SUCCESSFUL POND DESIGN

Enthusiasm alone is not sufficient to ensure a successful garden pond or water garden. Careful forethought must be given to the type, size, effect and expense involved. It is too major a project to rush into and construct, then decide there is some aspect or feature you intensely dislike, or then discover you have chosen the most inappropriate location possible! There are six main considerations in designing your pond — Style, Site, Size, Shape, Depth and Cost.

STYLE — the two major variations in style are between formal and informal pools. Generally a 'Formal' pool is deliberately artificial in appearance. Its aim is to act as a focal point or counterpoint to some other dominant feature such as an avenue or the house. It is usually geometric — rectangular or circular and so on. Equally suited to being sunken or raised, it is normally surrounded by stone or brick paving. Often concrete statuary or sculptural elements form the centrepiece. Variations include reflecting pools — broad, still and shallow, - or courtyard pools — streams emerging from a wall or gargoyle into a small rectangular pond.

An 'Informal' pond is the exact opposite — not intrusive, natural and blending into the garden or landscape. Surrounded by foliage, the edges can be grassed, natural stones, pebbles or marsh/bog plantings. The pond should fit into the contours of the land and look as if it is natural. Simple freeform shapes and natural edges give the most natural look. Informal ponds are at their best imitating nature with a little dirt, broad planting and stocked and equipped along biological principals.

SITE — of an informal pond needs particular care — it will look artificial and contrived unless it follows the laws of nature, it must be in a hollow, not on top of a rise! Its waterfalls or cascades must also be in the most logical place. Care and advice should be sought before placing ponds in a watercourse that becomes a torrent after heavy rainfall.

Formal pools can be in just about any position. Providing it fits in the overall design of the garden, as they are best as a focal point or contrasting element.

Other criteria are — a) avoid overhanging trees, b) ensure pond receives at least five or six hours of sunlight per day, c) consider provision of services - drainage of overflow, power for pump and lights, fresh water for top—up, d) avoid overexposure from prevailing winds, e) aim for visibility from your preferred viewing area. Ie. — lounge or patio.

SIZE — will be mainly determined by your site and available space. As a rule, bigger is better, but proportion is essential — it must suit its position and not be a nuisance because of its size. Small ponds are much harder to 'balance' biologically (establish stocking and planting levels .in biological balance that make a pond self regulating), are less stable in temperature, and limit the number of fish that can be kept. Fish need a certain surface area to survive ($1m^2$ for every 25cm of fishes in length). For a balanced pond the recommended minimum would be around $4m^2$ and over $6m^2$ is ideal.

SHAPE — For a formal pool the shape should be geometric and suit the overall garden design. Examples include a rectangular pool reflecting an archway or a circular pool in a circular grove. Peg the design out on the ground before you buy or dig. Normally a square or rectangular pond is best for a paved area with square paving! The wider the expanse of water, the more effective it will look, while squares and circles give maximum expanse from all angles. L—shapes and half—circles are better suited for courtyards or irregular corners of the garden.

Informal ponds should not be geometric but still keep the shape simple with gradual curves and large radius features. Narrow peninsulas may look good on a paper but are difficult to construct. After foliage has grown near the pond, edges are softened and hidden. Interest can be added by cascades and streams, but avoid bridges and islands unless your pond is of large size. Kidney and pear shapes are popular.

DEPTH — visually, depth is uncritical — for a reflecting pool in black colour to give illusion of depth, 100mm could be sufficient. You will need much more to support fish and plant life and to ensure successful operation of pumps and lights etc. For fish, depth is best, as it gives security from predators, stability from temperature extremes and plenty of room. As a rule, deeper is better, but don't overlook safety for toddlers and depth over 800mm is probably excessive.

Some generalizations— water lilies should have 450mm(18") to 600mm(24") , pumps usually require at least 200mm(8") but deeper is better (for protection), marginal plants usually require 200mm to 250mm (8—9"). 450mm is ideal for ponds up to $10m^2$ but consider greater depth where there is high exposure to elements and shallow pools are far more susceptible to prolific algae problems. It is possible to combine depths in the pool with just one deep section at one end. Your Local Council may require a fence if depth is greater than 300mm.

