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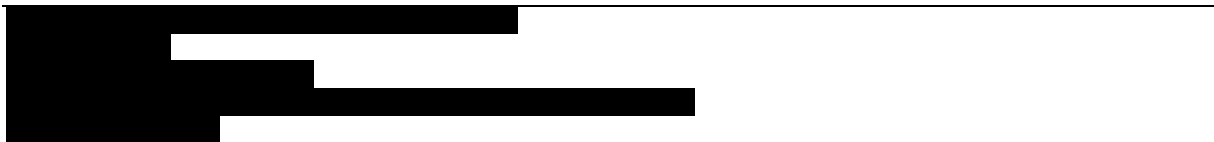
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37 Grange Park Road : TREE SAFETY SURVEY DATA SHEET

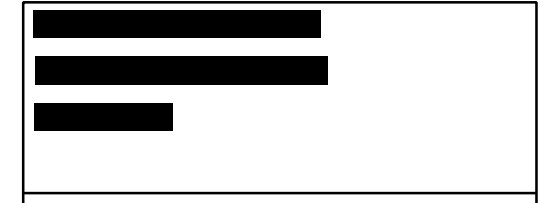
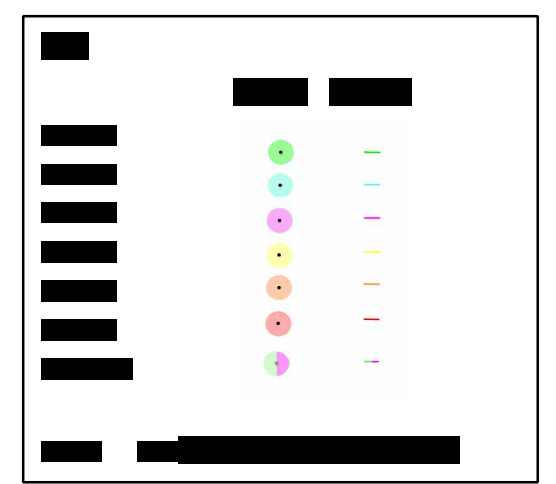
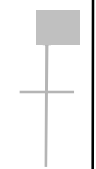
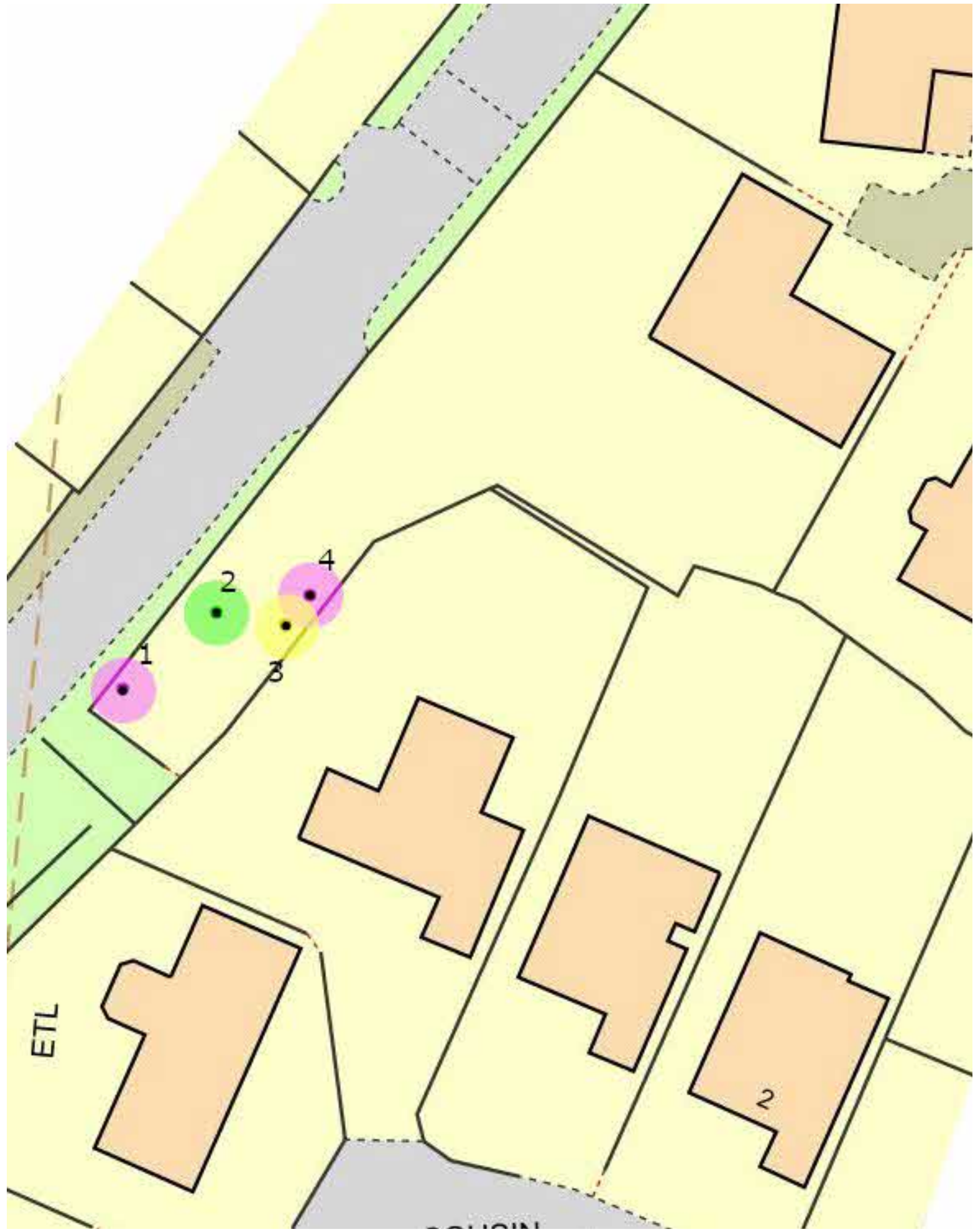
Tree No.	Species	Age Class	Ht (m)	Stem dia. (mm)	Phys. Cond. G-F-P-D	Observations	FS	TS	IS	Hazard Rating	Threat Category	Recommendations	Urgency code
1	Goat willow	M	9	410, 380, 340	F	Multiple stems from ground level with included unions where stems meet. W most stem lying on ground after historic partial failure, no sign of recent stem/rootplate movement. No observed dieback or disease	2	20	4	160	3	Raise crown above road by removing subsiding stem at road side boundary.	A
2	Sycamore	M	14	570	F	Upright stem leads to slightly skewed crown due to adjacent competition. No observed dieback or disease and no sign of obvious decay	0	15	6	0	1	No action required at time of survey	3/5Y
3	Sycamore	M	16.5	580	F	Skewed crown with heavy bias to E above neighbouring garden of Cousin fields. Leaning stem towards E also with signs of bark compression on lower stem. Void beside base of stem, but no sign of lower stem decay or fungal fruiting bodies. Two decaying pruning wounds on lower stem to 4m, possibility of coalescing internal stem decay between wounds, but no sign of associated fungal fruiting bodies. Ivy on lower stem	2	40	6	480	4	Reduce spread and height of crown to 3.5m and 12m respectively to reduce weight above adjacent property.	13W
4	Sycamore	M	14	470	F	Ivy covered lower stem and crown. Crown suppressed by ivy load. No sign of basal or stem decay. No observed dieback or disease	2	40	4	320	3	Sever ivy at base of tree	A



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Logo for Forest & Tree Consulting, featuring three stylized trees and the text 'FOREST & TREE CONSULTING'.



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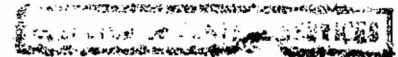
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TOWN AND COUNTRY PLANNING ACT 1990

THE BOLTON (GRANGE ROAD No.3, BROMLEY CROSS)
TREE PRESERVATION ORDER 2000



The Borough Council of Bolton, in exercise of the powers conferred on them by Sections 198 and 203 of the Town and Country Planning Act 1990, hereby make the following Order:-

1. This Order may be cited as The Bolton (Grange Road No.3, Bromley Cross) Tree Preservation Order 2000.
2. In this Order "the authority" means the Bolton Metropolitan Borough Council and unless the context otherwise requires, any reference in this Order to a numbered section is a reference to the section so numbered in the Town and Country Planning Act 1990.
3. Without prejudice to Subsections (6) and (7) of Section 198 (power to make tree preservation orders) [or subsection (3) of Section 200 (orders affecting land where Forestry Commissioners interested)] and subject to Article 5, no person shall:-
 - (a) cut down, top, lop, uproot, wilfully damage or wilfully destroy; or
 - (b) cause or permit the cutting down, topping, lopping, uprooting, wilful damage or wilful destruction ofany tree specified in Schedule 1 to this Order or comprised in a group of trees or in a woodland so specified, except with the consent of the authority and where such consent is given subject to conditions, in accordance with those conditions.
4. (1) Nothing in Article 4 shall prevent:-
 - (a) the cutting down, topping or uprooting of a tree by or at the request of a statutory undertaker, where the land on which the tree is situated is operational land of the statutory undertaker and the work is necessary:-
 - (i) in the interests of the safe operation of the undertaking;

