

Workplace Safety and Health Guidelines

Working Safely with Green

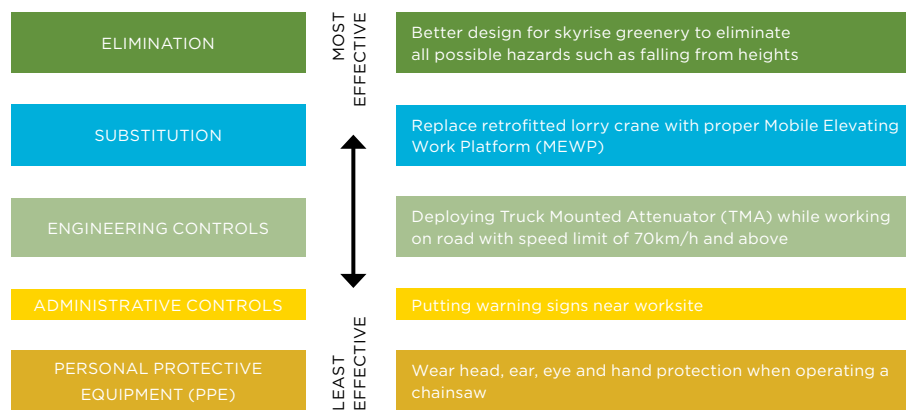
Text by Chris Low
Images as credited

Green is no longer an extended afterthought. In Singapore, it is a deliberate inclusion to our living environment. With this, more attention and focus needs to be placed on the stages of maintenance and the design of green spaces.

The latest edition of *Workplace Safety and Health (WSH) Guidelines—Landscape and Horticulture Management*, first published by WSH Council in August 2008, provides information and guidance on common workplace conditions, specifically, in carrying out maintenance works to landscape and horticulture. Following the marked increase in green spaces in the last decade, this updated revision comes at a timely stage. The following are several points that are covered in greater detail in the WSH Guidelines.

Risk Assessment

The primary approach to raising work safety standards is to first identify and analyse the safety and health hazards associated with the works being carried out.



1. Hierarchy of Control: Ranking measures for the control of hazards and reduction of risks in order of their effectiveness.

Skyrise Greenery

To eliminate risk from the beginning would require better design of green spaces bearing in mind subsequent maintenance works that are to be carried out. In the interest of a holistic approach to safety, Centre for Greenery and Urban Ecology (CUGE) Research has set up guidelines on safe design for skyrise greenery. The guidelines, *Guidelines for Design for Safety of Skyrise Greenery*, would highlight the specific work practices needed to maintain high-rise greenery safely. Broadly, it would identify the provisions and considerations that should be taken into account at the design stage.

Maintenance of high-rise greenery is of utmost concern, as stated in the Workplace Safety & Health Statistics Report 2013. Falls were the top incident types, accounting for 61 percent of total workplace fatal injuries across all industries. This includes falls from heights, slips, and trips.

