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CAP'EM
Cycle Assessment Procedure for Eco-Materials

www.capem.eu

Infrastructure, Innovation & Info

Infrapenny inforapound

Sustainable Infrastructure?

Just a superficial skim above the surface,
from a greenie's perspective of course

This & contained presentations

- Scribd: www.scribd.com/brianspecman
- > collection > Infrastructure
- http://www.scribd.com/doc/32152901/
- http://www.scribd.com/document_collections/2401889
- Twitter: http://twitter.com/brianspecman
- Founder of www.greenspec.co.uk
- E BrianSpecMan@aol.com
- Facebook: http://www.facebook.com/pages/GreenSpec/77375462337
- Brian Murphy BSc Dip Arch (Hons+Dist)
- Architect by Training
- Specification Writer by Choice
- Greening up my act since 1999

Scope of talk

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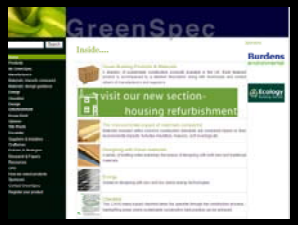
- Sustainable Infrastructure
- Standards and misinformation
- Information resources
- Surveys and GIS
- Digging holes & filling them
- Plaining and resurfacing
- Road sweeping & Gully Guzzling
- Fly-tipping
- Aggregates
- Cement replacement
- Biodiversity & infrastructure
- Energy generating pavement
- Water permeable pavement
- Green/Brown roofs
- Deducing waste in design,
- Simplified traffic management,
- Sustainable integrated transport



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Are you Green or Violet?

Another GreenSpec CPD file to download

www.scribd.com/brianspecman

What is infrastructure?

- A Hot topic: conferences everywhere
- Impossible to list exhaustively
- Roads & pavement , airports, rail and waterways, and all that creates and maintains them
- Green grids and blue ribbons
- Towns and rural places
- All transport, distribution & consolidation systems
- Food, drink & good distribution and storage
- Waste in all forms and disposal/recycling/recovery
- Local government activity
- Public places, buildings and their consumptions
- Utilities & Renewables (Autonomy)

We have ours

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- The Victorians create much of it
- Its has done a great job
  - but much of it is past its best
- Some is replaced and others left to fail
  - Cost of repair outweighs Cost of water supply and potential fines

3rd world doesn't

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- Has managed without one for a century
- Now its benefits from the outputs of and leapfrogs the 1st world
- With PV for power & Chargers
- Satellite for TV,
- Mobile phone networks for email and internet
- Most of the infrastructure is still human and animal powered
- Still carry water and animals haul goods over poor roads,
- Open sewers are common

Why is infrastructure Important?

- Zero Energy/Carbon/Emissions Lifestyles are impossible without addressing Infrastructure
  - Zero E/C/E homes: are possible
    - Until people move in and start consuming
  - Zero E/C/E food: is possible
    - If all is grown in own vegetarian gardens and allotments
  - Zero E/C/E employment: is possible
    - If Z E/C/E travel and Z E/C/E non-domestic building is possible
  - Zero E/C/E travel: possible
    - If roads and transport are Zero E/C/E
  - Zero E/C/E non-domestic buildings: possible
    - When Government sets the rules CfSB & CfSR
    - Until people move in and start working

Utilities v Autonomy

- Water, Power, Heat, Sewerage, Communications
- Generation and distribution
  - including inefficiencies and transmission losses
  - Dispersed generation
  - ESCos and MUSCos
  - Renewables on site, off site and off shore
- Extraction, cleaning and distribution
  - Harvesting and recycling
- Rainwater, roof, pavement and land drainage
  - SUDS Sustainable Urban Drainage Systems
- Sewerage, mains and treatment plants
  - Alternative sewerage systems
- Mains
  - Private wire (power, communication and/or heat
  - ITC & Communication systems,
- WiFi, Radio, IR,
  - satellites

Sustainable Infrastructure:

- how new ones could be created
- how old ones could be maintained
- What is one?
  - One in which the true costs to the environment are accounted for in the costs
    - to the developer
    - and in turn to the consumer

Infrapenny Inforapound

- Value Engineering: Pennies well spent?
- Everybody looks for a penny here and a penny there of cost savings
- Forgetting that we need to be chasing pounds or kilos of CO_2
- well actually tonnes of CO_2
- Tonnes of CO_2 for Pounds spent

Environmental Assessments

- EIA Environmental Impact Assessments
- Environmental Assessment Method
  - CEEQUAL
  - DREAM (Defence Related EAM)
- LCA
  - BRE's Green Guide to Specification
  - Loughborough student MSc or PhD in LCA: bypass v no action
  - Later: LCA of creating a bypass v carrying out a road upgrade

Standards & misinformation

- DoT standards: permit recycled (years)
- Dissemination: or lack of it
- BAU & SQP: Engineer's assumption
- Engineers: Permit, but do not require
- City Engineer's need re-education
- EA are educated but are they engaged?
  - 'Anti-recycling league'
  - Inconsistent interpretation: Postcode lottery
  - Conflict of interest? Too may roles
  - Scared of their own shadows

Information resources

- WRAP
  - Aggregain website
- Envirowise
  - Website, Publications,
  - Business visits, Analysis, Suggested Improvement
- Recoup
  - Recycled Plastics
- GreenSpec (downloads soon)
  - Specification and Appendix
  - CPD Seminars
- Material Exchange (many)
- Earth Exchange (small competitor to NISP)

Services

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- Envirowise
  - Resource Efficiency
- Salvo
  - Salvage & reuse
- NISP (best performance)
  - Reuse & Recycling
  - Swaps: 1 man's waste is another man's resource
- WRAP: (head of the organisation tree)
  - Recycling
- BRE
  - Waste management, SMARTWaste data logging kit
- CE
  - Checklist, KPIs and EPIs

Surveys & GIS

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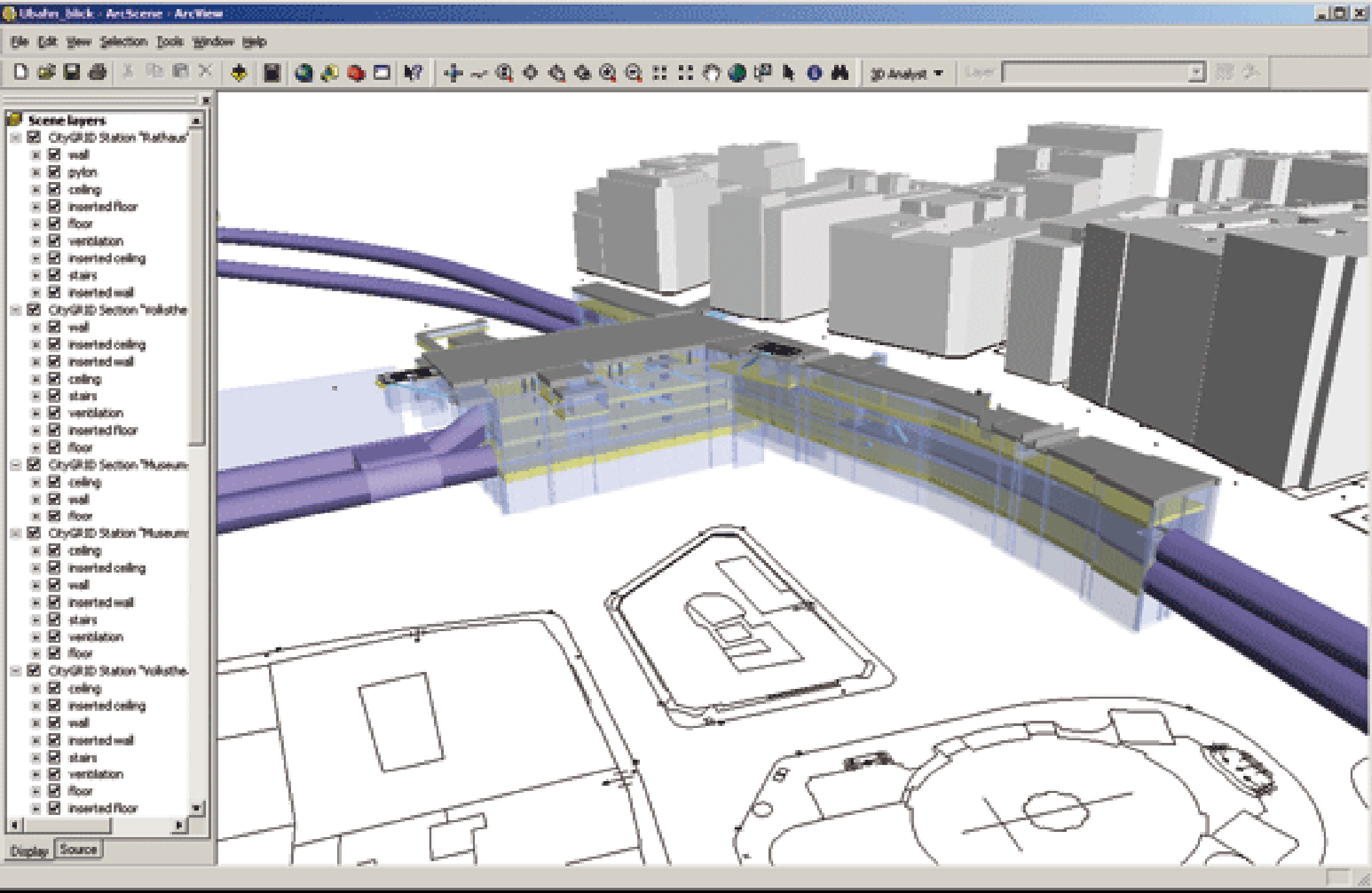
- Digging up HV Cables is not very bright
  - Cutting through gas mains provides a torch
- Computers are often clever typewriters
  - We can do better than that, But can't be asked
- Mapping of 3D model at and below the surface:
  - roads and hard surfaces
  - mains, pipes and cables, valves, boxes
  - Drains, chambers, etc.
  - underground tunnels and chambers
  - polluted soils, hazardous waste backfill
  - UXB Unexploded bombs
- Google Releases New 3D Buildings Layer for Google Earth

