FINAL BEAM ASSESSMENT REPORT

THE BUILDING ENVIRONMENTAL ASSESSMENT METHOD FOR NEW BUILDING DEVELOPMENTS

VERSION 4/04

LEE SHAU KEE BUILDING & LO KA CHUNG BUILDING / HKUST JOCKEY CLUB INSTITUTE FOR ADVANCED STUDY

THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Submitted by
Business Environment Council Limited 商界環保協會有限公司
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**APPENDIX I** SUMMARY OF FINAL BEAM ASSESSMENT
EXECUTIVE SUMMARY

BACKGROUND

BEAM, the Building Environmental Assessment Method, is the independent and voluntary initiative which provides recognition and a performance label for buildings with due consideration on safety, health, comfort, functionality, efficiency and environmental sustainability. BEAM embraces good practices in the planning, design, construction, and management, operation and maintenance of all types of new and existing buildings. BEAM standards are aligned with local regulations, standards and codes of practice, whilst its overall framework reflects international practices in green building labels.

Premises are submitted on a voluntary basis and measured against best practice criteria, on behalf of the BEAM Society by independent buildings and environmental specialists.

EDUCATIONAL DEVELOPMENT PROJECT

In October 2007, Business Environment Council Limited (BEC) was commissioned by The Hong Kong University of Science & Technology to undertake a BEAM New Building Development (Version 4/04) assessment for Lee Shau Kee Building & Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study. This report describes the final assessment for the premises. Information has been provided by the following project team members:

- The Hong Kong University of Science & Technology, the Project Manager;
- Dennis Lau & Ng Chun Man Architects & Engineers Company Limited, the Architect;
- Mott Macdonald Hong Kong Limited, the Structural and Building Services Engineer; and
- China State Construction Engineering (Hong Kong) Limited, the Main Contractor.
The Hong Kong University of Science & Technology (HKUST) has established Lee Shau Kee Campus to cater for the demand of teaching, learning and research facilities, due to additional student intake caused by launching of 3+3+4 curriculum.

Located atop the HKUST main campus, Lee Shau Kee Campus occupies an area of about 10 hectares. Main buildings include the eight-storey Lee Shau Kee Business Building and the six-storey Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study. Both of the new buildings have lecture theaters, classrooms, multi-functional conference rooms and seminar rooms, among other facilities. The buildings also offer ample open space to stimulate active academic exchange and interaction among faculty members and students.

Energy and water saving provisions, e.g. infra-red operating water taps, dual flush cisterns, etc. have been adopted in these buildings.

The foundation work was commenced on Feb 2010 and the opening ceremony for the Lee Shau Kee Campus was held in end of 2013.

**SUMMARY OF ACHIEVEMENTS**

The BEAM assessment criteria are grouped into six main impact categories, including site, material, energy, water, indoor environmental quality (IEQ) and innovation.

Based upon information provided, *Lee Shau Kee Building & Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study* has achieved 77 out of 115 credits available overall, and 25 out of 39 available credits in the IEQ section. (See Figures 1 & 2)

<table>
<thead>
<tr>
<th>Category</th>
<th>Applicable Credits</th>
<th>Bonus Credits</th>
<th>Achieved Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Aspects</td>
<td>23</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Materials Aspects</td>
<td>18</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>Energy Use</td>
<td>25</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Water Use</td>
<td>10</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>IEQ</td>
<td>39</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Innovation/Enhancement</td>
<td>-</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>115</strong></td>
<td><strong>12</strong></td>
<td><strong>77</strong></td>
</tr>
</tbody>
</table>

Figures 2 and 3 present the calculation scale for this particular project. Based upon the information provided, *Lee Shau Kee Building & Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study* have achieved the final rating of “Gold” at this final stage of the assessment.
Note:
1. A total 43 credits have been assigned as not applicable (N/A) as listed in Table 1 from Appendix I of the report.
2. For the purposes of calculating the overall BEAM rating, bonus credits are excluded from the total available credits but include in the number of credits achieved.
3. 77 credits achieved are confirmed credits i.e. submission from the project team and site inspections met BEAM requirements.
CONCLUSION  As a consequence of the client’s current drive and commitment towards environmental protection, high standards of building performance, management and maintenance have already been integrated into the design and construction of Lee Shau Kee Building & Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study. The credits achieved at this final stage could achieve the BEAM rating of **Gold**.

The BEAM Society is the non-profit and membership-based organisation which owns and operates, the Building Environmental Assessment Method (BEAM), on a self-financing basis. BEC certifies buildings under the direction and on behalf of the BEAM Society.

For more information visit : www.beamsociety.org.hk
1 INTRODUCTION

1.1 BACKGROUND

BEAM (The Building Environmental Assessment Method) provides a performance label for buildings with due consideration on safety, health, comfort, functionality, efficiency and environmental performance. BEAM covers all types of new and existing buildings. The assessment embraces a range of good practices in planning, design, construction, and management, operation and maintenance of buildings, and is aligned with local regulations, standards and codes of practice. Certification to BEAM is completely voluntary and is currently undertaken by independent specialists at Business Environment Council Limited (BEC), on behalf of BEAM Society.

In October 2007, BEC was commissioned by The Hong Kong University of Science & Technology to undertake a BEAM New Building Development (Version 4/04) assessment for Lee Shau Kee Building & Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study. This report describes the final assessment for the premises. Information has been provided by the following project team members:

- The Hong Kong University of Science & Technology, the Project Manager;
- Dennis Lau & Ng Chun Man Architects & Engineers Company Limited, the Architect;
- Mott Macdonald Hong Kong Limited, the Structural and Building Services Engineer; and
- China State Construction Engineering (Hong Kong) Limited, the Main Contractor.

1.2 PURPOSE AND STRUCTURE OF THIS REPORT

The purpose of this report is to summarise an indication of the final BEAM rating obtained by the existing design of Lee Shau Kee Building & Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study based upon inherent design features and construction practices. This report is based on discussions between BEC and the design/project team and information subsequently provided by team members.

A description and background information of Lee Shau Kee Building & Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study is given below. The remainder of this report is structured in accordance to the impact categories of the BEAM assessment framework:

Section 2 : Site Aspects
Section 3 : Materials Aspects
Section 4 : Energy Use
Section 5 : Water Use
Section 6 : Indoor Environmental Quality (IEQ)
Section 7 : Innovation and Performance Enhancements

In these sections, the BEAM best practice environmental criteria are stated on a credit-by-credit basis. In each case, the performance of the building, with the status of the credit, allocated as “not applicable”, “achieved”, and “not achieved” are summarised in italics.

1.3 RESULT OF THE FINAL ASSESSMENT

Based upon information provided, Lee Shau Kee Building & Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study has achieved 77 out of the 115 credits available overall, and 25 out of 39 available credits in the IEQ section. This accomplishes the BEAM rating of Gold at this final stage of assessment.

The result of the final assessment is given in Section 8. A set of summary tables is provided in Appendix I to summarise the achievement for each aspect.

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1 The referencing system used is identical to the labelling system adopted in the standard BEAM Manual for New Building Developments (Version 4/04).
1.4 Lee Shau Kee Building & Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study

View of Lee Shau Kee Building (LSK Building)

View of Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study (IAS Building)
View of Common Corridor in LSK Building

View of Common Corridor in IAS Building

View of Common Area in LSK Building

View of Common Area in IAS Building

View of Typical Classroom in LSK Building

View of Typical Classroom in IAS Building
The Hong Kong University of Science & Technology (HKUST) has established Lee Shau Kee Campus to cater for the demand of teaching, learning and research facilities, due to additional student intake caused by launching of 3+3+4 curriculum.

Located atop the HKUST main campus, Lee Shau Kee Campus occupies an area of about 10 hectares. Main buildings include the eight-storey Lee Shau Kee Business Building and the six-storey Lo Ka Chung Building / HKUST Jockey Club Institute For Advanced Study. Both of the new buildings have lecture theaters, classrooms, multi-functional conference rooms and seminar rooms, among other facilities. The buildings also offer ample open space to stimulate active academic exchange and interaction among faculty members and students.

Energy and water saving provisions, e.g. infra-red operating water taps, dual flush cisterns, etc. have been adopted in these buildings.

The foundation work was commenced on Feb 2010 and the opening ceremony for the Lee Shau Kee Campus was held in end of 2013.

1.5 **ASSESSMENT PROCESS**

**BEAM for New Building Developments** defines best practice environmental criteria for a range of planning, design, construction and management provision issues. The assessment criteria are grouped into six main categories, namely:

- Site Aspects
- Materials Aspects
- Energy Use
- Water Use
- Indoor Environmental Quality (IEQ)
- Innovation and Performance Enhancements

Premises are assessed against the criteria and ‘credits’ awarded where the criteria are satisfied. The assessment basically includes two stages, the “provisional assessment” and “final assessment” which are geared for buildings to improve their performance and upgrade their BEAM rating.

In the **Provisional Assessment**, an initial scoping process is conducted to identify appropriate criteria for the premises under assessment, since BEAM embraces over 100 criteria designed to cover all types of
local buildings. For criteria which are not relevant due to particular circumstances or building type of the assessed premises, these are allocated as *Not Applicable* (allocated as “N/A”), and are excluded from the total number of credits available.

Based upon intended design features and construction practices, the performance of the premises is identified. The client and design team are also able to achieve credit(s) through commitment at this stage if they are confident of fulfilling credit requirement(s) during the course of the assessment. These credit(s) will be designated as “**Provisional Credits**” which require submission of additional materials from the project team, site inspections and building surveys for further confirmation prior to the final assessment. In addition, recommendations for improvement are also presented at this stage through which the performance of the premises could be enhanced.

Prior to the **Final Assessment**, the client and designers have the opportunity to undertake the recommended improvements of their choice to upgrade the building’s BEAM rating. The assessors perform inspections during construction and upon completion of the property to verify allocation of credits. The final outcome of the assessment is presented on the BEAM Final Assessment certificate as a rating of Bronze, Silver, Gold and Platinum, according to the number of credits achieved.

### 1.6 Scoring and Weighting Methodology

The final Overall Assessment Grade is based on the percentage (%) of applicable credits gained. Given the importance of IEQ it is necessary to obtain a minimum percentage (%) of credits for IEQ in order to qualify for the overall grade. The BEAM award classifications are:

<table>
<thead>
<tr>
<th>Overall</th>
<th>IEQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platinum</td>
<td>75%</td>
</tr>
<tr>
<td>Gold</td>
<td>65%</td>
</tr>
<tr>
<td>Silver</td>
<td>55%</td>
</tr>
<tr>
<td>Bronze</td>
<td>40%</td>
</tr>
</tbody>
</table>

BEAM intends to encourage the clients to pursue outstanding environmental features, innovative technique or requirement above the norms by providing **Bonus Credits** for certain criteria throughout the assessment framework. Bonus credits are included as the total number of credits gained but excluded in the total number of credits available i.e. failure to comply will not be penalized.

When assessing a building complex with different parts e.g. a premises combining hotels, retails and office accommodations, an **Area Weighting Method** is introduced for the Energy Use and IEQ categories only as the differences in these categories is much significant than others. Under the area weighting method, the credits achieved are multiplied by the areas (in percentage of the overall normally occupied building areas) of particular part of the building complex. Summation of credits of individual parts of the building complex results in the overall weighted credits.

### 1.7 Rationale Behind BEAM

One of the prime objectives of BEAM is to address sustainability in buildings and its definition of a sustainable building is one which adversely affects neither the health of its users nor that of the larger environment. Therefore, the emphasis of BEAM is upon the use indoor environmental quality and amenities as key performance indicators, but with due consideration of local, regional and global environmental impacts. BEAM is a comprehensive, fair and transparent assessment scheme, with the following attributes:

- embraces many areas of sustainability, particularly social and environmental;
- recognises best practices;
- provides for a comprehensive method of quantifying overall performance;
- demonstrates performance qualities to end users; and
- provides economic benefits to stakeholders.

BEAM addresses items for which there is good evidence of the environmental problems they cause, and for which reasonably objective performance criteria can be defined. BEAM defines performance criteria
for a range of sustainability issues. ‘Credits’ are awarded where standards or defined performance criteria are satisfied. Where these are not satisfied guidance is provided on how performance can be improved.

Credits have been broadly allocated by taking into account the international consensus as given by an analysis of weightings used in similar assessment methods operating elsewhere, as well as surveys and informed opinions of those who have contributed to the development of BEAM. The BEAM assessment method is realistic, attainable and transparent, providing details of benchmarks (baselines), data, assumptions and issues taken into account in the assessment and credit ratings.