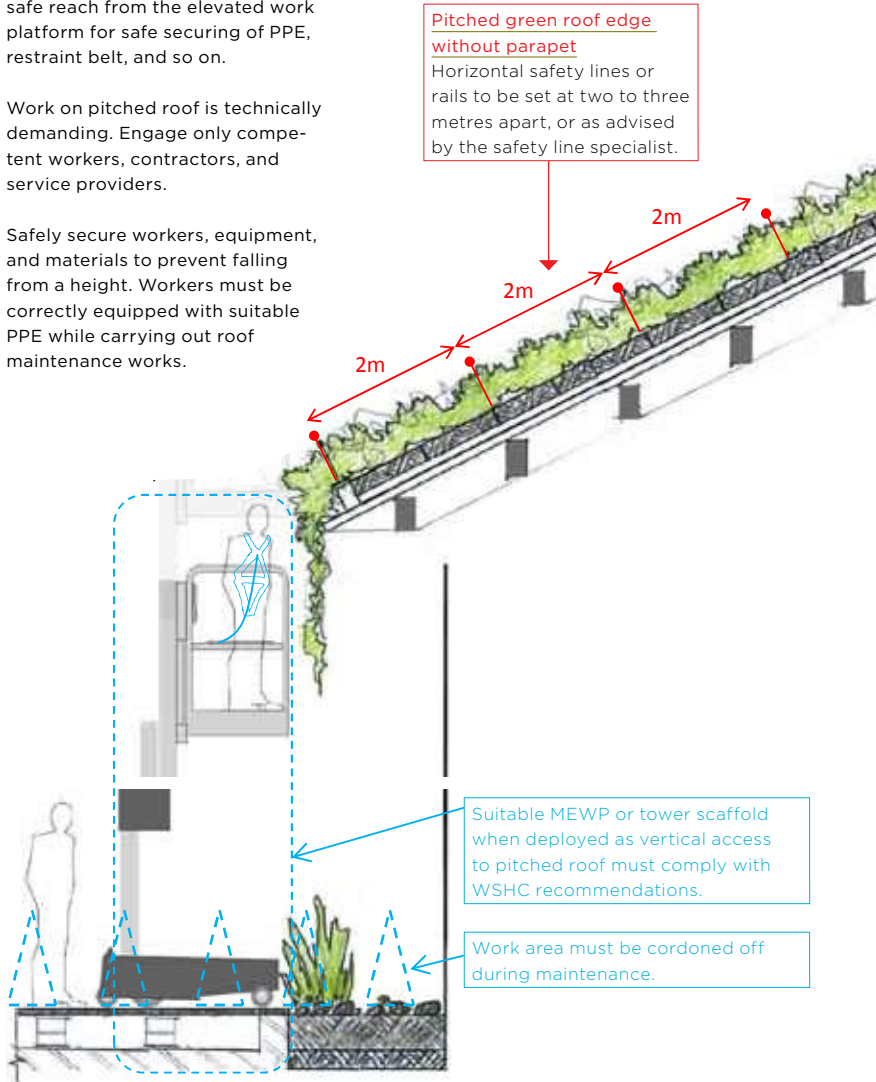
Among the considerations of design for safe maintenance on sloping surfaces or building walls are built-in inclusions that can be incorporated into the roof or high-rise structures for greenery. These should be constructed based on an informed understanding and study of the growth patterns of different types of plantings.

Access to pitched green roof must be via correct deployment of suitable MEWP or tower scaffold.

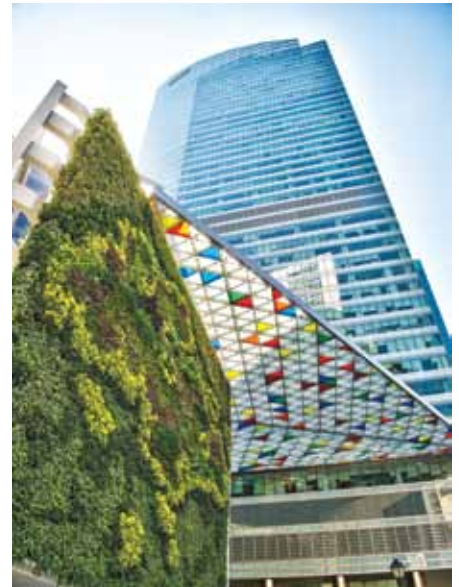
Safety line (designed and installed to registered PE's and specialist's requirements) must be within safe reach from the elevated work platform for safe securing of PPE, restraint belt, and so on.

Work on pitched roof is technically demanding. Engage only competent workers, contractors, and service providers.

Safely secure workers, equipment, and materials to prevent falling from a height. Workers must be correctly equipped with suitable PPE while carrying out roof maintenance works.



2. Access to pitched green roofs and inclined planes (Diagram: Poh Choon Hock).



3. Ocean Financial Centre, an example of high-rise greenery with well-designed maintenance walkways (Photo: Keppel Land).



