

4. SITE AND PROJECT MANAGEMENT

4.1. CONSERVATION & RESTORATION

4.1.1. CONSERVE & RESTORE TREES

Where possible, trees should be conserved, restored or relocated on site during construction. Singapore is one of the most densely populated cities in the world. Due to rapid urbanization, it is important to preserve and enhance Singapore's image as a garden city, both in respect of the nature areas and also the man-made parks and green spaces. Some examples are shown below.

Boundary fencing was offset 300mm to preserve the tree



Transplanting tree



POINTS TO NOTE

- When conserving trees on site, extra care and protection may be needed to ensure they are in good health and condition during construction.
- Before transplanting a mature tree, it is important to evaluate whether it is likely to be a successful transplant as transplanting could stress the tree. Such stress may cause the tree to die or to become unattractive. If in doubt, an arborist's opinion should be sought.

4.1.2. USE RECYCLED COMPOST

The building is encouraged to use compost recycled from local horticulture waste. Some examples are shown below.

<p><i>Using compost produced by a local factory</i></p>   <p>Compost production in a local factory</p>	<p><i>Using compost bins to recycle the organic waste from kitchen and garden such as fruit, vegetables, leaves, pruning etc</i></p> <p>Making compost in compost bins</p>  <div data-bbox="790 896 1462 1136" style="border: 1px solid green; padding: 5px;"> <p>POINTS TO NOTE</p> <ul style="list-style-type: none"> • Organic waste will turn into compost faster if it's in small pieces. A compost shredder is useful to chop up larger and coarser materials. • Mixing and turning the compost will also help it decompose faster. </div>
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4.2. CONQUAS

To ensure the Green Mark certified buildings are of acceptable quality standards, the building should meet the prevailing industry average CONQUAS score.

Since the launch of the Construction Quality Assessment System (CONQUAS) in 1989, more than 2,278 public and private buildings projects with total contract value exceeding S\$82 billion have been assessed by the BCA. The industry average CONQUAS score improved steadily from 67.9 in FY1989 to 80.6 in FY 2005. The information on industry average CONQUAS score, CONQUAS assessment and standards can be obtained from BCA website at <http://www.bca.gov.sg>



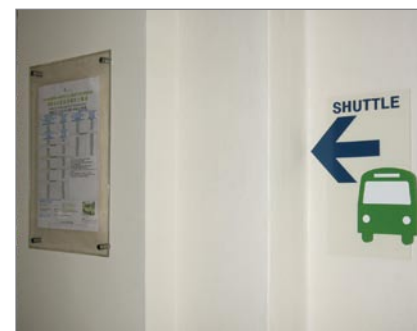
4.3. PUBLIC TRANSPORT ACCESSIBILITY

Access should be provided to public transport such as MRT/LRT and bus stops.

If development site is not in close proximity to public transport, shuttle bus service should be provided to the nearest MRT or bus stops.

A building project's accessibility to public transport would influence how its occupants travel. When a development is far away from public transport such as MRT/LRT stations and bus stops, building occupants will use more private transport as it is more inconvenient for them to use public transport.

The environmental benefits of traveling by public transport include reduction in greenhouse emissions, urban air pollution and traffic congestion.



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4.4. ENVIRONMENT MANAGEMENT SYSTEM

Construction sites are responsible for significant environmental impacts. These arise from site disturbance, pollution, construction waste, water and energy use. It is important that the developer take responsibility to create and execute a policy to minimize these impacts.

4.4.1. ISO 14000 CERTIFIED

The developer, main contractor, architect and consultant should be ISO 14000 certified. This is to recognize and encourage the adoption of a formal environmental management system during construction.

ISO 14000 is a management system that enables a firm to control the impact of their activities, products and services on the environment. The ISO 14000 provides a mechanism for the firm to demonstrate its commitment to minimize environmental impacts. It requires the firm to establish their environmental policy, plans and actions.



4.4.2. ENVIRONMENTAL MANAGEMENT PROGRAMME

Environmental management programme such as waste management plan, monitoring of resources consumption, etc should be implemented to minimize environmental impacts throughout the construction period. For example, monitoring and setting targets to reduce electricity and water consumption on site.

The construction industry generates about 400,000 tonnes of construction and demolition (C&D) waste a year. Some of the waste is generated because of inefficient construction methods and inefficient use of construction materials.

Besides recycling the C&D waste, more should be done to reduce waste at source. To minimize waste, waste management plan should be developed and implemented. The plan should include the measures listed below:

- o Designate a coordinator for developing the plan and monitoring its progress.
- o Identify materials to be salvaged.
- o Identify recyclable materials.
- o Identify products or packaging which will be picked up and recycled by the manufacturer.
- o Proper collection, segregation and storage of the identified materials.
- o Dispose of all hazardous materials properly.
- o Waste prevention measures such as reuse of salvaged material at the site, ordering materials accurately and as needed, etc.

Source separation collects recyclables in separate containers. This yields the highest recycling rate but space limitation and labour costs may limit extensive use of source separation.

One strategy is to concentrate on a few key materials to be source separated such as those that are easy or most valuable or abundant.

4.5. ENVIRONMENT-FRIENDLY MATERIAL

To encourage greater use of recycled building materials, the support and participation of the construction industry are important to sustain such recycling efforts.

The use of environmental-friendly products should be increased. These products should incorporate at least 60% recycled content by weight. If necessary, supplier's production process should be verified to confirm the percentage of recycled content materials.

Where possible, select recycled product which is made locally such as precast road kerbs and drainage channels made from recycled aggregates. The recycled aggregates are mainly processed from construction and demolition waste recovered.



4.6. BUILDABLE DESIGN

To recognize and encourage the use of buildable design to improve productivity and reduce wastage, the building should meet the prevailing industry average buildability score. Table 7 shows the average buildability for commercial and industrial projects. The detailed information on buildability score can be obtained from BCA website at <http://www.bca.gov.sg> and BCA's Code of Practice on Buildable Design 2005.

Table 7: Average Buildability Score

Calendar Year	Commercial	Industrial
2000	63	62
2001	63	64
2002	71	67
2003	72	69
2004	70	71
2005	73	75

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4.7. BUILDING MAINTENANCE AND OPERATION GUIDELINES

The developer should provide a simple building user's guide which describes the following information to the building users, occupants and tenants:

- To include information on energy efficient features and strategies. It is important to include potential savings as this will make it easier for occupants to understand the importance.
- To include building's energy target. It will be useful to inform the tenants on the building's metering and sub-metering strategy and how to read, record and present meter readings.
- To describe the basic functions and operation of the air-conditioning and mechanical ventilation system, electrical and lighting system. Where possible, simplified system diagrams and explanation of energy saving features should be included.
- To provide information on available transport facilities such as local public transport information, car parking requirements, cycling facilities (if applicable).
- To provide information on recycling such as list of potential recycle materials, the location of recycling storage areas and schedules for waste recycling removal. Where applicable, to include instructions on proper use of less common practices such as composting.
- To provide information on environment-friendly practices with regards to renovation works (noise and dust control, ventilation, waste disposal). It is advisable to include recommendations on environment friendly fixtures and products.



The purpose of the building user's guide is to provide information on the building systems and their operation details. It should be easily understood by building occupants. The guide will ensure that design features are used efficiently and that changes to space usage are managed in the most environmentally appropriate manner.

It is important to note that the provision of a building Operations and Maintenance (O&M) manual is also necessary to provide the detailed specialist information required by building managers and maintenance staff to enable the system to operate at a high level of energy efficiency.