Statutory Consultation 2022

Preliminary Environmental Information Report

Volume 3: Appendix 6.6

Draft Soil Management Plan

Contents

Tables

Insets

1 INTRODUCTION

1.1 Background

1.1.1 Luton Rising (a trading name of London Luton Airport Limited) ("the Applicant") is proposing to submit an application for a development consent order (DCO) to enable London Luton Airport (the airport) to expand to accommodate 32 million passengers per annum (mppa) ('the Proposed Development').

1.1.2 Elements of the Proposed Development would be constructed on land owned by the Applicant, under agricultural use or pasture and containing large reserves of topsoil and subsoil. Therefore, as part of the Preliminary Environmental Information Report (PEIR), appropriate management of soil resources has been identified as a measure to reduce the potential impact of the Proposed Development. This Draft Soils Management Plan outlines the measures proposed to recover, store and re-use the existing topsoil and subsoil reserves for the soft landscape scheme.

1.1.3 It is envisaged that following the earthworks phases, that the new landscape areas will be constructed on new (reinstated) soil profiles which are constructed entirely using stored topsoil and subsoil.

1.2 Reference Material

1.2.1 The following information has been reviewed as part of this Soil Management Plan:

a. Tim O'Hare Associates – Soil Resource Survey Report: Land Near Luton Airport. (dated 15th June 2016, provided as **Appendix 6.3** in Volume 3 to the PEIR);

b. Tim O'Hare Associates – Soil Resource Survey Report: Wigmore Valley Park. (dated 11th December 2017, provided as **Appendix 6.4** in Volume 3 to the PEIR); and

c. Tim O'Hare Associates – Soil Resource Survey Report: Luton Airport Expansion Project. (dated 24th October 2018, provided as **Appendix 6.5** in Volume 3 to the PEIR).

1.3 Report Purpose and Limitations

1.3.1 The purpose of the Draft Soil Management Plan is to outline the strategy for the correct procedures for intensive soil handling operations including topsoil stripping and storage, topsoil respreading and amelioration as well as treatments for the subsoil to ensure that a suitable soil profile is produced to help enable healthy root growth and successful plant establishment.

1.3.2 This Draft Soil Management Plan has been developed in conjunction with the findings of the Soil Resource Survey reports for this site, with respect to the re-use of the site soils (topsoil and subsoil for soft landscape purposes only).

1.3.3 Matters relating to geotechnical and geo-environmental issues are outside the scope of this document.

2 SITE SOIL RESOURCES

2.1 Soil Types

2.1.1 The site contained significant reserves of undisturbed topsoil and subsoil. A total of 4 No. soil profiles were identified, comprising:

a. Soil Profile 1 - Agricultural Soil
b. Soil Profile 2 - Agricultural Soil (calcareous)
c. Soil Profile 3 - Parkland Soil
d. Soil Profile 4 - Woodland Soil

2.1.2 At the time of the surveys (June 2016 to October 2018) these soils were in-situ and undisturbed. The distribution of these soils is indicated in the Soil Map as **Appendix A** to this report.

2.2 Soil Profile 1, Soil Profile 3, Soil Profile 4

2.2.1 From the site survey and subsequent laboratory analysis, Soil Profile 1, Soil Profile 3 and Soil Profile 4 comprised a respective Topsoil type over reasonably consistent Subsoil. The main characteristics of these soils are summarised in **Tables 1 to 3**.

Table 1 Properties of Topsoil 1

Topsoil 1
a. medium clay loam to heavy clay loam
b. slightly compacted; breaks on disturbance to granular and blocky structure
c. moderate to high stone contents with common large sized stones (>50mm)
d. acid to slightly alkaline (non-calcareous)
e. moderately high levels of organic matter, total nitrogen, extractable phosphorus and extractable magnesium
f. moderately low levels of extractable potassium
g. fertile with respect to habitat creation purposes

