Bee walls, habitat and nesting blocks
Native solitary bees have two basic needs: **Food and shelter. It’s as simple as that.**

Though bees’ housing needs vary, they all feed exclusively on nectar and provide their larvae with pollen. Of course, a good nectar and pollen source must be present when each species is active, which may be for only a few weeks per year.

*They must have access to a diversity of plants* with overlapping blooming times so that flowers are available to forage all year round. And because native bees come in a range of sizes, it is important to provide flowers of various sizes, shapes, and colours.

*They need places to nest.* Solitary native bees don’t build the wax or paper structures we associate with honey bees, social stingless bees or wasps. Many solitary bees nest in a small series of tunnels and cells they construct underground. These burrow narrow tunnels down to small chambers. In order to build these nests, bees need direct access to the soil surface, often on sloped or well-drained sites. Others nest in narrow tunnels often left behind by wood-boring beetle larvae in dead trees (carpenter bees will excavate their own holes), and a few use the soft pithy centres in some plants. Some bees require small cavities, either in tree boles, underground, or under clumps of fallen grass. Whether underground or in wood-tunnels, most solitary bees spend most of the year maturing in their nest (brood) cells. In these cells, they are vulnerable to nest disturbances such as soil tillage or tree removal.

*Bees need protection from most pesticides. Insecticides are primarily broad-spectrum and are therefore deadly to bees. Furthermore, indiscriminate herbicide use can remove many of the flowers that bees need for food.*

Avoid disturbing the soil surface during flowering; never apply insecticides to plants in flower (apply herbicides in the most targeted way possible e.g. spot spraying), and leave logs, branches, posts, wood whenever they do not pose a hazard. Create holes for nesting.

Enhance habitat for bee communities by removing vegetation from small patches of sunny, well-drained soil.

Solitary bees will be productive year-round if temperature range is good, however most activity in your garden will be in September through to late Autumn (April May). Little is known of the complete life cycle of solitary bees. Basically, there are two generations of leaf cutter in a year, most of the others lay just once.
Construction of Solitary Bee Nest Sites

Types of nests could include:

1. **Blocks of wood** (both hardwood and softwood) with various sized holes drilled (see sizes below) at approximately 20 mm centres. Make holes smooth and blind (that is not right through the timber).

<table>
<thead>
<tr>
<th>Hole Size</th>
<th>Depth</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 mm</td>
<td>70 mm</td>
<td>(few)</td>
</tr>
<tr>
<td>5 mm</td>
<td>120 mm</td>
<td>(most commonly used)</td>
</tr>
<tr>
<td>6.5 mm</td>
<td>150 mm</td>
<td>(most commonly used)</td>
</tr>
<tr>
<td>9.5 mm</td>
<td>150 mm</td>
<td>(few)</td>
</tr>
<tr>
<td>13 mm</td>
<td>150 mm</td>
<td>(few)</td>
</tr>
</tbody>
</table>

2. **Bundles of bamboo, rush and lantana stems**, with open end, cut about 150-200 mm lengths (cut close to node so one end is open, other closed), pack horizontally into and protected by enclosures of recycled materials, such as plastic pipe, or wooden frame. Some bees like **hollow stems** and other like **pithy stems** that they chew out themselves. Bundles can also be hung in tree, but fix firmly so they do not swing in the wind.

3. **Bundles of wax drinking straws**, packed into enclosures.

4. **Tree stumps** preferably rotting and with beetle holes.

5. **Mud bricks** of various textures.

6. **Bare ground** : clear patch of ground and compact the surface. Put in a step, so that you have a flat slope and a vertical surface.

7. **Sand pits** : in a sunny well drained spot, dig a pit about 600 mm deep and fill with mixture of fine-grained sand and loam. If necessary use chicken wire to protect the pits from cat poo, etc. Weed the sites when necessary.

8. **Sand piles** : make a pile or raised bed of mixture of fine-grained sand and loam. This option is better than a pit where the natural soil is poorly drained.

If you wish to **identify the species** of bees occupying the nest, then insert a roll of newspaper in the hole. When the nest is occupied, pull out the newspaper and place in a container for emergence of the adult bee. Don’t forget that many of these solitary bees will sting.

