LEVEL 4 AWARD, CERTIFICATE AND DIPLOMA IN ARBORICULTURE

Exemplar Material

Level 4 Award – [60024902]
Level 4 Certificate – [60026984]
Level 4 Diploma – [60025827]

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Exemplar Material

This material has been produced to provide guidance for tutors on the level of response required to meet the standard.

Material will not be provided for the full unit but there will be evidence provided for a range of assessment criteria across the units. This will provide a greater understanding of the depth and detail required in the response. Where an assessment criteria asks for a range of descriptions, an example will not be given for all. Instead, one or two examples will be given to provide understanding of the type of detail required.

The responses have been written by the Lead Moderator for Arboriculture, to show the type of response that would contribute to an overall pass as well as stronger responses and ones that fail to meet the full standard.

The assessment criteria covered will be:

Unit Title	**Assessment Criteria Covered**
Pest, disease and disorder identification [M/503/3322]	1.2
Principles of woodland establishment and management [F/503/3325]	3.2, 5.1
Tree biomechanics and maintenance [M/503/3319]	1.3
Tree development and protection [A/503/3324]	1.1
Tree related damage to built structures [L/502/3327]	1.1
Woody vegetation formation and physiology [D/503/3316]	2.4, 4.3
Principles of tree management [T/503/3323]	1.4, 6.1
Selection, planting and design with hardy nursery stock for amenity and landscape purposes [L/503/3330]	1.1, 3.2

Pest, disease and disorder identification [M/503/3322]

1.2 Describe how domestic legislation would operate for a named pest or disease which is subject to a plant health order.

Named pest - *Chalara* dieback of ash *(Chalara fraxinea)*. This disease causes leaf loss and crown dieback to trees and is usually fatal to ash trees, especially young trees.

The body responsible for policy (National Plant Protection Organisation) is Defra combined with the Forestry Commission.

The legislation has led to a ban on any imports of this species of tree and the movement and planting of trees within the UK if they are infected.

It is still possible to import kiln dried logs, woodchip and firewood from other EU countries as well as material produced in a way that reduces the risk of transmission. Ash timber is also allowable within Great Britain. Sawn ash timber from abroad is also allowed under tight controls such as an accompanied plant health certificate and that the wood is bark free.

FERA have instructed their Plant Health & Seeds Inspectorate to carry out regular inspections on sites that have been given plant passports to produce this type of tree. The Forestry Commission have been given the power, under this order, to grant licenses for trials or scientific purposes in relation to this disease.

A new agency was created in 2014 in response to the threat of introductions from abroad.

Principles of woodland establishment and management [F/503/3325]

3.2 Describe the application of six grants/sources of funding aimed at different aspects of woodland management

Woodland Planning Grant – This grant provides funding to help with the production of a management plan for a woodland area to ensure that it meets the requirements of the 2011 UK Forestry Standard. To get this funding, an applicant is required to be registered with the Rural Payments Agency and also have approval from the Forestry Commission. The woodland must be a minimum of 3 hectares.

Woodland Regeneration Grant – This grant can help to re-establish trees after a period of felling, including supplements for trees felled due to *Phytophthora ramorum* infection. The grant should be used with the aim of increasing the capacity of sustainable management and also benefits to the public. To be eligible for this funding, all felling work must have been completed in line with UK guidelines, the area of broadleaved woodland must not have been reduced by felling and it will also require Forestry Commission approval.

Woodfuel Woodland Improvement Grant – The aim of this grant is to support the sustainable production of woodfuel and other timber products. The grant offers up to 60% towards the cost of the work and will not take account of the income generated from the project. A woodland management plan is needed in order to be eligible for this grant and that the proposals meet the UK forestry standard. The work associated with the grant must be completed within one year.

5.1 Identify the significant information to be collected as part of a site assessment and justify how each item of information contributes to forming a plan of operations

Site history – Understanding how the woodland was formed and how the landscape has evolved can help to inform the management of the forest and preserving features. Understanding the history, current uses and sensitivity of the woodland means that suitable machinery for the area will be used to ensure that no unnecessary damage is caused and the area can be mapped carefully to act as a reference for the plan.

