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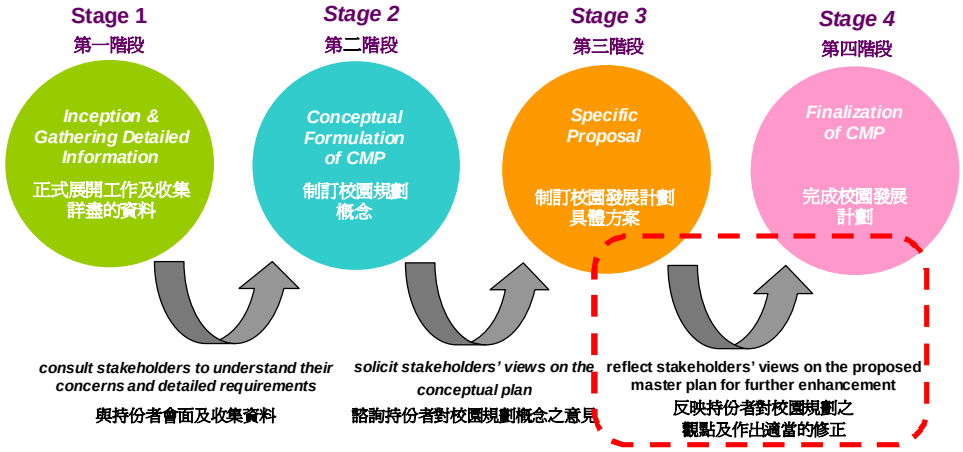
- **Introduction 引言**
- **Specific Proposals 具體建議**
  - Places for Academic & Recreational Activities 教研康體設施
  - Enhancing College Life 校園生活添姿采
  - Making a Sustainable Campus 可持續發展校園
- **Final Submission of Campus Master Plan 發展計劃顧問最後報告**

This document shall be read in conjunction with the presentation of the consultant.

Introduction 引言

Work Stages of CMP 校園發展計劃工作流程



Introduction 引言

Stage 3 Stakeholder Engagement Activities
第三階段持份者交流活動

Panel and Model Exhibition 圖片及模型展覽
- 20 January - 28 February 2009 (Mon – Sat)

Seminars 研討會
- 20 January 2009
  Presentation by Edward Cullinan on Master Planning Vision
- 21 January 2009
  Presentation of Specific Proposals:
  - Places for Academic & Recreational Activities
  - Enhancing College Life
  - Making a Sustainable Campus
- 22 January 2009
  Presentation of Specific Proposals:
  - Creating a Pedestrian-Friendly Campus
  - A Landscape of Vital Importance
  - Conserving the Places of Value

Guided Tour 中大文化徑/校園發展計劃導遊團
- 14 March 2009

Views Collection 意見收集
- February 2009

This document shall be read in conjunction with the presentation of the consultant.

Introduction 引言

Stage 2 – Stakeholders' Engagement 第二階段持份者參與計劃

***General Consensus** 持份者普遍的期望*

Conserving the Places of Value
- elaborate the proposed assessment procedure with consideration of consultation process

Places for Academic & Recreational Activities
- **maintain the Central Campus as the major teaching and administration centre**, yet avoid overcrowding
- locate research facilities relatively further away from the Central Campus
- forming communities of academic disciplines to achieve physical proximity and obtain the benefits of interdisciplinary collaboration

Enhancing College Life
- form a neighbourhood setting for the new and existing colleges
- **enhance linkage within and among colleges, particularly to enhance linkage to the Central Campus**
- maintain and enhance the identity of each college
- provide more spaces for both resident and non-resident students for social gathering and interaction
- **provide more indoor or semi-open venues for learning and share of knowledge**

A Landscape of Vital Importance
- explore thematic planting, yet maintaining the existing bio-diversity of birds and plants
- **promote use of natural trails and preserve the existing natural environment**

A Pedestrian-Friendly Campus
- **provide additional vertical links with proper integration with the buildings**
- **provide new exit at northern edge of University Station, with appropriate entrance design to enhance the University's identity**
- provide a designated and safe cycling track and parking spaces at low-level precinct
- provide centralized carpark on the fringe of campus, but with sufficient support of a comprehensive pedestrian network and improved shutter bus service
- improve shuttle bus service including reconfiguring the bus route

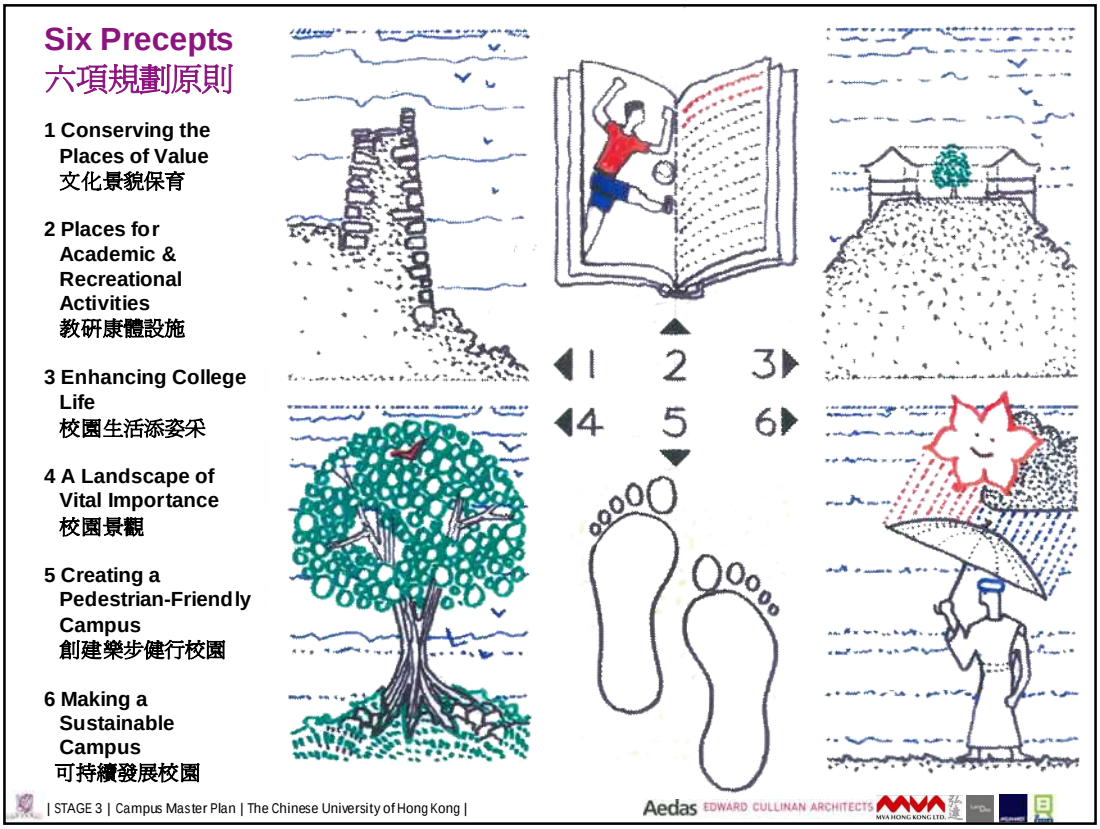
Making a Sustainable Campus
- establish guidelines for new structures/ buildings
- promote greening and environmentally friendly building design
- **establish additional policies on the reduction of gas emissions and energy consumption**




