

A. Raised bed frame

Instead of watering plants from above, self-watering (wicking) beds water plants from below. They are containers with a water reservoir at the bottom, and moisture is drawn upward through the soil like a wick via osmosis. A wick works through capillary action – the same force you see when a piece of tissue paper is partially dipped into a glass of water and the water “climbs” the paper. This process allows plants to decide how much water to use and when. This also substantially reduces the amount of time the bed needs watering.

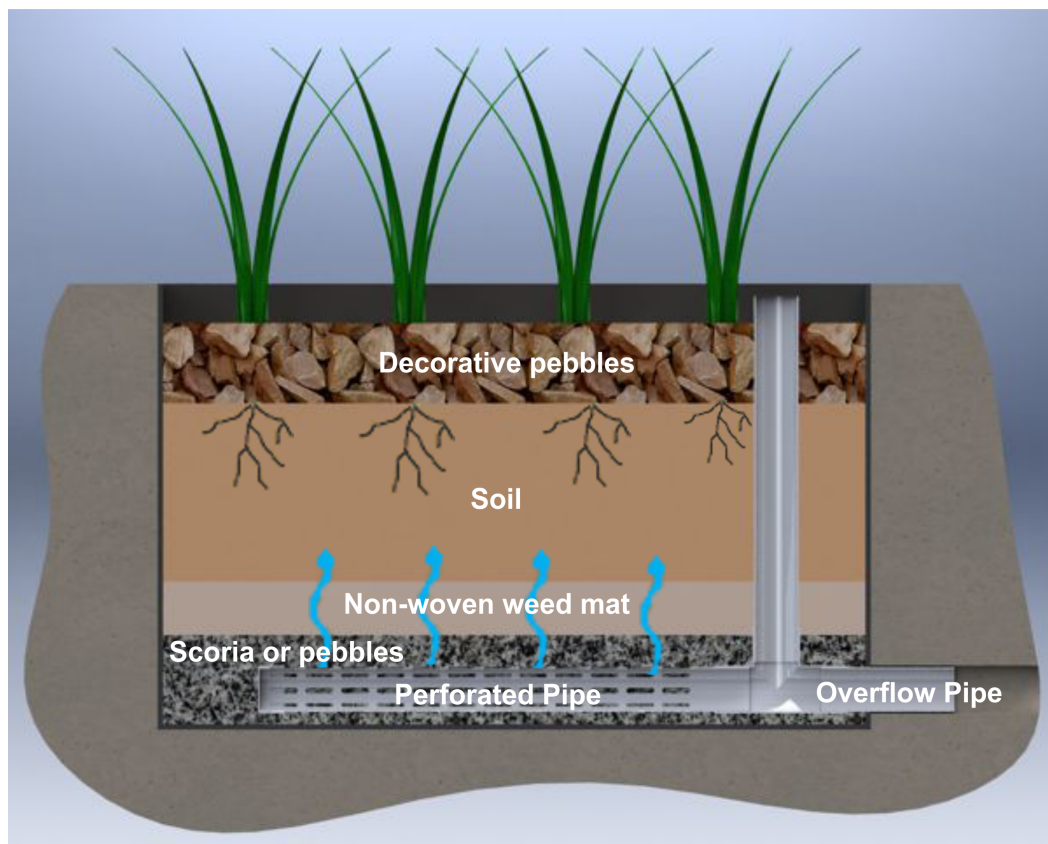
Building your own self-watering raised bed is highly effective when you follow a layered construction. You will need to choose which wicking system works best for your needs – perforated pipes or gravel.

Because of the heavy gravel and the water reservoir, the bed will be much heavier than a traditional raised bed. Make sure your frame is structurally reinforced.



Fasteners & structural support (for wooden frames)

- **1 box of 3" or 3.5" exterior wood screws:** Look for ceramic-coated structural deck screws to fasten the 4' x 8' frame walls together securely.
- **4 heavy-duty corner braces (L-brackets) with matching exterior screws:** The wet weight of 18 cubic feet of gravel and water creates massive outward pressure; these reinforce your corner joints.
- **2 structural wood stakes (2" x 4" x 24"):** Driven into the ground midway down the 8-foot lengths on the inside before putting down the liner. Screw these into the side walls to prevent the long 8-foot boards from bowing outward over time. Key Layers & Components (Bottom to Top)



