BS5837:2012 'TREES IN RELATION TO DESIGN, DEMOLITION AND CONSTRUCTION - RECOMMENDATIONS'

INITIAL ARBORICULTURAL SURVEY REPORT

SITE OF SURVEY	Glyncoed Primary School Glyncoed Road, Cardiff CF23 7DW
CLIENTS	Angharad Traylor RIBA Pensaer | Architect Datblygu Economaidd | Economic Development Cyngor Caerdydd | Cardiff Council
SURVEYED BY:	T. A. Seymour BA (Hons) M.Arbor A. Dip Geog ND Arb Cardiff Treescapes 17 Ravenscourt Close Penylan Cardiff South Glamorgan Telephone: 02920 481284 Mob 07831109904
DATES SURVEYED	15th. December 2020 Revised 4/01/2021 Report valid for 60 months* (* tree health notes valid12 months)

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1. INTRODUCTION

1.1 TREES AND DEVELOPMENT SITES

Trees are of vital importance to the landscape and are essential for enhancing the rural and urban environment. They provide scenic character, visual amenity and are vital habitats for dependent wildlife populations.

The retention of trees within a new development provides an immediate sense of maturity for the benefit of a site and its surroundings, raising the overall quality of a scheme and enhancing property value.

Trees can occupy a substantial part of a development site and because of their potential size can have a major influence on the planning and use of the site. Existing trees of good quality and value can greatly enhance a new development. However, trees can also be a constraint. Poorly laid out sites or the retention of inappropriate or poor quality trees can restrict development and can cause nuisance to future residents.

Where retained trees are inadequately protected, damaged or their immediate environment significantly changed by a development, the trees may subsequently decline and die resulting in all positive benefits being lost.

The purpose of a Pre-development Tree Survey is to provide the proposed developers, architects and landscape designers with an independent, concise presentation of the position, dimensions, condition and future life expectancy of existing trees on the site. This will enable them to evaluate the impact of different development layouts and select the optimum solution for the situation. This survey is based on British Standard 5837 2005 'Trees in Relation to Construction – Recommendations'.

1.2 ASSIGNMENT

I have been instructed by Angharad Traylor RIBA of Cardiff City Council to:

Visually assess the significant trees within the proposed development area at Glyncoed Primary School Glyncoed Road, Cardiff CF23 7DW. Prepare a written report, tree schedule and categorization.

- Prepare a Survey Plan and a Tree Constraints Plan to BS 5837:2005 'Trees in relation to construction – Recommendations'

1.3 QUALIFICATIONS AND EXPERIENCE

I have based this report on site observations and have come to conclusions in the light of experience. Qualifications and experience in arboriculture are listed in Appendix 1.

1.4 DOCUMENTS AND INFORMATION PROVIDED

I was provided with a site plan indicatng an outline of the proposed development area and subsequent plan (drawing No. BM12099-003) which included details on drainage strategy and a proposed rain garden by Cardiff City Council.

1.5 LIMITATIONS AND USE OF COPYRIGHT

I have no connection with any of the parties involved in this situation that could influence the opinions expressed in this report.

2. THE SITE

2.1 SITE VISIT

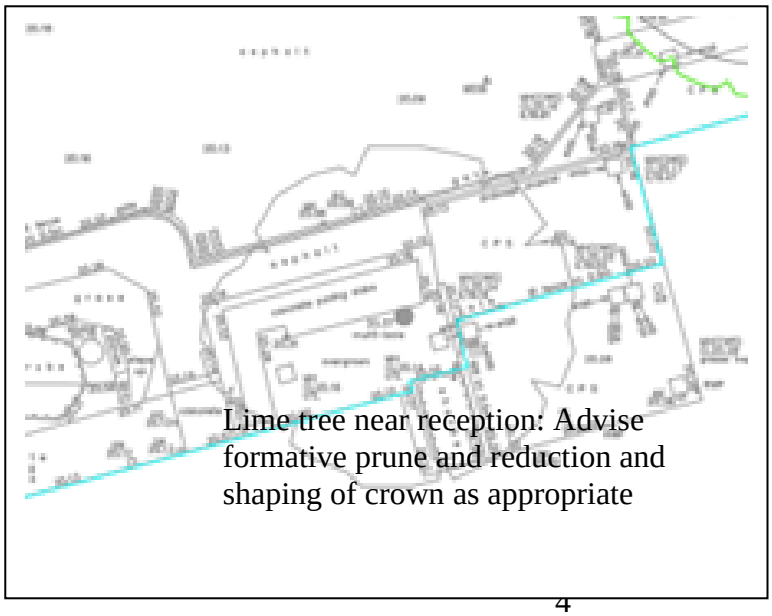
I carried out the site visit on 8th. December 2020. All observations were from ground level without detailed investigations and I measured all dimensions unless otherwise indicated. At the time of inspections there were light winds and bright sunshine.

2.2 SITE DESCRIPTION

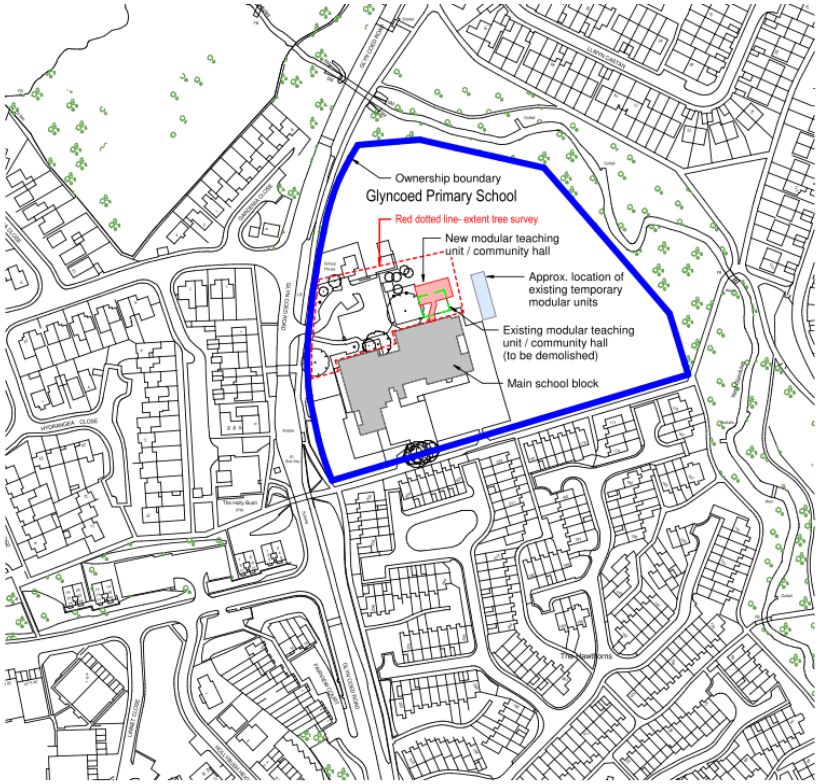
There are some mature trees around the grounds as well as fruit trees planted to provide screening and outdoor teaching areas which provide both shade and a valuable environmental asset

2.3 IDENTIFICATION AND LOCATION OF THE TREES

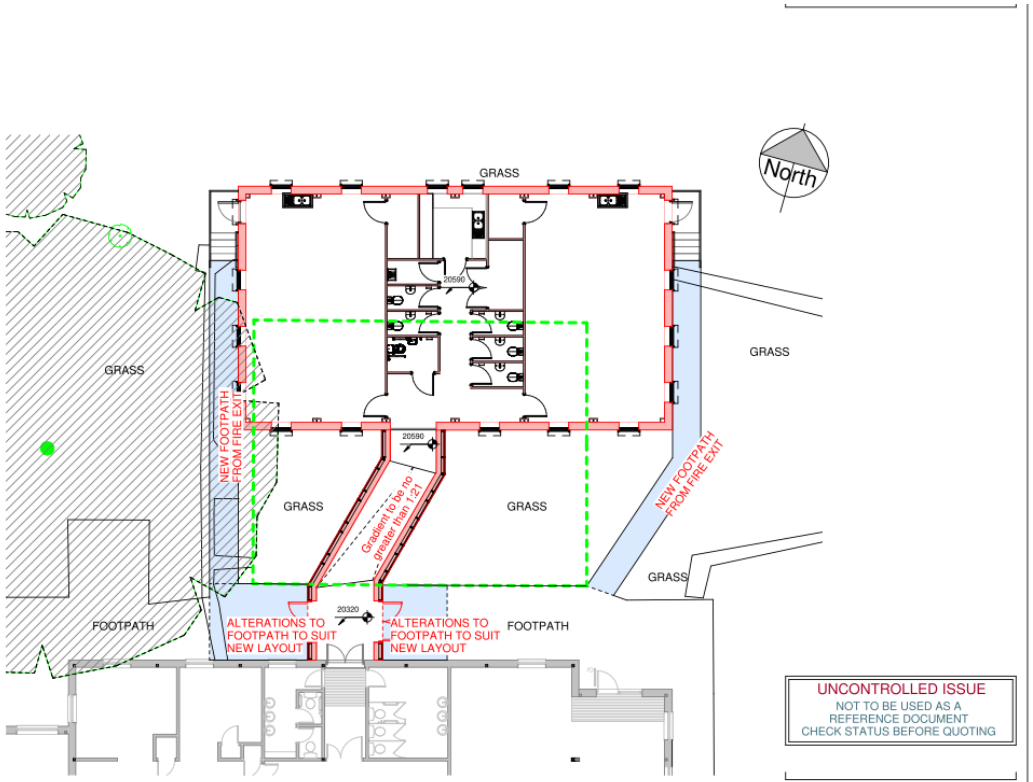
I have illustrated the locations of the surveyed trees on a scale plan. All the relevant information on the trees is contained within this report and the provided documents.
There are other trees on site which were not included as part of the survey as they will not be implicated by the proposal, although it was noted that a mature/eary mature Lime tree close to the reception area was found to have some structural defects(Tightly forked branch unions throughout crown). This tree may require some formative pruning to reduce risk of branch failure in the future and its position has been highlighted below.