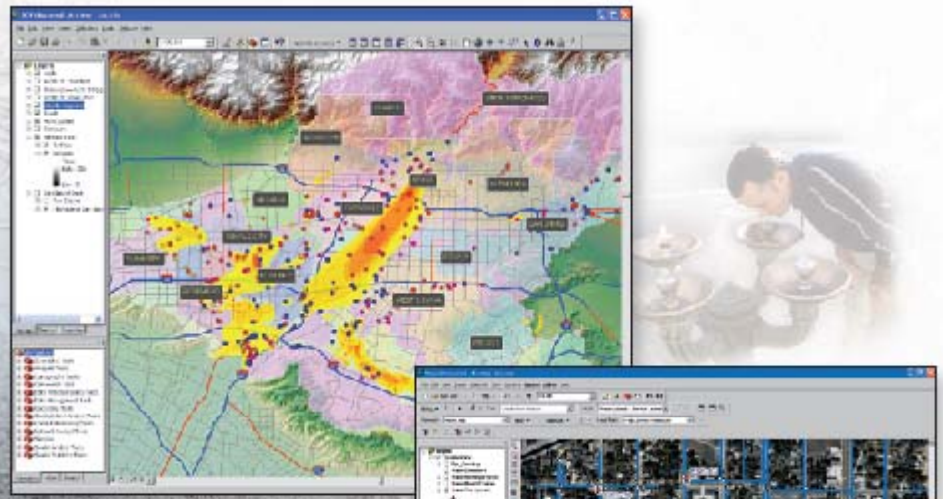
Everybody adds their bit

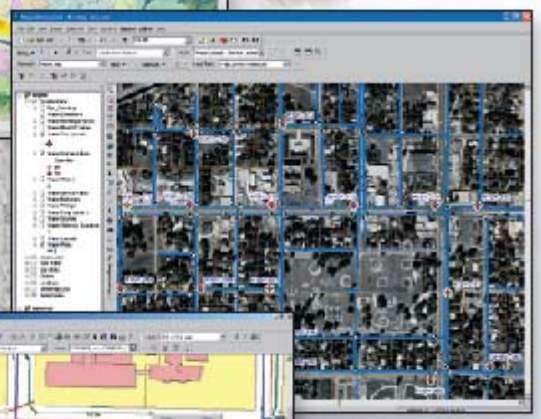
GIS accessibility

- Hand held computers
  - can add data as:
    - surveys are carried out
    - roads are dug up
    - pipes and cables altered
- Can see data on:
  - your mobile, iphone, ipod or ipad
- National pipelines GIS complete



GIS Technology for Water, Wastewater, and Storm Water Utilities





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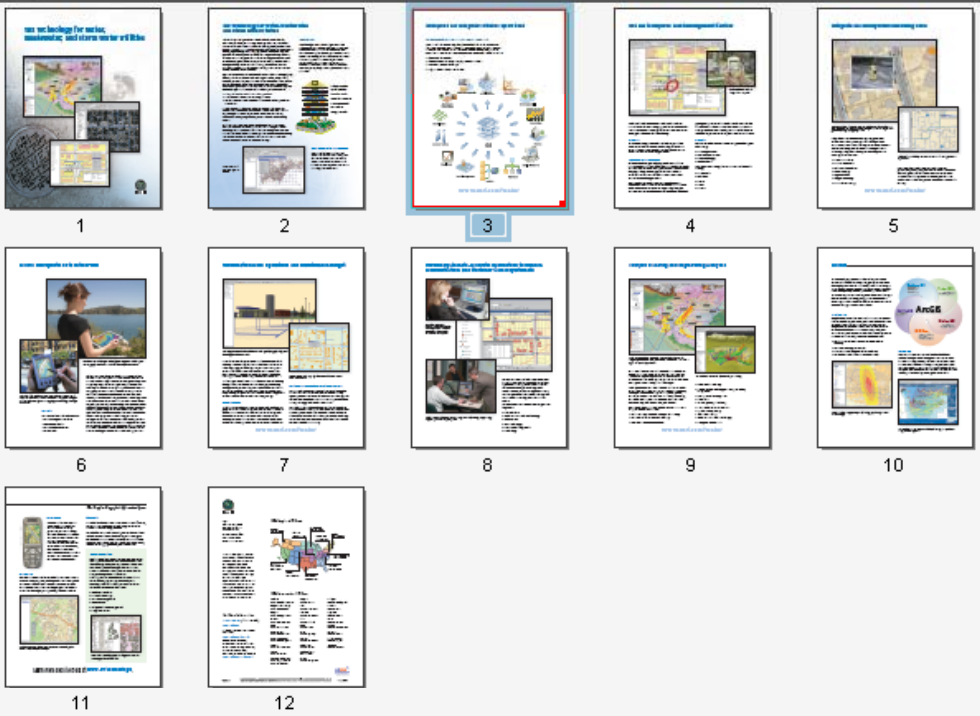

Enterprise GIS Integrates Utilities Operations

Build a Foundation to Support All Your Departments

An ESRI enterprise GIS is an integrated, multidepartmental system composed of interoperable components. It provides broad access to geospatial data, a common infrastructure upon which to build and deploy GIS applications, and significant economies of scale. ESRI enterprise GIS customers report benefits that allow them to

- Reduce data redundancy.
- Improve accuracy and integrity of geographic information.
- Share data efficiently and quickly.
- Integrate GIS and non-GIS applications.

www.esri.com/water

Digging holes,

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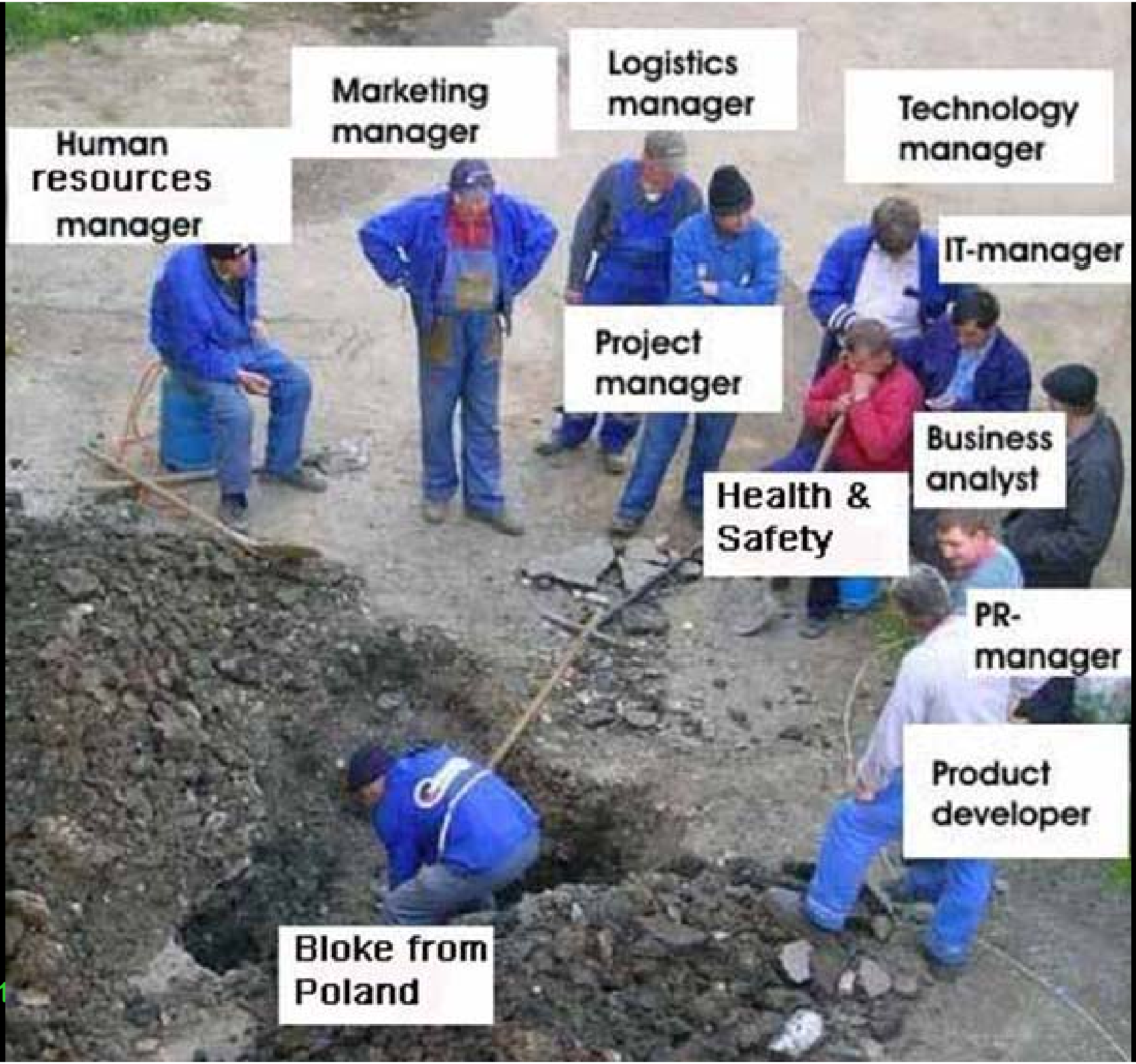
- GIS plans
- coordinated planning of opening up
- All interested parties become team
- Pro-actions not reactions
- Short opening up: all in, all out
- Fines for delays? Why not?
- In London the holes are open for months at a time


Human resources manager
Marketing manager
Logistics manager
Technology manager
IT-manager
Project manager
Business analyst
Health & Safety
PR-manager
Product developer
Bloke from Poland