Table 2 Properties of Topsoil 3 and Topsoil 4

Topsoil 3 and Topsoil 4
a. medium clay loam to heavy clay loam
b. granular to subrounded blocky structures
c. Topsoil 3 (Parkland Soil); compacted
d. low to moderate stone contents
e. slightly acid to alkaline (non-calcareous) - Topsoil 3 and Topsoil 4 (TH48)
f. strongly acid (non-calcareous) – Topsoil 4 (TH45)
g. moderately high levels of organic matter, total nitrogen and extractable magnesium
h. moderately low levels of and extractable phosphorus and extractable potassium
i. infertile to intermediate fertility status with respect to habitat creation

Table 3 Properties of Subsoil

Subsoil
a. medium clay loam to silty clay loam
b. blocky structures
c. low to moderate stone contents, including occasional large stones
d. alkaline (non-calcareous)
e. elevated levels of organic matter

2.3 Soil Profile 2

2.3.1 From the site survey and subsequent laboratory analysis, Soil Profile 2 comprised Topsoil 2 over Calcareous Subsoil and Chalk as described in **Table 4**.

Table 4 Properties of Topsoil 2 and Calcareous Subsoil

Topsoil 2	Calcareous Subsoil
a. medium clay loam to clay (calcareous) b. breaks on disturbance to granular and blocky structure) c. moderate to moderately high stone contents d. strongly alkaline e. (high carbonate content) f. moderately high levels of organic matter, total nitrogen, extractable phosphorus and extractable magnesium g. moderately low levels of extractable potassium h. fertile with respect to habitat creation purposes	a. heavy clay loam to clay (calcareous) b. blocky structure c. low to moderate stone contents d. strongly alkaline (high carbonate content) e. moderately high levels of organic matter

3 CONSIDERATIONS FOR RE-USE

3.1 Physical Considerations

3.1.1 At present, Topsoil 1, Topsoil 2 and Topsoil 4 have moderate structures and providing the physical condition of these topsoils is maintained through the earthworks phase, they should need only routine cultivations prior to re-use.

3.1.2 Decompaction treatment(s) suited to established amenity grass may be required for areas of Topsoil 3 (Wigmore Park) to improve its drainage performance for certain uses (e.g. as an informal ‘kickabout’ area).

3.1.3 All of the topsoils contain stones over 50mm in diameter. The proportions of larger stones vary between topsoil types, with Topsoil 1 and Topsoil 2 containing the highest proportions. Appropriate stone treatment(s) should be undertaken to remove/reduce the quantity of large stones from the seed beds for ‘sensitive’ seeded areas. The largest stones should also be removed from ‘sensitive’ planted areas.

3.1.4 The subsoil generally falls into the heavy clay loam to clay soil texture classes. Any damage to the structure of this soil will reduce its drainage properties. Once disturbed and respread, the soakage potential of this soil is likely to be restricted (poorly drained) and the soil is likely to suffer from seasonal waterlogging, particularly after periods of prolonged or heavy rainfall.

3.1.5 It will be essential that all subsoils are fully decompacted as part of future landscape construction activities. All subsoils should be left in an uncompacted state for future landscape purposes.

3.2 Soil Amelioration

3.2.1 The overall fertility status of the topsoils would require amelioration with an appropriate fertiliser prior to planting and seeding.

3.3 Drainage Considerations

3.3.1 The site soils are dominated by clay and silt sized particles. As such, they will display structural degradation following disturbance, (particularly in the short term) resulting in poor drainage and aeration.

3.3.2 Given the soil's vulnerability to damage during handling, it will be essential that the damage caused is minimised by observing best practice in terms of soil management. In particular, close attention should be paid to section 5.3 General Soil Handling and the soils should only handled when they are reasonably dry and friable in consistency (crumbly). If these soils are handled when they are moist/wet and plastic, the damage caused is likely to render the soil unsuitable for re-use without further reconditioning.

3.3.3 In view of these conditions, following disturbance and reinstatement, the site soils would only be suited to plants which are tolerant of moisture retentive soils and they are not suited to more demanding planting environments (e.g. tree pits). Planting types which demand free draining soils would not be suited to this site. Demanding planting types, such as semi-mature trees, will require improvements to their planting conditions (tree pits) to improve drainage, to prevent the pits from acting as sumps and to reduce the risk of prolonged waterlogging / stagnation within the rooting zone. An alternative source of topsoil and subsoil should be considered for such uses.

