

PLANNING YOUR POND

Helpful tips, tools and calculations

What kind of pond are you planning?

Planning and building your pond is much easier if you clearly define for yourself what it is you are looking for. By articulating these choices early in the process, the resulting requirements can be incorporated into the plan and the construction of the pond. The most important choice you will probably face is whether or not you want to have fish in the pond. Fish increase the biological load on the pond ecosystem significantly and necessitate planning for a pond that is deeper and incorporates a more effective filter system.

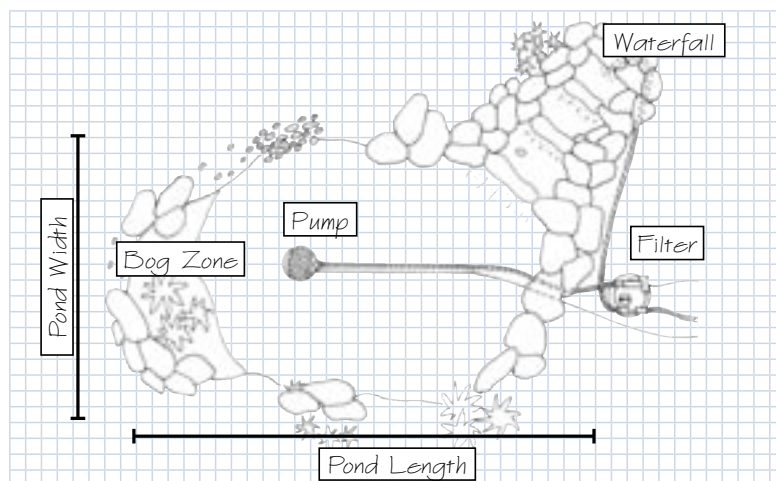
Where will your pond be built?

A koi or fish pond should be located near a patio or close to the house so that one can observe and interact with the fish. A splashing water feature is best placed in the middle of the garden, while a natural pond is perfect for the garden perimeter. 4-6 hours of direct sunlight is ideal. Placing a pond under trees is not recommended without a water surface skimmer to remove accumulating leaves. Most importantly the location of the pond should work well with the landscaping of the rest of the backyard.

What about streams and waterfalls?

In addition to being interesting to look at, waterfalls and streams are of biological benefit to the pond. The moving water aerates the pond and reduces stagnant areas. However, not every pond will look good or benefit from Niagara Falls splashing into it. If your yard is more or less flat, a tall waterfall will look out of place or unnatural and a stream might be much better suited for the landscape. For most normal-size ponds a 2 ft. waterfall is close to ideal and provides all the benefits and aesthetics of something larger.