- (ii) in connection with the inspection, repair or renewal of any sewers, mains pipes, cables or other apparatus of the statutory undertaker; or
 - (iii) to enable the statutory undertaker to carry out development permitted by or under the Town and Country Planning (General Permitted Development) Order 1995;
- (b) the cutting down, topping, lopping or uprooting of a tree cultivated for the production of fruit in the course of a business or trade where such work is in the interests of that business or trade;
 - (c) the pruning, in accordance with good horticultural practice, of any tree cultivated for the production of fruit;
 - (d) the cutting down, topping, lopping or uprooting of a tree where that work is required to enable a person to implement a planning permission (other than an outline planning permission or, without prejudice to paragraph (a) (iii), a permission granted by or under the Town and Country Planning (General Permitted Development) Order 1995) granted on an application under Part III of the Act, or deemed to have been granted (whether for the purposes of that Part or otherwise);
 - (e) the cutting down, topping, lopping or uprooting of a tree by or at the request of the Environment Agency to enable the Agency to carry out development permitted by or under the Town and Country Planning (General Permitted Development) Order 1995;
 - (f) the cutting down, topping, lopping or uprooting of a tree by or at the request of a drainage body where that tree interferes, or is likely to interfere, with the exercise of any functions of that body in relation to the maintenance, improvement or construction of watercourses or of drainage works and for this purpose "drainage body" and "drainage" have the same meanings as in the Land Drainage Act 1991; or
 - (g) without prejudice to Section 198 (6)(b), the felling or lopping of a tree or the cutting back of its roots by or at the request of, or in accordance with a notice served by, licence holder under paragraph 9 of Schedule 4 to the Electricity Act 1989.

(2) In paragraph (1) "statutory undertaker" means any of the following:-

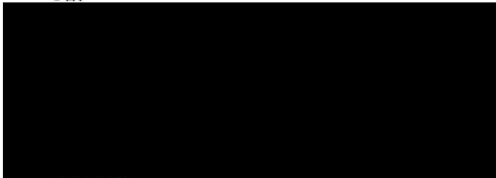
- (a) a person authorised by any enactment to carry on any railway, light railway, tramway, road transport, water transport, canal, inland navigation, dock, harbour, pier or lighthouse undertaking, or any undertaking for the supply of hydraulic power;
 - (b) a relevant airport operator (within the meaning of Part V of the Airports Act 1986);
 - (c) the holder of a licence under Section 6 of the Electricity Act 1989;
 - (d) a public gas transporter;
 - (e) the holder of a licence under Section 7 of the Telecommunications Act 1984 to whom the telecommunications code (within the meaning of that Act) is applied;
 - (f) a water or sewerage undertaker;
 - (g) the Civil Aviation Authority or a body acting on behalf of that Authority;
 - (h) the Post Office;
5. An application for consent to the cutting down, topping, lopping or uprooting of any tree in respect of which this Order is for the time being in force shall be made in writing to the authority and shall:-
- (a) identify the tree or trees to which it relates (if necessary, by reference to a plan);
 - (b) specify the work for which consent is sought; and
 - (c) contain a statement of the applicant's reasons for making the application.
6. (1) The provisions of the Town and Country Planning Act 1990 relating to registers, applications, permissions and appeals mentioned in column (1) of Part I of Schedule 2 to this Order shall have effect, in relation to consents under this Order and applications for such consent, subject to adaptations and modifications mentioned in column (2).
- (2) The provisions referred to in paragraph (1), as so adapted and modified, are set out in Part II of that Schedule.

7. (1) Where consent is granted under this Order for the felling in the course of forestry operations of any part of a woodland area, the authority may give owner of the land on which that part is situated ("the relevant land") a direction in writing specifying the manner in which and the time within which he shall replant the relevant land.
- (2) Where a direction is given under paragraph (1) and trees on the relevant land are felled (pursuant to the consent), the owner of that land shall replant it in accordance with the direction.
- (3) A direction under paragraph (1) may include requirements as to:-
 - (a) species;
 - (b) number of trees per hectare;
 - (c) the preparation of the relevant land prior to the replanting; and
 - (d) the erection of fencing for the protection of the newly planted trees.
8. (1) If, on a claim under this Article, a person establishes that loss or damage has been caused or incurred in consequence of:-
 - (a) the refusal of any consent required under this Order; or
 - (b) the grant of any such consent subject to conditionshe shall, subject to paragraphs (3) and (4) be entitled to compensation from the authority.
- (2) No claim, other than a claim made under paragraph (3), may be made under this Article:-
 - (a) if more than 12 months have elapsed since the date of the authority's decision or, where such decision is the subject of an appeal to the Secretary of State, the date of the final determination of the appeal; or
 - (b) if the amount in respect of which the claim would otherwise have been made is less than £500.
- (3) Where the authority refuse consent under this Order for the felling in the course of forestry operations of any part of a woodland area, they shall not be required to pay compensation to any person other than the owner of the land; and such compensation shall be limited to an amount equal to any depreciation in the value of the trees which is attributable to deterioration in the quality of the timber in consequence of the refusal.

- (4) In any other case, no compensation shall be payable to a person:-
 - (a) for the loss of development value or other diminution in the value of the land;
 - (b) for the loss or damage which, having regard to the statement of reasons submitted in accordance with Article 6(c) and any other documents or other evidence submitted in support of any such statement, was not reasonably foreseeable when consent was refused or was granted subject to conditions;
 - (c) for loss or damage reasonably foreseeable by that person and attributable to his failure to take reasonable steps to avert the loss or damage or to mitigate its extent; or
 - (d) for costs incurred in appealing to the Secretary of State against the refusal of any consent required under this Order or the grant of any such consent subject to conditions
 - (5) Subsections (3) to (5) of Section 11 (terms of compensation on refusal of licence) of the Forestry Act 1967 shall apply to the assessment of compensation under paragraph (3) as it applies to the assessment of compensation where a felling licence is refused under Section 10 (application for felling licence and decision of Commissioners thereon) of that Act as if for any reference to a felling licence there were substituted a reference to a consent required under this Order and for the reference to the Commissioners there were substituted a reference to the authority.
 - (6) In this Article:-
 - (a) "development value" means an increase in value attributable to the prospect of development; and in relation to any land, the development of it shall include the clearing of it; and
 - (b) "owner" has the same meaning given to it by Section 34 of the Forestry Act 1967
9. This Order will on its confirmation delete from the Bolton (Bradshaw) Tree Preservation Order 1972, the Trees specified in schedule 1 to this Order.

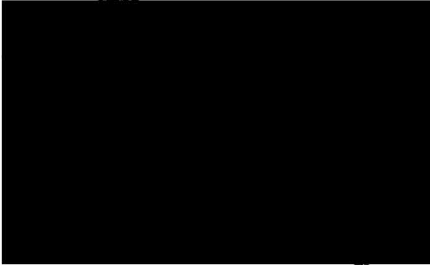
Dated this 17th May 2000

The Common Seal of the Borough Council
of Bolton was hereunto affixed in the presence
of:-

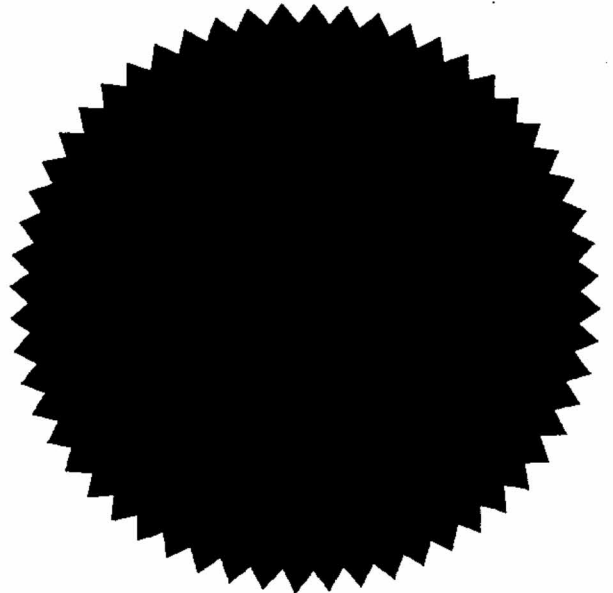


Mayor

By



Director of Central Services
Authorised Sealing Officer

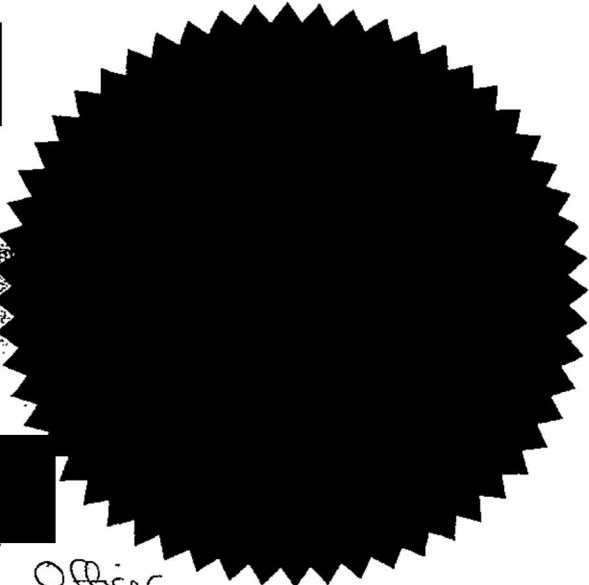


THE COMMON SEAL OF THE BOROUGH COUNCIL OF
BOLTON WAS HERETO AFFIXED ON THE CONFIRMATION OF
THE BOLTON (GRANGE ROAD NO. 3, BRAMLEY CROSS)
TREE PRESERVATION ORDER 2000 WITHOUT
MODIFICATION BY COUNCIL ON 9th AUGUST 2000.
IN ACCORDANCE WITH MINUTE No. 13 (x) OF THE
PLANNING & HIGHWAY COMMITTEE HELD ON 27th
JULY 2000 IN THE PRESENCE OF:-



