8.a TREE REMOVAL AND SURGERY

Prior to the erection of the protective fencing any tree felling or pruning works should be carried out.

This will involve the removal of 4 trees.

All the remaining trees on site will be crown-cleaned to help promote health and vigour.

All works should be carried out to British Standard 3998:1989. by qualified arborists.

8.b SITE INSPECTIONS

After the tree surgery works have been completed and the protective fencing erected, the developers Arboricultural Consultant will visit the site. This will be to ensure that all works are being carried out correctly. This would also be a good opportunity to invite the Local Authorities Tree Officer to carry out a site inspection. Any changes discussed at this time can then be implemented to the satisfaction of all parties.

During development the Arboricultural consultant should visit the site on a weekly basis to ensure that all works are being carried out in line with British Standard 5837:91, trees in relation to construction.

9.a Protective fencing around trees

All the trees that are to be retained should be protected by stout fencing to avoid damage to their root systems by severance or asphyxiation. The fencing should run in a continuous line, which runs along the position of the working zone as depicted on the site plan. Such fencing should be erected before any materials or machinery are brought on site and before development commences. Once erected it should not be removed without prior consultation with a specialist in arboriculture.

The fencing should be at least 1.2m high and comprise of a vertical and horizontal framework of scaffolding, well braced to resist impacts. It should be strong and appropriate for the degree of construction activity taking place on site.

9.b Additional precautions outside fenced areas

Once the area has been fenced off, any works on the remainder of the site can be carried out providing such works do not impinge on the protected areas.

To prevent injury to the trees, oil or cement should not be stacked or discharged within 10m of the bole. Materials generally should not be stacked or discharged within 5m of the bole.

Concrete mixing should not be carried out within 10m of the tree.

Fires should not be lit beneath or in close proximity to the trees canopy.

Trees to be conserved should not be used as anchorage for equipment used for removing stumps, roots or other trees, or any other purposes.

Care should be exercised when using cranes or similar equipment near the spread of the canopy of the tree.

Allowances should be made for the slope of ground so that damaging materials such as concrete washing; mortar or diesel oil cannot run towards the tree.

Trees to be felled that are adjacent to, or that lie within a continuous canopy of, trees to be retained should be removed with care. In some cases a tree may have to be removed in sections to avoid damage.

10. Precautions in Respect of Temporary Work

If temporary vehicle access is required through the protected area, a reinforced concrete slab should be laid over the existing soil surface, with appropriate protection along the road edge.

If it is essential for scaffolding to be erected within a protected area, fencing in accordance with 8.2.2 or 8.2.3. should be erected to provide just sufficient space for the scaffolding. The ground between this fencing and the building should be protected by boarding e.g. scaffold boards, as shown in figure 6. A single thickness of boarding laid on the soil surface will provide sufficient protection for pedestrian loads, but more substantial boarding sufficient to spread the load should be used for heavier traffic. The ground beneath the boarding should be left undisturbed and should be protected with a porous geotextile fabric. If necessary, sand should be laid on the fabric to level the ground. When required, the building scaffolding should be erected. The boarding should be left in place until the building works are finished.