B. Wicking system: perforated pipes

How the system works

1. **Water reservoir:** A waterproof liner at the bottom of the bed holds a pool of water. The perforated pipe sits inside this reservoir, ensuring water distributes evenly across the entire base.
2. **Perforated pipe:** Corrugated drain pipe (also known as weeping tile) or perforated PVC. If using a corrugated pipe, consider using one wrapped in a filter "sock" or wrap the pipes in **landscape fabric** to keep soil and fine particles from clogging the holes
3. **Aeration & wicking:** A layer of gravel surrounds the pipe, creating an airspace for oxygen. The gravel also acts as a base for potting soil or a specific wicking medium (like a mix of peat moss and perlite) placed on top. The soil pulls water up from the reservoir below.
4. **Fill & overflow:** A vertical PVC pipe extends above the soil surface so you can add water directly to the reservoir. An overflow hole prevents the bed from flooding during heavy rains.

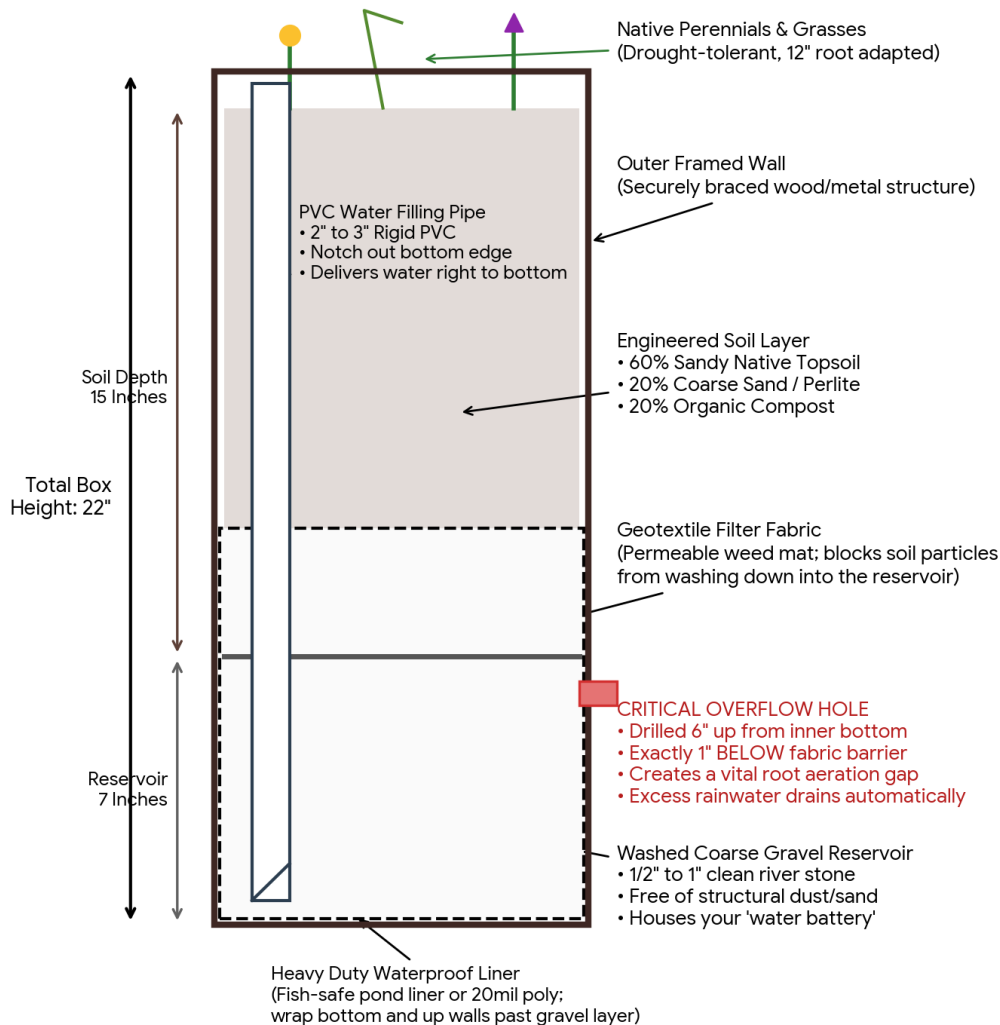
C. Wicking system: gravel

1. Materials and supplies needed

Here is your shopping list to build a **4' x 8' x 22"** self-watering wicking bed. You can find all of these items at standard home improvement centers or local plumbing supply shops.