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Filling holes

- Arising: Not waste but resource
  - Quality Protocols: to set standards
  - Specifications and City Engineers to permit
- Add healthy ingredients or additives
  - Not hazardous, not soluble
- Refill
  - Stabilization and consolidation
- Resurface with recycled product

The Original Soil Stabiliser

PERMA-SOIL-UK

The ULTIMATE Soil Stabiliser

www.permasoiluk.com

01792 895906 *info@permasoiluk.com*

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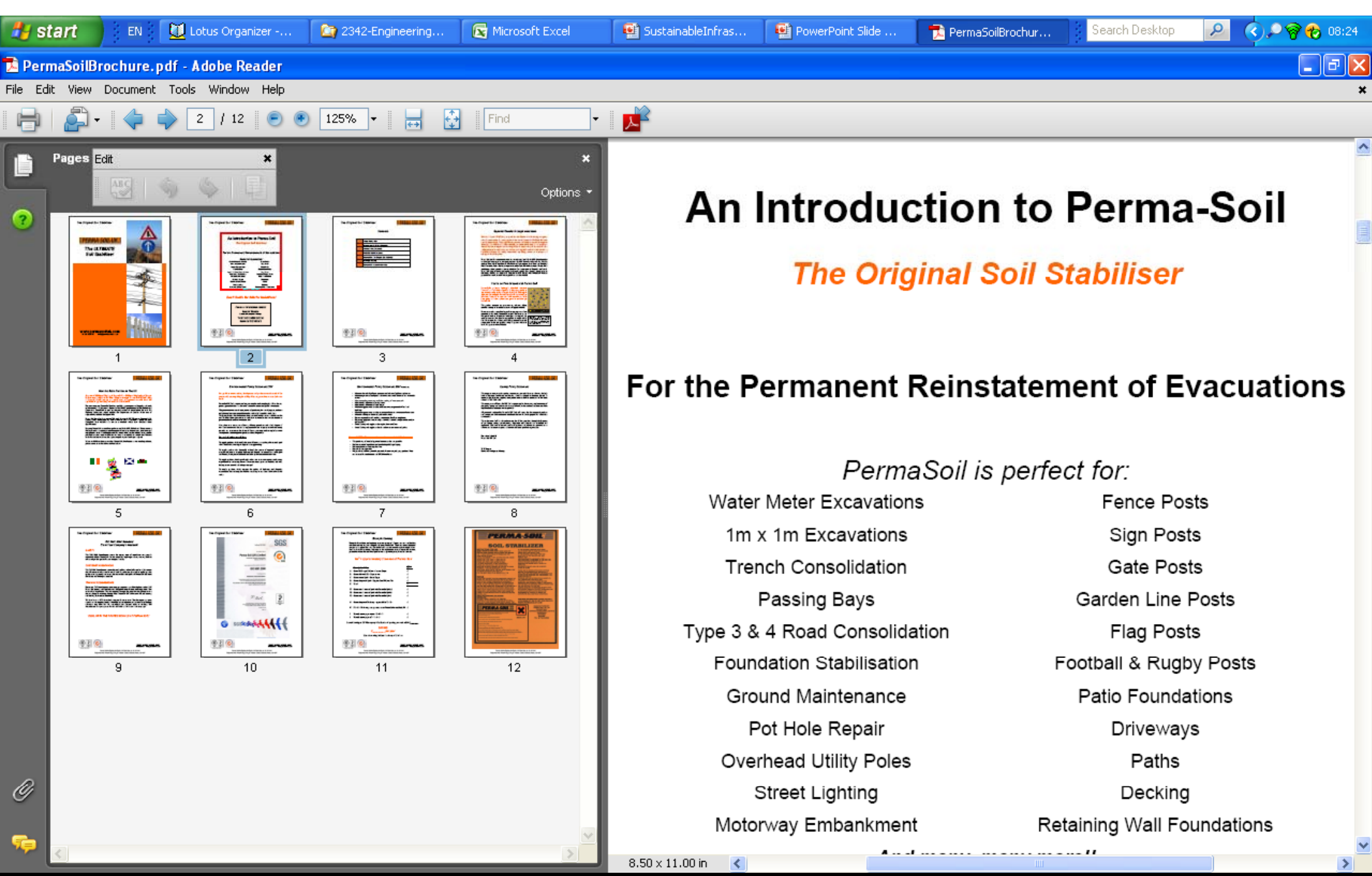
Asked if they could have a Product Page on GreenSpec

Lets assess it.....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An Introduction to Perma-Soil
The Original Soil Stabiliser
For the Permanent Reinstatement of Evacuations
PermaSoil is perfect for:
Water Meter Excavations
1m x 1m Excavations
Trench Consolidation
Passing Bays
Type 3 & 4 Road Consolidation
Foundation Stabilisation
Ground Maintenance
Pot Hole Repair
Overhead Utility Poles
Street Lighting
Motorway Embankment
Fence Posts
Sign Posts
Gate Posts
Garden Line Posts
Flag Posts
Football & Rugby Posts
Patio Foundations
Driveways
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Retaining Wall Foundations
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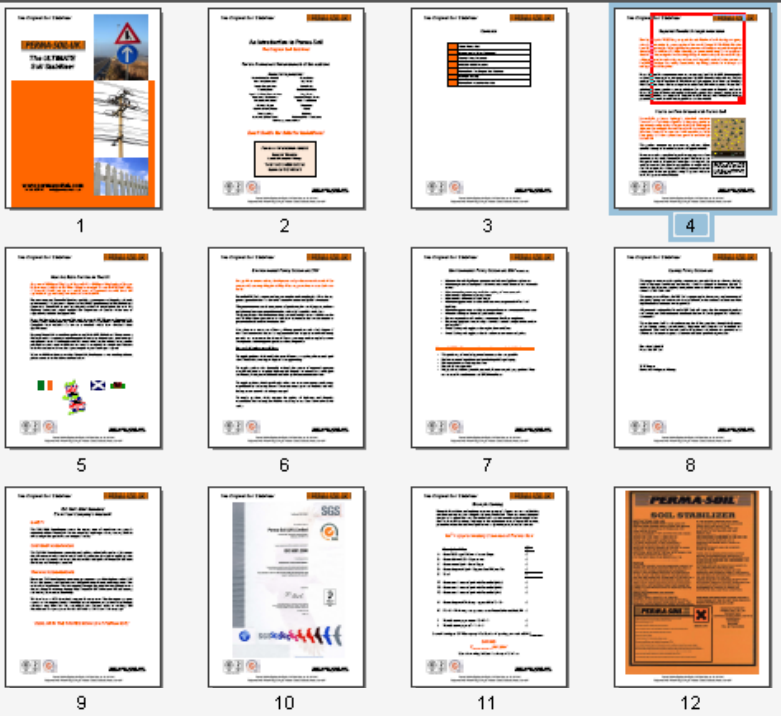

Soil Stabiliser

Superior Results through Innovation

by the US Military to speed the stabilisation of soils during emergency nstruction in remote regions of the world, Perma-Soil Soil Stabiliser has ng municipalities, highway departments and utility companies throughout ave millions of dollars annually on construction costs for more than a y increasing the load bearing ability of excavated spoil, Perma-Soil helps mpaction and moisture problems, making quick work of reinstatement or perations after utility excavations, repairing potholes in roadways and rhead line poles.

enables construction crews to use excavated spoil for backfill, eliminating the ul away spoil or transport purchased backfill materials to the job site. On jobs ater Meter Installations, Fire Hydrant Replacements, Joint Bays and Overhead ons, Perma-Soil turns spoil into usable backfill within minutes. Perma-Soil's action provides a strong sub-base for excavations in footpaths and roads. also stabilises and improves the soil strength when erecting utility poles to shifting or movement. Because backfill treated with Perma-Soil remains to water, rot and freezing problems are also avoided.

