, co-ordination and involvement of subcontractors at times is found to be a limiting factor for the soil exchange.

11) **Lack of soil management regulation**: It is felt a common soil management process is required to standardise proceedings and thus simplify the process of soil management on projects. CL:AIRE CoP is aimed to fulfil such propose. The absence of a common standard for both quality processes and chemical composition has left clients and councils to devise their own which are often
Direct exchange of uncontaminated soil

unrealistic and unobtainable. There is a need to clarify not only the production process for soil but the chemical composition and suitability of soils containing various trace elements. A misunderstanding of the chemistry of soil has lead to overcautious standards severely restricting the re-use of the soil.

Limitations and Barriers in the use of online exchange systems

192. Many companies were unaware of the existence of online systems, their capabilities and benefits of such systems. Companies were also found to be sceptical about the benefits of such systems. The existing online earth exchange systems were found to have limited use and the limitations or barriers in their use has been highlighted as follows.

a) Timing and certainty of exchange: The ability of online earth exchange systems to match-make sites effectively in order for donor and recipient sites to exchange materials at precise times is challenging. Certainty of exchange is a big concern also with companies taking on big risk to export and import materials off and on site, with such a large risk being taken, the cost of failure is large regarding project penalties.

b) Lack of suitable soil: The quantities of right quality of soils are not available in the required large enough volumes from one site or at the same time of the requirement, although large quantities of unsuitable clay are normally available. The suitability of the available soil is questionable as their use to meet the requirements of recipient site so the only avenue for such materials is probably landfill or cut and fill projects of non-residential developments.

c) Limited functionalities and concerns over the use of online systems (Cost/commercial benefits/confidentiality/risk): The confidentiality of information and documents entered onto the online
systems was a major concern for companies. This was seen as jeopardising future earnings and impacting the company adversely if information is not treated confidentially and professionally. Other limitations of online exchange systems are found to be: highly detailed process, duplication of data entry as the systems require a great deal of information and detail to increase the probability of finding a match. Also the online systems should update information as soon as additional or updated information becomes available or when projects become clearer in scope.

d) Legal issues: Legal compliance of online exchange systems with waste legislations and regulations was found to be a major issue as companies fear the risk of prosecution, a credible and full-proof system must be provided to generate trust and confidence.

e) Supply-chain communication: The online systems or the process of direct soil exchange will only be possible if ways of communicating the availability and requirement information early in the project processes is developed.

Glossary

‘Waste Producer’ means anyone whose activities produce waste (original waste producer) or anyone who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of this waste.

‘Waste Management’ means the collection, transport, recovery and disposal of waste, including the supervision of such operations and the after-care of disposal sites, and including actions taken as a dealer or broker.

‘Prevention’ means measures taken before a substance, material or product has become waste.

‘Re-use’ means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.
‘Disposal’ means any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy.
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APPENDIX 1 QUESTIONNAIRE SURVEY

Appendix 1: Uncontaminated Soil Exchange Project Survey Questionnaire

“An investigation into the logistics and management of Uncontaminated Soil Exchange in the Southern Region of the UK”

1) Please state your Job Function:

2) Please circle the box which reflects your company’s relative size:

   Small          Medium          Large

3) Please circle the construction sector(s) within which your company operates:

   Site Investigation  Groundworks  Waste Handler/Haulier
   Civil Engineering  Contractor  House-builder  Property
   Developer  Infrastructure  Consultancy  Other (Please state):

4) Please indicate (circle) your company’s main involvement (soil management procedures) with soil:

   Transportation  Testing  Excavation and removal  Importation
   Other (Please state): .................................................................

5) Approximately, how many tonnes of uncontaminated soil does your company deal with annually? Please state approximate tonnages: ....................

6) a) Does your company implement stringent soil management procedures?
   (Please Circle Answer)
   Yes   No

   b) If ‘Yes’ above please briefly outline the current process by which your company manages uncontaminated soil on projects: .................................
      ...........................................................................................
      ...........................................................................................
      ...........................................................................................
      ...........................................................................................
      ...........................................................................................
7) Approximately, how much is spent ‘managing soil’ on your company’s projects? Please state approximate figure:

8) a) Do you feel there are barriers which prevent a more cost-effective and sustainable process of managing soil arisings on projects?

   Yes    No

b) If ‘Yes’ to 6a), please list 3 KEY BARRIERS—outlining KEY reasons for each KEY BARRIER identified, e.g. legislation, supply-chain, etc.

1) ........................................................................................................................
........................................................................................................................
........................................................................................................................
2) ........................................................................................................................
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3) ........................................................................................................................
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9) a) Are you aware of any existing ‘Online Exchange System(s)’ which facilitate the exchange of materials? (Circle Answer)

   Yes    No

b) If ‘Yes’ list these in the space allocated

........................................................................................................................
........................................................................................................................
........................................................................................................................

c) If ‘Yes’ to 9 a), How often does your company utilise the above listed ‘Online Exchange System(s)’? (Circle Answer and briefly outline main details/reasons)

   Every project............................................................................................
........................................................................................................................
........................................................................................................................

   Specific projects only................................................................................
........................................................................................................................
........................................................................................................................
Never

10) Please identify and outline 3 KEY LIMITATIONS of ‘Online Exchange System(s)’:

1) ............................................................................................................................
2) ............................................................................................................................
3) ............................................................................................................................