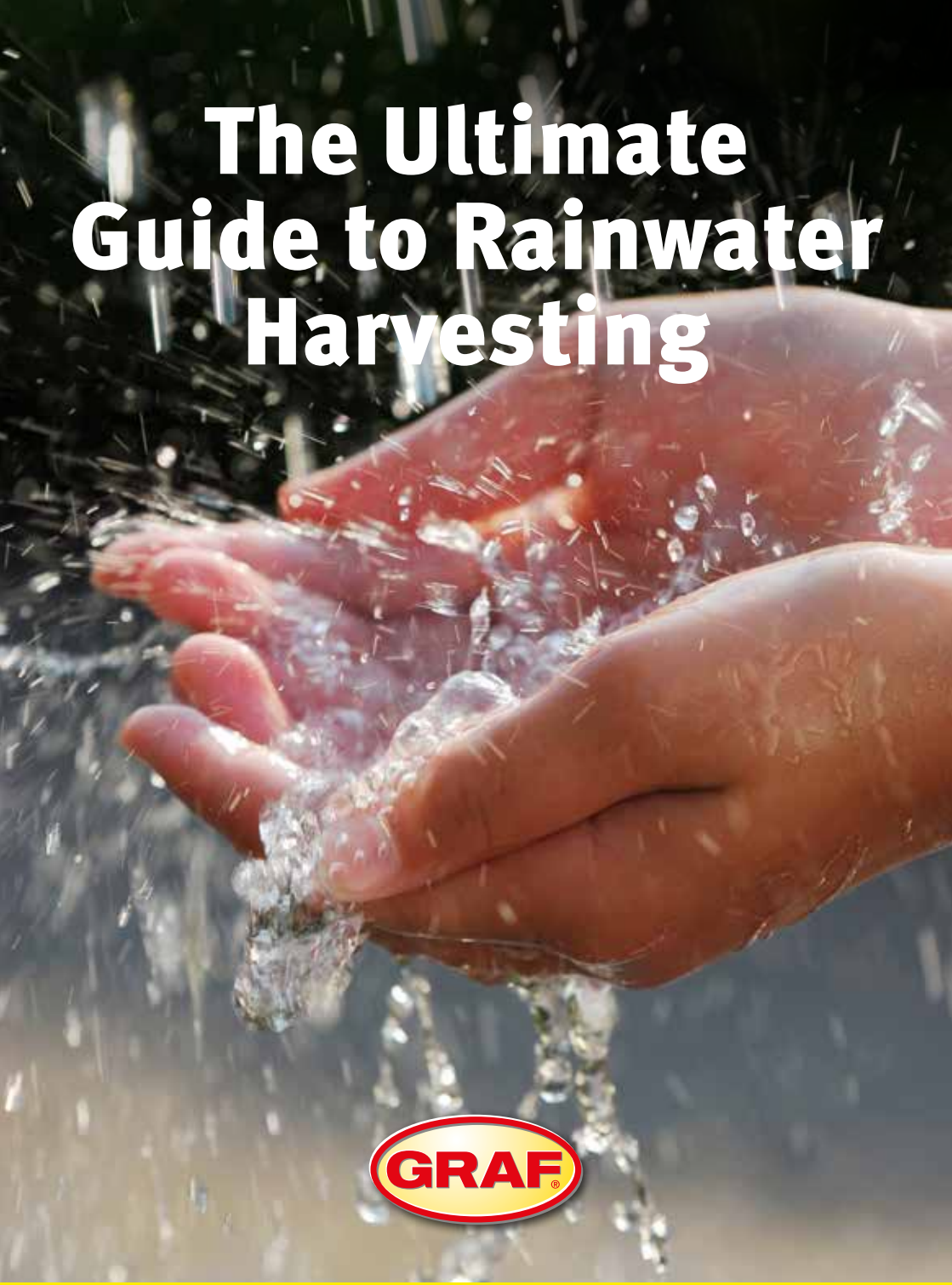
The Ultimate Guide to Rainwater Harvesting



GRAF®

What is Rainwater Harvesting?

Rainwater harvesting, also sometimes known as rainwater recycling, is the collection of rainwater with the purpose of putting it to good use.

Rainwater that falls freely from the sky can be used for many things. We don't need to use mains water for everything! In fact, rainwater can actually be better than mains water for certain things.

Rainwater harvesting is a simple process and typically it involves the following five steps...

Firstly, Rainwater falls onto the roof of a property.

Then rainwater is channelled through the guttering and downpipes into an underground (or sometimes above ground) rainwater tank, via a filter.

The filter is positioned either in the top of the rainwater tank, or prior to the tank, and the rainwater passes through it before being stored in the tank. The filter cleans the rainwater on its way into the tank and it prevents any leaves, moss or debris from getting into the tank.

The clean rainwater is then stored in the rainwater tank ready to be used.

Finally, the rainwater is then pumped from the underground tank to its point of use.

What can rainwater be used for?

Rainwater is great for garden irrigation, even better than mains water. It can also be better than mains water for washing machines as rainwater is soft water, which means less build-up of limescale in washing machines.

