

# C11 Ground Investigation

Ground Survey  
Ground Investigation  
Ground Inspection  
Ground Analysis

# Survey

- C10 Site Survey
- C11 Ground investigation
- C12 Underground services Survey
- C13 Building fabric Survey
- C14 Building services Survey



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# NGS D20

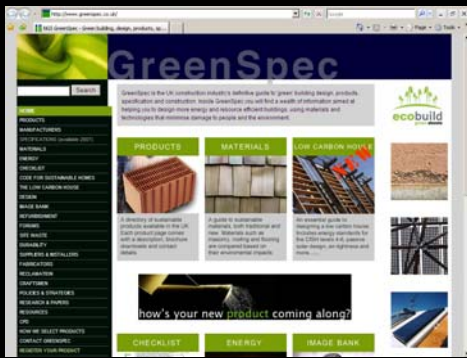
**NGS GreenSpec D20  
Excavation Resource Recovery/  
Waste Minimisation  
Specification clauses**



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# NGS Q29

**NGS GreenSpec Q29  
Landscape Resource Recovery/  
Waste Minimisation  
Specification work section**



# Desk Study

- Local Library & Museum: other historical
- Coal mining records
- Nottingham tunnels
- Rivers covered over
- Prior use: Planning records

# RCHME:

- Swindon & London
- Historic and Social records
- Historic Maps
- Historic records of buildings and land tunnels and caves by address
- List (Listed buildings)
- Planning Application data

# RCHME: Photography

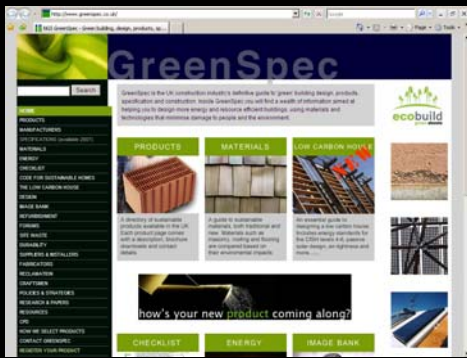
- Ariel Photography (See next)
- RCHME
  - post-WWII Aerial Photography collection
  - Vertical and oblique
- Country Life magazine photographic collection
- Social Historic Photographic Records (Mining, Steel making)

# Previous use

- **Industrial uses**
  - **Gas works: Pollutants**
  - **Milk Processing: Corrosive**
  - **Printers: Ink**
  - **Church or Graveyard, Burial sites, Black death,**
- **Land fill: Category, Methane and CO2**
- **Backfill: clean or contaminated**

# VOCs Volatiles at Brownfield Sites

- Consultation - Investigation & Assessment of Volatiles at Brownfield Sites
- CIRIA, a leading provider of technical guidance to stakeholders in the built environment is currently developing guidance for the assessment and management of risks to human health from volatile chemicals in the ground.
- The output of this project will be consistent with and suitable for use with the existing UK Contaminated Land Regime.
- It will provide an important extension and will be compatible with guidance from DEFRA and the Environment Agency currently being developed.
- The proposed document will provide guidance to a range of contaminated land stakeholders including developers, industrial clients, consultants, etc.
- We feel that the report will be very useful to primary regulators i.e. local authorities.
- The research contractor for the project is Arcadis Geraghty and Miller International, Ltd.
- The attached questionnaire has been compiled to improve understanding of the current practice for the investigation, assessment and remediation/mitigation of volatile compounds on brownfield sites (excluding bulk landfill gases).
- We would be grateful if you, or one of your colleagues, could complete and return the form by Friday 16 November 2007 by e-mail or by post.



- The form should be completed by an individual who has knowledge and experience in the investigation and/or assessment and/or remediation/mitigation of risks posed by volatile compounds on brownfield sites.
- If you believe that the form has reached you in error, please pass it to a colleague who has the appropriate experience.
- If there are other individuals within your organisation/associated with your organisation who might be able to add an alternative viewpoint we would be pleased to receive more than one completed form.
- Please make copies of the form as necessary, and feel free to include information on additional pages.
- We intend to incorporate case studies in the guidance, for example, highlighting different investigation techniques, comparison of site data and model outputs and successful remediation/mitigation techniques.
- Should you have any case studies that you consider to be examples of good/best practice, which could be included in the guidance, please tick 'yes' to question B16, and we will contact you to discuss further details.
- Joanne Kwan, Project Manager, CIRIA,

