
Clean Capping Requirements for Brownfield Land Remediation

In association with



Programme

- Introduction & Clean Cover Background – Matt Lennard, NHBC
- British Sugar TOPSOIL – Andy Spetch, National TOPSOIL Manager
- Sources of Topsoil, Soil Assessment and Soil Compaction – Tim O’Hare, Tim O’Hare Associates
- Verification of Soil Capping Systems – Emma Jones, NHBC
- Local Authority Requirements – Fabia Pollard, King’s Lynn & West Norfolk Borough Council

Clean Cover System Background & Design

Matthew Lennard – Principal GeoEnvironmental Engineer



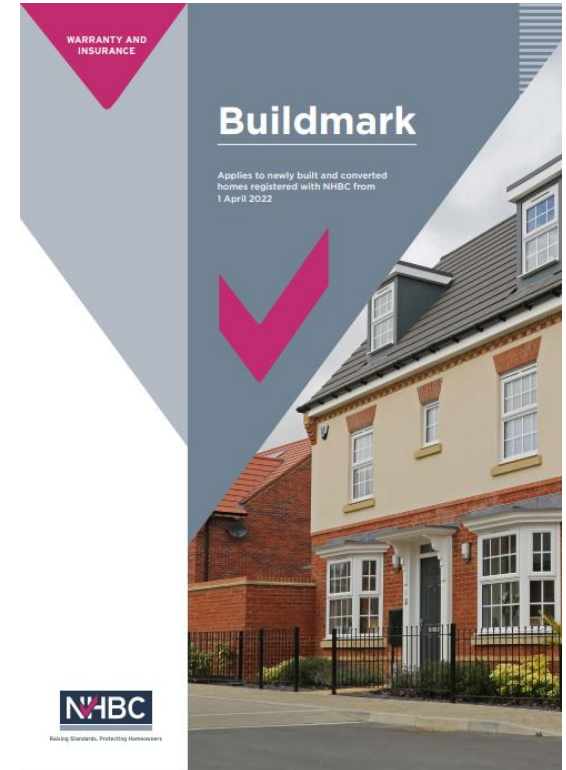
Requirements for Soil Capping Systems

What will be covered

- NHBC and land quality
- Soil capping / clean cover theory
- Design of clean cover systems

NHBC and Land Quality

- The National House Building Council (NHBC) are:
 - Leading Warranty and Building Control Provider
 - Providing consumer protection for new homebuyers
 - Raising standards in the new house building industry
- Contaminated Land Cover is included in Section 3.4 of the Buildmark Warranty
- What is Covered
 - *‘Work required to improve the condition of your land if you receive a statutory notice for your land or a statutory notice could be issued because of the condition of your land’*
- Financial Limit for the warranty is typically the sales price of the home up to £1,000,000.



NHBC Standards – Chapter 4.1

- www.nhbc-standards.co.uk
- Chapter 4.1 Land Quality – Managing Ground Conditions
- Provides a framework for managing geotechnical and contamination risks
- Key objectives for contaminate sites are to ensure:
 - all sites are properly assessed and investigated for potential contamination hazards;
 - all sites are properly remediated where necessary or appropriate, and design precautions are taken;
 - Appropriate documentation and verification is provided to NHBC



