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Norwich to Tilbury

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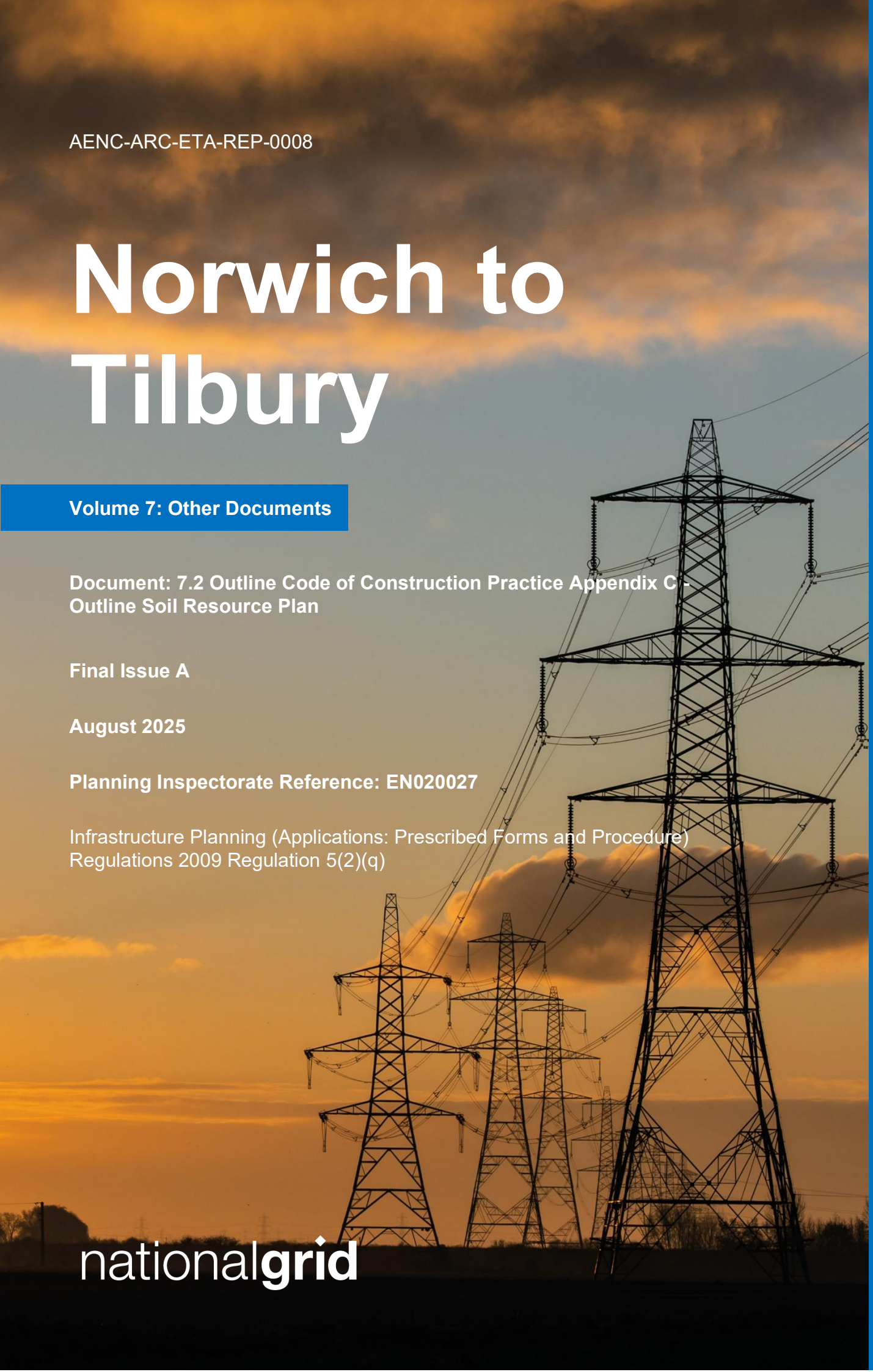

nationalgrid

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1. Introduction

1.1 Summary

1.1.1 National Grid Electricity Transmission plc ('National Grid') has developed plans for Norwich to Tilbury (the 'Project'). The Project would support the UK's net zero target through the connection of new low carbon energy generation in East Anglia and by reinforcing the transmission network.

1.1.2 The Project comprises reinforcement of the transmission network between the existing Norwich Main Substation in Norfolk and Tilbury Substation in Essex, via Bramford Substation, the new East Anglia Connection Node (EACN) Substation and the new Tilbury North Substation.

1.1.3 The Project is a Nationally Significant Infrastructure Project (NSIP), and National Grid is seeking development consent under statutory procedures set by government. NSIPs are projects of certain types, over a certain size, which are considered by the government to be of national importance, hence permission to build them needs to be given at a national level, by the relevant Secretary of State. Instead of applying to the Local Planning Authority for planning permission, the developer must apply to the Planning Inspectorate for a Development Consent Order (DCO) that would grant development consent.

1.1.4 This document is an outline management plan prepared as an appendix to the Outline Code of Construction Practice (CoCP) (document reference 7.2). It forms part of a suite of outline management plans that provide the preliminary framework for the principles, standards and procedures that the Main Works Contractor(s) must implement to minimise and manage the potential environmental impacts of construction activities associated with the Project. This outline management plan will be fully developed based on detailed design and construction methodology information to be provided by the Main Works Contractor(s). The final version will be submitted for approval in accordance with Requirement 4 (construction management plans) of the Draft DCO (document reference 3.1) prior to commencement of development. This process ensures that detailed design is developed with a clear alignment between the Outline CoCP (document reference 7.2), and this outline management plan.

1.1.5 All pre-commencement operations (as defined in Article 2(1) of the Draft DCO (document reference 3.1)) must be carried out in accordance with the Outline CoCP. In doing so, where any measures referenced in the Outline CoCP are to be agreed with the relevant Local Planning Authority, National Grid and / or its Main Works Contractor(s) must seek the agreement of the relevant Local Planning Authority before carrying out any pre-commencement operations to which those measures are relevant.

1.1.6 The purpose of this Outline Soil Resource Plan (SRP) is to provide strategy, guidance and methodology in relation to the key soil mitigation measures required to protect soil resources during the stages of pre-construction, construction, post construction, and operation (and maintenance). Implementation of these measures will ensure the land can be restored to its previous condition, or as agreed with the

landowner, following the completion of the construction phase and any required aftercare period.

1.1.7 This Outline SRP will be evolved and subsequently further developed into the SRP by the Main Works Contractor(s) prior to commencement of development, taking account of, for example, detailed construction approaches and Project programme, with more site-specific soil measures and soil baseline formation including soil profiles added as required. The SRP will be informed by both detailed Agricultural Land Classification (ALC) surveys undertaken to support the DCO Environmental Impact Assessment (EIA), and soil resource surveys undertaken prior to commencement of development in areas which were not covered by the detailed ALC surveys.

1.1.8 Protection of the soil resource during pre-construction archaeological investigations will be critical to ensure the long-term sustainable use of the land affected by the Project. Full details of the required approach during these investigations will be set out in the final SRP in alignment with the requirements as detailed in the Written Scheme of Investigation. In addition, the final SRP will include details on how areas with potential archaeology remains will be managed and considered if soil reinstatement is required.

1.1.9 The Outline SRP will not be used in its current form for soil management during construction; however, it will define the principles of soil handling during the Works and inform the development of the SRP, which will be implemented for soil management during construction.

1.2 Project Overview

1.2.1 The Project is a proposal by National Grid to upgrade the electricity transmission system in East Anglia between Norwich and Tilbury, comprising:

- A new 400 kilovolt (kV) electricity transmission connection of approximately 180 km overall length from Norwich Main Substation to Tilbury Substation via Bramford Substation, a new EACN Substation and a new Tilbury North Substation, including:
  - Approximately 159 km of new overhead line supported on approximately 509 pylons, either standard steel lattice pylons (approximately 50 m in height) or low height steel lattice pylons (approximately 40 m in height) and some of which would be gantries (typically up to 15 m in height) within proposed Cable Sealing End (CSE) compounds or existing or proposed substations
  - Approximately 21 km of 400 kV underground cabling, some of which would be located through the Dedham Vale National Landscape (an Area of Outstanding Natural Beauty (AONB[1])
- Up to seven new CSE compounds (with permanent access) to connect the overhead lines to the underground cables
- Modification works to connect into the existing Norwich Main Substation and a substation extension at the existing Bramford Substation

[1] National Landscape is the rebranded name of an Area of Outstanding Natural Beauty (AONB) from 22 November 2023

- A new 400 kV substation on the Tendring Peninsula, referred to as the EACN Substation (with a new permanent access). This is proposed to be an Air Insulated Switchgear (AIS) substation
- A new 400 kV substation to the south of Orsett Golf Course in Essex, referred to as the Tilbury North Substation (with a new permanent access). This is proposed to be a Gas Insulated Switchgear (GIS) substation
- Modifications to the existing National Grid Electricity Transmission overhead lines to facilitate the connection of the existing network into the new Tilbury North Substation to provide connection to the Tilbury Substation
- Ancillary and/or temporary works associated with the construction of the Project.

1.2.2 In addition, third party utilities diversions and/or modifications would be required to facilitate the construction of the Project. There would also be land required for environmental mitigation and Biodiversity Net Gain (BNG).

1.2.3 As well as the permanent infrastructure, land would also be required temporarily for construction activities including, for example, working areas for construction equipment and machinery, site offices, welfare, storage and temporary construction access.

