GREEN ROOF SPECIFICATION – **25 King's Mews London Borough of Camden**

1.0 **The Green Roof Elements**

1.1 There will be two green roofs on the development at King's Mews; the roof terrace meadow and a pitch roof. There will be a different treatment for each of the roofs.

1.2 The Upper roof will consist of a substrate based green roof with a varied depth between 80 – 150mm. Two different extensive substrates will be used to provide a range of substrate types for nesting hymenopteran. The roof will be planted with a range of native plugs and be seeded with the London Living roof seed mix. This consists of native annuals and herbs associated with calcareous grassland.

1.3 The pitch roof will require a different treatment due to the pitch of the roof. It is proposed that a wildflower turf will be laid on top of 100mm extensive substrate. The turf and the substrate will be retained on the roof by the innovative use of larch poles that will be fixed horizontally across the length of the roof. The larch poles themselves will be pre-drilled with a variety of holes to allow for a variety of hymenopteran to nest.

2.0 **Maintenance**

2.1 Seeding and planting of roofs are best undertaken in late September to early October. Many of the seeds specified require the winter frosts to germinate. Planting at this time allows for winter rain to help the plug plants to establish themselves within the soil If planting is required to be done at other times April through to August should be avoided completely.

2.2 In general, but specifically outside of the prime seeding/planting period, the roofs should be watered for 4 -6 weeks to ensure that the seeds/plants establish themselves.

2.3 Long term maintenance should include provision to inspect all drainages outlets and shingle perimeters to ensure that they are vegetation free in early autumn and early spring.

2.4 In the autumn there should be removal of unwanted vegetation, such as invasive plants, such as *Buddleia davidii*, fleabanes *Conyza sp*. and Fat Hen *(Chenopodium album)* to ensure that do not become established. The removal of woody species should also be undertaken at the end of the year. However the dead stems of plants other than invasive or woody species should not be removed, as these are an important part of many invertebrates' life cycles, providing hibernation, refuge and eggs and larvae for the new season.

3.0 Detailed Specification Guide – Upper Roof

3.1 **Root Protection:** Waterproofing to the required German DIN standard for root protection as outlined in the FLL

3.2 **Geotextile:** geotextile fleece to be laid on top of waterproofing to provide additional root protection and moisture retention

3.3 **Drainage Layer:** 25mm water retaining drainage layer with a minimum flow rate of 0.3litres/m2/per second. Profiles to permit excess water to drain in any direction beneath. Boards to be close butted to form a continuous drainage layer over the deck.

3.4 **Filter Sheet:** Roll out filter sheet over the drainage layer. Laps to be minimum 100mm. Filter sheet to be taken up all up stands, protrusions etc to surface level.

3.5 **Plant Substrate 1:** To install substrate onto the Filter Sheet to at varied depth of between 80 - 100mm. This substrate will need to support the seed mix and plants specified in (6). This would be an extensive green roof soil based on crushed brick with the right organic balance to encourage herbs to grow. Use of extensive sedum brick substrate is in appropriate for herbs.

3.6 **Plant substrate 2**: Ceramic waste from recycled toilets/baths will be used on 30% of the roof to provide a different substrate habitat. This will be blended with 20% organic green waste compost and be laid at a varied depth between 80 -150mm.

3.7 **Plant 1:** The seed mix for plant substrate 1 will consist of all plants in the table below. These will be provided by a native seed source and be hydro seeded at a rate of 1.5gms/m^2.

Scientific name	**Common name**
Agrimonia eupatoria	*Agrimony*
Anthyllis vulneraria	*Kidney Vetch*
Briza media	*Quaking-grass*
Centaurea nigra	*Common Knapweed*
Echium vulgare	*Viper's-bugloss*
Galium verum	*Lady's Bedstraw*
Festuca ovina	*Sheeps fescue*
Hypericum perforatum	*Perforate St John's-wort*
Knautia arvensis	*Field Scabious*
Koeleria macrantha	*Crested Hair-grass*
Leontodon autumnalis	*Autumn Hawkbit*
Leontodon hispidus	*Rough Hawkbit*
Leucanthemum vulgare	*Oxeye Daisy*
Linaria vulgaris	*Common Toadflax*
Lotus corniculatus	*Bird's-foot-trefoil*
Malva moschata	*Musk-mallow*
Origanum vulgare	*Wild Marjoram*
Plantago media	*Hoary Plantain*
Primula veris	*Cowslip*
Prunella vulgaris	*Selfheal*
Ranunculus acris	*Meadow Buttercup*
Ranunculus bulbosus	*Bulbous Buttercup*

Reseda lutea	*Wild Mignonette*
Sanguisorba minor	*Salad Burnet*
Silene vulgaris	*Bladder Campion*

The combined seed mix should be seeded at 1.5gm/m^2.

