A.T.K. PARTNERSHIP
CIVIL & STRUCTURAL ENGINEERING
CONSULTANTS

STRUCTURAL APPRAISAL ON FOUNDATION OPTIONS

PROJECT : PROPOSED HOUSE at EAST END, LOCHWINNOCH

CLIENT : Mr D JOHNSTON

PROJECT REF NO : 16781

DATE : DECEMBER 2022

33 UNION STREET
GREENOCK
PA16 8DN

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Email: mail@atk-partnership.co.uk

1.0 Introduction

1.1 ATK Partnership were invited to review the options available to form the foundations for the proposed house with particular attention being paid to the close proximity to the existing trees.

2.0 Scope of the report

2.1 The scope of the following report was to investigate the various foundations readily available and to advise on the best solution. A site inspection was carried out on the 8th December 2022.

2.2 The investigation comprised a visual non-disruptive inspection of the site and no trial pits or boreholes were carried out.

2.3 A topographical survey was made available along with a tree condition report prepared by Ayrshire Tree Surgeons.

2.4 Photographs are also included which help to identify the density of the present growth on site.

3.0 Observations

3.1 The site comprises a long almost rectangular shaped site with a broader triangular shaped section to the rear. It lies opposite the church known as Auld Simon and at the junction of Johnshill and East End.

3.2 The proposed house will be detached, probably a one and a half storey built in timber frame construction and located as shown on the attached plan.

3.3 The main trees which will be closely affected are shown on the site plan along with others lying outwith the building area.

3.4 The construction using timber frame will be fairly light around 35kN/m and may have a brick outer cladding but also may have a timber cladding as an alternative.

3.5 The ground floor construction is likely to be a suspended concrete floor with integral insulation to help form the U-values.

3.6 Since the tree survey report some of the badly affected (rotted) trees have been taken down in line with the recommendations of the tree report.

4.0 Foundation options

4.1 Traditional strips

4.2 On the basis that the soil conditions are favourable and ordinary strip foundations are possible these would be expected to be constructed at around 600mm down from the proposed ground.

4.3 However the foundations will be prone to damage by the remaining roots of the trees and in line with guidance by the NHBC consideration must be given to the use

of trench fill concrete to take the excavations below the level of anticipated damage. Along with the use of trench fill it would be sensible to use a root barrier system to help prevent damage to the founds.

4.4 The excavations for the foundations may also do damage to the root infestation locally within the house footprint with any remaining trees also affected by this root loss.

4.5 **Raft Slab**

4.6 Due to the light loads involved a simple slab raft would also be a suitable option sitting on a cushion of compacted hardcore.

4.7 However due to the preferred detail of having a limited excavation the existing roots will still exist under the raft slab, probably through the hardcore, and may lead to structural damage to the slab in time.

4.8 **Piling**

4.9 Piling would be solution by excluding the loads being taken down on to the immediate sub-surface soils. Due to the nature of the piles involved the loads would be taken further down into the sub-soils and below the level of the expected root bowl. The perimeter walls and any internal loadbearing lines would be supported on concrete ground beams spanning between the piles.

4.10 The ground floor would be constructed with either a cast in-situ concrete slab supported on a permanent steel sheet formwork such as Holorib or Ribdeck. This would help to support the floor and span across the top of any root system below the footprint of the house. An alternative could the use of beam and block flooring which is a sectional floor system but again spanning clear between the ground beams.

