Unit 20: Undertake Tree Surveys and Inspections and Analyse the Data

Unit code: T/601/0408

QCF Level 3:   BTEC National

Credit value: 10

Guided learning hours: 60

● Aim and purpose

This unit aims to provide learners with an understanding of tree surveys and inspections and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

● Unit introduction

The importance of tree surveys and inspections continues to grow as society becomes more litigious. A landowner's duty of care to ensure that their trees do not present a hazard remains a high priority. British Standards relating to tree inspection are always in development and developers are often required to have tree surveys undertaken before submitting planning applications, in accordance with BS 5837 Trees in Relation to Construction. This continued increase in survey and inspection requirements ensures that the skills learners gain while undertaking this unit will be of significant value in their future careers.

This unit focuses on developing and integrating learners' knowledge and experience gained from other units. This applies to a number of situations, including street trees, trees on development sites, in domestic gardens, parklands and country estates, as well as trees in rural areas that have both common and unique problems.

Learners will need to become familiar with the legal framework surrounding tree surveys and inspections, and in particular will need to gain an understanding of liability and negligence. Learners will develop a professional standard of judgement and an ability to write reports in appropriate formats. In addition, an awareness and appreciation of currently available equipment and software used in surveys and inspections is essential.

● Learning outcomes

On completion of this unit a learner should:

1   Be able to survey trees

2   Be able to inspect individual trees

3   Understand results of tree surveys and inspections.

Unit content

1 Be able to survey trees

Purpose of surveys: management, stock take, location, work planning, potential development, street tree monitoring, woodland management, pest and disease monitoring

Collect data: survey equipment; location; species, age, diameter at breast height (DBH), height, height to crown, crown spread; surroundings (proximity to buildings, sightlines, streetlights); tree condition, nuisance, recommended work; BS 5837 categories; health and safety; personal protective equipment

Data interpretation: maps, tables, charts

Data collection methods: paper systems; geographic information technologies (GIT), global positioning system (GPS), geographic information systems (GIS), remote sensing; chain and offset; triangulation

2 Be able to inspect individual trees

Purpose of inspections: safety, hazard analysis; mortgage requirements, property damage, management, maintenance; health, development proposals, tree preservation orders (TPO); civil claims, criminal activity

Collect data: ownership, history; TPO; location, conservation area; species, age, diameter at breast height (DBH), height, height to crown, crown spread; surroundings (proximity to buildings, sightlines, streetlights); tree condition (physical and physiological), nuisance, recommended work; health and safety; personal protective equipment

Decay detection methods: non-invasive; visual tree assessment (VTA), tapping, tree radar unit (TRU), thermal imagery, semi-invasive; Arbosonic, PICUS sonic tomography, micro hammer, invasive; drilling, increment borer, Fractometer, Sibert drill, Resistograph

Data recording: pro forma; mobile technology; hazard rating systems

Legislation and health and safety: current relevant legislation eg Wildlife and Countryside Act 1981, Town and Country Planning Act 1990, Town and Country Planning (Trees) Regulations 1999; variations in legislation between countries in the UK, common law, statute law, nuisance, negligence, occupiers' liability; professional indemnity insurance, insurance implications; TPOs

3 Understand results of tree surveys and inspections

Data analysis: maps, tables, charts

Inspection recommendations: age structure; species; condition; locations; work required; work priorities; annual work programmes; hazard analysis; useful life expectancy; civil liability; amenity value eg Helliwell System

Inspection reports: report structure eg title, summary, brief, background, findings, conclusions, recommendations; differences between report types and styles; client requirements

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 explain why tree surveys are carried out	**M1** present graphical information from a survey, highlighting the key points	**D1** evaluate a range of non-invasive, semi- invasive and invasive inspection techniques
P2 carry out tree surveys to collect data to meet specific objectives		
P3 compare a range of methods for collecting and recording data [IE]		
P4 explain why individual tree inspections are carried out	**M2** using a tree inspection proforma, rate the hazard of individual trees using a recognised hazard rating system	
P5 inspect individual trees to collect appropriate data		
P6 collect data using appropriate techniques		
P7 accurately record data using an appropriate method		
P8 carry out inspections in compliance with current legislation and health and safety considerations	**M3** discuss the potential legal consequences for a tree owner who does not have their trees surveyed and inspected	**D2** explain the potential legal consequences for an individual who carries out tree inspection and surveying
P9 analyse and interpret data from tree surveys and inspections [IE]		
P10 prepare recommendations appropriate to inspection objectives	**M4** prioritise and justify recommendations appropriate to inspection objectives.	**D3** comprehensively report on an individual tree.
P11 report on inspected trees and present information.		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Tutors delivering this unit have opportunities to use a wide range of techniques. Lectures, discussions, seminar presentations, site visits, supervised fieldwork, internet and/or library-based research and personal and/or industrial experience would all be suitable.