3.3.4 There may be some options to mitigate the poor physical properties of these soils, including:

a. **Installation of land drainage**. Drainage may need to be installed at key locations or specifically for particularly vulnerable planting types. The type, design and depth of the drainage should be suitable to the proposed application. Such drainage would require a suitable outfall/discharge point.

b. **Localised mounding for tree and shrub planting**. The topsoil may be mounded locally for tree pits and shrub beds. This effectively 'lifts' the plants and reduces the risk of harm from waterlogging and improves aeration within the rooting zone.

4 IMPACTS ON SOIL QUALITY BY CONSTRUCTION ACTIVITY

4.1 Degradation of Soils

4.1.1 Soil is a vulnerable and non-renewable resource and therefore care must be taken throughout all handling, transporting and stockpiling activities to ensure that the soil resources of the site are protected and conserved. Findings from the Soil Resource Survey for this site indicate that site soils are particularly vulnerable to physical degradation during intensive soil handling operations such as stripping, storage and respreading.

4.1.2 Any damage to the soil structure would reduce aeration and drainage characteristics and increase the risk of waterlogging and anaerobism (oxygen depletion).

4.2 The Potential Impacts of Soil Degradation

4.2.1 Many general construction activities have the potential to damage soils. These include: compacting soils through trafficking of plant or vehicles, mixing soil with construction materials such as cement or aggregate, lime-stabilisation, or mixing different qualities of soil during handling and storage, including subsoil with topsoil.

4.2.2 Failure to protect soils during disturbance can lead to their degradation with consequential environmental impacts both on-site and off-site, such as:

a. soil erosion;
b. loss of soil organic matter leading to loss of nutrients and a decline in soil fertility;
c. soil compaction leading to loss of soil structure and permeability to water (waterlogging) and restricted aeration and rooting potential;
d. loss of soil biological activity;
e. poor re-establishment of vegetation; and
f. visual impact of slope failure or soil erosion (bare soil surfaces).

4.2.3 Measures are provided in this Draft Soil Management Plan to ensure, as far as is practicable, that soils on site will be stripped, handled and stored appropriately so that they can be re-used for landscape construction purposes.

5 SOIL MANAGEMENT STRATEGY

5.1 Strategy Outline

5.1.1 This section highlights the sequential treatments for the recovery, storage and re-use of the existing soil resources. These practices are based on the DEFRA Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2009).

5.1.2 **Method Statements** – all contractors working under this Soil Management Plan should each prepare a site-specific Method Statement for all soiling operations (e.g. handling, stockpiling, setting out, spreading, cultivations, amelioration). Each Method Statement shall include details of the methods of working, proposed site machinery and tillage equipment, materials, manpower and Health and Safety requirements. Each Method Statement shall be submitted for written approval by Luton Rising and the project Soil Scientist before any works commence.

5.1.3 **Pre-Start Meeting** – a pre-start meeting will be held between Luton Rising, the Soil Scientist and the lead contractor at least 1 week prior to commencement of any soiling works. The purpose of the meeting will be to finalise and sign-off the Method Statements.

5.2 Pre-treatment of Existing Vegetation

5.2.1 It is good practice to reduce the quantity of vegetation entering the storage stockpiles in order to minimise the formation of anaerobic conditions during storage. As such, in advance of soil stripping the topsoil will be cleared of surface vegetation by a method suited to the vegetation type present.

5.2.2 All arable/grassland areas will be close mown (< 100mm), where necessary and the cuttings collected where necessary for removal to a suitable green-waste recycling facility.

5.2.3 Any trees/woodlands/hedges will be pre-treated before soil stripping, including:

a. each tree will be felled and removed from site, including all branches/brash;

b. tree stumps and associated large roots (> 20mm diameter) will be lifted using a suitable excavator fitted with a hydraulic grab; and

c. all woody materials (tree trunks, stumps, branches and brash, etc), including wood chippings, will be removed from site to a suitable green-waste material processing facility for recycling.

