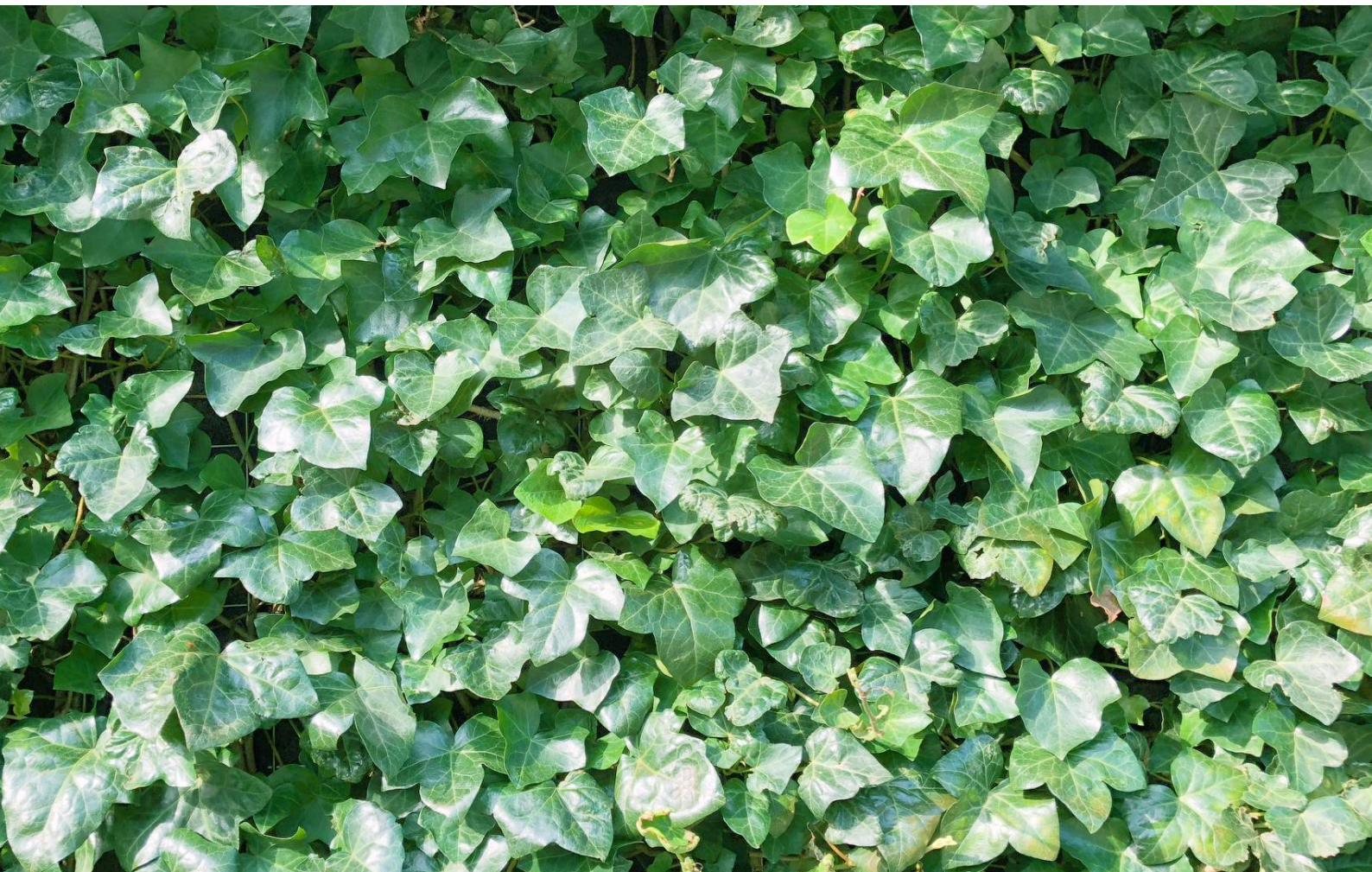
Midori-chan™

Greening Solutions



Midori-chan™

Greening Solutions

Helping Businesses Build a Better Tomorrow

Midori-chan™ is a revolutionary Japanese greening system developed by Kawada Industries, Inc., that has been designed for building rooftops and roadside greening projects. It uses natural rainwater and recycled waste material to promote maximum vegetation growth, which minimises maintenance and water use. Unlike other competing systems, which are often merely superficial examples of "green washing" to give the appearance of being environmentally friendly, the Midori-chan™ system is truly green throughout. Our engineers in Japan have developed this innovative technology to encourage greener, cleaner communities and help companies create a sustainable future for all.