It would be beneficial for learners on work placements and their supervisors to be aware of the requirements of this unit before any work-related activities, so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to inspect unhealthy or structurally unsound trees and they should ask for observation records and/or witness statements to be provided as evidence of this.

Visiting expert speakers could add to the relevance of the subject for learners. For example, an arboricultural officer, consultant, surveyor, solicitor or an insurance inspector could talk about tree survey and inspection from their perspective, the situations they face and the methods they use.

Whichever delivery methods are used, it is essential that tutors stress the importance of safe working practices and sound environmental management and the need to manage the resource using legal methods.

Health and safety issues relating to inspecting unhealthy or structurally unsound trees must be stressed and reinforced regularly, and risk assessments must be undertaken before any practical activities or fieldwork. Adequate personal protective equipment (PPE) must be provided wherever appropriate and used following the production and implementation of suitable risk assessments.

Access to a range of decay detection instrumentation, as well as geographic information technologies, is essential to develop learner understanding of how the industry has progressed and current tree hazard assessment tools. Learners should also have access to a range of trees and groups of trees in order to develop their surveying and inspection skills.

This unit could be delivered towards the end of the course as it is a natural successor to other units. Learners would benefit from being able to practise skills developed in previous units and finding how these skills fit together.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives **an indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit.
Assignment 1: Tree Survey (P1, P2, P3, M1)
Tutor introduces assignment.
Theory session: introduce surveys, data collected, equipment required, BS 5837 surveys, methods of data collection.
Practical: learners undertake surveys using both manual recording and GIT.

Topic and suggested assignments/activities and/assessment
Personal study.
Data interpretation and presentation: drawing up maps/plans, computer manipulation of data and graphical representation, management planning, report writing.
Personal study.
Individual support.
Section review.
Assignment 2: Tree Inspection Evaluation (P4, M2, M3, D1, D2)
Tutor introduces assignment.
Theory session: introduce inspections, inspection techniques, data collected, equipment required, VTA, methods of data collection.
Tree condition: physical and physiological.
Practical: in field examples of tree disorders.
Tutor introduces hazard rating systems.
Practical session: VTA, pro forma use, apply hazard rating systems.
Decay detection instrumentation: introduce the range and types available.
Decay detection instrumentation: use of a variety of non-invasive, semi-invasive and invasive decay detection instruments.
Theory session: introduce legislation relating to tree inspection, TPO, conservation areas, insurance requirements.
Tutor introduces report writing styles, structure and content.
Assignment 3: Tree Inspection Report (P5, P6, P7, P8, P9, P10, P11, M4, D3)
Tutor introduces assignment.
Tree management.
Work programming.
Personal study
Individual support.
Unit review.

Assessment

P1 requires learners to explain why tree surveys are carried out. Learners should describe a range of different survey objectives and the information that can be recorded.

For P2, learners must survey trees to meet given objectives. Tutors should identify the objectives or agree them through discussion with learners. Where possible, to ensure assessment is fair, the size and complexity of the tasks should be the same for all learners. Due to the seasonal nature and timing of events, for example when signs and symptoms of pathogens may be found most easily, tutors should consider the timing of assessment carefully. Learners are expected to be given a realistic purpose which is vocationally relevant to their industry (for example BS 5837). Any reasonably sized tree population (30 or more individuals) can be used for the survey exercise.

Evidence could be in the form of an assignment or class exercise. P1 could also be assessed directly by the tutor during practical activities and it would be feasible for learners to give verbal answers to tutors. If this format is used, suitable evidence from guided activities would be observation records completed by learners and the tutor. If assessed during a placement, witness statements should be provided by a suitable

representative and verified by the tutor. Evidence could also take the form of recorded verbal answers, video evidence, record sheets, a field notebook (the data possibly recorded and stored as a spreadsheet using appropriate software), or a project.

For P3 learners must compare a range of methods for collecting and recording data. Tutors should identify the different methods through discussion with learners. This could be linked to P2 to allow reasoned comparisons to be made.

P4 requires learners to explain why tree inspections are carried out. Learners should describe a range of different inspection objectives and the information that can be recorded. This can be linked to work being undertaken for P1.

