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The Granary Studio
Crewe Lane
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Arboricultural Impact Assessment

& Method Statement:

1 Orchard Way
Fontwell
Walberton
West Sussex
BN18 0SH

REPORT PREPARED FOR:

Mr Joshua Knowles
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REPORT PREPARED BY

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Ref: jwmb/ rpt1/ 1orchardway/ AIAAMS

Date: 15th December 2018 amended 4th March 2019

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1.0 Introduction

1.1 Purpose & Use of the Method Statement

- 1.1.1 This impact assessment & method statement report has been prepared for submission to Arun District Council (ADC) to accompany a planning application for two detached dwellings, adaptation to existing cross-over & new driveway at 1 Orchard Way, Fontwell, Walberton, West Sussex, BN18 0SH. This statement is intended to demonstrate the feasibility of construction without harm to the retained tree resource on the site. See material accompanying this report for full scheme details.
- 1.1.2 This document lays down the methodology for any proposed works that may have an effect upon the trees on and adjacent to the site. It is essential within the scope of any contracts related to the development proposals that this method statement is observed and adhered to. It is recommended that this document form part of the work schedule and specification issued to the building contractors and can be used to form part of the contract.
- 1.1.3 Copies of this document should be available for inspection on site. The developer will inform the local planning authority within twenty-four hours if the designated arboriculturist is replaced.

1.2 Terms of Reference

- 1.2.1 I am instructed by Mr Joshua Knowles of Quay Contracts to prepare an arboricultural impact assessment & method statement report to accompany a planning application for a proposed development at 1 Orchard Way, Fontwell, Walberton, West Sussex, BN18 0SH with reference to BS5837:2012 Trees in relation to design, demolition & construction-Recommendations (BS5837:2012).

1.3 Development Proposals & Impact Assessment

- 1.3.1 See section 1.1.1 and accompanying material for full details of the development proposals. Further to consultation with ADC the two dwellings have been shifted further west: blue dotted outlines show previous proposals & grey outlines are current.
- 1.3.2 None of the surveyed trees will be removed to allow or facilitate development. The face of the young cypress screen (G3) will be trimmed back to the boundary for clearance and the southern and south western crown (asymmetric in this direction) of the mature oak (2) will be reduced by up to 30% to deliver sustainable separation off the proposed structure(s): this suggested crown edge is shown in dotted outline on the tree protection plan at Appendix A. The orientation of tree 2 to the proposals is optimal in terms of shade, daylight & sunlight being directly north of the more eastern of the two proposed dwellings. The proposed reduction is acceptable in arboricultural terms (given the current marked crown asymmetry of tree 2) and is likely to deliver an acceptable separation between the proposed dwelling(s) and tree 2.

-
- 1.3.3 Patio hard standing within the root protection area (RPA) of tree 2 has been removed from the proposals to minimise pressure on the morphed root protection area (RPA) of tree 2. An asymmetric (morphed) RPA has been employed after discussion with Mr Mark Warwick the ADC tree officer to reflect the likelihood that roots of this important tree will be present within the site rather than under the busy road to the north. Soft ground near the dwelling(s) & within the RPA of tree 2 will be protected through the course of development by ground protection as detailed in section 2.2.1 and at Appendix E.
- 1.3.4 The likely encroachment from the proposals into the RPA of tree 2 requires a specialist helical screw piled foundation such as those supplied by ABC Anchors. Further detail is provided in Appendix F. The use of this system has proven to be extremely satisfactory on previous projects.
- 1.3.5 The single storey element of each dwelling will be founded on a shallow concrete raft to ensure that the impact on any roots in these areas (a combined circa 5.5% encroachment into the RPA of tree 2) is kept to a low and acceptable minimum.
- 1.3.6 The great majority of site works will take place beyond the RPA of retained trees and canopies. Retained trees will be protected through the course of development by fencing to the specifications recommended by BS5837:2012-see Appendix C for details.

1.4 Sequence of Works

- 1.4.1 The sequence of works should be as follows:

- ¿ recommended tree works-see Appendix B
- ¿ erection of new permanent boundary fence
- ¿ installation of Tree Protection Barrier (TPB) for construction on suggested line(s)
- ¿ laying of ground protection where indicated (2.44m x 4.27m dura-base sheets see Appendix E)
- ¿ laying of service runs as required
- ¿ main construction of new driveway & dwellings
- ¿ removal of ground protection & TPB
- ¿ soft landscaping if envisaged

1.5 Site Supervision

- 1.5.1 Site supervision' an individual e.g. the Site Agent, must be nominated to be responsible for all arboricultural matters on site. This person must:
- ¿ be present on site for the majority of the time
 - ¿ be aware of the arboricultural responsibilities
 - ¿ have the authority to stop any work that is causing, or has the potential to cause, harm to any retained tree
 - ¿ be responsible for ensuring that all site operatives are aware of their responsibilities toward trees on site and the consequences of the failure to observe these responsibilities
 - ¿ make immediate contact with the local authority and/ or the designated arboriculturist in the event of any tree related problems occurring, whether actual or potential

1.6 Site Monitoring

- 1.6.1 The site agent will be responsible for monitoring all arboricultural works, inspecting protective fencing and monitoring any works within exclusion zones. The designated arboriculturist will be available for site visits on a basis to be agreed between client and planning authority when/ if appropriate or required i.e. during key phases. On this basis supervision from the designated arboriculturist will be necessary to confirm that ground protection has been laid over the required areas to the correct specification and during installation of helical screw piles (at minimum) and on a monthly basis thereafter until construction works are completed. A record of site visits will be maintained for inspection on site and copies forwarded to the developer/ agent and to ADC. A certificate of practical completion should be produced for sites deemed by all parties to merit this.
- 1.6.2 Principal contact information: 1/. James Bell. Arbortrack Systems Ltd. Arboricultural Consultant 07986 122074. 2/. Mr Mark Warwick ADC Arboricultural Officer. 01983 737500 or email mark.warwick@arun.gov.uk. 3/. Mr Joshua Knowles. Quay Contracts. 07849076592. 4/. Site agent details to be advised.

1.7 Statement Adoption

- 1.7.1 It is recommended that, in due course, acceptance of the recommendations in this report is demonstrated by, for example, the architect specifying in writing to the building contractor that tree care conditions apply in execution of the contract, and by an estimate or written undertaking from the contractor to the architect demonstrating that the practical aspects of observation of such recommendations have been priced in.
- 1.7.2 If conflicts between any part of a tree and the building arise in the course of development these can often be resolved quickly and at little cost if a qualified arboriculturist is consulted promptly. Lack of such care is often apparent quickly and decline and death of such trees can spoil design aims and can of course affect saleability, and reflect poorly on the construction and design personnel involved. Trees that have been the recipients of careful handling during construction add considerably to the appeal and value of the finished development.

2.0 Pre-Development Site Preparation

2.1 Arboricultural Works

- 2.1.1 See Appendix B for full details of tree works required to allow or facilitate development.

