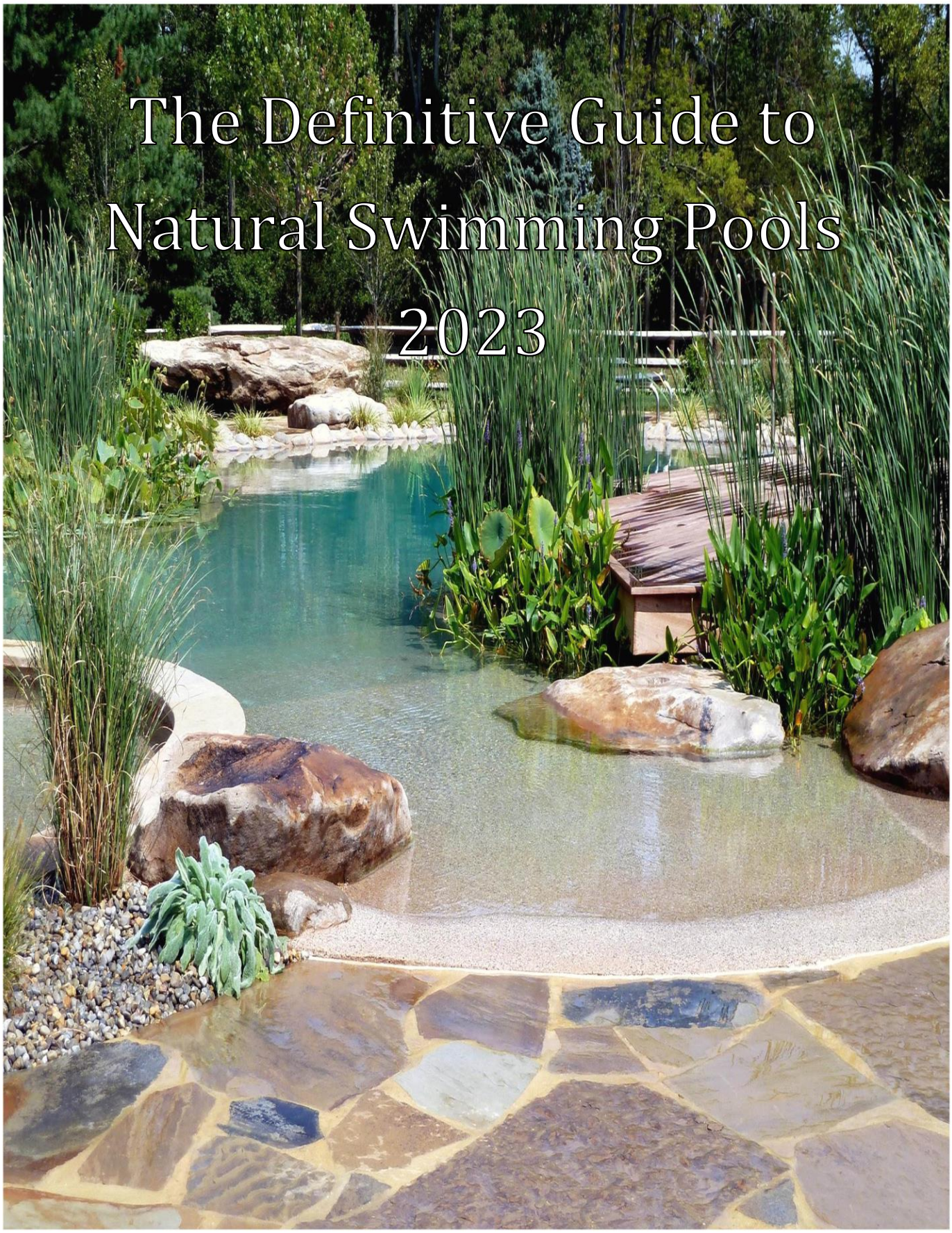
BioNova natural pool

The Definitive Guide to Natural Swimming Pools 2023



To Our Readers

This guide is created to provide the reader with a complete story on Natural Swimming Pools (NSPs): where they came from, what they are, how they work, design iterations, and how to get started building one in your backyard. NSPs represent an entirely new paradigm in swimming pool ownership and care.

A Natural swimming pool is Living water. Unlike chemically treated pools, they will sometimes have a hue of a yellow/green, but the water will be clear, clean, cool, and soothing to swim in. If you don't brush or vacuum the pool it will begin to form a film on the pool surfaces… but the water will be clean, cool, and soothing to swim in. Some people don't want a pool like that.
Not everyone "likes" the look. Some think it looks like a swamp. That's Ok.

The first constructed natural swimming pool

by Werner Gamerith in Austria in 1980 - Still in operation.

Photo courtesy of www.naturgartenfreude.de

The water in a healthy ecosystem is enjoyable to swim in. Yes, it may get green occasionally, and yes some, (like the one on the right) is a welcoming habitat for a very diverse population of insects, birds, reptiles, amphibians, racoons, herons, hawks… as well as an aquatic garden of lotus, lilies, cat tails and wire grass. Some people don't want that. That's Ok.

However, as you read on and discover, an NSP is not defined by how it looks. It's a natural pool because it is filtered by a biological filter system. Many NSPs have been built that don't even "look" natural. They're classic rectilinear shapes without an aquatic plant in sight. Read on to find out about the BioNova® BF4 biofilm filter system.
We hope that you enjoy reading it as much as we enjoy designing and building NSPs!

Swim Natural!

Allen Schnaak
VP BioNova® Natural Pools

BioNova® History

BioNova® North America owes its start to Gerhard Brandlmeier, an Austrian landscape contractor who started building swimming ponds in 1985. Brandlmeier began using the name BioNova® for his swimming ponds and grew his business building scores of residential NSPs. His greatest work was building the world's first public natural swimming pool in Herzogsdorf, Austria, in 1990.

The first NSP open to the public - constructed by BioNova® founder Gerhard Brandlmeier in Austria, 1990. Still in operation!

The BioNova® name was carried on by Brandlmeier's pupil, Rainer Grafinger, who continued building with great success in southern Germany. The first public NSP in Germany was built near Munich. Fast forward to 2010, and Grafinger designed and installed his 100th NSP in Germany!