Mayor

by



authorised Sealing Officer

SCHEDULE 1

SPECIFICATION OF TREES

Trees specified individually (encircled in black on the map)

Reference on map	Description	Situation
T1	Birch	Adjacent to the eastern edge of Grange Road approximately 35 metres east of "Birch Lea".
T2	Beech	In the north-east corner of the grounds of "Howfield"
T3	Sycamore	Adjacent to the western edge of the Grange Road approximately 24 metres east of the north corner of "Howfield"
T4	Oak	In the grounds of "Howfield" approximately 12 metres east of the north corner of of "Howfield"
T5	Lime	Adjacent to the western edge of the Grange Road approximately 24 metres east of the north corner of "Howfield"
T6	Beech	Adjacent to the western edge of the Grange Road approximately 18 metres north-east of "Moor Croft"
T7	Cyprus	In the south-west corner of the grounds of "Howfield" adjacent to Grange Road.

T8	Sycamore	In the grounds of "The Hundreds" adjacent to the west side of Grange Road.
T9	Sycamore	In the eastern corner of the grounds of "The Elms" adjacent to Grange Road.
T10	Oak	Approximately 12 metres from the northeast corner of 47 Grange Park.
T11	Oak	Approximately 5 metres east of tree T10 (17 metres from 47 Grange Park) at junction of boundary and path
T12	Oak	3m west of garage of 69 Long Meadow.
T13	Oak	3m west of 38 Grange Park Road in front garden.
T14	Oak	3m north of Gable end of 13 Long View.
T15	Sycamore	1.5 metres back from northeast corner of 13 Long Meadow
T16	Oak	West corner of 77 Grange Park Road
T17	Oak	1 metre in from southerly corner of 77 Grange Park Road boundary
T18	Ash	1 metre east of rear of 8 Long Meadow.

Trees specified by reference to an area (within a dotted black line on the map)

Reference on map	Description	Situation
None		

Groups of trees (within a broken line on the map)

Reference on the map	Description (including number of trees in the group)	Situation
G1	1 Ash, 2 Oak, 7 Sycamore	Adjacent to the west side of Grange Road approximately 6 metres east of Cousin Fold Farm.
G2	6 Sycamore	Strip of land east of Grange Road opposite 25 and 27 Grange Road
G3	6 Oak, 6 Sycamore, 4 Beech, 2 Elm, 2 Hawthorn	Strip of land east of Grange Road starting opposite northeast corner of 'Monksfield' and ending opposite northeast corner of 9 Grange Road
G4	2 Oak, 1 Elm	Enclosed strip of land east of Grange Road opposite 9 Grange Road
G5	11 Sycamore, 1 Oak	Strip of land east of Grange Road, starting opposite northern boundary of 7 Grange Road ending opposite southern boundary of 3 Grange Road
G6	7 Sycamore, 1 Oak, 1 Elm, 1 Beech	Strip of land east of Grange Road opposite 1 Grange Road
G7	1 Oak, 1 Sycamore	Adjoining east boundary of 10 Long Meadow

Woodlands (within a continuous black line on the map)

Reference on map	Description	Situation
None		

SCHEDULE 2
PART 2

The provisions of The Town and Country Planning Act 1990 applied
With adaptations or modifications

**Provisions of the Town and
Country Planning Act 1990**

Adaptation or Modification

Section 69 (registers)

- (a) In subsection (1)-
 - (i) omit-
“ , in such manner as may be prescribed by a development order,” ,
“such” in the second place where it appears, and
“as may be so prescribed”; and
 - (ii) substitute “matters relevant to tree preservation orders made by the authority” for “applications for planning permission”.
- (b) In subsection (2)-
 - (i) after “contain” insert”, as regards each such order”; and
 - (ii) for paragraphs (a) and (b) substitute -
“(a) details of every application under the order and of the authority’s decision (if any) in relation to each such application, and
(b) a statement as to the subject-matter of every appeal under the order and of the date and nature of the Secretary of State’s determination of it.”.
- (c) Omit subsections (3) and (4) (as required by section 198(4)).

Section 70 (determination of
Applications: general
Considerations)

- (a) In subsection (1)-
 - (i) substitute-
“Subject to subsections (1A) and (1B),
where” for “Where”;
“the authority” for “a local planning authority”;
“consent under a tree preservation order” for “planning permission” where those words first appear; and
“consent under the order” for “planning permission” in both of the other places where those words appear;
 - (ii) after “think fit”, insert-
“(including conditions limiting the duration of the consent or requiring the replacement of trees)”;
and
 - (iii) omit “subject to sections 91 and 92,”.
- (b) After subsection (1) insert-
“(1A) Where an application relates to an area of woodland, the authority shall grant consent so far as accords with the practice of good forestry, unless they are satisfied that

**Provision of the Town and
Country Planning Act 1990**

Section 70 (determination of
Applications: general
Considerations) (*continued*)

Section 75 (effect of
Planning permission)

Section 78 (right to appeal
against planning decisions
and failure to take such
decisions)

Adaptation or Modification

the granting of consent would fail to secure the maintenance of the special character of the woodland or the woodland character of the area.

(1B) Where the authority grant consent for the felling of trees in a woodland area they shall not impose conditions requiring replacement where such felling is carried out in the course of forestry operations (but may give directions for securing replanting.”.

(c) Omit subsections (2) and (3).

- (a) In subsection (1) substitute-
- (i) “Any” for the words from “Without” to “any”;
 - (ii) “consent under a tree preservation order” for “planning permission to develop land”;
 - (iii) “the consent” for “the permission”; and
 - (iv) “the land to which the order relates” for “the land”
- (b) Omit subsections (2) and (3).

- (a) In subsection (1) substitute-
- (i) “the authority” for a “local planning authority”;
 - (ii) “consent under a tree preservation order” for “planning permission” in the first place where those words appear;
 - (iii) “consent under such an order” for “planning permission” in the second place where those words appear;
 - (iv) for paragraph (c) substitute-
“(c) give a direction under a tree preservation order, or refuse an application for any consent, agreement or approval of that authority required by such a direction; or
(d) fail to determine any such application as is referred to in paragraphs (a) to (c) within the period of 8 weeks beginning with the date on which the application was received by the authority,”.
- (b) Omit subsection (2).

**Provision of the Town and
Country Planning Act 1990**

Section 78 (right to appeal
against planning decisions
and failure to take such
decisions) (*continued*)

Adaptation or Modification

- (c) In subsection (3) for “served within such time and in such manner as may be prescribed by a development order.” substitute-
“in writing addressed to the Secretary of State, specifying the grounds on which the appeal is made; and such notice shall be served-
(a) in respect of a matter mentioned in any paragraphs (a) to (c) of subsection (1), the period of 28 days from the receipt of notification of the authority’s decision or direction or within such longer period as the Secretary of State may allow;
(b) in respect of such a failure as is mentioned in paragraph (d) of that subsection, at any time after the expiration of the period mentioned in that paragraph, but if the authority have informed the applicant that the application has been refused, or granted subject to conditions, before an appeal has been made, an appeal may only be made against that refusal or grant.”.
- (d) For subsection (4) substitute-
“(4) The appellant shall serve on the authority a copy of the notice mentioned in subsection (3).”.
- (e) For subsection (5), substitute-
“(5) For the purposes of the application of section 79(1), in relation to an appeal made under subsection (1)(d), it shall be assumed that the authority decided to refuse the application in question.”.

Section 79 (determination of
Appeals)

- (a) In subsections (1) and (2), substitute “the authority” for “the local planning authority”.
- (b) Omit subsection (3).
- (c) In subsection (4), substitute-
(i) “section 70(1), (1A) and (1B)” for “sections 70, 72(1) and (5), 73 and 73A and Part I of Schedule 5”
(ii) “consent under a tree preservation order” for “planning permission”; and
(iii) “the authority”. For “the local planning authority and a development order may apply, with or without modifications, to such an appeal any requirements imposed by a development order by virtue of section 65 or 71.”.
- (d) Omit subsections (6) and (6A).
- (e) In subsection (7), omit the words after “section 78”

PART II

PROVISIONS OF THE TOWN AND COUNTRY ACT 1990 AS ADAPTED AND MODIFIED BY PART I

The following provisions of the Town and Country Planning Act 1990, as adapted and modified by Part I of this Schedule, apply in relation to consents, and applications for consent, under this Order.