2.2 Preparation of Surfaces

- 2.2.1 Areas within RPAs potentially requiring ground protection are shown in Appendix A. Ground protection should be fit for purpose as per guidance in BS5837:2012 section 6.2.3.3. The preferred specification is provided by products such as dura base or eve trakway, which are widely available and approved by many local authorities. Alternatively, treatments provided by InfraGreen Solutions are available: see www.infragreen-solutions.com. See Appendix E for dura base details.

2.3 Installation of Tree Protective Barrier

- 2.3.1 The TPB must be comprised of a vertical and horizontal scaffold framework, braced to resist impacts, with vertical tubes spaced at a maximum level of 3m. On to this weldmesh panels should be securely fixed with wire scaffold clamps: see section 6.2.2 and Figure 2 of BS5837:2012 (Appendix C). Hardboard or marine ply sheets can be used as an alternative to weldmesh panels but these must be firmly fixed to the framework. The location of the TPB is shown in Appendix A.
- 2.3.2 This TPB is to be erected before any construction work commences on site, is to remain 'in situ' undamaged for the duration of all work or each phase, and is only to be removed once all work is completed. If any work other than preparatory tree work is deemed necessary prior to the erection of fencing the designated arboriculturist should be informed to enable his/ her presence to oversee the work being carried out.
- 2.3.3 The only other exception is the completion of soft landscaping but if any excavations, however minor, are to be carried out as part of soft landscaping within RPAs, an arboricultural assessment must be carried out beforehand and any arboricultural protection measures incorporated. The TPB should carry waterproof warning notices denying access within RPAs.
- 2.3.4 The Tree Protection Plan in Appendix A illustrates where the protective fencing should be located to form the boundary of the Tree Protection Zone (TPZ). The TPZ is an exclusion zone and suitable steps should be taken to prevent access by pedestrians and vehicles and the storage of any works materials and equipment should be located outside of the TPZ.

2.4 Pre-Development Site Inspection

- 2.4.1 At the instigation of the client/site agent or ADC, upon erection of the fencing the designated arboriculturist will meet the relevant local authority member on site to check the standard of the work(s). If there are any amendments to the protective fencing these will be agreed at this meeting, confirmed in writing, and undertaken thereafter.

3.0 Development Phase

3.1 General Precautions

- 3.1.1 No fires shall be made on any part of the site, or within 10m of the furthest extent of the canopy of any tree or group tree to be retained on site or on land adjoining.
- 3.1.2 No spilling or pouring of fuels, oils, solvents or tar shall be made on any part of the site.
- 3.1.3 No materials that are likely to have an adverse effect on tree health such as oil, bitumen or cement will be stored or discharged within 10 metres of the trunk of a tree that is to be retained.
- 3.1.4 No spillage or discharge of wet mortar or concrete shall be made on any part of the site.
- 3.1.5 No storage of materials shall be made within the protective fences.
- 3.1.6 No breaching or moving of the protective fences shall occur without the approval of the designated arboriculturist.
- 3.1.7 Alterations in levels within the tree protection fence areas shall be avoided.

3.2 Root Protection Areas

- 3.2.1 The RPA is a desirable zone of protection around the trees' rooting system and these have been marked on the plan in Appendix A. The RPAs will lie within the TPZ and therefore, be fully fenced off (see Appendix A) unless where appropriate ground protection is offered.

3.3 Site Access, Accommodation & Storage

- 3.3.1 Many site activities are potentially damaging to trees e.g. material storage, parking, soil compaction and the use of plant machinery. In this latter example particular care is required to ensure that the operational arcs of excavation and lifting machinery, including their loads, do not physically damage trees when in use or in accessing the site.

3.4 Routing & Installation of Services

- 3.4.1 It is assumed that service runs will be brought into the site in a manner that avoids the RPAs of retained trees.
- 3.4.2 Where crown interference with mature trees is a possibility, over-ground services will be routed in an alternative direction. In relation to this, any landscaping taking place should accommodate the presence of over-ground services and take mature tree size into account.

3.5 Demolition Measures (n/a)

3.6 Changes in Grade

- 3.6.1 The upper layer of top soil (top 60cm) contains the majority of a tree's roots and if this is disturbed by a change in ground level, serious damage can be caused. On this basis, as a minimum, level changes should be avoided within RPAs.
- 3.6.2 If any significant section of ground level requires raising within RPAs, this should be achieved using coarse, granular material such as pebbles. See section 7.4.4.4 of BS5837:2012.
- 3.6.3 If ground levels need to be altered within 1.5 metres of any tree trunk prior agreement must be sought and given by the local authority tree officer.

3.7 Construction Measures

- 3.7.1 A helical screw piled foundation will be employed for the two storey element of the dwelling whose main footprint encroaches the RPA of tree 2. The rig installing these piles must operate either from outside the RPA of tree 2 or from off dura base ground protection. See guidance from ABC Anchors at Appendix F for further guidance on helical screw pile installation.

3.8 Removal of Tree Protective Barrier

- 3.8.1 The protective fencing may be removed only upon completion of the development phase when all drainage and service runs have been installed and any site machinery has been removed.

3.9 Post Construction Landscaping

- 3.9.1 Following the developing phase, some trees may be subject to either landscaping or seeding beneath their canopy but at this stage the protective fencing will have been removed.
- 3.9.2 Any approved landscaping works should avoid the changing of ground levels or deep digging. Mechanised cultivation such as tractor-mounted rotovation must not be used within the RPAs of existing trees.
- 3.9.3 Heavy machinery should not be used in the vicinity of any retained trees.
- 3.9.4 If herbicides are to be used they should be appropriate to their purpose and not in such a way as to damage any retained trees or vegetation.
- 3.9.5 Ideally, retained trees should be within a shrub area as this reduces the chances of compaction and disturbance of root systems.