1.2.4 Subsoil stabilisation techniques may be used in appropriate locations (as determined by the Soil Scientist) where arrangements can be agreed with landowners. These techniques have the potential to reduce the depth of stone required for the haul roads by approximately a third in ideal conditions, with the benefit of reducing vehicle movements. After the stripping of topsoil (to be stored in a separate bund to the side of the haul roads), and potentially the excavation of some subsoil material, one of a number of different treatments would be applied / mixed with the subsoil. The treatments use various means to bind some of the subsoil material together to form the base for the road and are then topped by imported stone (which may also be treated) to provide a running surface. Once any treated roads are no longer required, and after removal and recycling of the upper layers of stone surfacing, further treatments (chemical and/or mechanical) would be used to unbind the subsoil.

1.2.5 Any excavated material would be reused and replaced where practicable (ensuring topsoil is replaced above subsoil), with the site returned to its prior use and handed back to the landowner. Subsoil stabilisation would only be adopted where it would result in no materially different effects to those assessed in the Environmental Statement (ES) (Volume 6 of the DCO application). The Soil Scientist would develop an appropriate testing schedule to confirm the suitability of any soil stabilisation approach.

1.3 Guidance and Methodology

1.3.1 This section sets out the guidance and methodology used to inform the development of this Outline SRP.

1.3.2 The guidance which has been followed in developing the requirements set out in this document are as follows:

- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Department for Environment, Food and Rural Affairs (Defra), 2009a)
- Safeguarding our Soils: A Strategy for England (Defra, 2009b)

- Good Practice Guide for Handling Soils in Mineral Workings (Institute of Quarrying, 2021)
- BS 3882 Specification for topsoil (British Standards Institution, 2015)
- BS 8601 Specification for subsoil and requirements for use (British Standards Institution, 2013).

1.3.3 The development of the Outline SRP is supported by an ALC survey (and predictive grade assessment for areas not surveyed) (document reference 6.6.A1), providing baseline information on the soil resources present and the grade of the agricultural land.

1.4 Soil Protection Strategy

1.4.1 Since soil is a vulnerable and non-renewable resource, care must be taken throughout all handling, transporting, and stockpiling activities so that the soil resources are protected and conserved for future use. Many construction activities have the potential to damage soils. The following sections of this Outline SRP describe how the management of soils will be controlled and how soils will be protected, and their quality conserved throughout all stages of the work.

1.4.2 Failure to protect soils during soil handling can lead to their degradation with consequential environmental effects, both on-site and off-site, such as:

- Soil erosion, reducing soil volume, rooting depth and nutrient availability and increasing sediment loading to adjacent watercourses
- Loss of soil organic matter, leading to a loss of nutrients, a reduction in soil moisture holding capacity and a decline in soil fertility, potentially resulting in poor establishment and long-term survival of vegetation
- Soil compaction leading to loss of soil structure, reduced permeability to water (leading to waterlogging) and restricted aeration and rooting potential
- Loss of soil biological activity.

1.4.3 These effects on soils can have wider environmental consequences, including:

- Alteration to hydrology
- Increased sediment loading to adjacent watercourses
- Poor establishment and long-term growth of vegetation
- Visual impact of slope failure or soil erosion leading to bare soil surfaces.

1.4.4 Measures provided in this Outline SRP on how soils on site will be stripped, handled, and stored appropriately for reuse (where relevant) will be further developed in the SRP.

1.5 Roles and Responsibilities

1.5.1 The effective implementation of the soil management measures will be the responsibility of the Environmental Manager(s) of the Main Works Contractor(s). This individual will be supported by a Soil Scientist in assessing soils, soil conditions

and soil handling operations to ensure the measures outlined within this Outline SRP can be implemented, supervised, and monitored effectively.

1.5.2 The Soil Scientist appointed by the Main Works Contractor(s) will provide any training required and who will undertake monitoring visits and audits. The Soil Scientist will be a qualified soil scientist with the necessary training, qualifications, and experience, having achieved the Soil Professional Competence Standards No. 1 (Foundation skills in field soil investigation, description, and interpretation) as set out by the British Society of Soil Science (BSSS, 2018a); and No. 4 (Soil science in soil handling and restoration) (BSSS, 2018b) (Annex A).

1.5.3 Further details of the responsibilities of these roles are set out below.

Environmental Manager

1.5.4 The Environmental Manager, in collaboration with the technical teams, will be responsible for planning, overseeing and carrying out routine inspections of soil management activities to ensure these are being undertaken in line with the requirements of the SRP.

1.5.5 The Environmental Manager will be responsible for ensuring:

- Adherence to access/haul roads alignment and compliance with no off-route access throughout the works
- Effective vegetation and foreign matter clearance prior to soil stripping commencing
- Soil plasticity testing is undertaken ahead of soil stripping commencing, with additional checks undertaken if rainfall/ wet ground conditions result in works having to be stopped / recommenced
- Effective separation of soil types and layers during stripping and in stockpiles
- Effective stockpile construction and monthly inspections of stockpile condition
- Effective backfilling of each layer in the correct sequence (where backfilling is required).

1.5.6 The Environmental Manager will be responsible for reporting on all soil stripping and stockpiling activities through recording the following:

- Confirmation of effective vegetation clearance and the removal of arisings
- Confirmation that topsoil and subsoil resources have been correctly identified
- Records of soil plasticity test results
- Data relating to the volume and type of topsoil and subsoil excavated, transported and stockpiled
- Stockpile location and condition with reference to finalised site and landscaping plans
- Thickness of each layer replaced where soil reinstatement is required with reference to finalised site and landscaping plans.

1.5.7 The Environmental Manager may delegate these activities to individuals with sufficient training and expertise where required. The Environmental Manager and

anyone with delegated responsibility will undertake training provided by the appointed Soil Scientist.

Soil Scientist

1.5.8 The appointed Soil Scientist will be responsible for the provision of expert and technical soils advice throughout the earthworks and the subsequent site restoration activities. The role includes the following:

- Liaison with the Site Manager and any other personnel/ organisations as relevant to works affecting soils
- Train key site staff in identification of topsoil and subsoil resources which are suitable for re-use so that accurate segregation of topsoil and subsoil resources can be achieved
- Provide training on the assessment of soil plasticity status based on the field technique provided in Annex B and provide advice on the appropriate locations for the use of any soil stabilisation methodology to ensure it would not result in a detrimental change to the soil characteristics or the reinstatement of the land to its required post-construction use.

Roles and Responsibilities Checklist

1.5.9 Table 1.1 summarises the split of responsibilities across the above two roles.

Table 1.1 Roles and responsibilities matrix

Main Activity	Sub-activities	Frequency	Responsible	Qualifications
Training	Presentation of key aspects of soil management	Once, at start of site preparation works	Soil Scientist	An individual with the necessary 'Foundation Skills', having achieved the soil professional competence standards set out by the British Society of Soil Science (BSSS, 2018a).
	Identification of topsoil and subsoil resources	Once, at start of site preparation works		
	Soil plasticity assessment	Once, at start of site preparation works		
	Toolbox talks	To be agreed with Environmental Manager		
Inspections and monitoring	Adherence to access/haul roads alignment and compliance with no off-route access, including determining appropriate locations for the use of soil stabilisation if this approach is proposed.	Continuous until soil stripping complete	Environmental Manager (can be delegated to individuals with sufficient training and expertise where required)	In-house training provided by qualified soils scientist (with monitoring by the Soil Scientist to check works).
	Vegetation and foreign matter clearance	Ahead of soil stripping		
	Soil plasticity	Ahead of soil stripping for each stripping unit. Additional checks required if rainfall results in works having to be stopped prior to soil stripping recommencing within that stripping unit		
	Appropriate separation of soil layers as required (topsoil, upper subsoil, lower subsoil) and	Continuous until soil stripping complete		

Main Activity	Sub-activities	Frequency	Responsible	Qualifications
	accurate documentation of depths stripped, and volumes transported from each stripping unit.			
	Appropriate segregation of soil materials in stockpiles by stripping unit, layer and plasticity, and accurate documentation of material source and stockpile location.	Continuous until soil stockpiling complete		
	Stockpile construction	Continuous until soil stockpiling complete, and stockpiles prepared for storage period		
	Inspection of soil storage stockpiles	Monthly		
	Assessment of soil condition (including plasticity) within stockpiles prior to re-use	Prior to re-use from each stockpile	Soil Scientist	An individual with the necessary 'Foundation Skills', having achieved the soil professional competence standards set out by the British Society of Soil Science (BSSS, 2018a).
	Inspection of soil reconditioning windrows (where required)	Continuous until soil reconditioning complete		
	Inspections of restored soil profiles	Continuous until soil placement complete. Checks should be undertaken as each layer is placed.		
Reporting	Condition reports detailing works undertaken and replaced soil conditions (in relation to target)	On completion of soil replacement activities for each asset	Soil Scientist	

Main Activity	Sub-activities	Frequency	Responsible	Qualifications
Monitoring	All the above activities will be monitored	Weekly checks of soil handling operations (either combined with site visit or through review of reporting documentation).	Soil Scientist	
Auditing	All above activities will be audited	Monthly audits will be undertaken of activities which have taken place in the preceding month. Annual audits of all activities will be undertaken.	Soil Scientist	

1.6 Soil Baseline

1.6.1 The ALC Survey establishes soil baseline information across the Project, detailing soil physical properties, which supports decisions regarding the approaches to outline soil handling management, soil sustainable reuse (i.e., supporting landscape design and planting) and soil export if required.

1.6.2 The soil baseline will be incorporated into the SRP including the soil data from the ALC survey (presented in ES Appendix 6.1 of ES Chapter 6: Agriculture and Soils (document reference 6.6.A1)) and soil survey data collected from additional soil surveys undertaken post consent / pre-construction in areas which were not covered by the detailed ALC surveys. The soil baseline includes (but is not limited to) the following:

- Soil types (including soil textures and the main soil types present onsite)
- Soil type map of the different topsoil and subsoil resources
- Soil depths of topsoil and subsoil
- Soil depth map
- Potential site-won soil volume
- Soil balance.