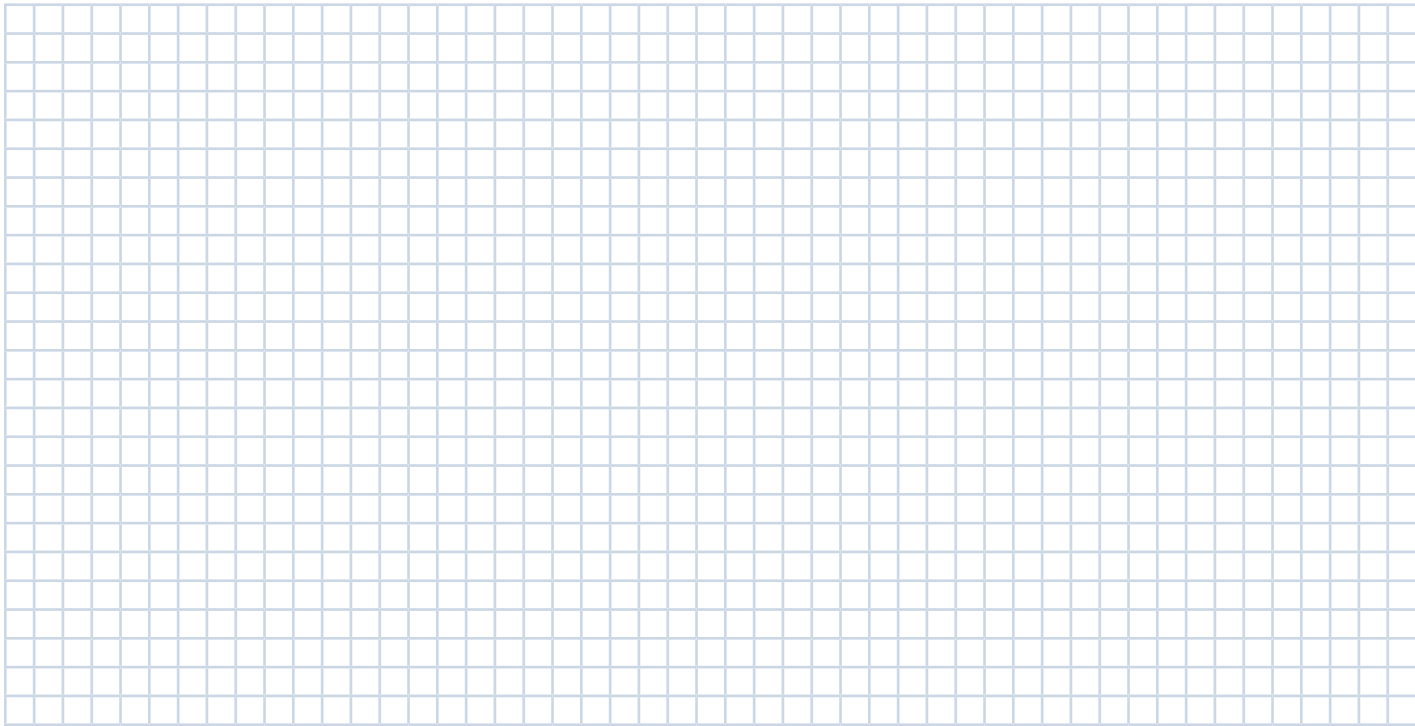
Basic Pond Design Example



This pond incorporates a waterfall and a generous bog zone, which will provide additional natural filtration and a very natural look. The excavated material is used to construct the waterfall and some of the landscaping around it. The Aquamax solids-handling pump is installed at the deepest point of the pond. This will ensure that all debris is eventually pumped into the filter where it can then be removed. The pump can be hidden by strategically placing larger rocks around it; tubing and cable can be hidden in a fold of the liner. The Filtoclear pressure filter is installed out of sight (it can be buried up to the upper lip of the filter – even below water level). The output line is fed to the water feature returning water to the pond. The flush line is directed to a drain or flower bed (a valve or cap to prevent accidental flushing is recommended).

Sketch your pond

Adding some of the landscaping features of your backyard will help you in designing the perfect pond for your garden.



How big in gallons is your pond?

This will allow you to choose the proper filtration system needed to maintain clear water of great quality from the chart below.

$$\boxed{\text{Pond Length in ft.}} \times \boxed{\text{Pond Width in ft.}} \times \boxed{\text{Avg. Depth in ft.}} \times 7.5 = \boxed{\text{Gallons}}$$

| POND SIZE (GAL) | | BIOTEC BIOMECHANICAL FILTER BASED SYSTEMS | | |
|--|-------|---|--------------------|-------------------|
| Few or no fish | Koi | Pump | Filter | UVC Clarifier |
| 2600 | 1300 | Aquamax SF 1600 | Biotec 5.1 | Bitron 18C |
| 6600 | 3300 | Aquamax SF 2200 | Biotec 10.1 | Bitron 36C |
| 9300 | 4800 | Aquamax SF 3500 | Biotec 10.1 | Bitron 36C |
| 10600 | 5300 | Aquamax SF 3000 | Biotec 12 Screenex | Bitron 36C |
| 11800 | 5900 | Aquamax SF 3500 | Biotec 12 Screenex | Bitron 36C |
| 12200 | 6100 | Aquamax SF 3500 | Biotec 18 Screenex | Bitron 55C |
| 13200 | 6600 | Aquamax SF 3500 | Biotec 18 Screenex | Bitron 72C |
| 18500 | 9250 | Aquamax 6000 | Biotec 18 Screenex | Bitron 72C |
| 24000 | 12000 | Aquamax SF 3500 | Biotec 36 Screenex | Bitron 110C |
| 29000 | 14500 | Aquamax 6000 | Biotec 36 Screenex | Bitron 110C |
| FILTOCLEAR PRESSURE FILTER BASED SYSTEMS | | | | |
| 800 | 400 | Aquamax SF 1600 | Filtoclear 800 | 9W UVC (built-in) |
| 1600 | 800 | Aquamax SF 2200 | Filtoclear 1600 | 9W UVC (built-in) |
| 3000 | 1500 | Aquamax SF 3000 | Filtoclear 3000 | 9W UVC (built-in) |
| 4000 | 2000 | Aquamax SF 3500 | Filtoclear 4000 | 9W UVC (built-in) |

What length and width of liner do you need for your pond?