Section 69

- (1) Every local planning authority shall keep a register containing information with respect to matters relevant to tree preservation orders made by the authority.
- (2) The register shall contain, as regards each such order-
 - (a) details of every application under the order and of the authority's decision (if any) in relation to each such application, and
 - (b) a statement as to the subject-matter of every appeal under the order and of the date and nature of the Secretary of States determination of it.

.....

- (5) Every register kept under this section shall be available for inspection by the public at all reasonable hours.

Section 70

- (1) Subject to subsections (1A) and (1B), where an application is made to the authority for consent under a tree preservation order-
 - (a) they may grant consent under the order, either unconditionally or subject to such conditions as they may think fit (including conditions limiting the duration of the consent or requiring the replacement of trees); or
 - (b) they may refuse consent under the order.
- (1A) Where an application relates to an area of woodland, the authority shall grant consent so far as accords with the practice of good forestry, unless they are satisfied that the granting of consent would fail to secure the maintenance of the special character of the woodland or the wood land character of the area.
- (1B) Where the authority grant consent for the felling of trees in a woodland area they shall not impose conditions requiring replacement where such felling is carried out in the course of forestry operations (but may give directions for securing replanting).

.....

Section 75

Any grant of consent under a tree preservation order shall (except in so far as the consent otherwise provides) ensure for the benefit of the land to which the order relates and of all persons for the time being interested in it.

.....

Section 78

(1) Where the authority-

- (a) refuse an application for consent under a tree preservation order or grant it subject to conditions;
- (b) refuse an application for any consent, agreement or approval of that authority required by a condition imposed on a grant of consent under such an order or grant it subject to conditions;
- (c) give a direction under a tree preservation order, or refuse an application for any consent, agreement or approval of that authority required by such a direction; or
- (d) fail to determine any such application as is referred to in paragraphs (a) to (c) within the period of 8 weeks beginning with the date on which the application was received by the authority,

the applicant may by notice appeal to the Secretary of State.

.....

- (3) Any appeal under this section shall be made by notice in writing addressed to the Secretary of State, specifying the grounds on which the appeal is made; and such notice served-
 - (a) in respect of a matter mentioned in any of paragraphs (a) to (c) of subsection (1), within the period of 28 days from the receipt of notification of the authority's decision or direction or within such longer period as the Secretary of State may allow;
 - (b) in respect of such failure as is mentioned in paragraph (d) of that subsection, at any time after the expiration of the period mentioned in that paragraph, but if the authority have informed the applicant that the application has been refused, or granted subject to conditions, before an appeal has been made, an appeal may only be made against that refusal or grant.
- (4) The appellant shall serve on the authority a copy notice mentioned in subsection (3).
- (5) For the purposes of the application of section 79(1), in relation to an appeal made under subsection (1)(d), it shall be assumed that the authority decided to refuse the application in question.

Section 79

- (1) On an appeal under section 78 the Secretary of State may-
 - (a) allow or dismiss the appeal, or
 - (b) reverse or vary any part of the decision of the authority (whether the appeal relates to that part of it or not),

and may deal with the application as if it had been made to him in the first instance.

- (2) Before determining an appeal under section 78 the Secretary of State shall, if either the appellant or the authority so wish, give each of them an opportunity of appearing before and being heard by a person appointed by the Secretary of State for the purpose.

.....

(4) Subject to subsection (2), the provisions of section 70(1), (1A) and (1B) shall apply, with any necessary modifications, in relation to an appeal to the Secretary of State under section 78 as they apply in relation to an application for consent under a tree preservation order which falls to be determined by the authority.

(5) The decision of the Secretary of State on such an appeal shall be final.

.....

(7) Schedule 6 applies to appeals under section 78

(x) That the Grange Road No. 3 Tree Preservation Order 2000 be confirmed.

**14. PLANNING APPEAL DECISIONS
(PH/13/2000)**

Resolved - That the report of the Director of Central Services informing the Committee of the decisions taken by, or on behalf of the Secretary of State for the Environment, Transport and the Regions in respect of appeals against the planning decisions of this Authority, be noted.

**15. BLACKBURN ROAD/DARWEN ROAD JUNCTION
IMPROVEMENT TRAFFIC REGULATION ORDER
(21576) - OBJECTION
(PH/7/2000)**

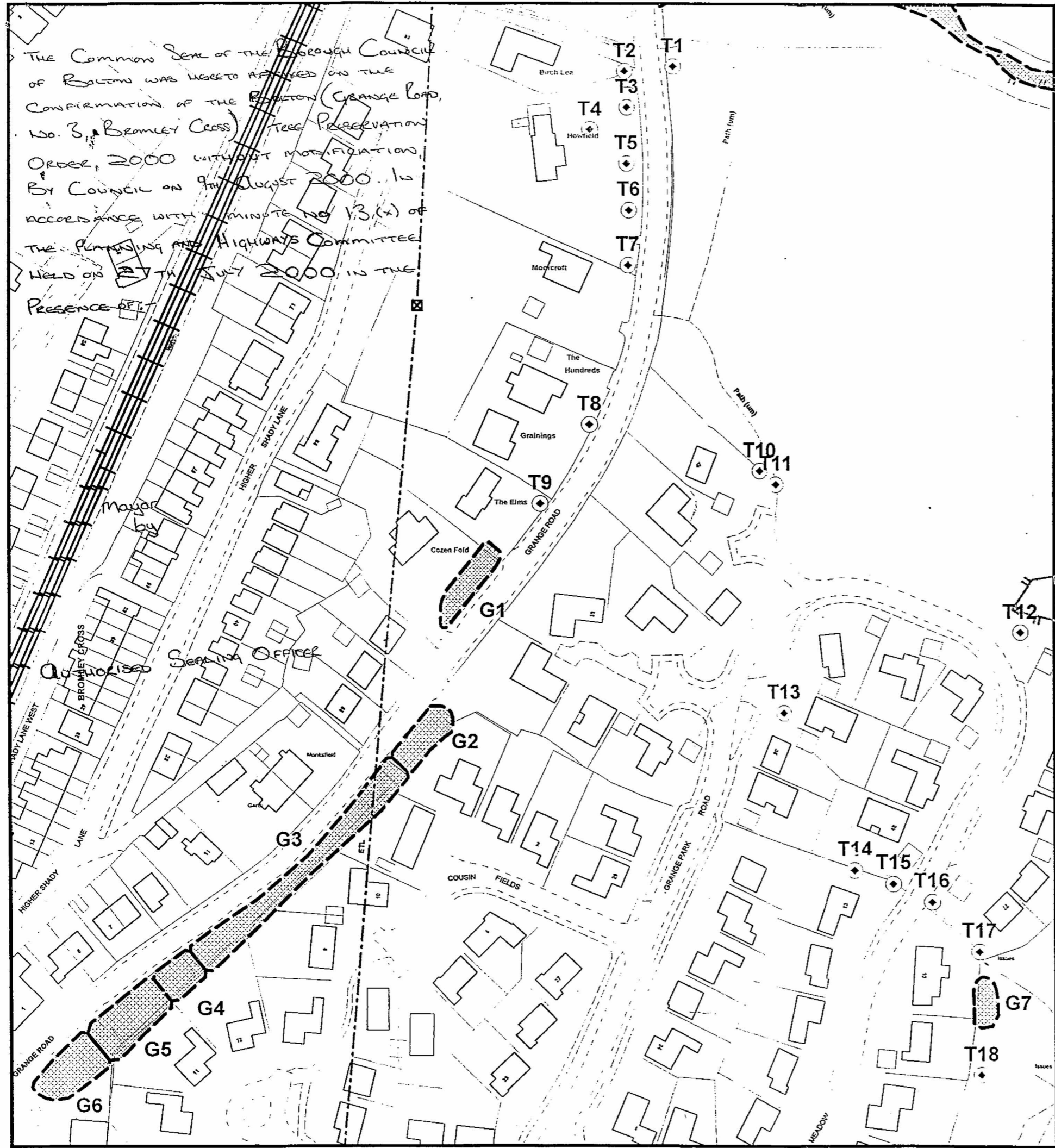
The Director of Environment submitted a report which reported and commented upon two objections received to an advertised Traffic Regulation Order at the junction of Blackburn Road and Darwen Road.

The reasons for objection were both numerous and diverse and copies of the letters were appended to the report.

Members were reminded that the Traffic Regulation Order was put forward to support the re-opening of the former slip road to the south of the War Memorial to provide a free flow vehicular access from Darwen Road to Blackburn Road, south bound. In assessing the objections, the implication of not introducing the Order was considered, including the effects on traffic movements and road safety.

Resolved - That, notwithstanding the objections received, the Director of Central Services be authorised to make the Order.