Lime tree near reception: Advise formative prune and reduction and shaping of crown as appropriate



1 01 SITE TREE SURVEY
1 : 1250



2 02 PROPOSED DEMOUNTABLE
1 : 100

UNCONTROLLED ISSUE
NOT TO BE USED AS A REFERENCE DOCUMENT
CHECK STATUS BEFORE QUOTING

revision

title
GLYNCOED PRIMARY SCHOOL - REPLACEMENT MODULAR TEACHING UNIT

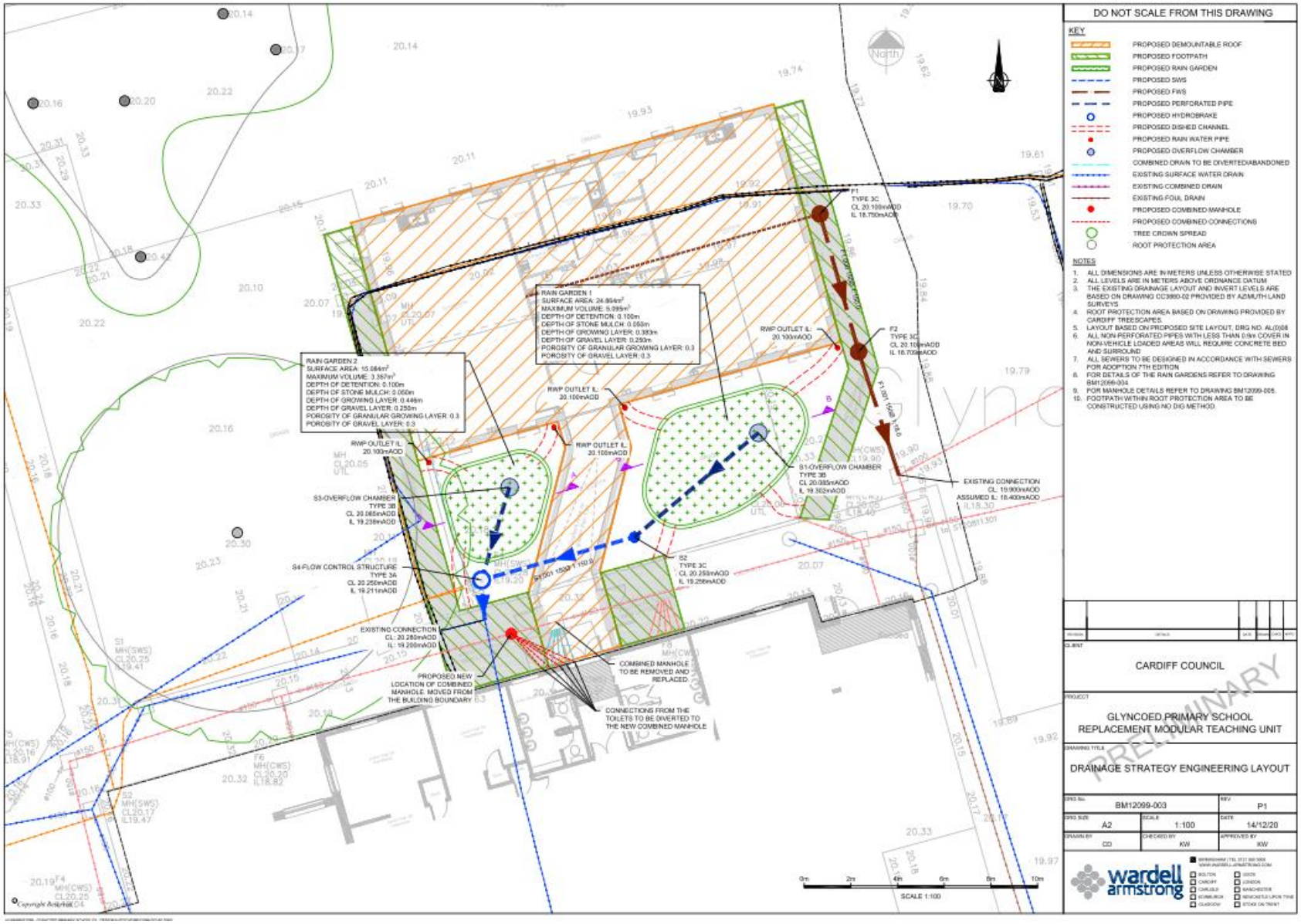
detail
TREE SURVEY

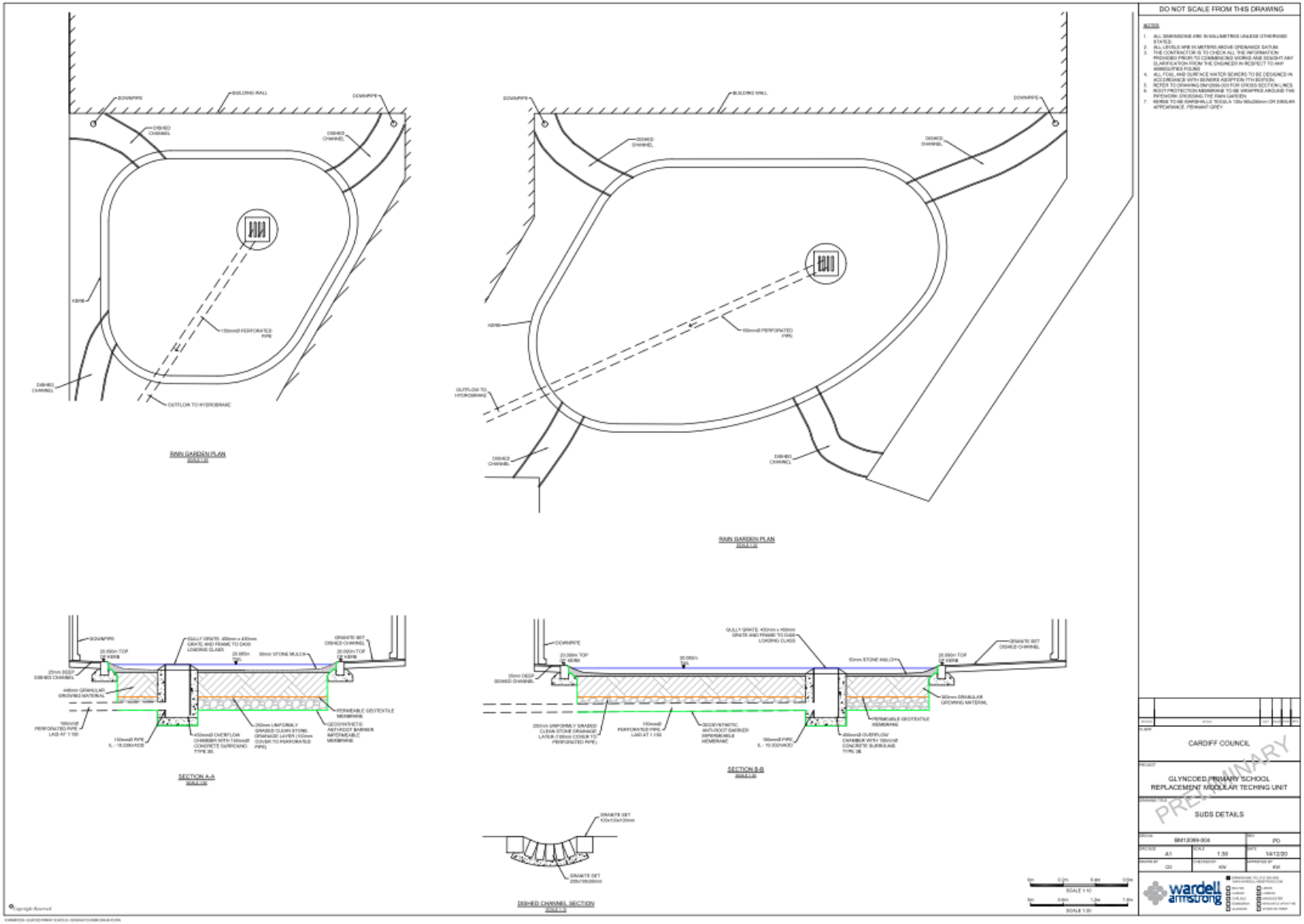
filepath

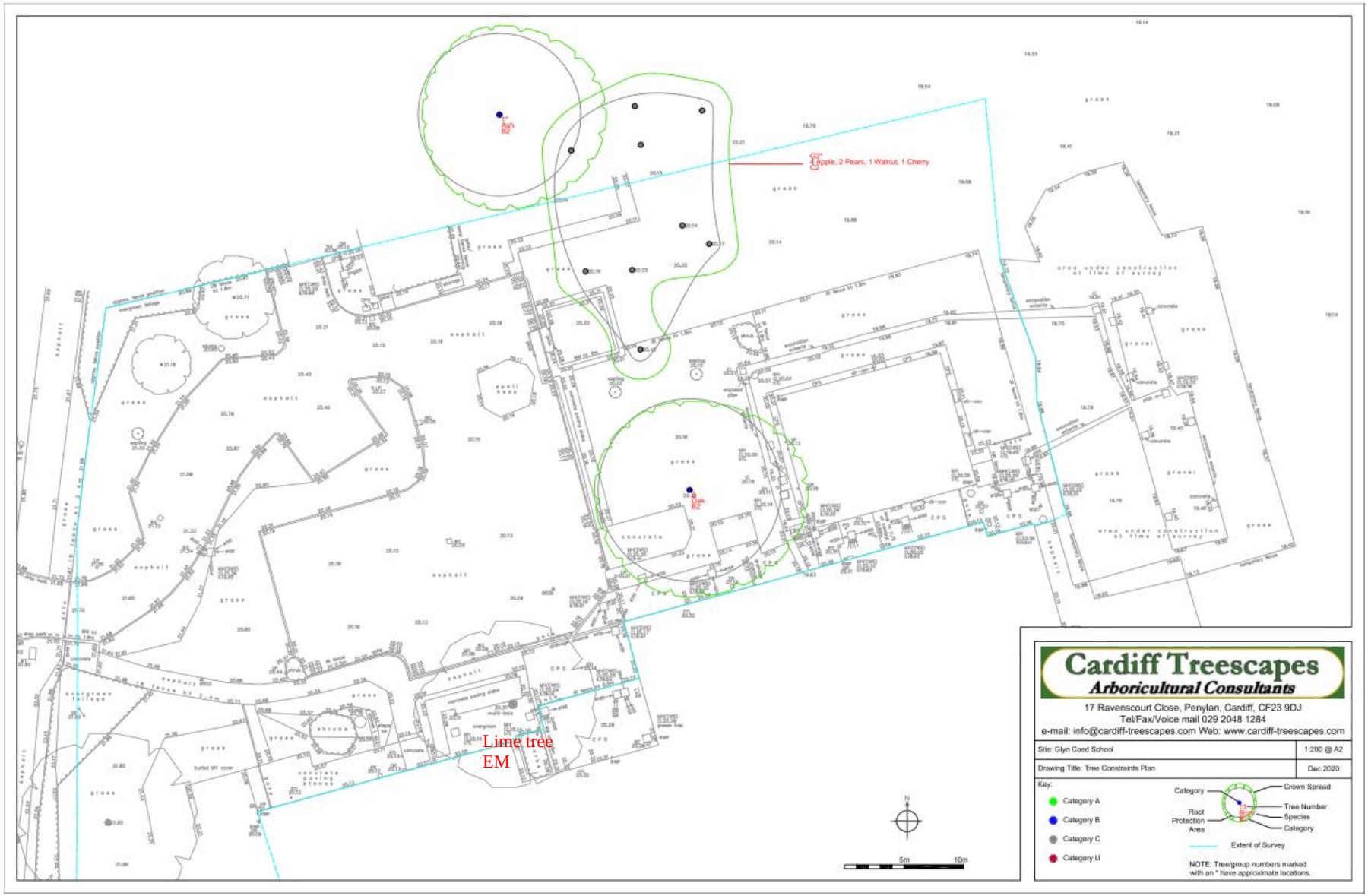
project number
EDUA 1975

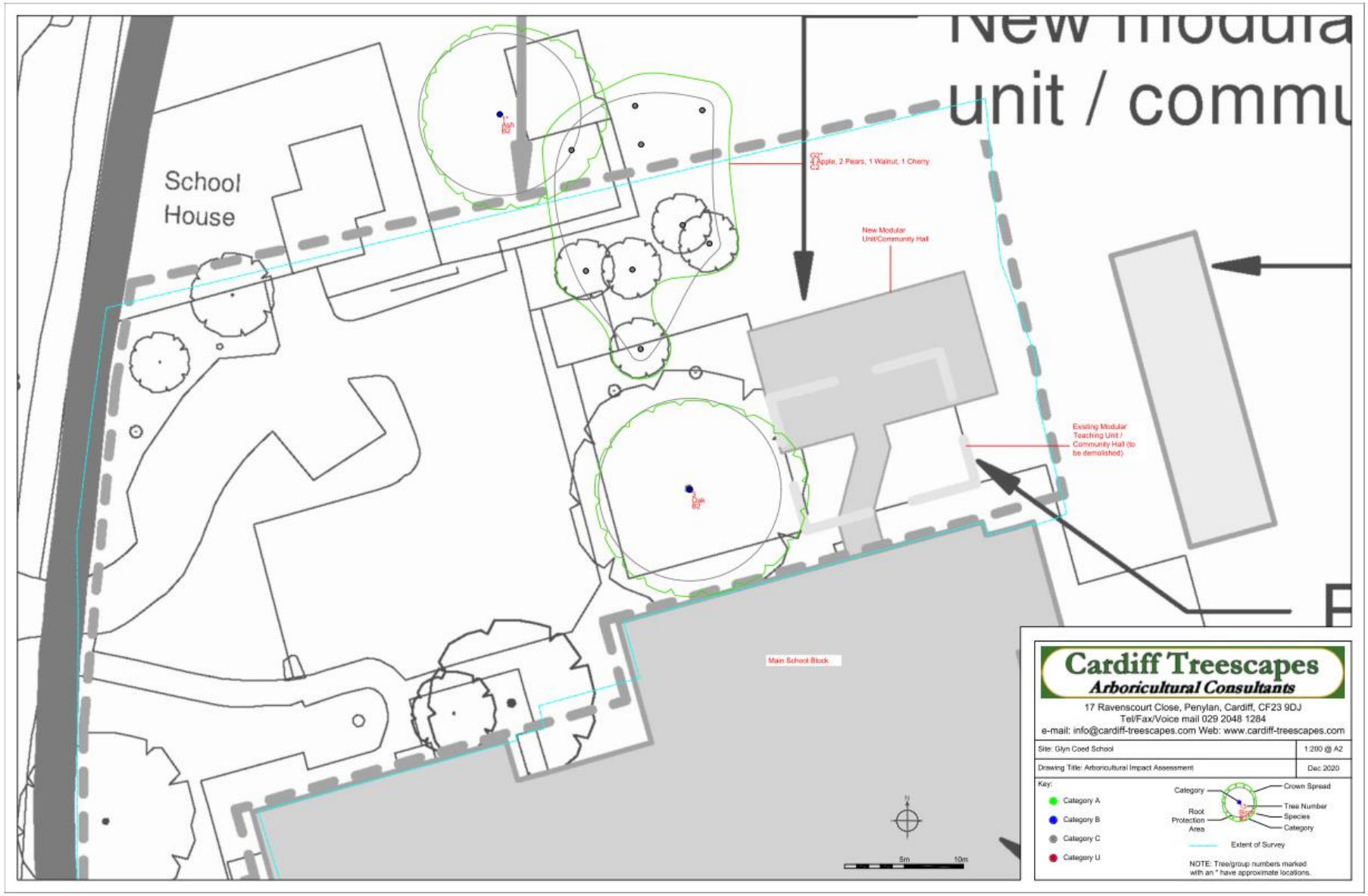
drawing number
AL (0) 04

revision


DO NOT SCALE FROM THIS DRAWING
KEY
PROPOSED DEMOUNTABLE ROOF
PROPOSED FOOTPATH
PROPOSED RAIN GARDEN
PROPOSED SWS
PROPOSED FWS
PROPOSED PERFORATED PIPE
PROPOSED HYDROBRAKE
PROPOSED DISHED CHANNEL
PROPOSED RAIN WATER PIPE
PROPOSED OVERFLOW CHAMBER
COMBINED DRAIN TO BE DIVERTED/ABANDONED
EXISTING SURFACE WATER DRAIN
EXISTING COMBINED DRAIN
EXISTING FOUL DRAIN
PROPOSED COMBINED MANHOLE
PROPOSED COMBINED CONNECTIONS
TREE CROWN SPREAD
ROOT PROTECTION AREA
NOTES
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE STATED
2. ALL LEVELS ARE IN METERS ABOVE ORDINANCE DATUM
3. THE EXISTING DRAINAGE LAYOUT AND INVERT LEVELS ARE BASED ON DRAWING CC3880-02 PROVIDED BY AZIMUTH LAND SURVEYS
4. ROOT PROTECTION AREA BASED ON DRAWING PROVIDED BY CARDIFF TREESCAPES.
5. LAYOUT BASED ON PROPOSED SITE LAYOUT, DRG NO. AL(0)08
6. ALL NON-PERFORATED PIPES WITH LESS THAN 0.9m COVER IN NON-VEHICLE LOADED AREAS WILL REQUIRE CONCRETE BED AND SURROUND
7. ALL SEWERS TO BE DESIGNED IN ACCORDANCE WITH SEWERS FOR ADOPTION 7TH EDITION