4. National University Hospital, an example of high-rise greenery with well-designed maintenance walkways (Photo: DP Architects Pte Ltd).

Tree Management

Working alongside moving traffic

Tree management along roadsides require working near moving traffic, posing high levels of danger to workers. The primary safety guidelines for working within traffic movement include: cordoning off the work area clearly; sufficient and proper warning and directional signs to oncoming traffic; use of Truck Mounted Attenuators (TMA) under specific conditions; and mounting blinking beacon lights on the top and at the rear of maintenance vehicles.

Managing traffic movement for horticulture and landscape maintenance works is to be carried out in close adherence to the Code of Practice for Traffic Control at Work Zone by Land Transport Authority (LTA). The code also applies to general planting, pruning of shrubs, plant removal, water operations using water tankers, fertilising, and other operations of horticulture management.

Working at heights

Due to the height of trees, there are greater risks and challenges in their maintenance compared to other types of plants. Often, when carrying out tree management activities, workers work from Mobile Elevated Work Platforms (MEWPs), which make them susceptible to falling from heights.

In the 2013 WSH statistics report across all industries, it is stated that of the total of 59 cases of injuries due to falls from heights (FFH), 17 cases (or 29 percent) resulted in fatal injuries. Some of the safe work practices for working at heights include securing the full-body harness with fall-arrest systems, such as energy absorbers or Self-Retracting Lifelines (SRL).

Tree management activities such as trimming and cutting off branches could risk injury to third parties as well in the case of branches falling on pedestrians. Properly cordoning

off the work zone area, establishing work co-ordination methods, and clear communication among workers help to minimise the risk of falling branches landing onto other workers or passersby below.

Operating machinery

Operating various machinery and equipment is another component of tree management. Only trained and competent personnel should be allowed to operate MEWPs for tree pruning, cranes for lifting trees during planting, transplanting, clearing, and removal of branches, and excavators to facilitate works such as the preparation of planting holes and removal of tree stumps. Machinery and equipment should be regularly inspected by an Authorised Examiner at least once every six months and be permitted to operate upon valid inspection certificates.

Workers operating chainsaws must be properly trained and equipped to ensure safety. Pre-start and regular checks are to be made to ensure that the equipment, particularly safety features installed by manufacturers, is in proper working condition. Findings in the WSH statistics report of 2013 state that the leading occupational disease is noise-induced deafness, with 564 cases reported. Noise-induced deafness is a chronic disease that develops over time. High volumes generated by the chainsaw could well exceed the Permissible Exposure Level (PEL). Hence, workers operating chainsaws are provided with mufflers, which should be employed when in they are in operation, to minimise aural damage due to the excessive noise produced.

Long-term operation of the chainsaw also results in Hand-Arm Vibration Syndrome, caused by the transfer of vibration from a tool or work piece to a worker's hands and arms. Work-related musculoskeletal disorder (WRMSD) is the second most common

Source	dB
Threshold of hearing	0
Average residential home, library	40
Whisper	50
General office, average conversation	60
Conversational voice	70
CNC machine	80
Typical home music-listening levels	85
Shouting	90
Auto horn, pneumatic hammer	100
Loud rock band	110
Chipping hammer, jet take-off, pneumatic drill at 1m	120
Jet engine at 30m	130
Jet engine, threshold of pain	140
Jet engine close-up	150
Rocket	180

5. Examples of Sound Level for Comparison. Workers should not be exposed to noise levels exceeding 85 A-weighted decibels (dBA) for 8 hours a day or its equivalent. If the second sound source produces twice as much power than the first, the difference is 3 decibels (dB).

occupational disease, with 237 cases reported, after noise-induced deafness. Frequent short rest periods and sufficient job rotations on the machine can minimise workers' exposure.