The Common Seal of the Borough Council of Bolton was hereto affixed on the confirmation of the Bolton (Grange Road, No. 3, Bromley Cross) Tree Preservation Order, 2000 without modification, by Council on 9th August 2000, in accordance with Minute No 13 (x) of the Planning and Highways Committee held on 27th July 2000, in the presence of:-



The Common Seal of the Borough Council of Bolton was hereto affixed to the making of the Bolton (Grange Road No. 3, Bromley Cross) Tree Preservation Order 2000 on 17th May 2000 in the presence of:-



Mayor by



Authorised Sealing Officer

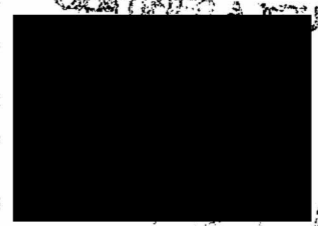


Bolton (Grange Road No. 3, Bromley Cross) Tree Preservation Order 2000

T1 Individual Tree

(G1) Groups of Trees

DC23. 470
drawn:PJG
January 2000



Environment Department:
Planning Control Section

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Scale : 1250



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[Redacted]

[Redacted]

- Planning
- TPO
- Safety Inspection
- Subsidence
- Litigation
- Design

Forbes- Laird Arboricultural Consultancy



Principal Consultant:

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BA(Hons), MICFor, MEWI, M. Arbor. A, Dip. Arb. (RFS)

THREATS

Tree Hazard: Risk Evaluation and Treatment System

A method for identifying, recording & managing
Hazards from trees

GUIDANCE NOTE FOR USERS

June 2010

*To be read in conjunction with THREATS pro forma,
included at the end of this document*



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1 Preamble

1.1 Development history

1.1.1 Work started on THREATS in 1998, when the author was engaged on a consultancy basis as a part-time highway tree surveyor/manager. A need was identified early in this commission for a method of quantifying the risk posed by trees identified as having structural defects. It was considered that the method should have several characteristics:

- It had to mirror and be in sympathy with typical tree assessment processes
- It had to record and analyse tree defects in such a way that it could be used for large scale tree inspections without impeding data collection
- It had to offer consistency of approach, definition and outcome
- It had to stratify tree risk such that intervention could be programmed as to urgency, roughly according to: immediate, scheduled and deferred
- It had to be transparent and comprehensible to non-specialists

1.1.2 The framework was laid down based on a two-page data collection pro forma which:

- Recorded the fact of inspection
- Listed any observed defects
- Assessed the three components of tree risk (defect, target and impact – after Matheny & Clark (1994)¹)
- Contained an algorithm that provided for a relatively subtle interaction between these three components
- Arrived at a conclusion which was in tune with what can be termed ‘unassisted arboricultural decision making’ (aka gut instinct)
- Established a defensible hierarchy of response that included delayed intervention and phased reinspection

1.1.3 Since its inception, THREATS has enjoyed several iterative amendments, chiefly based on feedback both from peer review (conducted in 2002 under the auspices of the Arboricultural Association), and from users of the method (who have always been encouraged to offer suggestions for improvement).

1.1.4 The framework and algorithm had not been altered in over ten years, when the author was commissioned to prepare an amended version of the method specifically for use by Network Rail Infrastructure Ltd, known as THREATS – NR. This exercise led to an extensive and intensive review of the method whereupon it was found for the railway application that one combination of factors produced an unsatisfactory result. This led to a boundary change which has been carried across into the standard method: the outcome being on a borderline the change was equally satisfactory.

1.1.5 In 2007 an in-depth comparative field trial was undertaken to examine 15 tree risk assessment systems, one of which was THREATS. Despite the trial group of eight arborists not having been trained in the use of the method, THREATS fared well in the tests, being preferred to and producing more consistent results than several other well-known systems, including that known as QTRA, in the use of which three of the eight users had been trained.

1.1.6 THREATS and the new THREATS – NR are effective, simple and quick to apply. THREATS has been rigorously examined in numerous scenarios for over ten years and has been found to be fit for purpose.

1.2 Introduction

1.2.1 The THREATS method has been designed to offer all those who have responsibility for evaluating and managing trees a means of assessing them for risk in a consistent fashion. THREATS also assists the user in determining the appropriate response to the level of identified risk.

1.2.2 THREATS can be applied in a number of ways, making it a versatile tool for tree managers:

- a) In its full form, most suited for smaller numbers of trees, THREATS is a detailed record of inspection; it can also be used in a compressed form to evaluate risk as part of larger scale tree surveys (see part 3)
- b) It provides a framework for defining a defensible, phased response to identified hazards, where the immediate rectification of all safety-critical defects identified during a tree survey is not always possible
- c) It can be used to reassure an anxious party that a tree has been found on inspection to be reasonably undangerous, or to demonstrate to a complacent party that a tree is unsafe, and that intervention is required
- d) It can be used as part of a desk study to prioritise tree inspections, by means of Target Zoning treed areas as type-diverse as large gardens, woodlands, country parks and even towns (see part 4)
- e) It can be used to quantify tree risk by ward, district, railway region etc, and by this means the effectiveness of tree inspection and management regimes can be monitored (the total THREATS score for a given area should generally decline with time under effective management)
- f) It can be used retrospective to a tree failure to assess foreseeability

1.2.3 THREATS takes established methodology for considering potential hazards from trees and puts this into a user-friendly framework by cross-referencing the factors that, in combination, define the level of risk for any given tree defect. In order to achieve this, THREATS relies on craftsman-level arboricultural knowledge, in the form of familiarity with tree defects, together with an judgement-based assessment of the likelihood of any given defect actually failing for the tree being assessed. In this context, the species of tree and, where pathogens are present, host/agent combinations, are frequently important.

1.2.4 THREATS deliberately relates back to the authoritative work by Lonsdale (1999)². Any further clarification required as to the nature of tree defects and the likelihood of them failing should lead the enquirer directly to this book as a starting point.

1.2.5 It is stressed that THREATS is not designed to provide 'The Answer' to the question of tree safety, and is not, therefore, a substitute for properly informed arboricultural judgement. Instead, it aims to offer a framework for systematically and consistently quantifying this judgement, allowing tree managers to arrive at their decisions through a logical, defensible and transparent process.

1.2.6 When the method was being constructed, the interaction between the Hazard Rating Calculation (THREATS section 7) and the Appropriate Response (section 8) was mapped out into 120 possible outcomes (5 x 6 x 4 outcomes). These were grouped into seven 'Threat Categories' that reflected, in the author's opinion, a satisfactory range of responses to any given outcome. In order for any derived set of possibilities to result in the 'correct' response (i.e. a response that matched up with unassisted arboricultural decision making), a weighting score was attached to each option within the three factors. Ensuring that this algorithm worked was beyond the author's limited mathematical capabilities, and was delegated to his wife (who is quite literally a former rocket scientist). Said rocket scientist also reviewed and modeled outcomes for the THREATS – NR variant.

1.3 Legal framework in the UK

This is well-trodden ground, so only the briefest of summaries is offered here³:

1.3.1 There is an obligation of reasonable safety owed by site owners both to visitors and to those adjacent to a site under the Occupiers' Liability Act 1957 (OLA 1957, i.e. the principle of Duty of Care) and 1984, such that an occupier may be held liable for losses (physical harm to life and/or property) arising from an accident to a third party, where the cause of the accident was both reasonably foreseeable and reasonably preventable, bearing in mind all the circumstances pertaining to the situation.

1.3.2 These circumstances include specific consideration for children; under s2(3)(a) of the OLA 1957, 'an occupier must be prepared for children to be less careful than adults'. The case of *Tomlinson v Congleton Borough Council* ([2003] 1 A.C. 46; [2004] UKHL 47), the 'shallow pond case', expanded on this requirement by stressing the need to consider the inequivalence of danger relative also to people of reduced mobility.

1.3.3 A considerable body of case law has established that, in order to be in a position to foresee and indeed to prevent harm arising from a tree failure, it is necessary to subject the tree or trees in question to 'regular inspection', with this inspection undertaken by someone competent both to identify any defects present and to interpret their significance for public safety.

1.3.4 Regular inspection is a notoriously vague concept, with intervals applied ranging from every six months to five years. The author considers that the former is unworkable and the latter potentially ineffective. The definition that this author proposes is that:

*'A tree should be inspected at a regularity that is appropriate to its condition, within its context, with a maximum interval between systematic expert inspections of five years within Risk Zones 1-4'*⁴ (Please refer to Table 2 at page 12)

For this definition to work in practice, and indeed for the occupier to discharge his Duty of Care at all, a baseline knowledge of the tree stock for any given site is essential.

2 Notes on applying THREATS

2.1 Completing PART I, the tree inspection record

2.1.1 Survey details

This section serves as the record of complaint where a problem tree is reported to the tree manager, and/or a record of inspection, is a mix of desk-based and fieldwork.

The 'surveyor details' box should be initialed on completion of the survey, as prompted, as well as having the surveyor's name and position recorded in full.

The 'origin...' box fixes the time of the incoming complaint, though it can also identify a more routine survey, such as "storm damage inspection".

The 'survey date & time' box effectively pegs the response time to the log of complaint; this should prompt the tree manager to consider carefully how urgent the complaint sounds...

The 'weather conditions' box notes the weather both at the time of the log of complaint, e.g. "strengthening wind", as well as when the tree is inspected.

'Other notes' should cover any other information provided by the complainant, such as "reports ground moving at base of tree"...

