# 1012434

# AquaHarvest Commercial Rainwater Harvesting System - Direct Installation & Operation Guidelines



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# **Enclosed Documents**

DS1161P	8000 - 14000L Storage Tanks (Integral Filter)	
DS1162P	18000-79000L Storage Tanks (Integral Filter)	
DS1168P	6000L Storage Tank (Integral Filter)	
DS1333P	AquaHarvest RWH Commercial Systems Wiring Diagram - Direct	
DS1405P	AquaHarvest RWH Commercial Plumbing Schematic - Direct	

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These instructions cover the installation of the Mechanical and Electrical components of the system as supplied by Kingspan.

The installation of ancillary equipment is covered by the manufacturer's own installation instructions. Please ensure that the installation is carried out in accordance with the relevant regulations for that part of the procedure (Building Regulations, Planning Requirements, Electrical Regulations, and Water Regulations etc.)

For assistance or further information, please visit www.kingspan.com

Thank you for purchasing your AquaHarvest Commercial RWH System. The following instructions will help you to install your chosen system with ease. It is important that you read and understand all of the installation procedure within these instructions. Please call us should you wish to discuss any part of the procedure in more detail.

IMPORTANT: If you have a DIRECT SYSTEM and you experience an electrical or pump failure you will NOT have a water supply to the appliances connected to the Rainwater Harvesting System Therefore users would not be able to flush their toilets or use other appliances, which could potentially lead to public health issues.

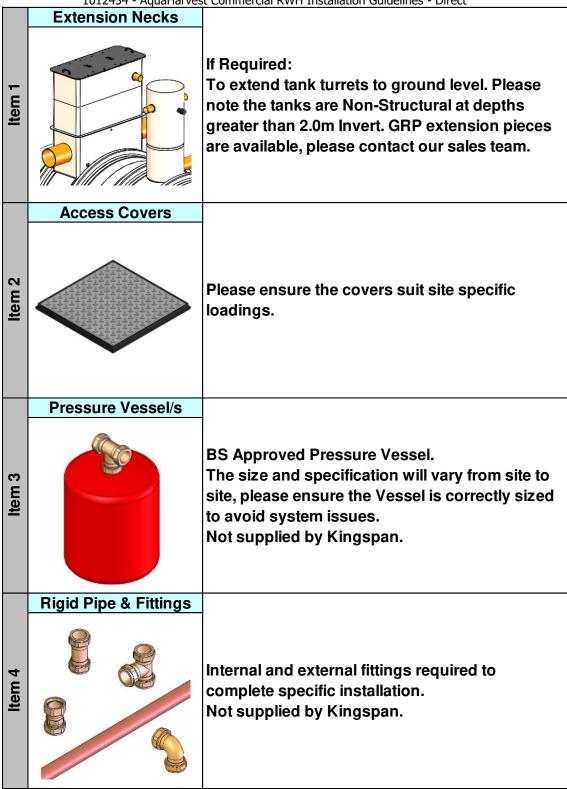
So it is <u>VITAL</u> that if a Direct System design is chosen at least one toilet must be able to operate normally. It's recommended that this is supplied direct from the mains water supply if the design does not incorporate a reliable alternative.

If a constant water supply is essential to an appliance in all circumstances, then a Gravity feed system should be installed in your property, being mindful that there is enough static head to operate solenoid valves on washing machines.

#### SITE DELIVERY CHECKLIST.

# **Delivery 1** Main Storage Tank, Filter & Pump Pipework **Storage Tank** NB: Storage tanks vary in design and volume, depending on roof area (L2 to L5) and storage requirements (6,000L to 79,000L). In addition single or Item twin pump options are available. Please check your particular order and cross reference with relevant sales drawing. **Delivery 2 Additional Components (Supplied In Box)** Pump(s) 1 x Kit (AQBBAG) 1 x Valve (011545) Item 3 Item 2 Item 4 1 x Inline Filter (004934) 1 x Float (015364) 1 x Tundish (004937) Item Item 1 x Solenoid (004929) 1 x MDPE Conn (000947) 1 x Manual (1012434) Item 9 tem 10 Item 1 x Label Reel (004932) 1 x Pump Panel (026138) 1 x Pump Isolator (010052) Item 12 Item 13 Item 11

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NB: All of the above items are a requirement for a complete installation but, these items are NOT supplied by Kingspan as standard.