Our Vision for 2021 二零二一年規劃展望

- "To build most sustainable on what we now have, we must strengthen the academic core and the encircling colleges as palpable places in a fine hillside landscape and we should connect the whole composition with a lattice of pathways." *Edward Cullinan*
- To maintain the CUHK campus as an ideal place for scholarly pursuits and to enhance the quality of life of the entire community by:
  - improving the *integration of learning, working, living, and social interaction*
  - creating a neighbourhood *colleges to strengthen the overall sense of community and identity* while accommodating new possibilities
- To formulate a planning framework to enable the evolution of the campus which *balances the need for future growth with preserving the lush, green and serene setting*

This document shall be read in conjunction with the presentation of the consultant.



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Places for Academic & Recreational Activities 教研康體設施

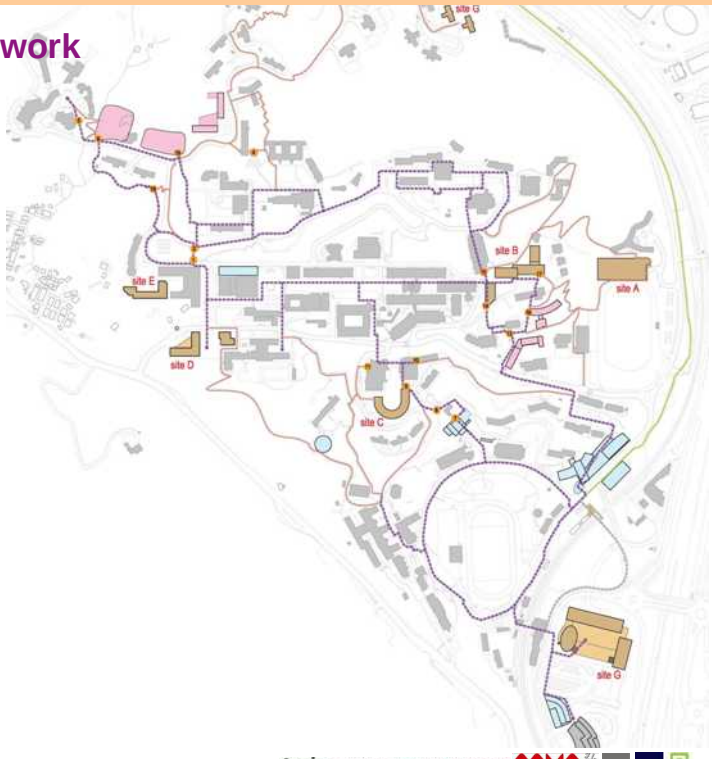
Objectives on Places for Academic & Recreational Activities
教研康體設施的規劃目標

The aim is to strengthen the presence of academic and recreational buildings in the following ways:

1. **Preserve and enhance the identities and the usefulness of existing academic facilities**
2. **Strengthen connectivity between academic facilities, existing and new**
3. **Enhance the landscape and make the character of the places between them as important as the buildings themselves**
4. **Promote walking by providing vertical transportation devices where gradients are steep**
5. **Give priority to pedestrians over vehicles**
6. **Create faculty zones to achieve physical proximity and obtain the benefits of interdisciplinary collaboration**

Places for Academic & Recreational Activities 教研康體設施

2021 Pedestrian Network



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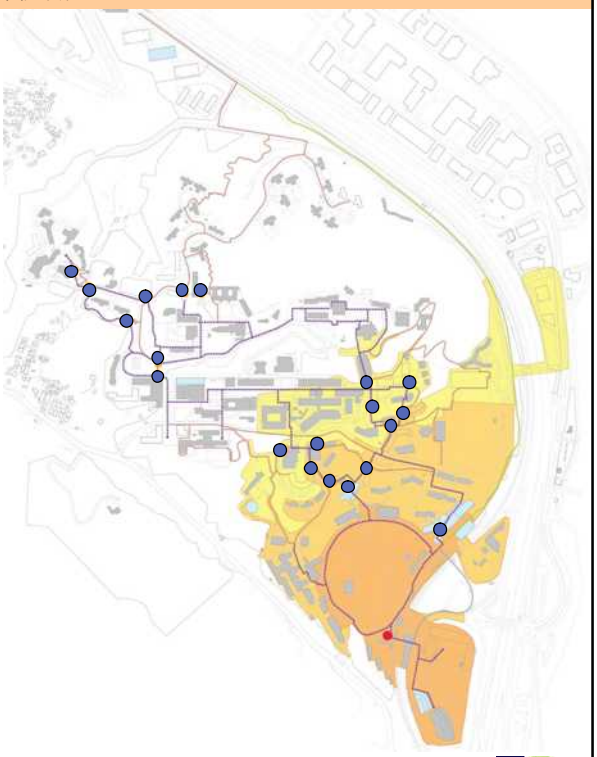
Places for Academic & Recreational Activities 教研康體設施

2021 Walking Distances
2021步行所需時間

Proposed 2021 Pedestrian Travel Distance - Walking distances from the MTR Station



KEY
- 5 minutes walk from the starting point
- 10 minutes walk from the starting point
- 15 minutes walk from the starting point
- starting point
- primary pedestrian route
- secondary pedestrian route
- vertical lifting device

