POND PLANNER

OASE

POND AND LINER SIZE

A pond's liner size is always larger than the finished water surface will be because of the extra liner used for edging.

Pond **DESIGN SIZE** in ft.:

_____ ft. (LENGTH) _____ ft. (WIDTH) _____ ft. (AVG. DEPTH)

LINER SIZE required for this pond:

LENGTH

(_____ + 4 ft.) + (2 x _____) = _____ ft.
(LENGTH + 4 ft.) + (2 x MAX. DEPTH)

WIDTH

(_____ + 4 ft.) + (2 x _____) = _____ ft.
(WIDTH + 4 ft.) + (2 x MAX. DEPTH)

CIRCULATION PUMP SIZING

Pond **VOLUME** in gal:

_____ ft. x _____ ft. x _____ ft. x 7.5 = _____ gal.
(LENGTH) (WIDTH) (AVG.DEPTH)

Basic pond water **CIRCULATION** requirement (without filtration and clarification):

_____ gal. / 2 = _____ gph
(POND VOLUME) (PUMP FLOW)

WATERFALL and WATER COURSE PUMP SIZING

Every 1 in. wide by 1 in. deep (i.e. every sq. in. of stream cross-section) of water requires 200 gph of water flow.

- ½ in. deep is a TRICKLE
- 1 in. deep is a CREEK
- 1½ in. deep is a STREAM

In flat yards, waterfalls should have no more than a 2 ft. drop. A stream should not drop more than 2 in. every 3 ft.

The **SIZE** of the water course is:

_____ in. x _____ in. = _____ sq. in.
(WIDTH) (DEPTH) (SIZE)

PUMP REQUIREMENT for this water course:

_____ sq. in. x 200 = _____ gph
(SIZE) (FLOW)

at HEIGHT _____ ft

(from pond water surface to start of the water feature)

TUBING SIZES

APPLICATION	FLOW RATE	TUBING
Statuary/Spitters	100 - 300 gph	3/8 in.
Statuary/Spitters	300 - 500 gph	1/2 in.
Small Falls	500 - 800 gph	3/4 in.
Small Falls	800 - 1,500 gph	1 in.
Medium Falls	1,500 - 2,100 gph	1¼ in.
Medium Falls	2,100 - 3,000 gph	1½ in.
Large Falls	3,000 - 5,000 gph	2 in.
Large Falls	5,000 -10,000 gph	3 in.

Long runs of tubing can result in an extra head requirement for the pump because of friction loss.
Always consult a friction loss chart for correctly sizing long runs of pipe or tubing.

POND SIZE (gal.)		RECOMMENDED PRODUCTS		
Water Gardens	Fish Ponds	Pump	Filter	UVC Clarifier
2,100	1,050	Aquamax SF 1600	Biotec 4	Bitron 9
2,600	1,300	Aquamax SF 1600	Biotec 5.1	Bitron 18C
6,600	3,700	Aquamax SF 2200	Biotec 10.1	Bitron 36C
9300	4,800	Aquamax SF 3500	Biotec 10.1	Bitron 36C
10,600	5,300	Aquamax SF 3000	Biotec 12 Screenex	Bitron 36C
11,800	5800	Aquamax SF 3500	Biotec 12 Screenex	Bitron 36C
12,200	6,100	Aquamax SF 3500	Biotec 18 Screenex	Bitron 55C
13,200	6600	Aquamax SF 3500	Biotec 18 Screenex	Bitron 72C
18,500	9,300	Aquamax 6000	Biotec 18 Screenex	Bitron 72C
24,000	12,000	Aquamax SF 3500	Biotec 36 Screenex	Bitron 110C
29,000	14,500	Aquamax 6000	Biotec 36 Screenex	Bitron 110C
			Pressure Filter (with UV)	
800	400	Aquamax SF 1600	Filtoclear 800	
1,600	800	Aquamax SF 2200	Filtoclear 1600	
3,000	1,500	Aquamax SF 3000	Filtoclear 3000	
4,000	2,000	Aquamax SF 3500	Filtoclear 4000	

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POND CONSTRUCTION

Placing stones in the pond adds significantly to the natural aesthetics, but will require more maintenance.