8. FOR DETAILS OF THE RAIN GARDENS REFER TO DRAWING BM12099-004
9. FOR MANHOLE DETAILS REFER TO DRAWING BM12099-005.
10. FOOTPATH WITHIN ROOT PROTECTION AREA TO BE CONSTRUCTED USING NO DIG METHOD.
RAIN GARDEN 1
SURFACE AREA: 24.864m²
MAXIMUM VOLUME: 5.095m³
DEPTH OF DETENTION: 0.100m
DEPTH OF STONE MULCH: 0.050m
DEPTH OF GROWING LAYER: 0.393m
DEPTH OF GRAVEL LAYER: 0.250m
POROSITY OF GRANULAR GROWING LAYER: 0.3
POROSITY OF GRAVEL LAYER: 0.3
RAIN GARDEN 2
SURFACE AREA: 15.084m²
MAXIMUM VOLUME: 3.887m³
DEPTH OF DETENTION: 0.100m
DEPTH OF STONE MULCH: 0.050m
DEPTH OF GROWING LAYER: 0.446m
DEPTH OF GRAVEL LAYER: 0.250m
POROSITY OF GRANULAR GROWING LAYER: 0.3
POROSITY OF GRAVEL LAYER: 0.3
P1 TYPE 3C CL 20.100mAOD IL 18.750mAOD
P2 TYPE 3C CL 20.100mAOD IL 18.700mAOD
RWP OUTLET IL 20.100mAOD
S1-OVERFLOW CHAMBER TYPE 3B CL 20.085mAOD IL 19.302mAOD
S2 TYPE 3C CL 20.250mAOD IL 19.256mAOD
S3-OVERFLOW CHAMBER TYPE 3B CL 20.085mAOD IL 19.238mAOD
S4-FLOW CONTROL STRUCTURE TYPE 3A CL 20.250mAOD IL 19.211mAOD
EXISTING CONNECTION CL 19.900mAOD ASSUMED IL 18.400mAOD
EXISTING CONNECTION CL: 20.280mAOD IL: 19.200mAOD
PROPOSED NEW LOCATION OF COMBINED MANHOLE. MOVED FROM THE BUILDING BOUNDARY
COMBINED MANHOLE TO BE REMOVED AND REPLACED.
CONNECTIONS FROM THE TOILETS TO BE DIVERTED TO THE NEW COMBINED MANHOLE
0m 2m 4m 6m 8m 10m
SCALE 1:100
CARDIFF COUNCIL
GLYNCOED PRIMARY SCHOOL
REPLACEMENT MODULAR TEACHING UNIT
DRAINAGE STRATEGY ENGINEERING LAYOUT
PRELIMINARY
DRG No. BM12099-003
REV P1
DRG SIZE A2
SCALE 1:100
DATE 14/12/20
DRAWN BY CD
CHECKED BY KW
APPROVED BY KW
wardell armstrong