It's ideal for flushing toilets because it's free! It prevents people needing to flush mains water, which is water that they've paid for, down the toilet.

How can I benefit from rainwater harvesting?

Rainwater harvesting systems can be either for full domestic use, which includes flushing WCs, supplying the washing machine, an external tap for use outside and even a sink in a utility room for cleaning water only, as well as just garden use outside with a garden only system. Typically, garden only systems do not have a mains water backup operation as they provide harvested rainwater when it is available from the tank. But they don't store up mains water as this would use up valuable rainwater storage room inside the tank or tanks.

You would get more use out of your rainwater harvesting system if you used it for domestic purposes as more of your household appliances will be using rainwater instead of mains water. In fact, you can save up to 50% of your mains water usage by using rainwater instead. This is great for the environment as you are reducing the demand for mains water and substituting it for a natural resource.

Installing a rainwater harvesting system can save you money in the long run if you are using rainwater for your washing machine. As rainwater is soft compared to mains water which is known to be harder you won't need to buy clothing softeners to put in your wash and it won't cause limescale to build up in your washing machine, therefore reducing the risk of your appliance breaking down due to a build-up of limescale.

A household can substitute **50%** of its mains water with rainwater

If you are thinking about using rainwater for your garden, you should know that watering your plants with rainwater instead of mains water is much better for your garden. As mentioned before as rainwater is soft and free from salts, minerals and chemicals, it is better for your plants as these materials found in mains water can cause damage to your plants over time. Also, rainwater has the correct pH level for the majority of plants in your garden, this includes plants that prefer slightly acidic water.

Why should I install a rainwater harvesting tank?

We are seeing an ever-growing demand for our mains water supply. With the implementation of rainwater, we can reduce the demand for mains water by up to 50% with a very simple rainwater harvesting system, such as the ones from GRAF. A rainwater harvesting system will save up to 50% of a household's mains water bill.

With GRAF's small rainwater irrigation system or rain barrels, you can easily store rainwater without breaking the bank. By utilizing the available rainwater in the best ways possible, you are also saving water as it is a step towards an eco-friendly and a sustainable lifestyle.

10 years warranty

What size tank do I need?

We're going to show you how to calculate what tank size you will need for your property so you can start collecting water and saving money on your water bill while helping the environment! Your plants will also enjoy being watered with fresh rainwater. Calculating the right tank size is important for two reasons. Firstly, you don't want the tank to be too big and collect more water than you will use because there is a risk that the water will sit in the tank for long periods, and this is not advisable. Secondly, you don't want to install a tank that is too small if you can use the maximum amount of rainwater that you can collect.

There are several factors you need to consider when calculating your tank size. Where do you live? How many people are in your household? These factors will have an impact as you may get more or less rain than someone in a different city!

The tanks size is calculated in one of two ways. Firstly, we would look at the rainwater harvesting yield, which is how much you can potentially capture. We then compare this against the demand (how much rainwater will be reused).

To calculate the rainwater yield, we take into consideration the catchment area, the location of where you are in the world, and the catchment coefficient, depending on the type of roof. We then divide this number by 360, to determine how much rainwater in litres you can capture per day, and then multiply this by a storage period to determine the tank size required.