1.8 BEAM SOCIETY LIMITED

The BEAM Society Limited is the non-profit organisation which owns and operates, on a self-financing basis, BEAM. The society oversees the on-going development and implementation of BEAM standards for building assessment, performance improvement, certification and labelling. The mission of the BEAM Society is to:

- Improve the environmental performance of buildings across their life cycle;
- Provide healthier, higher quality, more durable and efficient working and living environments for building occupants;
- Contribute significantly towards sustainable development in Hong Kong;
- Build capacity in the industry to move quickly towards;
- Educate the Hong Kong community to the concepts of eco-efficiency and sustainability;
- Extend these sound practices beyond Hong Kong, and into the Asia Pacific region.

Society members (constituted from stakeholders in the building industry) work to continually enhance and refine BEAM to meet the expectations of all interested parties (in particular building users), and to encourage and assist the local building industry to move towards sustainable development. More information on BEAM and the society can be found at www.beamsociety.org.hk

1.9 DISCLAIMER

The BEAM Building Environmental Assessment Method is intended for use by Clients and project teams engaged in new building developments, and owners and operators of existing facilities as a guide to more environmentally sustainable building design and operation. The Method has been prepared with the assistance and participation of many individuals and representatives from various organisations. The final outcome represents general consensus, but unanimous support from each and every organisation and individual consulted is not implied.

This report represents the assessment results and improvement measures using the latest techniques, practices and standards compatible with prevailing economic constraints. These are subject to changes, which will be included through periodic updating. It should be noted that none of the parties involved in the funding of BEAM, including the BEAM Society and its members provide any warranties or assume any liability or responsibility to users of BEAM, or any third parties for the accuracy, completeness or use of, or reliance on, any information contained in BEAM, or from any injuries, losses, or damages arising out of such use or reliance. As a condition of use, users covenant not to sue, and agree to waive and release the BEAM Society and its members from any and all claims, demands and causes of actions for any injuries, losses or damages that users may now or hereafter have a right to assert against such parties as a result of the use of, or reliance on BEAM.
2 SITE ASPECTS

2.1 SITE LOCATION

2.1.1 LAND USE

Two Credits

1 credit where the building development uses reclaimed land.

2 credits where the building development uses a previously developed site (Brownfield site).

The project team has provided previous site photos of the site, to demonstrate that the site is a previously developed land. In view of these, two credits are achieved.

2.1.2 CONTAMINATED LAND

One Credit

The project team indicated that the site was not previously used for industrial applications. In view of this, this credit is not applicable and excluded from the total number of credits available.

2.1.3 LOCAL TRANSPORT AND AMENITIES

2.1.3a Car parking Provisions

One Credit

1 credit if no car parking is provided other than provisions intended for use by company vehicles and/or any shuttle service vehicles.

The project team indicated that private car parking spaces have been provided. In view of this, this credit is not achieved.

2.1.3b Public Transport

One Credit

1 credit where there exists convenient pedestrian access to mainstream public transport.

The project team has provided campus map to demonstrate that there are bus stops and mini-bus stops at university road which are found within 500m walking distance from the premises. In view of these, one credit is achieved.

2.1.4 NEIGHBOURHOOD AMENITIES

2.1.4a Provision of Basic Services

One Credit

1 credit where neighbourhood services are sufficient to provide for basic needs of the users of the building.

The project team has provided a scaled map to demonstrate that basic amenities including campus bookstore, Park’n’Shop, hair salon, bank services and Lee Shau Kee Library in Academic Building are within walking distance from the Premises. In view of these, one credit is achieved.

2.1.4b Neighbourhood Recreational Facilities

One Credit

1 credit where neighbourhood recreational facilities and open space is adequate and available for building users.

The project team demonstrated that neighbourhood recreational facilities such as Seafront BBQ Site, Fok Ying Tung Sports Centre, Indoor and outdoor swimming pool are situated in the university campus within 500m walking distance from the Premises. In view of these, one credit is achieved.

2.1.4c Provided Recreational Facilities

One Credit

1 credit if recreational facilities and open space provided within the development that is open to the public.

The project team demonstrated that courtyard and sitting areas within the premises are open to public. In view of these, one credit is achieved.
2.2 SITE PLANNING AND DESIGN

2.2.1 SITE DESIGN APPRAISAL

One Credit

1 credit for a site design appraisal report which demonstrates a proactive approach to achieve greater integration of site planning issues.

*The project team has provided BEAM checklist CHK-033 with explanation to demonstrate that site planning and design of the development have taken into account of physical, visual impacts and other environmental aspects for integration with the immediate site surroundings and neighbourhood. In view of these, one credit is achieved.*

2.2.2 ECOLOGICAL IMPACT

One Credit

1 credit for designs that demonstrate how landscaping and other site design strategies minimises ecological impact for Greenfield sites, or contributes positively to the ecological value of Brownfield sites.

*The project team was unable to demonstrate that the ecological value of the site has been improved from the previous development. In view of these, this credit is not achieved.*

2.2.3 CULTURAL HERITAGE

One Credit

The project team indicated that there are no historic or heritage sites in the vicinity of the redevelopment and thus this credit is not applicable to this project and excluded from the total number of credits available.

2.2.4 LANDSCAPING AND PLANTERS

2.2.4a Hard Landscaping

One Credit

1 credit for using pervious materials for a minimum of 50% of hard landscaped areas.

*The project team was unable to demonstrate that at least 50% of hard landscaped areas are covered by pervious material. In view of these, this credit is not achieved.*

2.2.4b Soft Landscaping

One Credit

1 credit for providing appropriate planting on site equivalent to at least 30% of the site area.

*The project team has provided as-built master landscape plan and calculation to demonstrate that total area of lawn and shrubs are at least 30% of the site area. These soft landscape areas have been inspected during final building survey for verification. In view of these, one credit is achieved.*

2.2.5 MICROCLIMATE AROUND BUILDINGS

2.2.5a Wind Amplification

One Credit

1 credit for demonstrating that no pedestrian areas will be subject to excessive wind velocities caused by amplification due to the site layout and/or building design.

*The project team was unable to demonstrate that the average velocity at sample points are higher than 1.5m/s and the amplification factor for all the sample points are less than 2 when compared with previous site conditions. In view of these, this credit is not achieved.*

2.2.5b Elevated Temperatures

One Credit

1 credit for demonstrating that steps have been taken to reduce elevated temperatures in exposed public areas due to site layout and choice of materials.

*The project team demonstrated that steps to reduce heat island effect in the exposed public areas have been considered. Architectural layout plans, showing greener provision, canopy, have been provided. These features have been inspected during final building survey for verification. In view of these, one credit is achieved.*
2.2.6 OVERSHADOWING AND VIEWS

2.2.6a Minimum Daylight
One Credit

1 credit for designs for which the access to daylight of neighbouring sensitive buildings is maintained to the prescribed level.

The project team was unable to quantify the VDF, at least 12%, on the affected sensitive building façade of the lowest floor and confirm that the access to daylight of neighbouring sensitive buildings to be maintained to the prescribed level. Hence, this credit is not achieved.

2.2.6b Negative Impacts
One Credit

1 additional credit where the building development has no negative impact on neighbouring buildings in respect of access to daylight, views and natural breezes.

The project team was unable to confirm that the premises have no negative impact on neighbouring buildings in respect of access to daylight, views and natural breezes. Hence, this credit is not achieved.

2.2.7 VEHICULAR ACCESS

One Credit

1 credit for providing safe and efficient access for vehicles entering and leaving the site and buildings.

The project team has provided architectural layout drawings to demonstrate that loading and unloading area of the building has been provided within site boundary and these can allow user to get access to the building while vehicles waiting outside the site boundary are not be necessary. The loading and unloading area has been inspected during final building survey. In view of these, one credit is achieved.

2.2.8 ENVIRONMENTAL MANAGEMENT PLAN

One Credit

1 credit for an Environmental Management Plan including provisions for Environmental Monitoring and Auditing.

The project team has provided formal Environmental Management Plan (EMP) from the main contractor for construction works. The EMP included environmental policy, environmental management approach, control mitigation measures and environmental monitoring and auditing requirement. In view of these, one credit is achieved.

2.3 EMISSIONS FROM SITE

2.3.1 AIR POLLUTION DURING CONSTRUCTION
One Credit

1 credit for applying adequate mitigation measures for dust and air emissions during the construction as recommended by the Environmental Protection Department; and demonstrating compliance with the air quality management guidelines as detailed in the Environmental Monitoring and Audit Manual. BEAM checklist CHK-006 shall be addressed.

The project team demonstrated that adequate mitigation measures for dust emissions during construction as recommended by the Environmental Protection Department and compliance with the air quality management guidelines as detailed in the Environmental Monitoring and Audit Manual are undertaken. Completed BEAM checklist CHK-006 from main contractor, a summary of impact TSP levels measured throughout the construction period and corresponding photo records demonstrating mitigation measures for dust emissions taken have been provided. In view of these, one credit is achieved.

2.3.2 NOISE DURING CONSTRUCTION
One Credit

1 credit for demonstrating and confirming that the criteria and requirements laid down in ProPECC PN 2/93 has been achieved, for all Noise Sensitive Receivers. BEAM check list CHK-002 shall be addressed.

The project team demonstrated that control of noise pollution during construction like scheduling noisy works, maintaining noisy equipment properly and locating noisy equipment away from NSR, etc. has been implemented. Completed BEAM checklist CHK-002 from main contractor, a summary of impact noise monitoring results throughout the construction period and corresponding photo records demonstrating mitigation measures for noise emissions taken have been provided. In view of these, one credit is achieved.
2.3.3 **WATER POLLUTION DURING CONSTRUCTION**

One Credit

1 credit for undertaking measures to reduce water pollution during construction as outlined in ProPECC PN 1/94. BEAM check list CHK-022 shall be addressed.

The project team demonstrated that measures to reduce water pollution during construction as outlined in ProPECC PN 1/94 have been undertaken. Completed BEAM checklist CHK-022 from main contractor, laboratory test results of waste water quality with a frequency as per BEAM's requirement throughout construction period and corresponding photo records demonstrating mitigation measures for water pollution taken have been provided. In view of these, one credit is achieved.

2.3.4 **EMISSIONS FROM WET COOLING TOWERS**

One Credit

1 credit for a building development in which wet cooling towers are not used, or use seawater, or water from an acceptable source and are designed and maintained as specified in the Code of Practice for the Prevention of Legionnaires Disease. BEAM checklist CHK-013 shall be addressed.

The project team has provided relevant drawings and documents for government submission to demonstrate that design of heat rejection plant (i.e. cooling towers) complies with the requirements as stated in the Code Of Practice for the Prevention of Legionnaires Disease. In view of these, one credit is achieved.

2.3.5 **NOISE FROM BUILDING EQUIPMENT**

One Credit

1 credit for demonstrating that the level of the intruding noise at the facade of the nearest sensitive receiver is in compliance with the criteria recommended in the Hong Kong Planning Standards and Guidelines.

The project team indicated that the nearest noise sensitive receiver (NSR) is nearby existing senior staff quarters, student halls and teaching facilities. The project team has carried out calculation of the fixed noise sources such as cooling towers according to the latest building services design to demonstrate that necessary acoustic treatment has been applied to ensure the resultant noise levels at the NSRs could comply with BEAM requirements. A acoustical report, including architectural layout and noise level of equipment to be investigated, has been provided to demonstrate the level of intruding noise from the premises at the façade of NSRs is at least 5 dB(A) below the appropriate Acceptable Noise Levels (ANL). In view of these, one credit is achieved.

2.3.6 **LIGHT POLLUTION**

One Credit

1 credit for demonstrating that obtrusive light from exterior lighting meets the specified performance for the environmental zone in which the building development is located.

The project team was unable to demonstrate that the design of exterior lighting shall bring insignificant impact on light pollution with reference to CIBSE requirements. Furthermore, the project team was unable to provide a light pollution evaluation report, with reference to the latest exterior lighting design, to demonstrate that lighting into windows, source intensity, building luminance before/after curfew and sky glow can comply with CIE 150 standard. In view of these, this credit is not achieved.
3 MATERIALS ASPECTS

3.1 EFFICIENT USE OF MATERIALS

3.1.1 BUILDING REUSE

Two Credits

There was no existing building on the site. These credits are not applicable to this project and excluded from the total number of credits available.