DO NOT SCALE FROM THIS DRAWING
NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL LEVELS ARE IN METERS ABOVE ORDNANCE DATUM.
3. THE CONTRACTOR IS TO CHECK ALL THE INFORMATION PROVIDED PRIOR TO COMMENCING WORKS AND SOUGHT ANY CLARIFICATION FROM THE ENGINEER IN RESPECT TO ANY AMBIGUITIES FOUND.
4. ALL FOUL AND SURFACE WATER SEWERS TO BE DESIGNED IN ACCORDANCE WITH SEWERS ADOPTION 7TH EDITION.
5. REFER TO DRAWING DM-0356-003 FOR GROSS SECTION LINES.
6. ROOT PROTECTION MEMBRANE TO BE WRAPPED AROUND THE PIPEWORK CROSSING THE RAIN GARDEN.
7. KERBS TO BE MARSHALLS TEGULA 125x185x255mm OR SIMILAR APPEARANCE, PENNANT GREY.
DOWNPIPE
BUILDING WALL
DISHED CHANNEL
KERB
150mm Ø PERFORATED PIPE
OUTFLOW TO HYDROBRAKE
RAIN GARDEN PLAN
SCALE 1:20
SEALED CHANNEL
GUIDED CHANNEL
OUTFLOW TO HYDROBRAKE
150mm Ø PERFORATED PIPE
RAIN GARDEN PLAN
SCALE 1:20
GRANITE SET DISHED CHANNEL
25mm DEEP DISHED CHANNEL
400mm GRANULAR DRAWING MATERIAL
PERMEABLE GEOTEXTILE MEMBRANE
GEOSYNTHETIC ANTI-ROOT BARRIER IMPERMEABLE MEMBRANE
SECTION A-A
SCALE 1:20
GULLY GRATE 450mm x 450mm GRATE AND FRAME TO D400 LOADING CLASS
50mm STONE MULCH
150mm Ø PERFORATED PIPE LAID AT 1:150
250mm UNIFORMLY GRADED CLEAN STONE DRAINAGE LAYER (150mm COVER TO PERFORATED PIPE)
SECTION B-B
SCALE 1:20
GRANITE SET 100x100x150mm
GRANITE SET 255x185x50mm
DISHED CHANNEL SECTION
SCALE 1:5
SCALE 1:10
SCALE 1:20
CARDIFF COUNCIL
GLYNCODED PRIMARY SCHOOL
REPLACEMENT MODULAR TEACHING UNIT
SUDS DETAILS
PRELIMINARY
BM12089-004
P0
A1
1:20
14/12/20
CD
KW
AW
wardell armstrong


Ash
B2
Grp
C2
4 Apple, 2 Pears, 1 Walnut, 1 Cherry
Oak
B2
Lime tree
EM
Cardiff Treescapes
Arboricultural Consultants
17 Ravenscourt Close, Penylan, Cardiff, CF23 9DJ
Tel/Fax/Voice mail 029 2048 1284
e-mail: info@cardiff-treescapes.com Web: www.cardiff-treescapes.com
Site: Glyn Coed School
1:200 @ A2
Drawing Title: Tree Constraints Plan
Dec 2020
Key:
Category A
Category B
Category C
Category U
Category
Crown Spread
Tree Number
Species
Category
Root Protection Area
Extent of Survey
NOTE: Tree/group numbers marked with an * have approximate locations.
5m
10m


School House
New Modular Unit/Community Hall
Existing Modular Teaching Unit / Community Hall (to be demolished)
Main School Block
G27 4 Apple, 2 Pears, 1 Walnut, 1 Cherry
T1 B2
T2 Oak B2
N
5m
10m
Cardiff Treescapes
Arboricultural Consultants
17 Ravenscourt Close, Penylan, Cardiff, CF23 9DJ
Tel/Fax/Voice mail 029 2048 1284
e-mail: info@cardiff-treescapes.com Web: www.cardiff-treescapes.com
Site: Glyn Coed School
1:200 @ A2
Drawing Title: Arboricultural Impact Assessment
Dec 2020
Key:
Category A
Category B
Category C
Category U
Category
Crown Spread
Tree Number
Species
Category
Root Protection Area
Extent of Survey
NOTE: Tree/group numbers marked with an * have approximate locations.

3. TREE SCHEDULE KEY

The trees and groups of trees at the site have been assessed as per the recommendations set out in BS 5837 2012.

Tree Number	Each tree is given a number for the purpose of location. This number is specified in the schedule and site plan.
Tag Number	Each tree has been marked by a numbered tag for on site identification.
Species	Trees have been identified and both common and botanical names are given.
Height	Tree height has been calculated by means of a laser clinometer and recorded in metres unless otherwise stated.
Crown Spread	As it is rare that a tree's crown is asymmetric the crown spread is measured at the points of the compass to give an estimated representation of the crown spread which is then recorded on the pre development tree survey plan.
Diameter	The stem diameter is measured in millimetres at a height of 1.5m from ground level. Multi stemmed trees are measured at basal diameter, just above root flare. This is done by means of a rounding down girth tape or calipers. On sloping ground the tree is measured on the up slope side of the tree.
Crown Height	Is the distance from the lowest point of the crown from ground level.
Age Class	The tree's present age is estimated and categorised as either young, middle aged, mature, over-mature or veteran.
Life Expectancy	Safe useful life expectancy estimated in years and categorised as:- 0 – 10 years 10 – 20 years 20 – 40 years More than 40 years
Root Protection Area	This is calculated from BS 5837 'Trees in relation to design, demolition and construction – Recommendations' section 4.6 Root protection area (RPA) The first measurement is the radius of the root protection area. It is an area equivalent to a circle with a radius of 12 times the stem diameter at 1.5m above ground level, or 10 times the basal diameter if the tree has more than one stem. The second measurement is the total area of root protection. This can be modified if necessary by the arboricultural consultant. This is marked on the tree constraints plan.
Estimated Mature Dimensions	Anticipated mature dimensions for this species of tree under its present environmental conditions, taken from arboricultural literature and professional experience.
Form	Brief description of the tree's overall shape and structure which is influenced by its environment and relationship with neighbouring trees or structures.
Tree Category Category A Category B Category C Category U	BS5837 Trees in relation to design, demolition and construction – Recommendations See cascade chart Appemdix 2. . .
Condition	Each tree has undergone a brief preliminary visual inspection from ground level. This information is only relevant at the time of inspection because circumstances influencing a tree's condition can change rapidly. This section is divided into two separate sections: Physiological Condition

	Good – fully foliaged/twigged canopy for the tree's situation with an indication of natural vigor from shoot extension growth and signs of good vitality throughout the tree's system. **Fair** – signs of adequate vigour and vitality up to 70% canopy coverage. May show signs of slight stress such as branch tip die back, slightly sparse foliage, yellow or small foliage. Stress may be alleviated by prescribed maintenance. **Poor** – obvious signs of advance stress including less than 70% canopy coverage, crown die back, significant deadwood. Sparse and discoloured foliage. **Dead** – moribund or dead trees <u>Structural Condition</u> Any structural defects are noted such as splits, cracks tight forks, rubbing branches, cavities, decay and the presence of pests or diseases. These may compromise the mechanical integrity of the tree's structure. (Veteran trees may pose many physiological and structural faults yet still be considered in good condition for their age.)
Preliminary Recommendations	Following visual inspection preliminary recommended action, further detailed inspection, or maintenance may be prescribed.
Priority Code	Recommended work has been categorised into three priorities: **Priority 1** - Work to be carried out as soon as possible for health and safety reasons. **Priority 2** - Recommended tree maintenance to be carried out after completion of Priority 1 work. **Priority 3** - Recommended future tree management.