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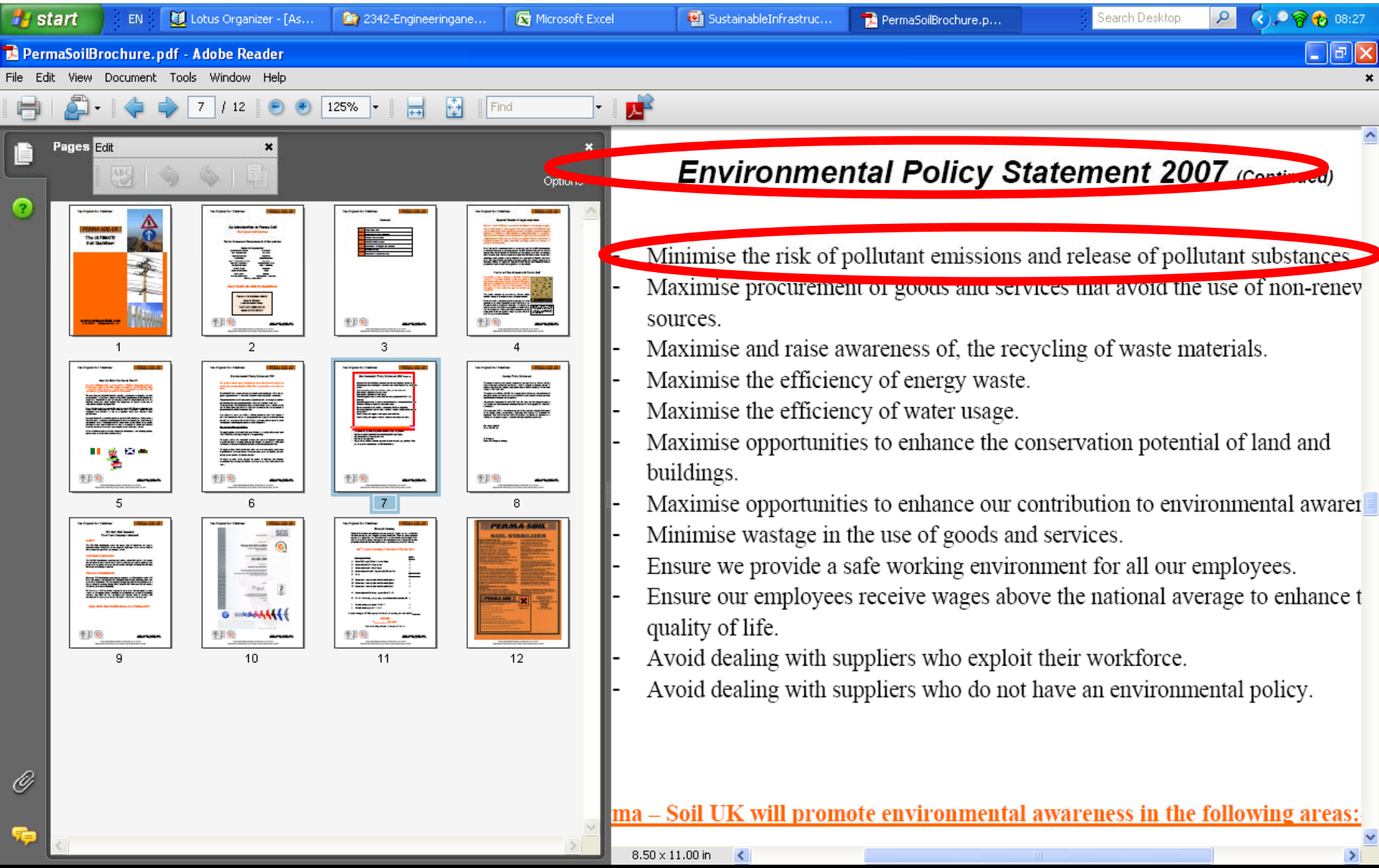
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Environmental Policy Statement 2007 (Continued)
- Minimise the risk of pollutant emissions and release of pollutant substances
- Maximise procurement of goods and services that avoid the use of non-renev sources.
- Maximise and raise awareness of, the recycling of waste materials.
- Maximise the efficiency of energy waste.
- Maximise the efficiency of water usage.
- Maximise opportunities to enhance the conservation potential of land and buildings.
- Maximise opportunities to enhance our contribution to environmental awarer
- Minimise wastage in the use of goods and services.
- Ensure we provide a safe working environment for all our employees.
- Ensure our employees receive wages above the national average to enhance t quality of life.
- Avoid dealing with suppliers who exploit their workforce.
- Avoid dealing with suppliers who do not have an environmental policy.
ma – Soil UK will promote environmental awareness in the following areas:
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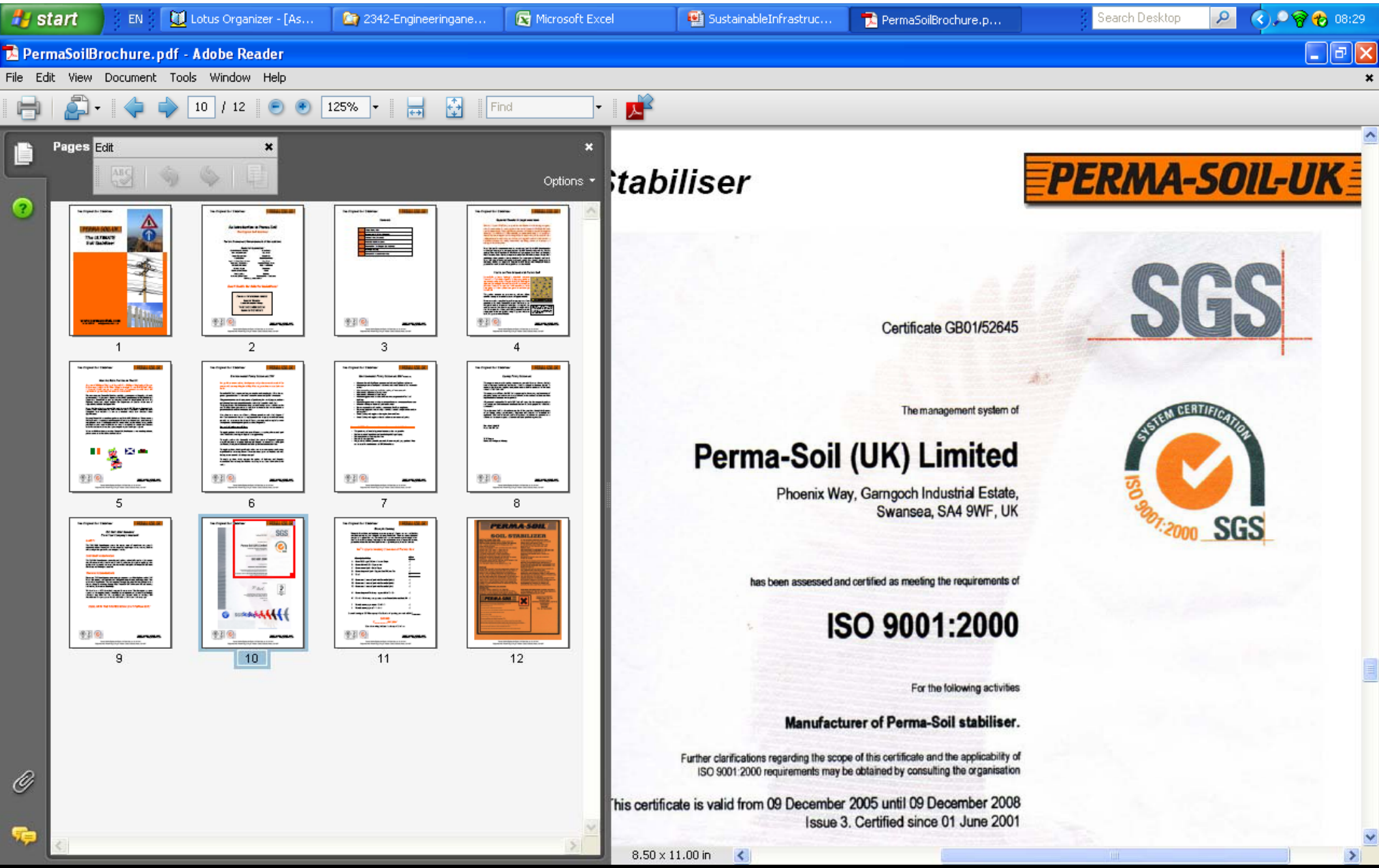
PermaSoilBrochure.pdf - Adobe Reader

By using Perma-Soil to transform spoil into useable backfill, Utility's and C finding that they are saving massive amounts of money on reinstatement, i transportation costs. Reducing the need for return visits has also reduced jobs such as water meter installations can now be completed in a single back of a medium sized van, that expensive grab wagon is no longer require