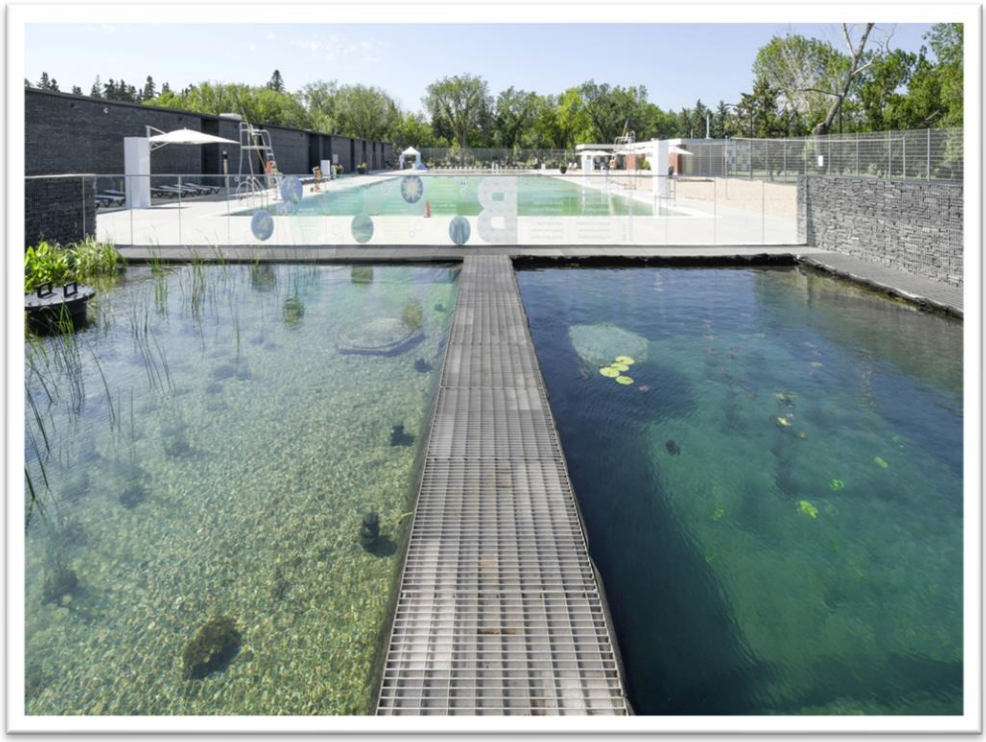
Let's rewind a bit to the early 2000s in the USA. James and Hae-Sun Robyn, pool company owners in New Jersey, had clients with a growing interest in natural-looking swimming pools that didn't use chemicals. This interest led them to investigate the amazing builds the Austrians and Germans had been using for almost 20 years. This newly discovered knowledge, coupled with James and Hae-Sun's German-based education and upbringing, led them to Germany to learn more about what made NSPs so successful abroad.

In the spring of 2007, the Robyn's traveled to Germany to look at some NSPs up close and returned in the fall of the same year to attend an international NSP trade show in Cologne, Germany. There they met Rainer Grafinger and formed a fast friendship.

Left to right: James Robyn, Werner Gamerith, and Hae-Sun Robyn

As a result of that meeting, James and Hae-Sun formed Robyn's Natural Pools Inc., and the BioNova® name was purchased for use in the USA and Canada. The NSP business in North America was born! Since then, the Robyns and other members of the BioNova® team have made dozens of trips across Europe to review and analyze the major firms' best technologies. At home in North America, BioNova® has adopted, refined, and improved the European technologies to offer the latest, state-of-the-art NSP systems. In 2010, the first residential NSPs in North America were implemented, and business has been growing ever since.

Making a Splash



In 2010, BioNova® performed a feasibility study for the city of Edmonton in Alberta, Canada. This was to test if the existing, chemically treated pool could be converted to an NSP. The city gave the green light for implementation and the Borden Park Natural Pool went into the planning phase. It became the 2nd public NSP built in North America.

Borden Park Natural Pool, Edmonton, Alberta, Canada

The 1st public NSP in North America started in 2011, when BioNova® began consulting with the City of Minneapolis and Landform Consulting on the design of a Public Natural Swimming Pool to be installed at Webber Park in Minneapolis.

Webber Park Natural Swimming Pool –

21,000 ft2 Swimming Pool and 16,000 ft2. Regeneration Zone

In 2015, the first Public Natural Swimming Pool in the United States of America was opened by the City of Minneapolis at Webber Park. This milestone project was designed and constructed with BioNova® providing oversight to the Minneapolis Parks and Recreation Board and Landform Professional Services LLC of Minneapolis. The first Public Natural Swimming Pool in the USA has been very well received.

1st Public NSP in North America - Webber Park Natural Pool - Minneapolis

Leading America's Change to NSPs

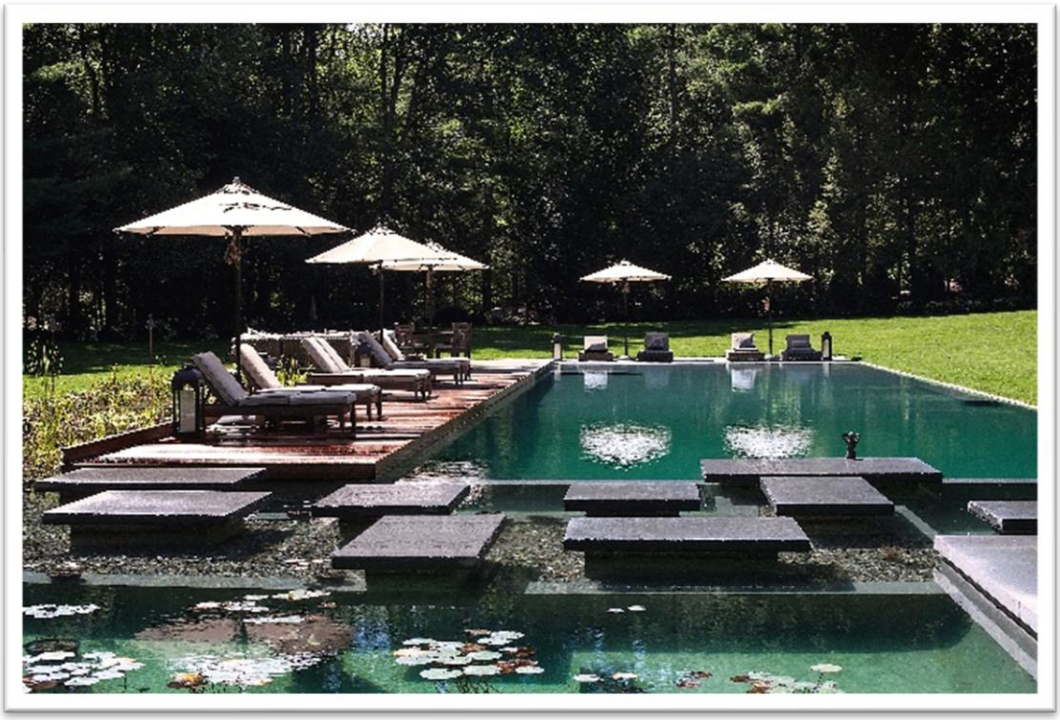
We love the phrase 'first one into the pool'! BioNova® North America has many firsts:

- BioNova® is the first company to build an NSP in the USA and Canada.
- BioNova® is the first to have NSP Dealers in North America (since 2007) and continues to have more Dealers than all other NSP companies combined.
- BioNova® is the leading NSP company in North America and the first to have successful NSP installations in climates from California to Connecticut and from Toronto to Texas.

BioNova® also leads the NSP industry in other ways:

- BioNova® is the largest/oldest Natural Swimming Pool (NSP) provider in North America.
- BioNova® is wholly American owned and operated.
- BioNova® has completed more NSP installations in North America than all other NSP companies combined.
- BioNova® expertise was used for the design and installation of the first Public NSP in North America at Webber Park in Minneapolis, MN.
- BioNova® is the only NSP company to exhibit at the American Society of Landscape Architects, American Institute of Architects and International Pool Spa and Patio annual trade shows

Since 2008, BioNova® has been adding dealers in the USA and Canada. In order to earn the BioNova® Certificate of Authenticity, all North American installations must adhere to our quality process to ensure the system is installed as designed.