4. THE SURVEY

Tree Number	Tag number	Type	Age	Tree Name (Common name)	Tree name (Botanical)	Condition	Crown height	Height	Trunk Dia. (mm)	Single stem (1) or multi-stem (m) *	North (m)	South (m)	East (m)	West (m)	BS Cat.	RRPA radius(m)	RPA Area (m2)	Comments	Action	
1	892	T	EM	Ash	*Fraxinus excelsior*	Good	3S	12	570	1	7.5	8	9	6.5	B2	6.84	147.0	Open grown tree with single stem and natural taper, supporting a full and naturally formed canopy. Some Ivy growth present. Several minor dead limbs and broken and suspended limbs present. Several crossing limbs within lower crown. Growing in recreational greenspace adjacent to boundary fence and caretakers house.	Monitor for decline.	
2		Group 8 trees	SM	4 Apple, 2 Pears, 1 Walnut, 1 Cherry	*Malus spp. Pyrus spp. Juglans spp. Prunus spp.*	Good	0.5	3	80	1	See plan				C2	0.96	2.9	Group of fruit trees with suppressed canopy towards neighbouring trees and full crown towards the light. Some significantly leaning stems. Growing in recreational greenspace.	Carry out formative pruning. Monitor stability of root plates. Monitor future growth.	
3	893	T	EM	Oak	*Quercus robur*	Good	4E	14	640	1	7.5	9	10	8	B2	7.68	185.3	Open grown tree with single stem and natural taper, supporting a full and naturally formed canopy. Large side limb growing from main stem at approx. 1.3m. Heavily end loaded limbs developing within the east side of the crown. Several significant dead limbs within the crown. Several broken and suspended limbs within crown. Growing in recreational greenspace adjacent to school building, temporary classroom and public footpath.	Remove significant deadwood and broken and suspended limbs. Reduce end loading of vulnerable limbs throughout crown by approx. 2m. Monitor future growth.	

5. ARBORICULTURAL IMPLICATIONS ASSESSMENT

From the plans supplied (***TITLE****: Glyncoed Primary School-Replacement modular teaching Unit* ***DRAWING NUMBER;*** *AL (0) 04 PROJECT: EDUA 1975.*) I have assessed the implications of the proposed development.

5.1 DIRECT LOSS OF TREES

None

5.2 ROOT SEVERANCE

T3 OAK Possible , minor quantity small fibrous (see 5.3)

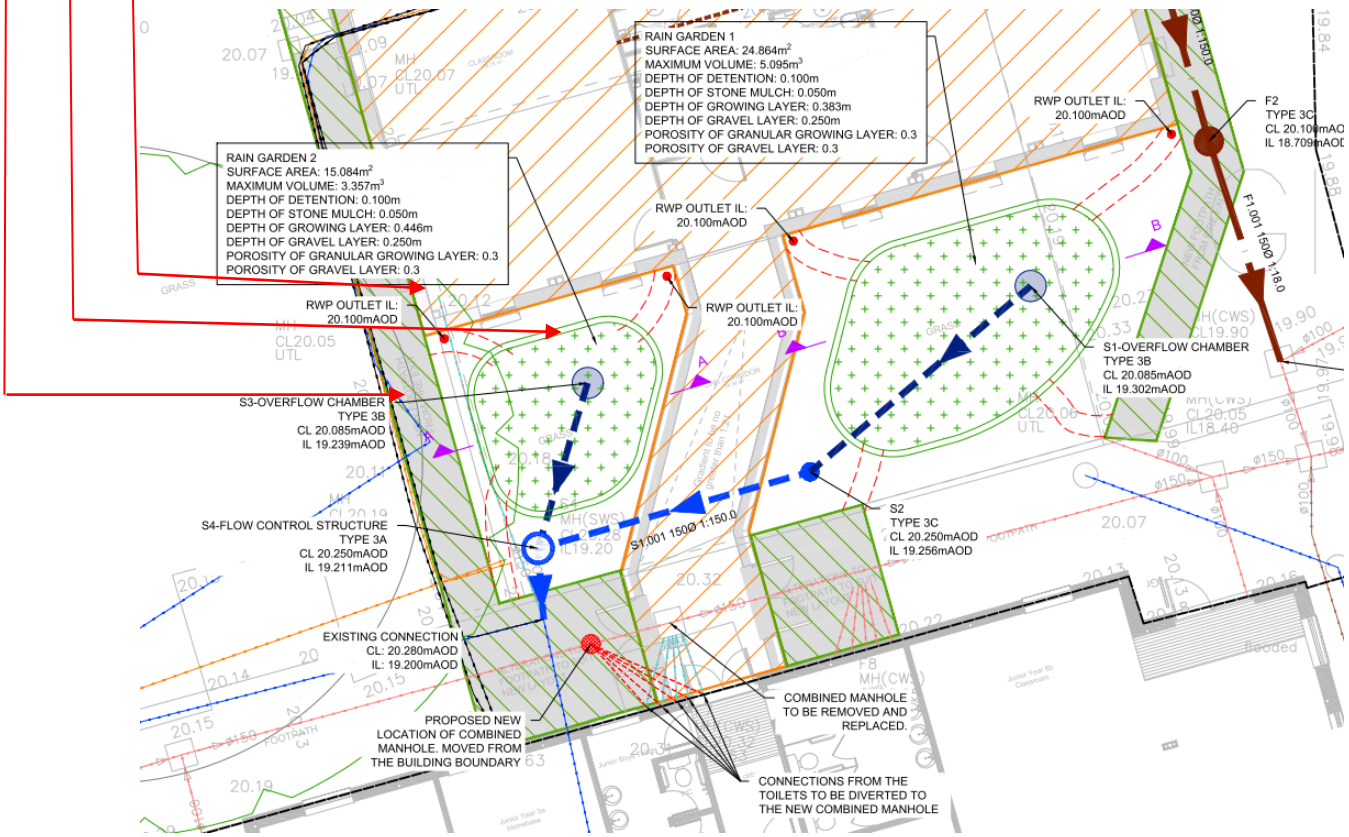
5.3 CONSTRUCTION /DEMOLITION WITHIN ROOT ZONES

5.3.1 BELOW GROUND The following areas of construction within or at the edge of the root protection area of Tree 3 Oak have been identified

1 The construction of a new footpath

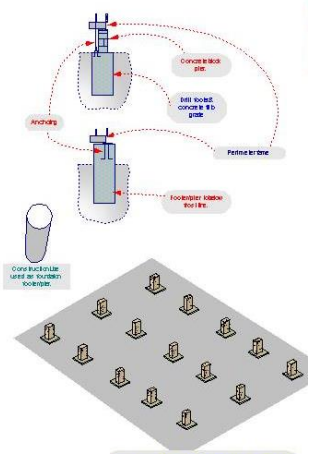
2.The construction of a rain garden in a depressed area with drainage channel/pipe

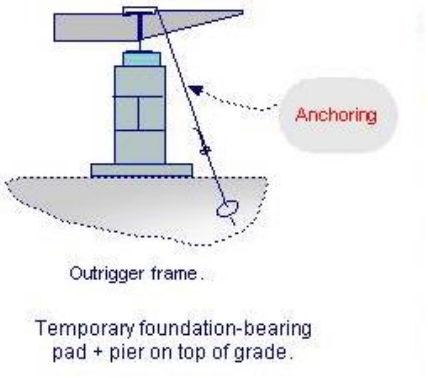
3. Placement of foundation / securing blocks for the proposed modular demountable classroom.



The removal / demolition of the existing class room may also affect Tree 3 Refer to .

The proposed footpath and rain garden 2 are located at the very edge of the Root Proptection are of T3 and will only affect a small percentage of the RPA. However it is possible that roots from Tree 3 extend beyond the RPA and it is advised that the foot path is constructed using a **no dig** method to avoid excavation and potential root loss. (See AMS 1)
The development proposal involves the installation of a demountable building which either requires excavation of ground for the placement of concrete pads as supporting foundations:





Or for less permanent buildings the pad is placed on the existing ground and anchored:
From the plans supplied the proposed new unit appears to be being placed on or very near to the existing building and the supports proposed will be either outside or at the very edge of the tree root protection area. If the construction requires excavation root loss/ severance is likely to be minor and roots encountered are likely to be of a small diameter. It is advised that excavation is undertaken following guidelines set out in AMS II .
Construction and construction traffic access in, to, or close to the root protection area of retained trees may necessitate the use of ground protection boards to avoid compaction of ground and root damage. (AMS III)

5.3.2 ABOVE GROUND

Tree 3 Oak has several low limbs, dead branches and heavily end loaded limbs that may conflict with the vehicles and machinery on site required for the positioning and placement of the demountable unit as well as presenting a hazard. It is advised that the tree is pruned initially prior to this work. : Remove significant deadwood and broken and suspended limbs. Reduce end loading of vulnerable limbs throughout crown by approx. 2m. Monitor future growth.

5.4 LANDSCAPING

The proposed construction of rain gardens is detailed in drawing number BM12099-003.

5.5 TREE PROTECTION AND GENERAL CONSTRUCTION OUTSIDE RPA

Trees are often damaged both above and below ground level and soils compacted as a result of construction activity. In order to minimise this risk, tree protective barriers will be placed to prevent construction activities that may have a detrimental effect on any retained trees as well as open soil within influential distance of the construction area.

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The proposed access route is for construction is not known and there may be a risk of compaction of soils by construction traffic which could impact on the surveyed trees and therefore ground protection may be required. A draft tree protection plan is included below. The barriers will be erected prior to the start of any construction or demolition activities and remain in place until all construction works are complete.
The area protected by barriers will be considered sacrosanct and will not be entered into by construction contractors without consultation with the commissioned Arboriculturalist and Local Authority Tree Officer.

During demolition/ removal of the existing classroom and where construction vehicles are accessing the site the following guidelines are supplied in respect of T3 Oak and other trees within the school grounds. These need to be made available to the project manager and construction staff:-

TREE PROTECTION AND GENERAL CONSTRUCTION OUTSIDE RPA

a) Care should be taken when planning site operations to ensure that wide or tall loads, or plant with booms, jibs and counterweights can operate without coming into contact with retained trees. Such contact can result in serious damage to them and might make their safe retention impossible. Consequently, any transit or traverse of plant in close proximity to trees should be conducted under the supervision of a banksman to ensure that adequate clearance from trees is maintained at all times.