Soil Protection Measures

1.6.3 This Outline SRP describes procedures for soil stripping, handling, transporting, storing, and restoration of soils to maintain, as far as practicable, their soil quality and viability as required for the proposed end uses. There will be a number of control measures at each stage of the works.

1.6.4 A summary of these measures is outlined in bullet form below and described in more detail in the following sections.

Early soil protection measures:

- Measures for in situ soil protection during early site clearance activities
- Soil recovery and storage (soil stripping and stockpiling)
- In situ soil protection ahead of stripping
- Pre-treatment of existing vegetation
- Measures for handling and stockpiling
- Measures to ensure correct segregation of different topsoil and subsoil resources
- Measures for separate storage of different soil types
- Method and locations of stockpiling.

Soil reconditioning (for use where required):

- Measures to recondition wet and plastic soil resources before reuse
- Measures to ensure correct segregation of different topsoil and subsoil resources; measures for handling and to optimise soil drying and re-aeration.

Soil restoration methods:

- Soil prescriptions for each different land uses
- Soil handling/ replacement methods
- In situ soil treatments for each different land use
- Clear re-use strategy for all soil resources taken off-site.

Monitoring:

- Monitoring programme; soil assessment procedures for the following:
  - Soil stripping and storage
  - Soil reconditioning
  - Restoration activities
- Acceptability criteria for soil storage, reconditioning and soil replacement activities
- Failures of acceptability criteria and corrective actions.

Quality control and auditing measures:

- Quality control, auditing procedures and plans; criteria for cessation of works
- Non-compliances and corrective actions
- Use of toolbox talks for staff training.

1.7 Wet Weather Working and Cessation of Works

1.7.1 Soils shall be handled when they are in a reasonably dry and friable state, or where they have passed the test for soil plasticity (as described in Annex B), which is when soil structural units are least susceptible to damage by compaction and smearing.

1.7.2 The soil plasticity tests shall apply to all soil materials that are to be tracked over and handled (to include stripping, stockpiling and reinstatement). All soil plasticity tests shall be carried out by a competent Soil Scientist or practitioner, or an individual who has been trained by the appointed Soil Scientist. The results of the soil plasticity tests are to be recorded.

1.7.3 Soil stripping operations must be suspended under the following conditions and not restarted until the ground has had at least a full dry day, or the soil moisture criteria set out in Annex B have been met to allow the restarting of soil handling operations:

- Sustained heavy rainfall (>10 mm in 24 hours) which leads to waterlogged soils or pools of water on the ground surface
- The ground surface is frozen or covered by snow.

1.7.4 In collaboration, the Environmental Manager and Soil Scientist will ensure there is continuous awareness of ground conditions as weather patterns change and take proactive decisions regarding whether soil handling operations should be suspended/ restarted. Where soil handling operations continue when soils have become plastic the soil materials will be clearly tracked as plastic so that effective reconditioning measures can be implemented at the appropriate time.

1.7.5 In some exceptional cases, it may be necessary to handle soils when they are in a plastic or frozen state, for example due to engineering constraints, the specific nature of the soil or to avoid the risk of greater environmental effects to other receptors if works were significantly delayed. In these cases, location-specific methods will be agreed with the Environmental Manager and Soil Scientist prior to work commencing.

1.8 Use of Toolbox Talks

1.8.1 Toolbox talks will be used so that all site personnel are aware of the SRP and applicable soil handling and soil protection procedures. The toolbox talks will be site- and task-specific, discussing soil conditions and approaches to soil handling at the site.

1.8.2 Toolbox talks must include at least the following topics:

- Key aspects of the SRP
- Identification of topsoil and subsoil resources (to ensure accurate soil stripping and prevention of topsoil/subsoil mixing)
- Stockpile creation
- Assessment of soil plasticity using the techniques set out in Annex B
- Soil reinstatement approach (where required).

1.8.3 The suite of toolbox talks will be developed by the Soil Scientist in collaboration with the Environmental Manager.

1.9 Soil Management Measures

General Soil Protection Measures

1.9.1 Plant and other site vehicles will be managed so that they do not directly traffic across in situ topsoil. Where required, trackway will be used if vehicle access is required over unstripped soils, and the access could result in compaction/rutting (based on the soil plasticity test set out in Annex B). If site access arrangements change as works progress, all personnel should be made aware of the new arrangements through a toolbox talk.

1.9.2 There will be no laydown of materials, except for those materials required for specific ongoing construction activities, either within the route corridors or anywhere outside designated storage areas.

1.9.3 Materials may only be temporarily stored on topsoil if it is considered this will not be detrimental to soil quality. Approval is subject to ground conditions and confirmation from the Environmental Manager and/or Soil Scientist.

1.9.4 Efficient material management will be in line with the requirements set out in the Outline Site Waste Management Plan (SWMP) (Appendix B of the Outline CoCP (document reference 7.2)). This includes the effective reuse and classification of soils as non-waste to reduce soil sent off site and reduce or eliminate soil imported. There should also be designated areas for the storage of soil, and space to allow topsoil and subsoil to be stored separately.

Clearance of Existing Vegetation

1.9.5 All vegetation removal will be in line with the requirements set out in the Outline Landscape and Ecological Management Plan (document referent 7.4).

1.9.6 Prior to soil stripping commencing, any vegetation will be cleared, and arisings removed. This is to ensure large quantities of green vegetative material do not get mixed with the stockpiled soils.

1.9.7 The method used will depend on the nature of the vegetation present. The clearance operation should ensure the vegetation is removed to ground level and all arisings (including chipped wood material) are removed. Vegetation clearance would be undertaken by best practicable methods; however, blading off vegetation using a bulldozer will not be permitted.

1.9.8 All vegetation clearance works will be undertaken ensuring, where practicable, that the soils are not damaged through the creation of ruts or mixing or compaction of topsoil and subsoil resources. This is particularly important where the soils are of a heavier texture and more prone to compaction and smearing (i.e. the compression and smoothing of clay-rich materials, removing structural units, drainage routes through the soil etc.).

1.9.9 The potential risks from vegetation clearance will be identified by the Soil Scientist (or suitably briefed delegate) in a toolbox talk prior to the works commencing. Soil plasticity tests will be undertaken as detailed in Annex B to minimise the risk of soil damage (as vegetation clearance will require tracking over unstripped topsoil).

Soil Stripping

1.9.10 Before any soil stripping activities take place, the proposed works and phasing will be detailed by the Main Works Contractor(s) in the Contractor pre-start information pack (to include method statements, drawings, specifications etc.) and issued to National Grid for acceptance. The Contractor pre-start information pack will provide timescales and sequencing of soil stripping the proposed temporary haul roads.

1.9.11 The earthworks will be phased to ensure that the topsoil is stripped in each part of the site ahead of subsoil materials, and that all soils are stripped from a designated area prior to bulk excavation and earthwork activities within that area.

1.9.12 To ensure that the correct soil depths are stripped (to avoid the mixing of topsoil and subsoil resources) all personnel involved in the works will attend a toolbox talk to gain general awareness on the identification of topsoil and subsoil resources. Specific instructions regarding soil depths to be stripped will be provided during Daily Activity Briefings (DABs).

1.9.13 All stripped materials will be logged, tracked and labelled, in line with the movement and tracking systems detailed in Appendix B: Outline Site Waste Management Plan of the Outline CoCP (document reference 7.2).

1.9.14 All stripped soils will be free from significant quantities of foreign matter or other materials which would make the soils unsuitable for their intended re-use.

1.9.15 Immediately prior to stripping, the soil shall be tested for plasticity using the methodology presented in Annex B.

1.9.16 Soil will be stripped using a hydraulic excavator or tracked dozer, where practicable, following the methodology set out in Annex C to minimise the risk of compaction of either topsoil or subsoil materials.

1.9.17 Prior to soil stripping commencing, a toolbox talk will be provided by a Soil Scientist (or suitably briefed delegate) in conjunction with the construction lead, to set out how topsoil and subsoil resources will be stripped and stockpiled separately. This will ensure that any differences between the topsoil/subsoil boundary is understood.

1.9.18 Dump trucks will be used to transport the soils to the landscape bund or stockpile locations.

Soil Stockpiling

1.9.19 Key issues for soil handling, storage and eventual re-use are soil moisture content and soil consistency (plasticity). During the works, soil plasticity status will be determined in situ prior to stripping (see Annex C) and the test results recorded.

Stockpile Formation

1.9.20 Locations of stockpiles will be determined in collaboration with the technical team, Environmental Manager and/or Soil Scientist when pre-construction information is available and will be decided in line with the SRP.

1.9.21 Appropriate stockpile heights should be used for topsoil that can be stripped and stockpiled in a dry state, but heights may need to be greater where storage space is limited. Good practice recommendations include topsoil stockpiles no higher than 3 m and subsoil no higher than 5 m (Defra, 2009a). The precise size and height of the stockpile should be determined by the technical team, Environmental Manager and/or Soil Scientist taking into account the amount of space available, the nature and composition of the soil, the prevailing weather conditions at the time of stripping and planning conditions associated with the works, in line with the SRP.