COST — is of course an even more determining factor on your pond design and size. You must decide on your budget - overall cost, effort and time! Generally, the bigger the better, and you get return in proportion to your investment, but you must decide your limiting factors and don't forget to budget for fish and plants to bring your pool to life! Other features such as lighting, fountains and filtration can be added later as time and money permit. Your proposed pond may require the expertise of a professional to ensure its success.

POND CONSTRUCTION COMPARISONS

The main methods of Pool/Pond construction are concrete, preformed fibreglass, preformed polyethylene or flexible pool liners.

Concrete — is by far the best method of construction for commercial large scale water features, being almost indestructible and versatile. However, for the garden, concrete tends to be expensive and usually a failure because of constructional methods employed. Designing a concrete pond must include reinforcing, foundations, waterstops or should be cast in a single pour to ensure watertightness. It is best left to professional builders or pool constructors and treated as a major structure. For the majority of garden scale projects, it is best avoided. Failure to construct concrete ponds properly will mean leaks and often gives poor-looking ponds.

Fibreglass — is generally easy to install, although comparatively expensive and very robust as a preformed pool. It is best kept to smaller, semi—hidden ponds. The range of shapes is limited, depth can be inadequate and it can be difficult to disguise as a natural pond. Size of course is limited to what is easily transportable and storable. Care is needed to ensure pool walls are adequately backfilled for support against the weight of the water. While smaller ponds are the most economical to buy, larger sized fibreglass ponds tend to be very expensive. Durability is generally not a concern.

Semi—Rigid Polyethylene — these are an attractive alternative to fibreglass ponds and are cheaper and lighter, but require more care in installation, although they look more natural. Thick wall polyethylene can be considered comparable with fibreglass in durability. Larger sizes are reasonable balances between size, price and function.

Pool Liners - Are the most versatile and adaptable of pool systems, both as in—ground membranes or as linings for brick or block work raised pools. Advantages include the vast range of sizes and shapes possible, versatility in edge treatments, but disadvantages are susceptibility to damage from physical force or puncture. They also come in a variety of materials —

*E.P.D.M. — A roofing membrane — is a very durable flexible sheet membrane. Lifetime is 50 years or more if properly installed with minimal exposure to the elements. It is generally expensive and heavy to handle.

*Butyl Rubber - Another roofing membrane — a close second to EPDM having slightly less life expectancy and slightly harder to join. It can be even more expensive than EPDM

*PVC - (Similar to vinyl liners used in swimming pools). In its quality form —UV resistant and non—recycled, it is the most economical form of pool liner available. It can be guaranteed to 15 years and if properly installed, will last far beyond this (with minimal exposure to the elements), as it does not decompose. P.V.C. membrane not produced as a dedicated pool liner often is not U-V resistant or contains recycled ingredients. The life expectancy is thus greatly reduced.

*XAVAN – a premium liner having a reinforcing, non woven core sandwiched between two polypropylene membrane layers. The strongest and lightest liner available for its moderate thickness. Less flexible than EPDM due to its reinforcing it is however liner of choice for larger jobs where weight and handling are a major issue.

PUMP APPLICATION GUIDELINES

Pumps are essential to successful water gardening. Circulation of water stops stagnation and foul water, but pumps are also used to filter and aerate the pond or run fountain sprays or waterfalls/cascades. A pump turns a dead pool into a living pond.

Consumers often hope to get maximum performance at minimal price and thus purchase pumps too small for their needs. It is more practical to buy a pump larger than needed and restrict the output by a valve, as it is impossible to get more performance than maximum out of any pump.

[RULE #1 — YOU CAN ALWAYS THROTTLE IT, BUT YOU CAN'T MAKE IT BIGGER.)

Comparing pumps can be confusing to the uninitiated. To compare pump sizes, pump manufacturers quote maximum figures. These are 'maximum heads' — the limit or height up to which a pump will push water, and 'maximum flows' — which is the quantity of water the pump pushes without any pipe work — straight out of the pump. Pumps are almost never run near their maximum performances — a maximum head means the minimum flow and vice versa. (The more 'head' on a pump, the less flow you can get). Pump performance charts or graphs give an assessment of what pumps can pump at various heads (heights). Normally pumps would be used at between 50% and 75% (that is 1/2— 3/4) of their maximum performance figures.