Liner in your size might not be available directly, but can easily be glued from smaller pieces.

$$\begin{array}{l}
 \boxed{\text{Pond Length in ft.}} + (2 \times \boxed{\text{Max. Depth in ft.}}) + 4 = \boxed{\text{Liner Length in ft.}} \\
 \boxed{\text{Pond Width in ft.}} + (2 \times \boxed{\text{Max. Depth in ft.}}) + 4 = \boxed{\text{Liner Width in ft.}}
 \end{array}$$

How much rock and pebbles do you need for your natural pond?

This calculation assumes you will cover most of the liner of a 2 ft. deep pond with rocks and pebbles.

$$\begin{array}{l}
 \boxed{\text{Pond Length in ft.}} \times \boxed{\text{Pond Width in ft.}} / 65 = \boxed{\text{Tons of Rocks}} \\
 \boxed{\text{Tons of Rocks}} / 2 = \boxed{\text{Tons of Pebbles}}
 \end{array}$$

What pump is needed for your stream or waterfall ?

In flat yards waterfalls should have a maximum drop of 2 ft. A stream should drop 2 in. for every 3 ft.

For larger waterfalls – due to the volume required for a particular effect – it is often far more economical to use one pump – usually the most suitable and most energy-efficient pump possible – to run the pond filtration system, and a second pump to run a waterfall at maximum flow periodically. This will not just reduce energy costs but will prolong the life of the second pump dramatically.

a) What total dynamic head (TDH) is required for my waterfall or water course?

$$\boxed{\text{Total Pipe Length in ft.}} / 10 + \boxed{\text{Number of 90° Elbows}} + \boxed{\text{Rise Above Water in ft.}} = \boxed{\text{Total Dynamic Head in ft.}}$$

b) What flow rate is required for my waterfall or water course?

$$\boxed{\text{Width of Flow in inches}} \times 150 = \boxed{\text{Flow Rate in gph}}$$

c) Select the pump out of the chart below by finding the calculated flow rate in the respective TDH column.

| TDH in ft. | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 30 |
|-----------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|
| | Flow Rate in gallons per hour | | | | | | | | | | |
| Aquamax SF 1600 | 1300 | 1000 | 675 | 375 | 75 | – | – | – | – | – | – |
| Aquamax SF 2200 | 1800 | 1400 | 1000 | 600 | 200 | – | – | – | – | – | – |
| Aquamax SF 3000 | 2600 | 2200 | 1850 | 1450 | 1050 | 675 | 300 | – | – | – | – |
| Aquamax SF 3500 | 3100 | 2750 | 2400 | 2025 | 1650 | 1300 | 925 | 550 | 200 | – | – |
| Aquamax 6000 | 5500 | 4750 | 4400 | 3250 | 2800 | 1800 | 1500 | 1100 | 500 | – | – |
| Profinaut 6000 | 5900 | 5700 | 5400 | 5200 | 4950 | 4700 | 4400 | 4150 | 3900 | 3800 | 2000 |

What plants and fish will inhabit your pond?

Aquatic Plants

In general, floating plants, such as water lilies should cover about half of the pond's water surface. These will provide shade for fish and reduce the growth of algae.

BOG ZONE (0 – 4 in. deep)

- Asclepias incarnata* – swamp milkweed
- Chelone lyonii* – turtlehead
- Eupatorium purpureum* – Joe Pye weed
- Houttuynia cordata 'Chameleon'* – chameleon plant
- Lobelia cardinalis* – cardinal flower
- Lysimachia nummularia* – golden creeping jenny
- Sarracenia spp.* – pitcher plant
- Sisyrinchium angustifolium* – blue-eyed grass
- Tradescantia* – spiderwort
- Zephranthes candida* – rain lily