3.1.2 MODULAR AND STANDARDISED DESIGN

One Credit

1 credit for demonstrating the application of modular and standardized design in buildings.

The project team demonstrated that modular and standardized design has been adopted in the premises by providing completed BEAM checklist CHK-034. From the checklist, more than 50% of items in façade, architectural/internal building elements and building services elements are modular and standardized designs. Furthermore, relevant drawings and explanations have been provided to substantiate the calculation. In view of these, one credit is achieved.

3.1.3 OFF SITE FABRICATION

Two Credits

1 credit when the manufacture of 50% of listed building elements has been off-site.

1 additional credit where the manufacture of 80% of listed building elements has been off-site.

The project team indicated that off-site fabrication was not adopted during the construction of the premises. In view of this, these credits are not achieved.

3.1.4 ADAPTABILITY OF DECONSTRUCTION

3.1.4a Structural Adaptability

One Credit

1 credit for designs providing flexibility through the choice of building structural system that allows for change in future use. BEAM checklist CHK-035 shall be addressed.

The project team was unable to demonstrate that versatile envelope capable of accommodating changes to interior space, structure grids, sufficient height to lower floors and structural floor that accommodates various M&E services distribution scheme have been included in the building’s design. In view of these, this credit is not achieved.

3.1.4b Spatial Adaptability

One Credit

1 credit for designs providing spatial flexibility that can adapt spacers for different uses. BEAM checklist CHK-036a shall be addressed.

The project team demonstrated that spatial adaptability has been adapted in the design by providing flexibility and convertibility to allow capacity of the premises to accommodate substantial changes. Features such as inclusion of multi-functional spaces, possibility to sub-divide large grids and wide common corridor have been included. Furthermore, completed BEAM checklist CHK-036a with more than 50% of applicable items ticked and relevant drawings have been provided as substantiation to the ticked items in the checklist. In view of these, one credit is achieved.

3.1.4c Flexible Engineering Services

One Credit

1 credit for flexible design of services that can adapt to changes of layout and use. BEAM checklist CHK-036b shall be addressed.

The project team demonstrated that flexible design of engineering services have been adopted in the design by providing flexibility and convertibility to allow capacity of the premises to accommodate substantial changes. Relevant MVAC layout drawings, installation details of luminaries and diffusers and site photos demonstrating the ticked items in the checklist have been provided as substantiation. Furthermore, these features have been inspected during final building survey. In view of these, one credit is achieved.
3.1.5 ENVELOPE DURABILITY
One Credit 1 credit for demonstrating the integration of building envelope systems which optimises the integrity of the envelope over the building life.

The project team demonstrated envelope durability in accordance to Building (Construction) Regulation, PNAP issued by BD and Code Of Practice for pre-cast concrete construction 2003 listed in BEAM checklist CHK-037 have been included in the design. Completed BEAM checklist CHK-037 with more than 50% applicable items complied, supported by relevant structural drawings, has been provided. In view of these, one credit is achieved.

3.2 SELECTION OF MATERIALS
3.2.1 RAPIDLY RENEWABLE MATERIALS
One Credit 1 credit for demonstrating that in applications where rapidly renewable materials can be employed at least 50% are used in the building.

The project team indicated that rapidly renewable materials such as linoleum or bamboo flooring have not been specified for this project. In view of these, this credit is not achieved.

3.2.2 SUSTAINABLE FOREST PRODUCTS
3.2.2a Timber Use for Temporary Works
One Credit 1 credit where virgin forest products are not used for temporary works during construction.

The project team demonstrated that all timber for temporary works during construction was originated from certified well-managed and sustainable sources, e.g. FSC certifies wood with appropriate authentic certificates. Furthermore, timber delivery note and site photographs showing the same batch of timber with same certification registration code on site has been provided as substantiation. In view of these, one credit is achieved.

3.2.2b Forest Products Used in the Building
One Credit 1 credit for sourcing timber and composite timber products which are from well managed sources, including reuse of salvaged timber.

The project team was unable to demonstrate that all timber used in the premises is originated from sustainable sources. In view of these, this credit is not achieved.

3.2.3 RECYCLED MATERIALS
3.2.3a Outside Surface Works and Structures
One Credit 1 credit for use 50% of recycled materials in site exterior surfacing work, structures and features.

The project team was unable to demonstrate that more than 50% of recycled materials have been used in site exterior surfacing work, structures and features. In view of this, this credit is not achieved.

3.2.3b Building Structure
One Credit 1 credit for using 5% of recycled materials, other than PFA, in the construction of the building; and maximising use of PFA or similar in concrete.

The project team indicated that no recycled materials have been used in building structure. In view of this, this credit is not achieved.

3.2.4 OZONE DEPLETING SUBSTANCES
3.2.4a Refrigerants
One Credit 1 credit for using refrigerants with an ozone depleting potential (ODP) 0.03 or less and a global warming potential (GWP) of 1600 or less.

The project team has provided equipment catalogue of water cooled chiller to demonstrate that the refrigerants used are R123 and R134a with global warming potential meets BEAM requirement. Refrigerants used by water cooled chiller have been inspected during the final building survey. In view of these, one credit is achieved.
3.2.4b  Ozone Depleting Materials

One Credit  1 credit for the use of products in the building fabric and services that avoids the use of ozone depleting substances in their manufacture, composition or use.

The project team has provided catalogues of insulation materials for ductwork, rockwool and pipework, with manufacturer's confirmation to demonstrate that all major thermal insulation and fire retardant materials in roof construction, walls, condensate drain pipe and ductwork are CFC and HCFC free in their manufacture and composition. In view of these, one credit is achieved.

3.3  WASTE MANAGEMENT

3.3.1  DEMOLITION WASTE

Four Credits  There was no existing building on the site. These credits are not applicable to this project and excluded from the total number of credits available.

3.3.2  CONSTRUCTION WASTE

3.3.2a  Waste Management

One Credit  1 credit for implementation of a waste management system that provides for the sorting and proper disposal of inert and non-inert construction materials.

The main contractor for construction works has provided waste management plan including waste management policy, responsibility, legislation, approach, mitigation measure, trip ticket requirement, record keeping, training programme and monitoring/auditing during construction of the building. In view of these, one credit is achieved.

3.3.2b  Sorting and Recycling of Waste

One Credit  1 credit sorting and recycling specified construction waste.

As indicated in the waste management plan from main contractor, the contractor is required to implement sorting and recycling of waste generated on-site to reduce the waste to be disposed. The inert portion of all excavated materials is recovered for reuse whenever possible. All metals, plastic and papers on site are kept in dry and clean conditions for later collection by recycling contractors. Site photographs showing recycling of inert and non-inert construction waste during construction period have been provided. In view of these, one credit is achieved.

3.3.2c  Quantity of Recycled Waste

One Credit  1 credit for demonstrating that at least 50% of construction waste is recycled.

The project team has provided waste flow table of the construction works to demonstrate that more than 50%, by weight, of the waste during construction has been recycled. In view of this, one credit is achieved.

3.3.3  WASTE RECYCLING FACILITIES

One Credit  1 credit for providing facilities for the collection, sorting, storage and disposal of waste and recovered materials.

The project team demonstrated that refuse storage chamber, with reference to PNAP-98, has been provided for temporary storage of refuses for collection. Furthermore, waste recycling facilities have been provided for sorting purpose. The refuse storage chamber has been inspected during final building survey for verification. In view of these, one credit is achieved.
4 ENERGY USE

4.1 ANNUAL ENERGY USE

Note: BEAM criteria for energy use in commercial buildings (section 4.1.1), hotels (section 4.1.2), residential buildings (section 4.1.4), mechanical ventilated buildings (section 4.1.5) and other building (section 4.1.6) are not applicable to this project. These criteria are therefore excluded from this report, with the criteria for educational buildings (section 4.1.3) being shown.

4.1.3 ANNUAL ENERGY USE IN EDUCATIONAL BUILDINGS

4.1.3a ESTIMATED ANNUAL ENERGY CONSUMPTION

Eight Credits

<table>
<thead>
<tr>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 credit for a reduction in the annual energy consumption by 5%</td>
</tr>
<tr>
<td>2</td>
<td>2 credits for a reduction in the annual energy consumption by 9%</td>
</tr>
<tr>
<td>3</td>
<td>3 credits for a reduction in the annual energy consumption by 13%</td>
</tr>
<tr>
<td>4</td>
<td>4 credits for a reduction in the annual energy consumption by 17%</td>
</tr>
<tr>
<td>5</td>
<td>5 credits for a reduction in the annual energy consumption by 21%</td>
</tr>
<tr>
<td>6</td>
<td>6 credits for a reduction in the annual energy consumption by 24%</td>
</tr>
<tr>
<td>7</td>
<td>7 credits for a reduction in the annual energy consumption by 27%</td>
</tr>
<tr>
<td>8</td>
<td>8 credits for a reduction in the annual energy consumption by 30%</td>
</tr>
</tbody>
</table>

HTB2/BECON simulation program has been applied to estimate the “Base Case” and the “Designed Case” annual electricity consumptions of the premises. The overall evaluated results for base case and the designed case are 150.5 and 117.5 kWh/m²/year respectively, based on worst case scenario. The default case simulation was done by using local practices as a base. References such as code of practices from EMSD are extracted. 21.9% of annual energy consumption reduction as compared with the reference norm baseline case is estimated. In view of these, five credits are achieved.

4.1.3b ESTIMATED MAXIMUM ELECTRICITY DEMAND

Three Credits

<table>
<thead>
<tr>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 credit for a reduction in the maximum electricity demand by 8%</td>
</tr>
<tr>
<td>2</td>
<td>2 credits for a reduction in the maximum electricity demand by 12%</td>
</tr>
<tr>
<td>3</td>
<td>3 credits for a reduction in the maximum electricity demand by 15%</td>
</tr>
</tbody>
</table>

By application of the HTB2/BECON simulation program to the building’s layout, construction and building services designs, it was found that the maximum electricity demand for base case and the designed case are 78.0 and 63.1 W/m² respectively. Therefore, 19.1% reduction of the building’s maximum electricity demand as compared with the baseline model building was predicted. In view of these, three credits are achieved.

4.2 ENERGY EFFICIENT SYSTEMS

4.2.1 EMBODIED ENERGY IN BUILDINGS STRUCTURAL ELEMENTS

Two Credits

<table>
<thead>
<tr>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 credit for demonstrating the embodied energy in the major elements of the building structure of the assessed building is reduced by 10%</td>
</tr>
<tr>
<td>2</td>
<td>2 credits for demonstrating a reduction by 20%</td>
</tr>
</tbody>
</table>

The project team was unable to provide embodied energy analysis of major building structural elements used in the premises. In view of this, these credits are not achieved.

4.2.2 VENTILATION SYSTEMS IN MECHANICAL VENTILATED BUILDINGS

Three Credits

As there are no mechanically ventilated carpark areas in this development, therefore, these credits are not applicable and excluded from the total number of credits available.

4.2.3 LIGHTING SYSTEMS IN MECHANICALLY VENTILATED BUILDINGS

Three Credits

As there are no mechanically ventilated carpark areas in this development, therefore, these credits are not applicable and excluded from the total number of credits available.
4.2.4 **HOT WATER SUPPLY SYSTEMS**

One Credit

The project team indicated that no centralised hot water services will be provided. Hence, credit is not applicable to this project and excluded from the total number of credits available.

4.2.5 **LIFT AND ESCALATOR SYSTEMS**

One Credit

1 credit for complying with the Code of Practice for Energy Efficiency of Lift and Escalator Installations.

The project team demonstrated that lift design for the building complies with the EMSD Code of Practice for Energy Efficiency of Lift and Escalator Installations by providing the duly completed EMSD’s form LE-G, 1, 3 and 6. In view of these, one credit is achieved.

4.2.6 **ELECTRICAL SYSTEMS**

One Credit

1 credit for complying with the Code of Practice for Energy Efficiency of Electrical Installations.

The project team has provided duly completed form EL-1 to EL-5 of EMSD Code of Practice for Energy Efficiency of Electrical Installations, with reference to electrical schematic diagrams to demonstrate compliance. In view of these, one credit is achieved.