If you would like to know more about Perma-Soil, the ultimate on site recy please contact us on the address outlined above.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Stabiliser
PERMA-SOIL-UK
SGS
Certificate GB01/52645
The management system of
Perma-Soil (UK) Limited
Phoenix Way, Garngoch Industrial Estate,
Swansea, SA4 9WF, UK
SYSTEM CERTIFICATION
ISO 9001:2000
SGS
has been assessed and certified as meeting the requirements of
ISO 9001:2000
For the following activities
Manufacturer of Perma-Soil stabiliser.
Further clarifications regarding the scope of this certificate and the applicability of
ISO 9001:2000 requirements may be obtained by consulting the organisation
This certificate is valid from 09 December 2005 until 09 December 2008
Issue 3. Certified since 01 June 2001
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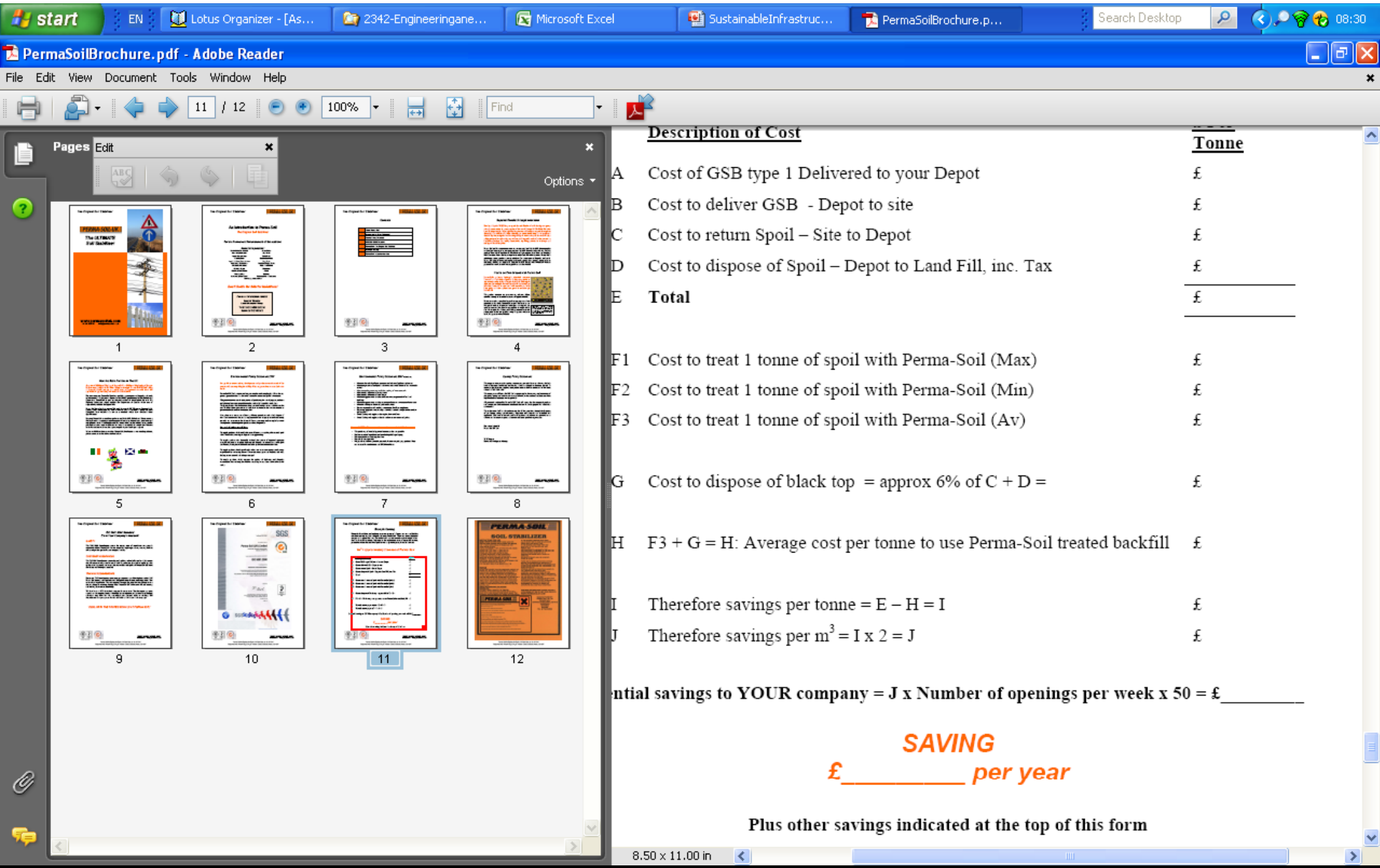
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Description of Cost
Tonne
A Cost of GSB type 1 Delivered to your Depot £
B Cost to deliver GSB - Depot to site £
C Cost to return Spoil – Site to Depot £
D Cost to dispose of Spoil – Depot to Land Fill, inc. Tax £
E Total £
F1 Cost to treat 1 tonne of spoil with Perma-Soil (Max) £
F2 Cost to treat 1 tonne of spoil with Perma-Soil (Min) £
F3 Cost to treat 1 tonne of spoil with Perma-Soil (Av) £
G Cost to dispose of black top = approx 6% of C + D = £
H F3 + G = H: Average cost per tonne to use Perma-Soil treated backfill £
I Therefore savings per tonne = E – H = I £
J Therefore savings per m3 = I x 2 = J £
ntial savings to YOUR company = J x Number of openings per week x 50 = £_____
SAVING
£_____ per year
Plus other savings indicated at the top of this form
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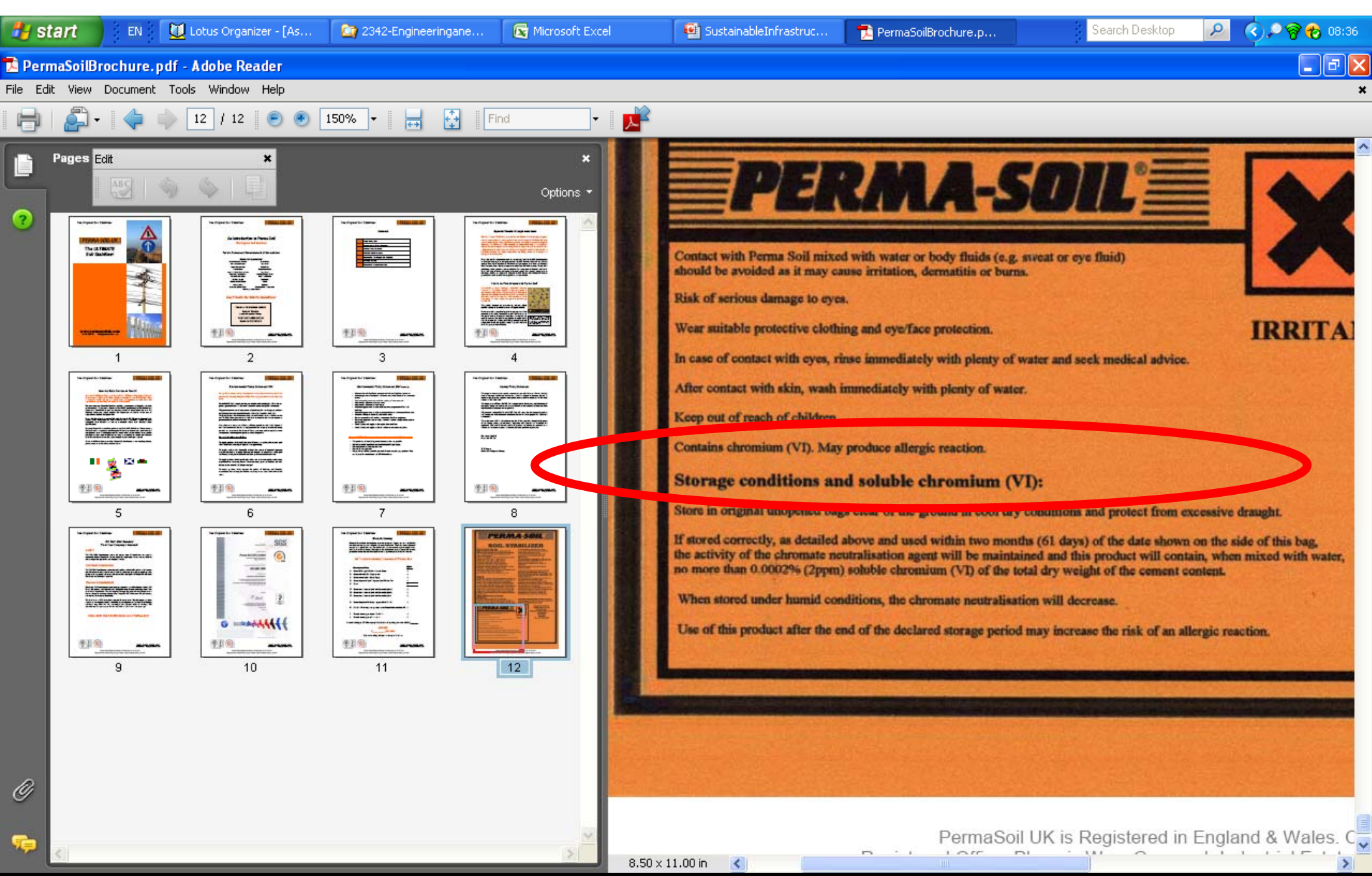
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PERMA-SOIL®
Contact with Perma Soil mixed with water or body fluids (e.g. sweat or eye fluid) should be avoided as it may cause irritation, dermatitis or burns.
Risk of serious damage to eyes.
Wear suitable protective clothing and eye/face protection.
In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
After contact with skin, wash immediately with plenty of water.
Keep out of reach of children.
Contains chromium (VI). May produce allergic reaction.
Storage conditions and soluble chromium (VI):
Store in original unopened bags clear of the ground in cool dry conditions and protect from excessive draught.
If stored correctly, as detailed above and used within two months (61 days) of the date shown on the side of this bag, the activity of the chromate neutralisation agent will be maintained and this product will contain, when mixed with water, no more than 0.0002% (2ppm) soluble chromium (VI) of the total dry weight of the cement content.
When stored under humid conditions, the chromate neutralisation will decrease.
Use of this product after the end of the declared storage period may increase the risk of an allergic reaction.
IRRITA
PermaSoil UK is Registered in England & Wales.
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H&S DS

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- Health and Safety
  - Product Data Sheets
  - Interrogate the health risk information
- Question specifiers
  - if hazardous to anybody or anything
- CHIP (Transporting)
- COSHH (Handling & Application)
- CDM (Constructing & Maintaining)
- REACH (Sourcing & Manufacturing)

Bio Remediation

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- Polluted sites, idle land
  - waiting to be developed
  - Waiting for planning enquiry outcome
- Removed agricultural use
- Plant species to draw out the pollutants
- Harvest the pollutants
- NISP help you sell minerals & chemicals
- Clean the site in 3 years
- In place of 20 low loaders of plant to site

Bio Engineering not Civil Engineering

- Planting to stabilise unstable ground
- Ground cover: Slopes, embankments
- Tree roots: take care: water extraction
- Avoid cement and aggregates
- Avoid bituminous binders
- Avoid plastics
- Clay as a DPM or pond liners

Who pays: Frost Damage?

- Severe prolonged wintery spells
- Potholed roads
- Who pays? nobody and nothing done
- You pay for car repair damage
- Your insurer pays in the long run
- Should insurers pay LA & HA to repair sooner?