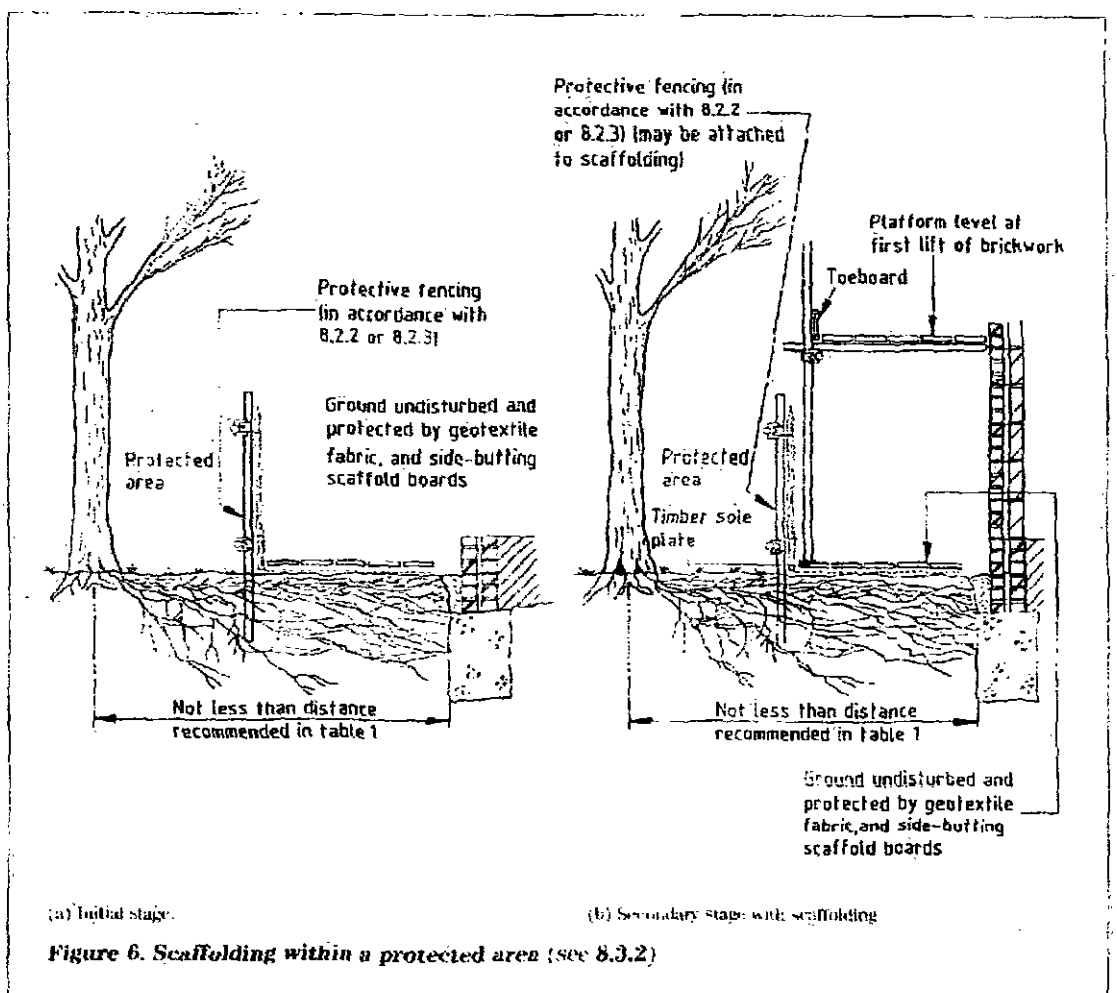


Figure 6. Scaffolding within a protected area (see 8.3.2)

11.a Trees root system

Most trees have been growing undisturbed on a site for many years and will have developed an extensive root system. There is a balance between the trees crown (which demands water) and the roots (which supply it). Any change in the soil conditions will upset this balance. During construction machinery can squeeze the soil causing compaction, this reduces the amount of oxygen available to roots preventing them growing through the soil. Any material placed over the roots of a tree will reduce air movement into and out of the soil resulting in the reduction of oxygen to the roots. This results in progressive shoot and branch dieback until a new balance can be reached. However, if damage is severe and a new balanced cannot be reached the tree will ultimately die.

11.b Prevention of damage to roots

The majority of feeder roots occur in the uppermost 600mm of soil; changes in level should be minimised.

Kill ground vegetation using an appropriate herbicide such as glyphosate. Herbicide products containing sodium chlorate should not be used. All dead organic material should then be gathered up, this would prevent the build up of anaerobic conditions beneath the construction, which may otherwise occur if vegetation is allowed to decompose.

Construction should ideally be undertaken between May and October when the ground is driest and least prone to compaction.

All major protrusions such as tree or shrub stumps should be removed. Stumps should be ground out rather than excavated to minimise soil disturbance.

If excavation is so close to the tree that roots larger than 50 mm in diameter are encountered, extra care should be taken to avoid damage. Excavations should be undertaken by hand, avoiding damage to bark. The roots should then be surrounded with sharp sand before soil is replaced.

For roots to be retained undamaged no excavation, soil stripping or site grading should be carried out within the protected zone.