The Midori-chan™ system operates in a natural way by cleaning, storing and recycling rainwater, before supplying it to more than 100 potential species of plants. The ultra-lightweight system transfers moisture from water storage units via the thermal energy balance in the soil. A specially regenerated layer of charcoal filters the rainwater before it is drawn up into the plants' roots.

Installing the Midori-chan™ greening system in your project offers the following benefits:

- Saves costs by using dramatically less water than conventional greening systems
- Reduces temperatures of concrete decks by over 30°C
- Decreases the thermal load of the local environment by transferring heat to vegetation
- Removes more CO_2 from the atmosphere through photosynthesis
- Offers flexibility around loading constraints by tailoring soil depth, as required

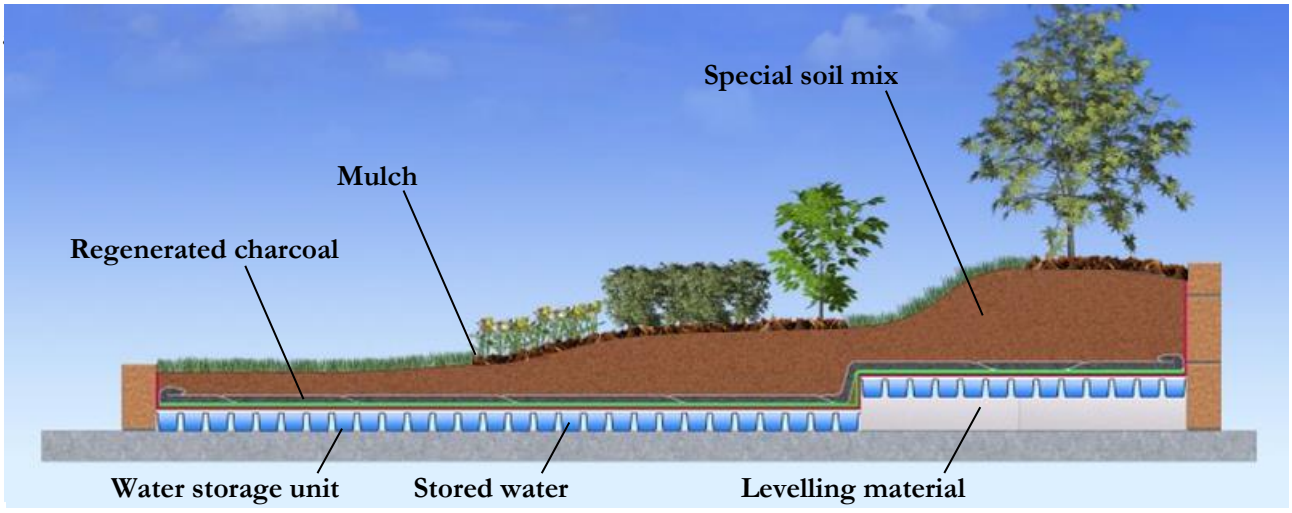
With Midori-chan™, you can achieve a sustainable green space while building a better tomorrow