IMPORTANT: Every care is taken to ensure that all components are correctly fitted, and no debris is left in the bottom of the unit prior to leaving the factory. However, subsequent handling during transportation and installation may result in debris collecting in the unit.

Your installation contractor should have thoroughly checked the unit, on inspection if there is any debris and building contamination, please remove prior to starting the unit. All rain feeding pipework and rain collection surfaces should also be flushed clear of debris.

#### **INSTALLATION INSTRUCTIONS**

#### 1.0 General:

- 1.1 The Storage tank requires the installation of a duct, of minimum diameter 110mm to carry the pump cable and the WatchmanFlo Sensor cable (If applicable). The duct should run from the Storage Tank to the Plant Room and should be suitable for drawing the cables freely.
- 1.2 The Storage tank requires an MDPE (Medium Density Polyethylene) pump feed pipe from the tank back to the Plant Room of MINIMUM 32mm diameter (see the tank connector). To comply with current regulations this pipe should be Black with green stripes (see section on Water Regulations).
- 1.3 The Storage tank requires an Inlet feed from the rainwater Collection pipe work (usually via the Rainwater Filter or pre-tank collection manhole) and an Outlet to a suitable wastewater discharge point (Surface Water Drain, Ditch, Stream or Soak away). This pipe work should preferably be Solvent Jointed rather than ring-seal jointed.
- 1.4 The Rainwater Pump Status Panel requires a 3-core cable. The Pump Status Panel should be mounted in a frost-free area in a highly visible location and not in an area which is rarely used.
- 1.5 The system you are installing is pressurised (Direct), therefore external factors can affect the system's operation. As in any pressurised plumbing system, a correctly sized Pressure Vessel (Expansion Vessel) should be installed. The vessel (supplied by others) should be installed between the Control Panel and the appliances. Pressure vessel sizes will vary site by site, please ensure your vessel is sized to suit your specific site. Incorrect sizing of the pressure vessel will lead to system issues at a later date.
- 1.6 Once you have fully understood these general points, you should be confident in the type of system you intend installing, and in the layout and location of the parts. You should now be able to begin installation. Be aware of the following advisory points.
- a. Before carrying out any work of the system isolate the electrical supply.
- b. The pump and suction filter should be assembled and positioned on the bottom of the Storage tank, not suspended. When raising or lowering the pump you should first RAISE the WatchmanFlo Sensor (If applicable) to avoid damage. Replace the SENSOR when any work on the pump is completed and the pump is reinstalled.
- c. The WatchmanFlo Sensor should be positioned as close to the bottom of the Storage tank, not suspended.
- d. The Pump Status Panel should be mounted in a visible location.
- e. All serviced appliances and external taps must be connected on the plumbing line as per DS1405P.

#### TANK INSTALLATION

These guidelines represent Best Practice for the installation of Kingspan RWH (Rainwater Harvesting) Units. Many years of specialist experience has led to the successful installation of thousands of units it must be noted, however, that these Guidelines are of a general nature. It is the responsibility of others to verify that they are appropriate for the specific ground conditions and the in-service loads of each installation. Similarly, a qualified specialist (e.g. Civil engineering consultant) must verify any information or advice given by employees or agents of Kingspan regarding the design of an installation.