If it is necessary for a service trench to be taken closer to the tree than recommended, boring a hole for the service is acceptable. Provided the borehole is small root damage should be minimal. Boreholes should be kept as deep as possible. Alternatively a narrow trench can be excavated passing directly towards the tree along a radius no closer than 1 m from the trunk. Tunnel straight beneath the tree to a depth of no less than 750 mm. Provided the trench is kept as narrow as possible, root severance will be minimal.

12.a Services

The drainage and services will need to be placed in a trench that is set well outside the crown spread and rooting zone of the trees to be retained. Should it be necessary to dig within the protected area at any time, the developers arboricultural consultant should be present to ensure only hand digging is undertaken.

All services work on site will follow the National Joint Utilities Group's Guidelines for Planning, Installation and Maintenance of Utility services in Proximity to trees.

12.b No Dig Construction

Successful retention of trees even when adopting a no dig method, particularly within the protected zone, depends upon the condition of the trees, which should be assessed by a qualified arboriculturist, and on adherence to three simple rules:

- Roots must not be severed
- Soil must not be compacted
- Oxygen must be able to diffuse into the soil beneath the engineered surface

Damage to trees can only be avoided if the construction embraces the above principles and (within the protected zone) is no more than 4m wide.

Construction should incorporate two main components: a geogrid and an aggregate sub-base. Geogrid are high tensile strength synthetic grids designed to support roads on soft ground. When placed on the geogrid, appropriate granular sub-base material penetrates the mesh, but is unable to pass through it, forming positive interlock. This interlock between aggregate and geogrid provides a reinforced platform and efficient load spread into the underlying ground. A suitable geogrid/aggregate combination will prevent rutting of the ground beneath the construction.

Granular sub-base material Type 1. As specified by the Department of Transport (Department of Transport, 1991: clause 803) is the recommended aggregate. This has a relatively low fines content, which means that even when it is compacted it should be freely draining and will allow oxygen to diffuse into the soil.

For site-specific prescriptions and materials specifications advice may be sought from a qualified geotechnical or civil engineer.

Tensar SS30 Geogrid is manufactured by Netlon Ltd, New Wellington Street, Blackburn, BB2 4PJ.

13. General Site Organisation

13.a Working Area

The working area of the site will need to allow sufficient space to permit all the building operations to be carried out. This may include access for long or wide loads, or heavy materials; temporary site roads for these will not necessarily conform in size or position to the final road layout.

Adequate height clearance often poses problems, cranes, tipping lorries, piling rigs or other tall vehicles will all need adequate space for working.

Space will also be needed for storage of building materials, and for site cabins. It is essential that materials which are potentially toxic or damaging to trees not be stored in their vicinity. Nothing should be stored within the crown spread or rooting zone of the trees on site.

All deliveries to the site must be monitored, and their unloading supervised, to eliminate the risk of loads being placed outside the designated storage areas.

13.b Phasing of Construction

Where possible the building of the units should be phased to keep the maximum working and storage areas available for as long as possible. Phasing of construction may help to reduce the amount of materials being stored on site at any one time.

In certain situations, where development is very close to the minimum protection zone, it may be necessary to dig and install the foundations from within the buildings footprint.

Alternatively the use of piling may be considered to reduce the amount of ground disturbance in these very sensitive areas.

14.a Removal of protective fencing

When construction works have been completed, and the site machinery has been removed the protective fencing can be taken down. This should be undertaken with care ensuring heavy machinery is not used.

When works have been completed it may be necessary to carry out de-compaction around some trees. This should be carried out with a manually operated machine to avoid further disturbance.

14.b Post construction remedial work to trees

Even though trees to be retained have been protected as recommended, direct damage can still occur. Alternatively it may not have been possible to detect the weakened condition of a tree prior to development and the change in the environment could cause indirect damage and accelerate decline of the tree.

The development of any site should not be considered complete until all the trees have been re-examined by a specialist with experience in the detection of early signs of declining tree health. Any remedial work necessary to ensure the health of the tree should be implemented before work is completed

At this late stage in the development, the safety of people and property in the vicinity of trees should be paramount when making decisions about retention and treatment of trees.

14.c Completion meeting

On completion of all the works, a site meeting should be arranged with the developer's Arboricultural Consultant and the Local Authority Tree Officer to discuss any further works that may be required.