2.1.2 Description of tree

'Owner...' & 'tree no...' are self-explanatory

'Location' could be "outside No.21 Acacia Avenue", a GPS waypoint reference (see section 3), a highway chainage and so on.

'Species' & 'age class' are self-explanatory.

'Size category' refers to the stem size bandings listed in section 6 of THREATS under 'Agents' (see 2.2.3).

2.1.3 Description of failure indicators

The prompt in brackets tells the user how to deal with a tree that has more than one indicator: all indicators should be recorded, but the one that should be scored in Part II of THREATS is that which gives greatest concern. The list of failure indicators is taken from Lonsdale (ibid.). Whilst it is hoped that the THREATS list is exhaustive, as with all the best pro forma there is an 'other' box provided.

It is important that every visible indicator is recorded. However, the indicator that requires the most urgent attention is the one that should be scored (first) in Part II (though of course any other defects that might be present should be considered for remediation at the same time).

The nature of the hazard from each indicator is explained very briefly, to assist the user in his/her assessment of their significance. Identified indicators should be flagged in the tick-boxes provided. Field use of THREATS suggests that it is helpful to record the precise nature of the indicator(s) identified and also, at this stage, to suggest what target might be vulnerable should the indicator(s) fail, hence the notation space provided.

This section completes the written tree inspection record and could, if required, stand alone.

2.2 PART II: The Risk Evaluation Sum

The Note is of critical importance: the given examples are just that and **must not** be treated as a substitute for good judgement based upon sound arboricultural knowledge.

2.2.1 Failure Score

The prompt directs the user to consider known data on relative vulnerability of tree species to failure from observed defects, as well as the possibility of seasonal pre-disposing factors.

Examples of the former would include the differing persistence of dead wood on pedunculate oak (*Quercus robur* L.) and common ash (*Fraxinus excelsior* L.), and examples of the latter would include humidity during the high photosynthetic period (as an agent involved in summer branch drop), and autumnal gales (storm damage, windthrow, etc).

Thus a horse chestnut (*Aesculus hippocastanum* L.) with a heavily end-loaded limb surveyed in December might require a different entry in the 'Likelihood of failure' range than would the same tree if inspected in May.

Also important at this stage is a consideration of failure criteria, such as $t:r$ ratio⁵. Where the tree's condition relative to failure criteria has yet to be established, the assessor should err on the side of caution (though overreaction to uncertainty should be avoided).

When considering 'Likelihood of failure', it is important to bear in mind two (almost) conflicting issues:

- Defects that might appear at risk of impending collapse often remain sound for years
- As well as the protection of life and property, another purpose of the survey is frequently to protect owner liability: the user should not take unnecessary chances – an identified defect that threatens a target is a 'foreseeable danger'

The numerical weighting of the score for each failure category gives an indication as to the approach required. The user should reserve 'Imminent/Immediate' for only the most hair-raising of defects, as suggested in the examples given.

The failure category 'Probable/Soon' might seem to cover many tree defects, though actually it should be reserved for clearly identified problems where failure in the near term is a reliable prognosis. This is where the oak/ash deadwood example is useful: on pedunculate oak it is not usually 'probable' that dead wood will detach 'soon', this process generally takes years and frequently occurs by piecemeal crumbling from the branch tip, with bark and sapwood disintegration to leave a robust desiccated heartwood spar. Ash trees, of course, shed their dead wood much more readily, and thus it *is* 'probable' that dead wood recorded on ash will detach 'soon'.

The failure category 'Likely, foreseeable' is the one that field use suggests most often applies to tree defects, and it is designed to reflect a guesstimated failure timeline in the two- to three-year range, and possibly a little more.

'Potentially with time' covers emergent defects that are likely to become hazards only slowly. A good example of this is given as 'robust dead wood', where we are thinking of pedunculate oak again.

'None apparent' is a category that becomes increasingly used the more trees one surveys with THREATS...

The important issues to consider are:

- How far advanced towards failure is the defective part? (Returning to our dead oak branch, it may indeed take many years to shed, but this tree inspection may be taking place years towards the end of that period)
- What is the known failure pattern of trees of survey species, and when and how do they or their constituent parts actually fail, and where does the identified defect fit into these questions?
- How does the defect relate to established failure criteria? If this is not known and cannot be established by visual inspection alone, then a suitable 'Control Measure' selection (see 2.3.1) might be 'Further investigation'

Again, sound arboricultural judgement is essential in making the appropriate selection, and in avoiding either complacency or over-reaction. However, where there is genuine uncertainty, the selection should be made one category higher (though not from score 8 to score 50).

2.2.2 Target Score

There are three prompts here:

- The first is a reminder that, for example, the now well-known dead oak branch is unlikely to hit a target far outside its vertical drop zone (though a realistic possibility of ricochet off other branches should not be ignored)
- The second prompt is designed to highlight cases where people are at elevated risk: those 'trapped' in cars or unsighted whilst driving, the relative naivety of children to danger, whereby a higher Duty of Care pertains to them⁶, and those whose physical or mental functions are impaired, with a consequent decline in their ability to be aware of or to react to/evade imminent danger. THREATS addresses this by upgrading any given target value by one level if, for example, unsupervised children are likely to be the human component of the target. A little common sense is necessary here: children ubiquitously traveling in cars, for example, would not warrant a rise in the target value of a road
- The third prompt directs users to the railway-specific variant THREATS – NR where the target is an active railway line

Targets are divided into two groups: Static and Target Occupancy. This is designed to help the user to identify the appropriate Target Score and has been field tested quite exhaustively.

- The 'Static target examples' presuppose a cross-reference between the monetary value of the structure and the presence of people. This would not always be the case, so these examples should be used with some caution: a park bench is a low-cost item, but it may be that the one under consideration is frequently occupied by old ladies feeding squirrels
- The 'Target Occupancy examples' are included to guide the user through the park bench dilemma: the bench is properly scored as a low-cost item, rating a '7', but the old ladies would probably rate '20' (or perhaps '25' if very persistent), being 'frequent use' and 'constant traffic- pedestrian' respectively. With this example of course, the Control Measure, if required, would probably be the relocation of the bench

2.2.3 Impact Score

The prompt is designed to help the user focus on the actuality of the impact potential of any given defect, once failed. For example, an unstable tree adjacent to a busy highway is obviously not hazardous if it leans heavily over the adjoining field. The same tree would be assessed differently if it inclined the other way.

The list of 'Agents' has been re-worked several times but ultimately, in the author's view, remains somewhat unsatisfactory: tree size class, limb size and weight and likely momentum are deceptively complex issues. As such, this list represents the best iteration to date and the author would welcome any suggestions for improvement.

For this reason, the examples listed under 'Degree of harm' should be used as a good guide as to the appropriate Score. In simple terms, these can be thought of as killed, disabled, injured, hurt where people are concerned. However, care is needed to avoid over-reacting to the possibility of fluke injuries. In this connection, the user should remember that Duty of Care is discharged by mitigating 'reasonably foreseeable' dangers.

The agent to be scored will be either a whole tree or a part of the crown (single branches included), so the surveyor should consider either the stem size millimeter range (estimated at 1.5m above ground level), or the approximate weight of the vulnerable section, or revert to the examples.

It is essential that the agent of damage is considered with particular care: whole tree failure might be the assessed risk, but the impact score should relate only to how hard the target might be struck. For example a 25m tree toppling onto a target 20m away is likely to strike it only with relatively minor branches: the impact score should probably be 4 rather than 10.

The impact score is necessarily weighted to give low importance to a 'recoverable injury': the point being that a balance should be struck between the retention of desirable trees with public safety. Whilst the thought of a collapsing tree injuring or killing someone should give the surveyor pause, the possibility of a minor injury ought not to lead to mistimed intervention. Apart from anything else, in large, district-wide surveys, not all hazard trees identified can be remediated simultaneously.

2.2.4 Risk Evaluation Sum

This is the heart of the THREATS method: by mirroring the established decision making process employed by arboriculturists, the method takes the three scores from sections 4-6 to transform the surveyor's arboricultural judgement concerning the relative safety of a tree into a number, capable of further manipulation.

2.3 Implementing Control Measures: PART III of THREATS

2.3.1 Appropriate Response

Very simply, the number derived above is compared with the 'Score range' column to arrive at a Threat Category: this is the ultimate goal of THREATS, and provides the user with a quantified assessment of the risk.

The 'Threat Categories' are both numbered and described, so one might refer equally to a Category 3 tree, or to the same tree posing a 'Slight' threat. The word description is designed to give the user a convenient means of defining the risk to a non-specialist. Users report that this is a very helpful feature.

The 'Action Required' is deliberately prescriptive: too often unsafe trees are not afforded the intervention priority necessary to discharge Duty of Care. The balance between intervention and deferred action through reinspection shifts from the lower end of the scale where it restrains over-reaction, to the higher end where it requires a decisive response.