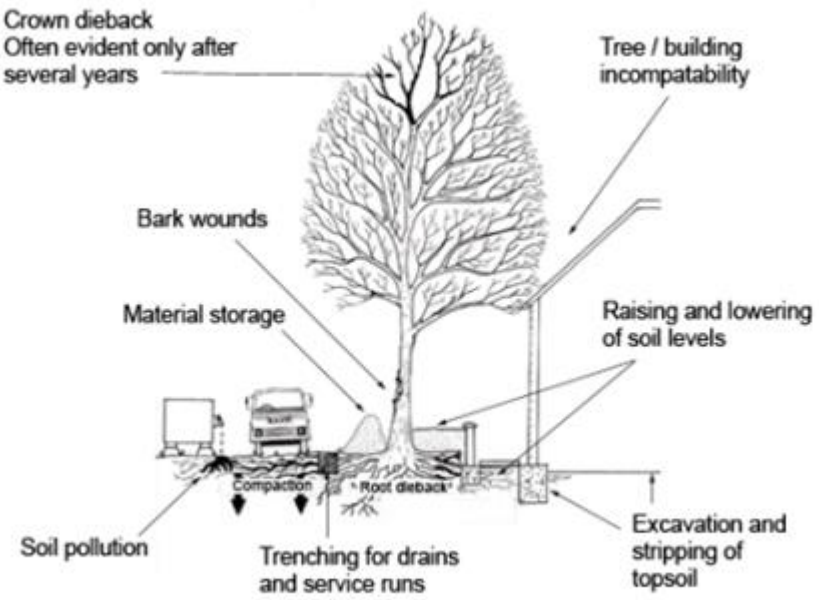
b) Material which will contaminate the soil, e.g. concrete mixings, diesel oil and vehicle washings should not be discharged with 10m of the tree root protection area.

c) Fires should not be lit in a position where their flames can extend to within 5m of foliage, branches or trunk. This will depend on the size of the fire and wind direction.

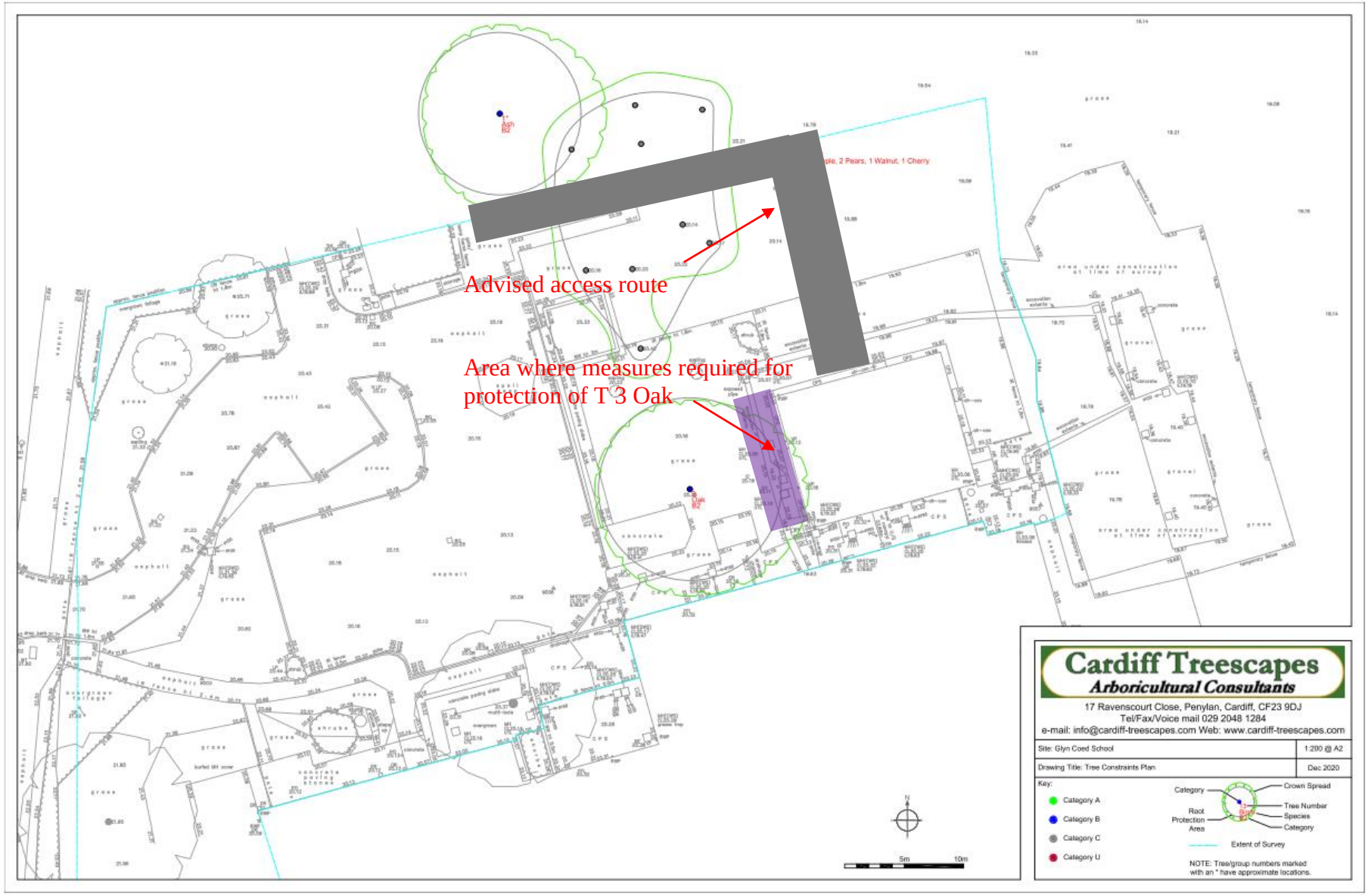
d) Notice boards, telephone cables or other services should not be attached to any part of the tree.

e) It is essential that allowances should be made for the slope of the ground so that damaging materials such as concrete washings, mortar or diesel oil cannot run towards the trees.

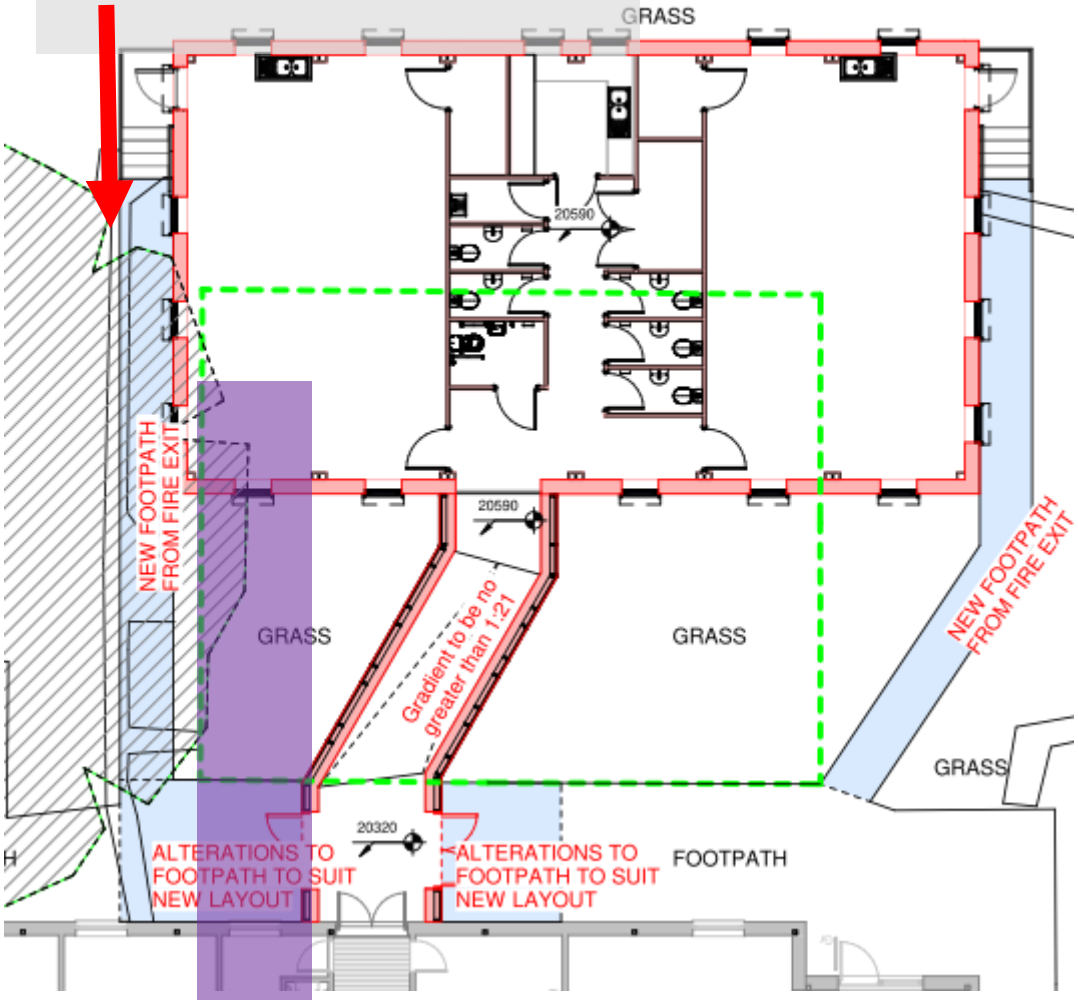
Potential causes of damage to trees on development sites.



DRAFT TREE PROTECTION SCHEME



Area where ground protection boards, a no dig construction method for footpath construction (AMS 1), and excavation within RPA will need to comply with (AMS 2) will be required



5.6 ON SITE STORAGE OF SPOIL, BUILDING AND TOXIC MATERIALS

Prior to and during construction works on site, no spoil or construction materials will be stored within the root protection area of any tree on site or within the adjacent land.