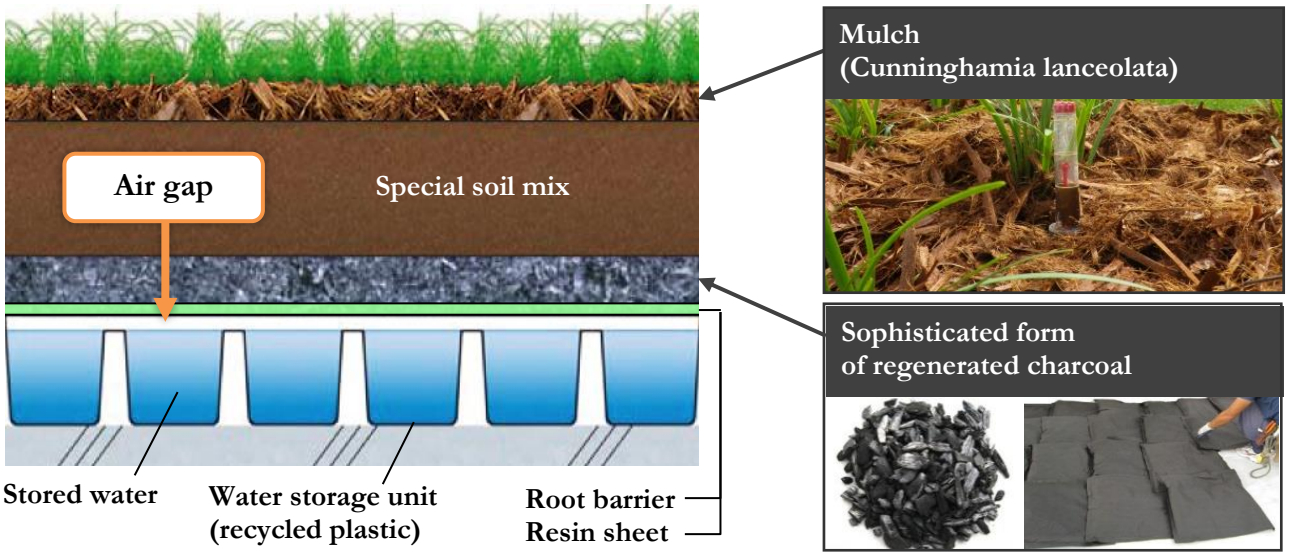
川田工業株式会社
KAWADA INDUSTRIES,INC.

How the Midori-chan™ System Works

Our ultra-lightweight system harnesses the power of nature by making the most of rainfall, creating a truly green, sustainable space for your project, whatever its size.

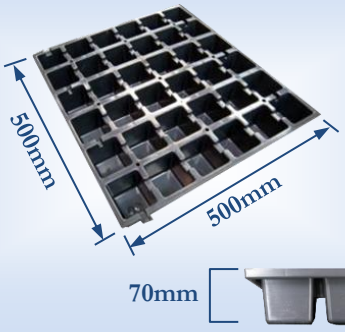
- Rainwater is cleaned as it filters through Kawada's special capillary-action soil mix, plus a layer of regenerated charcoal, into water storage units
- The water storage units are locked and interlinked, much like ice-cube trays, and are designed to enable excess water to drain away naturally
- Resin nets above the water storage units enable the hassle-free installation of bags of regenerated charcoal
- Vegetation roots won't access the filtered rainwater directly due to a root barrier layer between the resin net and regenerated charcoal
- The water storage units ensure an air gap exists between the stored water surface and the regenerated charcoal
- Surface soil starts to dry during hot weather
- The layer of regenerated charcoal below the soil absorbs water vapour from the air gap and feeds water steadily to the roots above



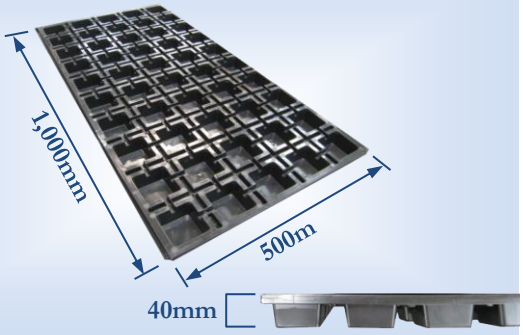


Water Storage Unit Types

Standard type (34L/m²)

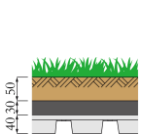
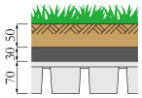
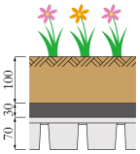
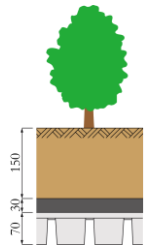
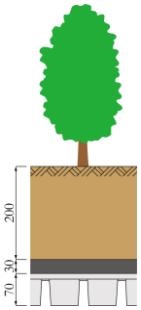
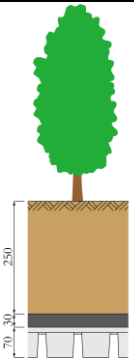


Slim type (16L/m²)



Vegetation Characteristics

The Midori-chan™ greening system allows for the installation of more than 100 plant species, including grass, shrubs and mid-sized trees. This offers unparalleled flexibility to suit even the most demanding of projects in Hong Kong, or even further afield.