Occasionally, typically when first using THREATS, the user discovers on cross-referencing the Hazard Rating with the Threat Category, that an 'Action Required' seems at odds with his/her expectation. Repeated field-testing has suggested that this is due to an incorrect category assignment in Part II and not a flaw in the algorithm itself. Accordingly, if the derived outcome fails to match professional judgement, it is necessary to recheck the assigned categories to see whether one has been incorrectly attributed. In any event, if disagreement persists the author always recommends following professional judgement (though currently there are no instances of serious disagreement reported from practiced users).

At the lower end of the scale where, of course, by far the majority of trees are found, THREATS guides the user towards a more routine approach to Control Measures. However, THREATS stresses the need to reinspect a defective tree following circumstances that might cause its condition to deteriorate, including the passage of time. The obvious example of this is high wind speeds, and THREATS suggests what response should be appropriate following winds of different velocities, listed according to the Beaufort Scale (see Table 1).

Table 1: Beaufort Scale, Specification on Land⁷

Beaufort Force	Description	Specification on land	Speed		
			Knots	km/h	mph
0	Calm	Smoke rises vertically	Less than 1	Less than 1	Less than 1
1	Very Light	Direction of wind shown by smoke drift but not by wind vanes	1 - 3	1 - 5	1 - 3
2	Light breeze	Wind felt on face, leaves rustle, ordinary wind vane moved by wind	4 - 6	6 - 11	4 - 7
3	Gentle breeze	Leaves and small twigs in constant motion, wind extends white flag	7 - 10	12 - 19	8 - 12
4	Moderate breeze	Wind raises dust and loose paper, small branches move	11 - 16	20 - 29	13 - 18
5	Fresh breeze	Small trees in leaf start to sway, crested wavelets on inland waters	17 - 21	30 - 39	19 - 24
6	Strong breeze	Large branches in motion, whistling in telegraph wires, umbrellas used with difficulty	22 - 27	40 - 50	25 - 31
7	Near gale	Whole trees in motion, inconvenient to walk against wind	28 - 33	51 - 61	32 - 38
8	Gale	Twigs break from trees, difficult to walk	34 - 40	62 - 74	39 - 46
9	Strong gale	Slight structural damage occurs, chimney pots and slates removed, branches break from trees	41 - 47	75 - 87	47 - 54
10	Storm	Trees uprooted, considerable structural damage occurs	48 - 55	88 - 101	55 - 63
11	Violent storm	Widespread damage	56 - 63	102 - 117	64 - 73
12	Hurricane	Widespread damage	>64	>119	>74

The Beaufort Scale was originally developed for the Royal Navy in 1805 (by one captain Francis Beaufort) and was adapted for use by 'land-based observers' in 1906. As can be seen from the descriptions in Table 1, the land version frequently relies on the behaviour of trees under wind action (instead of on waves), such that, at higher wind speeds, the observations define failure thresholds.

The UK Meteorological Office uses the land version of the Beaufort Scale in issuing severe weather warnings to predict the likely level of damage from forecasted high winds. Thus the Beaufort Scale can be used to identify a measure of foreseeability of tree failure.

Concerning reinspection and possible future work to a tree, it is important to realise that the first time a tree is assessed using THREATS is not necessarily the last: in other words, a defect can and potentially should be re-evaluated at each successive regular inspection. By this means, the deferring of intervention, as opposed to reinspection, can be rolled on such that a defect may never, in fact, reach the state where intervention is required during the life of the tree. This recognizes the fact that trees exist on a very different timescale to people: what might appear a defect with, for example, a three-year critical time, in reality might never require remediation. By using THREATS, the surveyor is given a framework that justifies doing nothing.

In this way, hazard tree mitigation can be systematised towards proactive intervention based on necessity, rather than either the 'fire brigade tactics' of reactive response, or the frequently wasteful policy of cyclic pruning regardless of need.

Finally, the reinspection interval for Category 1 is reduced from five to three years where a) there is child-specific access and b) the target score is 20 or higher. This further precaution towards children reflects the view that it is not safe to leave trees with identified defects uninspected for over three years where children are present in significant numbers.

2.3.2 Outline of Work Required

The prompt is designed to make the user consider the suitability of non-arboricultural solutions: can the target score of the old ladies' park bench be reduced, preferably to zero, by relocating it? The suggestions for remedial measures are not in any way intended to cover all the options, but merely to offer a few possibilities. In fact, no formal attempt has been made to tie this section into the method as a whole, as individual tree problems demand tailored solutions. Notation space is provided so that the surveyor can enter a more detailed description of the necessary work.

However, the practiced user will soon develop a correlation between the nature of the defect and the work required. Indeed, someone ticking the 'Tree removal' box having scored only an end-loaded limb should look again! The main intention of this section is to show how the level of tree work should be graded, with wholesale removal clearly identified as the measure of last resort.

It may be that more than one defect was originally identified: where this is the case, it may be advisable to score other defects using THREATS, as a guide to whether it is appropriate to prescribe additional treatments while the contractors are on site.

3 THREATS used in Large-scale Tree Surveys

3.1 Up to now, we have examined THREATS as a stand-alone method for assessing individual trees, and it is obvious that the use of the full pro forma for a tree survey covering numerous specimens would be cumbersome. However, THREATS was designed from the outset for use in large-scale tree safety surveys; in fact, practiced users find that employing the method actually reduces time required per tree. Most proprietary tree management software has THREATS as a selectable option.

3.2 'Action required' and the 'Priority' for this would, in any case, be standard columns in any tree safety survey (albeit perhaps under different headings). The advantage of using THREATS in this context is that outcomes in the method provide a guide as to the appropriate entries in the columns that deal with recommended treatments and priority. For these reasons, the author and other THREATS users have found large tree surveys to be the most useful application of THREATS to date. In fact, practiced users find that the method actually speeds up the decision-making process and takes if anything less time than surveying without it.

3.3 Finally, local authorities using THREATS for district-wide safety surveys can benchmark the effectiveness of their tree risk management regime by comparing total accrued every five years (the recommended interval for baseline inspections). This is a helpful tool when approaching considerations of Best Value & performance evaluation.

4 THREATS as Part of a Desk Study: Target Zoning & Tree Inspection Priorities

Even where the existing level of knowledge of the tree stock's condition is low (and likewise, perhaps, the resources for its inspection), THREATS can assist in the prioritizing of tree inspections, and can do so in two ways:

4.1 By considering the Target Score

The tree manager can evaluate his area of responsibility in the context of varied target value. At the larger scale this will be a fairly blunt tool, but even so a useful one. By referring to the target examples, and producing one's own list tailored to the locality, it is possible to arrive at a prioritised schedule of areas for inspection.

4.2 By considering the Impact Score

Cross-referencing known size of any trees present with their locations can further prioritise the inspections: clearly the damage potential from young *Sorbus* is much lower than from mature *Platanus*, and even in areas where baseline knowledge of the stock is low managers usually have *some* idea of the nature of the population.

4.3 Example

Based on these factors, a THREATS-prioritised list for a locality could look something like this:

- a) Various mature trees adjacent to playground
- b) Raywood ash avenue along dual carriageway
- c) Lapsed pollards in pedestrian precinct
- d) Mixed age/species planting in hospital grounds
- e) Several mature horse chestnuts in public parks
- f) 30-40 year old trees at lower school
- g) Mature pines lining roads in Victorian residential district
- h) Trees flanking cycle-way through park
- i) Area of woodland designated as a Public Open Space

See Table 2 for an example Risk matrix for target zoning.

Table 2 Example matrix for risk zoning and tree inspection

Risk Zone	Land use (examples)	Frequency of access	Tree attributes (wh known)	Level of inspection	Frequency of inspection
1	Major road or busy junction where cars static under tree(s) School buildings or immediate environs and school main access / busy playgrounds Urban centre Hospital buildings / main access	Constant to very frequent access / occupancy including frequent access by unsupervised or partially supervised children	Maturing or mature trees	Arboricultural	Annual (consider basic inspection after severe weather conditions)
			Young trees or mature trees regularly managed as pollards	Basic	Quinquennial for young trees, triennial for mature trees managed as pollards
2	Busy road / footway pavement or road junction / bus stop with peak times traffic where cars or pedestrians static under trees School grounds or less well-used playgrounds Frequently used buildings including college buildings	Very frequent to frequent access / occupancy including regular access by unsupervised or partially supervised children or by people with reduced mobility and other impairments that elevate risk	Maturing or mature trees	Arboricultural	Biennial or annual as driven by tree condition (consider basic inspection after severe weather conditions)
			Young trees or mature trees regularly managed as pollards	Basic	Quinquennial
3	Peak times traffic (pedestrian or vehicular) including main access to colleges, or buildings with regular use	Some access throughout the day but busy during peak times, or sporadic use / access by unsupervised or partially supervised children or by people with reduced mobility and other impairments that elevate risk	Maturing or mature trees, especially if large	Basic or refer for arboricultural inspection if required	Triennial or more frequent as driven by tree condition
			Young trees or mature trees regularly managed as pollards	Basic	Quinquennial
4	Occasional traffic or use including most rural roads and regularly used woodland paths	Sporadic access only	Mature or large trees	Person with good working knowledge of trees, or refer for basic / arboricultural inspection if required	Regular though casual observation
5	Infrequently used rights of way including minor woodland paths	Access is rare	Mature or large trees	Landowner / occupier should be familiar with tree stock, seeking advice where required	Occasional casual observation
6	No formal public access including private land with no rights of way / permitted paths	Access is not foreseeable	No applicable	None likely to be required	None likely to be required

5 Concluding remarks

5.1 THREATS has been designed as a way of utilizing existing arboricultural knowledge, not replacing it. Essentially, therefore, the method is a codification of a tool that tree managers use every day: professional judgement.