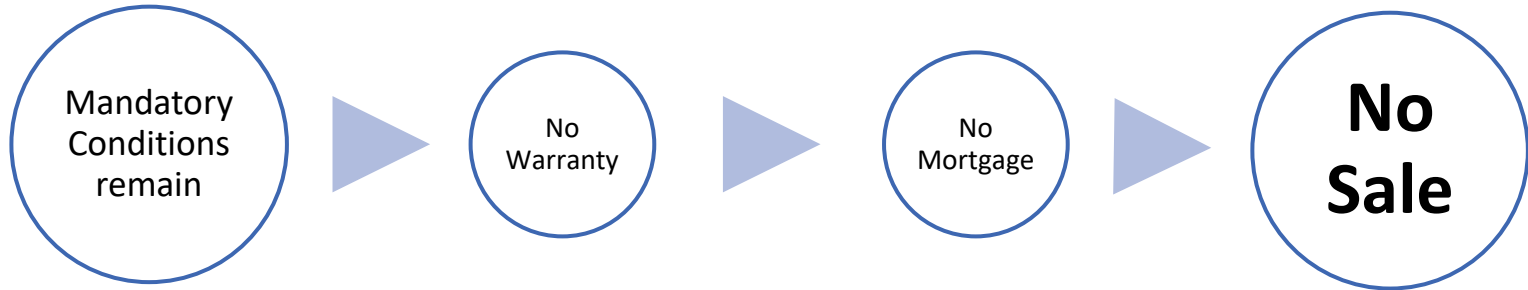
NHBC Standards – Chapter 10.2

- Chapter 10.2 – Drives, paths and Landscaping
- Key points for garden areas:
 - 10.2.1 – All works should be completed in accordance with the ground remediation statement (where applicable)
 - 10.2.7 & 10.2.9 – Topsoil and subsoil should be of a quality that will not present a hazard to users of the garden area;
 - 10.2.9 – Old foundations, concrete, bases and similar obstructions should be removed from within 450mm of the finished ground surface;
 - 10.2.9 – Appropriate action should be undertaken to restore physical condition (e.g. soil structure) and drainage characteristics of topsoil and subsoil that has been compacted during construction
 - 10.2.9 - A minimum thickness of 100mm topsoil is required



NHBC Land Quality Conditions

- We undertake a land quality review for ALL sites that are registered with us.
- We set MANDATORY conditions to ensure the requirements set out in the NHBC standards are met
- A warranty will NOT be provided until all mandatory conditions have been cleared.
- This includes the verification of clean cover



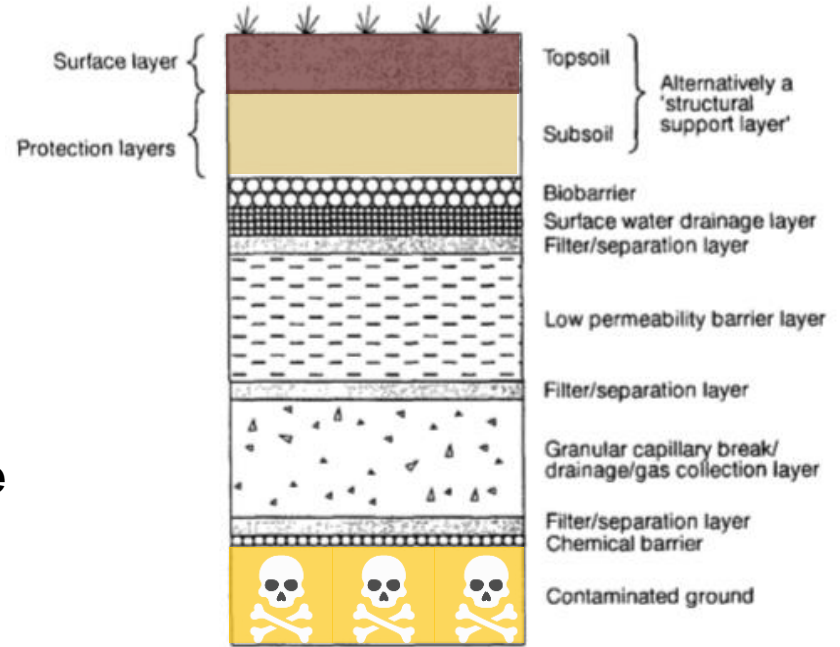
Soil Capping / Clean Cover System Theory

- A cover system is the provision of clean material over contaminated ground
- The aim of the cover system is either:
 - Complete separation of receptor from a hazard; or
 - A reduction in hazard exposure to acceptable levels.
- Guidance in BRE 465 – Cover Systems for Land Regeneration, March 2004