Waste-free road plaining and resurfacing

- Plaining 50 mm.
  - Generates waste to landfill
- Resurfacing 50 mm.
  - Requires more aggregates and binder
- Single action machines
  - Plane, re-melt, correct recipe, relay
  - On the hoof
  - No waste

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Urban Logistics

- Consolidation Centres
  - Materials in by 'milk round'
  - Waste out by same vehicles
- Delivery of only what is needed
  - For the days work
  - To within x meters of work place
  - By logistics experts
- Skilled labour: kept active
  - Not shifting materials

Just in time delivery

- No idling, No down time
- Buffer parking places nearby
- No circulating in city
- Not supply chains
  - Create demand chains
  - Lean thinking
- Minimise
  - Packaging
  - Waste

Material Exchange

- Take back schemes
- Excess to requirements: Not waste
- Virtual Websites
  - E.g. Earth Exchange
- Real yards
- Architectural Salvage
- Construction reclaim
- NISP marrying wants and haves

Services Corridors

- Every road built could have a services common trench or culvert
  - Services need not be built in
  - provision to add them later
- Provision for moving water from wetter to drier parts of country
- Collection of rainwater and ability to move it to other parts of the country
  - Not pumping or add CO_2 load
- Avoid overhead cables
  - Run cables in central reservation

Biodiversity related to infrastructure

- Green Infrastructure:
- Green Grids:
  - Green spaces and natural corridors
- Natural Corridor:
  - Footpaths, Cycle ways, Bridleways, buffer zones, hinterlands,
- Blue Ribbons:
  - Rivers, Canals, Dykes, water bodies
- Navigation by hedgerows and boundary walls and fences reinforce if damaged
- Avoidance of unnecessary lighting

Aggregates:

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- Virgin
  - Levy, energy & emissions burden
- Secondary
- Recycled
  - Diverted from landfill, avoided landfill tax
  - Energy burden
    - Glass sand
    - Glass Aggregate in base layers
    - Paper as road reinforcement
- Manufactured
  - Carbon Sequestration


Glass sand for bedding

Glass sand bedding

Subsoil and Aggregates

- Clean subsoil and aggregates arisings
- Material Quality Protocols
  - Avoid becoming waste
- Cut and Fill: in required amounts
- Excess to requirements
  - Earth Exchange
  - NISP
- Used somewhere else, locally

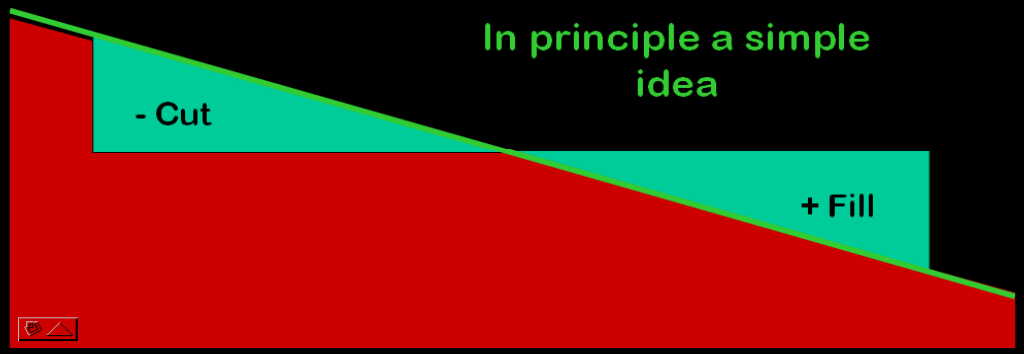
Recycled Subsoil

Topsoil & Subsoil Stockpile on site

Reuse of what you find on site

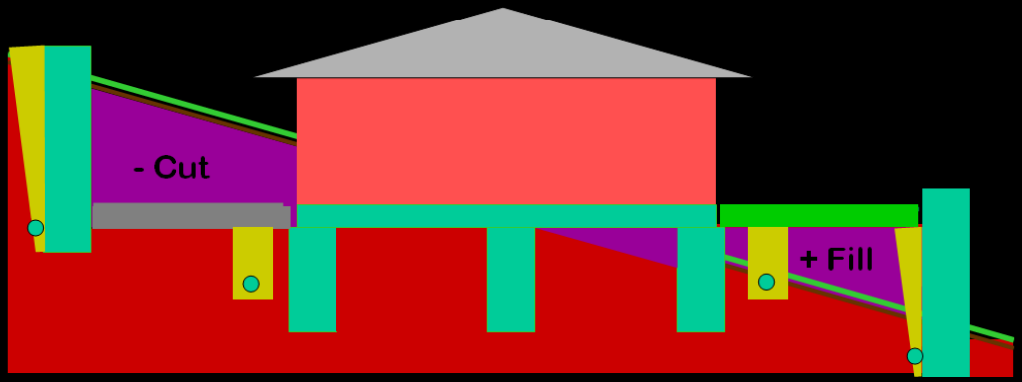
Cut and Fill

In principle a simple idea



Cut and Fill

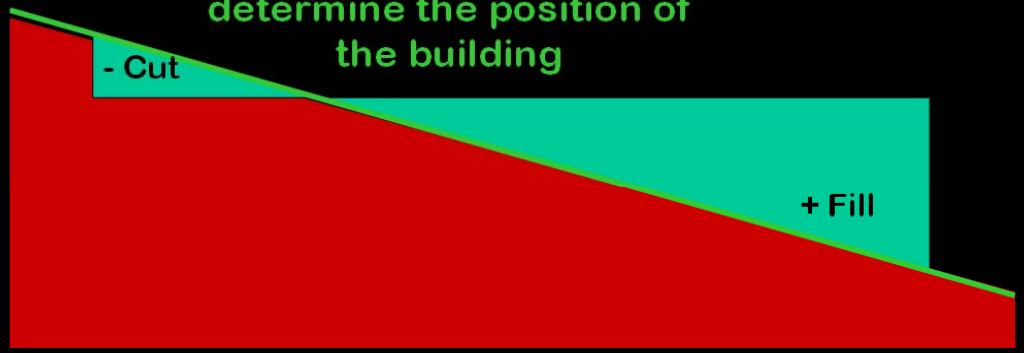
Allow for site strip, design fill size to accommodate excavated materials from: Cut, retaining walls, land drains, foundations, floor slabs, services and drain trenches and paved areas, allow for bulking



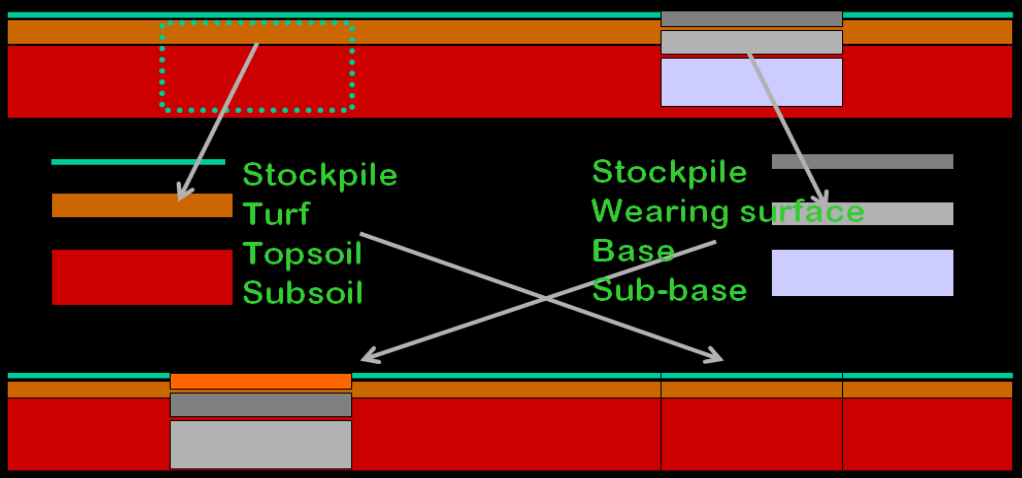
Cut and Fill

Check all your quantities first and determine the level

Or decide the level and determine the position of the building



Rearranging pathways

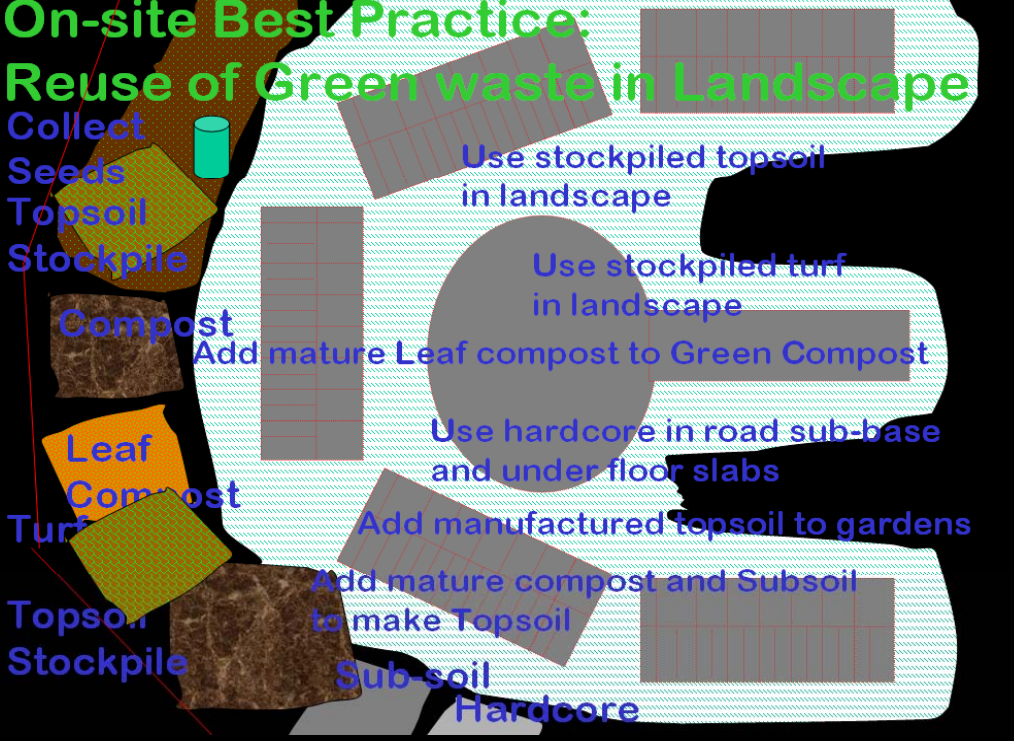


Recycle surface, base & sub-base as sub-base & base
add new wearing surface

Topsoil & Subsoil Stockpile on site

On-site Best Practice: Initial Site Strip: Landscape Waste

On-site Best Practice: Reuse of Green waste in Landscape




Brownfield Landscape
Creekside Visitors Centre


Brown Roofs: Gravel from site
Shifting shingle - plants of shingle beaches


Boulders not Bollards

Recycled Concrete

- As a recycled aggregate for concrete
- As large aggregate for:
  - Gabion filling (no cement)
  - Rock piling (no cement)
  - Permeable pavement sub-base (no cement)

Recycled Concrete in gabions

Down-cycled Concrete or bricks in Gabions & Trapions

A new earth shelter building: ‘Field Station’ with studio facilities for art & science programme

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Case Study

Engineering a new life for Hoo Island

Organisations involved: GPS Marine, H. Sivyer, Peel Ports, and Thames Water

The Challenge

Hoo Island covers an area of 160 acres and lies in the River Medway in Kent. Its owners, Peel Ports, recently began works to transform the area and upgrade their deposition site facilities. The company turned to NISP South East to help source a sustainable supply of aggregate materials to rebuild the infrastructure on the island.