			Grass Slim type	Grass Standard type	Groundcover 100～500mm	Shrubs (small) 600mm or less	Shrubs (large) 900mm～1,200mm	Mid-sized trees 1,500mm～2,500mm
Vegetation installation examples								
Plant spacing			Complete coverage	Complete coverage	200mm intervals	400mm intervals	600mm intervals	1,000mm intervals
Mulch		mm	-	-	50	50	50	50
Soil thickness		mm	50	50	100	150	200	250
Regenerated charcoal		mm	30	30	30	30	30	30
Water storage unit		mm	40	70	70	70	70	70
Total thickness		mm	120	150	250	300	350	400
Saturated reference weights	Without plants	kg/m²	78	102	160	205	245	290
	With plants	kg/m²	86	117	168	215	301	350
Dry weight with plants		kg/m²	52	62	100	138	220	260

Verified by Castco Testing Centre Ltd. - June 2016

Midori-chan™ keeps future maintenance costs to a minimum, despite the broad range of plant species available for installation. Conventional greening systems available on today's market rely on integrated irrigation pipes and pumps, which leads to huge water usage and associated costs. The Midori-chan™ system effectively removes these expenses by relying on Hong Kong's abundant supply of rainwater instead.

In Japan, where the Midori-chan™ system has been installed on fully exposed rooftops, manual watering has not been necessary for more than seven years. With Hong Kong's water costs set to rise, a self-sustaining greening system is a wise investment. The Midori-chan™ system essentially acts as insurance against inevitable water-cost hikes in the future.

Controlling Maintenance Costs

With all Midori-chan™ projects, each site only requires minimal monthly maintenance. This reduces maintenance costs dramatically when compared with conventional greening systems. Our system achieves this by using a finely shaved fir mulch (*Cunninghamia lanceolata*). The mulch sits on top of the soil mix once the plants are in place, and provides the following benefits:

- Minimises the need for weeding and watering
- Forms a matrix that prevents weeds from germinating
- Improves the overall appearance of a project during its initial stages
- Reduces the soil-moisture dispersion rate

Case Study: Fo Tan Railway House

Since 2012, Midori-chan™ has conducted a pilot project at the MTR Corporation's (MTRC) Fo Tan Railway House rooftop. The MTRC desired to make significant lifecycle savings on its Fo Tan greening project, based on the following criteria:

- Water prices will increase significantly over the next 20-year period
- Hong Kong imports 80% of its water from mainland China
- Water sources in mainland China are under increasing pressure from large-scale agriculture and heavy industry

Our pilot project has taken place during one of the driest periods in Hong Kong since records began. The results from Fo Tan so far highlight the following:

- Midori-chan™ rooftop gardens are environmentally friendly as they utilise fully recycled or recyclable materials, while keeping water usage to a minimum
- Midori-chan™ rooftop gardens are economically feasible as they remove the need for expensive, highly maintained irrigation systems and unsustainable levels of water usage
- The Midori-chan™ greening system remains cost effective and aesthetically pleasing in challenging environmental conditions

How Fo Tan Compares with Conventional Systems

The MTRC has carried out a comparative trial using a conventional greening system at Tai Po Station over a 10-month period. The trial adopted identical plant species at the two sites.

Government monthly water-use recommendation:
190L/m^2

Irrigation water required each month:
Tai Po: 189L/m^2 (for conventional competing systems)

Midori-chan™ Fo Tan: 0.35L/m^2

Total irrigation water required over 10 months:
Tai Po: 2,511,965L

Midori-chan™ Fo Tan: 253L

Phases 2, 3, 4 and 5 at Fo Tan have now been implemented over a 30-month period. These phases have increased water-use efficiency even further to a monthly consumption rate of **0.17L/m^2**. Our low irrigation figures can be enhanced even further by ensuring your rooftop is fully covered in greenery and deploys properly sealed ABWF works.