[RULE #2 — MAXIMUMS ARE NOT RECOMMENDATIONS]

Pumps need power! They use it and don't work without it. That may not be obvious to everyone. Many consumers forget that they will need a power source near their pond.

[RULE #3 — PUMPS DON'T WORK WITHOUT POWER)

Power can concern many consumers for two reasons — safety and cost to run. Small submersible pumps are designed to operate in water, and so are made to be safe by double insulation, which means even a faulty pump will not make the pond 'live'. For pumps, the main danger is the cord being cut.

For outdoor or garden installations, the power cord should have an earth wire as extra protection, but all pumps should be on a power circuit that is protected by an R.C.D. (Residual Current Detector or 'safety switch'), that will cut power supply if power 'leaks' from cord or pump. These are mandatory in new houses and advisable for any outdoor power situation. In some pumps, the earth wire will 'earth' the pond too — ensuring the fuses will blow in a malfunction.

[RULE #4 — POWER SUPPLY SHOULD BE 'SAFETY SWITCH' PROTECTED]

Low voltage versions of some pumps are available. These provide additional safety as power is only 12 Volts or 24 Volts, but cost more to buy as a transformer is needed. Most people will rather save on the cost and use a 240V version, but a low voltage pump does have the advantage of allowing handymen to run power to the pond (in low voltage) without employing an electrician.

However, the transformer power rating must exceed that of the pumps', and short circuits, while not dangerous as in 240V, will quickly ruin the transformer. Excessive (very long) extensions will require more power and thus a bigger transformer.

Power costs are minimal for small pumps. Small submersible pumps are very energy efficient, generally using less power than a light globe. Even run continuously, a 27 watt pump (Hydrogarden L30) will use less than 0.65 kw/h per 24 hours, which at 16 cents per kw/h is around 10 cents per day. (A 10 watt pump costs less than 5c per day). Other types of pumps (swimming pool pumps etc) will be far more expensive to run.

[RULE #5 — LOW VOLTAGE PUMPS RUM ON TRANSFORMERS, NOT MAINS POWER. MAINS VOLTAGE PUMPS RUN ON MAINS POWER, NOT VIA TRANSFORMER]

Pumps don't work without water — obvious, but unfortunately not always. Running pumps without water means they are not cooled by the water and that damages the pump. Pumps should always be well covered with water and sited in the pond to ensure this. If run externally, as some pumps are capable of, they should only be installed with a flooded suction — so that the pump is below the water level and the outlet and pipe from water to pump is always below water level. Also the suction pipe should be oversized (at least one size bigger than the output hose) and an intake strainer fitted.

[RULE #6 - PUMPS DON'T WORK WITHOUT WATER]

Fountain pumps are designed and manufactured for continuous operation, but to ensure long life, some basic precautions are needed. Pump prefilters are there to restrict dirt and rubbish passing through the pumps and wearing the impellor. If not cleaned for long periods, the foam may constrict and the water and dirt will bypass the filter, greatly increasing wear on the impellor

For larger ponds, pumps should be placed to avoid sludge and sediment that will accumulate at the lowest points of the pond, but always well covered by water. Foam pump prefilters are only intended to protect the pump, not clean up the pond. If filter is continually blocking (every second day), the pond needs cleaning out and fresh water added. For larger ponds, biological filters are recommended to clean the pond's water. A balanced, healthy pond should have relatively clear water so that the prefilter does not require over—frequent cleaning. Conditions other than this indicate some problem with the pond or its condition.

[RULE #7 — PUMP PRE—FILTERS NEED REGULAR CLEANING]

NOTES AND GUIDELINES ON FILTRATION

Garden Ponds provide relaxing atmospheres and endless enjoyment, particularly with fish and attractive planting. However, most of our 'installed' ponds suffer from poor water quality — dirty, green, polluted water, unpleasant smells and poor fish and plant health.