4.2.7 **RENEWABLE ENERGY SYSTEMS**

4.2.7a **Densely Populated Urban Centres**

Three Bonus Credits

1 BONUS credit where 0.5% or more of building energy use is obtained from renewable energy sources.

2 BONUS credits where 1% or more of building energy use is obtained from renewable energy sources.

3 BONUS credits where 2% or more of building energy use is obtained from renewable energy sources.

The project team was unable to demonstrate that at least 0.5% of building energy can be obtained from renewable energy sources such as solar panel. In view of these, these bonus credits are not achieved.

(These credits are considered as bonus credits and will be included in the total number of credits gained but excluded in the total number of credits available.)

4.2.7b **Less Densely Populated Areas**

Three Bonus Credits

This section is for less densely populated urban areas, hence these bonus credits are not applicable to this project and excluded from the total number of credits available.

4.3 **ENERGY EFFICIENT EQUIPMENT**

4.3.1 **AIR-CONDITIONING UNITS**

Three Credits

This section is only appropriate to premises using de-centralised air conditioning units, and thus these credits are not applicable to this project and excluded from the total number of credits available.

4.3.2 **CLOTHES DRYING FACILITIES**

One Credit

This section is for evaluating the provision of clothes drying facilities in residential buildings, thus this credit is not applicable to this project and excluded from the total number of credits available.

4.3.3 **ENERGY EFFICIENT LIGHTING IN PUBLIC AREAS**

One Credit

1 credit for installation of energy efficient lighting equipment; and control for the lamps in areas where daylight is available.

The project team was unable to demonstrate that the development includes energy efficient lighting and control for the lamps in areas where daylight is available. In view of these, this credit is not achieved.
4.3.4 HEAT RECLAIM

One Credit

The section is for heat reclaim facilities in hotel buildings. Thus this credit is not applicable to this project and excluded from the total number of credits available.

4.3.5 MECHANICAL VENTILATION IN HOTEL BUILDINGS

One Credit

This section is for evaluating energy efficiency of ventilation fans in hotel buildings, thus this credit is not applicable to this project and excluded from the total number of credits available.

4.3.6 ENERGY EFFICIENT APPLIANCES

One Credit

1 credit for specifying the use of certified energy efficient appliances.

Refrigerator has been provided by the owner. The project team has provided equipment catalogues and their energy labels to demonstrate that they comply with the requirements of efficiency grade 2 of EMSD’s Energy Efficiency Labelling Scheme. The abovementioned appliance has been inspected during final building survey for verification. In view of these, one credit is achieved.

4.4 PROVISION FOR ENERGY MANAGEMENT

4.4.1 TESTING AND COMMISSIONING

4.4.1a Commissioning Specifications

One Credit

1 credit for provision of appropriate specifications and cost provisions in contract documents detailing the commissioning requirements for all systems and equipment that impact on energy use and indoor environmental quality. BEAM checklist CHK-025 shall be addressed.

The project team has provided BEAM checklist CHK-025 with contract specifications of building services system specifying commissioning requirements for all systems and equipment that impact on energy use and indoor environmental quality. In view of these, one credit is achieved.

4.4.1b Commissioning Plan

One Credit

1 credit for the appointment of a commissioning authority and provision of a detailed commissioning plan that embraces all specified commissioning work. BEAM checklist CHK-026 shall be addressed.

The project team has provided completed BEAM checklist CHK-026 with reference to the commissioning plan of building services system, endorsed by commissioning authority appointed by the owner, to demonstrate that a commissioning team has been established to review and monitor the implementation of commissioning plan of building services system during commissioning process. In view of these, one credit is achieved.

4.4.1c Commissioning

One Credit

1 credit for ensuring full and complete commissioning of all systems, equipment and components that impact on energy use and indoor environmental quality. BEAM checklist CHK-027 shall be addressed.

The project team has provided completed BEAM checklist CHK-027 and commissioning records, endorsed by commissioning authority, to demonstrate that well established procedures have been executed to ensure full and complete commissioning of all building services systems, equipment and components that impact on energy use and indoor environmental quality. In view of this, one credit is achieved.

4.4.1d Commissioning Reports

One Credit

1 credit for providing fully detailed commissioning reports for all systems, equipment and components that impact on energy use and indoor environmental quality. BEAM checklist CHK-028 shall be addressed.

The project team has provided completed BEAM checklist CHK-028 and commissioning reports of building services system to demonstrate that commissioning results for all building services systems, equipment and components have been documented in a formal report according to the contract requirement and endorsed by commissioning authority appointed by the owner. Furthermore, these commissioning reports have been inspected during final building survey for verification. In view of these, one credit is achieved.
4.4.2 OPERATIONS AND MAINTENANCE

4.4.2a Operations and Maintenance Manual

One Credit

1 credit for providing a fully documented operations and maintenance manual to the minimum specified. BEAM checklist CHK-029 shall be addressed.

The project team has provided completed BEAM checklist CHK-029 to indicate that fully documented operations and maintenance (O&M) manual has been prepared for all building services system within the premises. Furthermore, O&M manuals for building services system have been provided to support the ticked sub-items as stated in the BEAM checklist CHK-029. Furthermore, these O&M manuals have been inspected during final building survey for verification. In view of these, one credit is achieved.

4.4.2b Energy Management

One Credit

1 credit for providing fully documented instructions that enable systems to operate at a high level of energy efficiency. BEAM checklist CHK-030 shall be addressed.

The project team has provided completed BEAM checklist CHK-030 to indicate that fully documented instructions for all building services system with specific emphasis for energy management have been prepared. Energy management plan with fully documented instructions on building services system has been provided to support the ticked sub-items as stated in the BEAM checklist CHK-030. Furthermore, this energy management plan has been inspected during final building survey for verification. In view of these, one credit is achieved.

4.4.2c Operator Training and Operation and Maintenance Facilities

One Credit

1 credit for providing training for operations and maintenance staff to the minimum specified; and demonstrating that adequate maintenance facilities are provided for operations and maintenance work. BEAM checklist CHK-031 shall be addressed.

The project team has provided completed BEAM checklist CHK-031 to indicate that sufficient operation and maintenance training has been arranged for the operators of the building and the design of the building has made provisions for adequate maintenance facilities. Furthermore, corresponding training records, layout plan and photos of maintenance facilities available have been provided for substantiation. These facilities have been inspected during final building survey. In view of these, one credit is achieved.

4.4.3 METERING AND MONITORING

One Credit

1 credit for installation of metering that allows monitoring of electricity use by the main chiller plant and auxiliaries; and instruments for monitoring building cooling load and operating parameters central chiller plant; and metering that allows separate monitoring of electricity use by the air side of the HVAC system; and metering for landlord’s electricity consumption in common space/public areas.

The project team has provided as-built electrical schematic diagram with provision of energy meter highlighted to demonstrate its capability to continuous monitor energy performance of building services system serving the building. These facilities have been inspected during final building survey for verification. In view of these, one credit is achieved.
5 WATER USE

5.1 WATER QUALITY

5.1.1 WATER QUALITY

5.1.1a Fresh Water Plumbing

One Credit

1 credit where fresh water plumbing installations comply with the referenced good practice guides. BEAM checklist CHK-001 shall be addressed.

The project team has provided completed BEAM checklist CHK-001 to indicate that EMSD design guidelines for the prevention of Legionnaire Disease in cold water systems have been observed in the premises and design provisions to satisfy requirements stipulated in accordance to Water Supplies Department's guidelines has also been specified. Furthermore, as-built installation details of plumbing system has been provided to demonstrate the ticked sub-items as stated in the BEAM checklist CHK-001. In view of these, one credit is achieved.

5.1.1b Water Quality Survey

One Credit

1 credit for demonstrating that the quality of potable water meets the referenced drinking water quality standards at all points of use.

The project team demonstrated that water sampling and analysis of potable water quality at the farthest point of use from the water tank, with reference to the as-built plumbing layout drawings and schematic diagrams, has been carried out upon project completion. In view of these, one credit is achieved.

5.2 WATER CONSERVATION

5.2.1 Annual Water Use

Three Credits

1 credit for demonstrating that the use of water saving devices leads to an estimated aggregate annual saving of 15%.

2 credits for demonstrating an estimated annual saving of 25%.

3 credits for demonstrating an estimated annual saving of 35%.

The project team has provided calculation to demonstrate that 16.7% annual water saving can be achieved by application of water efficient devices in the premises. Furthermore, catalogue of water fittings has been provided to substantiate the water saving calculation. In view of these, one credit is achieved.

5.2.2 Monitoring and Control

Two Credits

1 credit for installations of any two features:

2 credits for installation of all three features:

- Automatic shut-off of devices for the purposes of water conservation;
- Monitoring water leakage within the fresh water distribution system;
- Monitoring of water flow at main supply branches for audit purposes.

The project team demonstrated that the following features have been employed in this project:

- Automatic shut-off devices, such as automatic shut-off water tap, have been provided for the building;
- Water meters have been provided to monitor water consumption of cleansing, irrigation and potable water

Furthermore, manufacturer catalogue, relevant layout drawings and schematic diagrams demonstrating the provision of automatic shut-off devices and water meters have been provided as substantiation. These provisions have been inspected during final building survey for verification. In view of these, one credit is achieved.
5.2.3 **WATER USE FOR IRRIGATION**

One Credit

The soft landscape area and planting coverage is less than 50% of the area of the building footprint. Hence, this credit is not applicable to this project and excluded from the total numbers of credits available.

5.2.4 **WATER RECYCLING**

5.2.4a **Harvested Rainwater**

One Credit

1 credit for harvesting of rainwater will lead to a reduction of 10% or more in the consumption of fresh water.

The project team was unable to confirm that a reduction of 10% in the consumption of fresh water can be achieved by application of rainwater recycling system. Hence, this credit is not achieved.

5.2.4b **Provisions for Grey Water Recycling**

One Bonus Credit

1 credit for the provision of plumbing and drainage systems that provide for separation of grey water from black water.

The project team indicated that grey water recycling system has not been considered for this project. Hence, this bonus credit is not achieved. (This credit is considered as bonus credit and included in the total number of credits gained but excluded in the total number of credits available.)

5.2.4c **Recycled Water**

One Bonus Credit

1 additional credit where harvested or recycled water will lead to a reduction of 10% or more in the consumption of fresh water.

The project team was unable to confirm that a reduction of 10% in the consumption of fresh water can be achieved by harvested water. Hence, this bonus credit is not achieved. (This credit is considered as bonus credit and included in the total number of credits gained but excluded in the total number of credits available.)

5.2.5 **WATER EFFICIENT FACILITIES AND APPLIANCES**

5.2.5a **Water Efficient Facilities (pools, spas, fountains, etc.)**

One Credit

1 credit for demonstrating that installed water facilities are more efficient than otherwise.

The project team was unable to demonstrate that as-built water facilities such as water feature can achieve at least 20.0% annual water saving, comparing to those without water conservation measures (baseline). In view of these, this credit is not achieved.

5.2.5b **Water Efficient Appliances**

One Credit

The project team indicated that no water efficient appliances would be provided by the developer. Thus, this credit is not applicable to this project and excluded from the total number of credits available.

5.3 **EFFLUENT**

5.3.1 **EFFLUENT DISCHARGE TO FOUL SEWERS**

One Credit

1 credit for demonstrating a reduction in annual sewage volumes by 25%.

The project team has provided calculation to demonstrate that 36.51% annual sewage volumes reduction can be achieved by application of efficient flushing devices in the building. Furthermore, catalogue of flushing devices have been provided to substantiate the sewage volumes saving calculation. In view of these, one credit is achieved.
6 INDOOR ENVIRONMENTAL QUALITY

6.1 SAFETY AND SECURITY

6.1.1 FIRE SAFETY

6.1.1a Design Integration

One Credit

1 credit for demonstrating design integration between fire services systems, and non-fire services systems.

The project has provided BEAM checklist CHK-039, fire services drawings and air side schematic diagram to demonstrate that the following features have been incorporated into the fire services design:

- Adequate fire resistance period is ensured in the structure of the building; and
- Durability of fire safety systems, equipment and components.

In view of these, one credit is achieved.

6.1.1b Fire Safety Manual

One Credit

1 credit for provision of a fire safety manual based on a fire risk assessment for the building.

The project team has provided completed BEAM checklist CHK-040 and formal fire safety manual including fire contingency plan to demonstrate that fire safety manual, with reference to the latest fire services design, addressing the items in the BEAM checklist CHK-040 has been provided and kept in place. Furthermore, the fire safety manual has been inspected during final building survey. In view of these, one credit is achieved.