Existing ground vegetation – Gathering this information gives planners an understanding of the species that grow successfully, the type of soil present and moisture content leading to decisions of specie choice or required remedial measures e.g. soil improvements, also invasive or weed species e.g. Japanese knotweed that require control and conversely protected species that require protection e.g. orchids.

Tree biomechanics and maintenance [M/503/3319]

1.3 Describe the ways that a tree or parts of can fracture using five different examples

Root delamination – This is where the wind load on the crown produces forces at one of its weakest points, the root plate. This can cause a shear crack in the base of the tree. The wood cracks along the grain on the tension side of a tree, near where the grain turns from the axis of the main stem to the axis of a root.

Shell buckling of an open cavity – This occurs in hollow trees when the wood fails on the compression side to create splits causing the tree to fail under bending stress.

A/503/3324 Tree development and protection

1.1 Explain how to determine the following aspects of development using best practice.

Tree Survey BS 5837- All trees (with a stem diameter of 75mm or more at 1.5m) should be initially identified and use some information to inform the retention species, life stage, physiological and structural condition, remaining contribution, allocation of a category and sub category of retention for individual or group of trees. A cascade chart to be applied by an arboriculturist.

Cat U in the current context of land use – not for retention
Cat A in the context of the development proposal high value
Cat B in the context of the development proposal mod value
Cat C in the context of the development proposal low value

Information should then be presented to a design team (includes the project arboriculturist) along with notes of the constraints to development posed by the trees. The design team should then consider all the factors highlighted by the arboriculturist. The result is a final design with trees marked either for retention or not to retain.

Possible constraints posed by trees on a site would be determined by considering the following:

- the ultimate height and spread
- shade cast
- species characteristics – leaf litter, fruit, canopy
- RPA's
- crown overhang outside RPA's
- amenity value.

Importance of protecting trees

There are times when the protection of trees has been contained within planning permission and this must be considered during the planning phase. To ensure their protection, the planning should look to ensure the long term protection of the trees by making sure that pathways are clearly marked away from trees in order to limit physical damage and any possible chemical run off is streamed away from the trees.

There are also many benefits that trees provide to an urban environment, such as:

- visual amenity long term
- softening the built environment
- indicators of seasonal change

- wildlife value in built up areas
- precipitation interception
- climate change adaptation through urban cooling etc.

Tree related damage to built structures [L/502/3327]

1.1 Describe the following:

- **a shrinkable clay soil**
- **a desiccated clay soil**
- **modified plasticity index**
- **plastic limit**
- **liquid limit.**

Shrinkable clay soil is soil containing 35% fine particles (<60µm) and having a Modified PI of 10% or more (NHBC Ch.4.2).

Modified plasticity index – This is the adjusted percentage after calculating the shrinkage potential of the amount of the sample that went through the 420µm sieve.

Woody Vegetation Formation and Physiology [D/503/3316]

2.4 Describe three clearly different reasons of how tree work is likely to reduce potential energy levels in a tree

Crown reduction – This is a process used to reduce the height or spread of the crown of the tree by cutting back the length of branches, therefore store (potential) energy reserves are lost

Pruning which reduces the number of photosynthetic leaves reduces the trees ability to capture sunlight energy used in the making of stored energy.

Pruning can, in some species e.g. lime, induce a high production of epicormic growth that utilises stored energy and therefore reduces stored energy levels.

4.3 Explain the significance of the Adenosine Triphosphate (ATP) and Adenosine with two phosphates (ADP)

ATP stands for Adenosine Triphosphate. This transfers energy from chemicals to short term energy storing molecules (batteries) created in the first stage of photosynthesis and used in the second. It is also used as an energy source in the first stage of respiration (glycolysis) when it becomes ADP.

ADP is created in the first stage of respiration (Kerb's cycle) – glycolysis as part of energy release as the glucose bond is broken between two of the phosphate molecules – dephosphorylation. Also created, with hydrogen from the split water molecules, is Nicotinamide adenine dinucleotide phosphate (NADP) which is a coenzyme used in anabolic reactions.