**Other insects** may also occupy these nests, including wasps and parasites of the bees. You can expect an **increase in bee numbers** in the second and third year after construction. But sometimes the numbers of some species decrease as parasites accumulate.

Male bees will sometimes be found around the bees roosting in trees etc. They usually do not enter the nests. Keep your eye open for these.

Note that most of these bees are solitary but **some are gregarious** and so like nesting near others of their own species.

Remember: bees need a source of water.
John Klumpp’s Blue Banded bee wall. This one is made by pouring mud into a polystyrene packing frame.

An alternative is to make mud bricks and pack them together.

Herb and Insects Spiral from Urban Bees. Chris Fuller’s Bee Village at Kin Kin.

Wall faces north-east.

Herb & Insect Spiral

This wall of dry stones built in a spiral shape helps to warm and dry light soil. This structure favours the growth of Mediterranean aromatic plants and nectariferous plants that bees love. Temperature and hygrometry differ between the top and the base of the spiral.

At the top, where the soil is the driest:
- Lavender, hyssop, savory, thyme, rosemary, common rue, Aegean wallflower, red valerian, and sedum, for example, can be planted.

A little lower:
- Burnet, pyrethrum, and borage thrive along the slope.

At the base, where the soil is cooler and more nutrient rich:
- Dill, oregano, basil, chives, mint and lemon balm flourish.

The stones of the spiral are deliberately placed with wide spaces between them and set with lime, in order to welcome other living creatures (ladybirds, spiders, hedgehogs, lizards etc). The spiral offers homes and food to a multitude of small creatures by making maximum use of a small area (two to four metres in diameter).

This design is not only useful but pleasant to the eye.

Some additional notes:

Solitary bees don’t clean out old debris from the previous year, and so each year they need clean housing.

As solitary bees, no-one directs traffic - each bee must find her nest on her own. Large artificial systems with too much uniformity can confuse solitary bees - asymmetry and bold decorations that define areas can help individual bees find their nests.

Most nest systems need weather-resistant housing - a large diameter pipe capped at one end; a tennis ball tube; a milk carton set in an open wooden box; some other variation.

To reduce rain soaking the nests, tilt the nests a bit forward after first binding them together, (with masking tape, wire). Shelter from strong wind is also important.
Black Parasitic Wasp

for solitary bees

This wasp homes in on partially completed nest holes and takes a look inside. If the bee is in residence, the wasp withdraws to a strategic distance and waits. Once the bee leaves, the wasp creeps up and if the coast is clear, inserts into the hole its long tail with its needle-like egg laying tubes.

If successful, the offspring of this wasp will be the product of that nest site instead of the offspring of the solitary bee!

Article from www.aussiebee.com.au

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Paper tubes / straws / hole liners

The simplest bee homes are holes drilled in wood or made in clay. While easy to make, they have several disadvantages. Pests, especially mites, are a natural part of the bee life cycle. In wood or clay, the mature cocoons cannot be removed for cleaning, so pest populations remain high. It is also nearly impossible to clean the holes for re-use without destroying either unhatched adults or freshly laid eggs.

Many people who have drilled bee nesting blocks will use paper liners. These treated paper or cardboard tubes fit into holes in wood, clay or other mediums, or are sometimes used alone. The bees nest in the tubes (or 'straws'), which can be removed when the bees are mature. Once removed, they can be exchanged, brought to another site, stored in suitable safe containers to await hatching etc.

Fresh liners in the holes then provide clean nest spaces for the following season. Some liners can be opened for access to the cocoons for cleaning, but many are difficult. In those, bees still emerge in association with pests.

The liners can either be purchased, or you can make them yourself. We are currently in the process of working this through for our bees here in this area, and it is a work-in-progress. We will be preparing a document over the coming months to clarify this whole process, but in the meantime, there is a bit of info available on the www, or speak to people who are currently actively involved in the solitary bees. And start researching...and experimenting. Let us know.

From 'Paper Liners That Work'

Chris Fuller, as well as a number of our Valley Bees members, are currently experimenting with various techniques, and we will try to keep you updated.

Try ANBees Forum - Yahoo Groups
These guys sell the liners: www.pollinatorparadise.com /Binderboards/new_products

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This resin bee takes a liking to the liners!