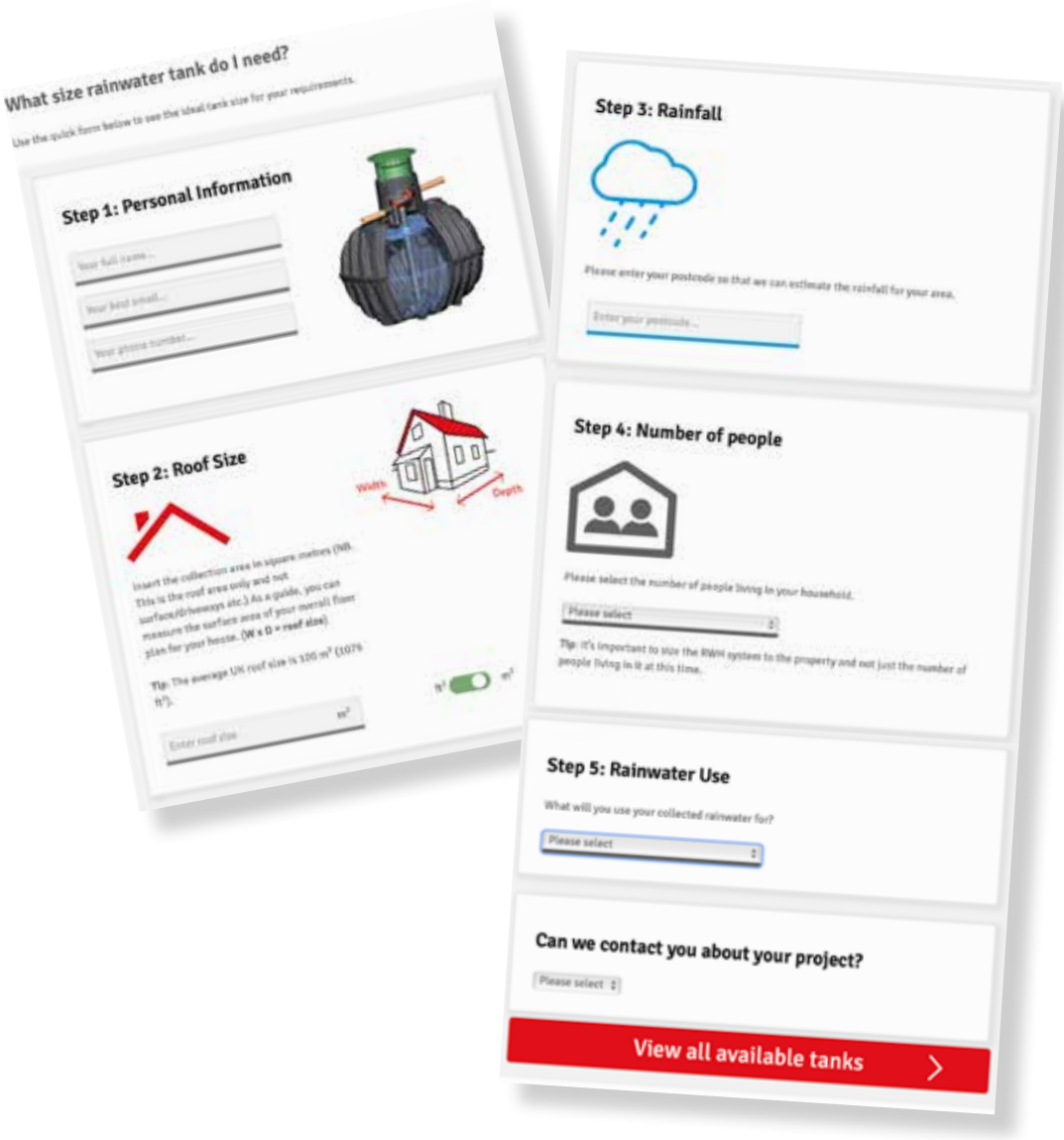
Or, follow this simple equation:
Footprint of property (m^2) x Drainage coefficient
x filter efficiency x annual rainfall x 0.05
= **recommended tank size**.

The roof size is one of the most important figures to get right in this calculation. Sometimes the whole roof is used as a collection area, and sometimes only the front or back of the house can be used as the collection area. This is especially true on existing properties where the drainage at the front of the house doesn't connect up to the drainage from the downpipes at the rear of the house. In addition to this, it's worth considering if other nearby roof areas can be used as additional collection areas if you have a high demand for non-potable water. If you use a lot of water externally or you have several WCs in the house with a high number of people living in the home, then it is advantageous to collect as much rainwater as possible. The more accurate the square metre collection area is calculated the better, to get this tank size calculation right for the property.

The type of roof your property has will also influence how much rainwater you can collect. A flat or tiled roof will reduce the yield coefficient. While green, vegetated roofs reduce water collection as they absorb approximately 50% meaning less is available to be collected in the tank. This level of detail won't make too

much difference on the average property size but if large roof areas are being collected from it is worth considering the roof material.

Follow the link below if you would like to use the Graf online tank size calculator.
https://www.grafuk.co.uk/rainwater-harvesting-tank-size-calculator/



When looking at demand, we ask questions to the customer on what they are intending to use their rainwater for. This could involve toilet flushing, reuse into the washing machine, outside irrigation, and general cleaning purposes. We can then estimate how many litres will be used per person per day, and then multiply this by the number of days we are considering for the storage period of the tank. We then compare these two tank sizes together and take an average to determine the best tank for the solution. The average person can use around 22.10 litres of water flushing their toilet every day, and a washing machine can use around 50 litres of water per wash on an average cycle. So, this is where the number of people comes into the equation. The more people you have in your house, the more water you are going to use.

It is also worth keeping in mind that the tank should be sized on the property measurements rather than the current owners. For example, if a couple is building a new home which they are going to live in, just the two of them, then their non-potable water demand will be reasonably low. However, if they're building themselves a four- or five-bedroom home then the system installed should be sized on the maximum occupancy level in case the house is sold in the future and may then be occupied by more people. This way the system is useful to the future owners of the property, rather than just suiting the current owners who don't have such a high need for as much water.

What type of tank do I need?

When you know what size of tank you need, then it's time to decide what type of tank you need.

One first important consideration is the ground water level on the site that you are going to be installing the system. So how high is the water table underneath the ground? There are low profile shallow tanks specifically manufactured for this reason and application which can be completely submerged in ground water and still work and can still be guaranteed by manufacturers to stay in the ground, even though the pressure of the ground water surrounding the tank in the wrong situation with the wrong tank could cause the tank to pop up out the ground. When tanks are installed in ground water, they normally have some holes going through the tank vertically, and they are normally surrounded by gravel so that the ground water can surround the tank and pass up through it, and not build up pressure from underneath and around the sides which pushes against the tank and causes it to go upwards. When the ground water table is high it's important to design the drainage around the tank to try and remove that groundwater from being immediately around the tank if possible, and often perforated pipe is used for this in a circular position around the tank to collect it. The groundwater goes into this pipe and is taken away either to the nearest drainage point or somewhere ideally several metres away from the tank, where the flow of water can be directed away from the tank to reduce any risk and build-up of water immediately surrounding the tank.