Offering Flexibility with Birkdale International Limited in Sheung Shui

Over the last five years, we have worked closely with Birkdale International Limited, a globally recognised, leading landscape contractor and our trusted installation partner, at their headquarters in Sheung Shui. Birkdale International Limited is responsible for the installation and maintenance of the Midori-chan™ greening system in Hong Kong, as well as for providing the soil mix, which has been thoroughly tested by Kawada Industries, Inc. at our laboratories in Japan. Our continual trials in Sheung Shui, conducted in collaboration with Birkdale International Limited, have enabled us to tailor our approach to suit the arduous climate of Hong Kong and ensure the longevity of all Midori-chan™ projects. As a result of these trials, we have created a "plant palette" that comprises more than 100 species in a range of colours, heights and densities. Over time, we have adjusted the following factors to ensure that species are evergreen, low maintenance, aesthetically pleasing and require practically no irrigation once established:

Plant palette

Design

Soil depth

Maintenance

Hard landscaping

Optimal soil mix

Plant spacing

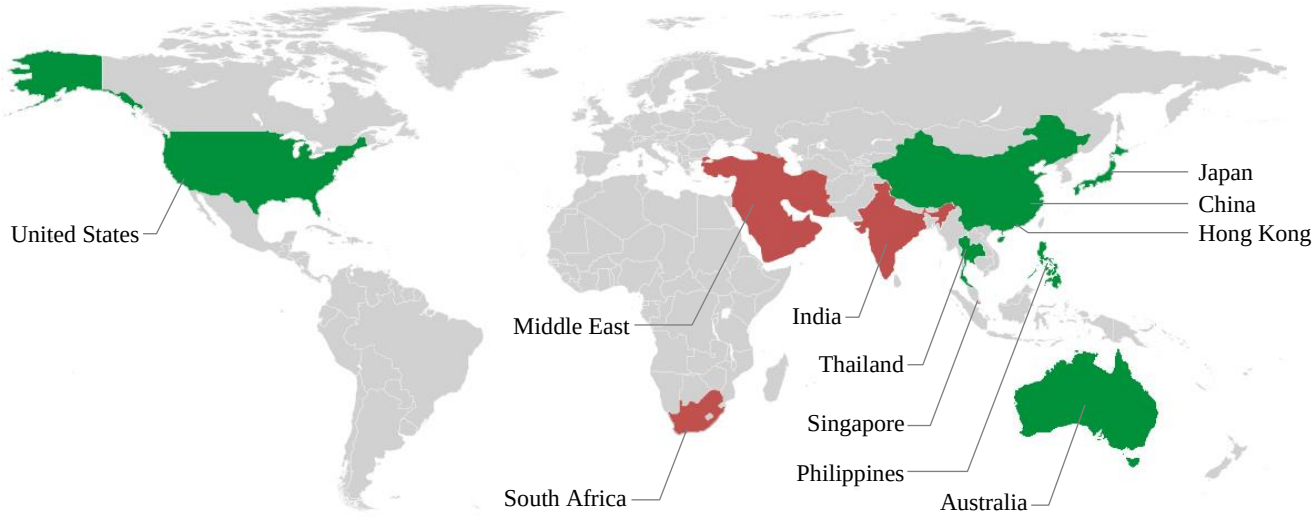
Mulch type

This approach can be applied to virtually any project. The Midori-chan™ system significantly cuts the costs of a greening lifecycle, and can even reduce the overall cost of a new building. Our system is ultra-lightweight and keeps soil depths to a minimum, resulting in less structural steel, concrete and reinforcement being needed during the construction process.

Our ultra-lightweight system could potentially make massive capital cost savings on your project.

Global Presence

Our greening system is now firmly on the world stage as more construction projects realise the benefits of adopting our technology. We are working closely with architects and landscape designers to explore new applications at ground level, including median strips, roundabouts, planter boxes and green hoardings in a number of countries and territories.



●Current projects/trials

- Japan
- Hong Kong
- China
- Australia
- Philippines
- United States
- Thailand

●Future trials

- India
- Singapore
- Middle East
- South Africa

For example, using the Midori-chan™ system for median strips means:

Watering vehicles are no longer needed

Consumption of fuel is reduced, saving money

Vehicle emissions are cut, helping the environment

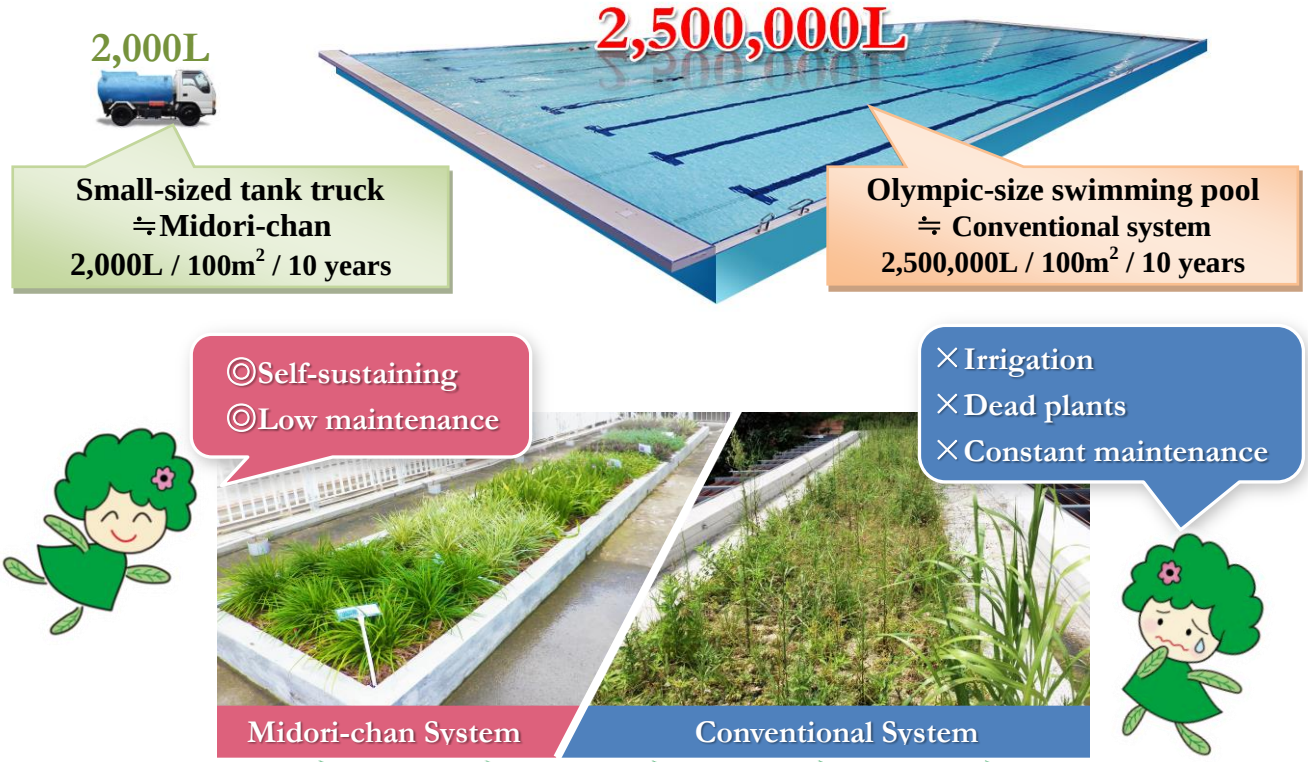
During what is undoubtedly a challenging time for our planet, our solution provides a sustainable, realistic way to reduce your project's carbon footprint. We offer a green technology that is simple, economical and natural. We believe that the Midori-chan™ approach is the right one, and hope it will contribute to building a better tomorrow for everyone.

Comparing Midori-chan™ with Existing Systems in Hong Kong

- Structural loads are much smaller due to shallower soil depths
- Continual maintenance costs are reduced as the special mulch keeps soil-base weed intrusion to a minimum
- Costly, unappealing and high-maintenance irrigation systems are made redundant because our system utilises pure rainwater, significantly reducing overall water consumption
- Structural integrity is maintained if a passenger vehicle drives over our system, whereas conventional systems are damaged even by foot traffic
- Ideal for difficult-to-access rooftops due to minimal watering, weeding and pruning requirements
- Midori-chan™ is flexible and can act as either an "extensive" or "intensive" green roof system as only the soil depth needs to be adjusted for differing plants, shrubs and trees
- Midori-chan™ is truly green as it comprises only fully recycled or recyclable materials
- Our local partners can install environmentally friendly waterproofing systems as part of our product offer. These are guaranteed for 20 years and are offered under Kawada Industries, Inc.'s umbrella approach as a one-stop shop, removing concerns about potential split-warranty claims

Across our numerous projects in Hong Kong, the majority of plant species in 100mm of soil have not required irrigation since they were installed on site. Conventional, high-maintenance irrigation systems which require costly electricity can be avoided. To test water levels in the Midori-chan™ system, only simple water gauges are needed. If levels are too low during a dry period, they can be topped up easily with a hose.