1.9.22 The following principles will be followed for all stockpiled materials, following the methodology presented in Annex D:

- Topsoil and subsoil materials will not be mixed; separate stockpiles will be created for topsoil and subsoil (if subsoil stripping is required)
- Stockpiles within each soil horizon layer (i.e. topsoil, upper subsoil, lower subsoil) should be separated based on soil texture. There will be no mixing of soil textural groups (i.e. light textured sandy topsoil would not be stockpiled with heavy textured clay topsoil)
- Documentation and physical control measures (such as signing of stockpiles) will be put in place to prevent accidental mixing, to ensure soils are segregated according to source location, and to protect soils from being trafficked by plant or vehicles
- Where there are spatial constraints, it may be required to stockpile soils up against each other, with physical separation being achieved by means of a

marker layer (such as straw or clear recording of ground level information) so that no mixing occurs, and the different materials can be effectively separated. Geomembranes will not be used due to the difficulty in cleanly recovering these materials

- Soil materials will also be stored on like for like (i.e. topsoil can be stockpiled on topsoil but subsoil should only be stockpiled on subsoil). A suitable marker layer (such as straw or clear recording of ground level information) will be used where topsoil is stockpiled on topsoil to ensure the in situ soils are not disturbed on stockpile removal
- Stockpiles will not be positioned adjacent to ditches and not within 10 m of a watercourse
- Soil resources will be loose tipped
- The sides of stockpiles will be smoothed using the back of an excavator bucket to ensure they shed water and to reduce the risk of waterlogging within the core of the stockpile
- Measures to manage and treat site runoff and prevent erosion and dust generation during soil stripping and stockpiling works will be set in place through a series of specific control measures as set out in the SRP.

Stockpile Maintenance

1.9.23 Soil stockpiles will be managed and monitored throughout their lifetime so that they can be maintained in relation to stability and integrity. Measures to manage stockpiles are as follows:

- Soil stockpiles will be seeded with a grassland seed mix to maintain slope stability and to prevent erosion or dust generation if they will be used in place for longer than six months
- Stockpiles without vegetation cover should be sprayed with water where necessary to firm the surface of the stockpile and create a crust to prevent the generation of dust
- Soil stockpiles will be managed and monitored throughout their lifetime so that they can be maintained in relation to stability and integrity, and any weed growth can be managed in a timely manner.

Stockpile Reconditioning

1.9.24 Prior to restoration activities taking place, soil resources may have been stored in stockpiles for extended periods and in some exceptional cases, soils may have been handled and stockpiled in a plastic state. To confirm suitability of stockpiled soils for restoration, they should be visually inspected, and assessments carried out before their reinstatement (see Section 1.10 - Monitoring). If any soil is found to be plastic or display excessive anaerobic conditions the materials should be reconditioned as detailed below. It will be the responsibility of the Soil Scientist to assess soil in each stockpile and to recommend and record appropriate pre-treatment prior to soil placement, should it be required.

1.9.25 Soils which are plastic in consistency shall be reconditioned using the methodology presented in Annex E. Where practicable, soils stripped when plastic will be

reconditioned before being stockpiled if time, weather conditions and available space allow.

Soil Reinstatement

1.9.26 The works required to effectively reinstate a soil profile suitable for the proposed end use and ensure the required soil structure is present and that there is no compaction, will depend on what soil layers have been stripped and the extent of the trafficking over the exposed surface that has occurred.

1.9.27 The sequence required to reinstate the soil profile will be detailed by the technical team, Environmental Manager and/or Soil Scientist and will be briefed to all personnel involved in the works during a DABs.

1.9.28 Subsoil and topsoil re-use will aim to achieve the following:

- Creation of the required combination of topsoil and/or subsoil to create a soil profile with the characteristics required for the proposed use, or re-create the soil profile in line with pre-existing soils where restoration to previous land use and land quality (including ALC grade) is required
- Ensure, through careful handling and placement of soils, no compaction within the restored soil profiles that may limit vegetation establishment and growth, restrict water infiltration etc.

1.9.29 The approach for the checks required and the methodology to be used to reinstate the land at the end of the construction phase will depend on the thickness of soils stripped and the results of compaction testing etc. The approaches set out will be in line with published guidance and will ensure the following:

- Deep ripping of the overburden where required prior to the placement of subsoil
- The soil profile created will be checked by the Soil Scientist to ensure it is suitable for the proposed end use (Table 1.1).

1.9.30 Where soils stripped for the construction of temporary haul roads are to be reinstated, any stone and/or membrane must be fully removed prior to soil reinstatement.

1.9.31 Where soils stripped during the construction phase will not be reinstated and cannot be re-used on site, they will be removed off-site. Prior to any removal off-site, the quantity and characteristics of available soil materials will be assessed.

1.9.32 The soil profiles being reinstated will be designed to maximise re-use (ensuring placing more soil does not have any detrimental effects). For example, it will be assessed whether a thicker topsoil layer can be placed. The final soil profile requirements will be detailed within the final landscape plans. A soil re-use summary report, produced by the Soil Scientist with supporting information from the Environmental Manager and technical team, will demonstrate how off-site disposal has been minimised.

1.9.33 During the placement of soil resources in their final location the methods outlined above will be followed. This will include, but not be limited to, the implementation of an access and egress plan for vehicles and plant to prevent unnecessary trafficking of restored areas, use of appropriate scale plant, avoidance of double handling and avoidance of mixing topsoil and subsoil where these materials are required for the

restoration of agricultural land. Soil replacement will be undertaken in accordance with the methodology set out in Annex F.

Aftercare

1.9.34 There will be a requirement for an aftercare period where soils are being reinstated to ensure they are returned to their previous condition, or the condition required for their end-use.

1.9.35 An Aftercare Management Plan will be produced by the Main Works Contractor(s) which will detail the aftercare period, monitoring frequency and interventions which may be required depending on issues highlighted by the monitoring.

Peaty Soils

1.9.36 Peat is a particularly sensitive material that varies in its physical characteristics based upon its forming factors, such as location, climate, landform, and parent material. Peatlands will often support or have the potential to support a range of sensitive habitats and species.

1.9.37 Failure to protect peatlands during disturbance can lead to its degradation with consequential environmental effects.

1.9.38 Organic-rich peaty soils have been found at Waveney Valley. Due to its high content of organic matter, peaty soil will be separated from mineral soils during stripping, stockpiling and restoration but will follow similar measures and procedures in this Outline SRP.

1.9.39 Peaty soils will be stored during construction in stockpiles with as low a height as practicable (and always <2 m in height) (depending on storage space and volumes excavated) to minimise drying out. Storage duration will also be as short as practicable based on the works programme to further minimise the risk of drying out and wastage of the peaty soils.

1.9.40 The SRP will set out measures to manage the risk of water and wind erosion of stockpiled peaty materials and to maintain the peaty soils in a damp state to limit increased deposition rates during storage.

1.9.41 The SRP will include detailed design for reinstated profiles of peaty soils and any hydrological management measures required.

1.9.42 More detailed measures for peaty soil mitigation will be developed and incorporated into the SRP post consent / pre-construction for peaty soil handling during construction once full details of working areas and works programmes are understood.

1.10 Monitoring

1.10.1 To ensure that the quality of the soil materials is not detrimentally affected during the soil stripping, stockpiling and re-use / restoration works, monitoring by the Soil Scientist will be undertaken as detailed in Table 1.2.

1.10.2 The movement and storage of soil materials will be logged, tracked and labelled, in line with the requirements set out in the Outline SWMP (Appendix B of the Outline CoCP (document reference 7.2)).

1.10.3 Responsibility for some repeated tasks, as indicated in the table below, can be delegated to a suitable experienced and trained person following the initial monitoring. Training would be provided by the Soil Scientist.

Table 1.2 Monitoring requirements

No	Monitoring Requirement	Responsible
1	Effective clearance of vegetation and arisings from the soil surface – once prior to soil stripping commencing	Soil Scientist (can be delegated)
2	Soil plasticity state – prior to soil stripping commencing with additional tests following rainfall events	Soil Scientist (can be delegated)
3	Topsoil stripping – correct identification of base of topsoil and minimisation of subsoil incorporation throughout the soil stripping operations	Soil Scientist (can be delegated)
4	Subsoil stripping (if required) – correct identification of base of subsoil and minimisation of overburden incorporation throughout the soil stripping operations	Soil Scientist (can be delegated)
5	Stockpile construction to ensure no mixing of topsoil and subsoil – throughout the stockpile construction period	Soil Scientist (can be delegated)
6	Stockpile condition – checks to record signs of vehicle tracking, erosion and weed growth, and set out remedial measures should issues be identified	Soil Scientist (can be delegated)
7	General monitoring of soil handling operations	Soil Scientist
8	Reinstated soil profiles – check to confirm profile and soil condition is suitable for the proposed end use	Soil Scientist

1.10.4 A record of monitoring visits will be created to include those listed in Table 1.3.

Table 1.3 Items for monitoring records

No	Information to be Recorded
1	Confirm successful treatment of vegetation
2	Confirmation of soil type (topsoil or subsoil)
3	Soil depth stripped
4	Soil plasticity (determined as ‘plastic’ or ‘non-plastic’)
5	Date(s) stripped, weather conditions during stripping, equipment/plant used for stripping
6	Stockpile location. Designate each stockpile or stockpile portion as ‘plastic’ or ‘non-plastic’
7	Record any stockpile non-compliance from stockpile inspections. Detail, date, and stockpile location code (refer to Stockpile Inspection Checklist and Stockpile Plan)

No	Information to be Recorded
8	Reinstated soil profiles characteristics and condition
9	Sign off for each stage

1.11 Reporting of Findings

1.11.1 The findings of all examinations and assessments will be recorded and held by the Main Works Contractor(s) for record keeping and to enable actioning of any necessary corrective actions.

1.12 Failures of Acceptability Criteria and Corrective Actions

1.12.1 Where the soils are found to be non-compliant in any respect, appropriate means of remediation will be proposed by the Main Works Contractor(s) for acceptance by National Grid, where guidance will be provided by the Soil Scientist. Once the affected area has been treated it will be reassessed before sign-off.

2. Implementation

2.1 Implementing the SRP

2.1.1 National Grid will put in place robust procedures to inform and supervise all those working on the Project including its Main Works Contractor(s), to make sure the control measures set out in the SRP (to be developed by the Main Works Contractor(s)) are adopted when undertaking the construction of the Project. The main responsibility for implementing these control measures will fall to the Main Works Contractor(s).

