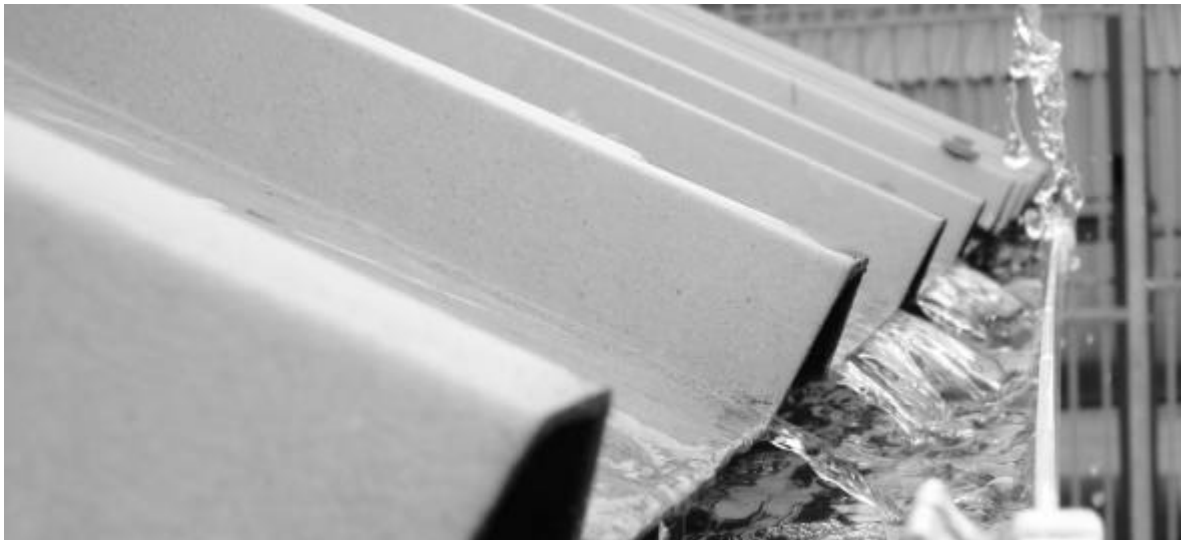


## **Tri-Cel Package Rainwater Harvesting System. A simple package solution, complete with a tri-cel rain control centre & tank.**

- **Overground & underground systems available –**
- **Pump direct to the services or to a header tank –**



The tri-cel rain harvesting system is a simple solution for taking “free” rainwater off the roof on commercial or domestic buildings and reusing this water to flush toilets or as process water in factories etc. As water metering becomes more prevalent in Europe, using free Rainwater is an easy cost saving solution available to all.

Our simple system uses a tank (underground or overground) and a control centre. Almost any capacity in a single tank, either as an underground or overground system is available. A pressure controlled pump feeds the rainwater through a special pipe work system to the building. If there is insufficient rainwater, only the required amount of water is drawn from the mains water supply, however the system always favours the rain harvesting tank. Once more rainwater becomes available, the system comes back online and the mains water is automatically shut off.

### **“Clean Water”**

The rainwater is filtered from the roof using a volume filter (roof sizes up to 350m<sup>2</sup> (larger filters available up to 3,000m<sup>2</sup>). Multiple filters may be required for different down pipes.

Overground systems are suitable for ground level or in a basement, reducing the costs of underground excavations & installation and are suitable for existing buildings. Our experienced site crews will assemble the tank and commission the system on site, all you have to do is plumb to the building. Underground systems, only a manhole and small control cabinet are visible after installation. Again we commission the system on site.

## **Rainwater Harvesting Systems – types available.**

We are pleased to offer 2 different types of Rainwater Harvesting Systems to suit all of your rainwater harvesting requirements. We offer underground & overground tanks as standard, with the overground tanks being an attractive option for existing installations like hotels, football grounds, schools, factories etc where a small hard standing area may be available. With overground systems, there are no tank installation costs to the customer, except for a concrete base or RSJ base for the tank, as we assemble the tank on site. Rain Water is suitable for flushing toilets & urinals, process water, sprinkler tanks, garden watering, car washing etc.