6.1.2 ELECTROMAGNETIC COMPATIBILITY

One Credit

1 credit for designs that meet the electromagnetic compatibility requirements in respect of power quality and low frequency magnetic fields.

The project team has provided electromagnetic assessment report to demonstrate that electrical distribution system complies with the requirement of electromagnetic compatibility in respect of power quality and low frequency magnetic fields as stated in Code of Practice of electrical installations issued by EMSD. Furthermore, on-site measurements in normally occupied area closed to transformer rooms and electric rooms have been conducted to demonstrate compliance. In view of these, one credit is achieved.

6.1.3 SECURITY

One Credit

1 credit for scoring at least 75% of the applicable security measures and facilities for the building.

The project team has provided BEAM checklist CHK-043 with more than 75% applicable points achieved to demonstrate that CCTV system, guard patrol, etc has been provided at the premises. Supporting evidence on the ticked items in the BEAM checklist CHK-043, such as equipment catalogue and CCTV schematic diagram has been provided. These security measures and facilities have been inspected during final building survey. In view of these, one credit is achieved.

6.2 HYGIENE

6.2.1 PLUMBING AND DRAINAGE

One Credit

1 credit for designs that reduce the potential for transmission of harmful bacteria viruses, and odours.

The project team has provided completed BEAM checklist CHK-041 to indicate that BEAM requirements have been incorporated into plumbing and drainage system design of the premises. Furthermore, as-built plumbing and drainage layout drawings, schematic diagrams with highlighted features, installation details and site photos of drainage service installations have been provided to demonstrate the ticked sub-items in BEAM checklist CHK-041. In view of these, one credit is achieved.
6.2.2 BIOLOGICAL CONTAMINATION

One Credit 1 credit for complying with the recommendations given in the Code of Practice - Prevention of Legionnaires Disease, in respect of air-conditioning and ventilation and water systems. BEAM Checklist CHK-001 shall be addressed.

The project team has provided completed BEAM checklist CHK-001 to indicate that EMSD guideline for prevention of Legionnaires Disease has been observed within the HVAC system design of the building. Furthermore, as-built installation details of HVAC equipment, drawings demonstrating provision of condensate drain pipe for HVAC equipment with highlighted features have been provided to substantiate the ticked sub-items in BEAM checklist CHK-001. In view of these, one credit is achieved.

6.2.3 WASTE DISPOSAL FACILITIES

One Credit 1 credit for the provision of a hygienic refuse collection system.

The project team was unable to provide details of refuse collection chamber, equipment catalogue of carbon filter and air purifier to demonstrate that independent mechanical ventilation system has been installed to ensure hygiene of refuse collection system serving the premises. In view of these, this credit is not achieved.

6.3 INDOOR AIR QUALITY

6.3.1 CONSTRUCTION IAQ MANAGEMENT

6.3.1a Construction IAQ Management

One Credit 1 credit for implementing a Construction IAQ Management Plan.

The project team was unable to provide completed BEAM checklist CHK-032 and construction IAQ Management Plan to indicate that construction IAQ management plan has been incorporated into site practices during construction. In view of these, this credit is not achieved.

6.3.1b Filter Replacement and Flush-out

One Credit 1 credit for a building “flush out” or “bake out”; and replacement of all filters prior to occupancy.

The project team was unable to demonstrate that the completion of flush out for at least 1 week as per requirements in construction IAQ management plan. Furthermore, relevant filter replacement records and photographs have not been provided to demonstrate compliance. In view of these, this credit is not achieved.

6.3.2 OUTDOOR SOURCES OF AIR POLLUTION

6.3.2a Carbon Monoxide

One Credit 1 credit for demonstrating compliance with the appropriate criteria for CO of less than 10,000μg /m³ (8.7ppm) (8-hour average at 25°C and 101.325kPa) for office building and public places. For other occupied areas, the criteria shall be that defined in the Guidance Note, in ASHRAE 62-2001, or other equivalent standard.

The project team has conducted IAQ measurement, with reference to the methodology in EPD’s Indoor Air Quality Certification Scheme for Offices and Public Places, in normally occupied areas in the premises such as offices to demonstrate that carbon monoxide level in these areas are below 10,000μg/m³ (8-hour average at 25°C and 101.325kPa) based on the worst-case scenario. In view of these, one credit is achieved.

6.3.2b Nitrogen Dioxide

One Credit 1 credit for demonstrating compliance with the appropriate criteria for NO₂ of less than 150μg /m³ (8-hour average at 25°C and 101.325 kPa) for office building and public places. For other occupied areas, the criteria shall be that defined in the Guidance Note, in ASHRAE 62-2001, or other equivalent standard.

The project team has conducted IAQ measurement, with reference to the methodology in EPD’s Indoor Air Quality Certification Scheme for Offices and Public Places, in normally occupied areas in the premises such as offices to demonstrate that nitrogen dioxide level in these areas are below 150μg /m³ (8-hour average at 25°C and 101.325kPa) based on the worst-case scenario. In view of these, one credit is achieved.
6.3.2c Ozone
One Credit
1 credit for demonstrating compliance with the appropriate criteria for ozone of less than 120μg/m³ (8-hr average at 25°C and 101.325kPa) for office building and public places. For other occupied areas, the criteria shall be that defined in the Guidance Note, in ASHRAE 62-2001, or other equivalent standard.

The project team has conducted IAQ measurement, with reference to the methodology in EPD’s Indoor Air Quality Certification Scheme for Offices and Public Places, in normally occupied areas in the premises such as offices to demonstrate that ozone level in these areas are below 120μg/m³ (8-hr average at 25°C and 101.325kPa) based on the worst-case scenario. In view of these, one credit is achieved.

6.3.2d Respirable Suspended Particles
One Credit
1 credit for demonstrating compliance with the appropriate criteria for Respirable Suspended Particulate (RSP) of less than 180μg/m³ (8-hr average at 25°C and 101.325kPa) for office building and public places. For other occupied areas, the criteria shall be that defined in the Guidance Note, in ASHRAE 62-2001, or other equivalent standard.

The project team has conducted IAQ measurement, with reference to the methodology in EPD’s Indoor Air Quality Certification Scheme for Offices and Public Places, in normally occupied areas in the premises such as offices to demonstrate that RSP level in these areas are below 180μg/m³ (8-hr average at 25°C and 101.325kPa) based on the worst-case scenario. In view of these, one credit is achieved.

6.3.3 INDOOR SOURCES OF AIR POLLUTION

6.3.3a Volatile Organic Compounds
One Credit
1 credit for demonstrating compliance with the appropriate criteria for Volatile Organic Compounds (VOC) of less than 600μg/m³ (8-hr average at 25°C and 101.325kPa) for office building and public places. For other occupied areas, the criteria shall be that defined in the Guidance Note, in ASHRAE 62-2001, or other equivalent standard.

The project team was unable to demonstrate that VOC level in normally occupied areas in the premises such as offices are below 600μg/m³ (8-hr average at 25°C and 101.325kPa) based on the worst-case scenario. In view of these, this credit is not achieved.

6.3.3b Formaldehyde
One Credit
1 credit for demonstrating compliance with the appropriate criteria for formaldehyde of less than 100μg/m³ (8-hr average at 25°C and 101.325kPa) for office building and public places. For other occupied areas, the criteria shall be that defined in the Guidance Note, in ASHRAE 62-2001, or other equivalent standard.

The project team has conducted IAQ measurement, with reference to the methodology in EPD’s Indoor Air Quality Certification Scheme for Offices and Public Places, in normally occupied areas in the premises such as offices to demonstrate that formaldehyde level in these areas are below 100μg/m³ (8-hr average at 25°C and 101.325kPa) based on the worst-case scenario. In view of these, one credit is achieved.

6.3.3c Radon
One Credit
1 credit for demonstrating compliance with the appropriate criteria for radon of less than 200Bq/m³ (8-hr average at 25°C and 101.325kPa) for office building and public places. For other occupied areas, the criteria shall be that defined in the Guidance Note, in ASHRAE 62-2001, or other equivalent standard.

The project team has conducted IAQ measurement, with reference to the methodology in EPD’s Indoor Air Quality Certification Scheme for Offices and Public Places, in normally occupied areas in the premises such as offices to demonstrate that Radon level in these areas are below 200Bq/m³ (8-hr average at 25°C and 101.325kPa) based on the worst-case scenario. In view of these, one credit is achieved.
6.3.4 IAQ in Car Parks
One Credit
As there are no mechanically ventilated carpark areas in this development. Therefore, this credit is not applicable for this project and excluded from the total number of credits available.

6.3.5 IAQ in Public Transport Interchanges
One Credit
There are no public transport interchanges within the development and thus this credit is not applicable and excluded from the total number of credits available.

6.4 Ventilation
6.4.1 Ventilation in Air-Conditioned Premises
6.4.1a Outdoor Air Ventilation Rate
One Credit
1 credit for demonstrating that the corrected design ventilation rate meets the design intent for normally occupied spaces, and the corresponding outdoor air flow rate is achieved.

The project team has provided calculation, with reference to as-built PAU schedule and fresh air rate calculation, to demonstrate that quantity of fresh air provided to normally occupy spaces in the premises meets the requirement as specified in ASHRAE 62.1-2007. In view of these, one credit is achieved.

6.4.1b Air Change Effectiveness
One Credit
1 credit for demonstrating that the air change effectiveness in normally occupied areas meets the specified performance.

The project team was unable to conduct ventilation effectiveness tests to demonstrate that the air change effectiveness in normally occupied areas meets BEAM requirement. In view of these, this credit is not achieved.

6.4.2 Background Ventilation
Two Credits
This section is for decentralised air–conditioned premises, thus these credits are not applicable to this project and excluded from the total number of credits available.

6.4.3 Uncontrolled Ventilation
Two Bonus Credits
This section is for decentralised air–conditioned premises, thus these bonus credits are not applicable to this project and excluded from the total number of credits available.

6.4.4 Localized Ventilation
6.4.4a Source Control
One Credit
1 credit for the provision of an adequate ventilation system for rooms/areas where significant indoor pollution sources are generated.

The project team has provided air change calculation, with reference to as-built fan schedule, and as-built MVAC layout to demonstrate that independent mechanical ventilation system have been provided to rooms where significant indoor pollution sources are generated such as:

- Refuse collection chamber.

In view of these, one credit is achieved.

6.4.4b Local Exhaust
One Credit
1 credit for the provision of a system of local exhaust of premises undergoing fit-out and redecoration.

The project team was unable to demonstrate that there is a provision of reserved exhaust system for flushes out during future fit-out and redecoration in the premises. In view of these, this credit is not achieved.
6.4.5 Natural Ventilation in Common Areas

6.4.5a Ventilation by Any Means
One Credit
1 credit for demonstrating that all enclosed common areas in a building are provided with adequate ventilation.

The project team demonstrated that all enclosed common areas (corridor, lift lobbies) in the development are provided with ventilation rate that meet the PNAP 278 recommendations. Environmental performance assessment report has been provided to demonstrate compliance. In view of these, one credit is achieved.

6.4.5b Use of Natural Ventilation
One Bonus Credit
1 BONUS credit where the provision for ventilation is by natural means.

The project team demonstrated that adequate ventilation has been provided to at least 80% of total area of common area in the building via utilisation of natural ventilation. Environmental performance assessment report has been provided to demonstrate compliance. In view of these, one bonus credit is achieved.

(This credit is considered as a bonus credit and included in the total number of credits gained but excluded in the total number of credits available.)

6.5 THERMAL COMFORT

6.5.1 THERMAL COMFORT IN AIR-CONDITIONED PREMISES

6.5.1a Temperature
Two Credits
1 credit for sustaining the air temperature at the design value within ±1°C when the air side system is operating at steady state under conditions of zero occupancy.

1 credit for sustaining the air temperature at the design value within ±1°C when the air side system is operating at steady state under simulated full-load conditions.

The project team has conducted 8-hrs temperature measurement and produced temperature profiles to demonstrate that the air-conditioning system is capable to operate with fluctuation of the temperature within ±1°C under both full-load and no-load conditions in at least 90% of occupied areas. In view of these, two credits are achieved.

6.5.1b Room Air Distribution
One Credit
1 credit where room air diffusers satisfy the Air Diffusion Performance Index.

The project team indicated that the Air Diffusion Performance Index study for occupied air-conditioned areas in the building has not been carried out. In view of this, this credit is not achieved.