2.1.2 The Main Works Contractor(s) will brief all operatives on the specific details within the SRP prior to the commencement of works. The briefings will be delivered by a suitably trained member of the team such as the Environmental Manager or Works Supervisor.

2.2 Non-Compliance Procedure

2.2.1 The Environmental Manager will be responsible for undertaking site audits to check compliance with the SRP and method statements. All incidents associated with the construction of the Project, including environmental incidents and non-conformance with the SRP, will be reported and investigated as defined within Section 6 of the Outline CoCP (document reference 7.2). Further detail will be included in the Code of Construction Practice to be developed by the Main Works Contractor(s).

2.3 Change Process

2.3.1 The CoCP is one of the plans listed in Requirement 4 of the Draft DCO (document reference 3.1).

2.3.2 Requirement 4(1) of the Draft DCO (document reference 3.1) states: '*No stage of the authorised development may commence until, for that stage, the following plans as relevant to that stage have been submitted to and approved by the relevant planning authority (in consultation with Natural England in the case of the landscape and ecological management plan) or other discharging authority as may be appropriate to the relevant plan concerned*.'

2.3.3 Where there is a need to update the CoCP beyond derogations addressed pursuant to the above, the below text addresses the process for changing the CoCP itself. This does not cover changes to the DCO (material or non-material) which would be managed through the process set out in Schedule 6 of the Planning Act 2008.

2.3.4 Therefore, the below process is limited to changes to the CoCP.

CoCP Changes

2.3.5 It may be necessary to amend the details contained in the CoCP as a result of the iterative discussion and engagement that will continue after the CoCP has been approved. The resulting changes would not alter any of the underlying commitments,

mitigations and methodologies set out in the CoCP. An example may be where a preconstruction survey identifies that a measure already committed to is no longer required in the CoCP. In every case, consideration will be given to any changes to the outcome of the assessment of environmental effects.

2.3.6 Where there is a proposed change to the CoCP, National Grid will provide details to the relevant Local Planning Authority together with evidence of relevant stakeholder engagement, where upon, the relevant Local Planning Authority will, acting reasonably, endeavour to respond within 28 days to either confirm its consent to the change to the CoCP or provide its reasons why the change is not accepted.

Abbreviations

Abbreviation	Full Reference
ALC	Agricultural Land Classification
AIS	Air Insulated Switchgear
AONB	Area of Outstanding Natural Beauty
BNG	Biodiversity Net Gain
BSSS	British Society of Soil Science
CoCP	Code of Construction Practice
CSE	Cable Sealing End
DAB	Daily Activity Briefing
DCO	Development Consent Order
EACN	East Anglia Connection Node
EIA	Environmental Impact Assessment
ES	Environmental Statement
GIS	Gas Insulated Switchgear
LEMP	Landscape and Ecological Management Plan
NSIP	Nationally Significant **Infrastructure Project**
SRP	Soil Resource Plan
SWMP	Site Waste Management Plan

Glossary

Term	Definition
Agricultural Land Classification (ALC)	The system of grading land quality for land use planning purposes. This divides farmland into five grades according to the degree of limitation imposed upon land use by the inherent physical characteristics of climate, site, and soils. Grade 1 land is of an excellent quality, whilst grade 5 land has very severe limitations for agricultural use. Grade 3 is subdivided into subgrades 3a and 3b.
Biodiversity Net Gain (BNG)	An approach for developments to ensure habitats for wildlife are left in a measurably better state than before the development.
Cable	An insulated conductor designed for underground installation.
Cable Sealing End (CSE)	Structures used to transfer transmission circuits between underground cables and overhead lines.
Cable Sealing End compound	Electrical infrastructure used as the transition point between overhead lines and underground cables. A compound on the ground acts as the principal transition point.
Code of Construction Practice (CoCP)	A code of construction practice sets out the standards and procedures to which a developer (and its contractors) must adhere in order to manage the potential effects of construction works.
Environmental Impact Assessment (EIA)	An assessment of the likely effects of a development project on the environment, which is reported in an Environmental Statement that is publicised and consulted on and taken into account in the decision on whether a project should proceed.
Environmental Statement (ES)	The main output from the EIA process, an ES is the report required to accompany an application for development consent (under the Infrastructure Planning (EIA) Regulations 2017) to inform public and stakeholder consultation and the decision on whether a project should be allowed to proceed. The EIA Regulations set out specific requirements for the contents of an ES for Nationally Significant Infrastructure Projects.
Haul roads	A road used by construction traffic within the Order Limits to access a working area from a the public highway
Lattice pylon	Pylon type widely used on the national electricity transmission networks. Both standard lattice pylons (approximately 50 m in height) and low height lattice pylons (approximately 40 m in height) are proposed on the Project.
Main Works Contractor(s)	Contractor(s) appointed by National Grid to construct the Project.
Mitigation	The action of reducing the severity and magnitude of change (impact) to the environment. Measures to avoid, reduce, remedy or compensate for significant adverse effects.

Term	Definition
Peat	Peat is the surface organic layer of a soil that consists of partially decomposed organic matter, derived mostly from plant material, which has accumulated under conditions of waterlogging, oxygen deficiency, high acidity and nutrient deficiency.
Pylon	Structures that support the overhead line (conductors).
Soils	Soil is a natural body comprising solids (minerals and organic matter), liquid, and gases. It occurs on the land surface, occupies space, and is characterised by one or both of the following: horizons, or layers, that are distinguishable from the initial material as a result of additions, losses, transfers, and transformations of energy and matter or the ability to support rooted plants in a natural environment.
Soil compaction	Soil compaction is the process where soil is compressed, increasing its density and reducing porosity, hindering water and air movement, and restricting root growth.
Soil organic matter	Soil organic matter means all living, or once-living, materials within, or added to, the soil.
Soil plasticity	Soil plasticity is its ability to undergo deformation without cracking.
Subsoil	Weathered soil layer extending between the natural topsoil and the unweathered basal layer (geological parent material, either solid or drift) below. In this SRP, subsoil is defined as the soil located beneath the topsoil, up to a depth of 1.2 meters from the surface.
Substation	Substations are used to control the flow of power through the electricity system. They are also used to change (or transform) the voltage from a higher to lower voltage to allow it to be transmitted to local homes and businesses.
Topsoil	Material which developed originally at the top of the soil profile and is characteristically darker in colour and has a higher organic matter content than subsoil material.
Underground cable	An insulated conductor carrying electric current designed for underground installation. Underground cables link together two Cable Sealing End compounds.

Bibliography

British Society of Soil Science (2018a). *Foundation skills in field soil investigation, description and interpretation*. Available at: https://soils.org.uk/wp-content/uploads/2021/02/WWS-1-Foundation-Skills.pdf.

British Society of Soil Science (2018b). *Soil science in soil handling and restoration*. Available at: https://soils.org.uk/wp-content/uploads/2021/02/WWS-4-Soil-Handling-and-Restoration.pdf

British Standards Institution. (2013). *BS 8601:2013 Specification for subsoil and requirements for use*. London: British Standards Institution.

British Standards Institution. (2015). *BS 3882:2015 Specification for topsoil*. London: British Standards Institution.

Department for Environment, Food and Rural Affairs (Defra) (2009a). *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*. Available at: https://assets.publishing.service.gov.uk/media/5b2264ff40f0b634cfb50650/pb13298-code-of-practice-090910.pdf

Department for Environment, Food and Rural Affairs (Defra) (2009b) *Safeguarding our Soils – A Strategy for England*

Institute of Quarrying (2021). *Good Practice Guide for Handling Soils in Mineral Workings*. Available at: https://www.quarrying.org/soils-guidance

Annex A. British Society of Soil Science Competency Standards

DOCUMENT 1

Foundation skills in field soil investigation, description and interpretation

WORKING WITH SOIL
setting standards in soil science

Background

The investigation of soils in the field, their consistent description according to a recognised scheme, and the interpretation of soil profiles, properties and conditions are generic foundation skills for professional scientists and engineers employed on tasks that relate to the use and/or management of land. This document identifies the minimum qualifications, skills and knowledge which the British Society of Soil Science (BSSS) considers to be required of scientists and engineers conducting field soil investigations.

Qualifications

Professional soil scientists with competence in these foundation skills are likely to have graduated in a relevant science subject. They will also have a number of years of relevant, regular field soil-based experience and will have, or be adequately qualified for, membership of a relevant professional body such as the BSSS.