For P5 and P6, learners must inspect trees to collect data relating to species, dimensions, physical and physiological condition and use a range of decay detection equipment. Tutors should identify, or agree through discussion with learners, the objectives and the equipment to be used. Where possible, to ensure assessment is fair, the size and complexity of the tasks should be the same for all learners. Due to the seasonal nature and timing of events, for example when signs and symptoms of pathogens may be found most easily, tutors should consider the timing of assessment carefully. Learners are expected to be given a realistic purpose which is vocationally relevant to their industry (for example hazard assessment). Tree inspection can be done on individual trees or on small groups within the tree population surveyed in P2.

Evidence could be in the form of an assignment or class exercise, or be part of the evidence produced for P11. P4 could also be assessed directly by the tutor during practical activities and it would be feasible for learners to give verbal answers to tutors. If this format is used then suitable evidence from guided activities would be observation records completed by learners and the tutor. If assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor. Evidence could also take the form of recorded verbal answers, video evidence, record sheets, a field notebook (the data possibly recorded and stored as a spreadsheet using appropriate software), or a project.

P7 and P8 require learners to use an appropriate method of data recording and undertake inspections in compliance with current legislation and health and safety rules. It is likely that this will be linked directly to P5 and P6 and evidence could take the same form as that for P5 and P6.

P9 requires learners to analyse and interpret tree survey and inspection data. Tutors should identify the data or agree it through discussion with learners. This is likely to be based on the data and information collected for P2, P5 and P6. Where possible, to ensure assessment is fair, the size and complexity of the tasks should be the same for all learners.

P10 requires learners to prepare recommendations appropriate to given inspection objectives. Where possible, to ensure assessment is fair, the size and complexity of the tasks should be the same for all learners. Learner evidence should be broad ranging and may link directly to work being undertaken for P5, P6, P7, P8 and P9.

For P11, learners must report on inspected trees. A summative report of inspected trees should be produced and it is likely that this will include work undertaken for P4, P5, P6, P7, P8, P9 and P10. Evidence should be in the form of a written report.

For M1, learners are required to graphically represent key information from a tree survey and highlight the main points. Evidence may link directly to P3 and use information produced for P2.

M2 requires learners to use a recognised hazard rating system to rate the hazard of the trees inspected. Evidence for this could form part of that supplied for P11 and is likely to be conducted on the trees used for P5.

For M3, learners must discuss the potential legal consequences for a tree owner who does not have their trees surveyed and inspected. Evidence may link directly to work being undertaken for P8 and is likely to take the form of a written report.

M4 requires learners to prioritise and justify the recommendations they have made appropriate to inspection objectives. This links to work being undertaken for P10 and may be in the same format.

For D1, learners are required to evaluate a range of non-invasive, semi-invasive and invasive inspection techniques. Evidence for this is likely to take the form of a written report.

D2 requires learners to explain the potential legal consequences for an individual who carries out tree inspection and surveying. It would be acceptable for learners to cite real cases as evidence if appropriate. Evidence may link directly to work being undertaken for M3 and be in the same format.

D3 requires learners to produce a comprehensive inspection report on an individual tree following a recognised style and structure. This links directly to P11 and builds on what should be produced. Evidence should be in the same format as for P11.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1	Tree Survey	Explain why tree surveys are undertaken. For a given area of trees locate and survey all trees against a specific objective. Collate the data obtained into a report format and produce graphs highlighting the key points. With reference to the graphs make recommendations appropriate to the survey objective. Explain your method of data collection and why you chose this method over other options.	Report and map.
P4, M2, M3, D1, D2	Tree Inspection Evaluation	Explain why tree inspections are carried out. Design your own tree inspection pro forma. Evaluate given decay detection equipment. Explain the legal requirements relating to tree inspection for tree owners and those carrying out tree inspections.	Discussion report.
P5, P6, P7, P8, P9, P10, P11, M4, D3	Tree Inspection Report	Produce a professional standard tree inspection report for an individual tree, prioritising and justifying recommendations. Include in the report a hazard rating for the tree using a recognised system.	Tree report.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Land-based sector suite. This unit has particular links with:

Level 2	Level 3
Undertaking Ecological Surveys and Techniques	TW32 Survey and inspect trees
Understanding Ecology of Trees, Woods and Forests	Understanding Woodland Management

Essential resources

Learners will require access to a variety of individual and groups of trees, including both sound and unsound trees, as well as to different species in a range of surroundings. Access to different decay detection equipment, including invasive, semi-invasive and non-invasive, would be advantageous. Access to general survey and inspection equipment, for example DBH tapes, linear tapes and clinometers, is essential.

Access to the internet and a library with multiple copies of specialist texts is also essential and access to tree management software, GIT and mapping software would be beneficial.