Renovation of existing Pond to a BioSwimPond in CT

Worldwide Support

BioNova® came to prominence in 2015 with the formation of the US-based Association for Swimming Ponds and Natural Swimming Pools (the ASPNSP). The ASPNSP was admitted the following year as a member of the International Organization for natural Bathing water (IOB). In 2017, James Robyn-CEO of BioNova® North America-was elected to the Board of Directors of the IOB and in 2021 Ryan Harmer, BioNova® project manager, was named president the ASPNSP

The International Organization for natural bathing waters (IOB) was founded on 29 September 2009 on the occasion of the 5th International Congress swimming in Merano, Italy. It is an umbrella organization: 12 national swimming pond organizations are currently united to form the international federation. As of 2021, the IOB represents more than 600 more than 600 individuals and companies that deal primarily with planning and construction of natural swimming pools. It is the perfect place to meet the experts in the area of natural swimming ponds.

Objectives of the IOB are the promotion and distribution of natural bathing waters with fully biological water purification. This is achieved by consultation between politics and administration, in the formulation of policies and as well as consultancy about statutes and laws concerning bathing in natural bathing water. IOB supports the member associations from various countries through exchange of experience on planning, construction, and operation of semi-natural bathing waters, and by publishing all kind of information.

An important task of the IOB is also supporting the development of other countries organizations. The IOB organizes conferences and seminars, coordinating the training and retraining of the national associations as well as the biennial International Congress for natural bathing water. Regarding the international aspects IOB supports and promotes investigation and research related to the subject of natural bathing water.

The IOB is organized as a registered association under German law and has its headquarters in Bremen, Germany. It is backed by a nine-member board, headed by an executive secretary, which is controlled in its work by the Assembly of National Associations (members).

The IOB is the exclusive international distributor of DANA, a web-based database system for swimming pools with biological water treatment, offering all the features of effective quality management.

IOB Common Essentials

The purpose of Common Essentials

Members of the IOB have collaborated to create this international agreement on the Common Essentials in planning, building, and maintaining Natural Swimming Pools/Ponds (NSPs). The reason and purpose of these criteria is to differentiate NSPs from pond environments that are not designed for the purpose of swimming.

Once released by IOB General Assembly, these Common Essentials for swimming ponds and natural swimming pools, collectively called NSPs, are binding for IOB affiliated associations. With this vote of confirmation, IOB is asking its membership organizations to implement these guidelines in their national regulations and to ensure that their members respect these guidelines in their projects.

The IOB Common Essentials:

1. Nature-based solutions

NSPs are nature-based solutions, engineered systems which use principles and processes known from nature.

2. Circular Economy

All materials used in the construction of NSPs should fulfil the requirements of a Circular Economy. The goal of this is to eliminate waste and the continual consumption of resources. Circular systems employ reuse, sharing, repair, refurbishment, remanufacturing, and recycling to create a closed-loop system, minimizing the use of resource inputs and the creation of waste, pollution, and carbon emissions.

3. Biological treatment

To clarify and purify water, NSPs use exclusively mechanical and biological methods to reduce nutrients. Any further measures or interventions must primarily ensure these processes. Sustained harmful impact using biocides, chemical, or mechanical disinfection is not permitted.

4. Planning process

Each NSP is the result of a professional implementation of the customer's request and planning process based on scientific approaches and state-of-the-art technology. The resulting plan describes the water treatment process and predicts excellent bathing water quality. When the NSP is in operation, the planned water treatment process must meet prediction and expectation on water quality.

5. Information to customers

Customers, (clients and bathers) should be informed about all the aspects of an NSP, including maintenance, especially with respect to what is to be expected in terms of living water quality and the presence of wildlife.

6. Regulations
Existing applicable building and construction regulations must be followed. This applies as well to all safety regulations existing for swimming pools.

7. Internal configuration
An NSP is divided into a bathing area or areas, and a biological treatment area or areas. Biological treatment areas are not for entry by bathers.

8. Runoff water
Surface water runoff from the property surrounding the NSP shall not flow into the NSP.

9. Sealing
A NSP must be sealed, i.e., isolated from the ground under and around the NSP.

10. Inoffensive (non-polluting) materials
Materials used in NSPs should not pollute or contaminate the water and environment. This also includes limiting the introduction of phosphorous.

11. Native plants
When using plants in an NSP, Autochthonous plants are preferred. Plants deemed to be invasive species in the locale where the NSP is located are forbidden. Plants used in an NSP should be cultivated for that purpose and not be harvested from nature.

12. Water composition
All water used to fill the NSP must be analysed for physio-chemical composition before the first filling and the result must be included in the planning process.
Any water used to refill the NSP must be analysed for physio-chemical composition and adjusted at regular intervals.

13. Water testing
Regular water testing with respect to hygienic and physical-chemical water quality parameters will be done as required by health officials for public NSPs and if needed for private NSPs.

14. Indicator organisms
For the assessment of water quality, the country-specific limit values will be used. Otherwise, the indicator organisms recommended by the World Health Organization for bathing water will be used.

Chemicals: A Vicious Cycle

The objective of any chemical approach to water care is to ***Suppress the Growth of "undesirable" microorganisms***. Historically, the industry standard for maintaining swimming pools has involved exterminating all microscopic organisms in the water. This approach relies on the repeated and constant addition of biocidal chemicals to your swimming pool to kill and suppress bacteria and algae.

However, the biocidal activity is only as good as the water balance parameters. In order to ensure the chlorine is doing its job it is of paramount importance that the pH be within 7.2-7.8. And in order to keep the pH between 7.2-7.8 you need to maintain the Total Alkalinity between 80-120ppm. And if you have a plaster pool failure to adjust the Total hardness can result in scale or etching.

Don't get me wrong, we are not against using chemicals in a chemically treated pool. With over 50 years' experience in the pool industry, we have spent decades instructing pool owners the proper methods for chemical maintenance. The pool industry is, unfortunately, galvanized around a once-a-week maintenance routine that requires owners to 1) Sanitize, 2) Oxidize, and 3) Add an Algicide. Then once a month have the water tested at a trained professional pool store, to ensure "all is well" with the water balance.

If you follow that method and are involved in testing the pool daily for Cl and pH, and provide the necessary cleaning maintenance, circulate, and filter the water… the water is beautiful. It is achievable. But often times, many complain about the skin irritation, brittle hair, bloodshot eyes.

But a chemical approach is not the only way to treat a swimming pool. Aside from our bodies' constant exposure to these chemicals, the suppression of all microbial life in the water creates an unnatural, sterile environment. Even in these chemically treated environments, undesirable bacteria (pathogens) and algae still exist; the bacteria are never totally removed, only suppressed. Waiting on the opportunity to grow.

By removing the syntropic community of beneficial microorganisms that naturally exist in a healthy aquatic ecosystem, we are removing the organisms that would otherwise outcompete the undesirable microbes that chlorine is trying to kill. A chemical approach is manageable. But it is not the only option for recreational water care.