Any facilities for the storage of oils, fuels or chemicals will have to be sited on impervious bases and surrounded by impervious bund walls. The volume of the bund compound will have to be at least equivalent to the capacity of the tank plus 10%. In case of accidental leakage, the compound will have to be at least equivalent to the capacity of the largest tank, or the combined capacity of interconnected tanks plus 10%. All filling points, vents, gauges and sight glasses will have to be located within the bund. The drainage system of the bund will have to be sealed with no discharge to any watercourse, land or underground strata. Associated pipe-work will have to be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets will have to be detailed to discharge downwards into the bund.

Pollution image 1: Where fuel or other chemicals are stored on site, it is now standard practice to have emergency spillage kits available to restrict the environmental impact of accidents.

Pollution image 2: Soil bunding or a supporting framework covered in heavy-duty plastic sheeting is essential where there is a risk of spillages contaminating RPAs. This specifically applies to cement mixing areas and vehicle washing facilities.

5.7 FACILITATION PRUNING

See below

TREE WORK

The following trees may require some attention as part of ongoing maintenance;

Tree number/tag number	Tree species	Category	Reason	Type
T3	OAK	B2	Hazard risk and reduce risk of conflict with construction	Remove significant deadwood and broken and suspended limbs. Reduce end loading of vulnerable limbs throughout crown by approx. 2m. Monitor future growth.
Group 8 trees	4 Apple, 2 Pears, 1 Walnut, 1 Cherry	C2	Good practice	Carry out formative pruning. Monitor stability of root plates. Monitor future growth.
None (tree near reception area	Lime		Good practice	formative prune and reduction and shaping of crown as appropriate

6. SITE MONITORING

6.1 Arboricultural Supervision.
An Arboricultural consultant (AC) may need to be appointed by the developer to advise on the tree management for the site and to attend:

- A pre-commencement meeting before any works start
- Regular supervision site visits to oversee the agreed tree protection
- Further site visits to supervise any unexpected issues arising affecting trees on site

Specifically, the pre-commencement meeting should be scheduled for before any site clearance or construction begins. This should be attended by the developer the arboricultural consultant and a representative from the Local Authority Planning Department (LAPD). In the event of the LAPD declining the discussion from the meeting will need to be documented. The meeting should include discussions of all measures required for tree protection and agreeing the form and location of tree protective measures. Any agreed clarifications or modifications to the consented details will be documented and details circulated to all involved parties. The aim of the meeting is to agree and finalize details of the tree protection programmed and will form the basis for supervision arrangements between the developer and the Arboricultural Consultant (AC).

6.2 General site management

It is the developer's responsibility to ensure that the details of the arboricultural method statement and any agreed amendments are known and understood by all site personnel. Copies of the agreed documents should be available on site and the site manage will brief all personnel who could be involved in operations that may impact on trees or on specific protection requirements. This should be part of site induction procedures and be written into appropriate site management documents.

6.3 Supervision of operations affecting trees

Tree protection measures and tree pruning may need to be overseen.

SUMMARY

Arboricultural input will be required for the following operation

1. Pre-Commencement meeting
2. Preliminary tree works
3. Design and specification for replacement tree
4. Pollution control near trees.

7. ARBORICULTURAL METHOD STATEMENTS

The function of the Arboricultural Method Statements and Tree Protection Plan is to provide the construction contractors with a clear and concise instruction on how to carry out tree related work. This includes the type and position of protective fencing and ground protection. General good practice and excavation close to trees. The method statements have been attached to this report as appendices, so they can readily be reproduced as work sheets for the contractors.

8. FUTURE CONSIDERATIONS

- Maintenance – Retained trees will require regular maintenance for hazard risk, size control and good husbandry reasons.

APPENDIX I

QUALIFICATIONS AND PROFESSIONAL DEVELOPMENT

Mr G.M. Ayres M Arbor A BSc Hons ND Arb

1. **QUALIFICATIONS**

- BSc (Hons) Biological Sciences & Environmental studies
- Diploma in Biological Sciences
- Surrey County Diploma in Arboriculture 1981 – Merrist Wood College
- Ordinary National Diploma in Arboriculture – 1981 Merrist Wood College, Surrey
- Professional member of the Arboricultural Association

2. **PROFESSIONAL AFFILIATIONS**

- Arboricultural Association

Mr .T.A.SEYMOUR BA Hons M Arbor A NDArb

1. **QUALIFICATIONS**

- BA Geog/Enviro
- Diploma in Geography and Environment
- Professional member of AA
- Diploma in Supervisory Studies
- Surrey County Diploma in Arboriculture 1981 – Merrist Wood College
- Ordinary National Diploma in Arboriculture – 1981 Merrist Wood College, Surrey

5. **PROFESSIONAL AFFILIATIONS**

- Arboricultural Association

ARBORICULTURAL METHOD STATEMENT I

'NO DIG' CONSTRUCTION OF A POROUS FOOTPATH WITHIN THE ROOT PROTECTION AREA OF TREE T3 OAK

1. INTRODUCTION

1.1 This method statement describes the procedure required to undertake the **NO DIG** construction of a driveway whilst minimising any adverse effects on underlying tree roots. The proprietary cellular confinement system, Cellweb 100, is formed by ultrasonically welding polyethylene (perforated) strips / panels together to create a three-dimensional network of interconnecting cells. A high degree of frictional interaction is developed between infill and the cell wall, increasing the stiffness of the system product. It is employed to create a structurally sound layer which confines the aggregate particles allowing free drainage, permeability and efficient dissipation of loading. An appropriate specialist should be employed to design and install the surface this method statement is indicative only.

1.2 This method statement must be read in conjunction with the manufacturer's installation instructions and an appropriate site-specific risk assessment.

1.3 Conventional methods of the construction of hard surfacing involve the scraping and removal of top soil and compaction of the sub base materials onto the sub soil in order to stabilise the structure. This conventional method is detrimental to tree roots, in that it causes root severance and prevents the penetration of water and oxygen to the underlying soils.

Although the prescribed Cellweb system is designed to dissipate surface loading, it is laid on non-compacted soils and therefore distortion of the surface make-up can occur from continual heavy vehicular traffic movement. It may be necessary to repair or re-lay this system in the future if major distortion occurs.

When looking at site conditions and use, the following information should be considered to enable a load bearing structure capable of supporting traffic to be proposed:

- Depth of engineered infill material
- Californian Bearing ratio (CBR) – Standard test method for measuring soil strength
- Soil types
- Water table
- Maximum load (vehicles)
- Acceptable rut depth
- Reinforcement type
- Type and Depth of engineered infill material

2. METHODOLOGY

2.1 Construction of the road will preferably be undertaken when the ground is reasonably dry with no water logging of the underlying soils.

2.2 Kill surface ground vegetation using a translocated herbicide. Care should be taken in the selection of herbicide so that desirable vegetation is not affected. This will be carried out by a suitably qualified and competent person.

2.3 All dead organic material will be removed using hand tools to prevent severe oxygen depletion in the soil during the process of decomposition.

2.4 All major protrusions such as rocks, large stones etc. will be removed from the root protection area by hand.

2.5 Fill major hollows using clean sharp sand – **DO NOT COMPACT OR SCRAPE THE SURFACE TO GRADE OFF HIGH SPOTS**.

2.6 The use of no-dig construction methods and materials elevates the structure above the existing ground level. Protective edging is therefore required to contain and support the construction materials. Timber edgings are an ideal support and are installed by:

- Carefully hammering treated softwood stakes into the ground at suitable distances to enable the support required for edging boards. If it is apparent that the pegs are coming into contact or are likely to contact roots, the installer must **STOP** immediately and re-position the peg or seek advice from the Arboricultural Consultant

- The final levels of the stakes shall be positioned lower than the edging boards to accommodate the finishing surface.

- Treated softwood edging rails shall be fixed to the outside edge of the timber pegs. The rails will be of an appropriate size as to leave a finished height equal to or above that of the finished surface level of the

driveway.

- The timber rails must be seated directly onto the existing ground level without any surface excavation or soil scraping to enable leveling.

The dimensions and positioning of the support stakes and edging rails will be specified by the Project Engineer.

2.7 If service cables are to be incorporated into the sub base structure, they can be installed at this stage, along the inside edge of the timber rails above ground level.

2.8 Lay a non-woven geotextile separation fabric over the prepared surface between the edgings, making sure it is taut and that there are no folds.

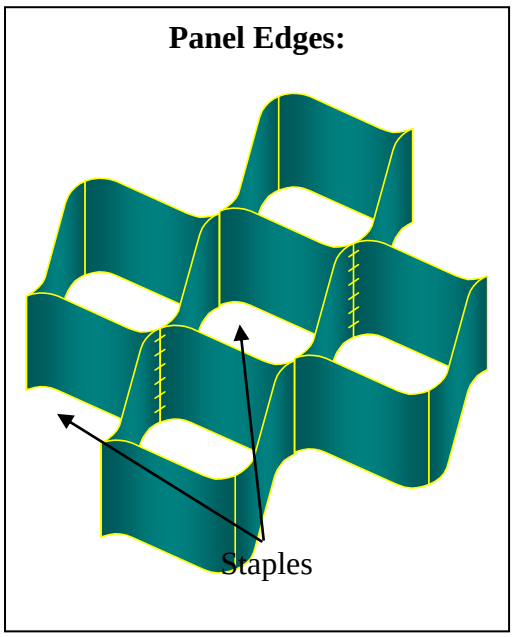
2.9 Overlap the adjoining geotextile, as to the manufacturer's instructions and taking into account the soil strength (CBR) and temporarily retain it with weights. This overlap must be a minimum of 300mm on dry soils.