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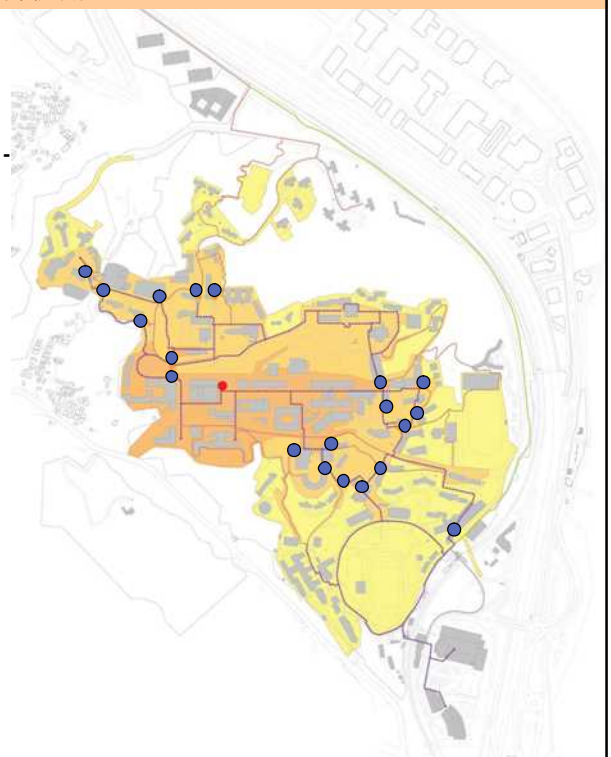
Places for Academic & Recreational Activities 教研康體設施

2021 Walking Distances
2021步行所需時間

Proposed 2021 Pedestrian Travel Distance - Walking distances from the Library



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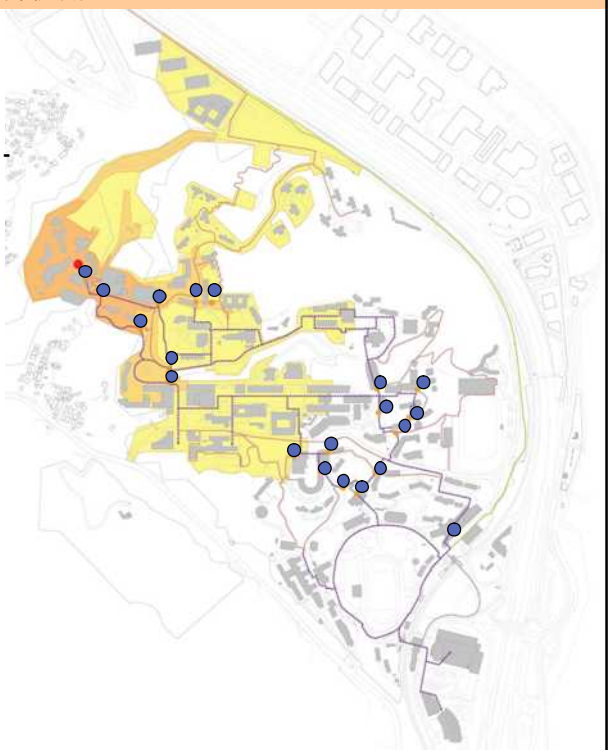
Places for Academic & Recreational Activities 教研康體設施

2021 Walking Distances
2021步行所需時間

Proposed 2021 Pedestrian Travel Distance - Walking distances from Shaw College



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Places for Academic & Recreational Activities 教研康體設施

Potential Development Areas within the Main Campus
於校園本部具發展潛力的地方

- **Site A - Romney Stores (Nissan Huts)** 貯物庫
- **Site B - Village Path** 山村徑
- **Site C - Academic Building 1** 教研樓一座
- **Site D - Open Car park outside John Fulton Centre** 富爾教樓旁停車場
- **Site E - Arts and Humanities Hub** 人文科學中心
- **Site F - Staff Residences** 教職員宿舍

Future Potential Areas
未來具發展潛力的地方

- **Site G - University Station Site** 大學站旁的土地
- **Site H - Area 39** ***(under Land Application)*** 39區

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Places for Academic & Recreational Activities 教研康體設施

Site A: Romney Stores (Nissan Huts) – Indoor Sports Complex
貯物庫 -室內運動綜合大樓

Notional Site Area:	5,290 m2
Proposed Max GFA:	3,860 m2
Proposed NOFA:	2,125 m2
Plot Ratio:	0.4

Places for Academic & Recreational Activities 教研康體設施

Site A: Romney Stores (Nissan Huts) – Indoor Sports Complex
貯物庫 -室內運動綜合大樓

View from Sir Philip Hadden Cave Sport Field

| STAGE 3 | Campus Master Plan | The Chinese University of Hong Kong |

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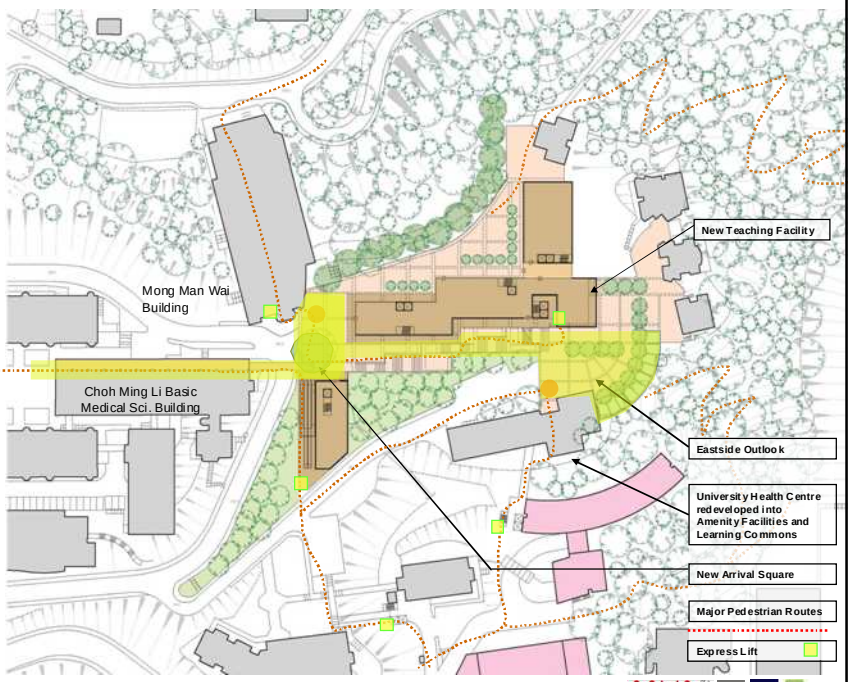
Places for Academic & Recreational Activities 教研康體設施

Site B: Village Path – Teaching Facilities
山村徑 - 教學設施

Notional Site Area:	9,840 m2
Proposed Max GFA:	19,900 m2
Proposed NOFA:	10,950 m2
Plot Ratio:	2.0