With a BioNova® Natural pool we eliminate the tedium of chemical testing and water balance and allow the water to reach its own natural healthy balance. Biological filtration systems optimize the conditions to create an overwhelming population of beneficial microbes to naturally filter nutrients (from atmosphere and bathers) from the water in order to ***Suppress the Growth of "undesirable" microorganisms***. Sound familiar? The next section explains how.

Harmonious Living Water

In a chemical pool, most anything that enters the pool water is considered a contaminant. In an NSP, debris that enters the water from wind, rain, dust, and bathers is considered nutrients. A chemical pool must constantly remove contaminants because pathogenic organisms still exist in the water and will grow if this "food source" is not removed. An NSP nurtures the development of the beneficial microorganisms to remove these nutrients by feeding on them and, because to their overwhelming presence, the beneficial microbes outcompete the undesirable microbes for these nutrients. Through this competition for resources our beneficial microorganism's control and suppress the growth of potentially harmful microorganisms. This process dives into a bit of Biology and Limnology but we at BioNova® love taking on the role of educating and enlightening folks on the science of these natural systems!

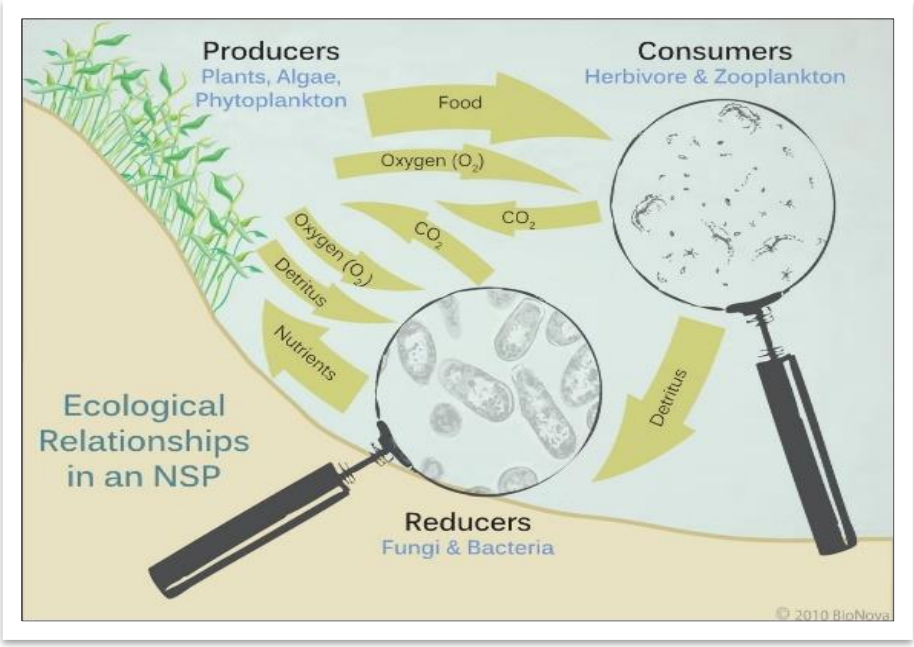
While were talking about education let us to draw your attention to some common pool rules, we've seen all our life but maybe never knew the logic and reasoning behind them. These rules apply to both natural and chemically treated swimming pools.

- SHOWER BEFORE ENTERING POOL – because each bather is carrying their own load of contaminants/nutrients into the water. Things like sweat, lotions, cosmetics, drugs, bodily waste, oils, and other organic matter.
- NO BABIES IN DIAPERS – because…
- NO SPITTING WATER FROM THE MOUTH – Not because its rude and crude but because there is always the possibility that the guy that dove into the pool in front of you didn't shower and, based on the debris trail he left behind, had just finished cutting the grass.
  OR
  The baby being pulled around shallow end of the pool, making motorboat sounds, has a brown saggy diaper.
  Even in chemically treated water, most microbes that can cause a problem must be ingested or enter through the nose. Don't take water in your mouth or up your nose.
- DO NOT SWIM IF YOU HAVE OPEN CUT OR SORES – because…
- DO NOT SWIM IF YOU ARE IMMUNE COMPROMISED – because…
- DO NOT DIVE IN SHALLOW WATER – because…
- NO GLASS OBJECTS ALLOWED AROUND POOL – Have you ever seen how invisible a broken Mason jar becomes when it, and the "cold beverage" inside it, was dropped on the pool coping sending most of it in the pool? Yeah… No Glass in the pool area.

The last rule has nothing to do with water care but all of them have to do with a responsible way to use a swimming pool safely. Now, Let's take a look at the biology that's at the foundation of an NSP.

Living Water

Natural filtered water isn't manufactured, it simply happens as a result of existing natural processes. What may seem like magic is simply the result of optimizing the conditions to nurture the growth of the “living water” containing numerous beneficial natural microorganisms (bacteria, fungi, phytoplankton, zooplankton, diatoms, etc.) This diverse community creates microbial syntropy, where the metabolic output of one organism benefits the metabolic needs of others in the community.



Producers like plants, algae, and phytoplankton, create energy for their own metabolic needs, as well as food and oxygen for others. This is a byproduct of photosynthesis (plants converting sunlight into energy).

Consumers consume the gases and metabolic byproducts created by the producers and begin the breakdown of nitrogen.

Reducers, like bacteria and fungi, feed on the remaining organic by-products, and this host of beneficial microorganisms multiply.

These ecosystems occur naturally, but they do have some basic requirements. If provided with a surface on which to grow, this biotic community will form a BioFilm. Biofilm is the result of free-floating microbes finding a spot to call home in the biological filter of the NSP. One of the key components of biofilm is the film itself. The film, called an Extracellular Polymeric Substance (EPS), encapsulates the community of organisms, providing protection from the elements and a means for the colony to sequester (capture) nutrients and anchor to a suitable surface. This biofilm is home to numerous species of bacteria, phytoplankton, and fungi, each with a specific function and metabolic purpose.

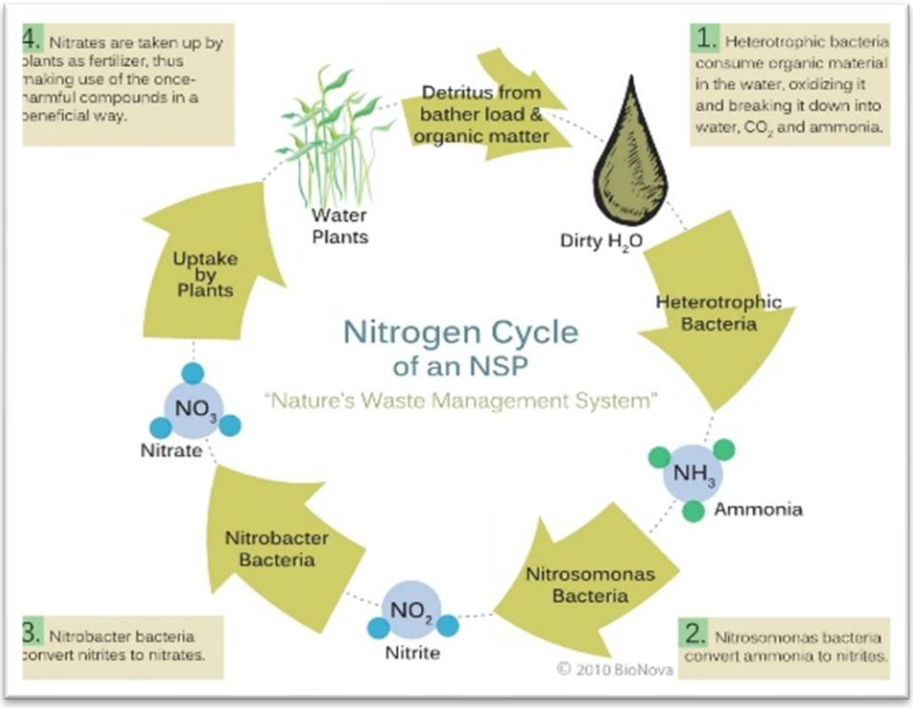
The other element to support a biological filter is matching the water flow rate to the type of biological filter employed on your NSP. A BioSwimPond® moves water at a slower rate than a BioPool®. Once the surface area, and flow rate are accounted for, the nutrients supplied by the environment (and bathers) will provide the food for the biofilm and plants to thrive.