### 2.0 Handling & Storage

- 2.1 Care must be taken to ensure that units are not damaged during delivery and handling on site.
- 2.2 The design requirements of Kingspan products will frequently mean that the centre of gravity of the unit is "offset". Care must therefore be taken to ensure that the unit is stable when lifting. Rainwater may also collect inside units, particularly if they have been stored on site prior to installation, adding weight and increasing instability. Check units before lifting and pump out any excess water.
- 2.3 When lifting units, use webbing slings of a suitable specification. DO NOT USE CHAINS.
- 2.4 A suitable spreader bar should be used to ensure that units are stable and that loads are evenly distributed during lifting. When lifting units, a spreader bar should be used where the slings would otherwise be at an angle > 30 degrees to the vertical.
- 2.5 Lifting equipment should be selected by taking into account the unit weight, length and the distance of lift required on site.
- 2.6 Kingspan accept no responsibility for the selection of lifting equipment.
- 2.7 Whenever Kingspan units are stored or moved on site, ensure that the storage location is free of rock, debris and any sharp objects, which may damage the unit. The units must be placed on ground which is flat and level to evenly support the base of the unit. Do not roll units.

#### 3.0 Site Planning

The following points should be considered before installation of the equipment:

- 3.1 Position the unit at a minimum distance of 5 metres from the face of the building, so as not to affect either the structural integrity of the building or the tank.
- 3.2 See BS EN 752-4 Drain & sewer systems outside Buildings.
- 3.3 Consider placing inspection points in the drain line before and after Units.
- 3.4 Ground conditions and water table level should be assessed. If the water table will be above the base of the unit at any time of the year, adequate concrete backfill must be provided to avoid flotation. In poorly draining ground, consideration should also be given to the likelihood of flotation due to surface water collecting in the backfill, and an appropriate installation method devised to avoid this.
- 3.5 If the overflow discharge is to a soak away, a porosity test should be carried out as part of the assessment of suitability for sub-soil drainage. The soak away must not drain back into the tank environs.
- 3.6 The unit must be installed at a level that will allow connection to the incoming down pipe and a free discharge at the system overflows.
- 3.7 Do not install the unit deeper than necessary; ensure that you purchase any necessary neck extension shafts at the same time as the unit purchased. The minimum invert depth of the unit is shown on the relevant equipment drawing. Units installed with an invert greater than 2.0m will require a civil design specific to the installation, in which the specific site conditions should be taken into consideration and the backfill designed to bear any loads which may be applied during and after installation to prevent the tank being subjected to these loads.
- 3.8 Adequate access to the unit must be provided for routine removal of solid build-up and maintenance. Vehicles should not be permitted within a distance equal to the depth of the unit, unless suitable structural protection is provided to the installation. Usually the unit should be sited within 30 metres of a hard standing area suitable for a vacuum tanker.
- 3.9 There must be at least 1 metre of clear, level ground all around the access covers to allow for routine maintenance.

- 3.10 Provide electrical supply for pumping equipment.
- 3.11 Suitably qualified and experienced contractors, in accordance with current Health and Safety Regulations should only carry out installation. A qualified electrician, working to the latest edition of IEE should carry out electrical work.

#### 4.0 Installation - General

- 4.1 When units are installed in unstable ground conditions where movement of the surrounding material and/or unit may occur, the connecting pipe work should be designed to minimise the risk of damage from differential movement of the unit(s) and/or surrounding material.
- 4.2 Units should not be installed at greater than 2000mm from cover level to the top of the unit, specific site conditions should be taken into consideration and the backfill designed to bear any loads which may be applied during and after installation to prevent the tank being subjected to these loads.
- 4.3 The excavation must be deep enough to provide bedding and cover depth as determined by the type of surface pavement and loading. Asphalt and concrete pads should extend a minimum of 300mm horizontally beyond the unit in all directions.
- 4.4 In situations where the excavation will not maintain a vertical wall, it will be necessary to shore up the side walls of the excavation with suitable trench sheets and bracing systems to maintain a vertical wall from the bottom to the top of the excavation. DO NOT completely remove the shoring system until the backfilling is complete, but before the concrete fully hardens.
- 4.5 In areas where the water table is above the bottom of the excavation and/or the excavation is liable to flood, the excavation should be dewatered using suitable pumping equipment and this should continue until the installation is complete.
- 4.6 During installation care must be taken to ensure that the body of any unit is uniformly supported so that point loads through the unit are avoided.
- 4.7 The Concrete Specification is a general specification. It is not a site specific installation design.