Places for Academic & Recreational Activities 教研康體設施

Site B: Village Path – Teaching Facilities
山村徑 - 教學設施

View from Sir Philip Hadden Cave Sport Field

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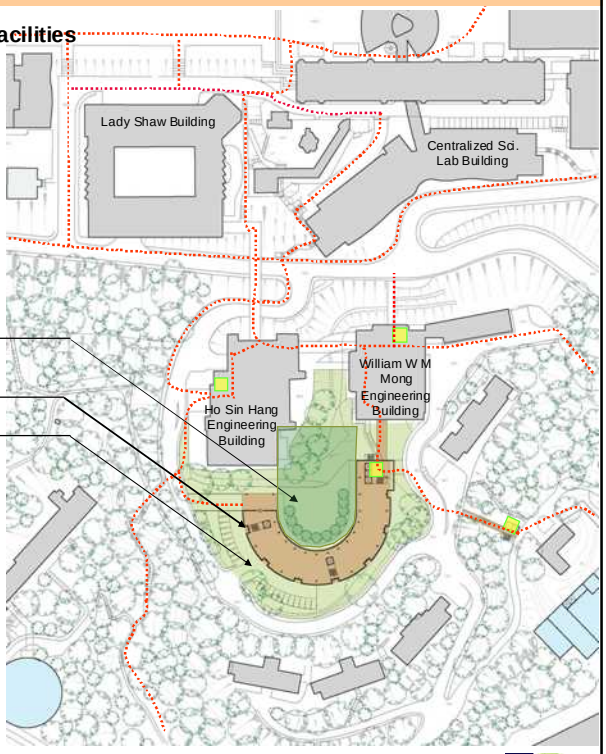
Places for Academic & Recreational Activities 教研康體設施

Site C: Academic Building 1 – Teaching Facilities
教研樓一座 - 教學設施

Notional Site Area:	4,990 m2
Proposed Max GFA:	10,000 m2
Proposed NOFA:	5,480 m2
Plot Ratio:	2.0



Places for Academic & Recreational Activities 教研康體設施

Site C: Academic Building 1 – Teaching Facilities
教研樓一座 - 教學設施

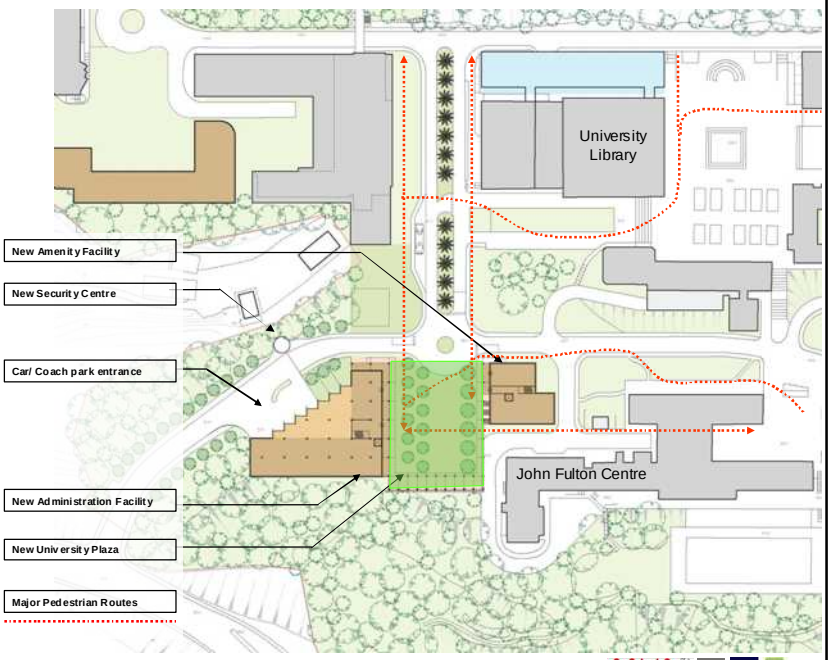
View from University Station

This document shall be read in conjunction with the presentation of the consultant.

Places for Academic & Recreational Activities 教研康體設施

Site D: **Open Carpark outside John Fulton Centre – *Administrative & Amenity Facilities***
富爾敦樓旁停車場 - 康樂及行政設施

Notional Site Area:	8,670 m2
Proposed Max GFA:	8,850 m2
Proposed NOFA:	4,850 m2
Plot Ratio:	2.5



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Places for Academic & Recreational Activities 教研康體設施

Site D: **Open Carpark outside John Fulton Centre – *Administrative & Amenity Facilities***
富爾敦樓旁停車場 - 康樂及行政設施

| STAGE 3 | Campus Master Plan | The Chinese University of Hong Kong |

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Places for Academic & Recreational Activities 教研康體設施

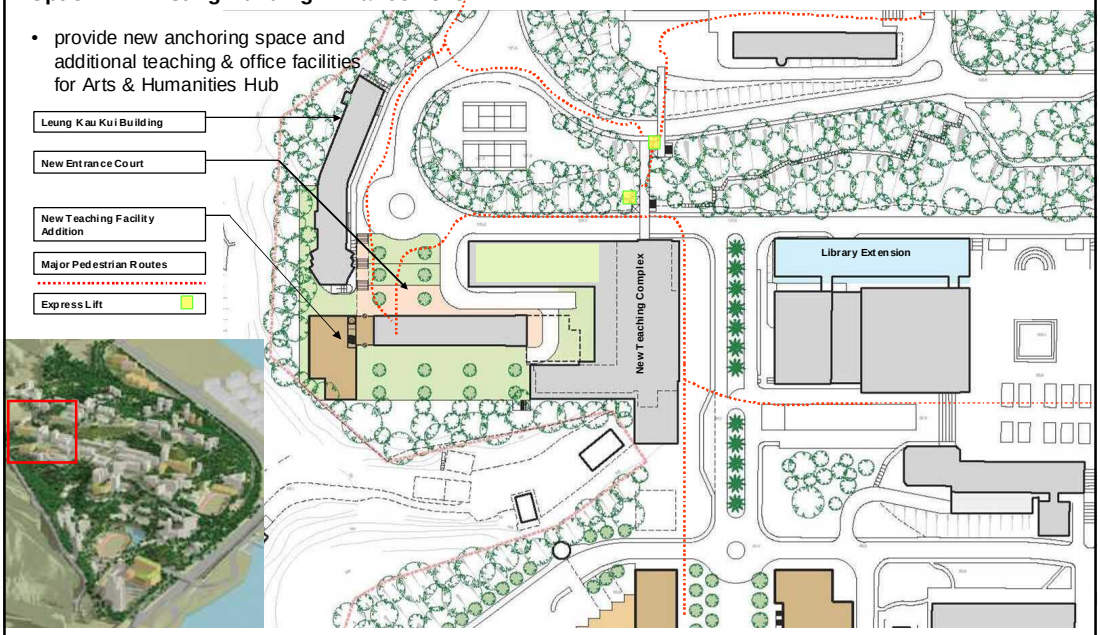
Site D: **Open Carpark outside John Fulton Centre – *Administrative & Amenity Facilities***
富爾敦樓旁停車場 - 康樂及行政設施