1. **The Submersible Pump Option** has a Rainwater tank with a submersible pump, pumping directly to a header tank. The pump is supplied as a complete set with a starting and running device, a system with run dry protection. Does not included are non-return valves, ball cocks, float switches etc. Plumbing with 4” duct will be required.
2. **The Tri-Cel Rain Centre Option** consists of a Tri-Cel Rain Centre, pumping directly into the services or to a header tank. This system requires very little onsite installation, just plug in the pump and very little plumbing connections, a 1” BSP connection to the services and a ¾ “ BSP mains connection. Plumbing with 4” duct will be required.
  - Tri-Cel Rain Centre: Pump, tank contents gauge, pressure switch, dry-run protection mains in, rainwater outlet, pressure gauge, capillary tube for pressure indication, float valve inlet for mains back-up, 3-way valve, mains back-up water tank, maximelder connection (float switch), digital level indicator.
  - TCRC Tank for housing the Tri-Cel Rain Centre with lockable cover and vents.

### **Both options include for the following:**

- Rainwater Harvesting Tank (underground or overground)
- Tri-Cel VF filter, suitable for roof areas upto 350m<sup>2</sup>. (Larger filters available, including WISY WFF Filters).
- Dip pipe with Calmed inlet connection & Overflow siphon
- Floating suction filter with hose
- On site commissioning of the system by trained site crews

### **Why should you choose the superior option?**

- It has the Tri-Cel Rain Centre.

### **What is the Tri-Cel Rain Centre?**

- This is a factory assembled, package Rainwater Harvesting System.
  - Everything that you need is included in it. (List in blue above)
- The only plumbing required, is a 1” BSP connection to the services and a ¾ “ BSP mains connection.
  - No messing with floats, ball cocks, non-return valve, solenoid valves etc.
  - No special ballcock design required.
- This will saves you thousands of euros by reducing on site design and installation works.

## **Introduction.**

Today, we are using more water than ever before according to a Cambridge water study. Luxurious showers, large jacuzzi baths, and manicured gardens have all added to this rise in water usage. Although we sometimes feel, that its always raining, the water still has to be pumped, cleaned, treated and piped to meet our demands. All water goes through the same process, even the water for toilets.

## **The toilet.**

A third of all domestic water used goes down the toilet. The average person uses about 150 litres of water per day. A bath uses 90 litres, 45 litres for a 5 minute shower, 110 litres for a washing machine and 45 litres for a dishwasher

## **Commercial applications.**

Commercial water varies depending on the application, but large hotels, airporst and football grounds can waste a lot of water, literally flushing money down the toilet.

## **Commercial watercharges**

Water charges are payable if water is being supplied for use by business, trade or manufacture. This includes hospitals, sanatoriums, homes for people with mental or physical disabilities, maternity homes, convalescent homes, laboratories, clinics, health centres, schools or clubs. Water rates vary and information can be found at local Council level.

## **Safety concerning roof types**

Rainwater collected from roofs that are constructed from materials like asbestos or galvanized tin, may not always be suitable to be used as harvested water and information should be sought from your at local Council regarding use, testing etc

**It is the responsibility of the customer to ensure that the system that is chosen, can fulfil your water requirements and that seasonal or sporadic loadings are catered for.**