5.2.4 To minimise anaerobism during storage and preserve the quality of the topsoil as a growing media, woody materials will not be incorporated with the soils during stripping. This includes any chippings left on the surface after clearance of woodland/hedgerows.

5.3 General Site Soil Handling

5.3.1 It is important to avoid soil physical degradation during all phases of soil handling (e.g. stripping, storage, respreading and planting). Soil handling operations should be carried out when the soil is reasonably dry and non-plastic (friable) in consistency.

5.3.2 The soils (topsoil and subsoil) should not be unnecessarily compacted by trampling or trafficking by site machinery.

5.3.3 If, during the course of the earthworks, the soil is structurally damaged, it should be suitably cultivated to relieve the compaction and restore the structure prior to any planting, turfing or seeding.

5.4 Topsoil Stripping

5.4.1 The four types of topsoil (Topsoil 1, Topsoil 2, Topsoil 3 and Topsoil 4) should be stripped separately from one another and kept separate from the other soils or engineering arisings on the site.

5.4.2 The loose tip method, using dump trucks and hydraulic excavators, should be used to strip, transport and stockpile the topsoil.

5.4.3 The loose-tipping method involves the use of a tracked hydraulic excavator, fitted with a flat edged grading bucket to strip the topsoil and load it into a dump truck. Alternatively, a tracked dozer may be used to strip the soils.

5.4.4 The dump truck, running along a pre-designated route, then transports the topsoil to the desired stockpile location.

5.4.5 This operation should be monitored to ensure that the soil is recovered without the inclusion of other soils (subsoil) or wastes. Cross contamination with other soil could significantly degrade the quality of the topsoil.

5.4.6 Any large stones (>75mm), waste or non-topsoil materials or soil heaps should be removed from areas to be stripped prior to topsoil stripping.

5.4.7 Topsoil stripping and stockpiling should be carried out whilst the soil is reasonably dry and friable. However, if due to construction programme constraints topsoil stripping needs to be carried out whilst the topsoil is wet, an alternative method for topsoil stockpiling should be used (Section 5.8).

5.5 Depth of Topsoil Strip

5.5.1 The depth of strip should be set as follows

a. Topsoil 1 and Topsoil 2 **280mm**
b. Topsoil 3 **300mm**
c. Topsoil 4 **220mm**

5.5.2 This will enable the majority of the topsoil to be recovered without the inclusion of significant quantities of subsoil. Based on the colour differences between the

topsoil and subsoil the topsoil strip should be reviewed by the machine operator on a continuous basis to ensure that the topsoil recovery is efficient.

5.6 General Considerations for Topsoil Stockpiling

5.6.1 The topsoils should be stored temporarily prior to re-spreading into landscape areas when they become available. The four topsoil types should be stored separately from one another and kept separate from the other soils/materials on the site (subsoils or engineering arisings).

5.6.2 The topsoils should be stored in an area of the site where they should not interfere with other site operations so that they can be left undisturbed during other construction activities.