4.0 Summary of Proposed Methods

4.1 Table of Impacts and Mitigation

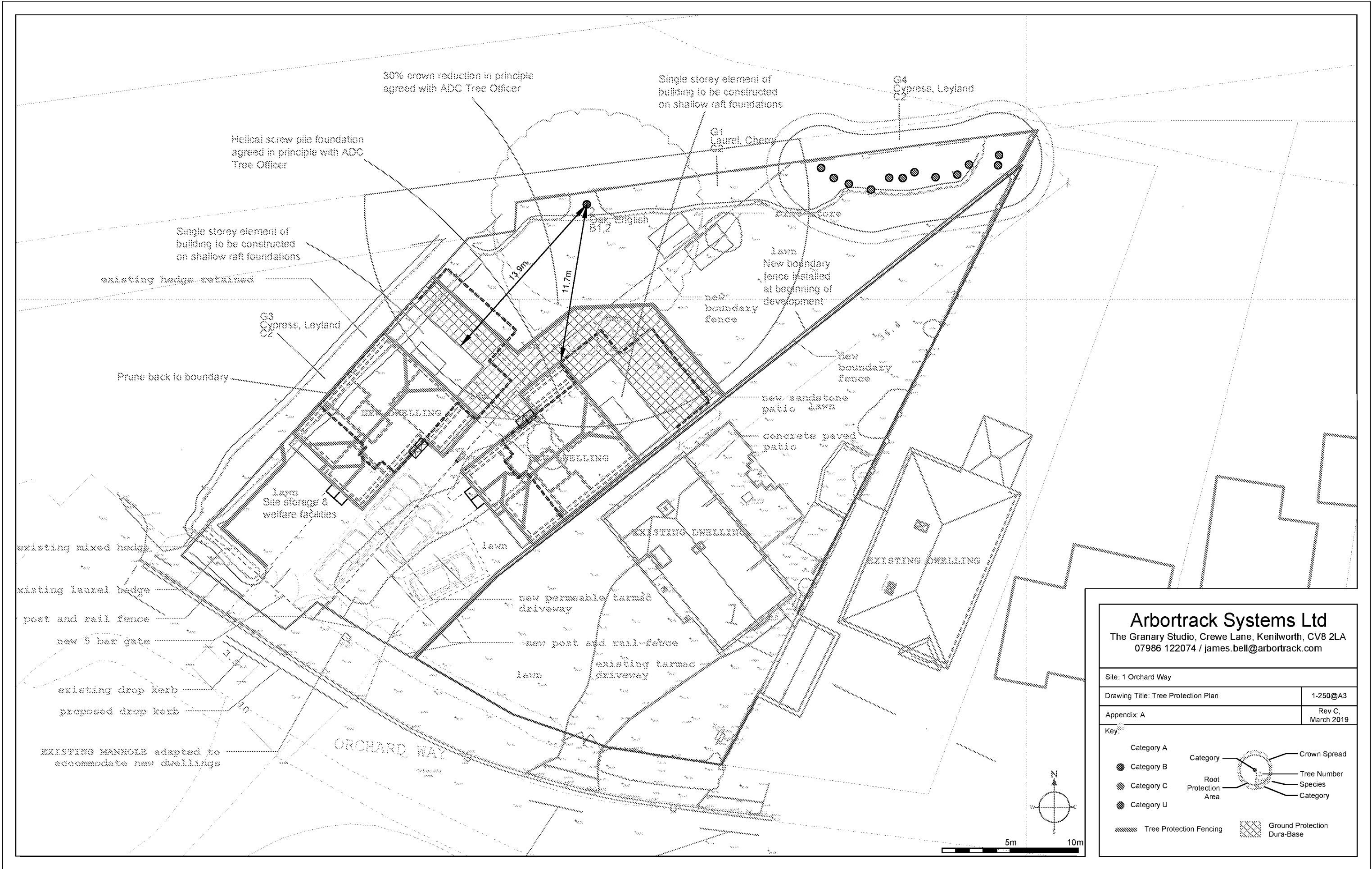
- 4.1.1 The table below summarises the main areas where trees could become damaged by the proposed development and the methods that need to be adopted in order to prevent such damage:

<u>Impact</u>	<u>Mitigation</u>	<u>Reference</u>	<u>Trees Affected</u>
Passage of machinery and storage of materials over RPAs	Construction of protective fencing to acceptable standards Ground Protection	Sections 2.3. Fencing spec Appendix C, Tree Protection Plan Appendix A Section 1.3.3, 2.2.1 & Appendix E	2
Foundation installation within RPAs	Helical screw piles installed with rig working off hard standing or outside RPA	Sections 1.3.4, 3.7.1 & Appendix F	2

5.0 Completion

5.1 Completion Meeting

- 5.1.1 Following completion of the approved works on site, the designated arboriculturist will meet with a local authority representative and agree upon any remedial works deemed necessary (if any).
- 5.1.2 Any works agreed in the above meeting will be confirmed in writing and should be performed to BS3998:2010.
- 5.1.3 Any work proposed post development should be checked to avoid penalty for performing illegal work on a protected tree.



Arbortrack Systems Ltd

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Site: 1 Orchard Way

Drawing Title: Tree Protection Plan

1-250@A3

Appendix: A

Rev C,
March 2019

Key

Category A

Category B

Category C

Category U

Tree Protection Fencing

Ground Protection Dura-Base

Category

Root Protection Area

Crown Spread

Tree Number

Species

Category

Site: 1 Orchard Way Fontwell

Date: 27th November 2018

Appendix B

BS5837:2012 Tree Survey Schedule

Arbortrack Systems Ltd

07986 122074

Surveyor(s): James Bell

Ref: jwmb/rpt1/fernbreeze/1orchardway



Tree No.	English Name	Height	Crown Spread				Ground Clearance	Stem Diameter	Protection Radius	Age Class	Growth Vitality	Structural Condition	B S Cat	Sub Cat	Useful Life	Comments
			N	S	E	W										
G1	Laurel, Cherry	3.5	1.25	1.25	1.25	1.25	0	75 #	0.9	Semi-mature	Normal	Good	C	2	20+	Boundary screen
2	Oak, English	23	7	11	8.5	7	8	1060	12.7	Mature	Normal	Good	B	1,2	>40	CS10m @ 232 degrees 3 branches in SE lower crown removed inappropriately
G3	Cypress, Leyland	4	.75	.75	.75	.75	0	100 #	1.2	Young	Normal	Good	C	2	20+	
G4	Cypress, Leyland	15	4	4	4	4	0.5	260	3.1	Early Mature	Normal	Good	C	2	20+	Drought stress needle browning Effective screen 11

Site: 1 Orchard Way Fontwell

Date: 27th November 2018

Appendix B Recommended Tree Works

Arbortrack Systems Ltd

07986 122074

Surveyor(s): James Bell

Ref: jwmb/rpt1/fernbreeze/1orchardway



Tree No.	English Name	Height	Stem Diameter	Crown Spread				BS Cat	Sub Cat	Recommended Works	Comments / Reasons
				N	S	E	W				
2	Oak, English	23	1060	7	11	8.5	7	B	1,2	Crown reduce to south by up to 30% maximum	CS10m @ 232 degrees 3 branches in SE lower crown removed inappropriately To facilitate development
G3	Cypress, Leyland	4	100	.75	.75	.75	.75	C	2	Cut back for clearance	To facilitate development

Appendix B

Notes on Tree Survey Schedule:

- ¿ Height describes the approximate height of the tree measured in metres from ground level.
- ¿ The Crown Spread refers to the crown radius in metres from the stem centre and is expressed as an average of N SE W aspect if symmetrical.
- ¿ Ground Clearance is the height in metres of crown clearance above adjacent ground level.
- ¿ Clear Stem Height is the distance between trunk base and first branch separation measured in metres.
- ¿ Stem Diameter is the diameter of the stem measured in millimetres at 1.5m from ground level for single stemmed trees. See section 4.6 for detail of treatment for multistems.
- ¿ Protection Radius is a radial distance in metres measured from the trunk centre.
- ¿ Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/ weak), Dead (dead or dying tree).
- ¿ Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present.
- ¿ B.S. Category refers to (British Standard 5837:2012 Table 1) and refers to tree/ group quality and value; 'A' - High, 'B' - Moderate, 'C' - Low, 'U' - Unsuitable for Retention.
- ¿ Sub Cat refers to the retention criteria values where 1 is mainly arboricultural qualities, 2 is mainly landscape qualities and 3 is mainly cultural values including conservation.
- ¿ Useful Life is the tree's estimated remaining contribution in years.
- ¿ First Significant Branch (FSB) is the height of the first significant branch above ground level taken at the trunk separation point.

