# Appendix 12-15
# Reed Marsh establishment methods

Three general methods of establishing a viable reed marsh have been used in Hong Kong. In light of that experience and in particular the large size of the proposed Reed marsh within the LMC Loop, it is considered that the planting of turfs is most appropriate in terms of cost-effectiveness ease/speed of establishment and low impact to negatively impact on the overall programme.

A summary of the key points for each method is provided below, beginning with the recommended method.

## 1. Planting turfs (recommended)

**Method:** Rhizome-rich turfs are mechanically excavated from an existing reed marsh. These are then placed into a hole excavated using the same implement which dug the turf. On a large scale project a digger with a bucket size of least 1m x 1m is required. Ideally a 'Reed marsh Nursery' is established prior to transferring turfs to proposed reed marsh area. This entails the creation of a smaller reed marsh approx $1/100^{th}$ the size of the proposed reed marsh at a location suitable for easy access when required. May require more than one nursery if proposed reed marsh is large and/or linear.

### Advantages

- Lowest cost
- High success rate
- Requires least aftercare (especially weeding)
- Establishment of reed marsh nursery permits weeding of unwanted plants and removal of pests prior to planting turfs
- Requires small source area
- Shortest planting time
- Better for large areas
- May import valuable invertebrates
- Timing and watering/water levels less critical

### Disadvantages

- Requires advance works (establishment of Reed marsh Nursery)
- Requires heavy machinery

### Impacts on Programme

- Requires advance establishment and maintenance of Reed marsh Nursery at least 12 months prior to planting
- During construction has least impact on programme assuming Reed marsh Nursery in optimum location (close to final reed marsh site)
- Possible to provide multiple (smaller) nurseries if site large or liner to reduce transport time
- Permits greatest flexibility in overall programme

### Resources required

- Requires establishment of Reed marsh Nursery 1/100$^{th}$ the size of the proposed area plus 50% contingency to permit supplemental/replacement planting of turfs
- Construction of Reed marsh Nursery requires excavation of approx. 1000 mm of soil and construction of 1000 mm high bund around nursery to retain water
- Requires routine weeding and watering of nursery
- Requires source area approx. 20% size of Reed marsh nursery
- 1 m x 1 m x .5 m turfs transplanted at 10 m spacing (100 turfs – total volume 50 $m^3$ - per ha) at proposed reed marsh
- Same area to be excavated prior to transplanting (50 $m^3$ per ha)
- For 12 ha of reed marsh a reed marsh nursery of 0.18 ha is required (0.12 ha plus 0.06 ha contingency)
- Excavation of material and creation of bunds for Reed marsh Nursery requires excavation and handling of approx 1,800 $m^3$
- Watering, weeding and general maintenance of 0.18 ha planted area for 1-2 years
- Excavation, transport and planting of 1,200 (600 $m^3$) turfs to proposed reed marsh area (plus up to 600 additional turfs)
- Excavation of 600 $m^3$ at receptor sites

## 2. Planting pot-grown reeds

**Method:** Individual pot-grown reeds are sourced from a commercial supplier and planted by hand. Temporary storage on-site required if large numbers of plant involved.

### Advantages

- Success rate high
- Allows for rapid establishment over a high proportion of reed marsh area
- Does not require heavy machinery

### Disadvantages

- In Hong Kong plants are typically sourced from China which can result in supply issues and often leads to plant damage during shipment.
- If large number of plants involved requires a temporary storage facility on-site to house and water plants prior to planting
- Labour intensive
- High risk of importing pests (such as Apple Snail, Signoret beetle) and unwanted aggressive exotic plant species (such as typha)
- Requires a supplier who is experienced in the propagation of wetland plants
- Difficult to check source of plants
- Can be problematic to source pot-grown reeds at short notice/high quantities
- Requires careful hand weeding during establishment
- Requires large no. of individual plants (approx. 100,000/ha)

### Impacts on Programme

- Programme can become negatively impacted due to supply issues
- Lengthy delays possible due to time consuming planting method
- Requires advance contract for plants at least 18 months prior to planting

**Resources required**

- Requires planting at a density of approx. 10 plants per $m^2$.
- Cost dependent upon supplier, bulk-buying, and whether planting included in cost, but approx. HK$8 per plant (including planting) for high volume
- For 12 ha of reed marsh 1.2 million plants would be required at an approximate cost of HK$10 million
- Contingency of 20% should be allowed.

**3. Spreading soil containing rhizomes**

**Method:** Involves excavation of top soil to just below the rhizome depth (to about 500 mm) of an existing reed marsh which is then spread at least 300 mm deep across proposed reed marsh area.

**Advantages**

- Low cost
- May import valuable invertebrates

**Disadvantages**

- Success rate dependent upon careful handling on material
- Establishment can be poor
- Requires careful weeding during establishment
- Soils containing rhizomes should be stored for no longer than one week
- Higher risk of importation of unwanted plants species and pests
- Working in source area can be problematic
- Requires proportionately large source area (an existing reed marsh approx 20% of the proposed reed marsh area)
- Risk of importing pests (such as Apple Snail) and unwanted aggressive exotic plant species (such as typha)
- Requires heavy machinery

**Impacts on Programme**

- Depends upon distance between source area and proposed reed marsh area but if nearby, rhizome-rich soils can be imported when required
- Conditions within source area can rapidly deteriorate during wet season or due to effects of heavy machinery which can lead to delays

**Resources required**

- Requires the excavation, transportation and application (i.e. double handling) of approx 3,000 $m^3$ of soil per ha
- For 12 ha of reed marsh 36,000 $m^3$ of soil required (requiring a source area of 1.8 ha)
- Contingency of up to 30% should be allowed