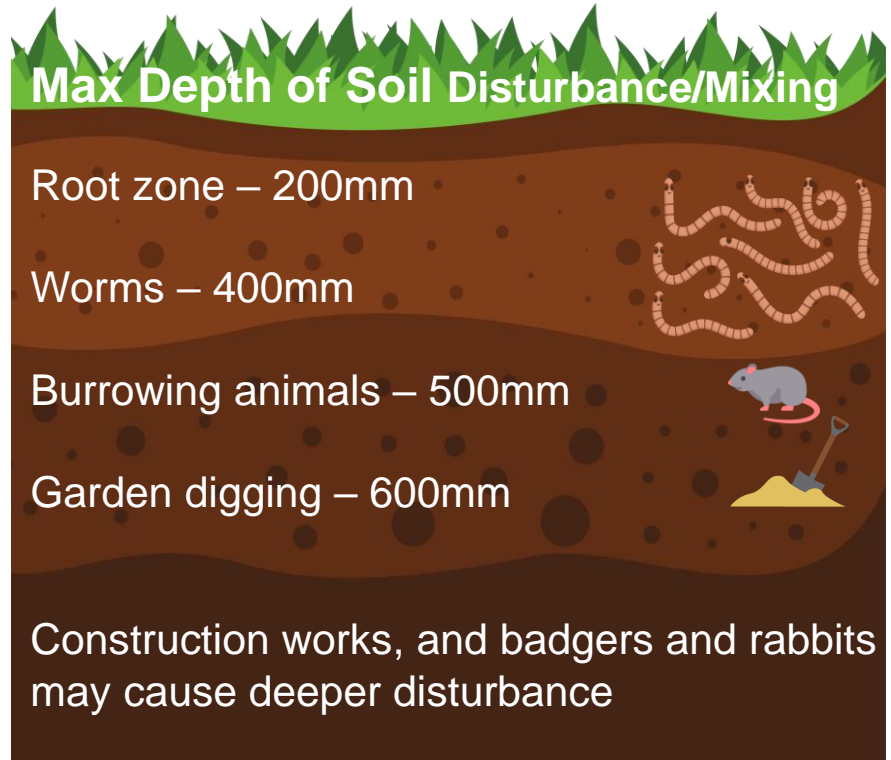
Types of Clean Cover Systems

- **Simple Cover System** (as defined in BRE465) – comprises topsoil and subsoil only - will **reduce exposure** to underlying soils
- **Engineered Cover System** (see CIRIA SP124) – designed to provide **complete separation**
- **Focus of this presentation is on simple cover or capping systems only**
 - However use of geotextile/membranes will be discussed later.



Simple Cover Systems - Theory

- Some mixing will occur between the placed clean cover and the underlying contaminated soil
- Disturbance/ mixing of soils is unlikely to exceed **600mm** in a typical garden (BRE 465)
- Soil mixing depth may be less in communal landscaping / public open space
- Geotextile/separator layers will reduce mixing



Simple Cover Systems – Suitable for Use?

- Used to reduce risks to human health from **low to moderate** levels of contamination
- Widely used (and accepted)

BUT....

- Not suitable for volatile/gaseous contaminants;
- Not suitable everywhere (e.g. sites with shallow water table, sloping sites)
- May not be suitable for areas with active rabbit and badger populations
- **Even simple cover systems need appropriate design, installation and verification**



NHBC Requirements for Clean Cover Systems

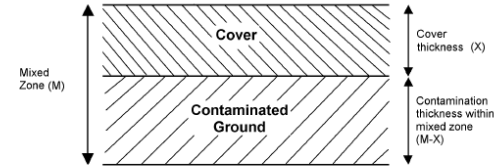
- Design it *(and agree design with warranty providers, Local Authority etc)*
- Install it
- Verify it
- *(Keep us (and the Local Authority) in the loop)*

Before you start your design... Sense Check.....

