NHBC Verification Requirements

Emma Jones– Senior Geo Environmental Engineer

Verification Requirements

- Soil Quality Testing Requirements
- Clean Cover Thickness
- **Reporting**

Verification – Soil Quality Testing Requirements

- Need to ensure the placed materials are suitable for use
- NHBC chemical testing requirements will depend on the source of the capping materials. Site won or imported?
- Sources :

Greenfield	Manufactured	Unknown /Brownfield site
• Greenfield • Agricultural land • Forestry land	• Manufactured soils from green waste/ re-processed soil	• Brownfield • Unknown source? • (Not agreed in advance)

Verification – Soil Quality Testing Requirements

- Greenfield Source (Direct Transfer From Donor Site)
  - A minimum of a desk study and a site walkover (by a suitably qualified person), and/or previous site investigation report is required to confirm no historical or visible evidence of contamination.
  - If no potential sources of contamination is identified then no additional testing above BS:3882:2015 and BS8601:2013 is required.
  - For site-won soils, sufficient evidence of soil suitability including SI data, and on site soil management would be required
- Manufactured soil where **GOOD** levels of quality control are in place:
  - Copy of suppliers chemical test certificate is required.
  - Certificate should be current and representative of the material actually being used on site.
  - If the above information is available, additional testing may not be required
- Delivery Tickets are required to confirm the soil source but beyond this NHBC would not normally require further chemical analysis for these sources

Verification – Delivery Notes/ Chain of Custody

- Chain of Custody is important if imported materials (from non contaminated sources) are assessed in advance based on off-site information
- Haulage delivery notes may be acceptable - the more info the better
  - On sites with large import volumes, a selection of delivery notes would be ok
- Can you confirm the certificate relates to the material imported to site?
- A visual inspection of soil on delivery essential (does soil visually compare with that described on suppliers test report?)

Verification – Soil Quality Testing Frequency

- For a source with unknown / insufficient background information or testing, sufficient testing should be undertaken to confirm the soils are suitable for use
- NHBC consider the suggested testing frequencies below as good practice (for each separate soil source used)

No of Plots	Nominal sampling frequency	Suggested min No of tests per site of each capping material
1-5	1 test per plot	3
5-10	1 test per 2 plots	5
10-20	1 test per 2 plots	5
20-30	1 test per 3 plots	7
30-40	1 test per 4 plots	10
Over 40 plots	1 test per 4 plots	10

- **Skip Waste is not normally acceptable as a capping material without extensive testing**

Verification – Soil Quality Chemical Analysis

- Chemical analysis should include contaminant concentrations as well as the criteria set out in BS3882:2015
- No simple answer to testing requirements – it depends on the source, the contaminants of concern and the available documentation;
- Should be agreed in advance / included in the Verification Plan
- Don’t forget to allow enough time for laboratory analysis to be completed!

Stone Content	%	0.1	NONE	< 0.1	34
Moisture Content	%	0.01	NONE	19	19
Total mass of sample received	kg	0.001	NONE	1.0	1.0

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SFS	SFS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	110	130
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.057	0.065
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	56.5	64.6
Organic Matter (automated)	%	0.1	MCERTS	3.2	0.9

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.22	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.45	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.42	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.31	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.24	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.31	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.16	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.31	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.22	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.28	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	2.92	< 0.80

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.8	2.5
Boron (water soluble)	mg/kg	0.2	MCERTS	2.1	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	6.8	3.0
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	8.4
Lead (aqua regia extractable)	mg/kg	1	MCERTS	41	9.4
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	6.3	3.1
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	43	17

Verification – Clean Cover Thickness

- The inspection frequency for capping thickness will depend on the final land-use and number of plots being built.
- For low-rise housing with private gardens

No of Plots	Inspection Frequency
< 5	Each plot
5 to 20	1 in 2
20-30	1 in 3
>30	1 in 4

- Typically, verification of cover system thickness is via trial pit and use of photographs and/or logging of encountered soils.
  - Photographs should include a tape or staff clearly showing the hole depth
- **If included in the clean cover design, don't forget to confirm the presence of geotextile/membrane/break layer**