GENERAL CONCRETE SPECIFICATION IN ACCORDANCE WITH BS EN 206-1 (BS 8500-1)					
TYPE OF MIX		(DC) DESIGN			
PERMITTED TYPE OF CEMENT		BS 12 (OPC): BS 12 (RHPC): BS 4027 (SRPC)			
PERMITTED TYPE OF AGGREGATE (coarse & fine)		BS 882			
NOMINAL MAXIMUM SIZE OF AGGREGATE		20 mm			
GRADES: C25 /30 C25 /30 C16 /20		REINFORCED & ABOVE GROUND WITH HOLDING DOWN BOLTS REINFORCED (EG. FOR HIGH WATER TABLE) UNREINFORCED (NORMAL CONDITIONS)			
MINIMUM CEMENT CONTENT	C30 C20	270 - 280 Kg/M <sup>3</sup> 220 - 230 Kg/M <sup>3</sup>			
SLUMP CLASS		S1 (25mm)			
RATE OF SAMPLING		READY MIX CONCRETE SHOULD BE SUPPLIED COMPLETE WITH APPROPRIATE DELIVERY TICKET IN ACCORDANCE WITH BS EN 12350-1			
NOTE: STANDARD MIXES SHOULD NOT BE USED WHERE SULPHATES OR OTHER AGGRESSIVE CHEMICALS EXIST IN GROUND WATER					

#### 5.0 Unit Installation

- 5.1 Excavate a hole of sufficient length and width to accommodate the tank and a minimum 225mm concrete surround and to a depth that allows for the burial depth of the unit plus concrete base slab.
- 5.2 Construct a suitable concrete base slab appropriate to site conditions. Ensure that the slab is flat and level.
- 5.3 When the concrete base slab has set enough to support the installed load, lower the unit onto the slab using suitable webbing slings and lifting equipment.

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- 5.4 Pour no more than 300mm depth of clean water into the unit, avoiding shock loads. DO NOT OVERFILL, the unit is not designed to hold water whilst unsupported.
- 5.5 Place concrete backfill to approximately 300mm depth under and to the sides of the tank ensuring good compaction to remove voids. DO NOT use vibrating pokers. If the unit does not have stabilising feet, i.e. units of 2.6 diameter, allow initial concrete set to occur before proceeding.
- 5.6 Continue adding concrete backfill, simultaneously keeping the internal water level no more than 300mm above the backfill level at all times, until the backfill is just below the underside of the tank overflow, giving sufficient room to connect the pipe work.
- 5.7 Connect inlet and overflow pipes when safe access to the backfill can be gained.
- 5.8 Fit 110mm diameter ducting (supplied by others) to the connection marked on the tank neck. Ensure that there is a draw cable fitted so as to allow sensor cable to be pulled through at a later time.
- 5.9 Supply and connect required medium density polyethylene pipe to the tank connector 32mm or 50mm.
- 5.10 Extension necks. Temporarily strut the extension neck(s) to avoid distortion during the concrete installation and back filling.

The neck(s) are provided with a 110mm pipe in the side wall and this is intended for the connection of above ground ventilation pipework. Ensure this pipework is suitably protected against ingress of vermin.

<u>Flanged extension necks</u> on 2.6 diameter tanks are supplied with mastic and bolts. Line up the necks. Ensure good & even compression of the mastic so as to provide a watertight seal.