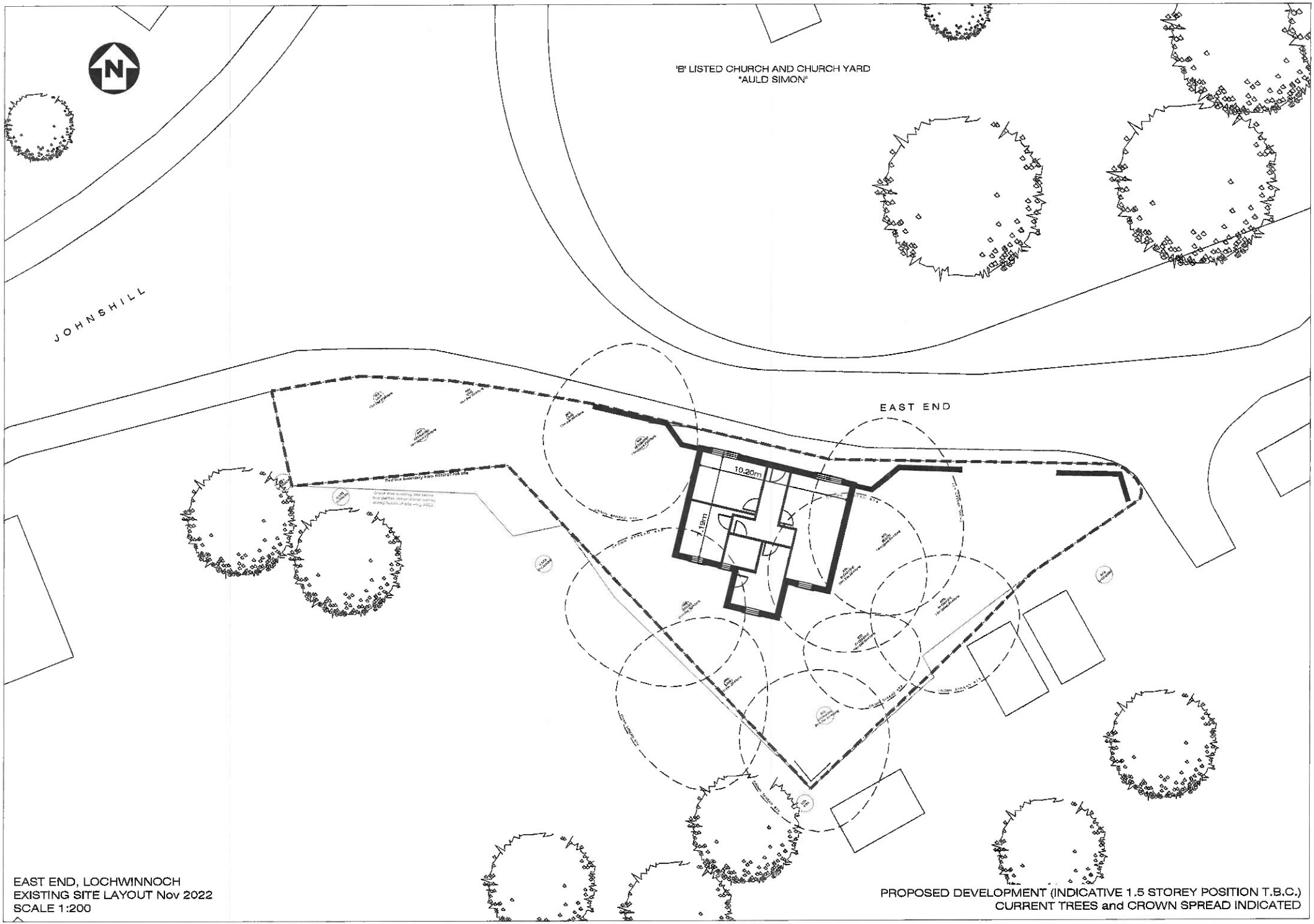
4.11 There are various piling systems available using driven steel tubes or continuous flight auger piles which all do the same job of transferring the loads below the sensitive areas.

5.0 Recommendations

5.1 On the basis of the above options and trying to limit the damage on site we are of the opinion that a system of piling using Shire stabilisers or similar would prove to be the best option. These are small scale piles developed for the domestic market and do not require heavy specialist plant that could damage shallow roots.

5.2 The advantage of using such a system is the small scale nature of the piles which are driven in manually without the need for heavy plant traversing the site. Should tree roots appear within the piling area it should be easy to move the location of the piles to miss these.

5.3 From the information available at this stage we are of the opinion that a suitable footprint of around 10 x 7m should be capable of fitting between the remaining trees. A final design can be agreed in due course.


'B' LISTED CHURCH AND CHURCH YARD
"AULD SIMON"
JOHNSHILL
EAST END
10.20m
7.15m
EAST END, LOCHWINNOCH
EXISTING SITE LAYOUT Nov 2022
SCALE 1:200
PROPOSED DEVELOPMENT (INDICATIVE 1.5 STOREY POSITION T.B.C.)
CURRENT TREES and CROWN SPREAD INDICATED

16781 – Proposed dwellinghouse at East End, Lochwinnoch – Site photos 8 / 12 / 22

View along East End looking towards Johnshill (Main Street)