**Pumps, filters, tanks etc need to be accurately assessed by the customer, in order to guarantee the required supply.**

**Scope.**

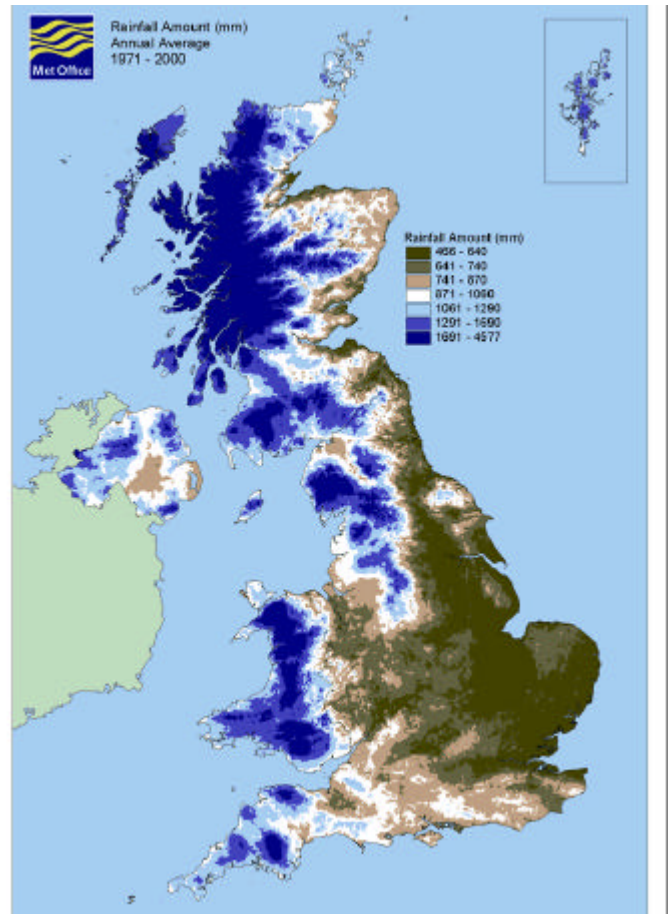
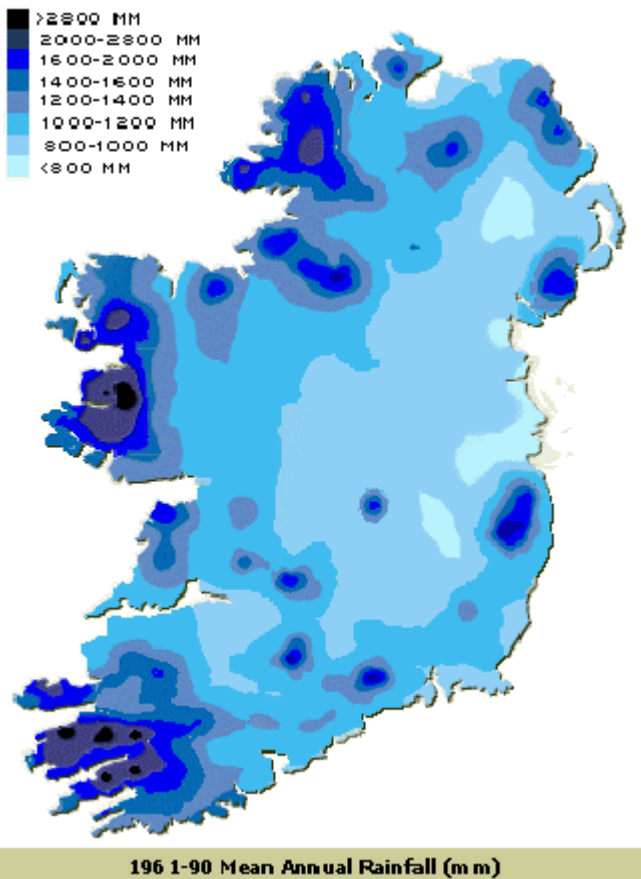
**1. Rainfall**

**Rainfall in Ireland.**

Most of the eastern half of the country has between 750 and 1000 millimetres (mm) of rainfall in the year. Rainfall in the west generally averages between 1000 and 1250 mm. In many mountainous districts rainfall exceeds 2000mm per year. The wettest months, almost everywhere are December and January. April is the driest month generally but in many southern parts, June is the driest. Hail and snow contribute relatively little to the precipitation measured.

**Rainfall in England, Scotland & Wales.**

Rainfall in England varies widely. The Lake District is the wettest part, with average annual totals exceeding 2,000 mm, comparable with the western Highlands of Scotland). The Pennines and the moors of south-west England are almost as wet. However, all of East Anglia, much of the Midlands, eastern and north-eastern England, and parts of the south-east receive less than 700 mm a year. Typically, it rains on about one day in three in England, more often in winter, though long, dry spells occur in most years. Near the south coast there is a maximum of rainfall, with totals in July barely half those in January; western, northern and eastern coasts are more likely to see the driest month in spring and the wettest in late autumn. Inland for example, at London and Birmingham, thunder occurs on an average of 15 days a year, but in the west and north-west the frequency declines to around eight days per year. Facts and figures. Maximum in a day (09-09 UTC): 279 mm at Martinstown (Dorset) on 18 July 1955.