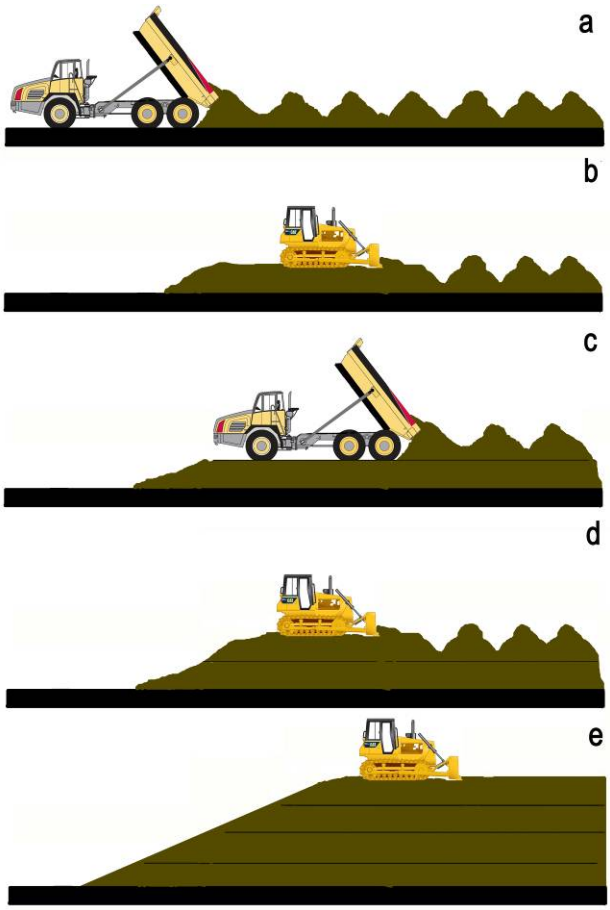
5.6.3 The area that is to be used for storing the topsoil should be cleared of vegetation, in-situ topsoil and any waste arising from the development e.g. building rubble and fill materials.

5.6.4 There are two options for stockpiling the topsoil depending on the moisture content and plasticity. These are dry soil stockpiling and wet soil stockpiling. These methods are each considered and detailed below.

5.7 Dry Soil Stockpiling

5.7.1 For dry/non-plastic soils the aim of the method is to create a large core of dry soil, and to restrict the amount of water that can get into the stockpile during the storage period. The dry stockpiling method is illustrated **Inset 1**.

Inset 1 The Dry Stockpiling Method



The process requires the topsoil 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) should 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 should 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 should be heaped to a maximum of 6.0 metres (health and safety permitting).

To protect from wet weather once the final height is achieved, the excavator or blade should re-grade 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. (e).

If the topsoil is to be stored for more than 3 months, a quick germinating fescue/clover seed mix should be sown over the sides and top of the stockpile to stabilise the surface and reduce the risk of erosion.

Once the stockpile has been completed the area should be cordoned off with secure fencing to prevent any disturbance or contamination by other construction activities.

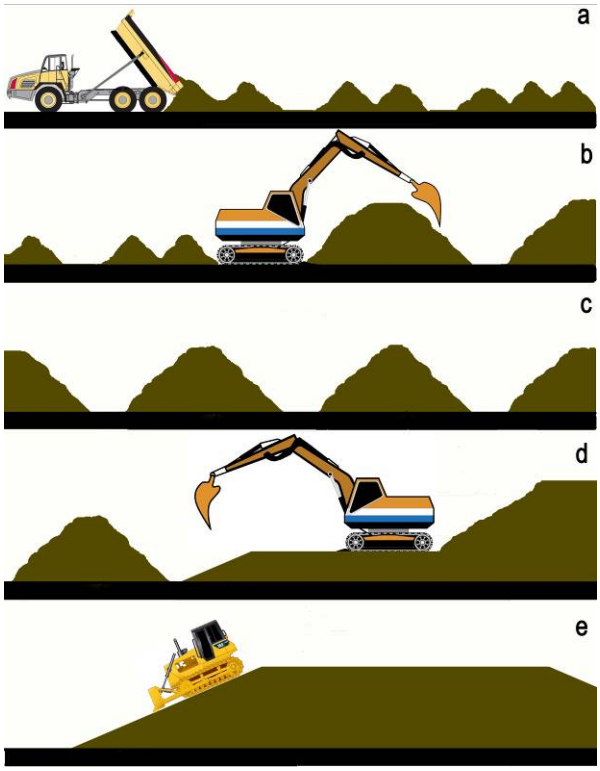
5.8 Wet Soil Stockpiling

5.8.1 The wet stockpiling method is to be used to initially recondition undisturbed soils that are stripped when wet/plastic in consistency.

5.8.2 The wet soil stockpiling method is illustrated in **Inset 2**; whereby wet soils are tipped for temporary storage as windrows until the topsoil has dried out. This technique minimises the amount of compaction caused by stockpiling as well as maximising the surface area of the stockpile to enable to soil to dry out. The

reconditioning operation would be timed during the summer months (May to September), to allow enough time for the topsoil to dry out effectively.