The result is swimming pool that is naturally cleaned.

An NSP can be in harmony with nature!

Harnessing Nature

Biofilm forms on surfaces--the more surface area the better. With a desirable place to form, the other requirement is nourishment for the biofilm, and that comes from the swimming vessel. The flow of the water from the swimming area into the biological filter area provides an abundance of nutrients to feed the biofilm and the water is cleansed as the nutrients are removed. This positive feedback loop is an incredibly efficient way to purify water and nature has been doing for millennia. Through constant and properly maintained water flow, this natural system will provide clear, soft water for bathers and swimmers.



The Nitrogen cycle, that we all learned about in High School Biology, plays a significant role in the conversion of detritus and bather waste in an NSP. In fact the ammoniated waste that is deposited by swimmers is converted nitrate that can then be used by water plants and phytoplankton. In a chemical pool when these same ammoniated wastes come in contact with chlorine, it forms chloramines causing eye irritation and an obnoxious "chlorine like" smell.

Another sustainable attribute of the NSP is that the filters that we use are all open-to-atmosphere, meaning they are not pressurized vessels like the filter systems used in chemical pools. Because they are open-to-atmosphere the NSP filters can run at lower pressures and higher flow rates consuming far less power.

Our NSP BioPool® design using a BF4-10 biofilm filter can treat a 500 sq. ft. swimming pool with the equivalent electrical consumption of two (2) 100-Watt light bulbs. And since we are using no chemicals, this is a very *sustainable* option for a backyard swimming pool. With the help of solar power and battery storage, this could easily be operated off the grid.

Paradigm Shift

Times are changing and there is an increasing number of people seeking environmentally sustainable lifestyle choices to support their “Green living” lifestyle

.

Natural swimming pools provide current and new pool owners with sustainable choice for recreational water enjoyment.

What is a BioNova® NSP?

A BioNova® NSP has 4 defining criteria:

The NSP is a “closed system”, isolated from surface water runoff and constructed using recognized swimming pool construction methods.

The swimming zone is clearly defined - If there are aquatic plants in a regeneration zone, they are separated/isolated from the swimming zone.

No chemicals - Salt chlorine generators, ozone generators, ionizers, mineral systems, or any other biocides are not used.

Conformance with applicable swimming pool codes - Local laws and guidelines dictate the proper swimming pool design and construction process.

NSPs share a few similarities to a chemical-treated pool. First, it is a contained, waterproofed, and recirculated system. Second, it is designed, permitted, and constructed in conformance with swimming pool code. This is where the similarities end, however.

We believe that a body of water intended for swimming should comply with the applicable swimming pool codes. We consider the importance of accessibility and safety for swimmers young and old.

Types of NSPs

The two primary types of NSPs recreate the freshwater environments you find in nature.
NSP BioSwimPond® -mimics the ecosystem you would find in a pond or lake.
NSP BioPool® - mimics the ecosystem you would find in a stream or river.

The BioSwimPond® is characterized by slow moving water, passive sedimentation filtration and the native aquatic plants (the regeneration zone) you would find in ponds and lakes in your region of the country. The regeneration zone in the ***BioSwimPond®*** does require approximately the same size area as the swimming area and the minimum project size for both swimming and regeneration zone is ~700 ft^2.

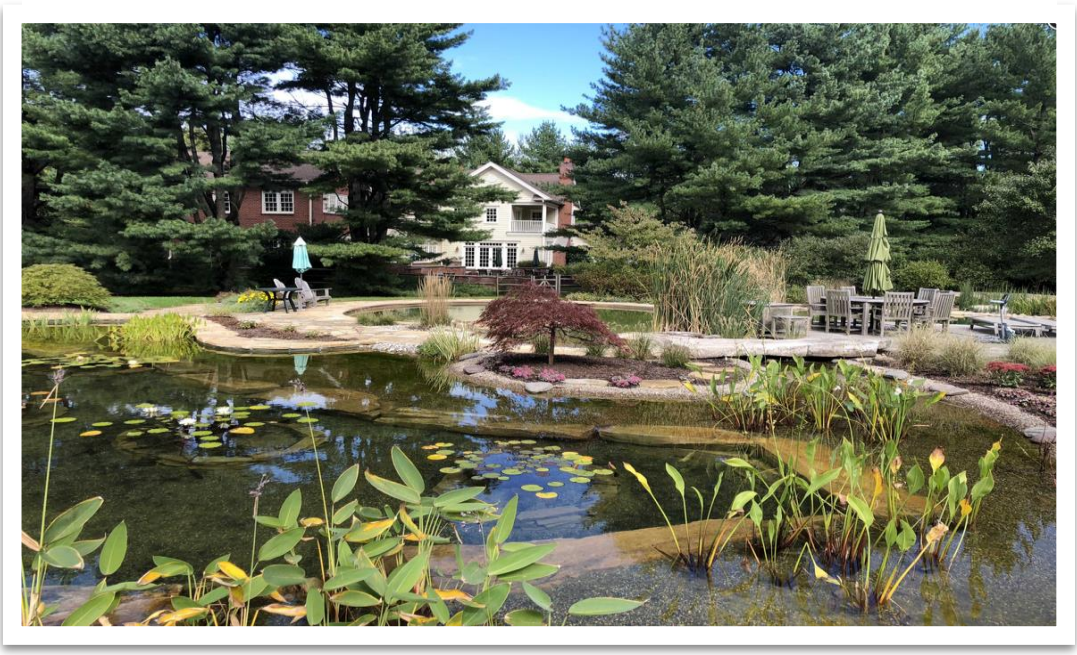
The swimming zone in the BioSwimPond® can either be in the same vessel as the regeneration zone or separated from the regeneration zone. When the swimming zone features regeneration zone within the same vessel, the two zones are separated by a wall. These NSPs typically look more like a pond because you can see many aquatic plants growing around the NSP system. An NSP BioSwimPond® constructed in one vessel with a wall separating the swimming zone from the regeneration zone will look most like a natural pond. This single vessel design with adjacent plant zone is referred to as the NSP BioSwimPond® *Solo*.

NSP BioSwimPond - Solo, Single vessel.

BioSwimPond® (cont.)