<u>Spigot extension necks</u> on 1.8 diameter tanks should be slipped inside the neck and sealed with silicone or mastic (not supplied)

Sites with high ground water will require special attention. Consider sealing by GRP lamination (if skilled operatives are available).

Where more than one neck section is required to suit a deep invert, back-fill section by section. If the extension neck is too long, it can be trimmed using a fine-toothed saw.

- 5.11 Continue back filling with concrete over the tank body to the required level. Build up a shell of concrete, minimum 225mm thick, around the access shaft(s). Temporarily strut the access shaft to avoid distortion.
- 5.12 Continue back-filling, ensuring minimum 225mm concrete thickness around the access shaft/ extension neck and alarm access tube (as applicable).
- 5.13 Do not install in trafficked areas unless a suitable top slab has been designed and constructed. The top slab should bear on a suitable foundation to prevent superimposed loads being transmitted to the unit and access shafts. Loads applied to covers and frames must bear on the top slab, not the access shaft.
- 5.14 It is essential that the tank is kept free from construction and post construction material contamination. Materials such as this will cause problems with the function of the system and the appliances it is connected to. Kingspan Environmental cannot be held liable for pollution of stored rainwater or post installation remedial works due to ingress of construction site contamination.

#### SYSTEM INSTALLATION

YOU ARE INSTALLING A DIRECT SYSTEM, Refer to the Plumbing & Wiring Guide drawings (at the end of this section). As you are installing a DIRECT system a MAINS WATER SUPPLY is required to top-up your storage tank with MAINS water during periods of low rainfall. In all cases, this equipment should be installed by competent, qualified personnel and should comply fully with all the relevant regulations, particularly the current Water Regulations and the current edition of the IEE regulations concerning the safe installation of such equipment. BE SAFE.

It is assumed that you have read and understood the tank Installation Instructions, the Tank is IN SITU but not fully backfilled, and you must now consider the installation of the pipe work and cable runs. Please be aware that there are connections to the pump and WatchmanFlo sensor (If applicable) located in the tank which must exit via the turret. If you intend using extension rings on the tank turret, please bear this in mind. If there is any doubt regarding the ability to carry out these connections due to such extensions, you may need to consider an access chamber. Consult with a qualified civil engineer in this circumstance, particularly regarding the surface loading.

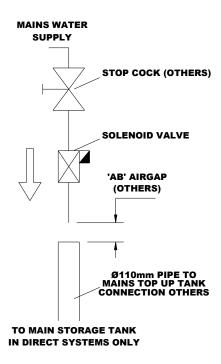
## Study the DIRECT Plumbing & Wiring Guide drawings and decide on the following:

- 1) The route by which you will take the surface drain pipes (minimum 110mm) back to the tank from the gullies and whether you are fitting an external rainwater leaf filter or not.
- 2) The route by which you will take the MAINS WATER TOP-UP pipe back to the tank. Note that this must enter the tank after the Rainwater Leaf Filter in the connection supplied (marked "Mains Top Up, Direct Systems Only".
- 3) The route of your tank overflow pipe.
- 4) The route and inverts for pipe work from any manifold chamber collection points or Rain Water Filters.
- 5) Choose the location of the Pump Status Panel. Note that this unit should be mounted under cover, protected from frost, and be located at a convenient height of between 1.5 metres and 2 metres above top water level in the storage tank. If you wish to mount the unit in any other location, please contact Kingspan for further advice.

<u>NOTE.</u> You are strongly advised to leave the Installation of the pump itself until you are ready to electrically connect it into the Isolator and Pump Status Panel. See step (14) following.