Principles of tree management [T/503/3323]

1.4 Outline the principal concepts of attributing a monetary value to a tree related to compensation for loss.

When trying to give a monetary value to a tree, a number of items should be considered in order to get the true value of the replacement cost. The size, species, condition and location should help to provide enough information to complete a method of assessment. There are a number of methods that look to give a reasonable level of compensation to both parties such as the replacement-cost method, which is suitable for use when you are looking to replace with the same type of tree. The trunk formula method can be used when the tree is too large to be replaced by a nursery tree and the cost of repair/cure methods can be used when damage is caused to the tree.

6.1 Contrast the two alternative approaches to managing trees, pro-active and re-active and form a conclusion.

Trees play an important role in society both in woodlands and also in towns and cities. In order to maintain this role, it is vital that they are managed in a way that continues to bring benefits to society. There are 2 ways of managing trees, pro-actively and re-actively.

Pro-active management of trees allows the planning of budgets to ensure that there is sufficient funding available for the work that needs to be carried out. Early planning, as opposed to reactive planning, also allows reduces the cost of the work as it will have been allocated resource and budget rather than allocating emergency resource and budget to the job as and when it arises.

Left to their own devices, trees can become damaged resulting in injuries and their death through pests, diseases and disorders, construction damage, weather and vehicles. Early management of trees, especially with regard to pest, disease and disorder can help to eradicate any outbreaks before they become too contaminated. Regular inspections can help this whereas treating the trees only when they become contaminated can be expensive and result in further work as the tree may be beyond help.

Once trees have become damaged, it is possible that they are more likely to cause damage to other types of property and people. This can result in expensive compensation costs.

In conclusion, using a pro-active rather than re-active management strategy, it is easier to maintain overall control of costs and budget as well as being able to make long-term management plans for the trees.

This assessment criteria could be presented in different formats and one example would be to use subheadings and contrast the different approaches to tree management resulting in a final conclusion section. Example headings are:

Cost effectiveness
Resource effectiveness
Public confidence
Staff motivation
Sustainability
Long term tree health.

Selection, planting and design with hardy nursery stock for amenity and landscape purposes [L503/3330]

1. Understand nomenclature and how to use a botanical key and other sources to identify trees and shrubs

1.1 Define the purpose of the International Code of Nomenclature for algae, fungi, and plants

The purpose of Botanical nomenclature is the scientific naming of plants, both wild and cultivated, and this is governed by The International Code of Nomenclature for algae, fungi, and plants.

Botanical nomenclature is independent of zoological and bacteriological nomenclature. The Code applies equally to names of taxonomic groups treated as plants whether or not these groups were originally so treated.

Its purpose is that it helps to ensure:

- Global uniformity in the classifying (classification), grouping (taxonomy) and naming (nomenclature) of plants
- The use of a single, simple and precise system in all countries – periodically updated
- Parity and consistency of all terms used and names given
- One internationally recognised reference system for all those involved with plants
- Showing how plants are linked.

3. Know what woody plant stock size and type is available

3.2 Specify an appropriate stock size, type and appropriate protection of plant for each of the following sites, justifying the selection:

- city street
- amenity woodland
- motorway embankment
- public open space
- prestigious development
- shrubs for mass planting adjacent to a highway.

Amenity Woodland based on a 2ha site

Stock Size – 60-80 cms. Justification – medium range of size, can be protected by a shelter if required, heads above a potential weed level, can be seen if mechanical weeding takes place and relatively low cost compared to larger stock at 120cms.

Type of Plant – Bare root transplants (Whips 1+1) Justification - will be used as this will provide a wide range of species choice, that are easy to plant by notch planting, are cost effective compared to containerised plants.

Protection Method for the plant

Rabbit proof fencing for the site. Justification – for the large site it is potentially cheaper than individual tree protection, deters unwanted visitors.

Weed control by translocated weedkiller e.g. Glyphosate minimum 3 weeks prior to planting to kill off the grass followed by spot treatments 1m radius circle with a guarded spray nozzle.