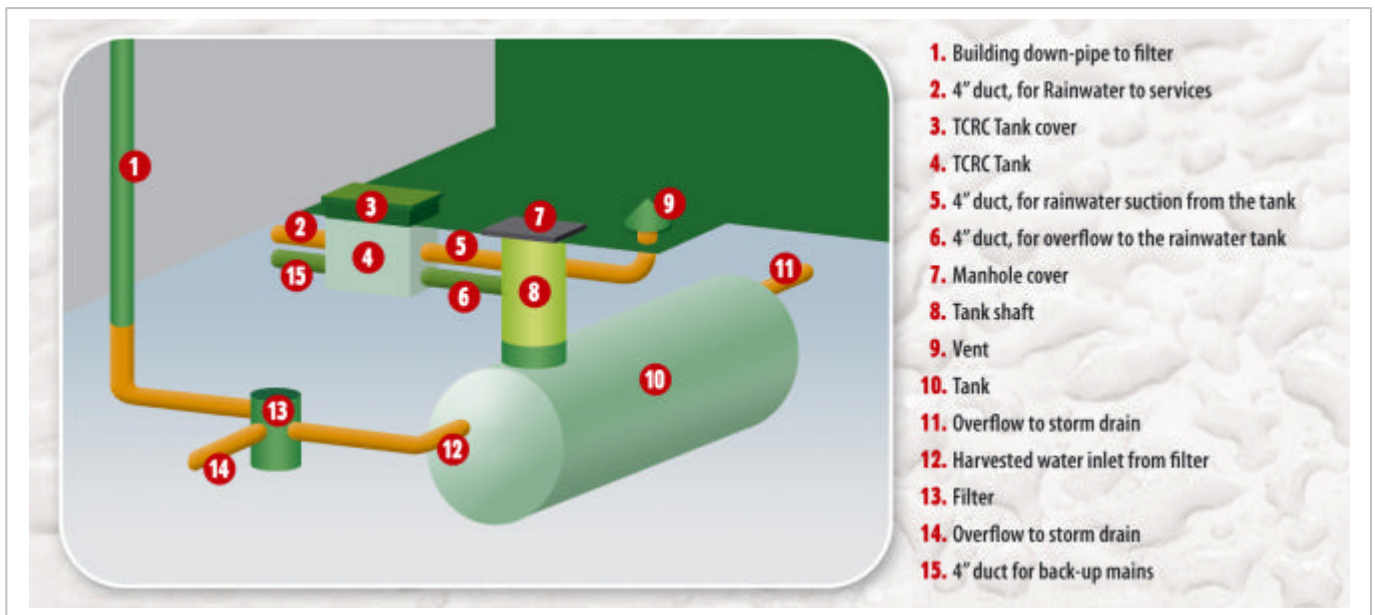


**System sizing. (Source Environment Agency, UK)**

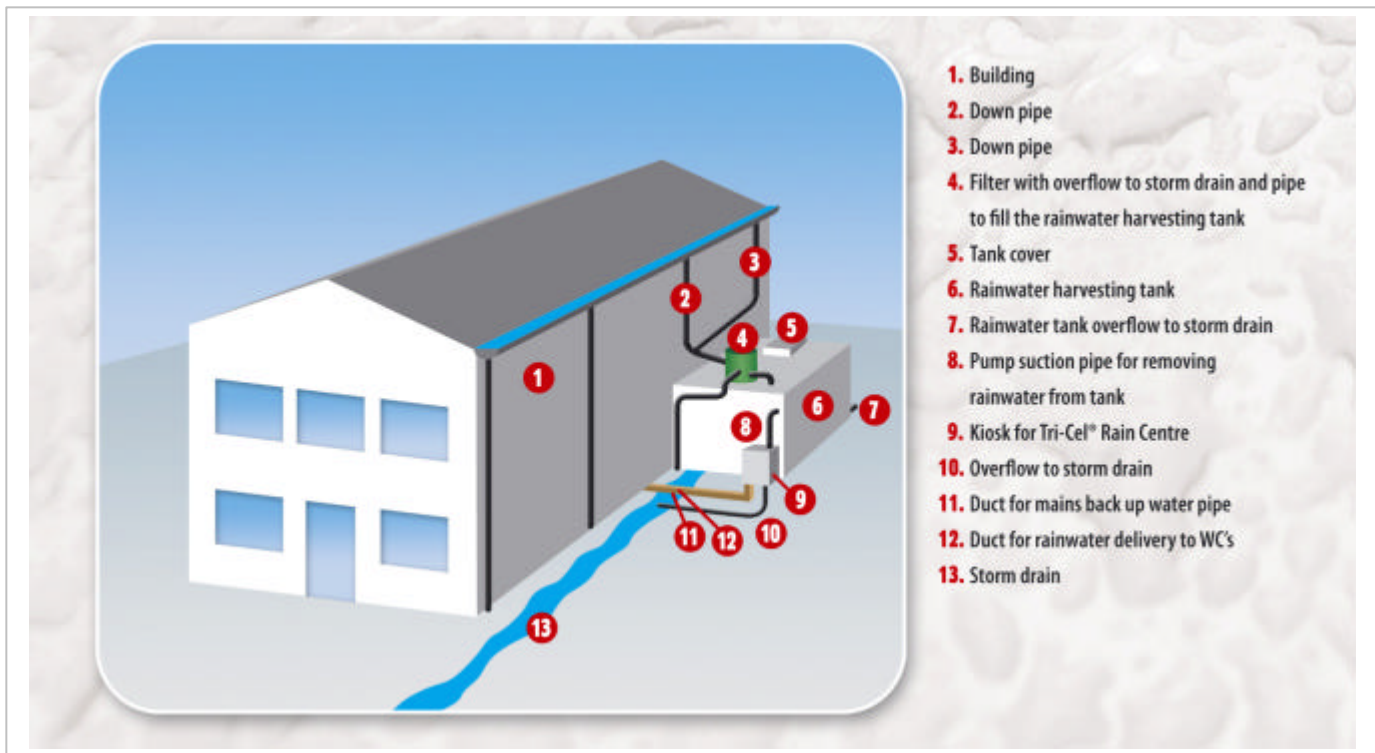
Rainfall can be sporadic, but the tank size is usually less than imagined. As a guideline, size the tank of the system to hold 18 days worth of demand. Or 5% of annual yield, whichever is lower. To calculate the optimum tank size, first calculate the potential yield. Once you know the potential yield, simply find 5% of this.