View of possible development area with some trees felled in the distance

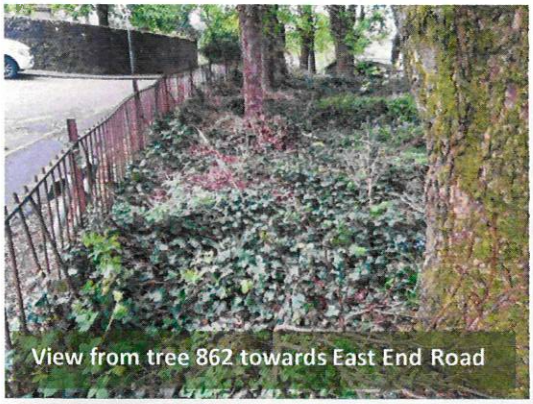
Tree Condition Survey

Land adjacent to the Old Simon Kirk, Johnshill
East end, Lochwinnoch

14th June 2022

Prepared for
Mr & Mrs Johnston

Prepared by
C. A. Calvey, P.T.I., Tech.Cert (Arbor.A), Cert.Arb (RFS), BA Hons.
Principal Arboricultural Consultant
Ayrshire Tree Surgeons Ltd


View from tree 862 towards East End Road

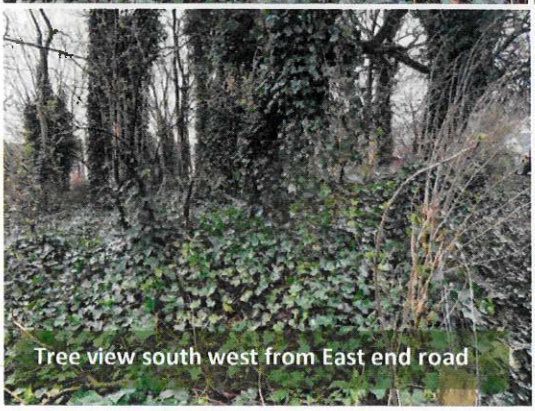

Ash 867 for removal

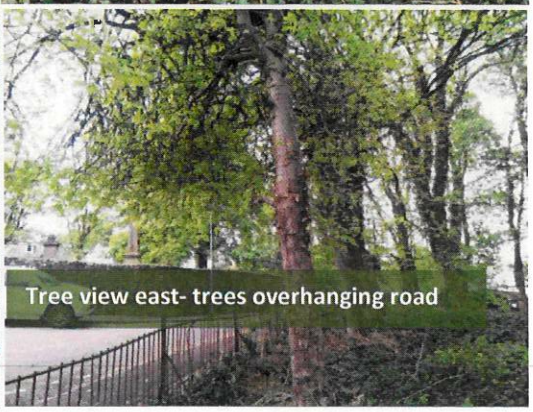

876 with basal decay for removal


Tree 870


Tree view south from East end road


Tree view west


Tree view south west from East end road

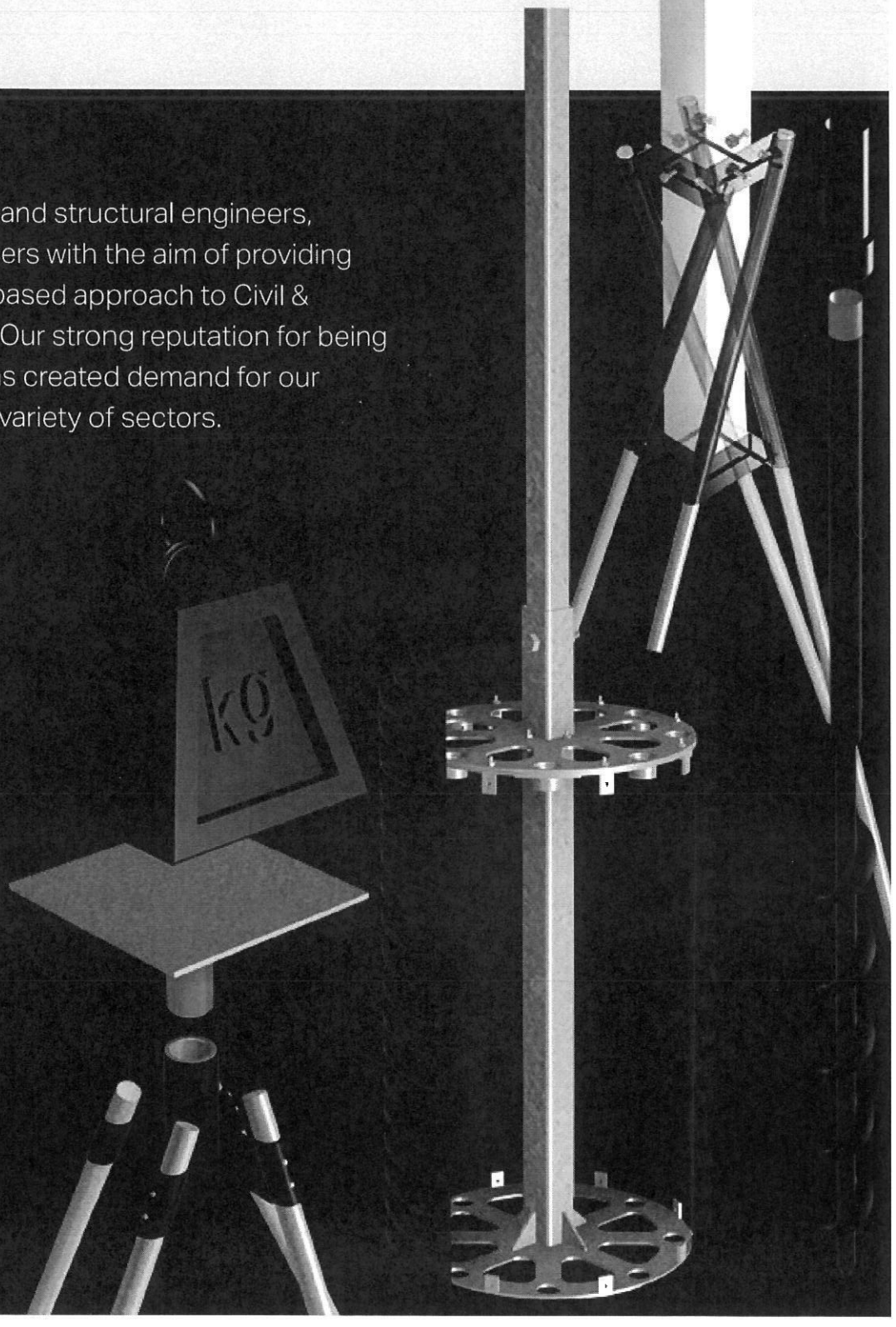

Tree view east- trees overhanging road

Shire

Innovation in Foundations

Bringing fresh thinking to civil & structural engineering

Shire are a team of civil and structural engineers, consultants and designers with the aim of providing a responsive, solution-based approach to Civil & Structural Engineering. Our strong reputation for being "Thinking Engineers" has created demand for our services across a wide variety of sectors.