- Final Land Use
 - Private Gardens, communal areas/landscaping, Public Open Space, Allotments?
 - Use appropriate screening criteria for clean cover
- Final Site layout
 - How much soft and hard landscaping will there be and where?
 - Podiums?
- What are the Final Site Levels?
 - Cut & fill or site strip? Will the contaminant source still be present?
 - Is there space for the capping?
 - If site levels are being raised, is the placed fill material protective of human health?

Design It – Clean Cover Thickness

- 600mm is widely accepted as standard clean cover thickness in gardens
- Consider BRE 465 Design Spreadsheet?
 - Simple model that assumes complete intermixing between clean cover and underlying soils to calculate required thickness of clean cover
 - Accepted for use by NHBC on appropriate low risk sites but all assumptions need to be **JUSTIFIED**
 - Pick realistic contaminant concentrations for clean cover
 - 2nd page of spreadsheet provides a sense check
- Minimum allowable thickness of clean cover set out in BRE 465 is 300mm**

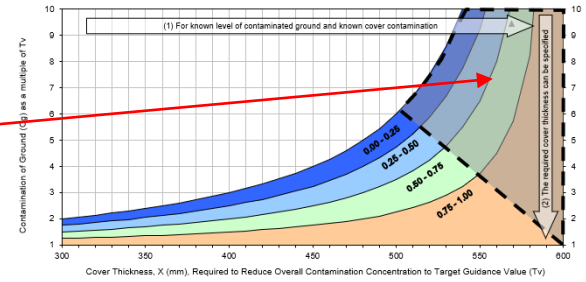


This model is also presented as Figure 2.

M = mixed zone
 Tv = adopted target guideline value (e.g. CLEA or other modelled value etc)
 Cc = contaminant concentration of cover (expressed as proportion of Tv, ie less than 1)
 Note: Cc concentrations must be below Tv, ie clean material.
 Cg = contaminant concentration of existing ground (expressed as a multiple of Tv)
 X = cover thickness
 T = total overall allowable contamination as a result of complete mixing (expressed as a proportion of Tv i.e. 1)

$$T = (X/M)(Cc) + ((M - X)/M)(Cg)$$

$$X = M(Cg - 1)/(Cg - Cc)$$



Design It - Topsoil and Subsoil Sources

- Soil Source(s) should be suitable for use and comply with any assumptions made in BRE 465 modelling
- Imported soil for clean cover should comply with BS3882 (topsoil) and BS8601 (subsoil).
- Clean cover should comprise topsoil and subsoil
- Topsoil Thickness
 - NHBC Standards (10.2.9) require a minimum thickness of 100mm topsoil in garden areas.
 - Best practice topsoil thickness is usually a minimum of 150mm and a maximum of 300mm (deeper in tree planting areas).
- **Is a separation or marker layer required?**

Clean Cover System – Install it (the easy bit?)

- Do what you said you'd do (or what was agreed)
 - If plans/designs change, let us (and the LA) know in advance
- Look out for unsuitable materials, odours, colours etc....
(would you want it in your garden?)
- Look after your source of clean cover
 - If clean soil is stockpiled on site, keep it segregated, avoid cross contamination
- Subsoil decompaction /restoration of soil structure is a requirement of NHBC Standards (10.2.9)
- Look after your records / filing
 - When importing soils to site, keep records of sources, import tickets and analysis etc.



Clean Cover System – Verify It

- A verification report is required to confirm that the clean cover system has been placed in accordance with the initial design and is suitable for use
- Verification approach (testing frequency, analysis requirements etc) should be agreed with NHBC (and other regulators) in advance of clean cover placement
- Frequency of verification testing / sampling is dependent on factors including the number of plots and the source of the clean cover material.
- If topsoil and/or subsoil is only being placed as a growth medium (e.g. a clean cover system is not part of the remediation strategy), NHBC will not usually require full verification of placement
- However, any materials being used **must** be suitable for use in accordance with **Chapter 10.2 of NHBC Standards**

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
- BS 8601: 2013 – Specification for Subsoil
- BRE 465 – Cover Systems for Land Regeneration
- Or call us on 0344 633 1000 and ask for Technical Services

Thank you