Alternatively, the design and construction of a BioSwimPond® can be done in a manner that creates two separate vessels. One for the regeneration zone and one for the swimming zone. This type of construction is called the NSP BioSwimPond® *Duo*. This design is appropriate when working on a slope or when you have enough space (and budget) to separate the two areas and build a pool for the people.

NSP BioSwimPond® Duo on a sloped landscape



BioSwimPond® Duo - Note swimming zone in the background

NSP BioPool®

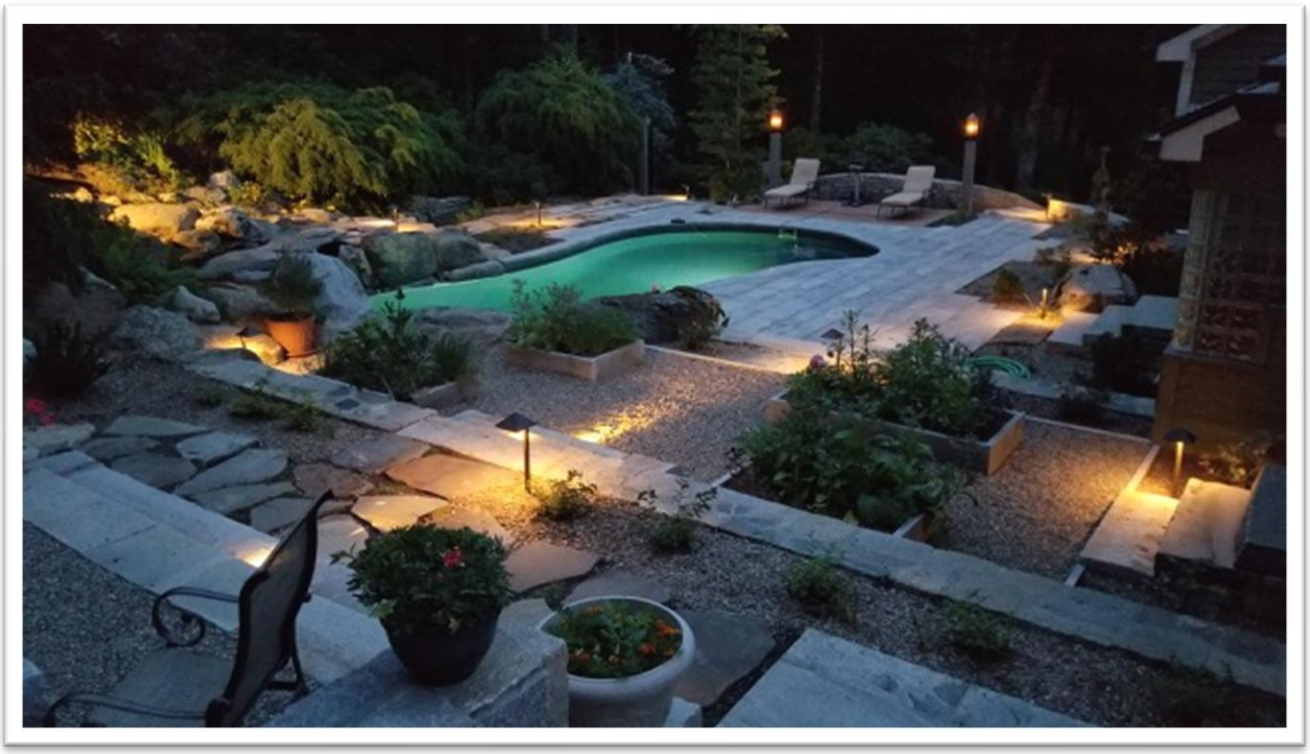
The NSP BioPool® employs the use of a biofilm filter zone instead of a planted regeneration zone. The biofilm filter is typically located directly next to a common wall on the pool separated from the swimming zone and many times installed underneath a modular constructed deck.

BioPool® with BF4 uncovered at end of pool

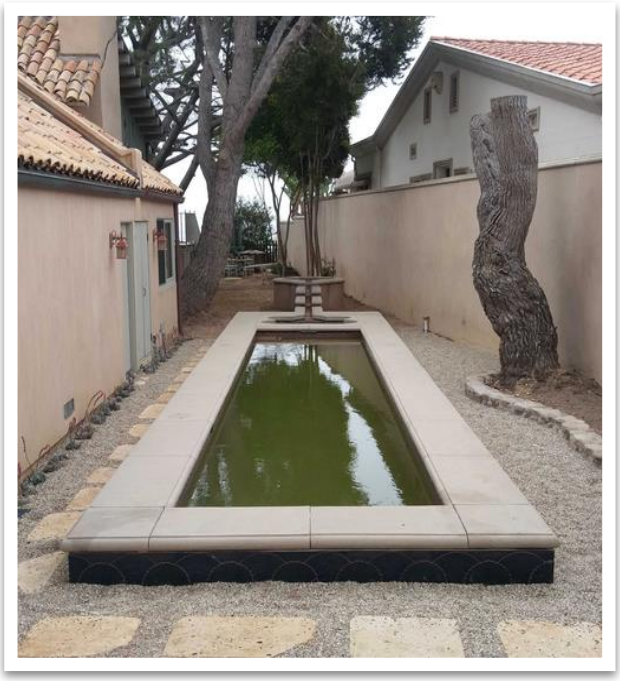
The biofilm filter uses specifically sized gravel in the filter vault to serve as the surface on which the biofilm will grow along with a fine filter to filter out smaller particles. The velocity of the water flow is faster in this design, compared to the BioSwimPond® and it's the water flow rate that assists in uniformly distributing biofilm growth throughout the filter media. By pulling the water quickly off the surface of the pool we encourage the abundant growth of biofilm in the biofilm filter vault and away from the swimming zone creating nutrient poor swimming area that does not easily support the growth of algae. Also, since the water is moving so quickly and the nutrients in the water are consumed by the biofilm in the filter, the water does not support the growth of aquatic plants. The tradeoff is a much more efficient use of space for the biofilm filter -typically less than 10% of the pool's surface area is required for the biofilm system, compared to the large area (~same as the swimming area) require for the regeneration zone in a BioSwimPond®

BioPool® with BF4 located under the wooden modular deck

The biofilm filters are typically installed adjacent to the swimming zone or somewhere convenient for hydraulic considerations. Access to the top of the BF4 is needed in order to clean the filter every 3-4 months, so many clients install the BF4 under a modular deck to maintain the deck space. Others choose to leave the BF4 uncovered. The BioNova® BF4 biofilm filter system can be scaled to accommodate any size pool. Trained BioNova® engineers will specify the appropriate size depending on the design and intended use.



BioPool® with BF4 covered at end of pool under the lounge chairs



BioPool® Plunge Pool

NSP Construction options

In the most fundamental sense, an NSP is a swimming pool. Therefore, designs and construction follow common swimming pool construction guidelines. The shape of the swimming zone and the regeneration zone is a design consideration, as is the elevation of both relative to each other. The shape and elevation will impact the hydraulic design, which guides BioNova® design professionals to a solution that fits your unique landscape. There is no specific way to construct an NSP, but there are design and construction methods that can enhance the look and maintenance of the finished vessel like the ones listed below.