Microscopic algae, the cause of green water, are present in all ponds except those sterilised by chemicals. It is an unavoidable natural occurrence, but it can be minimised. If your pond — has adequate depth to its size, is of ample size and has the right ratio of fish and plants, it might be possible to achieve a balanced healthy pond, but in practice, it is not.

In contrast to natural lakes and streams, garden ponds are characteristically shallow. The low depth means ponds cool and heat up faster than natural ponds and the temperature fluctuations (plus environmental influences such as fertilisers, garden wastes, lawn clippings that produce excessive nutrient), ensure extensive algae growth. Furthermore, a higher proportion of fish in comparison to natural ponds, accentuates the problems. Not only high stocking, but just the feeding of these fish causes a very high pollution due to excrement. This high level of algae and excrement causes severe depletion of oxygen, a high level of toxic ammonia and a sick pond!

The first step in achieving better water quality is circulation. Moving water has far less potential for encouraging algal growth. Any form of fountain or waterfall will assist this by mechanically aerating the water. This will increase the dissolved oxygen level, which is beneficial to water quality, plant life and fish.

Circulation alone is usually insufficient, particularly for larger ponds and for fish, therefore filtration becomes necessary. A lot of pond pumps available have filters, but do not regard these as pond filters — they are only provided to protect the pump and reduce wear on its parts. Internal foam—style filters, if of sufficient size — large enough for both pond and pump, can successfully filter the water, but be prepared for the regular maintenance (diving into the pond to clean the filter pads on a regular basis). Neglected foam filters are worse than no filter at all.

We recommend biological pond filters. A biological pond filter is best described as a miniature sewerage treatment plant, working continuously to purify the water. Most biological filters have at least two stages. First stage is mechanical filtration - which removes congealed algae and suspended matter through a strainer, such as filter brushes or foam pads. The second – the actual biological filtration usually takes place in a media compartment and works by the media becoming colonized by and using naturally occurring bacteria that feed on nutrients, toxins and suspended matter.

There are many different media types that vary in price and effectiveness including foam pads, all of which support growth of this bacteria. These bacteria convert the algae, fish waste and biological matter into harmless by—products that can be absorbed by the pond's plants. Bacteria convert ammonia into nitrite and other bacteria convert nitrite into nitrate. Nitrate is either absorbed by plants or converts to nitrogen which escapes to the atmosphere. The bacteria colonise or live on the surface of the filter media. Therefore, the higher the surface area available to these microbes, the larger their population and thus efficiency of your filter. Because the media is not densely packed and allows for easy water flow, the filters do not block up as do sand filters and cartridge filters. The maintenance is thus much lower than for fine mechanical filtration.

Filter bacteria need a good supply of well oxygenated water to do their job, so you should only ever turn your pump off for short periods of time. Starved or dehydrated bacteria will die and place high demands on the pool's biological system, creating further problems. If problems occur, reactivate or boost filter with an appropriate dose of dormant bacteria (Such as Blagdon Filter Start or Bioactivator).

Biological filters can be either internally (submerged) or externally mounted. Submerged filters are easily hidden in a deep pool, but are more difficult to maintain. Some types of biological filters are 'gravity return' and must be mounted beside or near the pool with gravity (free flowing) return line to the pond — often utilised as a cascade or waterfall. They may need concealing, but are easy to maintain and relatively trouble free. The other common type of biological filter is the pressurised unit, which can be situated virtually anywhere, but need more regular maintenance.

Filters are sized according to pond size and a chart should be used help to select them. Flow rate is also critical — keep under maximum flow rates or you will lose efficiency and bacteria will not thrive — it will be washed out into the pond! We recommend flow rates of 50 — 80% of filter's maximum flow rate, but also pond turnover rates of 1 Hour under 500 Litres, 2 Hours under 5000 Litres, 3 Hours — 5000 — 15000 Litres and 4 Hours over this.

A majority of Pond Filters now days have Ultra-violet clarifiers incorporated.