Notes on Recommended Tree Works:

1, 2,3	Urgent (ASAP), Standard (6-12 months), Non-Urgent (2-3 years)
CB	Cut back to boundary/ clear from structure
CL#	Crown lift to given height in meters
CT#%	Crown Thinning by identified %
CCL	Crown clean (remove deadwood/ crossing & hazardous branches & stubs)
CR#%	Crown Reduce by given maximum percentage (of outermost branch & twig length)
DWD	Remove deadwood
Fell	Fell to ground level
FInv	Further Investigation (generally with decay detection equipment)
Pol	Pollard or re-pollard
Mon	Monitor ongoing condition (annually by staff/ owners & every 2-3 years by consultant). Svr Ivy/ Clr Bs Sever Ivy/ clear base and re-inspect base/ stem for concealed defects

Appendix C Tree Protective Fencing Detail (from BS5837:2012)

Figure 2 Default specification for protective barrier

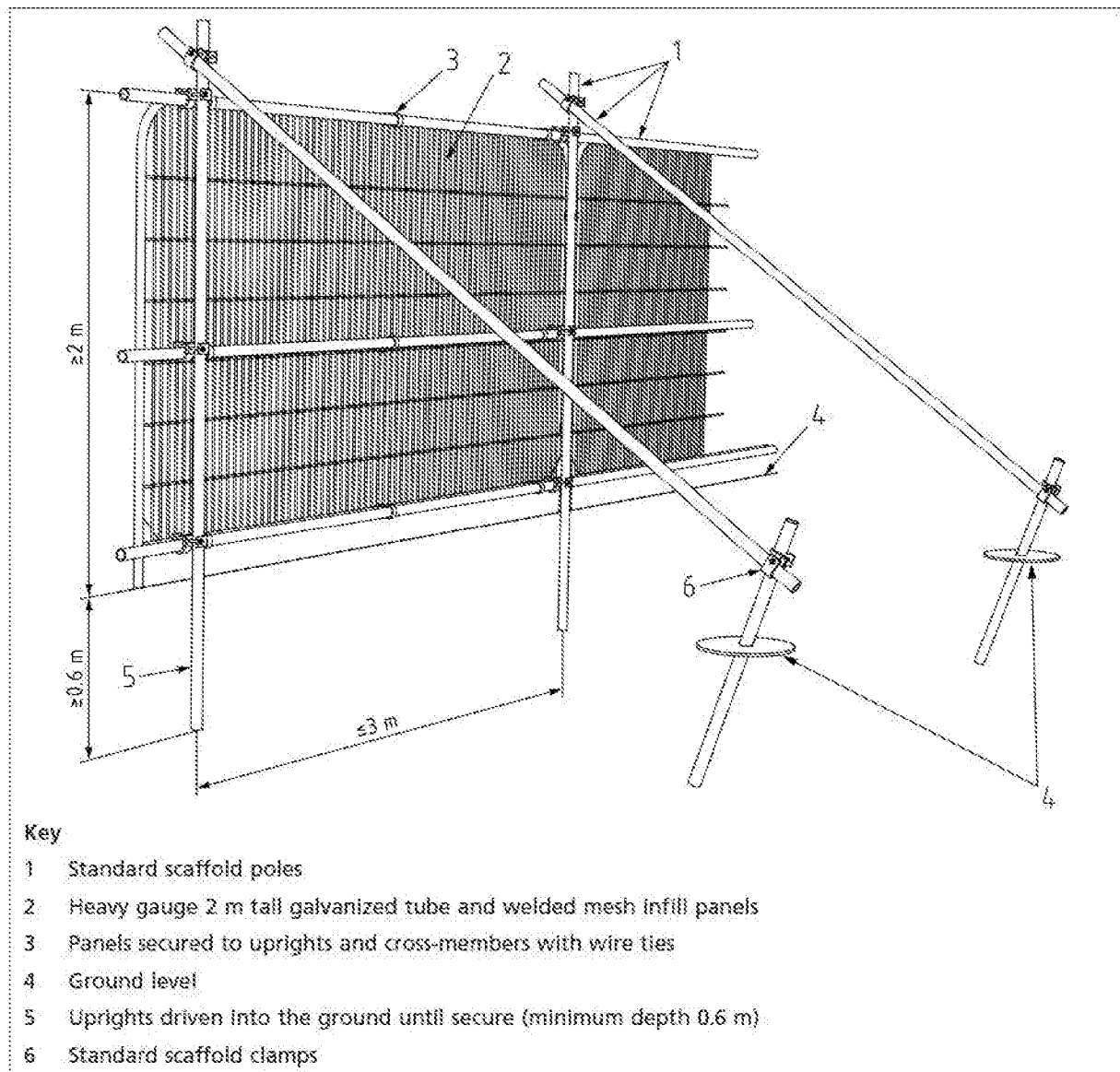
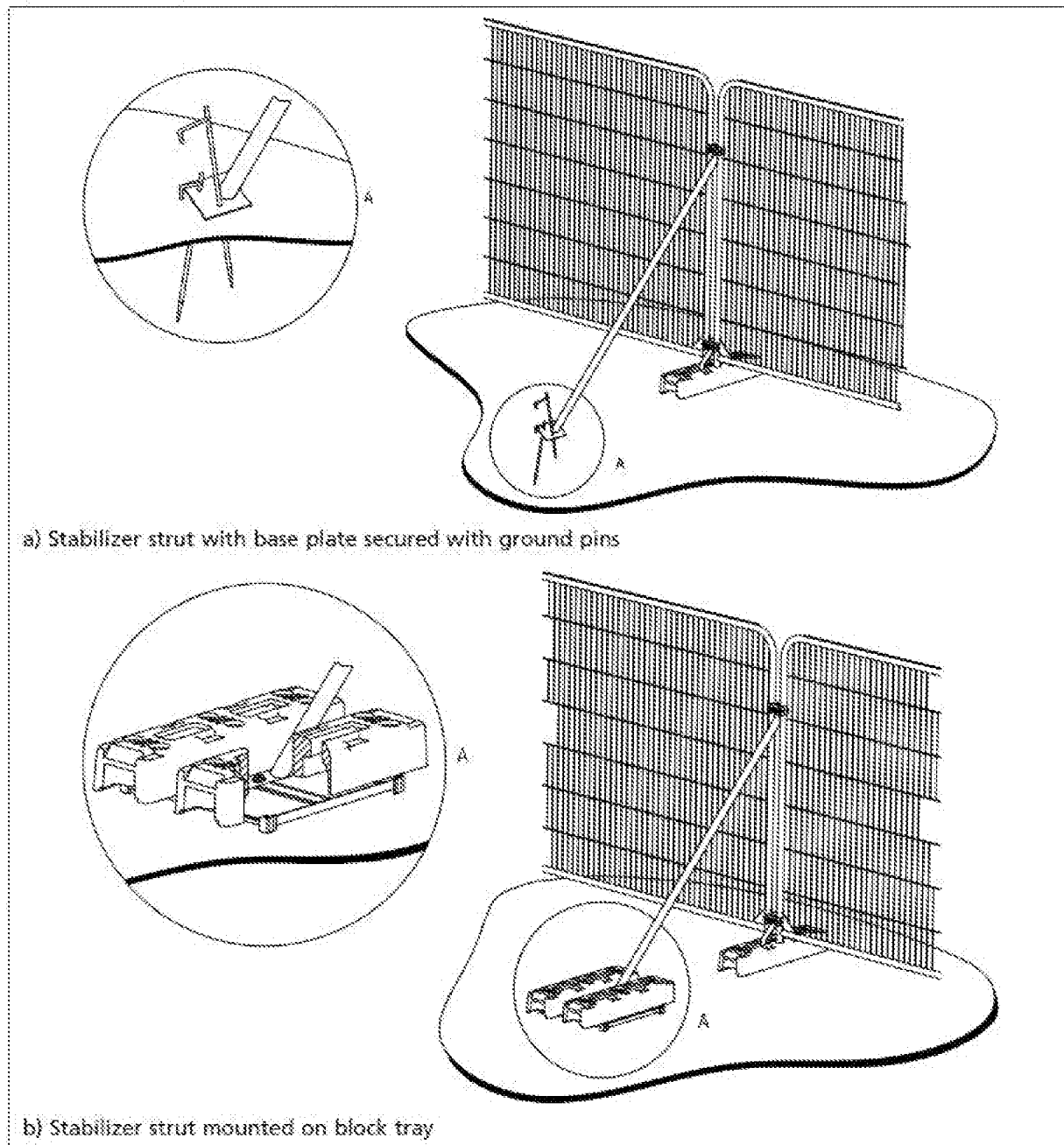