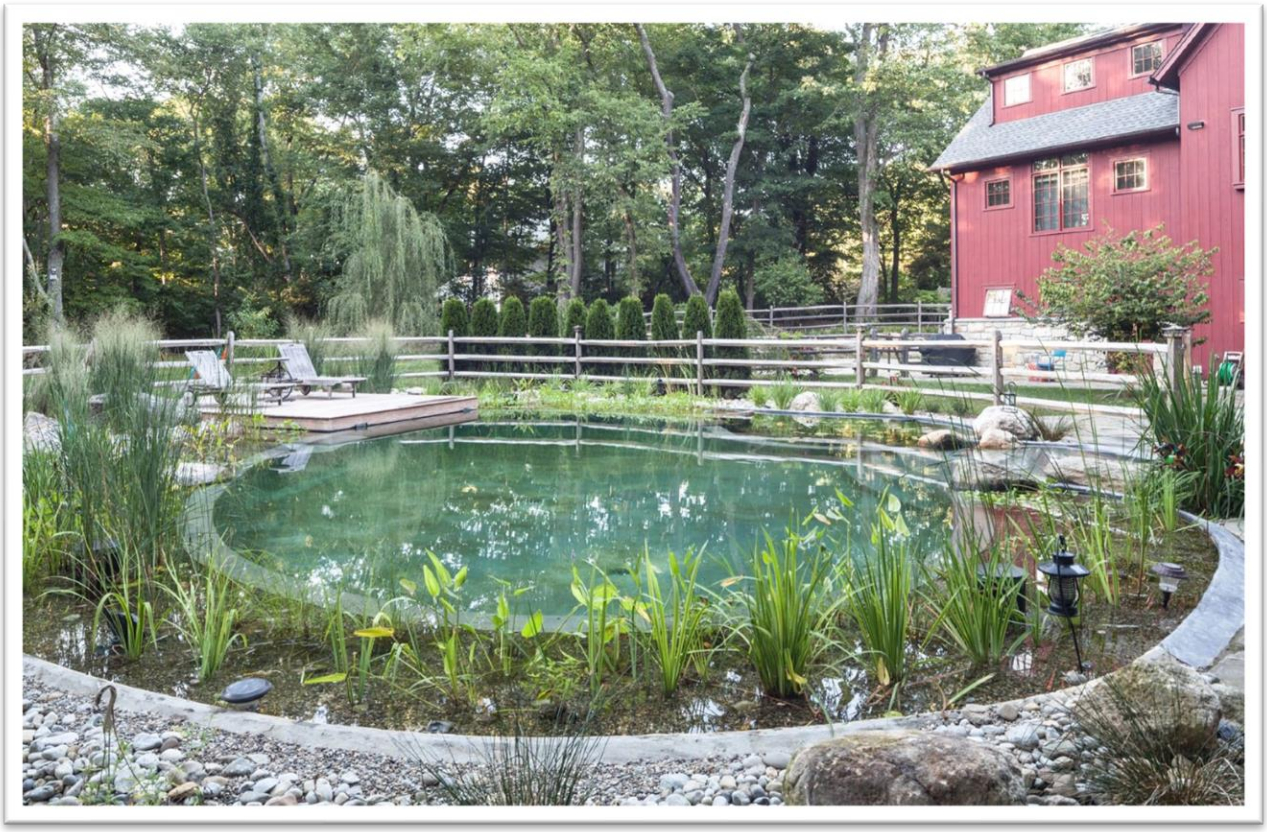
Structurally, an NSP can be built using different construction methods:

- **Steel wall construction** form the perimeter walls. The interior is lined/ waterproofed with PoolHide® 60 mil PVC membrane. The regeneration zone or biofilm vault is constructed the same way as the pool. This type of structure has few limitations in terms of size, depth, or shape. A key maintenance consideration is that PVC membrane is a nonporous waterproofing surface making the interior finish of the pool is exceptionally easy to clean. This method is a popular choice of construction due to short construction time, modest cost, and versatile design options to create any shape pool.

BioSwimPond® with Steel wall construction with PoolHide® PVC membrane. And NSP of any size or shape can be created

- **One Piece Fiberglass** pools are ideal candidates for the swimming zone of an NSP. The Regeneration zone (for BioSwimPonds) or the biofilm filter vault (for BioPools) would be constructed separately using Panel walls or CMU. The One-piece fiberglass pools has limitations in size, depth, and shape, but it can be installed quickly and easily. The interior finish of the pool is smooth and easy to clean.

- **<u>Gunite/Shotcrete</u>** pool is constructed using cement-based material for the construction of the swimming zone and the regeneration zone/biofilm vault. Construction time is much longer due to the time needed for the concrete to cure. Gunite pools offer unlimited choices for size, depth, or shape and typically use a cementitious waterproofing finish (plaster). Because of the porous nature of plaster, the surface texture tends to be more challenging to keep clean.



Converting Existing Pools into NSPs

If you already have a chemically treated swimming pool and want to convert to an NSP, BioNova® offers consultation, design, and construction. While there are a multitude of ways to convert your current pool setup, the two most common methods are to add a regeneration zone or biofilm filter.

By adding a regeneration zone, you will be converting your pool into an NSP BioSwimPond® with aquatic plants growing in the system

By adding a biofilm filter, you will be converting your pool into an NSP BioPool®. If it is possible to do this on your site, this is typically the lowest cost method of conversion.

Before NSP conversion

After NSP BioSwimPond® conversion. The added regeneration area is outlined in

Frequently Asked Questions

Can I build my own NSP?

Building an NSP is a complex process that should be professionally engineered, designed, and constructed to ensure the water is properly filtered and operates without error. Recent advances in biofilm filters have simplified the purification process by eliminating the need for spacious, planted regeneration zone. These filters mean less complexity, but it still requires exact measurements a knowledgeable builder can provide for the best possible quality.

BioNova® will provide a construction plan that can yield a beautiful and functional pool. However, for the pool to be a BioNova® Certified Natural Swimming Pool, it must be installed or supervised by one of our licensed builders. This oversight ensures that the final product provides you with years of enjoyment while minimizing frustration and risk resulting from poor execution.

How is the water treated?

It is important to remember that when we use the word "treated" we refer to the conversion and absorption of nutrients in the water by aquatic plants and microorganisms through their own unique and varied metabolic processes. A naturally purified swimming pool nurtures and employs helpful microbes to consume and convert these nutrients into energy to survive or to filter waste. There are two methods for providing naturally purified water.

1. Use a planted regeneration zone (NSP BioSwimPond®)
2. Use a biofilm filter (NSP BioPool®)

Whichever method is chosen, we replicate and optimize natural processes to create an environment for favorable microbes to outcompete less favorable microbes for the water's nutrients. With proper planning and hydraulic design, we can create beautifully clear, naturally purified water without any chemicals whatsoever.

How big does the biological filter need to be?

The answer varies among NSP designs, but NSP BioSwimPonds® utilize aquatic vegetation hydroponically rooted in select substrates to allow the water from the swimming area to flow through the planted environment. The biological filter (AKA the regeneration zone, bog filter, constructed wetlands, etc.) is approximately the same surface area as the swimming zone. So, a 16'x32' swimming zone (~512 ft^2) would require approximately the same amount of area (~512 ft^2) for the regeneration zone.