Another important consideration is whether the rainwater harvesting tank you choose requires a concrete backfill or a granular gravel backfill. Sometimes this depends on the type of tank, or the depth in which the tank is being installed, and it can depend on the loading which is going to be imposed on top of the tank. So, if it was going to be installed in a driveway, or access road, or car park on certain developments, or whether it's just going to be in the garden, these different things must be considered.

Backfilling with a gravel surround

Tanks that require a concrete surround will take longer to install and often installation costs are more expensive due to this additional time, and due to the cost of the concrete in the first place. Tanks that require a gravel surround can generally be installed in half a day or 1 day, depending on the size of the tank and whether you have all the equipment available at the same and right time. But because the gravel can simply be backfilled and compacted in layers as you go up you don't have to wait for concrete to go off and set, it's a much quicker process. It's important though that installation instructions are followed so that manufacturer's warranties will still be in place once the tank has been installed.

Many tanks are provided with 15+ years manufacturer's warranties, but all of which would be void if their installation instructions are not adhered to so it's important that if you're installing the tank, or your builder or contractors are, that these instructions are followed to the letter to make sure that the responsibility lies with the manufacturers even once the tank is in the ground.

Before we move away from ground water, some cylindrical tanks that go deeper in the ground are typically groundwater stable up to the half-way point on the tank, so even if the ground water is 1.5m to 2m below the surface it's still important to consider which tank is suitable in this scenario. There are many

low-profile tanks available now, which are shallow tanks that only require around 1m to 1.5m total excavation depth. These will always assist with high ground water table installations but it's still important to check where the groundwater level can come up to when installing these shallow tanks because different manufacturers will have different stipulations. Another important consideration on the type of tank is whether the filter is an internal integral part of the tank or whether it doesn't go in the tank at all and it's a pre-tank filter. If it's a pre-tank filter that means you're going to have two access covers, two manhole lids, in your garden or in your driveway and you need to think about the position of these.

If it is inside the tank, it keeps everything in the same place and you've got one lock on the top which should always be a child-proof lock. Accessing the tank means you can get to the filter; you can check the pump if it's a submersible pump system or check the pipework if it's an internal pump system in the house which is drawing water from the tank from inside. So, check what type of filter package fits inside the tank and whether it's manufactured by the same company. If it is, these are often made to suit each other, and the dimensions of the filter will match the tank and there will be instructions on how these go together. If it's a company using a tank from one manufacturer and a filter from another, check that these go together well and that they fit because they won't have been designed in the same way. It's important that you investigate which parts and which products are matched with another to make sure the system works.

When backfilling a tank which does require a gravel surround or even a concrete surround, it's important with most tanks to fill them with water inside the tank before backfilling. Most manufacturers in our experience, would suggest this is done in layers so you would fill the tank with approximately 300mm depth of water inside the tank and then surround it with 300mm depth of gravel at the base of the excavation. Then fill a further 300mm of water inside the tank and again a further 300mm of gravel on the outside of the tank, and simply keep going incrementally in this manner until you have a tank completely full of water and completely backfilled. Again, it should stipulate this in the manufacturer's instructions, but these are important aspects to prevent any future

issues with tanks which are really the main part of the system which is difficult to access and amend once installed.

One of the most important things to do with the tank on any rainwater harvesting installation, one of the top tips from this part of the book, is to keep the tank as clean as possible during installation. It's important that whoever is installing the tank, whether it's yourself, a builder or a groundwork contractor, that they realise this is a rainwater harvesting tank and not a septic tank or a wastewater treatment tank, and as such the cleanliness inside the tank is of paramount importance because when it is filled with water this water is going to be used for your washing machine, flushing toilets and your outside tap, and the water quality needs to be as clean as possible. So, if dirt or soil, bits of gravel or stone, find their way into the tank during installation because the access points have not been covered, or people aren't very careful with what gets put into the tank, then this will have a detrimental effect on the whole rainwater harvesting system once it's installed. It will invariably mean that the tank must be completely cleaned out as soon as it starts to be used because the water collected will be dirty, there may be some build-up of mud at the bottom of the tank, and it will all have to be cleaned out to prevent a negative effect on the system from day one.

So, it's important the tank is installed with the access covered or the lid temporarily already on, but mainly that the people doing the installation are made aware that this is a rainwater harvesting system and to be careful what goes in the tank. This is a challenging part of installation because you are digging a hole in the ground and building sites are obviously full of mud and soil and dirt and gravel and often it can be wet and raining and it's challenging to make sure the tank stays clean, but it's very important.

What type of lid do I need?

Once you have chosen the type of tank, you must decide what type of lid you require on top of the tank. On most tanks you'll have two options. The standard lid will be a pedestrian loading lid, which will be suitable for installation in a garden. This will only take pedestrians walking over it and must not be used in driveways or roads where any heavier loads can go on top of the tank.