Minimum competencies

Skills:

1. The ability to dig and/or auger a soil, or to instruct others to do this, so as to **expose a soil profile** to a relevant depth and to then accurately **identify the sequence of horizons** that comprise the soil profile (natural or manmade) using standard reference documents such as The Soil Survey Field Handbook[1]
2. The **design and development of a soil investigation strategy** that is appropriate to the site or landscape to be investigated, and will generate representative soil information at an appropriate scale. This should be based upon the objectives and context of the study, and an understanding of the likely patterns of soil variability
3. The ability to **read and interpret maps/spatial data** of topography, geology, soil and aerial photography in relation to the interpretation of soil conditions; where and when appropriate, conversance with the use of GIS, GPS and mobile technology

DOCUMENT 1

Foundation skills in field soil investigation, description and interpretation

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4. The application of a relevant scheme of **field soil description** (such as Soil Survey Field Handbook) and the production and recording of accurate, consistent descriptions of soil profiles or materials. This should normally include the ability to describe soil colour (e.g. using a Munsell soil colour chart[2]) including mottling, soil texture, the properties of the soil surface, soil structure, consistence and porosity
5. The consistent **hand texturing** of particle size distribution in the fine earth, and the description of stones by their frequency, size, shape and rock type
6. The ability to **interpret soil horizons, features and materials** and whole profile descriptions to develop an understanding of the soil environment and its variability within a landscape
7. The ability and understanding required to **sample a soil or the soils of a site** for one or more relevant determinands representative of the soil or site and relevant to the objectives of the study. This may involve the collection of aggregated topsoil samples or horizon bag or tin samples
8. The ability and knowledge required to interpret the results of any soil chemical, physical or microbial analysis
9. The ability to **interpret the relationships between soil and landscape, land use and climate**
10. The ability to **produce accurate and understandable verbal and written reports** of the soil conditions (text and map information as appropriate) at or across the investigation site, with an interpretation of these in a way that is relevant to the context of the investigation (this is amplified by other BSSS PCSS documents in this series)

1 Hodgson, J M (1997) Soil Survey Field Handbook. Soil Survey Technical Monograph No 5, Silsoe

2 Munsell Soil Colour Book, Munsell Colour (2009)

Knowledge:

1. An understanding of **soil development processes** and of the influence of relief, geology, climate, vegetation and soil organisms on soil development
2. A basic knowledge of world and European soils and their taxonomy, and a more detailed knowledge of soil development and taxonomy within the United Kingdom
3. An understanding of the potential for **soil heterogeneity** in space and time, and of the factors that cause and influence variability
4. Knowledge of **soil horizon notation** and, where appropriate, of a relevant scheme for soil classification including the identification of diagnostic horizons, features and materials
5. Knowledge of **local soils and land use history affecting the soils** and of the range of soils developed across the UK and Europe, and of information sources for more detailed information
6. Knowledge of **natural soil properties and conditions** that is sufficient to set soil conditions at an investigation site within the context of natural variability
7. Knowledge and application of relevant **Health and Safety, Environmental and Biosecurity regulations,** including any animal or plant health restrictions in force and all relevant safe working practices
8. Knowledge of the **potential impacts of human activity and of land management** on soil properties and processes
9. Particular specialist knowledge of soil and crop nutrition, soil hydrology, and of the influence of soil on plant and animal ecology may be required in particular circumstances and these are detailed in related PCSS competency documents

DOCUMENT 4

Soil science in soil handling and restoration

WORKING WITH SOIL
setting standards in soil science

Background

Large amounts of soil are disturbed during the development of land for urban, industrial/retail and transport uses, for installation of energy networks and for the quarrying of aggregates and minerals. In addition, previously excavated soils are re-instated after mineral working and in the restoration of previously despoiled land to green after-use and to create parks, gardens and landscaped areas within the built environment. Professional soil science has an important role to play in ensuring a successful outcome. Professional competence in managing the restoration of land after soil disturbance builds upon foundation skills in field soil investigation, description and interpretation (BSSS PCSS Document 1). The competencies outlined in BSSS PCSS Documents 6 (Soil science in the establishment, management and/or conservation of natural habitats and ecosystems) and 8 (Soil science in landscape design and construction) will also be relevant depending on the intended after-use of a site.

Qualifications

Professional soil scientists and engineers with competence in soil handling and land restoration will have graduated in a relevant science subject. They will also have a second degree and/or a number of years relevant field experience and will have or be adequately qualified for **full** membership of a relevant professional body such as the British Society of Soil Science (BSSS).

Minimum competencies

Skills and knowledge:

These are described under a number of sub-headings that relate to different tasks. A professionally-competent scientist or engineer should have the skills and knowledge identified under the **General heading** and **all other headings that are relevant** to the tasks required. Professional soil scientists and engineers working in this sector should be familiar with the Defra Construction Code of Practice for the Sustainable use of Soils on Construction Sites (Defra 2009).

General

1. The ability to investigate, sample, describe and interpret soils in the field in a consistent manner and to professional standards (BSSS PCSS Document 1)
2. The ability and knowledge required to interpret the results of any soil chemical, physical or microbiological analyses

DOCUMENT 4

Soil science in soil handling and restoration

WORKING WITH SOIL
setting standards in soil science

3. Knowledge of relevant European and national regulations and policies, including national and local land use planning policy and guidance, and soil protection policy
4. A working knowledge of the industry being advised, whether quarrying, development, infrastructure installation or landscaping
5. The ability to effectively communicate soil information in a simple and relevant form to developers, planners, landscape architects and earthmoving contractors with clear statements as to the reliability and certainty of the results
6. The ability to write accurate reports and/or method statements, written in clear terms, that communicate the relevant information to site planners, site managers, site personnel and eventual users of restored land
7. An awareness of the importance of systems of quality assurance and control in all aspects of professional work

The characterisation of soil resources

1. The know-how to select appropriate survey and sampling densities to characterise *in situ* and stockpiled soil resources to required levels of certainty
2. Understanding of Health and Safety requirements on site and the ability to compile a risk assessment when requested
3. Familiarity with the use and limitations of GPS for determining sampling locations on site
4. Proficiency in fieldwork practices and procedures such as soil texturing, soil description and the delineation of soil resource units (see BSSS PCSS Document 1)

The provision of advice on soil handling

1. A knowledge of the machines used for handling soils, their capabilities and limitations
2. An awareness of methods of soil handling that minimise physical damage to soils and guidance[1] that describes such methods, including management of stockpiled soil
3. An understanding of soil hydrology and physical and engineering properties such as plastic limit, and their relevance to soil handling
4. The ability to calculate volumes of *in situ* soil layers to be moved as well as soil stored in stockpiles
5. A knowledge and understanding of waste management and/or contaminated land regulations that might restrict the export of soil materials off-site or their management within site
6. Familiarity with British Standards relevant to characterising soil materials already on site or being imported to site[2]
7. The ability to prepare a Soil Management Strategy/Soil Resource Plan[3] and simple method statements for site personnel

The restoration of land

1. The ability to characterise existing substrates on site and make best use of them, including chemical or physical amelioration where necessary
2. Knowledge and experience of the uses of manufactured soils and the use of organic materials for soil creation where natural soils are in short supply
3. Understanding of the specific soil chemical and physical conditions (including the principles of soil engineering) necessary for various restored after uses and landforms, such as woodland, Best and Most Versatile agricultural land, wet meadow, species-rich grassland, commercial landscaping, etc.

The aftercare and assessment of restored land

1. The ability to prepare and/or interpret aftercare plans (for those restored land uses where one is required)[1]
2. The ability to assess soil physical quality and make any recommendations for amelioration to create a 'fit-for-purpose' soil profile[2]
3. The ability to take representative soil samples for chemical analysis and to interpret the results to make recommendations for the use of fertilisers[4], lime or other chemical ameliorants[3]

1 for example the MAFF (2000) Good Practice Guide for Handling Soils
2 e.g. BS3882:2007 Specification for Topsoil and Requirements for Use
3 Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites
4 Might necessitate a FACTS qualification where the use is agricultural; see BSSS PCSS Document 10 Soil science in crop and livestock production

Annex B. Field Assessment of Soil Plasticity

Appendix B Field Assessment of Soil Plasticity

B.1.1 This annex presents the method for assessing the plasticity (consistency) of soils in the field. This method is to be used to assess soil plasticity at all pertinent stages of the earthworks programme including:

- In situ before/during soil stripping
- Storage stockpiles (non-plastic soils only)
- Reconditioning windrows
- During soil re-spreading and decompaction/cultivation operations.

B.1.2 The procedure is outlined as:

- Walkover/visual examination
- Soil sampling
- Sample assessment.

B.2 Walkover/ Visual Examination

B.2.1 The assessor shall first walk over or along the area/field or stockpile/windrow to be assessed in order to identify any apparent significant variability (e.g., evidence of poaching incidents of surface water ponding, saturated soils, or distribution of moisture loving plant species such as Juncus) and to identify suitable locations for sampling.

B.2.2 In addition to any areas identified from the walkover, any locations likely to display varying plasticity to the majority (low-lying spots, the base of stockpiles/windrows etc) shall be accounted for when sampling.

B.2.3 Site observations relating soil moisture content and soil plasticity and the distribution of any significant variability shall be recorded.

B.3 Soil Sampling

B.3.1 For undisturbed areas, the topsoil and upper subsoil shall be sampled at several locations using an Edelman soil auger. Separate samples from each soil layer shall be taken from their full depth.

B.3.2 For stockpiles and windrows, the soil shall be sampled at representative locations using an Edelman soil auger at a range of depths depending on the stockpile size. Where deemed necessary by the site Soil Scientist, samples from greater depths shall be obtained using a suitably sized mechanical excavator.

B.3.3 For each layer, approximately a double handful of soil shall be collected and mixed up in a suitable container.

B.3.4 A minimum of five locations shall be sampled and assessed per field or stockpile/windrow.

B.4 Sample Assessment

B.4.1 The test sample (small handful) shall be taken from the collected sample and prepared for assessment by removing stones and vegetation including all roots greater than 1 mm. Any significant quantity of very fine roots (<1 mm) shall be removed.

B.4.2 The test sample shall be kneaded to break down any structure and ensure the mass is all at the same moisture content and assessed in accordance with the tables below.

Table B.1 Sample assessment for dry and friable soils

Examination	Assessment
If the soil sample is wet, films of water are visible on the surfaces of grains and aggregates and/or when a soil sample is squeezed in the hand, and it readily deforms into a cohesive 'ball'.	Handling not recommended – if handled, stockpiled material to be recorded as plastic
Peds (structures) break up/crumble readily when squeezed in the hand rather than forming into a ball.	Handling ok
If the sample is moist, there is a slight dampness when squeezed between the fingers, but it does not significantly change colour (darken) on further wetting.	No handling by dozers but may be handled by tracked excavators if consistency test is passed
If the sample is dry and brittle it will look dry and change colour (darken) if water is added.	Handling ok if consistency test is passed

B.5 Consistency Test

B.5.1 Attempt to mould a soil sample into a ball by hand:

Table B.2 First consistency test for dry and friable soils

Examination	Assessment
Impossible because the soil is too hard (dry)	Handling ok
Impossible because the soil is too loose (dry)	Handling ok
Impossible because the soil is too loose (wet)	Handling not recommended – if handled, stockpiled material to be recorded as plastic
Possible	Go to table below

B.5.2 Attempt to roll the ball into a thread of 3 mm diameter on a flat non-adhesive surface using light pressure from the flat of the hand:

Table B.3 Second consistency test for dry and friable soils

Examination	Assessment
Impossible; the soil crumbles or disintegrates	Handling ok
Possible	Handling not recommended – if handled, stockpiled material to be recorded as plastic

Annex C.
Soil Stripping Methodology

Appendix C Soil Stripping Methodology

C.1.1 This annex sets out the approach to be followed for soil stripping.