6.5.2 THERMAL COMFORT IN NATURALLY VENTILATED PREMISES

Three Credits
This section is for decentralised air-conditioned premises, thus these credits are not applicable to this project and excluded from the total number of credits available.

6.6 LIGHTING QUALITY

6.6.1 NATURAL LIGHTING
Three Credits
1 credit where the provision of daylight meets the levels specified in PNAP 278 for vertical daylight factor OR the average daylight factor (DF) is at least 0.5% for all normally occupied spaces.

2 credits where the average daylight factor in all normally occupied spaces is at least 1%.

3 credits where the average daylight factor in all normally occupied spaces is at least 2%.

The project team was unable to demonstrate that daylight factors of at least 0.5% can be achieved for normally occupied spaces in the premises. In view of these, these credits are not achieved.
6.6.2 INTERIOR LIGHTING IN NORMALLY OCCUPIED AREAS

6.6.2a Illuminance

One Credit

1 credit where the prescribed lighting performance in each type of premises in respect of maintained illuminance and illuminance variation is achieved.

The project team was unable to demonstrate that lighting designs for occupied areas including offices comply with illuminance, illuminance variation and uniformity requirements specified in CIBSE. In view of these, this credit is not achieved.

6.6.2b Lighting Quality

Two Credits

1 credit for lighting installations in which the limiting unified glare rating is achieved; and light sources have an appropriate colour rendering index.

The project team was unable to demonstrate that lighting designs for occupied areas including office comply with glare index and colour rendering index specified in CIBSE. In view of these, this credit is not achieved.

1 credit where fluorescent and other lamps with modulating (fluctuating) output are fitted with dimmable high-frequency ballasts in all work areas.

The project team was unable to demonstrate that dimmable high-frequency ballasts have been provided to all fluorescent and other lamps with modulating (fluctuating) output. In view of this, this credit is not achieved.

6.6.3 INTERIOR LIGHTING IN AREAS NOT NORMALLY OCCUPIED

One Credit

1 credit where the prescribed lighting performance in each type of common or service space in respect of light output and lighting quality is achieved.

The project team was unable to demonstrate that lighting designs for not normally occupied areas including staircase and lift lobby complies with CIBSE or equivalent requirements in terms of illuminance and limiting glare index. In view of these, this credit is not achieved.

6.7 ACOUSTICS AND NOISE

6.7.1 Room Acoustics

One Credit

1 credit for demonstrating that the reverberation time in applicable rooms meets the prescribed criteria for given types of premises. The reverberation time of A-weighted sound pressure level, in modular (private) offices and conference rooms, shall be 0.6s or below.

The project team was unable to demonstrate that impact on acoustical properties has been considered in design stage. In view of these, this credit is not achieved.

6.7.2 Noise Isolation

Two Credits

1 credit for demonstrating airborne noise isolation between rooms, spaces and premises meets the prescribed criteria:

The project team has carried out acoustic simulation to demonstrate that airborne noise isolation between rooms and premises within the building development complies with Noise Insulation Class (NIC) requirements. Acoustics and noise evaluation reports for Noise Insulation Class (NIC) have been provided to demonstrate compliance. In view of these, one credit is achieved.

1 credit for demonstrating impact noise isolation between floors meets the prescribed criteria.

The project team has carried out acoustic measurement to demonstrate that impact noise isolation between floors within the Premises complies with Impact Insulation Class (IIC) requirements. Acoustics and noise evaluation reports for Impact Insulation Class (IIC) have been provided to demonstrate compliance. In view of these, one credit is achieved.
6.7.3 BACKGROUND NOISE

One Credit

1 credit for demonstrating background noise levels are within the prescribed criteria:

- In bedrooms under window closed conditions at or below 30dB $L_{A_{eq},T}=8hr$, and <45dB between 23:00 to 07:00.
- In habitable rooms (other than kitchens) under closed window conditions < 55dB $L_{A_{eq},T}=16hr$ between 07:00 to 23:00.
- Modular (private) offices and small conference rooms: 40dB $L_{A_{eq},T} = 8hr$ or 45 dB $L_{A_{eq},T} = 5min$
- Large landscaped offices: 45dB $L_{A_{eq},T} = 8hr$ or 50dB $L_{A_{eq},T} = 5min$
- Background noise shall be below 45dB $L_{A_{max}}$ in schools in urban areas, otherwise at or below 40dB $L_{A_{max}}$, effective between the hours of 08:00 to 16:00

The project team has conducted acoustical calculation to demonstrate that external noise source (e.g. traffic noise) and internal noise source (e.g. equipment plants) to occupied areas within the premises, based on worst case scenario, comply with BEAM's requirements. In view of these, one credit is achieved.

6.7.4 INDOOR VIBRATION

One Bonus Credit

1 BONUS credit for demonstrating vibration levels shall not exceed the prescribed criteria given in ISO 2631-2.

The project team demonstrated that indoor vibration level within the building does not exceed the prescribed criteria given in ISO 2631-2 by providing indoor vibration measurement report with reference to the vibration level of lift motor, generator and pump. In view of these, one bonus credit is achieved.

(This credit is considered as a bonus credit and included in the total number of credits gained but excluded in the total number of credits available.)

6.8 BUILDING AMENITIES

6.8.1 ACCESS FOR PERSONS WITH DISABILITY

One Credit

1 credit for providing enhanced provisions for access for disabled persons.

The project team demonstrated that three enhanced provisions for access for disable persons have been provided in addition to Buildings Department’s COP for Barrier Free Access 2008. Furthermore, corresponding layout drawings and explanation has been provided to demonstrate compliance and these enhanced provisions for access for disabled persons have been inspected during final building survey. In view of these, one credit is achieved.

6.8.2 AMENITY FEATURES

6.8.2a Amenities for the Benefit of Building Users

One Credit

1 credit for providing amenity features that enhance the quality and functionality of a building to the benefit of building users.

The project team demonstrated that the following amenity features have been provided:

- Recreational facilities such as courtyard;
- Service counter, care taker office, lavatory and store for building management staff;

Furthermore, these amenity features have been verified during the final building survey for verification. In view of these, one credit is achieved.

6.8.2b Amenities for Improved Operation and Maintenance

One Credit

1 credit for providing amenity features that allow for improved operation and maintenance of the building and its engineering services.

The project team demonstrated that amenity features, such as mobile platform have been provided to facilitate routine maintenance of the building. In view of these, one credit is achieved.
6.8.3 IT PROVISIONS

One Credit

1 credit for including the required percentage of serviceability measures and IT facilities identified.

The project team indicated that 66.6% of the applicable items as stated in BEAM checklist CHK-044 have been provided in the building (including equipment room with a minimum area of 20m² and space, with demarcation for at least 3 service providers, etc.). Furthermore, supporting information in form of comprehensive explanation to items in the checklist and layout drawings have been provided as substantiation. These IT provisions have been inspected during final building survey. In view of these, one credit is achieved.
7 INNOVATIONS AND PERFORMANCE ENHANCEMENTS

7.1 INNOVATIVE TECHNIQUES (Bonus Credits)

Three Bonus Credits

This section applies to advanced practices and new techniques which have not yet been widely
adopted in Hong Kong or even elsewhere. Any credits gained are regarded as bonus credits,
towards the total number of credits obtained, but excluded from the total number of applicable
credits.

_The project team is not claiming any bonus credit under section 7.1 – Innovative Techniques._

(These credits are considered as bonus credit and included as the total number of credits gained
but excluded in the total number of credits available.)

7.2 PERFORMANCE ENHANCEMENTS (Bonus Credits)

Two Bonus Credits

Bonus credits in this section are available for strategies and techniques which perform significantly
beyond BEAM requirements (e.g., energy, water and materials savings). Any credits gained are
designated towards the total number of credits obtained, but excluded from the total number of
applicable credits.

1. Application of electronic document management system - Aconex

_The Project Team utilises Aconex to act as a platform of documents/drawings sharing to reduce
the consumption of paper. Aconex is an intelligent client-server based drawing and document
management system. It follows the work practices of CAD design industry; and integrates with
production and management workflow to best suit the needs of CAD design enterprises. With its
unique artificial intelligence drawing pattern recognition technology, Aconex facilitates the Project
Team to greatly enhance the efficiency of information management and CAD design processes._

According to the records of Electronic Document Management System, 912,100 sheets were
saved by using Electronic Document Management System, which saved approximately 5.0 tonnes
of wood.

(These credits are considered as bonus credit and included as the total number of credits gained but
excluded in the total number of credits available.)
8. RESULT OF THE FINAL BEAM ASSESSMENT

8.1 SUMMARY OF CREDITS ACHIEVED

The tables in Appendix I summarize the credit allocation for each assessment criterion, previously described in Sections 2 to 7.

For assessment criteria which are not applicable to the project, these are designated as “N/A” in the table. For credits which have been achieved these are allocated with a number. For assessment criteria which are considered as not possible under constrains of the project, these are designated as zero (“0”). Bonus credits (included as the total number of credits gained but excluded in the total number of credits available) are also highlighted in the table.

Based upon credit allocation for the premises, the status of this project may be summarised as follows:

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Applicable Credits</th>
<th>Applicable Bonus Credits</th>
<th>Credits Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Aspects (Section 2)</td>
<td>23</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Materials Aspects (Section 3)</td>
<td>18</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>Energy Use (Section 4)</td>
<td>25</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Water Use (Section 5)</td>
<td>10</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>IEQ (Section 6)</td>
<td>39</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Innovations (Section 7)</td>
<td>-</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Total Number of Credits</td>
<td>115</td>
<td>12</td>
<td>77</td>
</tr>
</tbody>
</table>

In conclusion, the development has achieved 77 credits in total and specifically 25 credits in the IEQ section.

8.2 CALCULATION OF THE BEAM RATING

The BEAM rating is established on the basis of the overall number of applicable credits that have been achieved, subject to the number of applicable credits accomplished in the Indoor Environmental Quality section.

For this project, a total of 115 credits have been designated as applicable, with 39 credits designated as applicable in the Indoor Environmental Quality section. The number of credits required to obtain a particular BEAM rating is therefore as shown overleaf.

---

Given the importance of occupant health and comfort in buildings, developments are required to score a certain minimum number of credits in the Indoor Environmental Quality section before achieving a particular overall BEAM rating as follows:

<table>
<thead>
<tr>
<th>Overall</th>
<th>IEQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronze</td>
<td>40%</td>
</tr>
<tr>
<td>Silver</td>
<td>55%</td>
</tr>
<tr>
<td>Gold</td>
<td>65%</td>
</tr>
<tr>
<td>Platinum</td>
<td>75%</td>
</tr>
<tr>
<td>Rating</td>
<td>Overall credits required (from 115 applicable credits)</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td><strong>BRONZE Rating</strong></td>
<td>46</td>
</tr>
<tr>
<td><strong>SILVER Rating</strong></td>
<td>64</td>
</tr>
<tr>
<td><strong>GOLD Rating</strong></td>
<td>75</td>
</tr>
<tr>
<td><strong>PLATINUM Rating</strong></td>
<td>87</td>
</tr>
</tbody>
</table>

Based on the information provided and commitment from the designers, the premises has achieved 77 credits in total and specifically 25 credits in the IEQ section, which is sufficient to achieve a final BEAM rating of **Gold**.
APPENDIX I

SUMMARY OF FINAL BEAM ASSESSMENT

For ease of reference, the labelling system used in this summary of credits is identified to the system adopted in the standard BEAM guidebook for *New Development* (Version 4/04).