The second choice is a driveway-loading lid. These are usually cast iron and will take a light traffic load, so typically a car or van, which is suitable for a driveway on a domestic property. If the tank is being installed in an access road or in a commercial property where lorries and heavy goods vehicles may pass over it, then this must be considered to ensure that the lid is suitable and that the underground tank can withstand the load of the weight above it. The lid offers 3.5 tonne loading. Aside from this, the tank needs to be submerged deep in the ground, usually 800 millimetres, to ensure there is enough cover to protect the tank beneath.


Choosing the correct lid is important

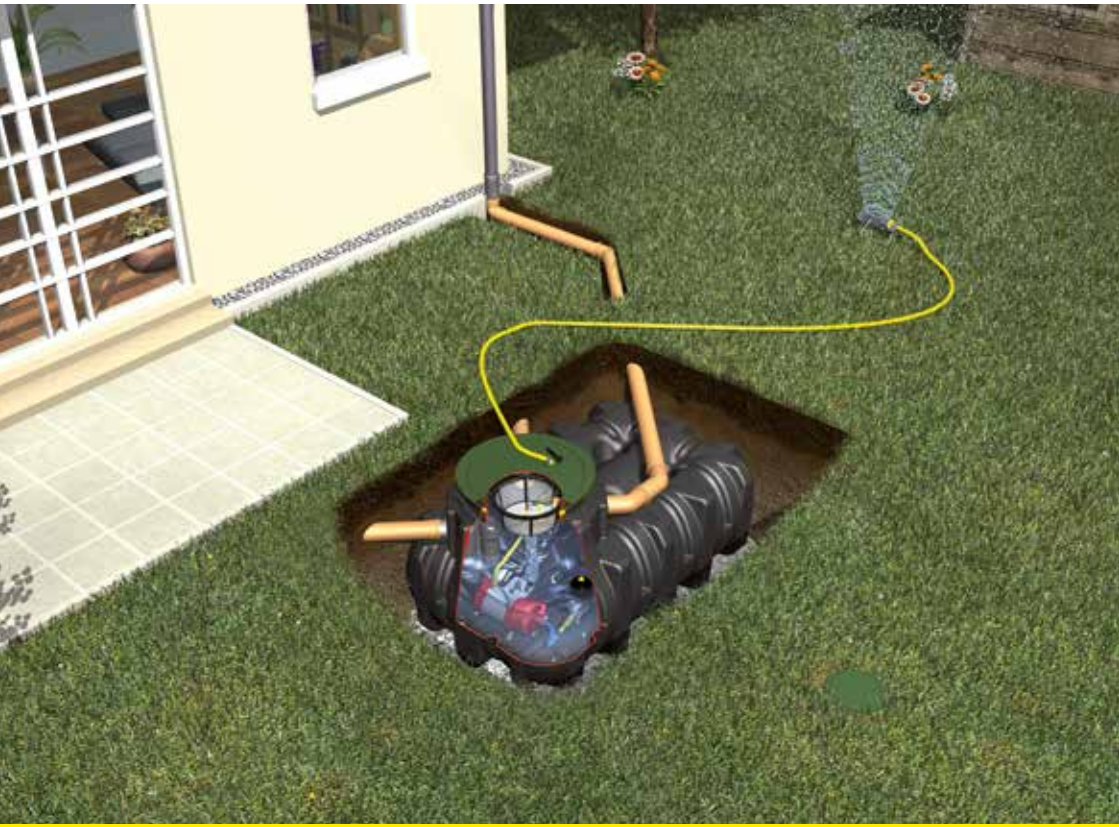
If further load bearing is required, the tank cover can be recessed below ground level, and a suitable manhole cover and frame can be located above. We can then increase the loading over the top of the tank quite considerably by incorporating a reinforced concrete slab. Specifications and details on this can be provided should this be a requirement for your project.

What pump package do I need?

Once you have determined what you are going to use your rainwater harvesting system for, whether it's going to be garden only or a full domestic system, there are several options for pump packages.

Garden systems tend to be a more basic pump package which simply includes an external or submersible pump, a short length of pressure pipe and some way of extracting the water from the tank, so either a hose connection point, an integral hose connection box, an outside tap or a tap stand. There doesn't tend to be a mains-water back up unit for a garden system and this is what makes the garden package more of a cost effective, or lower priced option.

On a full domestic system there are several options on mains water top-up units or pump packages which can be



used. The most comprehensive of which are commonly systems that have come over from Germany, and they tend to keep the pumps outside of the tanks and keep the mains water top up outside of the tank. They work based on keeping the whole tank available for rainwater and not putting any mains water into the tank, as this is the best solution because when it does rain you then have the full tank capacity to fill with rainwater and there is no mains water which is water that you have paid for filling space inside the tank. So, the way this work is they have a pump unit which is installed inside the property either in a utility room or a garage or under the stairs, or in a plant room, and there is a suction hose from the pump which has a floating ball on the end, that goes through a duct, to the tank and draws the water in to the pump which sucks the rainwater in from the rainwater tank and then pumps it directly to the toilets, washing machine or outside tap. Generally these types of pumps can only draw the water in from within around 12 to 15 metres between the tank and the pump unit so anything greater than 15 metres tends to need a booster pump inside the tank, in which case instead of the pump in the house sucking the water in, it starts to suck the water in then the pump in the tank turns on and pushes the water to the pump and then the pump

unit inside the property supplies directly to the toilets and washing machine and the outlets. When the rainwater level drops on these standard 'rain manager' style systems there is a float switch connected from the pump unit to the underground tank and this float switch is positioned inside the tank so that when the rainwater level drops the float switch will switch-over and this will cause the pump to automatically change to supply mains water instead of rainwater from the tank. On these pump units there is a small mains water chamber or reservoir which stays topped up with mains water all the time and as soon as the rainwater level drops the pump switches over to supply from that mains water chamber instead, so you don't necessarily know what water is being supplied unless you look whether there is water in the tank or unless you have a level sensor showing how much water is in the mains water tank.