Figure 3 Examples of above-ground stabilizing systems



Appendix D

1.0 Glossary of Terms & Abbreviations

Canker	Disease damaged area of a tree, usually caused by fungus or bacteria.
Co-dominant Stem	A stem which has grown in direct competition to the main stem and which has formed a substantial size influencing the appearance of the tree.
Crown Lift	The removal of the lowest branches, usually to a given height. It allows more residual light and greater clearance underneath for vehicles etc.
Crown reduce	The reduction of a tree's height or spread while preserving its natural shape.
Crown thin	The removal of some of the density of a tree's crown, usually 5-25% allowing more light through its canopy and reducing wind resistance.
Deadwood	The removal of all dead, dying and diseased branches from a tree. Also, wood which is dead.
Dieback	Where branches are beginning to show signs of death usually at the tips in the crown.
Epicormic shoots	Small branches that grow in uncharacteristic clusters around the base or the stem of a tree, usually as a result of bad pruning or some other stress factor.
Formative pruning	The trimming of a tree to remove weaknesses and irregularities which may lead to problems. The formative pruning operation is aimed at reducing the potential for future weaknesses or problems within the tree's crown.
Included bark	Where the bark on two adjoining branches or stems is growing tight together, forming a joint with limited physical strength.
Pollarding	A method of tree management in which the main trunk of the tree is cut at about 4m, and the resulting branches are then cropped on a regular basis.
Remedial pruning	The removal of old stubs, deadwood, epicormic growth, rubbing or crossing branches and other unwanted items from the tree's crown. Sometimes referred to as crown cleaning.
Topping	Topping is a form of pruning that removes terminal growth leaving a 'stub' cut end. Topping causes serious health problems to a tree.

2.0 General Guidelines

- 2.1 All work must be to BS 3998:2010 – Tree work-Recommendations
- 2.2 Staff carrying out the work must be qualified, experienced and ideally be Arboricultural Association approved contractors, and should be covered by adequate public liability insurance.
- 2.3 Any defects seen by a contractor or the client that were not apparent to the consultant must be brought to the consultant's attention immediately.
- 2.4 No liability can be accepted by the consultant in respect of the trees unless the recommendations of this method statement are carried out under the supervision of the designated arboriculturist.
- 2.5 It is advisable to have trees inspected by designated arboriculturist regularly. On this site it is recommended that these inspections are made every year.

APPENDIX E

TerrafirmaTM



Site Access Solutions

DURA-BASE[®]
Composite Mat System

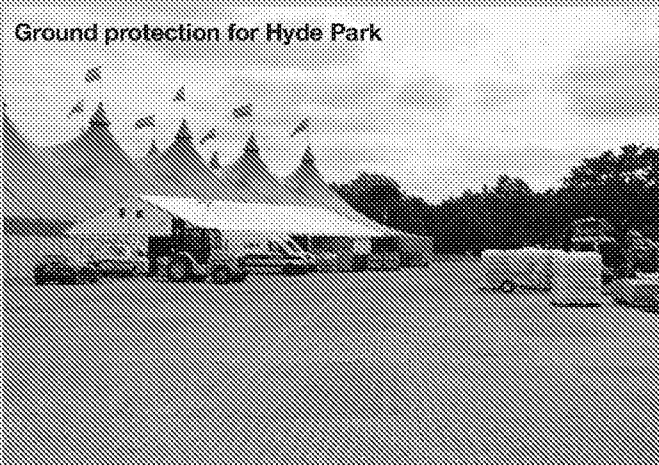


DURA-BASE®

If your temporary roadway or work platform calls for strength, durability, and versatility, Dura-Base Composite Plastic Mat System is your first choice.

Manufactured from High Density Polyethylene (HDPE) plastic, Dura-Base mats provide the ultimate in temporary road surfaces. When you need access to difficult terrain such as grasslands, wetlands, marshland, fields, or any other environmentally sensitive area, Dura-Base provides a lasting, cost-effective solution.