5.2 THREATS is a consistent, logical and transparent way of standardizing the assessment of tree risk, and of describing that risk to non-specialists. It will also assist the tree manager in justifying works budgets and in phasing tree work.

5.3 THREATS restrains over-reaction to some hazards, whilst demanding rapid intervention for others. As such, it can highlight a dangerously slow response, hopefully in time to implement necessary control measures.

5.4 In THREATS – NR, Britain’s rail infrastructure operator has a unique and bespoke system to assist in controlling risk from lineside trees, as well as those on third party land capable of falling on the railway.

5.5 Tree owners and managers are reminded that the most important letter in THREATS is the ‘S’ for ‘System’: having a system in place is essential to enable Duty of Care to be discharged.

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Note

Whilst competent arboriculturists are welcome to try THREATS for themselves, the author and Forbes-Laird Arboricultural Consultancy Ltd wish to stress that they accept no responsibility whatsoever for any consequences arising, whether directly or indirectly, from management decisions arrived at using the method, in the absence of training in its application by the author and continuing professional development by the user.

References

- 1 'A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas', NP Matheny & JR Clark, ISA Books 1994
- 2 'Principles of Tree Hazard Assessment & Management', Dr D Lonsdale, TSO 1999
- 3 For further reading see:
 - 'The Law of Trees, Forests & Hedgerows', Charles Mynors, Sweet & Maxwell 2002 (2nd Edition pending)
 - 'Liability for death and injury from falling trees or branches: a review of the present position under English law' JFL, Arboricultural Journal Vol 32. No. 3, December 2009
- 4 Definition provided by the author
- 5 'The Body Language of Trees', C Mattheck & H Breloer, TSO 1994
- 6 Mynors, op. cit. p. 142ff
- 7 Revised from the original by George Simpson, 1906
- 8 'Veteran Trees: A Guide to Good Management', Helen Read, English Nature 2000

TREE HAZARD: RISK EVALUATION AND TREATMENT SYSTEM - THREATS

PART I: TREE INSPECTION RECORD

1] Survey details

Surveyor details (initial on completion)			
Origin, date and time of inspection request		Survey date & time	
Weather conditions	At log	At site	
Other notes			

2] Description of tree

Owner if known													
Tree no. if applicable		Location											
Species		Age class (circle)	Y	MA	EM	M	OM	V	Size category (circle)	S	M	L	VL
Other notes													

3] Description of failure indicators (Circle Item no. to identify defect scored in Part II; always score most hazardous defect)

Item	Indicators	✓	Hazards	List defect and target details
1	Altered exposure		Tree vulnerable to windthrow/storm damage due to e.g. loss of companion	
2	Unstable root plate		Tree at imminent risk of toppling	
3	Root damage		Tree topples. Compare damage with failure criteria: <i>R:R_u</i> . Also consider health loss	
4	Root decay (fungi)		Tree vulnerable to windthrow/toppling, possibly without further warning (see 3)	
5	Stem/limb decay (fungi)		Stem/limb fracture causing crown elements to collapse (consider type of decay)	
6	Inadequate stem taper		Failure risk due to e.g. excessive crown raising or D/h deficiency	
7	Target cankers		Possible weakening/failure of affected area, especially if located on stem 'hot spot'	
8	Exudates		Indication of (internal) disorder; if from lower stem, Honey Fungus infection?	
9	Stem hollow, decayed, cracked inc. shear cracks		Stem fracture/buckling, causing crown to collapse. Consider <i>t:r</i> value	
10	Lapsed pollard		Re-growth epicormic in origin & possibly weakly attached; possible decay at knuckles	
11	Overweight, subsiding, or lion-tailed limbs		Limb failure due to an excess of mass over strength or to end-loading	
12	Bark congestion		Fibre buckling of leaning/subsiding area indicating possible forthcoming collapse	
13	Reactive growth		Member fails if repair (reactive growth) unsuccessful in stabilising defect	
14	Inclusive bark		Fork fails causing leader/limb to fall	
15	Fractured limbs; storm damage		Broken limbs/hanging breaks could fall; crown destabilised: further failures likely	
16	Bark necrosis		Cambium death causing xylem dys-function: affected area dies, decays & fails	
17	Dieback; poor foliage		Dead areas become unsafe. Various biotic and abiotic causes; roots damaged?	
18	Dead wood		Branches fall	
19	Prolific ivy		Possible obscuration of defects and excessive winter sail area	
20	Other/None (specify)			

PART II: RISK EVALUATION SUM NB: Examples given in sections 4-6 & 9 are neither prescriptive nor exclusive

4) Failure Score

Consider identified defects in relation to species/clone history, established failure criteria & time of year

Score	✓	Likelihood of failure	Example indicators
50		Imminent/Immediate	Uprooting; Extreme root loss; Collapsing structure (i.e. primary failure has already occurred)
8		Probable/Soon	Altered exposure; Primary decay fungus; Severe inclusive bark/root loss; Fragile dead wood
2		Likely, foreseeable	Lapsed pollard; Overweight/subsiding limbs; Poor stem taper; Dieback
.8		Potentially with time	Early development of inclusive bark; Robust dead wood
0		None apparent	No significant defects observed

5) Target Score

Consider impact radius of identified defect against potential targets. Consider forward visibility available to drivers (Poor Forward Visibility / Good Forward Visibility) & whether vehicles are likely to be stationary, e.g. at junctions. If targets liable to include unsupervised children &/or the elderly or infirm, upgrade target value by one category. For railway targets use THREATS NR

Score	✓	Value	Static target examples	Target occupancy examples
40		Very high	Building 24 hour use	Constant vehicular traffic/busy playground
25		High	Building 12 hour use, ≥11Kv power lines	Frequent vehicular traffic/constant pedestrian use
20		Medium	Building/structure occasional use, <11Kv lines	Peak times traffic/intermittent use, PFV, e.g. commuter run
15		Low	Garage, Summer house, Listed wall	Occasional traffic/sporadic use, GFV e.g. quiet rural road
7		Very low	Unlisted wall, paving, garden features	Infrequently used access/public right of way/bridleway
0		None	Grass	Hardly ever used, e.g. remote path

6) Impact Score

Consider height of fall/momentum & whether e.g. lower branches would impede agent's descent

Score	✓	Degree of harm and consequences (examples)	Agent: trees, mm, or branches, kg (NB size/weight for guidance only)		
10		Severe structural damage, vehicles crushed – passenger fatalities very probable	VL	> 750mm	> 500kg
6		Moderate structural/ severe vehicle damage – fatal/disabling injuries likely	L	350-750mm	50-500kg
4		Minor damage/probable disabling/hospitalising injury to pedestrians	M	100-350mm	10-50kg
1		Fragile objects destroyed, superficial/recoverable injury to pedestrians	S	< 100mm	< 10kg

7) Risk Evaluation Sum:

FAILURE SCORE _____ X TARGET SCORE _____ X IMPACT SCORE _____ =

PART III: IMPLEMENTATION OF CONTROL MEASURES

8) Appropriate Response

The use below of the word 'within' should not be taken to mean that delay is necessarily acceptable

Score range	✓	Threat Category	Recommended action & Completion deadline	Code
4000+		7- Extreme	Evacuate/prevent access to impact site, emergency call-out of contractors	E
2001-3999		6- Serious	Close site if practical; arrange for work to be completed within 7 days	7D
1000-2000		5- Significant	Arrange for work to be completed within four weeks maximum	4W
330-999		4- Moderate	Remediate within 13 weeks, reinspect after SWE meantime (inc. gales to Force 7+)	13W
160-329		3- Slight	Reinspect annually /after storms (Force 10+), expect to schedule work within 2 yrs	A
50-159		2- Minimal	Reinspect within 3 yrs if public access, schedule work as required	3Y
0-49		1- Insignificant	Reinspect within 5 yrs if general public access or 3 yrs if child-specific access & TS ≥20	3/5Y

9) Outline of Work Required

Consider amenity and conservation values of tree when selecting control measure

Control measure	✓	Examples	Notes / Work specification
Target management		Target value / vulnerability reduced by exclusion, diversion or relocation: e.g. anti-social planting / fence off & warn; re-route paths; relocate benches	
Further investigation		Decay mapping to establish significance of defect: set results against failure criteria	
Install support		Non-invasive brace to support vulnerable member / dividing union	
Localised pruning		Reduce weight loading on vulnerable limb (including shortening dead branches to retain habitat)	
Limb removal		Prune out dead/damaged/vulnerable growth	
General pruning		Reduce crown by specified amount	
Crown removal		Leave stem as a standing carcass (consider habitat-piling cord wood, preferably in dappled light)	
Tree removal		Takedown and fell to ground level (consider habitat piling & also stump-grinding as a disease reduction measure)	