The total roof area should be seed with the special cornfield mix below at a rate of 0.5gms/m^2

Agrostemma githago	*Corn Cockle*
Anagallis arvensis	*Scarlet Pimpernel*
Anthemis arvensis	*Corn Chamomile*
Centaurea cyanus	*Cornflower*
Chrysanthemum segetum	*Corn Marigold*
Matricaria recutita	*Scented Mayweed*
Myosotis arvensis	*Common Forget-me-not*
Papaver rhoeas	*Common Poppy*
Ranunculus arvensis	*Corn Buttercup*

3.8 **Plants 2**: In addition to the seed regime outlined above the roof will be planted with a range of herbs/sedums. These will include depending on availability:

Wild Mignonette - *Reseda lutea,*
Viper's Bugloss - *Echium vulgare,*
Selfheal - *Prunella vulgaris*,
Cowslip *Primula veris,*
Bird's Foot Trefoil **-***Lotus corniculatus*
Wild Strawberry – *Fragaria vesca*
Biting Stonecrop – *Sedum acre*
White Sedum – *Sedum album*

Tasteless Sedum - *Sedum sexangulare*
Dragon's Blood - *Sedum spurium*

Reflexed Sedum – *Sedum reflexum*
Kamchatka Sedum -*Sedum kamtschaticum*

The plants will be planted in species groups and will be at a density of 10 plugs per square metre.

3.9 Plant 3: In addition to the plugs and seeds at least 20 *Muscari armeniacum* will be planted in to the deeper areas of substrates in clumps of five bulbs

3.10 Logs: Natural logs will be laid and buried into the substrate. The logs should be at least 100mm in diameter and at least metre long. At least five logs will be placed onto the roof. Wherever possible the logs will be sourced from a local wood or park.

4.0 Detailed Specification - Pitched Roof

4.1 **Root Protection:** Waterproofing to the required German DIN standard for root protection as outlined in the FLL

4.2 **Geotextile:** a geotextile fleece to be laid on top of waterproofing to provide additional root protection and moisture retention. The geotextile will also act as a filter sheet to ensure that files are retained within the green roof system.

4.3 **Log supports:** Larch poles at least 150mm will be placed horizontally across roof. These will be fixed at the perimeter [see Architects detail]. The exposed surfaces of the logs will be pre-drilled with holes for mining bees and other *hymenoptera* species.

4.4 **Filter Sheet:** A thin filter sheet will be applied to on top of the geotextile and will run up both the sides perimeter upstands and the logs to at a height of 80mm. The filter sheet acts to allow egress of water but ensures that substrate fines are retained within the green roof system.

4.5 **Plant substrate:** Install substrate at a depth of 100mm between the log supports It is recommended that a substrate called BIODIVERSE mix as supplied by Shire Minerals Southern [www.greenroofsubstrates.co.uk]

4.6 **Plants:** A wildflower turf will be used on top of the plant substrate. It is recommended that Lindum Turf green roof turf will be used. This is pre-grown and includes the following species: *Achillea millefolium* Yarrow, *Allium schoenoprasum* Chives, *Anthemis tinctoria* Yellow Chamomile, *Dianthus carthusianorum* Carthusian Pink, *Dianthus deltoides* Maiden

Pink, *Echium vulgare* Vipers Bugloss, *Galium verum* Lady's bedstraw, *Hypochaeris radicata* Common Catsear, *Leontodon hispidus* Autumn Hawkbit, *Leucanthemum vulgare* Ox-eye Daisy, *Origanum vulgare* Wild Marjoram, *Reseda luteola* Dyers Rocket, *Silene uniflora* Sea Campion, *Thymus vulgaris* Common Thyme, *Verbascum nigrum* Dark Mullein

5.0 Green roof specification and London / Camden Biodiversity Action Plans

5.1 The implementation of green roofs at King's Mews meet a number of local and regional biodiversity action plan targets, as outlined in both the Camden and London Biodiversity Action Plans

5.2 Green roofs meet habitat targets for both the London and Camden *Built Environment Action Plans.* Green roofs are an important action within both plans.

5.3 **Stag Beetle** *Lucanus cervus* and **House Sparrow** *Passer domesticus* are both London and Camden Action Plan Species. The provision of semi-buried logs on the flat roof will provide potential breeding habitat for Stag Beetles and the presence of flower rich habitat at roof level should provide an important foraging area for House Sparrows, particularly during the breeding season. At this time adult birds need to provide a range of insect prey for their young. There are now a few roofs in London where House Sparrows have been observed foraging on green roofs, including the roof of the office of Bere Architects

5.4 Furthermore the detailed specification for the green roofs includes a number species highlighted in the Camden *Grassland Habitat Action Plan.* These include *Leucantheum vulgare, Prunella vulgaris, Ranunculus spp.,* and *Lotus corniculatus.*

5.5 A wide range of species are known to benefit from green roofs including Goldfinch *(Carduelis carduelis),* Small Blue Butterfly *(Cupido minimus),* Toadflax Brocade *(Calophasia lunula)* - a UK Priority Action Plan species – and a range of rare invertebrates especially *Bombus* species, mining and solitary bees.