Places for Academic & Recreational Activities 教研康體設施

Site E : **Arts and Humanities Hub**
人文科學中心

Option 1: Existing Building Enhancement

- provide new anchoring space and additional teaching & office facilities for Arts & Humanities Hub



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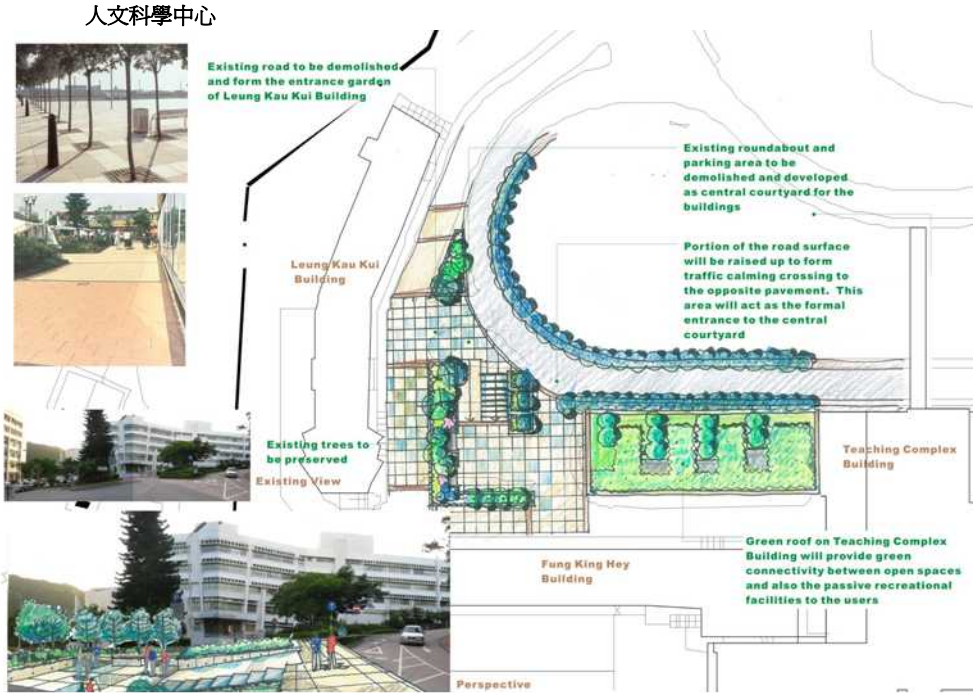
Places for Academic & Recreational Activities 教研康體設施

Site E : Arts and Humanities Hub
人文科學中心



Places for Academic & Recreational Activities 教研康體設施

Site E : Arts and Humanities Hub
人文科學中心

Option 2: Re-development

- provide new anchoring space and additional teaching & office facilities for Arts & Humanities Hub

This document shall be read in conjunction with the presentation of the consultant.

Places for Academic & Recreational Activities 教研康體設施

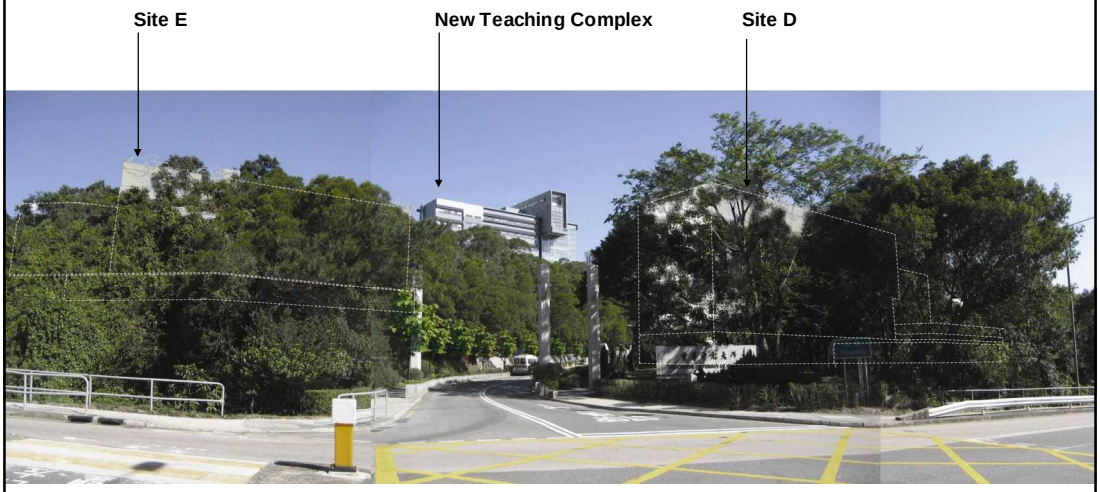
Site E : Arts and Humanities Hub
人文科學中心

Option 2: Re-development

View of new Arts & Humanities Hub looking east

Places for Academic & Recreational Activities 教研康體設施

Site D: Open Carpark outside John Fulton Centre – *Administrative & Amenity Facilities*
富爾敦樓旁停車場 - 康樂及行政設施
Site E : Arts and Humanities Hub
人文科學中心



View from Main Entrance at Tai Po Road

This document shall be read in conjunction with the presentation of the consultant.

Places for Academic & Recreational Activities 教研康體設施

Site F: Staff Residences
教職員宿舍

Places for Academic & Recreational Activities 教研康體設施

Site F: Staff Residences
教職員宿舍

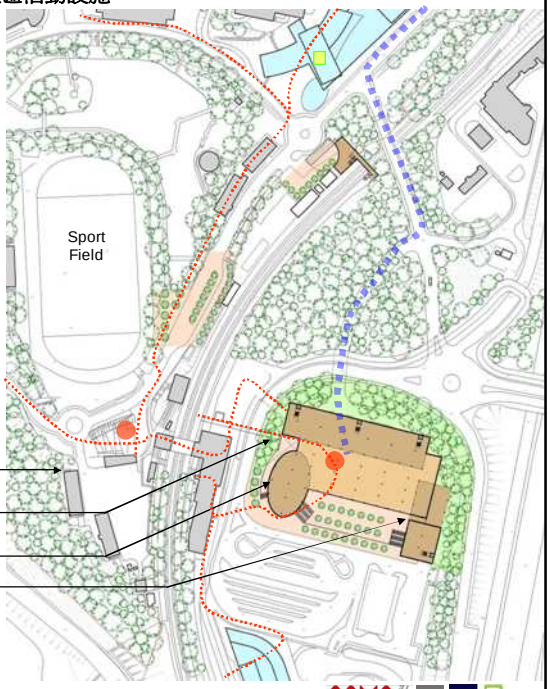
View of new staff residences looking east

This document shall be read in conjunction with the presentation of the consultant.