Inset 2 The Wet Stockpiling Method.



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 to a maximum height of 2.5m (b). To avoid compaction, no machinery, even tracked plant, should traverse 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 should be combined to form a larger stockpile(s) with a maximum height of 6.0m, using a tracked excavator (d).

The surface of the stockpile should be re-graded and compacted (e) by a tracked machine (dozer or excavator) to reduce rainwater infiltration.

5.9 Grading Subsoil

5.9.1 Subsoil should be placed graded in accordance with the Engineer's requirements. Grade to smooth flowing contours to achieve the desired formation levels and falls and the specified finished levels of topsoil.

5.9.2 Where the subsoil is placed over non 'rootable' landscape soil, the subsoil should be installed to an adequate depth to support the landscape scheme as indicated in the landscape architects drawings.

5.9.3 Any large stones and other debris larger than 75mm brought to the surface during subsoil spreading should be stone picked or raked and removed. The stones should either be re-used on site or they should be removed off-site to a suitably licensed waste facility.

5.10 Subsoil Decompaction

5.10.1 The subsoil will have been compacted during its placement and profiling. The subsoil should be decompacted (ripped) to a minimum depth of 0.3m (grass/marginal areas and planting beds) or 0.5m (tree planting and woodland areas) at 0.6m centres to break up the compaction and to provide a 'key' for the topsoil layer.

5.11 Decompaction Equipment

5.11.1 On the larger areas a wing-tined subsoiler mounted on either a tracked dozer or large tractor should be used, examples of which are shown in **Inset 3**.

Inset 3 Wing-tined subsoiler (Left) and Tractor drawn subsoiler (Right)

5.11.2 A suitably-sized tracked excavator fitted with a single rigid tine should be used to loosen the subsoil in smaller inaccessible areas, such as field boundaries, corners of the site, steep slopes or adjacent to roads and pathways; examples of which are shown in **Inset 4.**

Inset 4 Tracked excavator with single rigid tine (Left) and Single rigid tine in use (Right)

5.11.3 Rips should be preferably made at 90 degrees in 2 directions, and at 45 degrees to direction of slopes on mounds from the toe of the mound.

5.11.4 Repeated passes may be needed to break up the subsoil sufficiently. This should be largely dependent on the strength of the soil and its resistance to cultivation at the time of the operation.

5.11.5 Following decompaction, the subsoil should be roughly levelled and lightly firmed if necessary to provide a sensible surface to spread the topsoil.

5.12 Topsoil Respreading

5.12.1 Two weeks prior to topsoil respreading, the stockpile should be treated with a non-residual herbicide and green waste removed.

5.12.2 A hydraulic excavator fitted with a toothed-bucket should be used to load the topsoil from the stockpile into a dump truck.

5.12.3 For large open areas, the topsoil should be respread using the ‘peninsular method’.

5.12.4 The dump truck should transport the topsoil to the nearest access point to the desired spreading area and loose tip onto the prepared subsoil.

5.12.5 An excavator should then push the topsoil out over the subsoil to the required depth.

5.12.6 As the excavator pushes the topsoil further out, the dump truck should then loose tip subsequent loads of topsoil at the edge of the respread topsoil. Gradually the respread topsoil will ‘fan out’ from the original access point, hence the term ‘peninsular’ used to refer to this method.

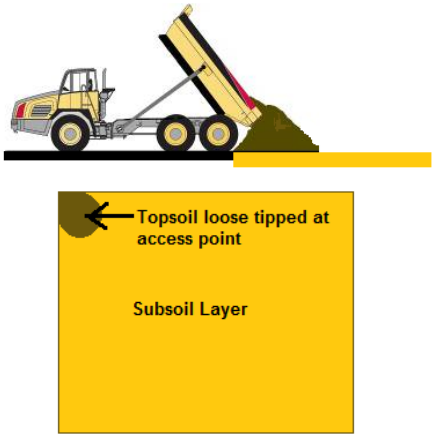
5.12.7 Both the dump truck and excavator should work on the topsoil layer only.