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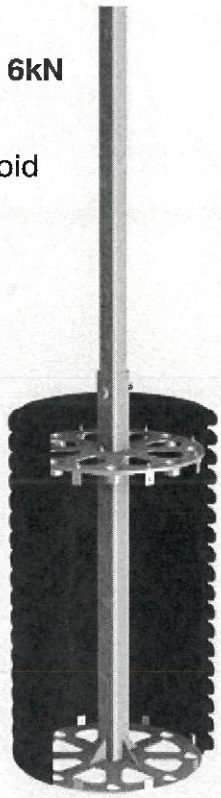
ShireGroundfillBase

SUPPORTS SIGNS UP TO 1MX1M INSTALLED IN 1 HOUR

- Tested with lateral forces of **6kN**
- No concrete
- Spoil is backfilled into the void
- Reusable and recyclable

- Designed to loading & ground conditions
- Installed with hand-held equipment
- Also available in 1.5m, 2m, 2.5m & 3m ground anchors
- Height adjustable



ShirePile

SUPPORTS LOADS UP TO 7 TONNES INSTALLED IN 1 HOUR

- Fast installation time
- A solution for all soil types
- Unique patented design
- Instant load capacity

- Installed in confined spaces
- Low ground disturbance
- Up to 10m deep
- Available with 1m, 1.5m & 2m helical bases

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RAILWAY INDUSTRY SUPPLIER QUALIFICATION SCHEME
RISQS
AUDITED

ShireRootBase *D-Range*

SUPPORTS PLATFORMS INSTALLED IN 30 MINUTES

- Fast installation time
- No concrete
- Reusable
- installed below typical depth of services