Places for Academic & Recreational Activities 教研康體設施

Site G: **University Station Site – *Facilities for teaching, continuing education & community events***
大學站旁的土地 - 教學、專業進修教育及社區活動設施

Notional Site Area:	13,180 m2
Proposed Max GFA:	50,000 m2
Proposed NOFA:	27,500 m2
Plot Ratio:	3.79



Places for Academic & Recreational Activities 教研康體設施

Site G: **University Station Site – *Facilities for teaching, continuing education & community events***
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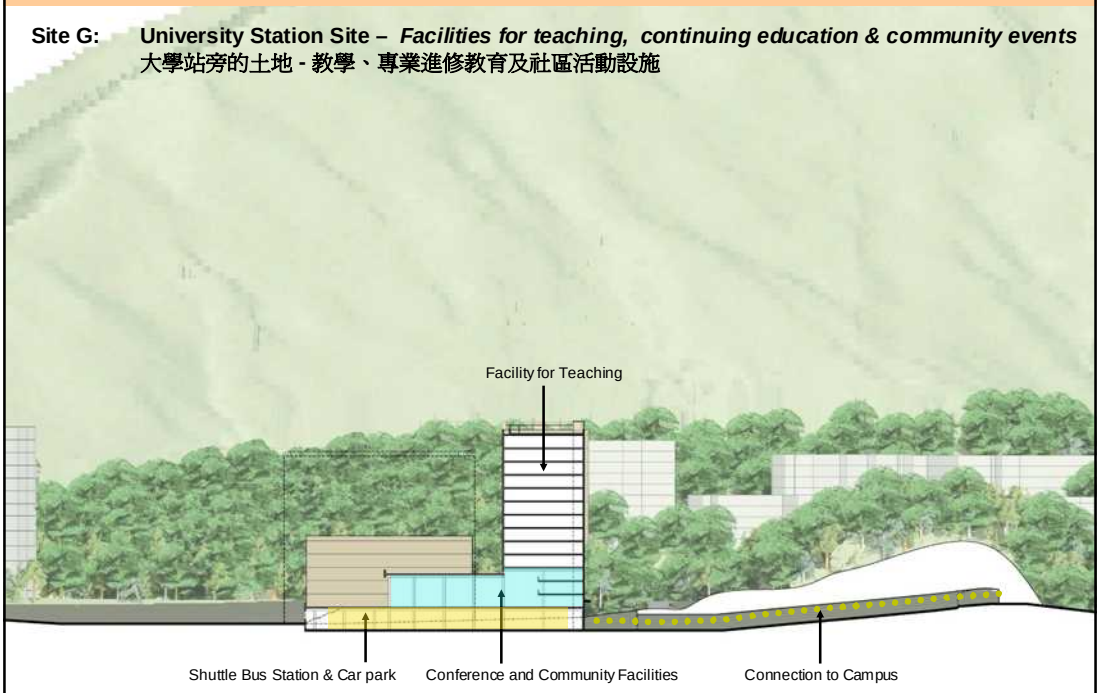

View of Site F looking west

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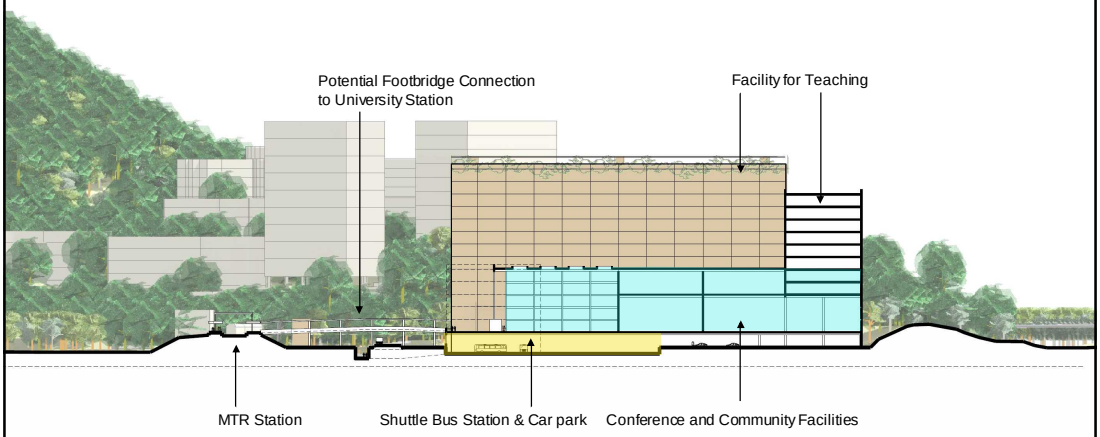
Places for Academic & Recreational Activities 教研康體設施

Site G: **University Station Site – *Facilities for teaching, continuing education & community events***
大學站旁的土地 - 教學、專業進修教育及社區活動設施



View of Site G looking north

Places for Academic & Recreational Activities 教研康體設施

Site G: **University Station Site – *Facilities for teaching, continuing education & community events***
大學站旁的土地 - 教學、專業進修教育及社區活動設施

View from Tolo Harbour

| STAGE 3 | Campus Master Plan | The Chinese University of Hong Kong |

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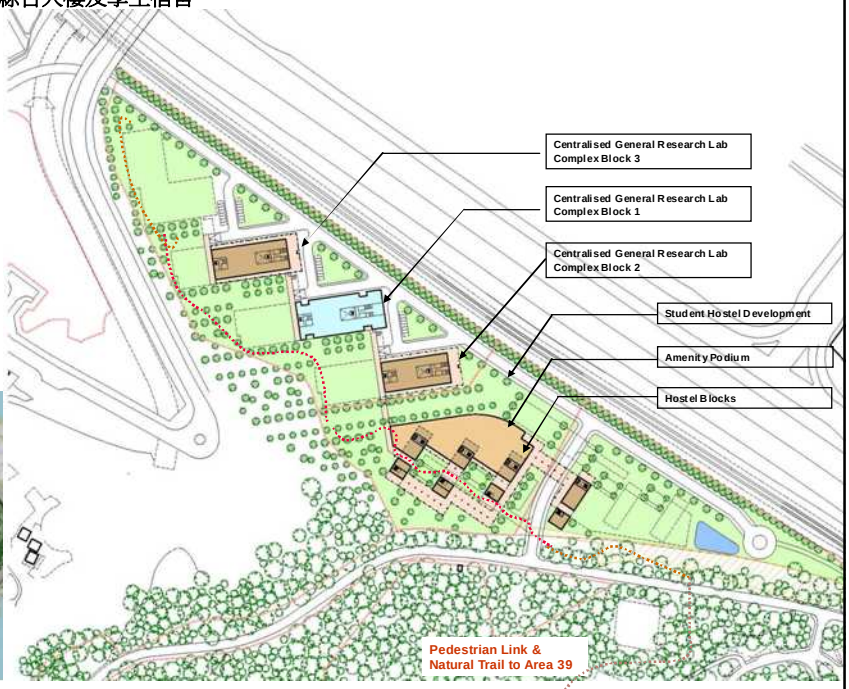
Places for Academic & Recreational Activities 教研康體設施