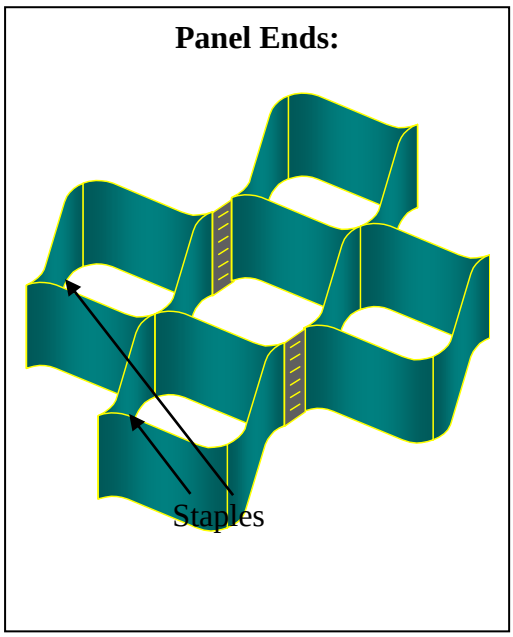
2.10 Expand the Cellweb 2.56m wide panels to the full 8.1m length.

2.11 Pin the Cellweb panels with the staking pins to anchor open the cells.

2.12 Staple the adjacent Cellweb panels together to create a continuous mattress. This will be carried out to the manufacturer's instructions.

Below are illustrations of the correct stapling procedure for joining both edges and ends of panels together;





2.13 Where necessary, cut the Cellweb panels to size using a sharp craft knife.

2.14 The infill material and its placement will be to the following method

•	Infill the expanded Cellweb panels with a 40/20mm, **no fines,** clean angular aggregate.
•	The specified infill material shall be placed into the expanded cells, making sure that each individual cell is filled to its full depth.
•	The filling of the Cellweb cells must be carried out by working in a direction from previously filled panels, so as to prevent any ground compaction and distortion of the unfilled panels. The maximum drop height of the specified infill into the cells will be limited to 1m to avoid damage or displacement of the cell walls. The gross weight of any machinery or vehicles used to infill the panels will not exceed the load bearing capacities of the Cellweb structure, as specified by the manufacturer.

2.15 The finished surfacing will be of a porous material to allow moisture and gas filtration to the underlying soils and tree roots. If using concrete block pavers or slabs, the joints will be filled with a porous material or left open.

2.16 The finishing surfacing will be laid to the following specifications:

<u>Surfacing Options</u>

Block Paving:

- Lay second layer of Fibretex F4M Geotextile separation fabric over the infilled Cellweb sections
- Lay sharp sand bedding layer compacted with a vibro compaction plate to recommended depth.
- Place block paviors as per manufacturer's instructions.

Tarmac (porous):

- Place 25mm surcharge of the granular material above the Cellweb system and lay the bitumen base and wearing courses.
- **Both the wearing surface course and the underlying binder course must be porous,** in order to allow both surface water and oxygen to penetrate through to the underlying sub base materials.

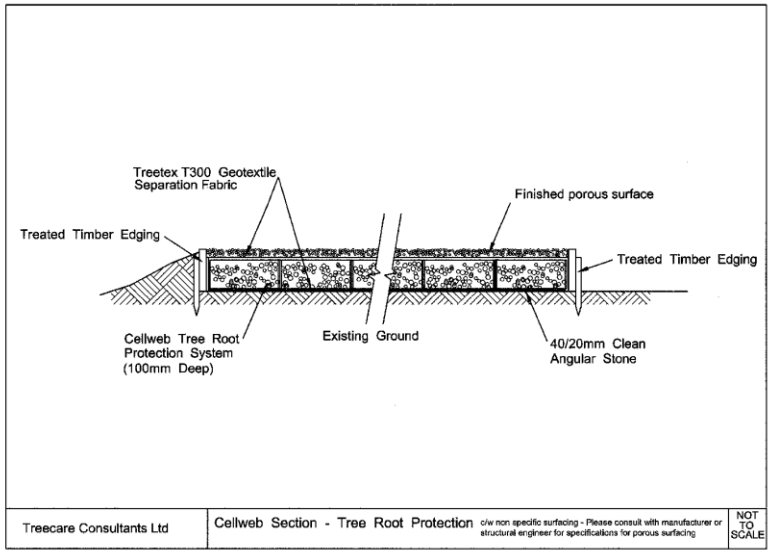
Loose Gravel:

- Place second layer of Fibretex F4M Geotextile separation fabric over the infilled Cellweb sections
- Place decorative aggregate to required depth
- NOTE: A treated timber edge should be provided to restrict gravel movement. A gravel confinement system can also be incorporated to retain the gravel.

Grass Blocks:

- Place second layer of Fibretex F4M Geotextile separation fabric over the infilled Cellweb sections
- Place 50/50 rootzone bedding layer to the required depth
- Lay recycled Duo Block 500 Grass Protection System infilled with 50/50 rootzone mix.
- Seed as per architects' instructions.
- (Alternatively, the Grass Blocks may be infilled with gravel.)

2.17 The edges of the trackway can be banked from the top of the edging boards to existing ground levels using a good quality top soil to recommendations in BS3882 "Specifications for Top Soil" 1994.



3. MATERIALS

Cellweb 100 Cellular Confinement System and Treetex T300 Geotextile Separation Layer

ARBORICULTURAL METHOD STATEMENT II

SPECIALIST METHOD FOR EXCAVATING FOUNDATION TRENCHES AND PITS WITHIN TREE ROOT PROTECTION AREAS

1. INTRODUCTION

Where it has been agreed that excavation can be carried out within a root protection area, the work should be done sensitively in order to minimise wounding, compaction and other impacts on the tree's system.

2. METHODOLOGY

a) Up until the time that excavation is necessary, the area should either be protected within protective fencing or by ground protection.

b) The area should be assessed for underground services by means of cable detection equipment.

c) Excavation should not be carried out by mechanical excavator. The work should be carried out manually with hand tools.

d) Where tree roots are encountered, the work should be undertaken by a trained arborist or by contractors supervised by a consulting arborist acting as a 'watching brief'.

e) Excavation around tree roots should be undertaken by means of a 'soil pick'. This specialist equipment uses high velocity compressed air to remove soil particles yet leaving tree roots unharmed.

f) The period of time that tree roots are exposed should be kept to a minimum. Tree roots should be kept moist and covered by Hessian cloth during periods that excavation is not in progress.

g) Exposed roots should be protected from building materials such as cement, concrete etc by plastic sheeting.

h) If root pruning is required it should be carried out by a trained arborist using a sharp hand saw and secateurs. The diameter of roots severed should be kept to a minimum.

i) Following completion of the construction, the excavation should be back filled with a good top soil and organic matter mix and tightly firmed.

ARBORICULTURAL METHOD STATEMENT III
THE CONSTRUCTION OF TREE GROUND PROTECTION AREAS AND TEMPORARY ACCESS ROADS

1. INTRODUCTION

Where it has been agreed at the design and planning stage that vehicle and pedestrian access for the construction operations may take place within the root protection area, special ground protection measures should be taken. Protective fencing may be positioned within a tree's root protection area at the edge of the agreed working zone but the soil structure of the root protection area beyond the barrier should be protected with ground protection. Please refer to accompanying Tree Protection Plan, which clearly shows the working zones that require protection.

The purpose of protecting the ground within the root protection zone is to

a) Prevent physical damage such as abrasion, compaction and severing of roots during the construction phase.

b) Make provision for water and oxygen to reach the roots.

c) Protect the soil surface from contaminants.

d) Preserve the soil structure at a suitable bulk density for natural root growth and function.

2. METHODOLOGY

A recently published bulletin from the supplier **Ground-Guards** gives a clear example of how to lay protective trackway which is deemed suitable for this location and is included below**.**

It may be that smaller machinery is required for the operation and the width of the trackway can be altered to suit

Ground-Guards Bulletin

TREE ROOT PROTECTION DURING CONSTRUCTION PROJECTS

Ground-Guards

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The Department for Communities and Local Government's guide **"Tree Roots in the Built Environment"** states that ***"ground protection should be installed before any materials or machinery is brought onto the site"***(Section 9.3.3.2)

It has been shown that ***"the major contribution to soil compaction from vehicle movements comes from the first passes of vehicles over the ground"*** (Section 4.2.3)
Thus it is essential that ground protection is specified and installed from day one of construction projects.

Failure to protect the ground from compaction will lead to reduced water and oxygen infiltration to the tree roots, and can ultimately lead to the decline of the tree.

Ground protection is essential to maintain the health of tree roots on construction sites.

The use of GROUND-GUARDS for tree root protection

The **Ground-Guards** temporary roadway system is frequently used on construction sites to protect the ground from erosion and damage by construction vehicles. **Ground-Guards** are usually installed as a roadway consisting of a parallel track of 2.4m x 1.2m panels with a 1.2m space in between. Where a temporary roadway must pass near to trees, the following extra precautions must be taken in order to provide cushioning for the ground under the tree canopy:

1. **Edge rails of 200 x 50mm sawn timber should be installed where the trackway will pass under the tree canopy. These should be staked on either side of the trackway using 50 x 50x 500mm timber stakes at 1.5m spacings.**

2. **A layer of geotextile membrane should be laid to cover at least the area under the tree canopy, and preferably under the whole of the trackway.**

3. **A pad of Ground Guards, three boards wide should be laid on top of the geotextile membrane, between the timber rails.**

4. **A 150mm deep layer of wood chippings should be laid.**

5. **The twin trackway can then be laid so that it rises over the wood chippings as it passes under the tree canopy. Extra Ground-Guard boards should be installed in the gap between the twin trackway at this point to retain the wood chips in place.**

Ground-Guard trackways should have additional cushioning installed where they pass near to trees.