Is there an advantage to a BioSwimPond® over a BioPool®?

It all depends on your aesthetic preferences! Both filtration technologies create *naturally purified water*, but they have different looks.
-A *BioSwimPond®* provides the aquatic vegetation that many desire to create an environment that closely mirrors a natural pond setting. The BioSwimPond® typically comes at a higher cost due to the increased area required for the planted regeneration zone.
-A *BioPool®* will look more like a conventional swimming pool. The biofilm filter in a BioPool® is typically hidden underneath a deck or similar structure.

In these cases, seasonal maintenance requires access to the top of the vessel. Also, the cost associated with a BioPool® is generally less than a BioSwimPond® with an equally sized swimming area.

Can I heat a Natural Swimming pool?

Yes! Although how much you can heat the pool depends on your climate and the time of the year. NSP BioSwimPonds® tend to be warmer than traditional pools because the biological filter is relatively shallow and acts as a passive solar collector. With clever use of solar panels, you can heat the pool during the day, or during a hot summer, cycle the circulation on at night when the air temperatures drop to cool the water.

Will mosquitoes be an issue?

BioNova® Natural Swimming Pool's water is always circulating, which means mosquitoes are not a problem as they do not breed and lay eggs in moving water. A more significant concern for mosquitoes near your NSP is potted plant bases, or any place water can gather and remain stagnant.

Do Natural Swimming Pools cost more than chemical pools?

The cost per square foot to construct a Natural Swimming Pool is no different than the cost per square foot to construct a traditional pool. But yes, an NSP will cost more to install than the same sized chemical pool because we are adding additional space for the biological filter and equipment. Typical cost per square foot will vary depending on the materials chosen for construction and what part of the country which you reside. These costs range between $150 to $200* per square foot of total NSP surface area.

BioSwimPonds® cost more than a traditional pool because they require nearly twice the surface area to accommodate the swimming zone and planted regeneration zone. On average, these types of installations start at around $130,000*.

BioPools® with a biofilm filter are a more cost-effective option due to their smaller size, with typical installation cost of a 16'x32' area starting at around $85,000*.

*NOTE: These estimates are for general comparison only and do not include, site prep, landscaping, perimeter deck, or utility hook-up.

Can we have fish in the pool?

Unfortunately, not, although fish would love to live there! Fish consume beneficial zooplankton which can upset the microbe community, but the biggest reason is that they put an undue load on the system with their waste. They are not permitted in the swimming or regeneration zones to meet BioNova® standards and quality processes. One of the biggest objectives in maintaining an NSP is to control the amount of nutrients entering the pool; fish provide an overabundance of nutrients making this balance problematic. However, if you desire a koi pond or an ornamental aquatic garden as part of the plan, we can include a separate and isolated pond adjacent to your NSP. The finished product could be designed to look as though the two areas are one contiguous system but they actually operate in separate, closed-loop environments.

Will there be algae?

Yes. Algae and other phytoplankton species are naturally occurring microbial plant life. The living aquatic environment we are creating relies on healthy – but controlled – growth of phytoplankton and other producers in the microbial lifecycle. An NSP will always have some algae in it (in fact, even a chemically treated pool still has some algae in it), but green algae are not harmful. We keep excessive algae in check with the correct assortment of aquatic plants in the regeneration zone or a properly sized biofilm filter to outcompete the algae for nutrients. Situations that may cause a temporary algae bloom are related to an unexpected influx of nutrients. As part of our BioNova® Quality Process, we will test your municipal water supply to determine if it would be suitable for

the initial filling of the NSP. Then we can plan and design the NSP system to handle any nutrient surplus stemming from the source.

What kind of maintenance is required?

Some physical maintenance is similar to the traditional chemical pool. We need to periodically empty and clean skimmer baskets, pump baskets, filters, and vacuum the pool. BioNova® employs state of the art robotic cleaners for vacuuming and brushing the pool walls and bottom. Simple cleanings will still outweigh and offset any future cost of chemicals for the lifespan of your pool.

BioSwimPonds® water garden maintenance is necessary – removing unwanted plants and debris, trimming, and maintaining existing plants, and cutting them back at the end of the season.

BioPools® "backwashing" or flushing out (approximately twice a year) of the biofilm filter is necessary. If you have a garden, don't forget that the discharge from backwashing the filter is an excellent natural fertilizer! *Reduce, reuse, and recycle!*

We have freezing weather in the winter, what about winterization?

In cold climates, the NSP needs to be treated just like any other pool. Plumbing lines need to be blown out and plugged, and the mechanical equipment needs draining. The swimming zone can be covered with a winter safety cover, and a mesh net can be draped over the regeneration zone to prevent leaves and other debris from entering the area. For BioSwimPonds®, the aquatic plants are cut back, and dead leaves are removed from the regeneration zone. Most native aquatic plants are perennial and will regrow the following spring. Some plants may need replacing, but the longer the regeneration zone matures, the hardier the plants become.

What is the minimum size for an NSP?

We do not recommend a BioSwimPond® smaller than 650 square feet in total, which should equal the swimming zone plus the regeneration area. For a BioPool®, there is no minimum size limit. The biofilm filter can be configured to accommodate any swimming pool, large or small. Consult BioNova® for details on correctly sizing an NSP.

Who designs and builds my NSP?

A BioNova® design specialist would be happy to assist during any phase of your planning. We will spend our initial conversations discussing your ideas and design goals:

- Spatial considerations.
- The quantity and ages of bathers who will swim regularly.
- Outdoor living and entertaining expectations
- Aesthetic expectations of the pool and surrounding area
- Pool depth
- Pool activities (volleyball, lap swimming)
- Diving board options
- Sun-bathing space or in-pool chaise lounges
- Whether the project will be a part of a long term, multi-phase plan
- Hardscape entertainment builds (firepit, outdoor kitchen)
- Water features like streams, waterfalls, grottos, or even a lazy river

The more we know, the more we can anticipate and incorporate your wants and needs into the design. We have many years of experience working with landscape designers, builders, contractors, architects, and pool companies. BioNova®'s professional collaboration between these trades ensures you get the pool of your dreams, on budget and in a timely manner. For the NSP to be *BioNova® Certified*, we require adherence to the BioNova® quality process that ensures the NSP is constructed as designed.

Planning for your new NSP

Your Vision - What scene do you see in your backyard? Do you want to incorporate the existing landscape in some way?
Your Space - A good starting place is to survey your property. Local swimming pool codes and lot coverage is important information to have when discussing your ideas.
Your Budget - Waterscapes are exciting! Each build comes with its own set of challenges though, and we'd like to work with you to find a design that you can count on staying in the budget you set.

Our Process for Getting Started

We use a PreConstruction Planning Agreement (PCPA) to start the planning process for your NSP. Whether you have had a landscape architect master plan, advice from in-laws, sketches on the back-of-the-napkin, or no design at all, we take it all into account with our PCPA.

The PCPA will provide the hydraulic and construction details and everything else needed to finalize the plans on the NSP. After that, building permits can be applied for and we can mobilize the resources for construction.

Build a beautiful, lifelong investment. Build a natural swimming pool!

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