5.12.8 The topsoil should be spread in smooth flowing contours with falls for adequate drainage and removing any minor ridges or hollows.

5.12.9 The 'peninsular method' is illustrated in **Inset 5**.

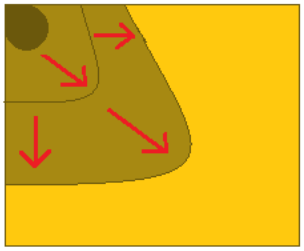
Inset 5 The 'Peninsular' Topsoil Spreading Method

a)



a) Topsoil should be transported from the storage area to the nearest access point in a dump truck and 'loose tip' at the edge of the spreading area (series of plots). At this stage, the dump truck traverses the adjacent ground rather than the subsoil within the respreading area.

b)



b) A tracked excavator pushes out the topsoil over the subsoil to the required depth. The excavator will track over the topsoil layer only.

c)

c) Each subsequent load of topsoil is then loose tipped at the edge of the 'peninsular' of spread topsoil.

This sequence is repeated until the required area is covered with topsoil.

5.13 Topsoil Depths

5.13.1 For the reinstatement of existing land following short term disturbance, the topsoil should be replaced to similar depths to those found within each area prior to disturbance. Depths of existing topsoil are summarised in section 5.5.

5.13.2 For new landscape areas, topsoil should be placed to depths in accordance with landscape architects drawings.

5.14 Topsoil Cultivation

5.14.1 After respreading topsoil, any large, compacted lumps should be broken down using suitable tillage equipment (e.g. chisel plough, power harrow, as shown in **Inset 6**) to break down larger clods and produce a fine tilth suitable for planting (<40mm), turfing and seeding (<10mm).

Inset 6 Example of power harrow (Left) and shakaerator (Right)

5.14.2 Small less accessible areas should be cultivated by hydraulic excavator fitted with a landscape rake attachment or similar and approved, examples of which is shown in **Inset 7**.

Inset 7 Examples of landscape rake

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

5.15 Soil Amelioration

5.15.1 Where the topsoils are to be re-used for **planting purposes**, to address the nutrient deficiencies and to help promote effective plant establishment, the

compound, slow release fertiliser ICL Enmag CRF (11%N:21%P2O5:9%K2O:6%MgO) at a rate of 70g/m^2 and to a depth of 200mm.

5.15.2 To address the nutrient deficiencies and to help promote effective grass establishment, it is recommend to apply and incorporate the pre-seeding grass fertiliser ICL Sportsmaster Pre-seeder (8%N:12%P2O5:8%K2O+3%MgO) prior to seeding or turfing at a rate of 35g/m^2 and to a depth of 100mm.

6 SITE SOIL INSPECTIONS

6.1 Soil Scientist Site Inspections

6.1.1 An appropriately experienced soil scientist will be appointed to inspect the implementation of the Soil Management Plan.