# Internet Study

- EA
  - Flood maps
  - Pollution maps
- Geographic Society
- British Geological Society: Soils/Rock Maps
- BAP Biodiversity Action Plans: LA
- RCHME See previous

# CDM Analysis

- **Bridges and underpasses**
- **Buried Ducts and cables**
- **Services inspection chamber covers**
- **Surface boxes and signs**
- **Buried Services & Chambers**
- **Sea, Lakes, Rivers, Canals**
- **Other Risks?**
- **Risk analysis**

# BREEAM/EcoHomes

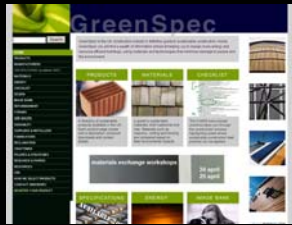
- **Proximity of Public facilities**
  - Telephone box, letter box
  - Public recreational facilities
- **Proximity of Public transport stops**
- **Access to car club rental**
- **Ease of use of bicycles**
- **Existing Biodiversity**

# Infrastructure:

- Highways & waterways, footpaths, cycle ways and bridal ways
- Railways Public and Goods, Station and yards
- Mains & Sewers
- National grid below ground
  - Gas & Electricity & Oil
  - Canal side power cable
- Hydraulic oil line (central London now redundant)
- Private lines
  - Communications Gov GTN, Public and Private
  - CHP Power & Heat, District Heating
  - Power
- Underground public and mail

# On site Resources

- Existing buried features and materials
- Reuse opportunities on site in the works
- Recycling opportunities on or off site
- Basements and foundations to reuse or materials to reclaim and reuse
- Lateral thinking necessary



# Environmental Impact Assessment

Another GreenSpec CPD to download soon

# Site Measured Survey

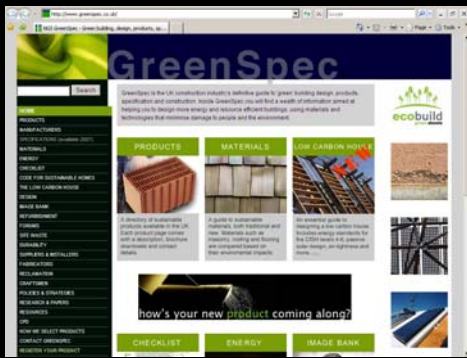
- **Briefing Surveyor:**
- **Scope of work and format of delivery**
- **Boundaries**
- **Features above and at ground**
  - indicating existence of things below.
- **At and below surfaces:**
  - levels: cover, identify, crown & invert, direction, falls
- **Buildings outline: size position and levels**
- **Hard, soft and wet landscape outlines: Shapes**
- **Accuracy important: Developer greed**
- **Check accuracy of plans prints and translations to CAD**
- **Do not get sued**

# Soil Inspection

- Thicknesses and levels
- Topsoil, Subsoil and substrata
- Load-bearing capacity
- Water table and moisture content, pipe leakage
- Pollutants: Sewage, Chemical and gases, hydrocarbons,
- Sulfates (SR Cements or not)
- Soil analysis for landscape capability
- Inspect adjacent basements too

# Site Ariel Photography

- CH&E Centre for Hydrology & Ecology
- Ariel photographic flypast
- Chemical analysis of soil, rock & water
- Image of site and analysis overlaid
- Analysis of deficiencies
- Proposals for rectification
- GPS on vehicle on site, feeder kit controlled by satellite