Ground protection for Hyde Park



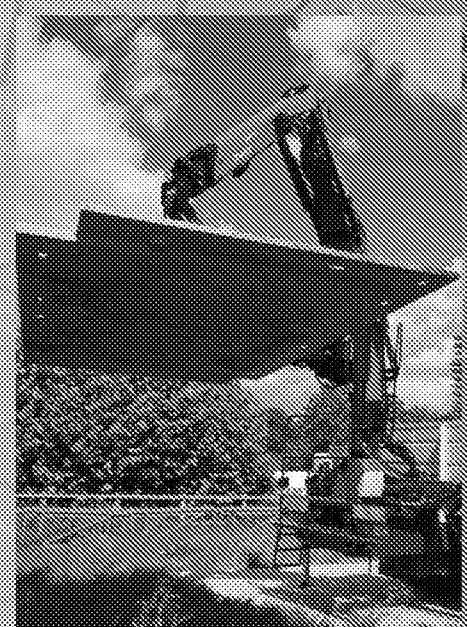
Construction



One access solution that covers all the bases.

Dura-Base mats provide all-weather performance and have been proven 'invaluable' for use in all industry applications, including utilities involved in the construction and maintenance of oil, gas, transmission and water installations.

Safe and efficient installation/recovery system.



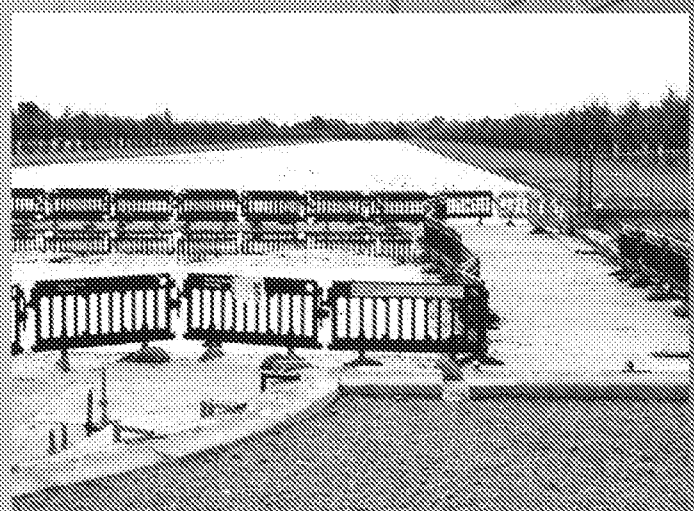
Dura-Base and the Environment

- The original concept of temporary roadway systems was designed to get you from A to B, not necessarily to protect soil or the environment. Dura-Base has been engineered as a development from that original concept.
- Frequently, temporary roadway construction takes place on farmland and the resulting damage can have far reaching consequences.
- The Dura-Base system causes less damage to soil structure and vegetation, thereby aiding fast recovery of the site.
- No additional protective materials are required when installing Dura-Base on tarmac, york paving, Astroturf etc.
- Due to the unique Dura-Base design, mud, water or soil cannot ingress the mat, so reduces the likelihood of soil born viruses being transmitted or spread.

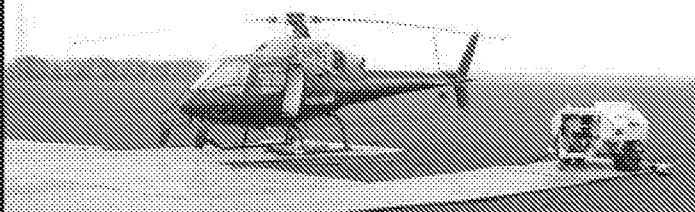
Safety and Security

- Health and safety is vital, whether installing, using or recovering temporary roadways.
- Installation of Dura-Base mats is quick and simple. No nuts, bolts or power equipment are needed, so there is less risk of injury or accident.
- Terraforma Roadways specially designed Terra Multi Grab (TMG) adds to safety during installation and recovery.
- The TMG has been further developed to operate on a telehandler, ensuring safe installation under high voltage lines or in buildings.
- The non-slip tread pattern on the mats provides a safe working surface, with no trip hazards. The overlap design prevents soil and water penetration, resulting in a cleaner, safer working environment.
- Using Dura-Base mats for your roadway and hard standing eliminates the need for manned security including all the health and safety implications that it brings.

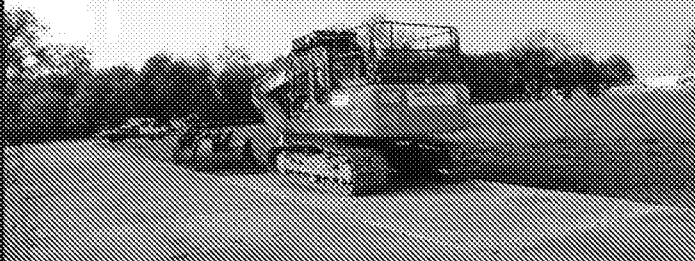
Floating pontoon at Hampton Court



National Grid heli-pad



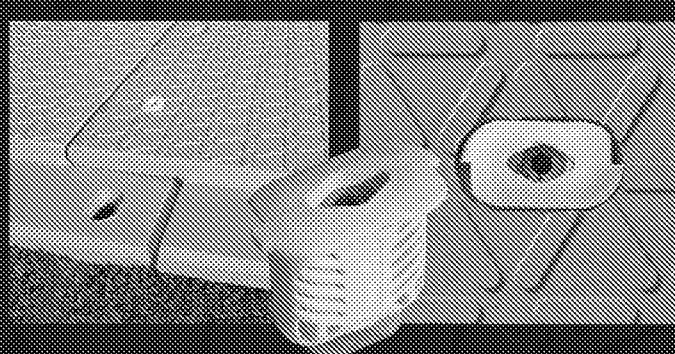
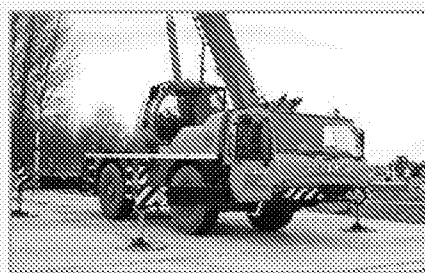
Takes Track layers with ease