Irrigation Requirement Comparison – Midori-chan vs Conventional Systems/Government Specifications (100m^2 rooftop over a 10-year period)



Waterproofing Works

If your project requires it, we can install Roofdex HB, a cold-fluid-applied, waterborne elastomeric membrane. It provides full resistance to root damage and at least 20 years' waterproof protection. Roofdex HB can be applied by brush, roller or airless spray, and maintains a good wet edge in hot conditions and has outstanding early rain resistance.

Roofdex HB uses water-based technology, so it is environmentally friendly, practically odourless and doesn't release toxic solvents. This allows it to be installed in densely populated urban areas. The system can be applied quickly over existing roof surfaces without the need to remove the substrate, causing minimal disruption. Roofdex HB provides seamless, armoured protection with exceptional resistance to long-term ponding.

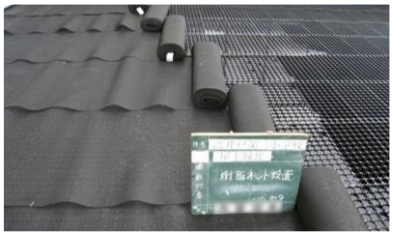
Roofdex HB is manufactured in the UK by Flexcrete Technologies Limited, pioneers of waterborne coating technology. Its 20-year lifespan also applies to areas where the coating is exposed to the elements, such as parapet walls or areas in direct sunlight. It is both light and heat reflective, and actively reduces energy consumption, as well as the urban heat island effect. Roofdex HD can also be used to create maintenance walkways simply by adding another coat and incorporating a non-slip aggregate.

Installation Sequence

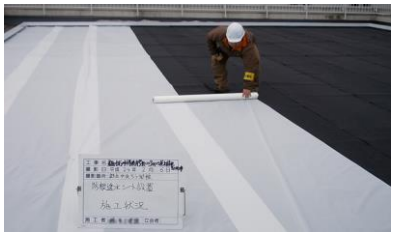
(1) Hoisting and unloading

(2) Setting the water storage units

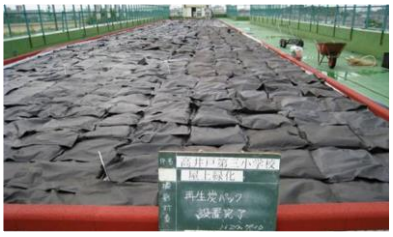
(3) Filling the water storage units



(4) Installation of industrial resin nets to prevent the charcoal bags from falling into the units



(5) Overlaying of a non-woven cloth root barrier



(6) Installation of the moisture holding regenerated charcoal bags

(7) Adding of special soil mix

(8) Planting vegetation

(9) Water after planting to ensure proper anchoring of the roots

(10) Right after completion

(11) Six months later

(12) One year after

Projects in Hong Kong


Hong Kong MTR, Shatin to Central Link, Ma Chai Hang Ventilation Building


Hong Kong MTR, Shatin to Central Link, Hung Hom Station


Hong Kong MTR, Shatin to Central Link, Hin Keng Station


Hong Kong MTR, Po Lam Station Podium


Hong Kong MTR, Pat Heung Container

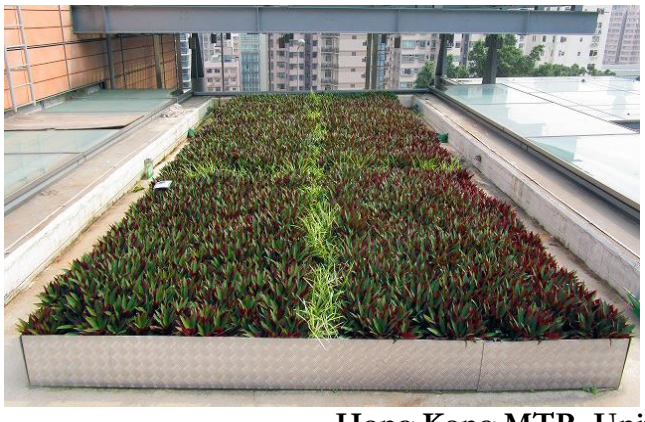

MTR Sai Ying Pun Station (Queen's Road West Exit A)


Hong Kong MTR, Sai Ying Pun Station (Market Exit B1/B2)


Hong Kong MTR, Sai Ying Pun Station (Bonham Road Exit C)


Hong Kong MTR, University Station (Uni Tower Exit A)