Verification – Reporting

- The verification report should ideally include:
  - Plot numbers – which plots/block are being verified?
  - A site plan confirming sample and depth check locations
  - Confirmation of clean cover depth including photos
  - Confirmation of source suitability and chain of custody (if materials are verified off-site)
  - Chemical analysis results

- Watch Points
  - Keep the report clear, concise and easy to review
  - Does the verification report correspond to the clean cover design?
  - Allow enough time for chemical analysis to be completed to meet the site deadline/CML
  - Get the report to us as soon as possible

Common Verification Issues

- Design and Installation
- Chemical Analysis
- Depth Check and Photos
- Timescales

Common Issues – Design and Installation

- Has all land quality information been submitted for review?
- Has the final version clean capping design and validation plan been reviewed and accepted by NHBC?
- Has the required depth of capping been achieved?
- Where is the membrane?
- Change in soil source is not documented?

Common Issues – Chemical Analysis

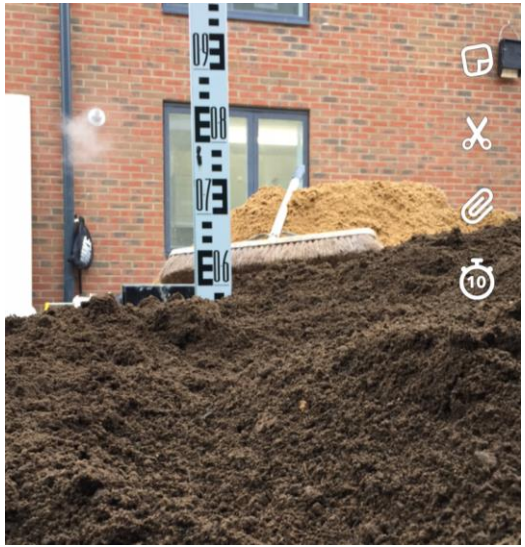
- Testing Frequency
- Incorrect chemical analysis results provided such as:
  - Waste Acceptance Criteria (WAC)
  - BS3882 nutrient analysis without appropriate contaminant analysis
  - Missing determinands
  - Does the testing suite match the contaminants of concern?
- Chemical analysis is out of date – it must be representative/applicable to the imported soil material;
- Chemical analysis exceeds the agreed screening/import criteria

Common Issues – Depth Check and Photos

- Frequency of Depth Check
- Poor quality photos
  - We need to the see the depth of the cover including base of the pit
  - If in doubt, two photos are better than one
  - Measurements on tape/staff need to be legible
  - Check photo resolution in electronic reports

Common Issues – Depth Check and Photos

These are genuine photos received for verification – not acceptable!



Common Issues – Depth Check and Photos

Plot 94 – Location of Hand Excavated Trial Pit

Common Issues – Depth Check and Photos

Common Issues – Depth Check and Photos

Good examples – clear depth measurements, base of hole (and membrane) visible!

Common Issues – Timescales

- The most common issue for verification reports is **TIME** (or lack of it)!
- Allow enough time for verification sampling, chemical analysis and reporting to be completed
- We need time to review the report
- If last minute submission is unavoidable please let us know in advance and keep us informed/updated on progress

Other Considerations – Garden Areas

- It might not be contaminated but…..
- Poor quality of gardens can be an issue and especially:
  - Waterlogging
  - Over compacted Soils; and
  - Poor growing medium
- Clauses 10.2.8 and 10.2.9 of NHBC standards include actions to reduce the risk of waterlogging such as rotavating to restore physical condition and drainage characteristics of soil which has been compacted

Finally….

- Verification of clean cover is not rocket science
- However, it does need some thought and planning
- Keep the verification report clear and concise; and
- Please keep us in the loop and avoid (if you can) submitting information at the last minute

Further Information

- NHBC Standards – www.nhbc-standards.co.uk
- NHBC Technical Extra 8
  - https://www.nhbc.co.uk/builders/products-and-services/techzone/nhbc-standards/technical-extra
- BS 3882: 2015 – Specification for Topsoil
- BS8601: 2013 – Specification for Subsoil
- Or call us on 0344 633 1000 and ask for Technical Services

Thank you