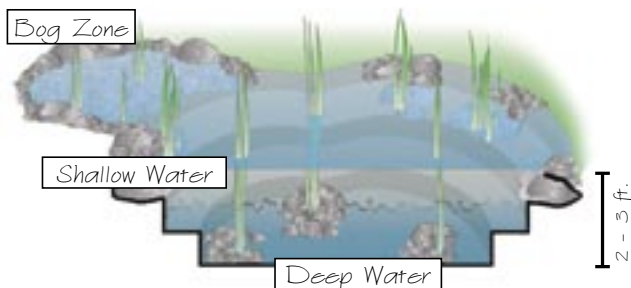
SHALLOW WATER ZONE (8 – 16 in. deep)

- Acorus gramineus* – dwarf Japanese sweetflag
- Acorus calamus 'variegatus'* – variegated sweetflag
- Caltha palustris 'Flore-Plano'* – double-flowered marsh marigold
- Canna glauca (Longwood hybrids)* – water canna
- Colocasia esculenta 'Black Magic'* – black taro
- Colocasia antiquorum 'Illustris'* – imperial taro
- Equisetum hyemale* – horsetail
- Iris Louisiana hybrids*
- Iris laevigata 'variegata'* – variegated rabbitear iris
- Iris pseudacorus* – yellowflag
- Juncus glauca* – blue rush
- Marsilea mutica* – variegated four-leaf water clover
- Mentha aquatica* – water mint
- Myosotis scorpioides* – water forget-me-not
- Oenanthe javanica 'Flamingo'* – variegated water celery
- Pontederia cordata* – pickerel rush
- Sagittaria latifolia* – arrowhead
- Saururus cernuus* – lizard's tail

DEEP WATER ZONE (> 18 in. deep)

- Anacharis (submerged)* – fish grass
- Aponogeton distachus* – water hawthorn
- Cabomba caroliniana (submerged)* – hornwort
- Hydrocles nymphoides* – Venezuelan water poppy
- Lotus*
- Nymphaea* – waterlilies (hardy and tropical)
- Nymphoides peltata* – floating heart

Planting Zones



Koi and Fish

The recommended fish stock is about 1 in. of adult fish length per sq. ft of water surface area. This means that 20 adult fish of about 1 ft. length each should be in a pond no smaller than 240 sq. ft. water surface area.

Koi can grow substantially over the years, so starting with only a few fish is highly recommended.

KOI CLASSIFICATIONS

- Kohaku* – red pattern on white background
- Sanke* – red and black pattern on white background
- Showa* – red and white pattern on black background
- Utsuri* – red, white or yellow pattern on black background
- Bekko* – black pattern on white, red or yellow background
- Asagi* – blue-grey with red along the side, cheeks and fin
- Shusui* – doitsu asagi with dark blue scales along dorsal and lateral line
- Koromo* – kohaku and asagi combo, white base with scale reticulation
- Kawarimono* – all non metallic koi that do not appear in a more specific variety
- Hikarimono (Ogon)* – single colored metallic koi
- Hikari Utsurimono* – metallic utsuri and showa
- Hikarimoyo-mono* – all metallic koi that do not fall in any other classification
- Tancho* – koi with red spot on head, background color varies
- Kinginrin* – all varieties with diamond scales (must have more than 20)

KOI COLORS

- Ai* – blue
- Aka* – red (background)
- Beni* – orange-red (background)
- Cha* – brown
- Gin* – silver (metallic)
- Hi* – red (pattern)
- Karasu* – black (background)
- Ki* – yellow
- Kinginrin* – gold (metallic)
- Midori* – green
- Nezu* – grey
- Orenji* – orange
- Shiro* – white
- Sumi* – black (pattern)
- Yamabuki* – yellow

SINGLE-TAILED GOLDFISH (type and adult size)

- Common Goldfish* – 10 in.
- Comet* – 10 in.
- Sarassa Comet* – 10 in.
- Shubunkin* – 10 in.

FAN-TAILED GOLDFISH (type and adult size)

- Common Fantail* – 6 in.
- Ryukin* – 6 in.
- Telescope-eye* – 6 in.
- Oranda* – 6 in.
- Lionhead* – 6 in.

GAME FISH (type and adult size)

- Catfish* – 36 in.
- Golden Orfe* – 36 in.
- Carp* – 36 in.
- Mosquito Fish* – 1 in.