Heavy crane



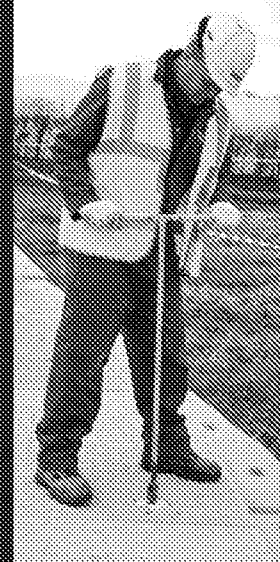
High point loading - no problem



It's not plastic, it's dura-base



Easy install



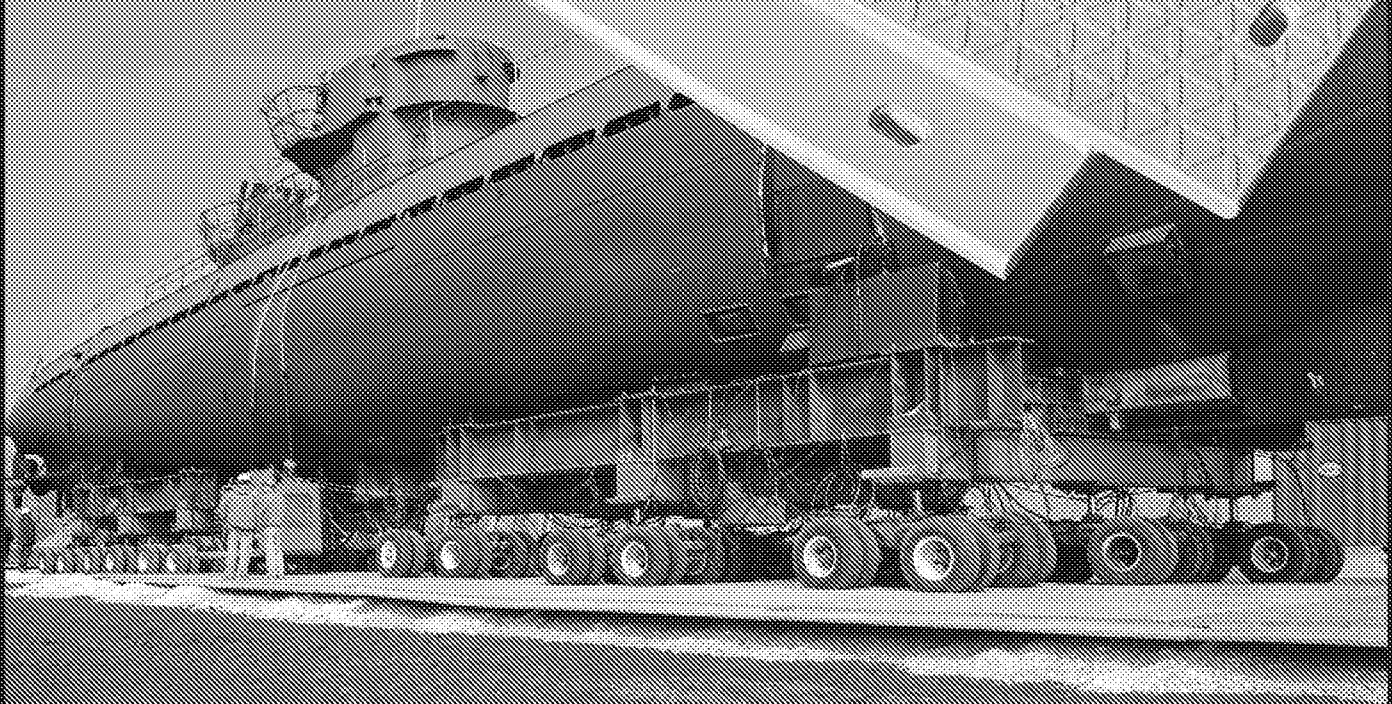
DURA-BASE[®]

Composite Mat System

- Each mat measures 2.44m x 4.27m x 10.8 cm thick and weighs approximately 477 kg.
- Usable surface 3.96 x 2.13m
- Directional mats are also available.



700 Ton submarine



Safe installation under live lines or restricted headroom



DURA-BASE®

Why Choose Dura-Base?

- No need for security
- The Dura-Base twist-lock fastener secures each mat with a single 90° turn
- No nuts, bolts, joining plates or additional tools
- Safer to install than aluminium systems and less strenuous for the crew members, with little or no stress put on the back
- Less chance of slipping with the 300mm overlapping lip system. This provides a continuous barrier between the ground and mat, with little chance of mud coming up between the mats
- No trip hazards on the working surface
- Dura-Base floats on water allowing safe pedestrian access
- Easy to clean, wet or dry
- Follows surface contours for flexibility on the most arduous terrain
- Compatible with the heaviest vehicles and plant. Each mat can support compressive loads of up to 40kg-cm²
- Eliminates static build-up. The plastic contains an additive to increase conductivity, allowing the charge to disperse
- Each mat is manufactured with a built-in RFID (Radio-Frequency Identification) chip to help track inventory

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APPENDIX F



Screw Piling Near Protected Trees

Technical Bulletin 17-12/01:

The Protection of Trees by Law

Trees form an integral part of our natural and built environment – providing a multitude of visual, environmental & societal benefits. Local Planning Authorities have the power to protect trees which bring significant amenity &/or benefit to the local area. This protection is particularly important where trees are under threat.

Any number of trees, of any type or combination of types can be protected under a legal notice known as a Tree Preservation Order (TPO) although hedges, bushes or shrubs are not usually protected. Generally a TPO is issued by an LPA in response to the submission of a planning application for a new house, building or structure.

A TPO has the power to halt any amendments or works planned on or near a tree. Trees can also be protected through specific conditions within a planning application response without a TPO being issued.

Impact on Developers

Being issued with a TPO typically means that a Developer or Home Owner will need to show they have met specific conditions put in place to protect the trees on their land from being damaged, altered or removed. Planning permission will not be granted before these and any other conditions have been proven to be met.

Root Protection Areas/Zones

Often the term ‘Root Protection Area’ or ‘Root Protection Zone’ is used. The definition of an RPA or RPZ is as follows:

“[A] Root Protection Area is defined as a layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree’s viability, and where the protection of the roots and soil structure is treated as a priority”

Woodland Trust (2017)¹

Specifying an RPA/RPZ helps planning authorities demarcate an area around a protected tree in which any construction work must meet certain conditions and stipulations.

The Role of a Project Arboriculturalist

An Arboriculturalist is an amenity tree specialist knowledgeable in all aspects of the growing, maintaining and removing of woody plants for any reason other than as a timber crop.

¹ <https://www.woodlandtrust.org.uk/blog/2017/09/root-protection-order/>



Commissioning an assessment of the trees on your development site should be considered as early as possible in the project programme. This will help identify any trees of interest (pre-empting possible TPOs and influencing the design early on) and provide an idea of potential RPA sizes. Often an Arboriculture report will be requested by the LPA to support your planning application at some stage regardless so it helps to have this early on.

Structural Foundations in Root Protection Areas

“Much of the damage that can be done to trees by construction occurs below the ground, and so if you are planning to build within an RPA foundation design is critical. One of the most significant issues of building around trees is severing roots. In extreme cases this can cause the tree to fall over (the issues this might create for a new building are clear), but will more likely cause the tree to die slowly as its nutrient supply is cut off. Essentially this means that traditional trench foundations in RPAs are out, unless they will only clip a small area.”

Archio (2017)²

The preferred alternative to traditional foundations when building in RPAs is to use small diameter piles. Piled foundations limit potential damage to roots during installation, and ensure no part of the tree bears the loads from the structure.

Micro Piling vs Screw Piling

Local Planning Authorities will often allow buildings or structures to be built within an RPA if they are supported by Micro Piles or Screw Piles.