Meanwhile, long-standing NISP Member, Thames Water, had earlier initiated discussions with NISP's South East team for effective solutions to thousands of tonnes of excavated materials arising from their Victorian Mains replacement work in London. Thames Water were working closely on a solution with one of their main contractors, H. Sivyer.

Above: Hoo Island facility

The Solution

NISP's South East team facilitated a complex collaboration between the companies, which sees clay and spoil material from Thames Water's mains replacement works being recovered, reprocessed, transported down the Thames by barge and reused to inject new life intoPeel Port's island facility near Chatham Docks. Chatham-based contracting firm GPS Marine provides the final piece in the puzzle, working in partnership with Peel Ports to transport the excavated and reprocessed material down the Thames by barge and deposit it atHoo Island to be used in rebuilding the infrastructure at the site.

The project was not only shortlisted as a finalist in the 2008 CIWM Awards for Environmental Excellence but also featured in a recent edition of The Environmentalist journal. The CIWM Judges called it an "excellent example of synergy and brokering of partnerships".

The Results

- Additional sales generated: £1.62 million
- Virgin materials saved and waste diverted from landfill: 100,000 tonnes
- Carbon emissions reduced by: 12,152 tonnes
- Jobs saved: 2

> "…"the concept of NISP is an excellent format for companies such as Thames Water to benefit from and the introductions to companies brokered by the South East team have allowed far reaching relationships to be formed that will ensure cost benefits for years to come."

Alan Young
Head of Waste
Thames Water

NISP South East
Tel: +44 (0) 845 094 9521
E-mail: southeast@nisp.org.uk
Or visit www.nisp.org.uk

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Case Study

Enterprising Solution for the M74

Organisations involved: Interlink M74 JV, Scottish Enterprise

The Challenge

Interlink M74 JV, a joint venture between Balfour Beatty, Morgan Est, Morrison Construction and Sir Robert McAlpine, recently won the contract for the M74 completion project. The Joint venture will be responsible for a contract worth £445 million to design and construct an 8km extension to the M74. When complete at the end of 2011, the extension will link the M74 from where it currently ends, at Fullarton Road junction near Carmyle, to the M8 just west of the Kingston Bridge.

Scottish Enterprise were involved in a separate project which saw an area of land south of Glasgow being excavated and redeveloped to form Cambuslang Investment Park. As part of the project, 25 000T of excavated clay had to be removed from the site.

Above: M74 Extension

The Solution

Balfour Beatty Regional Civil Engineering, on behalf of the Interlink M74 JV contacted NISP, who were able to assist in sourcing large quantities of local material for the project. As the Cambuslang Investment Park site is located within 500 yards of the M74 road extension project, NISP Scotland arranged that the clay accumulated by Scottish Enterprise from the excavation works would be used by Balfour Beatty Regional Civil Engineering in the M74 Completion Project as general fill material.

This synergy saved Scottish Enterprise £212 500 in haulage and landfill charges and helped reduce C02 emissions by 118 tonnes.

The Results

- Businesses Assisted: 2
- CO2 Reduction: 118 tonnes
- Cost Savings: £212,500
- Landfill Diverted: 25,000 tonnes
- Virgin Materials: 25,000 tonnes

> We have experienced first hand that working with the NISP team can bring benefits to your business. We are pleased to see construction materials being diverted from landfill and look forward to working with NISP again in the future

Henry Sharp
Chief Materials Engineer
Balfour Beatty Regional Civil Engineering

NISP Scotland
Tel: +44 (0) 845 094 9503
E-mail: scotland@nisp.org.uk
Or visit www.nisp.org.uk

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Case Study

Recycling Railway Ballast Works

Organisations involved: Works Infrastructure Ltd, Regional Solution Provider

The Challenge

Network Rail runs, maintains and develops Britain's track infrastructure as well as associated tunnels, bridges, level crossings,etc. Network Rail is committed to "reusing and recycling items whenever possible" and specifies that its contractors likewise seek the same aims.

As one of Network Rail's key contractors, Works Infrastructure is keen to find productive alternatives to landfill and is working with NISP Yorkshire and Humber on a variety of projects.

The replacement of railway ballast is a regular task in order to maintain the displacement of the mass of the train and the surface profile of the track. Unfortunately, accumulated deposits of oil, diesel spills etc mean that recovered ballast is largely deemed to be hazardous waste.

Above: Railway ballast maintains the profile of the track

The Solution

When carrying out a contracted task to replace the track ballast at York Station, Works Infrastructure were able to clean the recovered material through a regional solution provider. This clean ballast would then be available as secondary aggregates to the construction and road-building industries.

The process of cleaning the ballast involved:-

- Preliminary Treatment to pre-process the material using magnetic overhead belts and vibrating screens.
- Decontamination to separate the finer particles of clay and silt from the coarser sand fraction
- Gravel Washing using scrubbing and counterflow washing
- Sludge Treatment using chemical agents to generate a filter cake to make the residual material suitable for landfill
- Water Recycling

As a result of this process, 99% of the input material was recycled and reusable, reducing hazardous waste to landfill and therefore a significant environmental gain.

The Results

- Hazardous Waste: 75
- CO2 Reduction: 8
- 99% Recycle Rate

> "We are constantly looking for ways to improve our recycling rates as a business, and our relationship with NISP has opened new opportunities to do exactly that."

Neal Burrows
Quality and Environmental Manager
Works Infrastructure Ltd

NISP Yorkshire & Humber
Tel: +44 (0) 845 094 9509
E-mail: yorkshirehumber@nisp.org.uk
Or visit www.nisp.org.uk

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Case Study

Beneficial use of secondary aggregates

Organisations involved: Ballast Phoenix Ltd, Halcrow North East, Balfour Beatty

The Challenge

Halcrow specialises in the provision of planning, design and management services for infrastructure development worldwide, with interests in transportation, water, maritime and property. Halcrow approached NISP at a networking event to assist in sourcing secondary aggregates.

NISP member, Ballast Phoenix Limited is the UK's leading recycler of Incinerator Bottom Ash (IBA) producing a sustainable recycled aggregate, Incinerator Bottom Ash Aggregate (IBAA). They operate an aggregate recovery processing plant at Billingham, Teesside which takes in bottom ash from both SITA's Haverton Hill and Kirklees Waste from Energy facilities.

Above: IBAA at Ballast Phoenix ash processing plant

The Solution

Balfour Beatty, who were the principal contractors on the project, had requested Halcrow to investigate the potential of using the Incinerator Bottom Ash Aggregate and NISP were able to facilitate this by advising Halcrow of the relevant quality protocols and by putting them in touch with the technical personnel at Ballast Phoenix.

The use of the Incinerator Bottom Ash Aggregate was successful and the material improved the permeability for drainage of the embankment. Ballast Phoenix worked closely with the Environment Agency and carried out an Environmental Risk Assessment to ensure full approval for the use of IBAA for this individual site, rather than accepting that it was generally fit for purpose. As a result, far more preparation was required than when traditional primary materials are used. NISP assisted in this procedure by helping Ballast Phoenix to convince the EA that the material produced from their site passed H14 (eco-toxicity) testing, recently added to the requirements for this material by carrying out as a desk study at the University of Teesside. This is a good quality example of Industrial Symbiosis; by utilising material sourced within 3 miles of the construction site, and an example of cross sectoral collaboration.

The Results

- Additional Sales: £72,000.00
- Businesses Assisted: 3
- CO2 Reduction: 2,298
- Cost Savings: £60,000.00
- Landfill Diverted: 22,000
- Training Outcomes: 5
- Virgin Materials: 22,000

> "The use of IBAA reduced both the cost and environmental impact of the project. As a result 552 truck movements were taken from the highway system for this supply of IBAA versus local primary aggregates."

George Overfield
Site Manager
Ballast Phoenix Ltd

NISP North East
Tel: +44 (0) 845 094 9505
E-mail: northeast@nisp.org.uk
Or visit www.nisp.org.uk

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Ashes: Aggregates

- PFA Pulverised Fuel Ash
  - Cement replacement
  - Aggregate substitution
- IBA Incinerator Bottom Ash
- FA Fly Ash

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Case Study

Ashes To Aggregates

Organisations involved: Gilbert Chapple Haulage Ltd, Newlincs Development Ltd

The Challenge

Incinerator Bottom Ash (IBA) from municipal waste to energy facilities is recoverable as secondary aggregate, and this occurs routinely throughout Europe and Scandinavia. Incinerator Bottom Ash Aggregate (IBAA) derived from the cleaned clinker material has many applications in road construction, civil engineering and the building industry.

In the UK, reprocessing of IBA is less common, and many incinerators find themselves without options and so the material is disposed of in landfill.

One such incinerator in the Yorkshire & Humber region approached NISP to see if an outlet for their ash could be found.

Above: Above: Incinerator Bottom Ash Aggregate

The Solution

NISP teamed them up with GCH Ltd, a company with significant experience in reprocessing materials to produce aggregates for engineering work or feedstock for the blockmaking industry. GCH Ltd were able to screen the ash, removing ferrous and non-ferrous metals, and create a range of graded secondary aggregates suitable for use as pipe bedding / trench fill for the utilities market or as a sub-base for paths and tracks. This recycled aggregate is therefore being used in place of virgin materials, making excellent use of an otherwise waste product.