Tons of **boulders** for a **2 ft. deep pond**

______ ft. x ______ ft. / 65 sq. ft. per ton = ______ TONS OF BOULDERS
LENGTH WIDTH

Tons of **gravel** for this pond

__________ x 0.45 = ______ TONS OF GRAVEL
TONS OF BOULDERS

Tons of **boulders** for a **stream**

(__________ ft /10) x ¾ tons per foot = ______ TONS OF BOULDERS
LENGTH OF STREAM

Tons of **gravel** for a **stream**

(__________ ft /10) x ½ tons per foot = ______ TONS OF GRAVEL
LENGTH OF STREAM

______ TOTAL TONS OF BOULDERS NEEDED

______ TOTAL TONS OF GRAVEL NEEDED

SUGGESTED POND PLANT STOCKING

In general, floating plants, such as water lillies 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 pupureum* – 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 scirpoides* – 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
- *Hyrdocles nymphoides* – Venezuelan water poppy
- *Lotus*
- *Nymphaea* – waterlilies (hardy and tropical)
- *Nymphoides peltata* – floating heart

SAVING ENERGY WITH OASE PUMPS

One thing that is often forgotten when selecting pond pumps is that a filtration system has to run essentially 24 hours a day, year-round. Therefore the energy consumption of the pump should not be overlooked in the buying decision. Energy-efficient OASE pumps can save you thousands of dollars over the life of your pond.

An example:
An **OASE Aquamax 3500 SF** uses about 300W (or 0.3 kW) to produce a flow rate of 3,500 gph. Assuming year-round operation this means:

0.3kW x 24 hrs/day x 365 days/yr = 0.3kW x 8,760 hrs/yr = 2,628 kWh/yr

At a price of about 9.44 cents/kWh (2005 US average as per EIA) this means that the annual cost of operation is:

2,628 kWh/year x 9.44 cents/kWh = **$248.08 per year**

A **typical sump pump-style** pump uses about 775 W (0.775kW) to produce a flow rate of 4000 gph. Again assuming year-round operation this means:

0.775 kW x 24 hrs/day x 365 days/yr = 0.775 kW x 8,760 hrs/yr = 6,789 kWh/yr

This means annual cost of operation is:

6,789 kWh/yr x 9.44 cents/kWh = **$640.88 per year**

OASE pumps have a 5-year warranty. Sump pump-style pumps average 2-year life expectancy under continuous duty. So over the course of the warranty of the Aquamax, the sump pump has to be replaced 2.5 times. Assuming a price of $700 for the Aquamax and a price of $200 for the sump pump, the **Total Cost of Ownership** for the pumps over five years is:

Aquamax SF 3500

Equipment cost	1 x	$700.00	$700.00
Operating cost	5 years x	$248.08/yr	$947.40
Total cost over five years			**$1,940.40**

Sump pump

Equipment cost	2.5 x	$200.00	$500.00
Operating cost	5 years x	$640.88/yr	$3,204.40
Total cost over five years			**$3,704.40**

SAVING ENERGY WITH TWO PUMPS

By using one pump dedicated to the filtration system and another pump for water features, the need for one very high-flow pump can be avoided and running costs reduced significantly. Due to the volume required for a particular effect, it is far more economical to use an energy-efficient, lower-flow pump to run the filter and skimmer continuously, and to use a low-cost, high-flow sump pump to run the waterfall or stream at maximum flow periodically.

An example:

Above we showed that an OASE Aquamax 3500 SF (used as a continuously running filter pump) costs **$248.08 per year.**

If we add to this a dedicated sump pump (used 3 hrs/day as a waterfall pump), the following additional energy cost per year is incurred:
0.775 kW x 6 hrs/day x 365 days/yr = 0.775 kW x 2,190 hrs/yearr = 1,680 kWh/yr
which results in: 1,680 kWh/yr x 9.44 cents/kWh = **$158.59 per year**

So for 7,700 gph total circulation, this dual pump setup costs **$406.67 per year**.

In contrast, a single 8,000 gph sump-pump style pump is rated at about 1,400W (1.4 kW). To run this pump continuously, as required for proper filtration, costs:

1.4 kW x 24 hrs/day x 365 days/yr = 1.4 kW x 8,760 hrs/yr = 12,264 kWh/yr
which results in: 12,264 kWh/yr x 7.21 cents/kWh = **$1,157.72 per year**

Within one year, a dual pump setup saves **$751.05**; this handily pays for a higher quality, more reliable setup. With rising energy costs this difference will be even more tilted in favor of a dual pump setup.

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