But you've got your continuous supply of water to your toilets, washing machine etc. so there is water readily available on demand all the time. There are variations on this type of system; there are more comprehensive and typically more expensive systems which have additional items built in, so these may include a level gauge to show what level of water is in the underground rainwater tank. If they have a level gauge then they tend to work on a sensor instead of a float switch for when the mains water takes over when

rainwater levels are low, and then there are additional parts to these which are more technical which include inline fine filters, which are generally proposed for the washing machine connection, and there are also automatic filter cleaning units which can be added to these kinds of systems which will make the whole system more maintenance free so the filter within the underground tank has a small hose nozzle attached to the top and you can pre-set how often you want it to spray a flush of water over the filter to keep it clean from leaves and debris. These types of systems require space in the house.

They are good because the pump stays out of the tank so is always accessible. So for maintenance and inspection services they can be often boxed in within a cupboard to reduce the noise, and some of them are in a polystyrene casing which reduces the noise, which some say is similar to the noise of a washing machine, but of course it is only when they are pumping water, so if a toilet flushes the pump will turn on and there will be a bit of noise when the pump is filling the cistern, this is why it can be put in a utility room or garage away from the main living area in the house.

The other advantage to these systems, as briefly mentioned earlier, is that the whole capacity of the rainwater tank

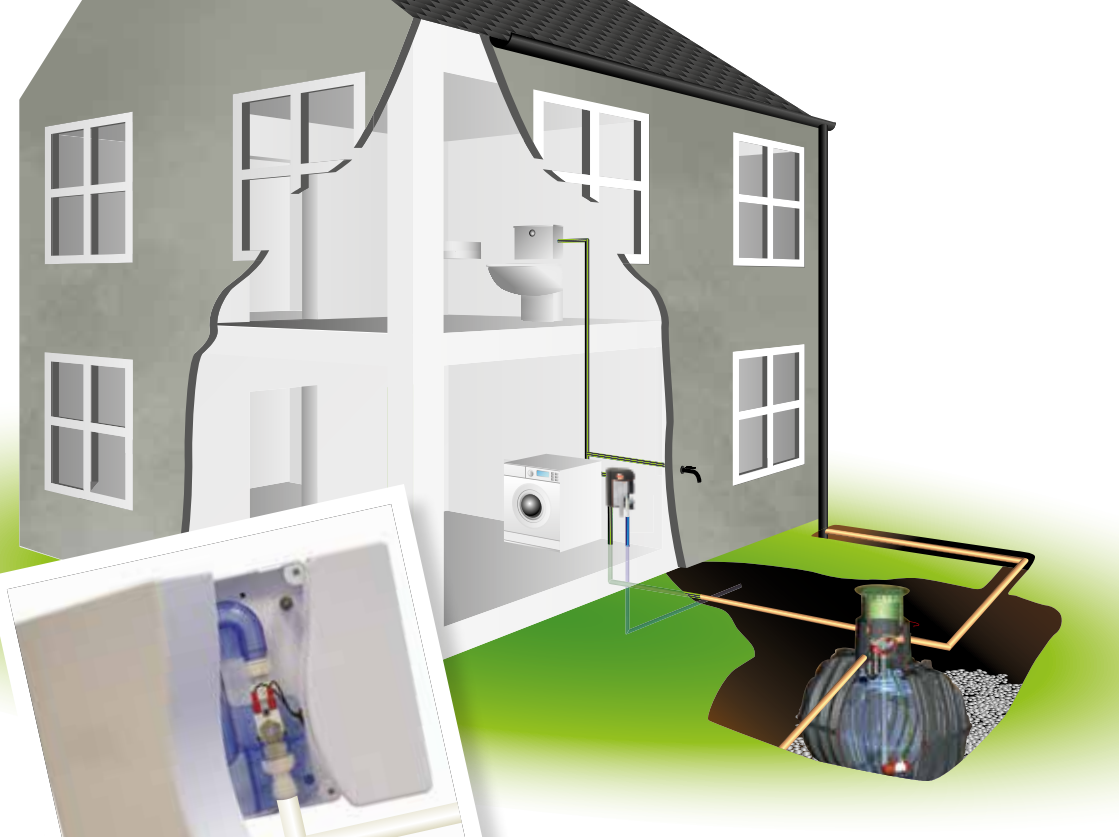
stays available for just rainwater and not mains water. This also gives you the option to put a submersible pump inside the rainwater tank and connect that to your outside tap supply or your external supply, so that as we mentioned if there is a hosepipe ban you can prove that you are just using rainwater from your underground tank and continue to use that during the hosepipe ban because there is not a mains water connection to the underground tank.