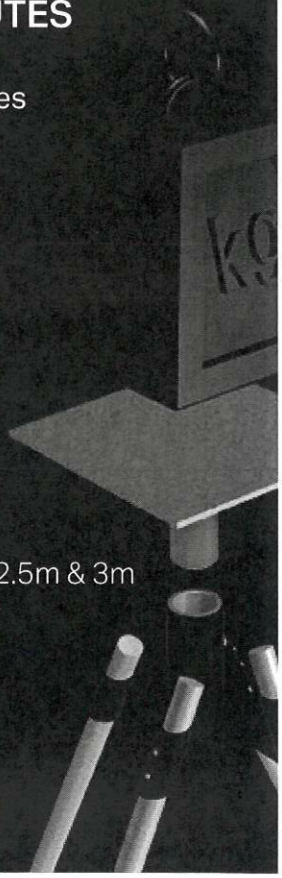
- Designed to loading & ground conditions
- Installed with lightweight post driver
- Available with 1.5m, 2m, 2.5m & 3m ground anchors
- 700mm height

ShireRootBase *S-Range*

SUPPORTS LOADS UP TO 8 TONNES INSTALLED IN 15 MINUTES

- Tested with vertical forces of **over 8 tonnes**
- Available in over 10 configurations
- No concrete
- Reusable

- Designed to loading & ground conditions
- Installed with lightweight post driver
- Available with 1.5m, 2m, 2.5m & 3m ground anchors
- Compact size



What our clients think...

> The team could not have been more helpful

> I am very pleased. Very efficient, sincere & hard working. They explained every step within the works - well done to you all

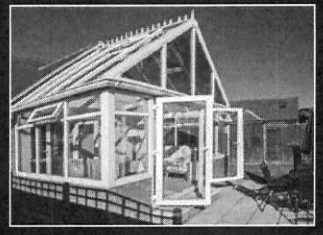
> The work on site was excellent, it was kept so clean & tidy

Applications

Garden rooms

SIPS panels

Single storey extensions



Conservatories / Orangeries

About Shire

The QuickBase Foundation System was designed by Structural Engineers at Shire and patented in 2008. Since it's launch, 12 million m2 have been installed across the UK. QuickBase is a multi-award-winning flooring, beam and pile system. A totally unique foundation system for conservatories and single-storey structures, revolutionising conventional construction methods.

Shire

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RICS

CHAS

The Institution of Structural Engineers

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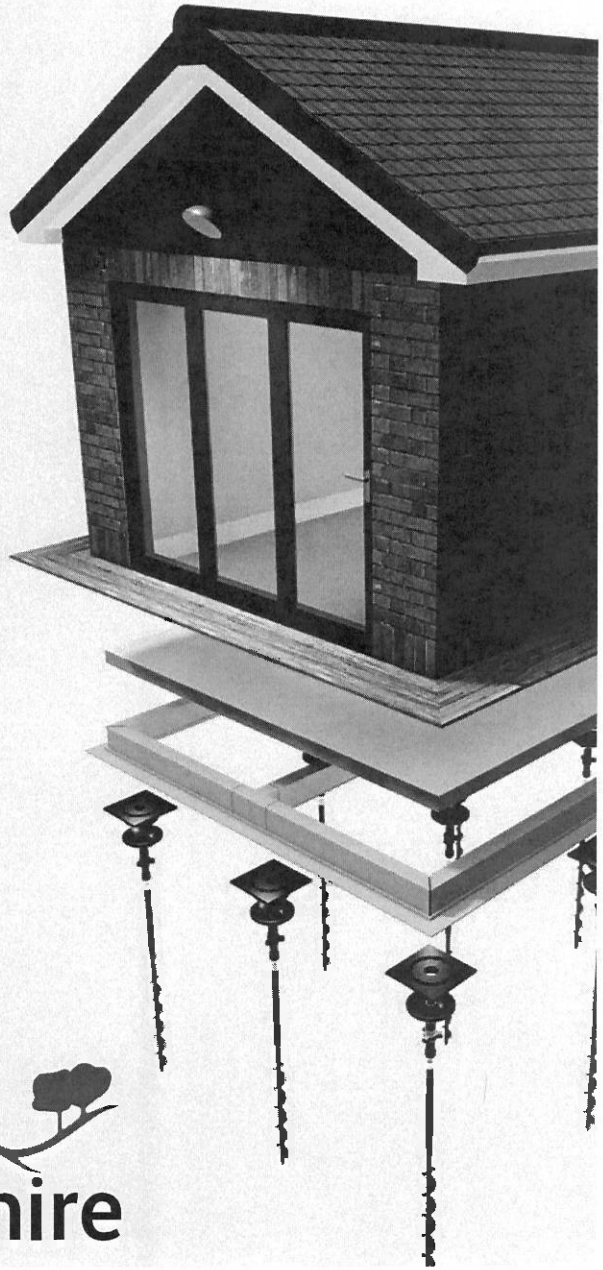
SafeContractor APPROVED

QuickBase Foundation Systems

Foundations to protect your investment



Shire

Why?

