Annex III

Fire-Resistant Landscaping

1.0 General principles

There is a general presumption in favour of the blending of fireworks factories within the landscape setting to prevent marring with characteristics and maintain a constant visual amenity. In rural areas, such landscaping shall be preferably consist of a non linear belt of trees and shrubs and a surrounding boundary rubble wall.

2.0 Use of appropriate tree and shrubs species and design

2.1 Flammable vs. Non-Flammable Plants

All plants are flammable, especially when located within the semi-arid climate, and hence striking the right balance in the use of and distribution of species is essential to reach the aims of landscaping, whilst at the same time not increasing the hazards of operation.

The current applicable guidelines for landscaping are the *Guidelines on Trees, Shrubs and Plants for Planting and Landscaping in the Maltese Islands* (MEPA. 2002). Appendix 3 of the latter specifies which trees and plants are acceptable in Outside Development Zone (ODZ) areas and in urban fringes, whereas Appendix 6 lists the species considered suitable for non-crop planting on agricultural land. Hence, the species listed within these two Appendices are applicable to be planted within fireworks factory complexes on the presumption that they are all ODZ and in the majority, surrounded by agricultural land.

However, not all species actually planted are acceptable since they may be readily flammable, and hence will ignite fast and burn readily. In such circumstances a number of plant species are more fire resistant than others, characterised by having properties which:

- Are less likely to ignite from a wildfire;
- Burn less intensely when they do ignite, and spread the fire slower;
- Have stems and leaves that are not resinous, oily, or waxy;
- Have a high moisture content- succulent plants;
- Easy to maintain and prune;
- Have less accumulated debris and fewer dead branches;
- Have an open, loose branching pattern; and
- Are drought resistant, requiring less irrigation.

2.2. Principles of fire-resistant landscaping

The principle of fire-resistant landscaping lies within the choice of species, the design implemented, and its regular maintenance. Permits for development consent can regulate the species and design, however regular maintenance is dependant on good practice during the regular operation of these complexes.

The following guidelines are applicable:

A. *Non-acceptable species are to be avoided and replaced with species having a low flammability*. In general flammable species are deciduous, produce clear resins or aromatic oils, and produce a lot of dead branches and leaves. Some examples are given below:

Table 1: List of non-acceptable species

Flammable Indigenous Species

- All pine species i.e. *Pinus halepensis* (Żnuber), *P. brutia* (Żnuber tal-Ivant), *P. pinea* (Żnuber ta' l-ikel);
- Cypress- *Cupressus sempervirens* (Ċipress), and its variants;
- Holm oak- *Quercus ilex* (Ballut);
- Junipers- *Juniperus phoenicea* (Ġniepru);
- Lentisk- *Pistacia lentiscus* (Deru)
- Olive- *Olea europaea* (Siġra taż-żebbuġ)
- Common sumach- *Rhus coraria* (Xumakk tal-konz);
- Strawberry tree- *Arbutus unedo* (Imbragla);
- Grasses and other oily shrubs e.g. aromatic herbs.

Flammable Alien Species

- All wattle/ acacia species- *Acacia* sp. (Siġra ta' l-Akaċja)
- Tree-of-heaven- *Ailanthus altissima* (Xumakk);
- All eucalyptus- *Eucalyptus* sp. (Siġra ta' l-Ewkaliptus);
- Castor oil tree- *Ricinus communis* (Siġra tar-Riċnu);
- Tree tobacco- *Nicotania glauca* (Tabakk tas-swar);
- Brazilian pepper- *Schinus terebinthifolius* (Siġra tal-bżar).

Less flammable trees, shrubs and plants are more adequate for landscaping of fireworks factories and hence should be actively considered. Moreover, consideration should be given to the context and hence,

should the site be within an area of dry-agricultural land, the use of species which require high volumes of water do not make practical sense.

A non-exhaustive list of ubiquitous species applicable in most scenarios is given below, although it may be considered that all tree species listed in Appendix 3 and 6 of the Guidelines are applicable, provided they do not fall within the list in Table 1 above.

Table 2: List of acceptable species

Acceptable Indigenous species

- Carob- *Ceratonia siliqua* (Siġra tal- Ħarrub);
- Judas Tree- *Cercis siliquastrum* (Siġra ta' Ġuda);
- Hawthorn- *Crataegus azarolus/ Crataegus monogyna* (Għanżalor/Żagħrun)
- Quince- *Cydonia oblonga* (Sfarġel)
- Fig- *Ficus carica* (Tin)
- Narrow-leaved ash- *Fraxinus angustifolia* (Fraxxnu);
- Bay laurel- *Laurus nobilis* (Rand);
- Medlar- *Mespilus germanica* (Naspli tedeski);
- African tamarisk- *Tamarix africana* (Bruk);
- Elms- *Ulmus canescens, Ulmus minor*, *Ulmus procera* (Ulmu)
- Ivy- *Hedera helix* (Liedna).

B. Design

The design and maintenance of the landscaping should be such to prevent fires spreading. To this end, it is recommended that the landscaping is separated into 2 zones which merge into each other, although this is not always possible due to site area or other constraints. Landscaping directly adjacent to structures is to be avoided in principle and as a minimum the safety distances stipulated within the relevant design guidelines should be respected:

Zone 1 (Inner zone): Within this area closest to the structures, landscaping should not be closer to structures than advised by the statutory distances. This zone is recommended to be composed of trees spaced at least 3 metres from each other. Plantings should be limited to carefully spaced, low flammability species and shall be subject to regular maintenance (through pruning, removal of dead wood, grass stubble, etc- see section C, below).

Zone 2: (**Outer zone):** Plants may be planted closer together, albeit the recommended distances to allow proper growth should be respected. Hence the views from outside the complex blend with the surrounding. Less maintenance is required and only selective pruning and thinning of all plants is recommended, in addition to removal of highly flammable vegetation.

In cases where zonation is not possible due to site constraints, the inner zone should be implemented.

C. Maintenance: The *Guidelines on Trees, Shrubs and Plants for Planting and Landscaping in the Maltese Islands* (MEPA. 2002) specify good practice notes for maintenance of the landscaping, and which are applicable for these scenarios. These include removal of dead wood and grass stubble, hence further reducing fire risk.

Although fire retardant plants may be grown, a firm commitment must be made to keep the landscaping maintained through a number of key points. When maintaining a fire-resistant landscape the following is essential:

- Remove all leaf clutter and dead and overhanging branches, especially in dry months;
- Keep all grasses and stubble low by using a grass cutter or mower, especially in dry months;
- Keep trees pruned and in shape. Remove major branches which touch each other;
- Dispose of cuttings and debris away from the site and according to local regulations;
- Irrigate regularly and be sure the irrigation system is well maintained; and
- Dispose of smoking materials carefully.