There are several of these types of pump packages on the market in the UK and costs vary. They are good systems which are easily maintained and easy to look after but they do require space. They would not fit in a kitchen cupboard for example, they suit a larger house, and they are all direct supply, so they require power. In the event of a power cut the pump wouldn't work and you would be without supply of rainwater and mains water to the toilets and that should be considered on certain projects and it's to customers preference and opinion whether that is a big problem or not.

The other types of pump package involve a submersible pump and either a direct supply or an indirect supply system. A direct supply works in the same way as the pump package we have just been talking about where water is pumped from the rainwater harvesting tank directly to the toilets, washing machine or outside tap so this particular system is reliant on power. The difference is that the submersible pump direct supply systems don't require anything inside the property in terms of a control unit. They have a mains water back up system which has to include an air gap between

Graf submersible pump

the mains water connection and the rainwater tank to meet regulations which prevents against cross contamination of rainwater into the mains water pipework, so the way this is typically done is with a length of pipe from somewhere in the house going back to the tank which contains a float switch from a mains water back unit, which comprises of a tun-dish to give you the air gap and a solenoid valve connected to a float switch which is inside the tank so as the rainwater level drops in the tank the float switch drops, the solenoid valve then opens, and this allows mains water to flow through the tun-dish and by gravity supply flow back through the pipe to the tank and it tops up the main underground tank out in the garden. It keeps filling with mains water until the float switch rises as the water level rises and then when the float switch is in the upright position the solenoid valve will close and the mains water top up will stop.



Mains water back-up unit

On these systems it's important to consider the length of distance between where the mains water back up unit is inside the house and the underground tank. From that mains water top up unit the water is only being supplied by gravity pressure so the speed it travels from the air gap arrangement to the underground tank can be quite slow, meaning that the system can be topping up with mains water for what appears to be a very long time. This depends on the type of tank, the position the float switch is tied off within the tank and the amount of height level distance between the mains water back up and the tank.

Obviously the higher the mains water back up the more head of pressure is built up as the mains water travels through the pipe and into the underground tank. Once the mains water has got to the tank, all water supplied to the toilets and the washing machine and any other outlet, is supplied by the submersible pump in the underground tank. Now, it is possible to add additional items such as a level gauge so that you can see how much water is in the tank but normally these are not related to the mains water top up functionality on these systems. In some systems they can be, but quite often they

are just to show the occupier of the house how much water is in the tank and it is an added visual item to the system.

The other alternative to this is a submersible pump indirect system, in which the submersible pump inside the mains water tank which works in the same way as the direct, so it's got a floating water intake on the pump which draws water in from just below the surface water level inside the tank which is where it's at its cleanest, it goes through a fine filter and it draws the water into the pump and the pump then sends it up to a header tank in the roof space of the property. A header tank is installed in the roof space and it has two connections; one for mains water and one for rainwater.
There are various types of header tanks but the idea in principle is to maximise the amount of rainwater used before switching over to mains water if necessary, if rainwater is not available in the underground tank. So, when rainwater is available the submersible pump will pump from the tank up via the black and green pressure pipe into the roof space and fill the header tank with rainwater. From there, on demand when toilets are flushed, the valve on the system opens and the rainwater will be supplied via gravity feed from the header tank in the loft down to fill up the toilet. It's important on this type of system that a traditional indirect header tank system is designed into the internal plumbing of the house so that the most direct route is provided for the pipework from the header tank to the outlets so that it doesn't slow down the rate in which the water fills the cistern because it's not being pumped under pressure it's just being supplied under gravity pressure from the header tank.

So, when the rainwater level drops inside the tank and isn't available for the pump to send it to the header tank the pumps dry running protection will kick in and the pump will shut off. That will mean the rainwater ball valve in the header tank will continue to drop and no water will be supplied. At this point the mains water top up would kick in which would be set at a lower position inside the header tank, and when that valve drops down that will open up the mains water supply and mains water is used to top up the header tank, making water always available to supply to toilets and washing machines etc.

The benefit of this system is that the mains water back up supply is not reliant on power so if there is a power cut in the property the pump wouldn't work inside the tank and the water level in the header tank would drop, but on a standard header tank system if it has a mechanical valve not a motorised valve, then mains water will still be allowed to top up the header tank and that can then be supplied to the toilets under gravity pressure.