$$\text{Roof area in m}^2 \times \text{drainage factor} \times \text{filter efficiency} \times \text{annual rainfall in mm} \times 0.05.$$

## 2. The Tri-Cel Package Rainwater Harvesting System.



**Underground and over ground solutions.** Typically overground tanks are placed into basements or existing buildings whereby an underground installation is undesirable. Overground systems can offer a more cost-effective solution, not requiring excavations, groundworks etc. Package system consisting of an underground or overground tank, a TCRC Tank with tri-cel rain centre, filter with extension, calmed inlet with dip pipe, floating suction filter with hose and overflow siphon. Header tank system is also available.



**Tri-cel rain centre.** The tri-cel rain centre is a ready to connect compact central unit for rainwater harvesting and can be used with any tank, over or underground. The modular design ensures ease of installation and consists of a mains back-up tank with an integrated mechanical float valve for reliable water supply. The rainwater centre microprocessor controls the entire sequence of functions and ensures reliable performance. The display provides information on the actual state of operation. If the sensors detect that there is no rainwater available in the tank, the 3-way valve switches over to mains water. Once rainwater is again available, the centre automatically switches back, ensuring that recycled water is primarily used.



**Tri-Cel rain centre**

### The “tri-cel rain centre”.

- Pump.
- Armoured cable.
- Tank contents gauge.
- Pressure switch
- Dry run protection.
- Rainwater outlet.
- System control panel.
- Pressure gauge.
- Capillary tube for pressure indication.
- Float valve inlet for mains back up.
- 3-way valve. Mains back up water tank.
- Connection for maximelder.
- The rain centre is housed in the TRRC Tank, which is partially buried.

The Tri-Cel rain centre can be used as a rain water system control unit for all standard rainwater tanks. It can be retrofitted above or below ground. The pump, the processor units and all other elements are modularly arranged around the mains water reserve tank, a highly compact, plug and play solution. This compact system design incorporates the reserve tank with a mechanical float valve, which ensures reliable and safe water supply. The microprocessor-controlled Tri-Cel rain centre controls the entire system and ensures superior reliability.

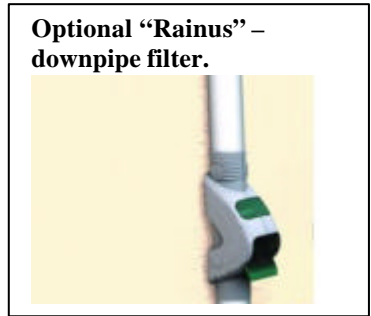
Tri-Cel rain centre uses rainwater from the collection tank. If the tank is empty, the Tri-Cel rain centre uses a sensor to switch to mains water supply from the reserve tank via a 3-way valve. A short rain shower is sufficient for the Tri-Cel rain centre to switch back to rain water supply. An integrated level indicator shows the level in the rainwater tank. The system will work with either above or belowground.