<table>
<thead>
<tr>
<th>2</th>
<th>SITE ASPECTS</th>
<th>Applicable Credit(s)</th>
<th>Credit(s) Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>SITE LOCATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.1</td>
<td>Land Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Reclaimed land</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>b) Previously developed site</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2.1.2</td>
<td>Contaminated Land</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2.1.3</td>
<td>Local Transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Carparking Provisions</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>b) Public Transport</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2.1.4</td>
<td>Neighbourhood Amenities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Provisions of Basic Services</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>b) Neighbourhood Recreational Facilities</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>c) Provided Recreational Facilities</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>SITE PLANNING AND DESIGN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.1</td>
<td>Site Design and Appraisal</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2.2.2</td>
<td>Ecological Impact</td>
<td>1</td>
<td>0</td>
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<tr>
<td>2.2.3</td>
<td>Culture Heritage</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2.2.4</td>
<td>Landscaping and Planters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Hard Landscaping</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>b) Soft Landscaping</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2.2.5</td>
<td>Microclimate Around Building</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Wind Amplification</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>b) Elevated Temperatures</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2.2.6</td>
<td>Overshadowing and Views</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Minimum Daylight</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>b) Negative Impacts</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2.2.7</td>
<td>Vehicular Access</td>
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<td>1</td>
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<tr>
<td>2.2.8</td>
<td>Environmental Management Plan</td>
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<td>1</td>
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<tr>
<td>2.3</td>
<td>EMISSIONS FROM SITE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3.1</td>
<td>Air Pollution During Construction</td>
<td>1</td>
<td>1</td>
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<td>2.3.2</td>
<td>Noise During Construction</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Water Pollution During Construction</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2.3.4</td>
<td>Emissions from Cooling Towers</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2.3.5</td>
<td>Noise from Building Equipment</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2.3.6</td>
<td>Light Pollution</td>
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</tr>
</tbody>
</table>

Total Site Aspects Credits

(From a maximum of 23 applicable credits) 23 16
### MATERIALS ASPECTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Applicable Credit(s)</th>
<th>Achieved Credit(s)</th>
</tr>
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<tbody>
<tr>
<td>3.1</td>
<td>EFFICIENT USE OF MATERIALS</td>
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<tr>
<td>3.1.1</td>
<td>Building Reuse (2 credits)</td>
<td>N/A</td>
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<td>3.1.2</td>
<td>Modular and Standardised Design</td>
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<tr>
<td>3.1.3</td>
<td>Off-site Fabrication (2 credits)</td>
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<tr>
<td>3.1.4</td>
<td>Adaptability and Deconstruction</td>
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<tr>
<td>3.1.4.a</td>
<td>Spatial Flexibility</td>
<td>1</td>
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<tr>
<td>3.1.4.b</td>
<td>Flexible Servicing</td>
<td>1</td>
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<tr>
<td>3.1.4.c</td>
<td>Structural Flexibility</td>
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<tr>
<td>3.1.5</td>
<td>Envelope Durability</td>
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<tr>
<td>3.2</td>
<td>SELECTION OF MATERIALS</td>
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<td>3.2.1</td>
<td>Rapidly Renewable Materials</td>
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<td>3.2.2</td>
<td>Sustainable Forest Products</td>
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<td>3.2.2.a</td>
<td>Timber Use for Temporary Works</td>
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<td>Forest Products Used in the Building</td>
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<td>3.2.3</td>
<td>Recycled Materials</td>
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<td>3.2.3.a</td>
<td>Outside Surface Works and Structures</td>
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<td>3.2.3.b</td>
<td>Building Structure</td>
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<td>3.2.4</td>
<td>Ozone Depleting Substances</td>
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<td>3.2.4.a</td>
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<td>3.3</td>
<td>WASTE DISPOSAL AND RECYCLING FACILITIES</td>
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<tr>
<td>3.3.1</td>
<td>Demolition Waste</td>
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<tr>
<td>3.3.1.a</td>
<td>Waste Management</td>
<td>N/A</td>
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<td>3.3.1.b</td>
<td>Sorting and Recycling of Waste</td>
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<td>3.3.1.c</td>
<td>Quantity of Recycling Waste (2 credits)</td>
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<td>3.3.2</td>
<td>Construction Waste</td>
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<tr>
<td>3.3.2.a</td>
<td>Waste Management</td>
<td>1</td>
<td>1</td>
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<tr>
<td>3.3.2.b</td>
<td>Sorting and Recycling of Waste</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3.3.2.c</td>
<td>Quantity of Recycling Waste</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3.3.3</td>
<td>Waste Recycling Facilities</td>
<td>1</td>
<td>1</td>
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</table>

**Total Materials Aspects Credits**

<table>
<thead>
<tr>
<th>Credits Achieved</th>
<th>From a maximum of 18 applicable credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>18</td>
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</tbody>
</table>

(From a maximum of 18 applicable credits)
## 4 ENERGY USE

### 4.1 ANNUAL ENERGY USE

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Applicable Credit(s)</th>
<th>Achieved Credit(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Energy Use in Educational Buildings</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Estimated Annual Energy Consumption (8 credits)</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Estimated Maximum Electricity Demand (3 credits)</td>
<td>3</td>
<td>3</td>
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### 4.2 ENERGY EFFICIENT SYSTEMS

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Applicable Credit(s)</th>
<th>Achieved Credit(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embodied Energy in Buildings Structural elements (2 credits)</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Controls for Energy Conservation</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Energy Efficient Ventilation System &amp; Equipment (2 credits)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Controls for Energy Conservation</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Energy Efficient Luminaries (2 credits)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Controls for Energy Conservation</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Less Densely Populated Areas</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Hot Water Supply System</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Lift and Escalator Systems</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Electrical Systems</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Renewable Energy Systems (3 Bonus Credits)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Energy Efficient Appliances</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Less Densely Populated Areas</td>
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<td>0</td>
</tr>
</tbody>
</table>

When assessing this building complex with classroom and office area, an Area Weighting Method is introduced for the Energy categories only as the differences in these categories is much significant than others. Under the area weighting method, the credits achieved are multiplied by the areas (in percentage of the overall normally occupied building areas) of particular part of the building complex. Some criteria are suitable only for classroom or office area while the others are suitable for all areas within the premise as highlighted in the abovementioned table. Summation of credits of individual parts of the building complex results in the overall weighted credits.

CFA of Classroom (A): 8,268m² (36.8% of the total CFA)
CFA of Office (B): 14,179m² (63.2% of the total CFA)
<table>
<thead>
<tr>
<th>Bldg type</th>
<th>Total credits available</th>
<th>Credits achieved</th>
<th>% of total CFA</th>
<th>Weighted credits available</th>
<th>Weighted credits achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>25</td>
<td>19</td>
<td>36.8</td>
<td>9.2</td>
<td>7.0</td>
</tr>
<tr>
<td>B</td>
<td>25</td>
<td>19</td>
<td>63.2</td>
<td>15.8</td>
<td>12.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25.0</strong></td>
<td><strong>19.0</strong></td>
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</tr>
</tbody>
</table>

**Total Energy Use Credits (From a maximum of 25.0 applicable and 3.0 Bonus Credits)**

### 5 WATER USE

#### 5.1 WATER QUALITY

5.1.1 Water Quality
- **a)** Fresh Water Plumbing
  - 1
- **b)** Water Quality Survey
  - 1

#### 5.2 WATER CONSERVATION

5.2.1 Annual Water Use
- **a)** Annual saving of 15%
  - 1
- **b)** Annual saving of 25%
  - 1
- **c)** Annual saving of 35%
  - 1

5.2.2 Monitoring and Control (2 credits)
- 2

5.2.3 Water Use for Irrigation
- N/A

5.2.4 Water Recycling
- **a)** Harvested Rainwater
  - 1
- **b)** Provisions for Grey Water Recycling (Bonus Credit)
  - 1
- **c)** Recycled Water (Bonus Credit)
  - 1

5.2.5 Water Efficient Facilities and Appliances
- **a)** Water Efficient Facilities (Pools, Spa, Fountains, etc.)
  - 1
- **b)** Water Efficient Appliances
  - N/A

#### 5.3 EFFLUENT

5.3.1 Effluent Discharge to Foul Sewers
- 1

**Total Water Use Credits**
- 10
- 5

(From a maximum of 10 applicable and 2 Bonus credits)
### 6 INDOOR ENVIRONMENTAL QUALITY

<table>
<thead>
<tr>
<th></th>
<th>Applicable Credit(s)</th>
<th>Credit(s) Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6.1 SAFETY &amp; SECURITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1.1 Fire Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Design Integration</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>b) Fire Safety Manual</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6.1.2 Electromagnetic Compatibility</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6.1.3 Security</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>6.2 HYGIENE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2.1 Plumbing &amp; Drainage</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6.2.2 Biological Contamination</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6.2.3 Waste Disposal Facilities</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>6.3 INDOOR AIR QUALITY</strong></td>
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</tr>
<tr>
<td>6.3.1 Construction IAQ Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Construction IAQ Management</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>b) Filter Replacement and Flush-out</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6.3.2 Outdoor Sources of Air Pollution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Carbon Monoxide</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>b) Nitrogen Dioxide</td>
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<td>1</td>
</tr>
<tr>
<td>c) Ozone</td>
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<td>1</td>
</tr>
<tr>
<td>d) Respirable Suspended Particles</td>
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<td>1</td>
</tr>
<tr>
<td>6.3.3 Indoor Sources of Air Pollution</td>
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<td></td>
</tr>
<tr>
<td>a) Volatile Organic Compounds</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>b) Formaldehyde</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>c) Radon</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6.3.4 IAQ in Car Parks</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>6.3.5 IAQ in Public Transport Interchanges</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>6.4 VENTILATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.4.1 Ventilation in Air-conditioned Premises</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Outdoor Air Ventilation Rate</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>b) Air Change Effectiveness</td>
<td>1</td>
<td>1</td>
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<tr>
<td>6.4.2 Background Ventilation (2 credits)</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>6.4.3 Uncontrolled Ventilation (2 Bonus Credits)</td>
<td>N/A</td>
<td>N/A</td>
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<td>6.4.4 Localized Ventilation</td>
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</tr>
<tr>
<td>a) Source Control</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>b) Local Exhaust</td>
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<td>1</td>
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<tr>
<td>6.4.5 Ventilation in Common Areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Ventilation by Any Means</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>b) Use of Natural Ventilation (Bonus Credit)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>6.5 THERMAL COMFORT</strong></td>
<td></td>
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</tr>
<tr>
<td>6.5.1 Thermal Comfort in Centrally Air-conditioned Premises</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Temperature (2 credits)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>b) Room Air Distribution</td>
<td>1</td>
<td>1</td>
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<tr>
<td>6.5.2 Thermal Comfort in Naturally Ventilated Premises</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Performance with Natural Ventilation (2 credits)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>b) Performance with Air-conditioning</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

(Continued overleaf)
6.6 LIGHTING QUALITY
6.6.1 Natural Lighting (3 credits) 3 3 0 0
6.6.2 Interior Lighting in Normally Occupied Areas
   a) Illuminance 1 1 0 0
   b) Lighting Quality (2 credits) 2 2 0 0
6.6.3 Interior Lighting in Areas Not Normally Occupied 1 1 0 0

6.7 ACOUSTIC AND NOISE
6.7.1 Room Acoustics 1 1 0 0
6.7.2 Noise Isolation 2 2 2 2
6.7.3 Background Noise 1 1 1 1
6.7.4 Indoor Vibration (1 Bonus Credit) 1 1 1 1

6.8 BUILDING AMENITIES
6.8.1 Access for Persons with Disability 1 1 1 1
6.8.2 Amenity Features
   a) Amenities for the Benefit of Building Users 1 1 1 1
   b) Amenities for Improved Operation and Maintenance 1 1 1 1
6.8.3 IT Provisions 1 1 1 1

When assessing this building complex with classroom and office area, an Area Weighting Method is introduced for the IEQ categories only as the differences in these categories is much significant than others. Under the area weighting method, the credits achieved are multiplied by the areas (in percentage of the overall normally occupied building areas) of particular part of the building complex. Some criteria are suitable only for classroom or office area while the others are suitable for all areas within the premise as highlighted in the abovementioned table. Summation of credits of individual parts of the building complex results in the overall weighted credits.

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<thead>
<tr>
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<th>Total credits available</th>
<th>Credits achieved</th>
<th>% of total CFA</th>
<th>Weighted credits available</th>
<th>Weighted credits achieved</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>39</td>
<td>25</td>
<td>36.8</td>
<td>14.4</td>
<td>9.2</td>
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<tr>
<td>B</td>
<td>39</td>
<td>25</td>
<td>63.2</td>
<td>24.6</td>
<td>15.8</td>
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<tr>
<td>Total</td>
<td>39.0</td>
<td>25</td>
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<td>25.0</td>
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Total IEQ Credits (From a maximum of 39.0 applicable and 2.0 Bonus credits)

7 INNOVATION AND PERFORMANCE ENHANCEMENTS

<table>
<thead>
<tr>
<th>Applicable Credit(s)</th>
<th>Credit(s) Achieved</th>
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<tbody>
<tr>
<td>7.1 INNOVATIVE TECHNIQUES (3 Bonus Credits)</td>
<td>3</td>
</tr>
<tr>
<td>7.2 PERFORMANCE ENHANCEMENTS (2 Bonus Credits)</td>
<td>2</td>
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</table>

Total Innovation and Performance Enhancements Credits (From a maximum of 5 Bonus credits) 5 1
A summary of the assessment criteria for credits achieved, credits not applicable and credits not achieved are provided in the following tables.