The Results

- CO2 Reduction: 1,027
- Jobs Safe Guarded: 3
- Landfill Diverted: 10,000
- Private Investment: £70,000.00
- Virgin Materials: 10,000

> Our first experience of dealing with NISP has been very productive. We find that information about various types of material that are currently "in need of a home" comes frequently and accurately from the NISP team. We are pleased to be involved in a project which actively prevents unnecessary use of landfill and at the same time uses our expertise to recover saleable material.

Gilbert Chapple
Director
Gilbert Chapple Haulage

NISP Yorkshire & Humber
Tel: +44 (0) 845 094 9509
E-mail: yorkshirehumber@nisp.org.uk
Or visit www.nisp.org.uk

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Low Carbon Cement Replacements

- GGBS Ground granulated blast furnace slag
  - Ground to fine powder
  - Slower set, Programme burden?
- PFA Pulverised Fuel Ash
  - No additional processes?
- Others (no carbon cement)
  - BRE investigating
  - Non-UK players: will they get a look in?
  - Will UK Cement/Conc/Agg sector resist?
  - £12m/annum marketing: probably

Road sweeping & Gully Guzzling

- Hazardous waste
  - Sharps, recreational drugs paraphernalia
  - Pathogens: Hazardous
  - Sewage:
    - rocket fuel for trees
    - LESA Lightweight expanded sewage aggregates
  - Hydro-carbons: waste to fuel
- Or useful arisings
  - Glass: recyclable as aggregates or insulation
  - Cigarette butts: Nicotine: chemical uses
  - Gravel: Recycled aggregates
  - Exhaust fumes: extract metals

Energy generating Pavement

- Pavement
  - Footpath light & footfall energy generators
  - Concentrate footfall
  - Lights in floor generate power for information signs

Energy generating margins

- Hard shoulder
  - Solar panel pavement
  - Interseasonal thermal store
  - Thaw out winter roads
- Central reservations
  - VAWT: Wind from passing vehicles
  - Air source heat pumps: Warm wind?
  - Noise: energy source?
  - Infrared panels: heat source night & day

Water permeable pavement

- Rainwater harvesting
  - Filter membranes
    - Hydrocarbon filters
      - Hydraulic pressure pushes water through not HCs
  - Granite aggregate bed (not glass-sand)
- Solar thermal collectors: Store heat for winter thawing
  - Road surface not parking spaces
- GSHP in sub-bases or WSHP in stored water
- HEP Hydro electric power?
  - Sloping road, sloping pipes,
    - hydraulic pressure?
- Microbes in sub-bases to keep water healthy


Sustainable Urban Drainage System
car park providing water for flushing of public toilets
microbes live in interstices
eat the bacteria and hydro-carbons
Keep the water clean
Formpave
tel 01594 8399
Aquaflow

Living Green/Brown roofs

- Performance benefits
- Contribution:
  - climate change adaptation
    - Solar protection/evaporation cooling
    - Avoiding urban heat island effect
    - Albeido
  - green infrastructure
    - rainwater mitigation
  - ecosystem services
    - Biodiversity

Green walls

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- Wall coverage
  - From the ground
  - Ground based frames
  - Wall cladding: Rainscreen approach
  - Wall hung troughs
- Freestanding:
  - Hedgerows
  - Hedgebank walling
  - Fences,
  - Living Fences
  - Hedge laying/making

Green Boundaries

- Acoustic barriers
  - Not trees
  - Green walls
    - Hedges with soil between
- Hedge bank walling
  - Boulders and turf mortar
- Traffic Slowdown/acoustic hedging
- Green retaining walls
  - Gabions for nature
- Amphibian boundaries
  - Frogs and Newts, one directional, not boundary

Pembrokeshire hedge bank walling

Random rubble & slate outer leaves, wild turf mortar, subsoil cavity fill, topsoil & wild turf/hedge plants on top, crevices for nature, rain rejuvenates in weeks

Flytipping

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- Roadside dumping
- 'Resource mining'
- Reuse:
  - Aggregates & Subsoil
- Recycle
  - Metals
- Recovery
  - Landscape waste: Compost
  - Plastics: Energy or Fuel

Timber as Biomass Fuel

Reducing Waste in design

- Modular e.g. pavings
- Modular plus margins
- Insitu margin
- Insitu main: Tarmacadam ‘Asphalt’
- Cut edges and curves

Design Dictates Waste

- Lazy design
- Labour intensive construction
- Cutting edge blocks generate waste
- Embodied energy in wasted materials
- Opportunity to object to quality
- Condemn materials to skip
- Delay programme
- Quantity Surveyor: think waste & labour

Design Avoids Waste

- Setting out: Not straight forward
- Few cut bricks: little waste
- Labour simplified
- Looks expensive: cheap to lay
- Assumptions made about relative costs
- Quality Surveyor: think resource efficiency & simple construction

Simplified traffic management

- Solve one problem
- Push the problem further down the road
- Simplified junctions
  - Roundabouts seem to work
- Out of town retail parks
  - Use of T junctions and strange car park layouts
- Road hierarchies
  - drive up fuel consumption

Safety & Perception

- UK City Engineer's approach:
  - make it look and feel so safe
  - easier to go faster and break harder
  - risks will be taken
- EU City Engineer's approach:
  - make it look so dangerous
  - that everybody takes extra care
  - and its is safer

Sign proliferation

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- Reduce the number of signs/posts
- Remove them all
  - nobody knows who has priority
  - everybody takes care, slows down
    - There are always exceptions
- Place signs on railings and bollards
  - At low level to be seen
  - Avoiding unnecessary posts

Street Lighting

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- Why illuminate urban and rural duel carriageways and motorways?
  - Cars have lights
  - Use retro-reflective road markings
  - Use PV cats eyes
- Why reduce numbers of lights on at night?
  - To pay for the lights left on in the day
- You only need illuminate where pedestrians/cyclists meet motorised vehicles
  - Use close-to-white light

Sustainable integrated transport:

- Paths:
  - Walking bus, pedestrian and cycle lanes
- Cycle lanes: continuous/narrower
- Bus lanes: Consider Green lanes
  - Green lanes: Buses, coaches, multiple occupancy cars, low emission, taxis
- Integrated transport: cycle & car parks, buses, trains, trams and underground

Green Tunnels & Bridges

- Nature tunnels
  - Below ground
  - Overhead
- Green Bridges
  - Flight paths
    - Kent Beyond Tonbridge Wells
    - Mile End Park London
- Funnelled entry essential
  - Or they don't find it

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Events

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Smart Grids

- Smart Grids & Cleanpower 2010
  - Energy sector transformation:
  - Building the commercial framework
- 24-25 June 2010 in Cambridge UK

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- **Led and supported by:**
  - Alstom Power, Siemens AG, AlertMe, Dialight plc, Green Energy Options, GE Energy, ARM plc, and Vestas A/S
- **Media Partners:**
  - Cleantech Investor Magazine, the Engineer, the IET, Renewables East & PV International, Carbon Capture & Storage Association, Montel, New Scientist, Cambridge Business Magazines.

Day 1: Smart Grids 2010

- **Simon Higgins, Solutions Architect, Arqiva**
  - Smart grids: introduction and infrastructure
- **Martin Pollock, Dir of M&A, Siemens Energy**
  - What's the smart grid for? Who needs it?
- **Martin Ansell, *Director*, GE Energy**
  - What's happening now: real, smart solutions
- **Ian Drew, *VP*, ARM Green technologies**

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- **Rizwan Ahmad, *Director*, Dialight plc**
  - **Why we need smart metering and what it'll mean for the UK**
- **Chris Wright, *CTO*, Moixa**
  - **Technology Home energy systems**
- **Pilgrim Beart, *Founder*, AlertMe**
  - **Smart home management platforms**
- **David Eurin, Head of Energy, Analysys Mason**
  - **How energy efficiency requirements will drive demand for smart grids**
- **Simon Anderson, COO, Green Energy Options**
  - **The need for real time feedback**
- **Mary Turner, *CEO*, AlertMe**
  - **Consumer demand**
- **Andrew Hill, Director, Tesco plc**
  - **Consumer priorities**

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- Ben Kott (live link from Mountain View, CA),
- EMEA Green Business,
  - Google Global green initiatives
- Etienne Pollard, Senior Associate,
  - Good Energies Good investments
- Nick Coutts, CIR Strategy
  - Building Routes to Customers
- Sarah Harrison, Ofgem
  - Sustainability and regulation
- Keith Dickerson ITU (United Nations Agency)
  - Global grid development standards
- Prof Mike Kelly, CU & former DCLG CSA
  - When will Engineering Reality enter the UK Energy Policy Debate?

Day 1: Smart Grids

- Digital Smart Grids
- Enabler technologies
- Software: platforms and the consumer;
- Hardware: smart meters, pipes, disconnects, chips
- Consumer demand management and pricing strategy
- Investment, regulation and policy

Participating Companies

- GE Energy, Alstom Power, Google, Siemens, First Solar Inc, Suntech Europe, Renesola China, ARM, AlertMe, Analysys Mason, Cambridge University, Cambridge Carbon Capture, Arqiva, Dialight plc, Green Energy Options, Japan Wind Developments, Moixa Technology, OFGEM, ITU, HG Capital, Rainbow Seed Fund, Tesco plc, Good Energies, Apax, TTP Ventures, Incrops, Green Energy UK, Quiet Revolution, Vestas

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Feedback

- These files are created by generalists with a big dollop of green flavour
- These files are updated from time to time
- We are not experts so from time to time these file may get out of date or may be wrong.
- If you feel that we have got it wrong please let us know so we can put it right

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- Brian Murphy BSc Dip Arch (Hons+Dist)
- Architect by Training
- Specification Writer by Choice
- Greening up my act since 1999
- Founder of www.greenspec.co.uk
- E BrianSpecMan@aol.com
- Twitter: http://twitter.com/brianspecman
- Scribd: www.scribd.com/brianspecman
- Facebook: http://www.facebook.com/pages/GreenSpec/77375462337