<b>TCRC Tank dimensions</b>	<b>1060 x 760 x 680mm</b>
<b>Dimensions tri-cel rain centre H x W x D</b>	<b>600 x 650 x 300mm</b>
<b>Weight tri-cel rain centre empty</b>	<b>27.5 kg</b>
<b>Weight tri-cel rain centre with water</b>	<b>45 kg</b>
<b>Capacity of reserve tank</b>	<b>18 litres</b>
<b>Operating temperature</b>	
<b>Water</b>	<b>+ 4° C to + 35° C</b>
<b>Ambient</b>	<b>+ 4° C to + 40° C</b>
<b>Supply voltage</b>	<b>230V ac, 50Hz</b>
<b>Maximum consumption</b>	<b>1500 VA</b>
<b>Maximum motor power</b>	<b>550 W</b>
<b>Maximum pumping height</b>	<b>40 m</b>
<b>Maximum pressure</b>	<b>4.0 bar</b>
<b>Maximum capacity</b>	<b>4,500 litres / hour</b>
<b>Maximum suction height</b>	<b>8 m</b>
<b>Maximum distance – tank to control unit</b>	<b>15 m</b>
<b>Emergency overflow</b>	<b>DN50</b>
<b>Protection class</b>	<b>1 (EN 60335-1)</b>
<b>Protection rating</b>	<b>IP42 (EN 60529)</b>
<b>Electrical safety</b>	<b>According to EN 60335-1</b>
<b>Mains in pipe</b>	<b>¾ “ BSP</b>
<b>Pipework carrying rainwater to services</b>	<b>1” BSP</b>
<b>Suction pipework from RWHS</b>	<b>1” BSP</b>

## 4. Filtering the water:

### Tri-Cel VF filter (WISY filters available to 3,000m<sup>2</sup>)

The Tri-Cel VF filter, filters leaves, moss and other debris from the water, ensuring cleanliness of water supplied. For roof areas of up to 350m<sup>2</sup>, the filter requires very little maintenance. Dirt is directly flushed away from the rainwater harvesting system. 80% to 95% of the rainwater is cleaned and fed into the tank for reusing. The filter inside of VF1 is s/s and can easily be cleaned, as opposed to being replaced. Telescopic extensions are available (right hand photo). As an extra precaution in areas with lots of leaves, a Down pipe filters "Rainus" also aid filtration.



**WISY Filters:** WISY WFF 100, 150, 300 suitable for roofs up to 200m<sup>2</sup>, 500m<sup>2</sup> & 3,000 m<sup>2</sup> respectively.



### Calmed inlet.

The dip pipe & calmed inlet ensures a non-turbulent supply of rainwater into the tank. This slow flow of water helps in preventing sediments from being stirred up.



### Floating suction filter.

The Floating suction filter is used for taking rainwater from the tank. The floating ball ensures that the water is always taken from the cleanest layer (the top of the tank). Included are a non-return valve, dirt collector and hose connection



### Siphon.

Siphon for tank overflow with stench trap, rodent stop and connection for backwash.



## 5. Pumping to a Header tank

Our header tank system differs from the standard system, whereby the harvested rainwater is pumped to a “Header” tank in an attic and the services are then drawn from there, for use in WC’s. The Tri-Cel Rainwater Harvesting Tank will collect rainwater as with the standard system. This water will then be pumped via the Tri-Cel Rain Centre or a submersible pump up into an attic header tank, (available in standard sizes with a cover up to 9000 litres (2,000 gallons) in a one-piece tank or as a sectional tank of any capacity). The pump, pumps the rainwater to the header tank which will have controls (designed and supplied by the onsite contractor) to ensure in the first instance that rainwater will always fill the header tank. If rainwater is unavailable, the level in the header tank will drop to a pre set level, and then the mains water will automatically maintain the header tank levels. When more rainwater enters the RHH Tank, it will automatically enter the header tank.

### Technical information: submersible pumps.

Non self priming

Submersible -motor deep-well pump

Mains connection 1~230 V or Mains connection 3~400 V

Connection cable (EM version)

Thermal motor protection switch (EM version)

Safety rope made of polypropylene

Installation Instructions

### Approved fluids

Pure water without settling sediment, Process water, cold water, cooling water & Rainwater

### Performance

Maximum flow volume [m<sup>3</sup>/h]: 4.8

Maximum delivery head [m]: 97

Fluid temperature [°C]L: +5 to +35

Maximum operating pressure [bar]: 10

Mains connection 1~ [V]: 230

Mains connection 3~ [V]: 400

Mains frequency [Hz]: 50

Rated motor speed [rpm]: 2900

### Motor

Protection Class: IP68

Insulation Class: F

### Pipe connections

Pressure side [Rp]: 1

Suction side [Rp]: 1`

### Materials

Pump housing: 1.4301

Impeller: Noryl

Shaft: 1.4005

Stage chambers: Noryl

Seals: NBR

### Pump Curves, Dimensions:

On request

## 6. Tanks used with the rainwater harvesting system “RHS”

**Underground tanks:** 3,000 litres to 150, 000 litres in one single tank. Recent tri-cel rain harvesting systems include from left, domestic system 3.5m<sup>3</sup> system, 16m<sup>3</sup>, 30m<sup>3</sup> & 75m<sup>3</sup> systems.