Ultra—Violet Clarifiers ensure crystal clear water or enable larger quantities of healthy Fish. These use Ultra—Violet light from a special lamp to kill Algae and other microscopic organisms in the water as it passes through the unit. It thus 'sterilizes' the pond water (pond—style units do not clinically sterilize water like expensive commercial units) and aids in reducing diseases as well as algae. Normally a Filter is required to remove dead algae from the water and the U/V units are more effective in clearer water, which is why mostly they are combined in a single unit. Ultra—Violet Clarifiers are available in various sizes (output wattages) and are sized to suit the pond volume and/or maximum flow rates, as are Filters. Too much flow will kill too little Algae! Biofilters and U/V Clarifiers will provide an excellent environment in your pond for fish and plants, with good water quality and minimal problems— enhancing the ponds attractiveness and are environmentally friendly.

Other methods of controlling Algae are chemical or bacterial additives. Chemical additives come in two types—The Bromine/Chlorine based Algaecides and precipitating type additives. Algaecides are effective in killing algae, but can be too effective- killing fish and plants. Even 'fish & plant compatible formulae' algaecides do retard growth of Fish and Plants. These are best only used for emergencies where algal growth is blooming and plants or fish are perhaps beyond help!

Precipitate additives (Greenaway) work well. They cause all suspended matter to fall to the bottom of the pond. They are not long term cures but treatments of the symptoms of an unbalanced or insufficiently filtered pond. Use before installing Biofilters or to assist in extreme weather conditions, if bio—system is struggling to cope. We also advise use of bacterial additives (Sludge Buster or Bio-Active Sludge-away) to then consume the layer of precipitated biomass on the pond floor.

Bacterial additives are very effective when used in conjunction with biological filters. They release quantities of microscopic bacteria, which feed on algae, thus being a natural means of control. However, they do place high demands on the pool's oxygen levels, so circulation and aeration are vital. Used just on their own, they will need regular reapplication and are not very economic. Best used as boosts for bio—filtration and occasional pond 'medicine'.

USING PUMPS FOR STATUARY

When using submersible pumps for statuary, be wary of some of the common problems.

SPLASH - Is a problem with large statues in small pools. Splash will travel up to 45° from its source. For a six foot fountain — splash at 5 foot will carry 5 foot , so if pond is not in proportion to statuary (pond's radius smaller than statue height), keep flows down and thus splash to a minimum.

WIND -Can also carry spray and splash. In a very exposed situation or one to wind, you should be prepared to turn the pump off in windy conditions

WATER LOSS - Splash and wind borne spray may not seem very great, but slight amount of water loss over an extended period can lead to substantial loss of water from a small pool. Combined with evaporation, water levels in a small statuary pond drop in a day, exposing the pump. Some customers will suspect a leaking pond, but distributed dampness is a sure sign of water loss due to splash.

WIND –In wind prone conditions splash factor becomes serious. Splash and spray can be carried by wind to double of that in a no wind situation

LIME AND CEMENT — in newly installed ponds with statuary, a high level of lime and cement may be in the water. This can lead to deposits on the pump, jamming the pump up. Water should be changed after mortar is used and effects of lime and cement neutralised.

USING PUMPS FOR WATERFALLS & CASCADES

SIZING - All the water used in a cascade/stream or waterfall must come out of the base or lowest pond in the system. So this must be as large as or larger than the rest of the cascades or pools in the system. A large, long stream needs a large pond to supply it!

FLOW - Flow rates for cascades/waterfall and streams are relative - like beauty in the eye of the beholder, so we cannot be too limiting in our recommendations. It comes down to the concept in the mind of the constructor. Again, pumps can always be throttled, but to be bigger needs a bigger pump! The bigger the flow in a stream or waterfall system, the more water needed to 'run' the system and the bigger the base pool needs to be — otherwise water level in base pool will drop excessively.

Also a pump and pond and stream becomes a closed 'system' – flow must always be the same at any point in the circuit –or water loss and overflow is going to result!

WATER LOSS — Cascades and streams need care in installation, or problems will occur from water loss, due to splash and capillary action. Seepage from capillary action is lost to system and if pump is run continuously, this can mean significant loss. A litre an hour is 24 litres a day - just 5 days to empty a 100 litre pond!

