

SocEnv Soils and Stones project:
Case study demonstrating one or more of the ten principles of good
soils and stones management

SILVERTON MILL SUSTAINABLE REMEDIATION



Silverton Mill [Google Earth™ Image]

Summary:

Ramboll supported DS Smith in surrendering the lease of the former paper mill, located within the National Trust estate of Killerton in Devon.

Our objective was to remediate the remaining legacy contamination that was present in the ground, ensure there was no risk left to the environment, and restore the land back to an undeveloped floodplain.

Ramboll worked closely with DS Smith to understand their sustainability commitments, strategy and objectives. The project also aligned to Ramboll's sustainability strategy and contributed to the National Trust's green recovery programme for the restoration of the floodplain and creation of wetland habitat at Killerton.

The work carried out included:

- Initial environmental surveys - including invasive species, flood risk and a controlled waters risk assessment.
- Design of a sustainable remediation strategy.
- Breakout, crushing and removal of all hardstanding.
- Investigation and removal of underground structures and areas of localised soil contamination.
- Reinstatement, including import of a growing medium and seeding.
- Design and implementation of a planting scheme by Ramboll's landscape architects.

Project Outcomes:

Waste minimisation: Achieved by taking a risk-based approach to the remediation to minimise the amount soil that was disposed off-site. We also undertook robust verification of the soils, groundwater and surface water to confirm there was a low risk to the environment.

Betterment: Improvement of the ground quality via removal of buried asbestos cement and segregation and removal of a contaminated waste pile.

Reduced carbon footprint: Site won crushed concrete was re-used locally within the Killerton Estate. The imported soil used as a growing medium was also sourced locally.

Increased biodiversity: The planting scheme included native trees and shrubs. Seeding of the land with grasses has helped to create new wetland habitat.

Floodplain capacity increased: Capacity was increased by removing the hardstanding which lowered the site level and increased permeable land on the floodplain.



Drone Footage prior to final restoration [Vertase FLI]

Meeting the ten principles:

Principle	How the principle was met in this project.
1. Implement soils and stones management practices to drive sustainable economic growth.	<p>Site-won crushed concrete was characterised and demonstrated as being suitable for re-use. The National Trust obtained the majority of the crushed concrete under a U1 waste exemption – in order for it to be re-used locally within the Killerton Estate (mainly to form track roads).</p> <p>Imported topsoil was obtained locally by the remediation contractor for use as a growing medium across the site.</p>
2. Preserve, protect, and enhance the value of all soils and stones in situ.	<p>A risk-based approach was taken for the remediation along with robust verification of soils, groundwater and surface water to demonstrate the in-situ soils did not pose a risk to the environment. This approach ensured that the minimal amount of soils were required to be removed as part of the remediation.</p>
3. Promote and enhance the inherent value of soils and stones as part of a wider integrated environmental system (e.g., for carbon sequestration, food security and biodiversity).	<p>Following restoration of the site with a growing medium, the land was seeded with native grasses creating wetland habitat and increasing biodiversity.</p> <p>In addition, the flood plain capacity of the River Culm was increased (contributing to climate resilience) via lowering of site levels which increased capacity as well as replacement of hardstanding with soft surfaced and permeable land.</p>
4. Use a common standard for soil health in relation to land-use, taking underlying soil conditions and functions into account in the management of land.	<p>Generic Assessment Criteria for a public open space scenario was used to verify the suitability of surface soils to be retained at the site. These are based on Category 4 Screening Levels (C4SLs) and Soil Guideline Values, using Land Quality and Management and Chartered Institute of Environmental Health suitable for use levels (S4ULs).</p> <p>In addition, the chemical quality of the soil was taken into consideration for the choice of native trees and shrubs used in the planting scheme.</p>
5. Use common quality standards for soil based on principle #4 for excavated	<p>Aggregate produced via crushed concrete was to a 6F2 standard prior to re-use.</p>

soils, stones and dredgings to be used in specific end-uses.	
<p>6. Understand and identify site specific soil conditions at the start of project planning or change of land-use. Define the status of any excavated soils and stones according to their value as an end-use resource and avoid the intention to discard them as surplus to the needs of the project. Protect undisturbed soils to enhance soil health.</p>	<p>Surface soils across the site were sampled to confirm their suitability to be retained, prior to importing the growing medium and seeding with grasses and returning the land to floodplain.</p> <p>All hardstanding was required to be removed from site to enable creation of the soft-surfaced floodplain land. This material was crushed to a 6F2 standard and chemically sampled to confirm suitability for re-use within the wider Killerton Estate.</p>
<p>7. Develop and implement a resource hierarchy for the management of land, soils and stones.</p>	N/A
<p>8. Implement financial metrics for the life cycle of all projects based on the impact on soil value in order to drive the market for offsetting (e.g., metrics for biodiversity loss, carbon sequestration and loss of food security).</p>	N/A
<p>9. Implement a national policy progressively to harmonise legislation, regulation, best practice guidance and monitoring programmes to protect soils. Include the fields of planning, land contamination, forestry, agriculture, ecological restoration, and waste management. Aim to promote integrated markets for soils and stones, offset trading and policies thereby allowing land values to reflect optimum soil health based on metrics in principle #4.</p>	<p>The remediation was developed using UK Government guidance on land contamination risk management (LCRM). The tiered approach was based on the results of risk assessments which determined what the appropriate level of remediation should be.</p> <p>By following LCRM guidance and good practice Ramboll designed a sustainable remediation strategy that balances environmental, social and economic factors to:</p> <ul style="list-style-type: none"> • effectively manage contamination risks; • minimise impact of the remediation on the environment and surrounding communities; and • consider the environmental and economic effects of remediation and maximising the net environmental benefit of clean-up actions.
<p>10. Periodically benchmark the natural and economic value of UK soils</p>	N/A

against both base-line UK and international metrics, taking into account global social, economic and environmental sustainability (e.g., the supply chain impacts of ensuring UK food security, and the valuation of soils and stones).



Aerial Drone Footage following restoration [Aerial Dimensions]

Lessons learned:

- Taking a risk-based approach helped to minimise waste and remediation efforts.
- Planning was important ahead of starting groundworks on a flood plain. This included timing the works to reduce the likelihood of encountering a flood event and having a Flood Risk Activity Permit in place.
- Early discussions with stakeholders helped to understand sustainability objectives as well as long term plans for the site. Discussions with the National Trust enabled the opportunity for crushed concrete to be re-used locally within the Killerton Estate.

About the author:

Jo McKay has been a member of Ramboll's Site Solutions team since 2005. Ramboll is a globally leading engineering and consultancy company. In the UK our 1,400 experts are at the heart of designing and implementing sustainable change that creates a lasting impact for both our clients and society at large - <https://www.ramboll.com/en-gb/contact-us/united-kingdom>