### Typical arrangement, underground tanks.

Tank with access manway, TCRC Tank containing the tri-cel rain centre, inlet from down pipe and overflow to storm drain.



**Overground tank:** One-Piece to 9,000 litres and any other capacity (any length x any width x 3m high)

### Overground installations.

Overground installations offer a suitable cost effective solution especially in existing builds, whereby costly excavations can be avoided. The systems are suitable for either indoor (typically in a basement) or outdoor. Our package system can offer a relatively maintenance free system, whereby the tanks and the tri-cel rainwater centre require minimal maintenance. Overground tanks are built on site by our dedicated site crews and commissioned at that time. We can offer a bespoke package to suit all of your rainwater harvesting requirements.

**Filter placed on the tank roof for ease of installation.**



## 7. The operations manual – Tri-Cel Rain Centre System

The operations manual details the following: Commissioning, Operation, Inspection and Maintenance, Troubleshooting

Systems component		Inspection		Maintenance	
		Interval		Interval	
		Annually	Monthly	Annually	Monthly
1	Tank	YES			
2	Float valve		YES	YES	
3	Reinforced/pressure Suction hose		YES		
4	Controller		YES		
5	Pump with switch		YES	Every 1000 h or 5 years	
6	Sensor and suction Sieve/filter	YES		When the collector is checked	

### Inspection and Maintenance

The RWSC system comprises components, which require inspection and maintenance. Inspections may be performed by the owner/operator of the system and a “Servicing Contract” can be obtained by contacting our sales dept.

### **Potable “Drinking” water.**

Rainwater is NOT always suitable to be considered Potable water. Rainwater also contains pollutants, soil, plant parts, insect parts, bacteria, algae, and sometimes, radioactive materials that the rain/snow has washed out of the air. If filtered and or boiled, you could probably drink the water safely. However, it is safer yet to get your water from municipal water supplies or from wells that are frequently tested.

### **Underground “POTABLE” tanks are unacceptable to Local Authorities due to the possibility of leeching and the lack of inspection possibilities and are therefore unavailable.**

Above ground tanks are available as Rainwater Harvesting Systems. “Format 30” Potable Water Tanks are also available to suit all of your POTABLE water requirements and these are fully compliant with UK, Irish and EU legislation. We recommend that not consume or wash, shower etc in rainwater.

## **8. Glossary of terms**

### **Access Shaft Extensions**

Loose shafts should be sealed using s/s bolts, silicon sealant, sikaflex or similar prior to installation to prevent ingress of groundwater under high water table conditions. It is the contractor’s responsibility to ensure a watertight seal.

### **Connections.**

Only RH Kit connections are supplied with the system. Standard connections are supplied, however plumbing to the building is the responsibility of others.

Installation guidelines for GRP cylindrical underground tanks and overground tanks available on request (separate document).

### **Construction.**

Underground tanks are to be manufactured from GRP containing glassfibre and polyester resins. The walls are rigid, self-supporting and cylindrical in shape, suitable for “man weight”. Overground systems are constructed from Hot press moulded Sheet Moulding Compound panels.

### **Control of Groundwater**

Tanks must not be subjected to buoyant forces during installation, taking account of ground water levels and surface water run-off, and their accumulation in the tank pit, even if tanks are anchored. The excavation area should be adequately drained, in order to permanently remove ground water from the proximity of the tank (or tanks). This is critical in order to avoid flotation of the tanks. Incorrectly installed tanks that move, rotate or float may be damaged, and we cannot accept liability for this damage. The excavation should be maintained dry by pumping or whatever suitable means until the cover depth reaches 300mm minimum above the tank. Refer to the technical manual.