- 6) Refer to the Guide Sheet DS1405P. The pump outlet tank connector is supplied with the tank. Make certain that it is securely tightened into the tank turret. Cut the MDPE 32mm (black/green) pipe squarely and clean off rough edges. Use an insert in the end of the pipe as recommended by the supplier. Make sure that the pipe and tank connector are clean and free from grit and soil, etc. Ensure the section to be inserted is not badly scratched. With the collet loose on the tank connector, insert the pipe fully home then tighten the collet. Check the fitting nut, tank side, for tightness. (Do not over tighten.)
- 7) Refer to the Guide Sheet DS1405P. Lay in the MDPE pump outlet pipe (water supply pipe from the tank to the property); ensure that bending radii are kept as large as possible to avoid kinking. Before terminating the pipe in the building, flush it through to clear any grit or small stones (not back into the tank). Fix and secure to a stop-cock, leaving adequate space for the inline filter. Install the in-line filter between the stop-cock and pressure reducing valve. Fit the filter as shown on the Guide Sheet ensuring the direction of flow is correct, arrow towards the appliances,
- 8) Refer to the Guide Sheet DS1405P. The Electrical Duct should be 110mm PVC and should be suitable for the purpose. The duct should enter the tank turret through the marked connection. Feed the draw wire (or rope) as the duct is laid. Use accessible joint boxes if there is a need for an acute bend on entry into the building. Terminate the duct at a point close to, or convenient for connection to, the pump Isolator and Pump Status Panel.

9) Refer to the Guide Sheet DS1405P. You are installing a DIRECT system and so it is necessary to run the mains water supply through a stop-cock and then to the supplied solenoid valve. The outlet from the solenoid valve should be directed into the 110mm "Mains Top Up" pipe that runs from the plant room to the tank. Connect into the "Mains Top Up" pipe connection Observe the flow arrow on the valve body. The flow is to the tank. Note that the return pipe work is shown as 110mm. This is to allow unrestricted flow to the tank. The AB Air gap is essential and must meet all relevant requirements. Please check both national and local requirements for your particular installation.



- 10) **Refer to the Guide Sheet DS1333P**. The electrical installation must be carried out by a competent person to the relevant standards as laid down in the current Building & IEE Regulations.
- 11) To install the pump, you should take great care. It is a heavy item. Two people will make the job much easier. Take the pump to the tank turret. Release the ties on the mains electric cable. Fit the pump rigid manifold (supplied loose) to the pump. Attach the suction filter to the pump. Draw the mains electric cable through the duct along with another draw-wire (or rope) to pull through the sensor cable later. When the electric cable is fully in place, with the waterproof connector accessible, connect the waterproof pump cable connector to the mains electric waterproof connector and twist to effect the seal. The pump can be lowered carefully, on its rope, into the tank. **Do not lower the pump by the electrical cable or by the hose.** One person should hold on to the pump hose free end and should guide the other person, not allowing the cable to be trapped by the descending pump. When the pump is sitting on the tank bottom, the rope should be tied off to the turret bracket, just sufficiently taught to keep the pump upright but not enough to suspend it. The pump hose should now be connected to the tank connector, ensure the seal is in place. Do not over tighten. Run the pump electrical cable from the duct to the Isolator and wire it in to the terminals marked on Guide Sheet DS1333P.
- 12) Refer to the Guide Sheet DS1333P to wire the associated electrical items Plantroom Junction Box, Solenoid & Mains Top Up Float, Pump Status Panel along with the Fused Spur.
- 13) Refer to the Guide Sheet DS1333P. The main electrical supply should come from the Distribution Board, fused or with MCB Type C rated 20 amps, with a separate Residual Current Detector (RCD) to an isolated switch local to the control unit, or from a 20 amp switched fused spur with integral RCD. Remove the control unit lid and identify the terminals within. The mains supply terminal block is marked "POWER" connect accordingly to L brown core, N blue core and E green/yellow core.

- 14) You have now completed the installation of your DIRECT system. Before proceeding to the final stage, Set-up and Commissioning, you should check the following.
  a) Are all the pipe work joints secure?

  - b) Is the pump submerged in clean water, free from installation detritus? If not fill tank with a hose pipe from the mains until the pump is submerged.
  - c) Have you completed the plumbing to all appliances to be served by the system?