VALVING — Use of several outlets from one pump usually means you will need to fit valves on hose to regulate flows from each outlet. Valves such as this are found in the irrigation aisles.

HOSE — for cascades and waterfalls, use larger hose, hose fittings and valves to give the best flows

Pond-less Water Features

Imagine coming home after a long hard day at work to be greeted by the sound of tumbling brook, a gushing rock or a tumbling waterfall – soothing pleasing sounds help wash the cares of the away. How pleasant you think! You look and follow the water to where it disappears - there is no pond at the bottom, where naturally one expects a pond. You then congratulate yourself on avoiding all the troubles and pitfalls caused by a pond and having successfully installed a beautiful pond-less water feature. Does this sound too good to be true! NO, this can be achieved now!

Now, the application of careful design and modern technology can leave you with a perfect functional water feature, babbling brook or a tumbling stream, without the cares and worries of a pond. Naturally, you still need a reasonably sized reservoir and pump compartment.

We can provide you with the equipment and accessories to have this concealed so it takes up minimal amount of space. Traditionally all these features would have needed a good sized, if not large pond. These can take up a large amount of room, be a danger to children and animals, go green, stagnant, breed mosquitoes, need topping up constantly because of high evaporation and unless it is maintained properly becomes an eyesore.

The hard facts are that unless ponds are of a reasonable depth and area they are very hard to maintain. Reasonable water features generally need a reasonable size pond. Alas most of us are pressed for space and money and we have to compromise with smaller ponds. The end result is that these ponds are hard to maintain and cause endless troubles to their owners unless they are properly planted, treated and filtered. While we can provide all the equipment to do this and have a perfectly functional, successful pond, we would like to point up an alternative that is rapidly growing in popularity – 'The Pond-less Water Feature'.

Basically the pond is replaced by a water well, pump pit, reservoir and a wet, rocky area. You dig a hole, possibly the size of a pond, line it with liner, and place a pump chamber in the centre, plumb up your water feature. Surround your pump chamber with large stones and rocks – this allows you to store large volumes of water between the rocks. Then create your water feature – a tumbling brook or a cascading stream. When the system operates, the stream of water simply disappears into the stones. The water permeates through the stones into the pump chamber and is pumped to the feature reticulating again and again.

The advantages of this system are many. Firstly there is no body of water that is a danger to small children or pets, there are minimal problems with algae, high evaporation, grunge and maintenance is kept to a minimum. Instead of taking up a vast area that is otherwise unusable, the rock filled pond-less pond becomes an extension of the garden - it can be walked on, does not need mowing or cleaning out. Furthermore, you don't need to feel guilty about water loss, as evaporation is kept to an absolute minimum. In short, it is an asset to your property with low liabilities.

The Disappearing Pond! - Truly a concept for the 21st Century!

Pond and Grate

The other method of having a water feature in your courtyard without a pond is to have grated pond. Primarily used for statuary, it means you can have a large gushing stone or stainless steel feature in your courtyard, providing the soothing, refreshing sights and sounds of falling water without the problems of a pond. Basically we provide a very strong galvanized steel grate that goes over the top of the pond and can support almost any sized monolith or statuary component such as a bowl or fountain and also will support a layer of rocks to hide the water beneath. Of course, it has all the attendant advantages of a disappearing pond – less evaporation, no sunlight reaches the water to cause algae problems, no safety concerns, no problems with mosquitoes and other water born diseases and creatures.

The grates and ponds are available in matched pairs – squares, round or rectangular and various sizes. The ponds can be either built into the ground to provide your grate level at ground level or can be enclosed in brick, masonry or other surrounds as a raised pond which means minimal digging, but still will have the same low maintenance advantages. The grate comes with a pump access hole to enable you to access and service the pump – also check on water levels and quality long after the unit is installed. As an alternative to the galvanized steel grate, the round ponds are also available with a poly lid that will enable you to use the small stones and with slightly reduced weight loading. These lids and grates are all capable of holding the weight of one or more adults, so there is no danger to any pedestrians caused by standing on them. We do not however recommend driving vehicles over these grates.