Tree transplanting

Tree transplanting involves a set of processes that is hazardous to both workers as well as the public in the vicinity. One of the primary steps of tree transplanting involves the preparation of holes and trenches. Properly cordoning off the work area with barricades is of paramount importance, to ensure there is sufficient space for the swing radius of the excavator boom stick and the movement of the excavator. This safety precaution would also eliminate the risks posed to passers-by.

When excavation works are involved, checks should be made with the Energy Market Authority (EMA) for possible locations of



6. Robocut, a remote-controlled grass mower, is a safer and more efficient alternative to the more commonly used single-person ride-on mower (Photo: Chew Thiam Kwee).



7. Landscape company Ho Eng Huat Construction was the first company in Asia to use Robocut in its grass-cutting operations (Photo: Ho Eng Huat Construction Pte Ltd).

buried live wires or cables near the area of excavation. If the works involve electrical works, a Licensed Electrical Worker (LEW) would have to be engaged for assistance, as required by EMA.

Tree transplanting often involves trees that may have deep roots growing more than one metre deep in the soil. While extracting the tree from the soil, a trench may be required to undercut or sever the deep-seated roots. Workers should take safety precautions and not be in the trench when the excavator is in operation. The trench should also be made wide enough for the worker or workers to carry out the task in a non-hazardous manner.

Following the severing of the root ball, a crane is used to lift the tree out from the soil bed. Safe and proper lifting operations should be followed. Cranes and their lifting gears should be inspected by an Authorised Examiner at least once every 12 months to ensure that they can be operated safely. Valid inspection certificates for the cranes and lifting gears must be made available prior to work commencement. Under no circumstance should workers stand below a suspended load or on top of an unsecured load. Most importantly, operation of the lifting crane can only be carried out by trained and competent personnel, in the presence of a lifting supervisor, rigger, and signalman.

Personal Protective Equipment

From the risk assessment table (see Fig. 1), the most primitive in the hierarchy of control measures is the employment of Personal

Protective Equipment (PPE). However, this must be seen as one of the most fundamental forms of protection that can be given directly to the worker.

When carrying out horticulture management, hazards like insect bites, contact with poisonous, stinging or biting animals, and exposure to soil-borne micro-organisms can only be prevented by PPE. In accordance to the safety guidelines, when carrying out horticulture management works, proper protective clothing, hand protection, face protection, and safety boots should be worn. Good hygiene habits such as thorough washing after coming into contact with soil should be practised at all times.

Landscaping works are primarily carried out under outdoor conditions, often under direct sun exposure. Excessive exposure would lead to heat stresses, such as heat exhaustion, heat cramps, and heat stroke. An appropriate work and rest schedule needs to be implemented to ensure sufficient breaks are taken. Rest spots should also be under shelter and protection from the heat. An adequate supply of cool water is to be provided for workers to replenish the loss of body fluids.

Innovation and Technology

New and innovative technology presents more possibilities for a safer working environment, particularly in the landscaping industry. Landscape company Ho Eng Huat Construction took the lead as the first company in Asia to use Robocut, a remote-controlled grass mower that is able to cover

five times more area within the same time period, as compared to a single-person ride-on mower, which is most commonly used in Singapore.

The Robocut mower is not only more efficient, but also more importantly a safer alternative to the ride-on mower. It reduces the instances of collision with other vehicles or structures if the operator does not give the machine his or her undivided attention. This danger increases when the mower is utilised on high terrains, such as slopes.

Awareness of Workplace Safety and Health Guidelines

Held in April 2014, the WSH Forum for Landscape Sector was organised by the WSH Council and Ministry of Manpower, with support from Landscape Industry Association Singapore (LIAS), National Parks Board (NParks), and CUGE. The forum addressed concerns of chemical management, noise control, and heat stress and at the same time introduced regulations pertaining to the landscape industry. The forum also gathered landscape contractors and landscape service buyers, such as facilities managers, to introduce them to the industry's latest measures.

Workplace safety and health is not an individual issue. It involves business leaders, communities, professional leaders, and government officials. The extensiveness of WSH is wide and aims to address workplace safety and health matters in a holistic way. 