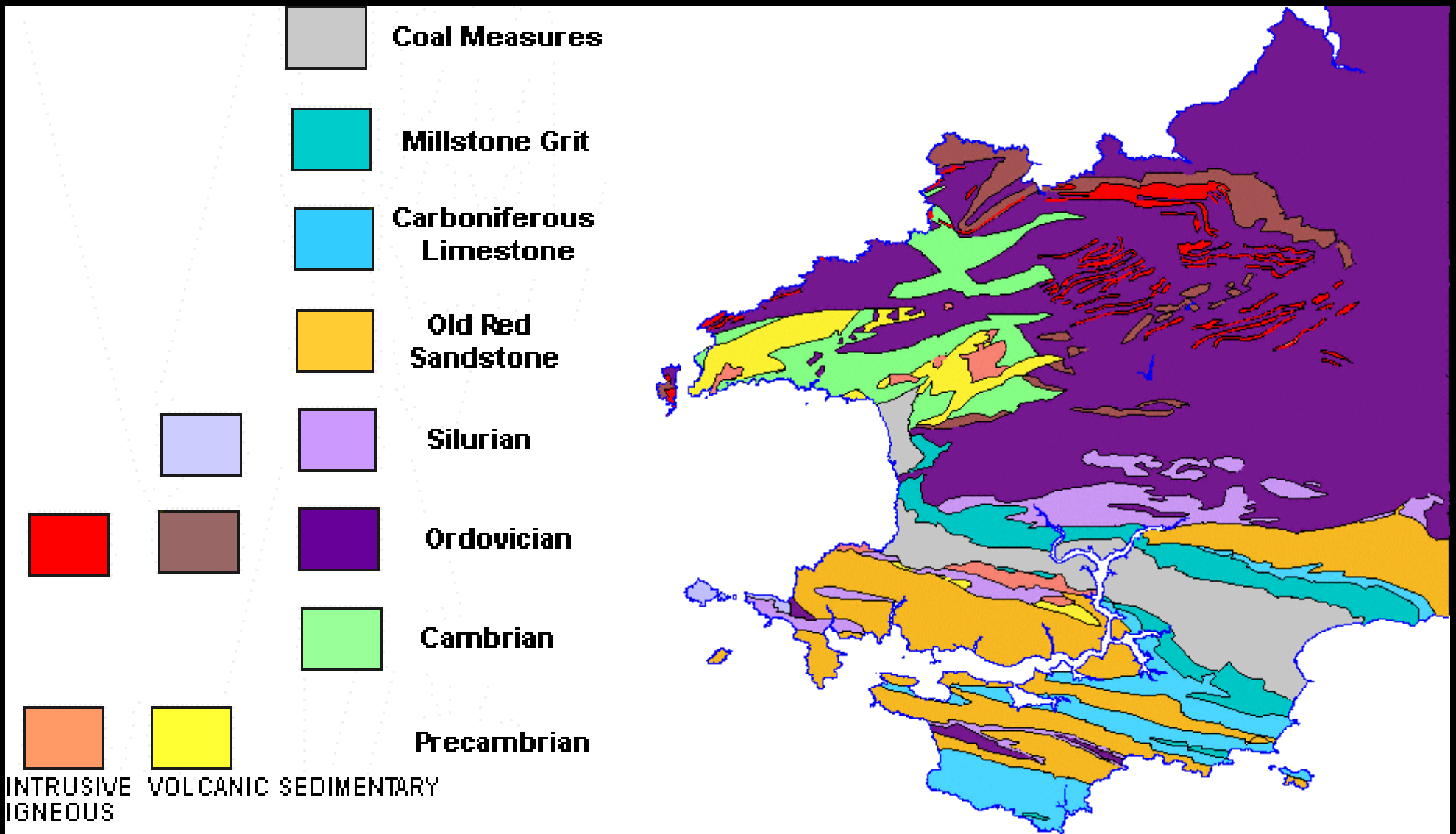


# Satellite Surveys

- Analysis of site, vegetation, soil, rock, water and pollution.
- UK already mapped

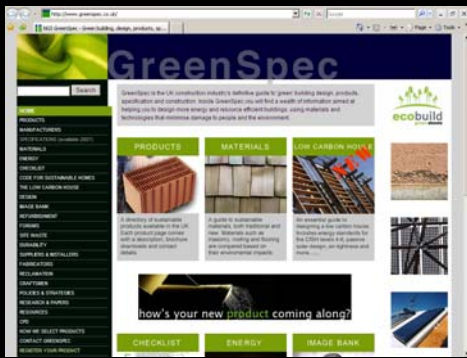
# Ground water

- River catchments
- Aquifers
- Springs
- Underground natural chambers
- Wells
- Ponds



# Geology & Drilling

- UK and Wales in particular
- Diverse mix of geology over area & depth with overlapping layers
- Small pockets of differing materials
- Drilling granite is predictable & easy with right tools, but not cheap
- Sloppy mud & sand: drilling cheap but subsoil collapses into hole
- Lining: time consuming & expensive
- All drilling generate arisings: any reuse opportunity?



# Renewable Energy

Ground Source Heat Pumps

# Renewable Energy

- GSHP Ground Source Heat Pumps using the stable temperature of ground water and subsoil at depth
- or solar gains from shallow subsoil,
- heat pump intensifies the temperature and warms the building with underfloor or in wall pipe heating
- Also used to cool building by pushing heat back into the ground

# Site investigation & GSHP

- **GSHP: big cost: to put pipes in**
- **Get pipes fitted at time of:**
  - SI drilling
  - Or piling
  - Or during landscape processes