#### **REGULATIONS - GENERAL**

It is important that all relevant Regulations surrounding the installation of the Rainwater Recovery System are adhered to.

For obvious reasons, we are unable to print all of the Regulations that could apply to your project therefore it is important that only Competent, Qualified Personnel with knowledge of the specific regulations are employed to install and commission the system.

## Water Regulations - Very Important

There are some important regulations from the *Water Regulations Advisory Scheme (WRAS)* which are in place to protect public health. It is a legal requirement that these regulations are adhered to, to ensure your new system complies with the requirements of your local Water Company.

Recovered Rainwater is guite safe for use in specific applications.

Recovered Rainwater is designed for use in non-potable applications such as toilet flushing, laundry, industrial applications, garden watering and vehicle washing. If the water is for use in any other application, advice should be obtained before connection is made.

WRAS have published **two** main documents which will guide the installer/user through the regulations for Rainwater Recovery Systems. The following documents can be found at <a href="https://www.wras.co.uk">www.wras.co.uk</a>

#### 1. N° 9-02-05 Marking & Identification of Pipe work

This document lists the requirements of the Water Company for the installer to ensure that all of the pipe work and appliances used to carry and deliver the reclaimed water are clearly marked to ensure that all users now and in the future can easily see the difference between the mains water and reclaimed water system.

In short, all tap points should be marked to ensure they are not used for potable (drinking) applications. All internal pipe work should be clearly marked (we supply special tape for this purpose). External pipe (from the Storage Tank to the Plant Room) should be Black and marked as reclaimed water (we supply special tape for this purpose)

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2. N° 9-02-04

#### **Reclaimed Water Regulations - General**

This document covers a number of requirements of the Water Company to ensure that the system is installed in such a way that Public Health is protected.

One of the main points raised in this document is the need to ensure cross contamination of rainwater and mains water does not occur within the mains pipe work system. The Regulations are quite specific on this matter and insist that a Type AB air gap separates the two water supplies.

A Tundish is supplied for use in a Direct System and will provide the required protection. A weir should be installed between the two supplies within a header tank. This weir would be a specific size depending on a number of factors. Please visit <a href="www.wras.co.uk">www.wras.co.uk</a> or call us should further information be required.

#### **HEALTH & SAFETY**

These warnings are provided in the interest of safety. You must read them carefully before installing or using the equipment.

It is important that this document is retained with the equipment for future reference. Should the equipment be transferred to a new owner, always ensure that all relevant documents are supplied in order that the new owner can be acquainted with the functioning of the equipment and the relevant warnings.

Installation should only be carried out by a suitably experienced contractor, following these guidelines.

Electrical work should be carried out by a qualified electrician.

Any person carrying out maintenance on the equipment should wear suitable protective clothing, including gloves. Good hygiene practice must also be observed.

We recommend the use of a dust mask and gloves when cutting GRP components.

Access covers should be selected with reference to the location of the unit and traffic loads to be accommodated. These are not (normally) part of the units supply.

When covers are removed precautions must be taken against personnel falling into the unit.

Should you wish to look into the tank, please observe all necessary precautions, including those listed below, which apply to maintenance procedures.

Ensure that you are familiar with the safe working areas and accesses. Ensure that the working area is adequately lit.

Take care to maintain correct posture, particularly when lifting. Use appropriate lifting equipment when necessary. Keep proper footing and balance at all times. Avoid any sharp edges.

#### **MAINTENANCE**

The correct ongoing maintenance is essential for the proper operation of the equipment. The removal of solids which accumulate in the unit should be carried out by a contractor. The contractor should refer to the guidelines in this document.

This tank is designed to collect and store rainwater. It should not be used for any other purpose without the agreement of Kingspan.

# RAINWATER HARVESTING MAINTENANCE LOG



Site address	
Location	
Total capacity	
Inspection/ Maintenance Date	Comments