Hong Kong MTR, University Station (Hill Road Exit B2)

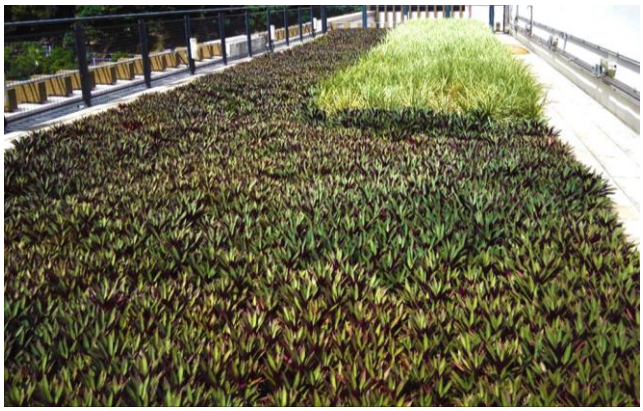



Hong Kong MTR, University Station (Exit C1)


Hong Kong MTR, University Station (Pok Fu Lam Plant Building)


Hong Kong MTR, Fo Tan Railway House (Renovation Project)


Hong Kong Water Supplies Department (West Kowloon Pumping Station)

Hong Kong MTR, Kennedy Town Station


West Kowloon Cultural District Authority Project Office


Hong Kong Water Supplies Department (Shatin Seafront)


Hong Kong Water Supplies Department (Tai Po Tau Screen House)


Hong Kong Water Supplies Department (Tai Shui Hang Lowland Raw Water Pumping Station)



Hong Chi Winifred Mary Cheung Morninghope School Sensory Garden


Hong Kong MTR, Fo Tan Railway House


Birkdale International Limited Pilot Project (Sheung Sui, Hong Kong)

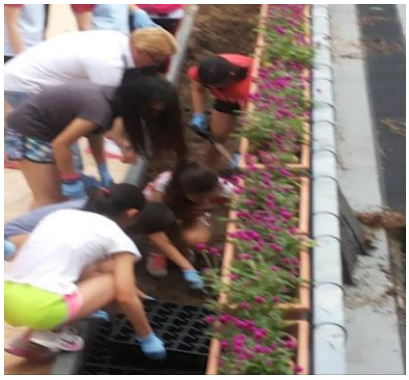
Hong Kong Cricket Club

Shouson Hill Private Residence

Victoria Shanghai Academy, Hong Kong

"On Thursday 25 June 2015, Mr Sean Johnstone from Kawada came to our school to assist Y7 students in installing a Midori-chan™ rooftop garden on the 5th floor. The system is eco-friendly and simple to install. Students had a great time putting it in place and will now monitor its progress over the next 12 months through their science work.
Thank you, Kawada!"

"Site's ready, let's go!"



"So easy to install"

"Soil in"

"Our first planting"

"In class designing follow-up experiments"

"After two months"

"Installing Kawada's Midori-chan™ was a wonderful experience as its environmentally friendly system is irrefutably transforming our school into a greener place." – Chantelle, Lydianne, Alyn and Charmain.

"Kawada has really good experience in building eco-friendly structures, and it is hoped that this can continue and will spread across the world, promoting this type of system." – Monique and Gisele

Pricing Made Easy

Simply provide the following information, and we can get back to you quickly with a quote:

- CAD drawings of the rooftop layout
- Details of site access for material and equipment
- Rooftop load-bearing details
- Plant species desired (our engineers can also provide recommendations after surveying the site and assessing location conditions)
- Details of the supply and installation schedule

For more information about the Midori-chan™ greening system, please visit: http://global.kawada.jp/environmental/index.html

If you wish to see a completed Midori-chan™ project in Hong Kong, please get in touch. We can arrange for you to visit our MTRC Sheung Shui trial, which we worked on with our exclusive partner, Birkdale International Limited, a globally recognised, leading landscape contractor.

Find out more about Birkdale International Limited at: http://www.birkdaleinternational.com

Midori-chan™

川田工業株式会社
KAWADA INDUSTRIES, INC.

11/F., The Broadway,
54-62 Lockhart Rd., Wanchai, Hong Kong
Tel: (+852) 2185-6648 Fax: (+852) 2185-6418
Email: sean.johnstone@kawada.co.jp
www.global.kawada.jp

Midori-chan™