Site H: **Area 39 - *Research Lab& Student Hostels* *(under Land Application)***
39區 - 研究綜合大樓及學生宿舍

Research Facilities:
Notional Site Area: 3.57Ha
Proposed Max GFA: 89,250 m2
Proposed NOFA: 61,360
Plot Ratio: 2.5

Student Hostels:
300 students per block



Places for Academic & Recreational Activities 教研康體設施

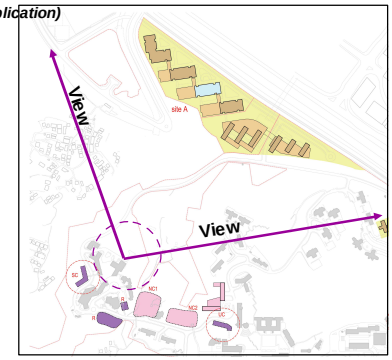
Site H: **Area 39 - *Research Lab& Student Hostels* *(under Land Application)***
39區 - 研究綜合大樓及學生宿舍

View of Area 39 looking east

This document shall be read in conjunction with the presentation of the consultant.

Places for Academic & Recreational Activities 教研康體設施

Site H: **Area 39 - *Research Lab& Student Hostels*** ***(under Land Application)***
39區 - 研究綜合大樓及學生宿舍



View of Area 39 from Shaw College

Specific Proposal具體建議 –
Enhancing College Life 校園生活添姿采

Enhancing College Life 校園生活添姿采

Objectives on Enhancing College Life
校園生活上的規劃目標

To strengthen the identity of the individual colleges, giving each a further sense of being a distinctive place

1. **Preserve and enhance the existing characteristics of the colleges**
2. **Encourage social interaction by enhancing the landscape and valuing the spaces between buildings**
3. **Strengthen pedestrian routes between colleges and the campus core**
4. **Establish neighborhood settings for the existing & new colleges to enhance sharing of facilities**

This document shall be read in conjunction with the presentation of the consultant.

Enhancing College Life 校園生活添姿采

- **Opportunity for individual Colleges to contribute to the Masterplan within college boundaries**

  Chung Chi College
  New Asia College
  United College
  Shaw College

  - Enhancement of College Identity
  - Potential Location for New Facilities

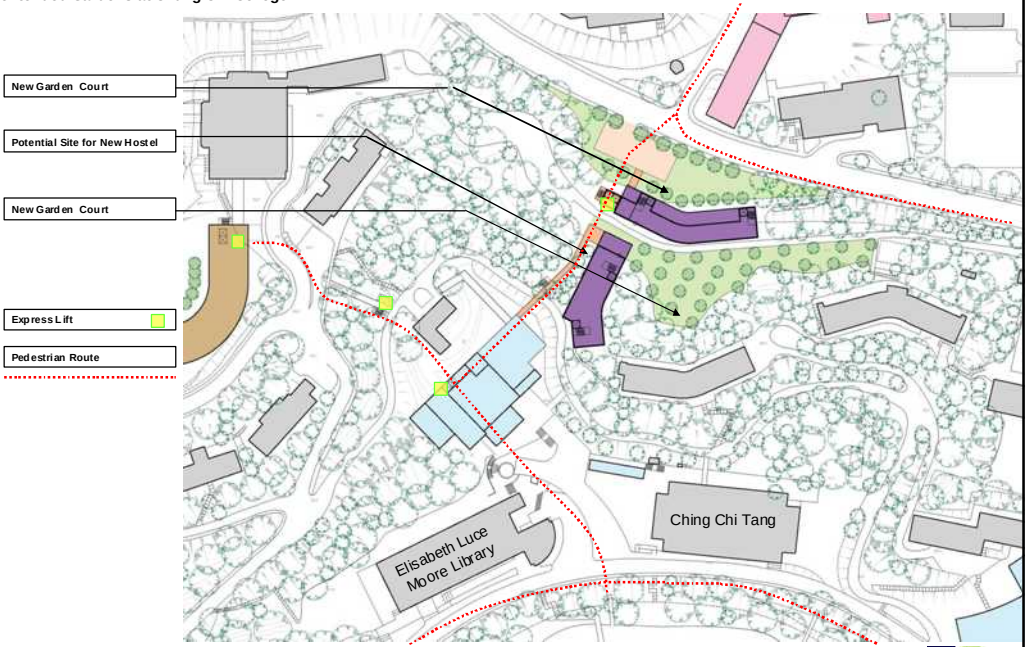
- **Recommendations for Facilities for College Neighborhood**

All recommendations are based on each Colleges' own Planning and Resources considerations

Enhancing College Life 校園生活添姿采

Chung Chi College 崇基學院

Potential Location for new Hostels and extended Gardens at Chung Chi College



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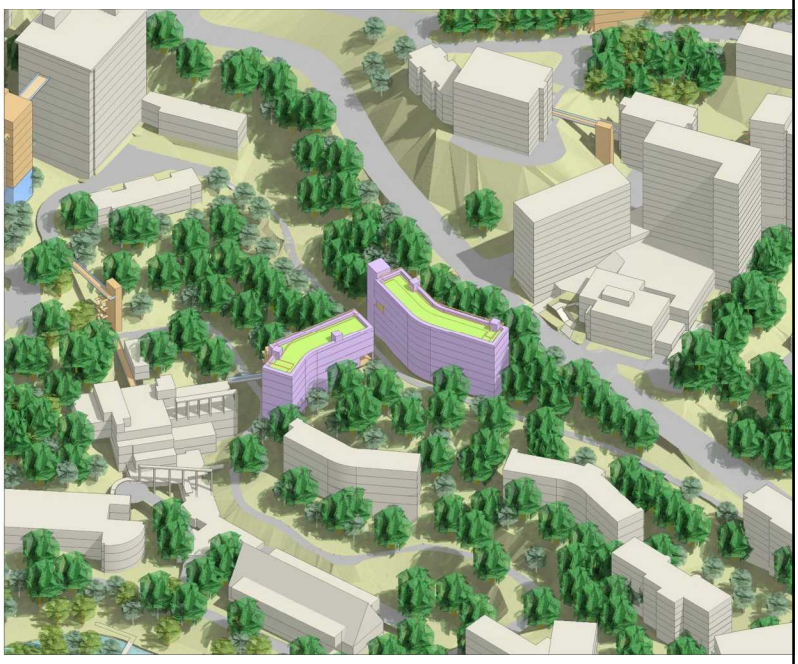
Enhancing College Life 校園生活添姿采