DIY SELF-WATERING WICKING BED BLUEPRINT

Cross-Section Construction Plan | Target Dimensions: 4' x 8' x 22"



2. Waterproofing & protection

- **1 piece of 45-Mil EPDM pond liner (or 20-mil polyethylene):** Size needed is **8' x 12'** minimum. This provides enough slack to cover the 4' x 8' floor and run 22 inches up all four walls. Make sure it is labeled **fish-safe** or **plant-safe** so chemicals don't leach into your soil.
- **1 roll of heavy-duty landscape fabric:** Used to separate the gravel from the soil. Buy a standard **3' or 4' wide roll** (non-woven geotextile is best). You only need about 35 square feet, but standard rolls are larger.
- **1 box of 1/2" heavy duty staples:** To temporarily secure the liner and fabric to the inside of your frame during assembly.

3. Plumbing components (filling & drainage system)

- **1 length of 2" or 3" schedule 40 rigid PVC pipe (white):** You need a single piece cut to **26 inches long**. This acts as your vertical fill tube, sticking out just above the soil line.
- **1 PVC cap:** To match your pipe size (2" or 3"). Keeping this on the fill tube prevents mosquitoes from breeding in your water reservoir and stops debris from clogging it.
- **1 bulkhead fitting (1/2" or 3/4" threaded):** This creates a watertight seal through the pond liner and wooden/metal wall for your overflow drain.
- **1 threaded PVC barb adapter (matching your bulkhead size):** Pushed into the bulkhead to extend the drain slightly past the outer frame wall.
- **1 small can of PVC primer and clear cement:** To glue any plumbing together if you choose to attach an interior screen to your overflow pipe.

4. Aggregates & soil bulk media

- **10 cubic feet of washed gravel:** Ask for **1/2" to 1" clean washed aggregate**. Avoid "A-Gravel" or road-base, as the fine dust will ruin the wicking system.
- **1.5 cubic yards of engineered soil mix:** To make the ideal native plant blend, look for:
 - **60% clean topsoil** (approx. 24 cu. ft. or 16 standard 1.5 cu. ft. bags)
 - **20% coarse play sand or perlite** (approx. 8 cu. ft. or 16 small 0.5 cu. ft. bags)
 - **20% organic compost** (approx. 8 cu. ft. or 8 standard 1 cu. ft. bags)

The ideal ratio for a 22-inch deep bed:

Material	Depth	Volume Needed	Bag Estimate	Bulk Estimate
Washed gravel	7 inches	10 cu. ft.	~20 bags (0.5 cu. ft. each)	0.4 cubic yards
Soil mix	15 inches	40.0 cu. ft.	~27 bags (1.5 cu. ft. each)	1.5 cubic yards

5. Assembly procedure

- a) **Waterproof membrane:** Line the inside of your wooden, metal, or plastic raised bed with a heavy-duty, fish-safe pond liner to ensure the water stays trapped in the reservoir.
- b) **Gravel reservoir:** Use lengths of 4" pipe and add washed, inorganic gravel or river stone to a depth of 7". This acts as the "water battery" (swimming pool) holding your water supply.
- c) **Fill tube:** Place a vertical PVC pipe in one corner that reaches all the way to the bottom of the gravel. You'll use this to pour water directly into the reservoir.
- d) **Overflow drain:** Drill your overflow drainage hole **1 inch below the top of the gravel line** (at the 6-inch mark from the bottom). This creates a mandatory air gap between the standing water and your soil fabric. Install a bulkhead fitting or a small pipe here so that excess rainwater automatically drains out, preventing the soil from getting waterlogged.
- e) **Geotextile/landscape fabric:** Lay a sheet of non-woven weed mat or permeable landscape fabric directly over the gravel. Secure it to the edges so dirt does not wash down and clog your reservoir.
- f) **Soil & plants:** Keep the total depth of the soil to about 15 -16 inches so the water can wick upwards efficiently. Drought-tolerant native plants typically thrive in lean, gritty, fast-draining conditions rather than the dense, moisture-holding peat mixes used for vegetables.
 - **Establishment period:** Native plants must be top-watered for the first 4 to 6 weeks after planting. Their roots need time to grow downward toward the wicking zone before they can fully rely on the gravel reservoir.
 - **Maintenance:** Continuous upward wicking can pull soil nutrients to the top layer over time. It helps to fertilize occasionally or top-dress your soil with fresh compost.