**TABLE 1. SUMMARY OF NOT APPLICABLE CREDITS**

The following summaries 43 credits which are not applicable for this development project:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>BEAM Criteria</th>
<th>No. of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2.1.2</td>
<td>Contaminated Land</td>
<td>1</td>
</tr>
<tr>
<td>Section 2.2.3</td>
<td>Culture Heritage</td>
<td>1</td>
</tr>
<tr>
<td>Section 3.1.1</td>
<td>Building Reuse</td>
<td>2</td>
</tr>
<tr>
<td>Section 3.3.1</td>
<td>Demolition Waste</td>
<td>4</td>
</tr>
<tr>
<td>Section 4.1.1, 4.1.2, 4.1.4, 4.1.5 &amp; 4.1.6</td>
<td>Annual Energy Use for Buildings other than Educational Buildings</td>
<td>13 Max</td>
</tr>
<tr>
<td>Section 4.2.2</td>
<td>Ventilation Systems in Mechanical Ventilated Buildings</td>
<td>3</td>
</tr>
<tr>
<td>Section 4.2.3</td>
<td>Lighting Systems in Mechanical Ventilated Buildings</td>
<td>3</td>
</tr>
<tr>
<td>Section 4.2.4</td>
<td>Hot Water Supply System</td>
<td>1</td>
</tr>
<tr>
<td>Section 4.3.1</td>
<td>Air-conditioning Units</td>
<td>3</td>
</tr>
<tr>
<td>Section 4.3.2</td>
<td>Clothes Drying Facilities</td>
<td>1</td>
</tr>
<tr>
<td>Section 4.3.4</td>
<td>Heat Reclaim</td>
<td>1</td>
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<tr>
<td>Section 4.3.5</td>
<td>Mechanical Ventilation in Hotel Buildings</td>
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</tr>
<tr>
<td>Section 5.2.3</td>
<td>Water Use for Irrigation</td>
<td>1</td>
</tr>
<tr>
<td>Section 5.2.5b</td>
<td>Water Efficient Appliances</td>
<td>1</td>
</tr>
<tr>
<td>Section 6.3.4</td>
<td>IAQ in Car Parks</td>
<td>1</td>
</tr>
<tr>
<td>Section 6.3.5</td>
<td>IAQ in Public Transport Interchanges</td>
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</tr>
<tr>
<td>Section 6.4.2</td>
<td>Background Ventilation</td>
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<tr>
<td>Section 6.5.2</td>
<td>Thermal Comfort in Naturally Ventilated Premises</td>
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</tbody>
</table>

**TABLE 2. SUMMARY OF CREDITS ACHIEVED**

The following summaries 77 credits which have been confirmed to comply with BEAM requirements:

<table>
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<tr>
<th>Item No.</th>
<th>BEAM Criteria</th>
<th>No. of Credits</th>
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<tbody>
<tr>
<td>Section 2.1.1</td>
<td>Land Use</td>
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<tr>
<td>Section 2.1.3b</td>
<td>Public Transport</td>
<td>1</td>
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<td>Section 2.1.4</td>
<td>Neighborhood Amenities</td>
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<tr>
<td>Section 2.2.1</td>
<td>Site Design and Appraisal</td>
<td>1</td>
</tr>
<tr>
<td>Section 2.2.4b</td>
<td>Soft Landscaping</td>
<td>1</td>
</tr>
<tr>
<td>Section 2.2.5b</td>
<td>Elevated Temperatures</td>
<td>1</td>
</tr>
<tr>
<td>Section 2.2.7</td>
<td>Vehicular Access</td>
<td>1</td>
</tr>
<tr>
<td>Section 2.2.8</td>
<td>Environmental Management Plan</td>
<td>1</td>
</tr>
<tr>
<td>Section 2.3.1</td>
<td>Air Pollution During Construction</td>
<td>1</td>
</tr>
<tr>
<td>Section 2.3.2</td>
<td>Noise During Construction</td>
<td>1</td>
</tr>
<tr>
<td>Section 2.3.3</td>
<td>Water Pollution During Construction</td>
<td>1</td>
</tr>
<tr>
<td>Section 2.3.4</td>
<td>Emissions from Wet Cooling Towers</td>
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</tr>
<tr>
<td>Section 2.3.5</td>
<td>Noise from Building Equipment</td>
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</tr>
<tr>
<td>Section 3.1.2</td>
<td>Modular and Standardised Design</td>
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<tr>
<td>Section 3.1.4b</td>
<td>Spatial Flexibility</td>
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<td>Section 3.1.4c</td>
<td>Flexible Servicing</td>
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<td>Item No.</td>
<td>BEAM Criteria</td>
<td>No. of Credits</td>
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<td>Section 3.1.5</td>
<td>Envelope Durability</td>
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<td>Section 3.2.2a</td>
<td>Timber Used for Temporary Works</td>
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<td>Section 3.2.4</td>
<td>Ozone Depleting Substances</td>
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<td>Section 3.3.2</td>
<td>Construction Waste</td>
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<td>Section 3.3.3</td>
<td>Waste Recycling Facilities</td>
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</tr>
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<td>Section 4.1.3</td>
<td>Annual Energy Use in Educational Buildings</td>
<td>8</td>
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<td>Section 4.2.5</td>
<td>Lift and Escalator Systems</td>
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<td>Section 4.2.6</td>
<td>Electrical Systems</td>
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<td>Section 4.3.6</td>
<td>Energy Efficient Appliances</td>
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<tr>
<td>Section 4.4.1</td>
<td>Testing and Commissioning</td>
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</tr>
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<td>Section 4.4.2</td>
<td>Operations and Maintenance</td>
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<td>Section 4.4.3</td>
<td>Metering and Monitoring</td>
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<td>Section 5.1.1</td>
<td>Water Quality</td>
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<td>Section 5.2.1</td>
<td>Annual Water Saving of 15%</td>
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<td>Section 5.2.2</td>
<td>Monitoring and Control</td>
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</tr>
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<td>Section 5.3.1</td>
<td>Effluent Discharge to Foul Sewers</td>
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<tr>
<td>Section 6.1.1</td>
<td>Fire Safety</td>
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<td>Section 6.1.2</td>
<td>Electromagnetic Compatibility</td>
<td>1</td>
</tr>
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<td>Section 6.1.3</td>
<td>Security</td>
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<tr>
<td>Section 6.2.1</td>
<td>Plumbing &amp; Drainage</td>
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</tr>
<tr>
<td>Section 6.2.2</td>
<td>Biological Contamination</td>
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</tr>
<tr>
<td>Section 6.3.2</td>
<td>Outdoor Sources of Air Pollution</td>
<td>4</td>
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<tr>
<td>Section 6.3.3b</td>
<td>Indoor Sources of Air Pollution - Formaldehyde</td>
<td>1</td>
</tr>
<tr>
<td>Section 6.3.3c</td>
<td>Indoor Sources of Air Pollution - Radon</td>
<td>1</td>
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<tr>
<td>Section 6.4.1a</td>
<td>Outdoor Air Ventilation Rate</td>
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<td>Section 6.4.4a</td>
<td>Source Control</td>
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<tr>
<td>Section 6.4.5a</td>
<td>Ventilation in Common Areas - Ventilation by Any Means</td>
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<tr>
<td>Section 6.5.1a</td>
<td>Thermal Comfort in Air-conditioned Premises - Temperature</td>
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<tr>
<td>Section 6.7.2</td>
<td>Noise Isolation</td>
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<td>Section 6.7.3</td>
<td>Background Noise</td>
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<tr>
<td>Section 6.7.4</td>
<td>Indoor Vibration</td>
<td>1 Bonus</td>
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<tr>
<td>Section 6.8.1</td>
<td>Access for Persons with Disability</td>
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<tr>
<td>Section 6.8.2</td>
<td>Amenity Features</td>
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<td>Section 6.8.3</td>
<td>IT Provisions</td>
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<tr>
<td>Section 7.2</td>
<td>Performance Enhancements</td>
<td>1 Bonus</td>
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</table>
TABLE 3. SUMMARY OF CREDITS NOT ACHIEVED

The followings summaries 40 credits for which the BEAM requirements have not been satisfied:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>BEAM Criteria</th>
<th>No. of Credits</th>
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</thead>
<tbody>
<tr>
<td>Section 2.1.3a</td>
<td>Carparking Provisions</td>
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<tr>
<td>Section 2.2.2</td>
<td>Ecological Impact</td>
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</tr>
<tr>
<td>Section 2.2.4a</td>
<td>Hard Landscaping</td>
<td>1</td>
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<td>Section 2.2.5a</td>
<td>Wind Amplification</td>
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<td>Section 2.2.6</td>
<td>Overshadowing and Views</td>
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<td>Section 2.3.6</td>
<td>Light Pollution</td>
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<tr>
<td>Section 3.1.3</td>
<td>Off-site Fabrication</td>
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</tr>
<tr>
<td>Section 3.1.4a</td>
<td>Structural Flexibility</td>
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<td>Section 3.2.1</td>
<td>Rapidly Renewable Materials</td>
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<td>Section 3.2.2b</td>
<td>Forest Products Used in the Building</td>
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<tr>
<td>Section 3.2.3</td>
<td>Recycled Materials</td>
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<td>Section 4.1.3</td>
<td>Annual Energy Use in Educational Buildings</td>
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<tr>
<td>Section 4.2.1</td>
<td>Embodied Energy in Buildings Structural Elements</td>
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<td>Section 4.3.3</td>
<td>Energy Efficient Lighting in Public Areas</td>
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<tr>
<td>Section 5.2.1</td>
<td>Annual Water Saving of At Least 25%</td>
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<td>Section 5.2.2</td>
<td>Monitoring and Control</td>
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<td>Harvested Rainwater</td>
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<td>Section 5.2.5a</td>
<td>Water Efficient Facilities (Pools, Spans, Fountains, etc.)</td>
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<tr>
<td>Section 6.2.3</td>
<td>Waste Disposal Facilities</td>
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<tr>
<td>Section 6.3.1</td>
<td>Construction IAQ Management</td>
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<td>Section 6.3.3a</td>
<td>Indoor Sources of Air Pollution - Volatile Organic Compounds</td>
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<td>Air Change Effectiveness</td>
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<td>Section 6.4.4b</td>
<td>Local Exhaust</td>
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<td>Thermal Comfort in Air-conditioned Premises - Room Air Distribution</td>
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<td>Section 6.6.1</td>
<td>Natural Lighting</td>
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<td>Section 6.6.2</td>
<td>Interior Lighting in Normally Occupied Areas</td>
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<tr>
<td>Section 6.6.3</td>
<td>Interior Lighting in Areas Not Normally Occupied</td>
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<tr>
<td>Section 6.7.1</td>
<td>Room Acoustics</td>
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</table>

TABLE 4. SUMMARY OF APPLICABLE BONUS CREDITS

There are in total 12 bonus credits for this assessment which includes:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>BEAM Criteria</th>
<th>No. of Credits</th>
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</thead>
<tbody>
<tr>
<td>Section 4.2.7</td>
<td>Renewable Energy Systems</td>
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<tr>
<td>Section 5.2.4b</td>
<td>Provisions for Grey Water Recycling</td>
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<td>Section 5.2.4c</td>
<td>Recycled Water</td>
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<tr>
<td>Section 6.4.5b</td>
<td>Ventilation in Common Areas - Use of Natural Ventilation</td>
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<td>Section 6.7.4</td>
<td>Indoor Vibration</td>
<td>1</td>
</tr>
<tr>
<td>Section 7</td>
<td>Innovations and Performance Enhancements</td>
<td>5</td>
</tr>
</tbody>
</table>

These bonus credits are excluded from the total number of applicable credits but if achieved still count towards the overall BEAM rating. From the information provided by the project team, 2 bonus credits for Indoor Vibration and Innovations will be addressed while bonus credits for Grey Water Recycling, Recycled Water, Uncontrolled Ventilation, Renewable Energy and Use of Natural Ventilation will not be addressed.