### **Dimensions and tank capacities.**

Underground tanks: Standard Diameter sizes: 1.5m, 1.7m, 1.8, 2.5m and 3m. Standard Lengths are 2.2m to 15m. Standard capacities from 3.5m<sup>3</sup> to 150m<sup>3</sup> in a single tank and multiple tanks can be connected. Dia 1.7m: 3m<sup>3</sup> to 3.5m<sup>3</sup>, Dia 1.8m: 5m<sup>3</sup> to 40m<sup>3</sup>, Dia 2.5m: 16m<sup>3</sup> to 80m<sup>3</sup>, Dia 3.0m: 60m<sup>3</sup> to 150m<sup>3</sup>, Dia 4.0m: on request

Sectional tanks: sectional tanks are in general 0.5m to 3m in height, any length and any width. Capacity 1m<sup>3</sup> to 1,200 m<sup>3</sup> and larger

### **Electrical Installation of the unit.**

All electrical work to be carried out by competent person using suitable materials for the application. Electrical work must be carried out strictly to the manufacturer’s instructions and in accordance with current IEE regulations or equivalent IRE / EU regulations. Supply voltage: 230V 50hz. We recommend armoured cable be brought to the TCRC Tank and that a waterproof plug and socket are used.

### **Loadings**

The tanks are designed to take a man-weight loading. Tanks are not suitable for vehicular or animal loadings.

## **Manways & turrets.**

Standard underground tank, include manways of dia. 750mm. GRP shaft standard height is 0.7m. Covers are not supplied but must be fitted. Sectional tanks have a lockable manway fitted to the system.

## **Manway covers and Fencing.**

Once the system has been completely installed, we recommend that a suitable lockable manhole, be put in place in order to prevent access by unauthorised people that could fall into the tank and be harmed. We also recommend that a fenced area may be required to ensure that access is restricted to the system and control cabinet. Access must be restricted to suitable trained maintenance personnel only. It is imperative that entry is not possible whereby (especially) children can be caused harm, by falling into the system. Local authority / government regulations, must be adhered to in relation to fence specifications and design.

## **Plumbing the system.**

Competent ground-works site personnel should connect the plumbing from the building to the system. The system is only for rainwater from roof areas, not car parks etc. Do not plumb water or storm-water from drains, footpaths, car parks etc, into the rainwater harvesting system. The TCRC Tank will have a 4" (100mm ID) pipe, which must be plumbed, to the rainwater storage tank. The mains back-up must be plumbed to the mains. The 1" BSP to the services (WC's) must be plumbed.

- **A mains-shut off must be fitted to the system by the mechanical contractors. This is required for maintenance and/or replacement of parts.**
- **A bypass valve must be fitted, in order to be able to manually bypass the system during power outages.**
- **The onsite mechanical contractors are to ensure that all plumbing connections are leak free.**
- **A Back-Flow Prevention Device may be required, in order to guarantee that harvested rainwater cannot enter the mains water.**

## **System orientation.**

Your system may be constructed from 1 or more tanks depending on your requirements. The orientation of the tanks in general will be in series. We recommend that when the system arrives on site that it is inspected for damage, miss-handling etc. If any damage is seen or suspected, please notify us immediately. Refer to installation instructions, available on request.

## **TCRC Tank for Tri-Cel Rain Centre:**

The tri-cel rain centre will be placed into a separate underground tank, the TCRC Tank. This lockable tank is to be partially buried, leaving the grass green part overground. The tank will house all of the components belonging to the tri-cel rain centre and must be connected to the system via a 4" (100mm ID) pipe(s). The tank must remain waterproof, and any other drilled holes must be sealed against ingress of water. This pipe will need a rope laid placed in it, in order to pull through the hoses, plumbing works etc. Run the pipework from the 110mm connection on the cabinet to the manway shaft. The tank is normally laid in wet cement. Ensuring that you are a maximum of 2 meters from the system, prepare a suitable location. Ensure that the tank is placed dead level in the cement.

- An optional overground Kiosk is available, in place of the TCRC Tank. The Kiosk is green and 980mm width x 700mm depth x 1200mm height. There is an additional cost. Please consult sales.

## **Ventilation**

Ventilation is crucial to the system.

## **9. Safety Precautions.**

Safety is paramount, and "best practices" should be followed at all times in relation to the system. Health & Safety legislation must be followed at all times.

## **10. Terms & Conditions:**

Subject to Nicholson Plastics Ltd standard terms and conditions, available on request. Nicholson Plastics Ltd. believe that the information contained is accurate, and is printed for information only. No warrants, express or implied, are contained therein, nor does any legal liability attach to Nicholson Plastics Ltd. for any reason whatsoever. Property rights of the subject belong to Nicholson Plastics Ltd., and transfer of these rights is not granted by possession of this document. KMG Nicholson Plastics Limited shall not be liable for any damage or loss, including consequential loss, caused by the failure of any equipment.

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