C.2 Existing Vegetation

C.2.1 Woodlands/hedges shall be pre-treated before soil stripping, in two stages:

- Each tree shall be felled and removed from site, including all branches/brash (as shown in Appendix A of the Outline Landscape and Ecological Management Plan (LEMP) (document reference 7.4))
- Tree stumps and associated large roots (>20 mm diameter) shall be lifted using a suitable excavator.

C.2.2 All woody materials (tree trunks, stumps, branches and brash, etc), including wood chippings, shall be removed from the area being stripped and will be managed in accordance with the Site Waste Management Plan. Excessive amounts of woody material will not be incorporated with the stripped soils. The only exception would be where deadwood forms a component of the surface features; in such circumstances a proportion of existing dead wood will be salvaged and used to recreate this habitat.

C.2.3 Any temporary stockpiles of woody materials shall be constructed with a small 'core' to minimise the risk of spontaneous combustion and monitored as appropriate.

C.2.4 Other vegetation will be cleared using an appropriate method. All arisings will be removed prior to soil stripping commencing to ensure significant quantities of green materials are not incorporated with the stripped topsoil as this can lead to the development of anaerobic conditions within the stockpiled soil.

C.3 Access Routes

C.3.1 Access to each area/compartment to be stripped shall be created by stripping the topsoil (and some subsoil) and aggregate (e.g. stone) placed on top of the subsoil. The intention is that the receiving dump truck for the rest of the area/compartment shall run on the aggregate layer to prevent damage to the topsoil or subsoil.

C.3.2 Access shall be created wide enough to permit access for the dump trucks which shall transport the stripped soils to the storage area.

C.4 Topsoil Stripping

C.4.1 In advance of stripping, the topsoil shall be cleared of all foreign matter or waste materials e.g. building rubble and fill materials.

C.4.2 All topsoil shall be stripped using hydraulic excavators and tracked dozers and transported using dump trucks, unless being stockpiled to one side of the construction area in accordance with the Good Practice Guide for Handling Soils in Mineral Workings (Institute of Quarrying, 2021) as shown in the images below.

C.4.3 The tracked dozer shall run on the surface of the subsoil and push up the topsoil in a single pass into a temporary row at the end of its run. Using a hydraulic excavator,

the stripped topsoil shall be loaded onto a dump truck for transportation to the designated stockpile location.

Image C.1 Soil stripping with bulldozers and dump trucks: the bed and segment system

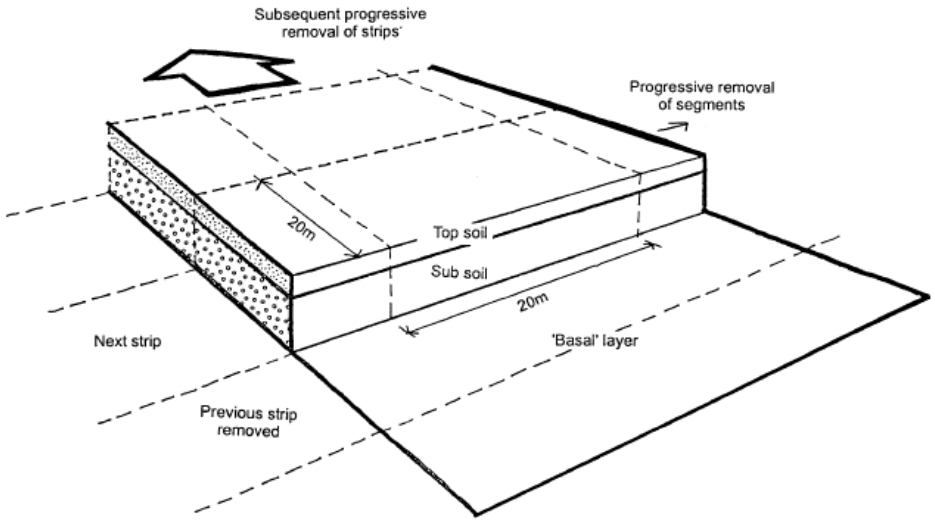
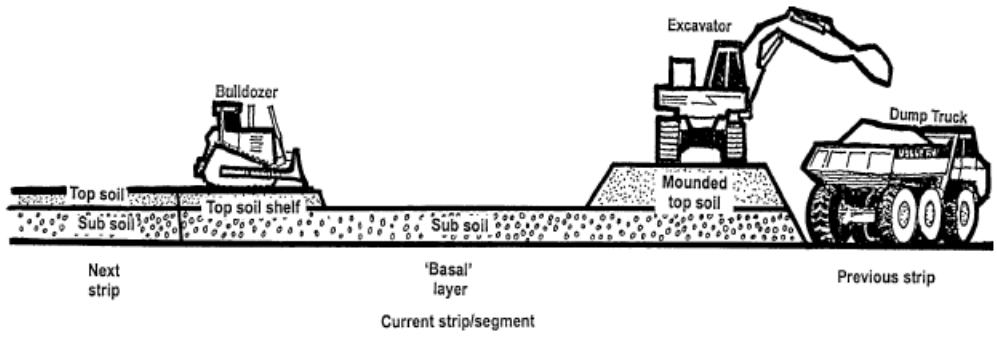


Image C.2 Soil stripping with bulldozers and dump trucks: Topsoil



C.4.4 The depth of strip shall be as set out in the Soil Stripping Plan. The aim of the topsoil strip is to enable the majority of the topsoil to be recovered without the inclusion of significant quantities of underlying subsoil. Some variation in topsoil depths is expected and therefore some discretion shall be made by the machine operator (based on soil colour and/or firmness) during the topsoil strip to maximise topsoil recovery without compromising the quality of the soil resource.

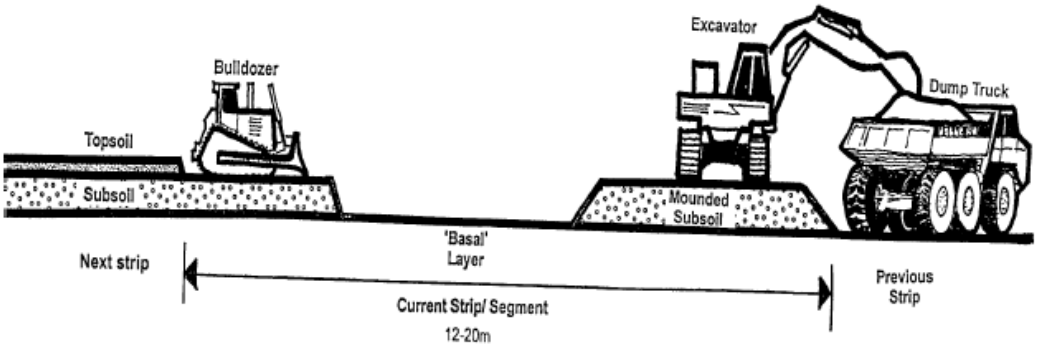
C.4.5 Once loaded, the dump truck shall transport the topsoil along the pre-designated access route to the desired stockpile location.

C.4.6 These operations shall be closely monitored to ensure that the correct soil type is recovered without the inclusion of other soils or wastes. Cross contamination with subsoil could significantly degrade the quality of the topsoil.

C.5 Subsoil Stripping

C.5.1 Subsoil shall be stripped (where required) using hydraulic excavators and tracked dozers and transported using dump trucks.

Image C.3 Soil stripping with bulldozers and dump trucks: Subsoil



C.5.2 The tracked dozer shall run on the surface of the basal layer and push up the subsoil in a single pass into a temporary row at the end of its run. Using a hydraulic excavator fitted with a toothed bucket, the stripped subsoil shall be loaded onto a dump truck for transportation.

C.5.3 Once loaded, the dump truck shall transport the subsoil along the pre-designated access route to the desired stockpile location.

C.5.4 These operations shall be closely monitored to ensure that the correct soil type is recovered without the inclusion of other soils or wastes. Cross contamination with deeper subsoil/parent material could significantly degrade the quality of the subsoil.

Annex D.
Soil Stockpiling Methodology

Appendix D Soil Stockpiling Methodology

D.1 Introduction

D.1.1 This annex sets out the approach for the storage (stockpiling) of soils.

D.1.2 Stockpiling will ensure that topsoil and subsoil resources are stored separately. Where required, soil resources with differing characteristics are also stockpiled separately.

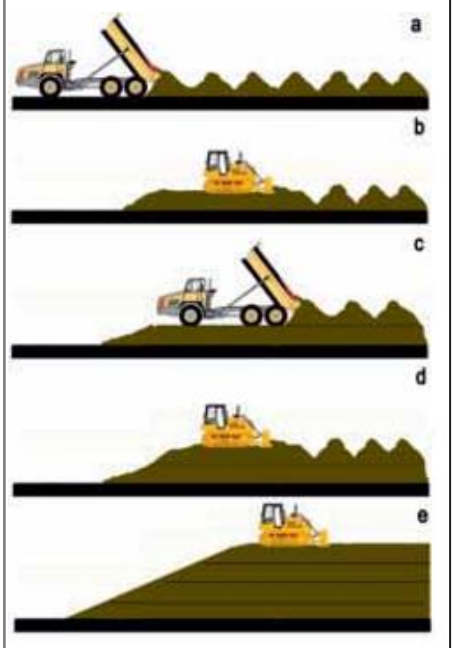
D.1.3 Stockpile locations will be identified in advance and clearly shown on relevant plans such that they do not interfere with other site operations, minimising the risk of stockpiled soil resources becoming contaminated, tracked over, etc.