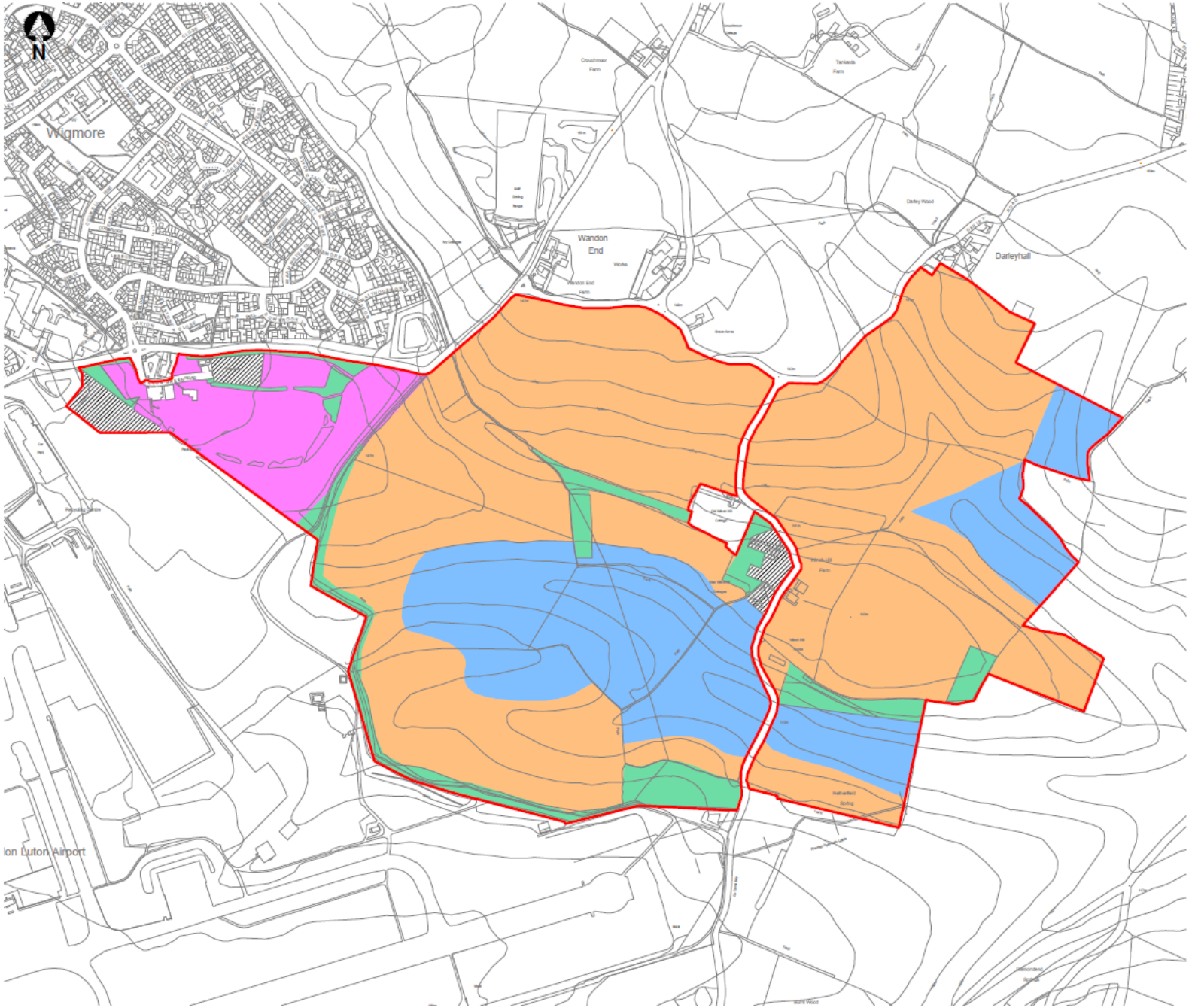
6.1.2 A soil scientist will carry out site inspections and liaise with the landscape architect/ site engineer/ contractor during the earthworks and landscape phases.

6.1.3 A soil scientist will inspect the site during the following operations:

a. pre-treatment of existing vegetation;
b. soil stripping and storage;
c. topsoil placement and preparation;
d. soil profile decompaction;
e. soil cultivation (and amelioration);
f. limited soil testing to confirm fertility status and horticultural properties; and
g. tree pit construction.

6.1.4 A short report will be produced after each site inspection to ensure that work is satisfactory and compliant with the Soil Management Plan and specification. At the end of the contract, a completion report will be issued to confirm that a suitable soil quality has been achieved and that the soils are compliant with the specification and fit for the landscape scheme.

APPENDIX A



LEGEND

- Soil Type 1 (Agricultural Soils)
- Soil Type 2 Agricultural Soils (Calcareous)
- Soil Type 3 (Parkland Soils)
- Soil Type 4 (Woodland Soils)
- Not surveyed

Revision	Date	Notes
-	-	-

Client	London Luton Airport Ltd
Site	Land at Luton Airport
Drawing Title	Soil Map
Job ref.	TOHA/18/3153/TW
Drawing No.	3153/1
Scale	NTS @ A3
Date	November 2018
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