Construction of Mound Systems

Mound Construction – Key Issues

- The Mound location must meet Development Consent conditions
- Erosion and sediment controls must be in place before construction work commences
- Approvals to remove any trees must be obtained from council prior to removal

Mound Construction – Key Issues

- Proper design and construction is vital to ensure satisfactory long term performance
- Site specific design normally required
- A Detailed Design and Construction Management Plan should be prepared by a suitably qualified professional

Mound Construction – Key Issues

- Work during dry weather only – avoid work during and after rain when soils are wet, as this leads to soil compaction
- Critical goal is to minimise compaction of basal area
- Long reach, (rubber) tracked equipment preferred to reduce soil loadings and compaction
- Work from the upslope side of the mound or from the side

Construction Steps (1 to 6)

12 key construction steps are identified:

- Position the mound
- Prepare the ground
- Install the pressure main
- Till the basal area
- Place filter media
- Construct absorption bed

Construction Steps (7 to 12)

- Construct pressure distribution network
- Install observation ports
- Install geofabric
- Form the final mound profile
- Topsoil and landscaping
- Final commissioning

Step 1 – Position the Mound

- Select the preferred position based on:
  - site and soil survey
  - along contour
  - good solar and wind exposure
  - avoid rocks, trees and other obstacles
  - buffer requirements
- Mark out the mound components:
  - overall mound footprint absorption bed and basal area
  - landscaped buffer
  - pre-treatment tank/s, dosing well and pressure main
  - access routes and protected areas

Step 2 – Prepare the Ground

- Fence the area to prevent disturbance by other site works (if necessary)
- Clear the site of trees, shrubs and boulders. Cut trees to ground level and grind stumps out, then backfill with sand or topsoil
- Slash grass and rake away all litter
- Till the basal area (see Step 4)
- Apply any soil ameliorants (e.g. gypsum, lime)

Step 3 – Install Pressure Main

- Identify location and depth of the pressure main, and dig its trench (300-500mm deep recommended)
- Main line best installed before tilling basal area
- Enter from the upslope (centre feed – preferred) or side (end feed) of the mound
- As far as possible avoid entering from downslope. If unavoidable use hand digging only, compact soil around trench well and install anti-seep collars to prevent moisture tracking along trench line

Step 4 – Till the Basal Area

- Till parallel to contour to roughen surface, encourage infiltration and help key in fill
- Till to around 200mm normally, do not invert topsoils
- Blend 50/50 filter medium and soil
- Deeper tillage can be used to break up hardpans
- Use chisel plough, track-mounted backhoe with scarifier or ripper tines, or hand spading
- Cover tilled area immediately with a layer of sand
- Never use a disc or rotary plough
- Only till the ground when the soils are relatively dry, and below field capacity

Step 5 – Place Filter Media

- Use paint marks and stakes to mark the position and depth of fill
- Place basal layer of fill to depth of absorption bed
- Use long reach, track-mounted equipment and work from the side or upslope
- If sand is moist, place in 100-150mm lifts and lightly compact (by foot-walking)
- If sand is dry, pour into position
- Ensure uniform compaction and density

Step 6 – Construct Absorption Bed

- Rake sand level to +/-20mm (use dumpy or laser) and form up absorption bed
- Timber formwork may be utilised
- Place aggregate to approx. 150mm, ensure square edges and avoid thinning at edges
- Lay the distribution network (Step 7)
- Install additional aggregate to finished depth (approx. 300mm)

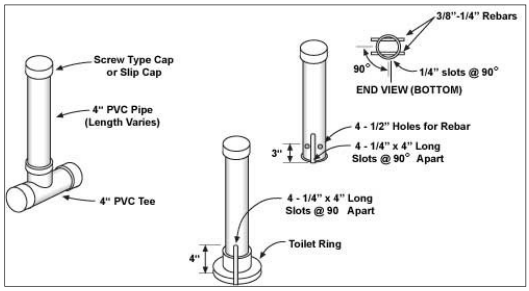
Step 7 – Construct Pressure Distribution Network

- Refer session for design of pressure distribution networks
- Lay the pressure main, manifold and laterals according to the design, ensuring all pipe work is completely level
- Force main should enter horizontally to prevent effluent tracking along line
- 300mm min. buffer from laterals to edge of bed
- Test run the system and check even distribution and squirt height, then backfill gravel to final level

Step 8 – Install Observation Ports

- To monitor water levels in mound
- Install at least 2 observation ports, nominally spaced at ¼ and ¾ positions along the bed, to at least the base of the gravel bed
- 50mm PVC pipe wrapped in geotextile with perforations along length
- Anchor firmly (refer figure below)
- Install screw-type cap, preferably lockable

Observation Ports



Options for Securing Observation Ports
(Source: Converse & Tyler, 2000)

Step 9 – Install Geofabric

- Cover gravel bed with a synthetic, non-biodegradable filter fabric to prevent sand and soil ingress to absorption bed
- Fabric should completely cover the gravel and either wrap down the sides or extend 200mm outside the bed

Step 10 – Form Final Mound Profile

- Place cover of sandy fill, topsoil or filter media to final mound profile, in preparation for final topsoiling
- The fill (including topsoil) should ensure at least 150mm cover over the bed edges, and 300mm cover at the centre (crest) after settling

Step 11 – Topsoiling and Landscaping

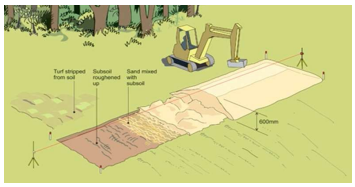
- Place final 100mm thick (min.) of garden quality topsoil
- Stabilise mound with vegetation, preferably turf
- Place turf rolls diagonally or horizontally across the batters (not vertically) and landscape around the mound
- Water vegetation during establishment and replace any failed plantings

Step 12 – Final Commissioning

- Monitor closely during first few weeks of operation
- Water vegetation regularly to aid establishment, especially if property not occupied
- Check for slumping or other signs of failure
- Provide the owners with as-built drawings, an O&M Plan and educate them about the various operation and maintenance requirements

Video

- Sydney Catchment Authority / WaterNSW video on mound construction
- A guide to installing a sand mound to manage onsite wastewater, WaterNSW
- https://vimeo.com/72859822



Maintenance of Mound Systems

Maintain vegetation cover

- Ensure remains grass covered
- Water turf following construction and before occupancy of premises
- Watch for die-back in dry weather or if premises not occupied
- Mow grass to maintain vegetation demand for water

Check pipework and inspection ports

- See that distribution pipework is functional
- Clear any blockages
- Look out for vegetation ingress into pipework
- Flush pipework periodically, especially if fed with primary treated effluent
- Check inspection ports to see seepage is adequate and mound is not saturated

Integrity of mound

- Ensure mound structure / shape remains sound
- Look out for compaction / collapse if fed through large diameter slotted pipes where distribution will be preferentially to near (delivery) end of pipework

Toe seepage

- Check for toe seepage, especially on downslope side of mound
- Determine cause; overloading, saturation, high water table etc.
- Alleviate by planting water demanding shrubs around mound toe
- Install seepage trench
- Review mound sizing vs load and climate

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