D.1.4 The area(s) designated for soil storage shall be cleared of vegetation and stripped, where required ahead of stockpile construction. Topsoil will be stored on top of in situ topsoil, with a marker layer of straw placed first to ensure, at the time of soil recovery, it is clear where the base of the stockpiled material lies. Subsoil will only be stored on subsoil (i.e. in an area where topsoil has been stripped).

D.2 Stockpiling Method

D.2.1 The approach illustrated in the image below will be used to stockpile non-plastic soils. Ideally, plastic soils will be reconditioned as shown in Annex E prior to final stockpile creation.

Image D.1 Stockpiling method



The process requires the soil to be transported to the storage area in a dump truck, and 'loose tipped' in a line of heaps to form a windrow (a).

Once the heaps cover the storage area, a tracked dozer (e.g. D6 Caterpillar) shall level the heaps to form a level, stable platform for dump trucks to travel across to tip a second layer of topsoil (b and c). This sequence shall be repeated until the maximum stockpile height is achieved (d). Assuming that the topsoil is reasonably dry and friable during the stripping and storage operation, it shall be heaped to its maximum permitted height for this site.

To protect from wet weather once the final height is achieved, the excavator or blade shall regrade the sides and top of the stockpile to firm the surface by tracking across it to form a smooth gradient. The aim is to seal in the dry topsoil and reduce rainfall/infiltration and stabilise the surface (e).

Once the stockpile has been completed, the area shall be cordoned off to prevent any disturbance or contamination by other construction activities.

Any emergent vegetation shall be managed to a maximum height of 300 mm and not allowed to 'set seed'.

Annex E.
Soil Reconditioning Methodology

Appendix E Soil Reconditioning Methodology

E.1 Introduction

E.1.1 This annex presents the approach to be used for reconditioning plastic soils. This Outline SRP requires all soils to be handled when non-plastic but should this not happen or plastic soils be identified in stockpiles prior to re-use, reconditioning will be required.

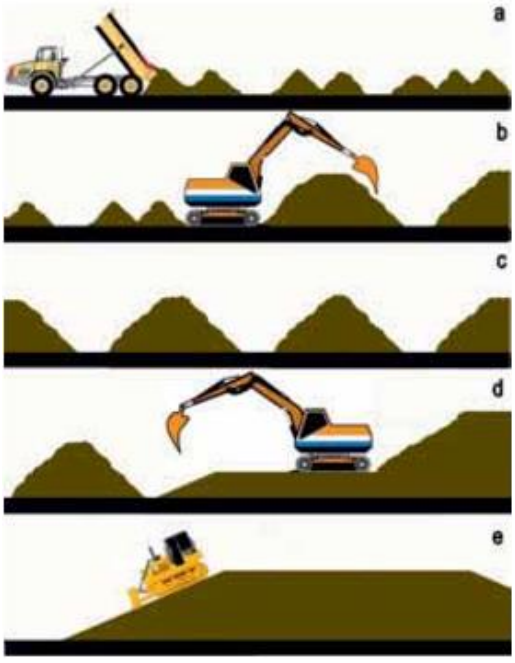
E.1.2 Reconditioning will be undertaken in area(s) of the site where it will not interfere with other site operations to minimise the risk of soils that are being reconditioned becoming contaminated, tracked over etc.

E.1.3 The area(s) designated for soil reconditioning shall be cleared of vegetation. Soil materials will only be windrowed on compatible soil types / layers. Where practicable, reconditioning at the re-use location will reduce the amount of handling required.

Soil Reconditioning Method

E.1.4 The approach illustrated in the graphic below shall be applied through placing the plastic soils into windrows and allowing the soil to dry over a period of several weeks (assuming suitable weather conditions). The reconditioned soil can then be used to reinstate areas or be re-stockpiled in a non-plastic state, as shown in the image below.

Image E.1 Conditioning prior to stockpiling



Excavate soil from existing stockpile using a hydraulic excavator fitted with a toothed bucket. Load into dump truck and move to reconditioning area.
The soil is tipped in a line of heaps to form a 'windrow', starting at the furthest point in the storage area and working back toward the access point (a).
Any additional windrows are spaced sufficiently apart to allow tracked plant to gain access between them so that the soil can be heaped up (b). To avoid compaction no machinery, even tracked plant, traverses the windrow.
Once the soil has dried out and is non-plastic in consistency (this usually requires several weeks of dry and windy or warm weather and for the windrows to be turned at least once), (c) the windrows are combined to form large stockpiles to the maximum height for this site using a tracked excavator (d).
The surface of the stockpile is then regraded and compacted (e) by a tracked machine (dozer or excavator) to reduce rainwater infiltration.

Annex F.
Soil Placement Methodology

Appendix F Soil Placement Methodology

F.1.1 This annex presents the methods for the placement of the soils. It comprises the following:

- Soil handling considerations
- Placement and treatment of overburden
- Subsoil and topsoil placement and spreading
- Cultivations and monitoring.

F.2 Soil Handling Considerations

F.2.1 To avoid further physical degradation during all phases of soil placement and handling (e.g. re-spreading/placement, overburden ripping/subsoiling and topsoil cultivation), these operations will be carried out when soil is non-plastic in consistency. As such, soil handling will be stopped during and after heavy rainfall, and not continue until the soil is again non-plastic in consistency.

F.2.2 Monitoring of the soil placement will be undertaken to ensure the placed soil is not structurally damaged and so any required remedial measures can be implemented as the works progress.

F.3 Placement and Treatment of Overburden

F.3.1 The finished surface, prior to the placement of subsoil and topsoil materials, will be loosened through the use of appropriate plant, such as a heavy duty subsoiler/ripper fixed to a tracked dozer. If access is limited, a single rigid tine fitted to a hydraulic excavator will be used to undertake this operation.

F.3.2 The depth of ripping of the overburden will be to 0.4 m, with tine spacing at a maximum of 1 m centres. Any oversized rocks (greater than 0.2 m diameter) that are uplifted to the soil surface during ripping will be picked and removed for use as infill elsewhere.

F.3.3 To ensure effective drainage, ripping shall include a straight run across the width of the area being reinstated at an angle of approximately 45° to any slope followed by a subsequent oblique pass. If assessed as necessary by the Soil Scientist, a third pass shall be run at an angle of 90° to the first pass to ensure that there are no remaining blocks of unbroken compacted soil.

F.3.4 As the areas being reinstated are generally narrow linear corridors, ripping will be undertaken to ensure tie-in with adjacent, non-worked land parcels such that the ripping does not result in subsequent drainage issues on those land parcels.

F.4 Subsoil and Topsoil Placement

F.4.1 A sequential approach to subsoil and topsoil placement will be undertaken as outlined below:

Subsoil Placement

- Using hydraulic excavator fitted with toothed bucket (to avoid smearing) remove subsoil from stockpiles
- Transport with dump truck to the appropriate re-use location
- Tip subsoil in a line of heaps at the edge of the ripped/subsoiled area to avoid re-compaction of the overburden
- Spread the subsoil using either a tracked dozer or tracked excavator
- Subsoil depths to be checked by Soil Scientist to ensure correct subsoil depth is achieved across the reinstatement area.

Topsoil Spreading

F.4.2 Once satisfactory subsoil placement has been achieved, topsoil shall be removed from stockpiles and spread following the same procedures for subsoil above, ensuring that placed and loosened subsoil and overburden is not tracked over.

F.4.3 Topsoil depths to be checked by Soil Scientist to ensure correct topsoil depth is achieved.

F.5 Cultivations and Monitoring

F.5.1 Once the soil profile has been formed, final cultivation will be undertaken. Cultivation will only be undertaken when the soils are dry and friable to the full depth of working to avoid the risk of smearing the soil.

F.5.2 An appropriate tracked machine or tractor fitted with a wing-tine subsoiler will be used for loosening the subsoil (subsoiling). For inaccessible areas, a suitable tracked excavator, fitted with a single rigid tine (ripper tooth) will be used. Loosening will be undertaken to a minimum depth of 0.6 m below surface level at maximum 0.6 m centres.

F.5.3 To ensure good drainage, subsoiling will include a straight run across the width of the reinstatement area at an angle of approximately 45° to any slope followed by a subsequent oblique pass. If assessed as necessary by the Soil Scientist, a third pass shall be run at an angle of 90° to the first pass to ensure that there are no remaining blocks of unbroken compacted soil.

F.5.4 After subsoiling, the Soil Scientist shall assess the subsoil layer to check the effectiveness of the operation. If compaction is still recorded, the above process will be repeated until this is removed.

F.5.5 Once subsoiling has been undertaken successfully, the topsoil will then be cultivated (with repeat cultivations as required) to its full depth using appropriate tillage equipment (e.g. chisel plough, power harrow or set of discs) to produce a suitable tilth. This operation will also help to re-aerate the topsoil after storage (if applicable).

F.5.6 Where access is limited, the topsoil may be cultivated using a landscape rake attachment fitted to a suitable hydraulic excavator.

F.5.7 Any undesirable material brought to the surface during this exercise shall be removed by picking or raking. For example, stones, fill materials and coarse vegetation larger than 50 mm in any dimension.

F.5.8 After topsoil cultivation, the Soil Scientist shall assess the topsoil horizon to check the effectiveness of the operation and to confirm the condition of the topsoil is suitable for the intended end use.

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