Employer engagement and vocational contexts

This unit focuses on developing skills that will be of value in the working environment. Centres are encouraged to create and develop links with tree professionals in the local area through guest lectures or site visits. Considering the high cost of some items of electronic equipment, links with industry may broaden learner access to different resources used professionally. Linking to industry will ensure that learners appreciate the importance of the skills developed in this unit and their value within the industry.

Indicative reading for learners

Textbooks

Biddle P – *Tree Root Damage to Buildings: Causes, Diagnosis and Remedy Vol 1* (Willowmead Publishing Ltd, 1998) ISBN 9780953308613

British Standard Institution – *BS 5837: 2005 Trees in Relation to Construction Guidelines: Recommendations* (British Standards Institution, 2005) ISBN 9780580464188

British Standard Institution – *Recommendations for Tree Work* (British Standards Institution, 1989) ISBN 0580171701

Council of Tree and Landscape Appraisers – *Guide for Plant Appraisal* (International Society of Arboriculture, 2000) ISBN 9781881956259

Fay N, Dowson D and Helliwell R – *Tree Surveys: A Guide to Good Practice* (Arboriculture Association, 2005) ISBN 9780900978388

Forestry Commission – *Hazards from Trees* (Stationery Office Books, 2000) ISBN 9780855385149

Harper P, Bond C, Solon M and Davies G – *The Expert Witness: A Practical Guide, 3rd Edition* (Shaw and Sons, 2007) ISBN 9780721914428

Helliwell D – *Visual Amenity Valuation of Trees and Woodlands: The Helliwell System* (Arboricultural Association, 2003) ISBN 9780900978340

Lonsdale D – *The Principles of Tree Hazard Assessment and Management* (The Stationery Office Books, 1999) ISBN 9780117533554

Matheny N and Clark J – *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas* (International Society of Arboriculture, 1993) ISBN 9781881956044

Mattheck C and Breloer H – *The Body Language of Trees: A Handbook for Failure Analysis* (The Stationery Office Books, 1995) ISBN 9780117530676

Mynors C – *The Law of Trees, Forests and Hedgerows, 2nd Edition* (Sweet and Maxwell, 2010) ISBN 9781847039149

Strouts R G and Winter T G – *Diagnosis of Ill-health in Trees, 2nd Edition* (Stationery Office Books, 2000) ISBN 9780117535459

Weber K and Mattheck C – *Manual of Wood Decays in Trees* (Arboricultural Association, 2003)
ISBN 9780900978357

Journals

Arboricultural Journal

Forestry Journal

Quarterly Journal of Forestry

Other publications

Arboricultural Association newsletter

Websites

www.communities.gov.uk	Communities and Local Government
www.fera.defra.gov.uk	Food and Environment Research Agency
www.forestry.gov.uk	Forestry Commission
www.hsegov.uk	Health and Safety Executive
www.isa-arboriculture.org	International Society of Arboriculture
www.treehelp.info	United Kingdom and Ireland Chapter The Tree Advice Trust
www.trees.org.uk	Arboricultural Association

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are …
Independent enquirers	comparing a range of methods for collecting and recording data
	analysing data from tree surveys and inspections.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Independent enquirers	evaluating a range of non-invasive, semi-invasive and invasive inspection techniques
	evaluating given tree inspection pro forma
	justifying recommendation priorities relating to tree inspections
Creative thinkers	producing their own tree inspection pro forma.

● Functional Skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	producing a report on surveyed and inspected trees
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	evaluating use of spreadsheets for managing inspection data
Manage information storage to enable efficient retrieval	storing inspection data
Follow and understand the need for safety and security practices	storing inspection data
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	producing a report on surveyed and inspected trees
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	producing their own tree inspection pro forma
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: ● text and tables ● images ● numbers ● records	producing a report on surveyed and inspected trees
Bring together information to suit content and purpose	producing a report on surveyed and inspected trees
Present information in ways that are fit for purpose and audience	producing a report on surveyed and inspected trees
Evaluate the selection and use of ICT tools and facilities used to present information	producing their own tree inspection pro forma
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	storing and communicating inspection data

Skill	When learners are …
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	analysing data from tree surveys and inspections
Identify the situation or problem and the mathematical methods needed to tackle it	analysing data from tree surveys and inspections
Select and apply a range of skills to find solutions	analysing data from tree surveys and inspections
Use appropriate checking procedures and evaluate their effectiveness at each stage	analysing data from tree surveys and inspections
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	analysing data from tree surveys and inspections
Draw conclusions and provide mathematical justifications	analysing data from tree surveys and inspections
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	explaining legal considerations to be taken into account when undertaking tree surveys and inspections
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	producing a report on surveyed and inspected trees.