There are many different forms of Micro Piles in use in the UK, mainly manufactured from steel or concrete or a combination of the two. They are typically pre-fabricated and driven in (using a percussion rig or vibratory action), or preaugured and cast in situ. Micro piles provide an excellent foundation system in the correct situation.

Installing virtually any type of micro pile will create a hole up to 300mm diameter to the required depth which involves fully displacing or removing soil or tree roots in the intended pile location. This creates a suitable hole to allow a pile to be driven in or cast into place but at the expense of root damage.

Screw piles are a far less invasive foundation system. A screw pile consists of a slender, hollow steel shaft with a small number of steel helices (or screw threads) welded to it. As an indication, the largest screw pile in the ABC Anchors range – the 89R - has a pile shaft outer diameter of 89mm, a maximum helix diameter of 350mm, a maximum helix thickness of 20mm but can support 25 tonnes as standard.

Installing screw piles is a smooth and steady process whereby screw piles are rotated into the ground using a handheld or excavator mounted torque head. Installation occurs at a constant speed, inducing no vibration and requiring no pre-auguring.

² <http://archio.co.uk/blog/2015/09/03/how-close-can-you-build-trees-part-3/>



A screw pile displaces a comparatively small amount of soil & tree roots compared to a traditional micro pile. The helices attached to the screw pile shaft are deliberately made from thin steel plate, with a blunt protruding edge to ensure that where possible, roots are moved out of the way during installation rather than severing them. The pile shaft is considerably smaller than that of a micro pile so again, displacement of soil and tree roots is minimised.

Screw Piles: Keeping Root Damage to a Minimum

Clearly there is no way that a pile can be installed through an existing root system without causing some damage, however it is key to the health of the tree to minimise this effect as much as possible. As previously discussed, micro piling requires the removal of all material in the position of the pile, including any tree roots encountered.

Based on experience, screw piling has been found to leave a good proportion of the tree roots intact following installation. It has been argued that screw pile installation acts to aerate the soil in which it penetrates, which has the added benefit of increasing oxygen supply to the root system.

Compression of soil containing tree roots by traditional foundations has been shown to have a detrimental effect on the continued health of the tree. Compaction of soil reduces the passage of oxygen to roots during wet weather, and can cause the soil to become so dense that roots are no longer able to penetrate through it. Screw piles overcome this by supporting load directly on their constituent helices. These are placed well below the tree roots to ensure the root ball does not experience any loading influence or disturbance as a result of development.

Additional benefits of using screw piles

When installed as a deep foundation (4m+), screw piles are resistant to water movement in the soil (heave/shrinkage) experienced as a result of water uptake from the soil by the tree and therefore are ideally situated for use in high volume potential clays. Installing screw piles as an alternative to deep footings in such soils is often considerably cheaper.

Screw Piles are installed to a predetermined torque during the installation process. A well-established relationship exists between installation torque achieved and the final load capacity of the pile, so the final capacity of the pile can be calculated quickly on site. As no further pile testing is required once the pile is in the ground, there is no need to place the tree at further risk of damage through the use of testing equipment.

No heavy plant is needed to install a screw pile. The ABC Anchors handheld anchor driver weighs less than 100kg and is capable of installing a pile with a safe working load capacity of 73kN (factored). Our excavator mounted torque head (capable of installing piles with a SWL of 250kN (factored)) can be operated from a long reach excavator, which ensures that the root ball experiences no loading as a result of pile installation.

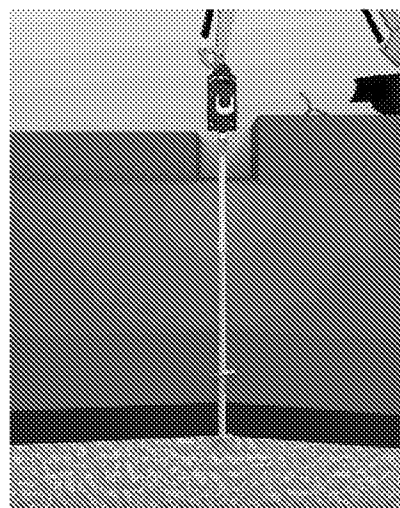
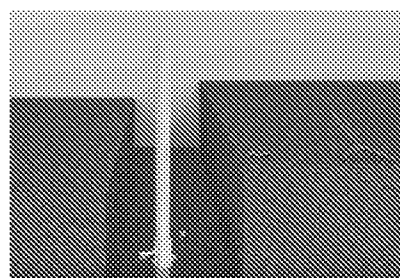
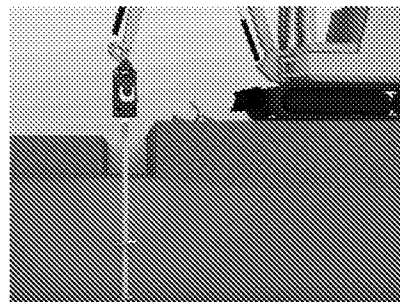
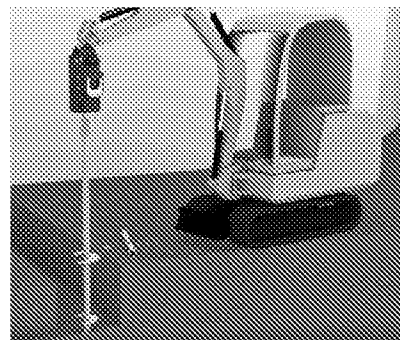
Typically screw piles are used in combination with a cast concrete ground beam system. This system is generally flexible enough to allow pile to be adjusted on site if any large tree roots are encountered and need to be avoided.



Screw Pile Installation Method

The typical screw pile installation method is described briefly below for reference.

1. Clear away vegetation in the area to be piled and check for underground cables, drains, pipes using appropriate equipment. Identify any major tree roots to be avoided in the intended pile locations.
2. Mount the powerhead to the excavator, remembering to connect the auxiliary hydraulics to the powerhead as per the detailed instructions supplied. Check for correct operation
3. Insert the upper end of the screw pile lead section into the anchor driver & secure with the drive pins supplied.
4. Position the anchor at the desired location and at a near vertical position screw the first helix into the ground.
5. When the first helix is buried, begin to make the angular adjustment to maintain verticality. Remember that final angular adjustments should be made before the second helix penetrates the ground.
6. When the installing tool becomes 300mm-500mm from the ground disconnect it from the section in the ground and reconnect it to the next extension.
7. Align the extension with the section in the ground and bolt them together. (Make certain that the bolt and nut are securely tightened)
8. Continue to drive the anchor and add extensions until the desired torque is reached and maintained; and the pile is installed to the correct depth and required height. It may be necessary to cut the pile to the desired length if it cannot be driven to a suitable depth in the ground.
9. Attach the terminations.



Industry Support

"Having specified and witnessed the installation of screw piles I consider they must be one of the most tree friendly foundation systems around. Easy to install from low ground pressure machines working on ground protection they can be installed without material impact to roots."

Jago Keen – Keen Consultants Ltd