Protecting your investment - what steps can be put in place to prevent foundation problems occurring?

Below are 4 practical steps to consider:

- Don't accept a 'one size fits all' foundation
- Take reasonable precautions to mitigate against the effects of nearby trees and soft soils
- Choose the right kind of foundation for your building
- Consider access requirements & restrictions. Ask for advice if needed

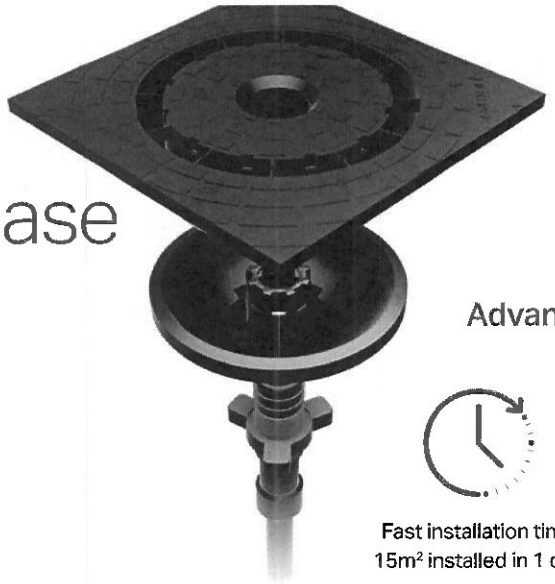
The foundations are one of the most important parts of your building investment. Often more time is spent considering the type of floor tiles than the foundation type. Foundations are often specified as a standard design 'to be confirmed on site'. This can lead to inappropriate foundations being constructed. It is essential that adequate thought is given to the foundation type and depth before work starts on site.

At Shire we design foundation systems for a wide range of project types. We have developed patented systems like QuickBase giving deep piled foundations that can be taken down to depths below the zone of influence of any tree roots or down to 20m in soft soils to find 'good ground'. QuickBase has also been designed to be installed in areas where parking & access is restricted. Foundations are installed quickly, often leading to cost reductions in the overall schedule.

Where there are unknown ground conditions, our geotechnical team can investigate and give advice on the appropriate solution. For more information, including a detailed guide contact engineers@shire-uk.com

ShirePile >
Supports loads of up to 70kN

ShireQuickBase



About the system

- Designed by Structural Engineers
- Made in the UK
- Unique patented design
- Achieves U-values of 0.02 W/m2K
- Combined floor, beam & pile solution
- Installed on a Shire Pile as standard

The modular system is based on helical screw piles, which support lightweight, part-recycled plastic ground beams connected via a series of push-fit joints to form a frame. The ground beam is then filled with a specially formulated non-shrink grout to give a high strength composite beam. The frame carries the load of the building through the piles to suitable bearing strata, uniquely removing the need for mass concrete foundations. It is then fitted with a premanufactured damp proof floor slab onto which the inner wall of the conservatory or extension is built.

QuickBase is particularly cost effective when working in confined spaces, where soil conditions would usually require deep excavation, where limited parking restricts the ability to remove the spoil associated with deep excavation and where trees are near the built site.

The QuickBase system doesn't require wet trade finishing, so labour costs are cheaper and build time is faster. The foundations can be quickly installed rapidly with up to 15m2 installed in a day.

Unlike traditional foundations, QuickBase is ideal for less than perfect ground. The piles are generally driven to 4m depth (deeper if required), guaranteeing suitable load-bearing strata, and avoiding troublesome tree roots.

QuickBase is fully compliant with Building Regulations and designed to meet Local Building Control standards. Our Engineers work in partnership with both Local Authority and Private Building Control to ensure all requirements are met. We also offer technical CPD's to any teams not familiar with the system.

Advantages of the system

Fast installation time
15m² installed in 1 day

No need for mass concrete foundations

Reduces site excavation work

Minimises spoil to landfill

Other piling systems available

ShireClayPile
Anti-heave engineering

ShireRootBase
Installed in 15 minutes