There are alternatives that require power so it's not one rule fits all, so it's important to understand how each individual header tank system works, but more often than not on an indirect system there is a way of ensuring there's a continued water supply with or without power so it works whether there is a power cut or a pump failure so there won't be a time when the toilets aren't being supplied with water, which is of particular importance to housing associations

who have several properties who have rainwater harvesting systems and they need to keep their tenants supplied with water, and they need to be confident that they are not going to be getting phone calls about their toilets not filling or their washing machines not working, or there's a problem with the system and they don't know what it is. So, these indirect systems give an added peace of mind under that scenario. Having said that, header tank systems are not everyone's preference. It's seen as quite traditional and 'old-fashioned' to put a tank of water in the loft or roof space of the property and it's not the most modern way of doing it. In certain countries it's not done at all. To summarise on types of pump packages and mains water back-up units the main thing to realise is that there is such a choice, and some systems will suit particular properties better than others, so it's important to consider what best meets your needs and what you prefer the sound of in terms of what maintenance will be required and how often you need to check the system, and if you need to do anything with the system at all. So the main point in this chapter would be to consider all options and not just opt for the lowest price system that gets proposed because that might not be the case in the long run, depending on whether it's an individual private build for your own home or whether you are building a housing site development of a number of homes, there will always be a level of maintenance required on any type of system but this can be minimised by choosing particular products and pump packages that are more maintenance free and that work automatically. So, it is important that you understand what the options are and how they work so you can determine what works best for you.

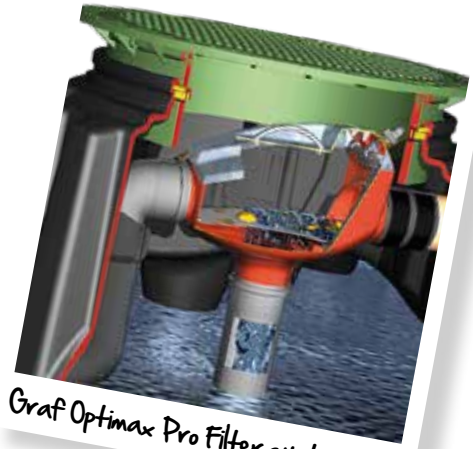
What else do I need with my tank?

With your tank, you might need various other parts to help everything run smoothly. Filters, guards, pipes, and extension rings are all examples of other equipment you may need to purchase depending on what your rainwater harvesting system will be used for.

Alongside the tank, you'll need various accessories to filter the water and extract it from the underground tank. When rainwater enters the tank, we generally filter the rainwater on entry. This is to ensure the cleanliness of the water in the ground tank. On extraction from the tank, via a pump, this is also filtered here too, to ensure the water being fed to the outlet point is the best that it can be.

There are various technical packages that we can incorporate for the pump supply. More commonly, you would see a submersible pump in an underground tank, which would pump water on demand to the outlet points or appliance, when demand is created.

Premium systems would incorporate a wall-mounted solution, where you would have a mains water cistern located alongside the pump. The mains water backup system helps maximize the volume of water in the underground tank for rainwater, whereas other systems may use a mains water top-up device to fill the underground tank up in long periods without rainfall.



Graf Optimax Pro Filter system

We can also provide extension sleeves or rings to help achieve finished cover levels. Depending on the level of the underground drainage coming into the tank, the tank may become very deep in the ground. The standard supply with the tank offers a varying invert range via the telescopic lid. If this doesn't prove to be sufficient to meet the incoming drainage, an extension ring can be implemented to help meet these levels.

How to install a rainwater harvesting system?

The GRAF Systems are designed to be installed underground. An excavation will need to be prepared to put the tank into.

For the excavation, you will need to include a few different materials to give your tank a solid structure and base. This will include the following:

- Compacted Stone
- Pea Gravel
- Stone
- Water

The excavation site should be lined with 150milll of compacted stone. The tank would then be placed on top of this. Then, the tank should then be partially filled with water to stabilize it before backfilling around the tank with further stone. We would normally recommend 8 to 16mill pea gravel or non-angular stone to do this.

You will also need to add components when installing pipes. Any pipes coming into the tank, which are going to be used as inlets, outlets, or service ducts should also be bedded in pipe shingle. Alongside installing the tank, we will have a service duct to bring electrical connections into the underground tank along with rainwater pipes coming out. This allows you to use the rainwater tank fully going forward and makes maintenance and servicing on the system possible in the future.

There are 9 steps involved in installing the system:

1. Excavate the area for the tank installation. Follow any guidelines related to slopes and groundwater levels.
2. Lower the tank into the trench ensuring it is aligned horizontally.
3. Carefully attach the tank turret to the top of the tank.
4. Install the filter package before connecting the roof downpipes along with the overflow u-bend. Aim for a minimum decline of at least 1% in the same direction as the flow.
5. Using gravel or similar, backfill the excavated space in layers of 30cm while raising the water level at the same time.
6. Before the backfilling is complete, install the dome shaft, which can be adjusted to fit flush with ground level once the hole has been filled.
7. Connect the underground tank to the house with a pipe. This will be managed by the control panel inside the property where the entire system operates from.
8. Install the control panel in a nearby area such as the garage or utility room and connect it to the external piping linked to the tank.
9. Lastly, ensure all rainwater pipes have the appropriate markings to identify those which are not used for drinking water.

Thank you for taking the time to read our free book 'The Ultimate Guide to Rainwater Harvesting'.

We hope you found the contents of this book useful and informative. Details are provided in good faith and believed to be correct at the time of writing; however no responsibility is taken for any errors. This publication will be updated regularly; please let us know of any amendments or additions which you think may be useful for future editions.

Further information about rainwater harvesting can be found at
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