Chung Chi College 崇基學院

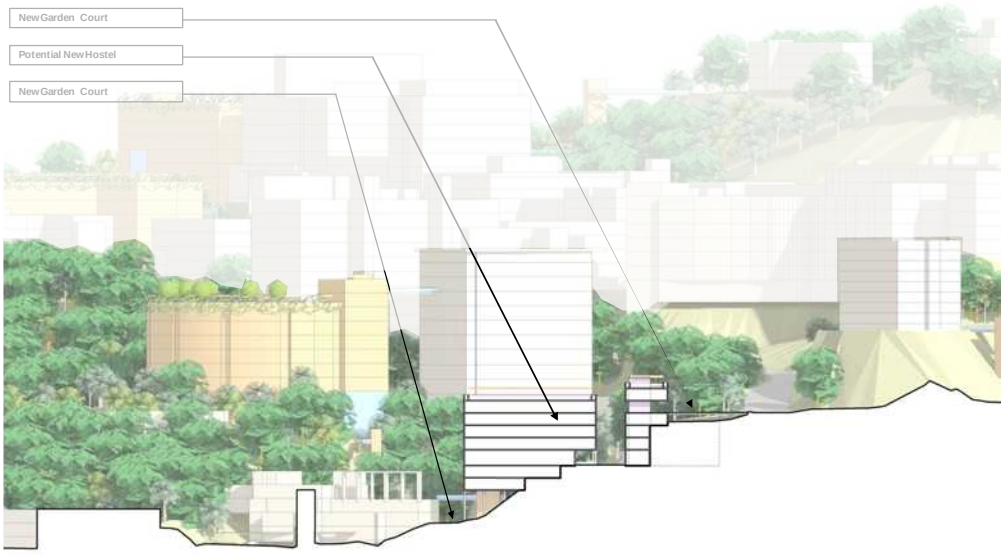
Potential Location for new Hostels and extended Gardens at Chung Chi College



Enhancing College Life 校園生活添姿采

Chung Chi College 崇基學院

Potential Location for new Hostels and extended Gardens at Chung Chi College



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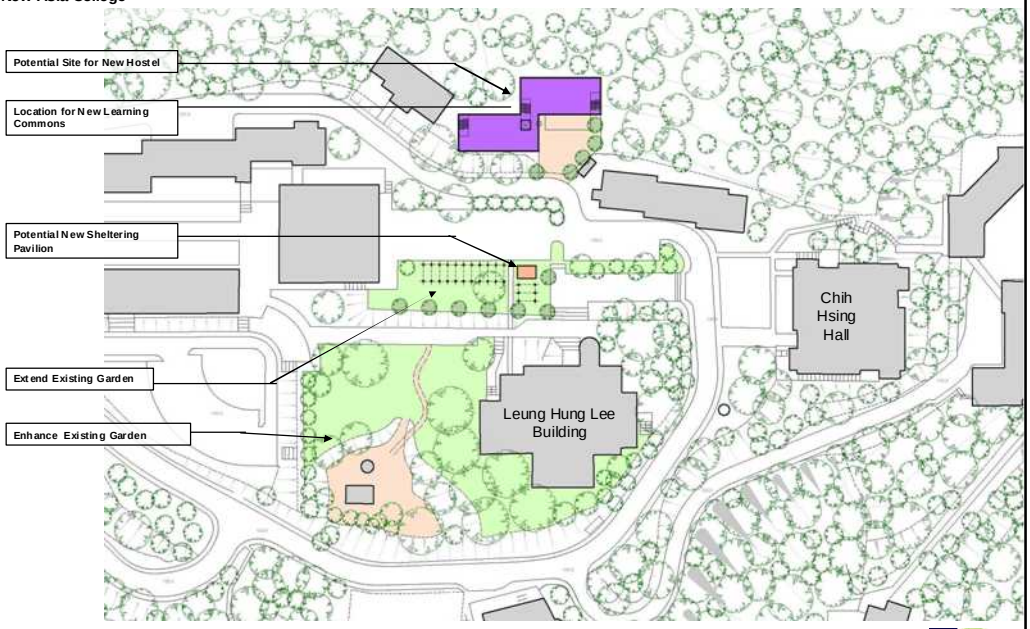
Enhancing College Life 校園生活添姿采

New Asia College 新亞書院

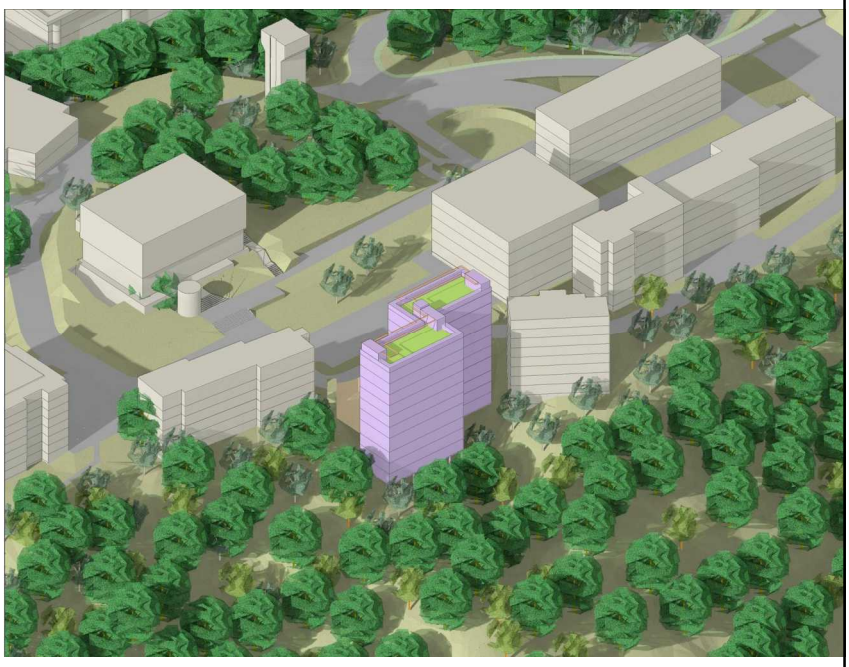
Potential Location for new Hostel, Learning Commons, Extended Gardens and Pavilion at New Asia College



Enhancing College Life 校園生活添姿采

New Asia College 新亞書院

Potential Location for new Hostel, at New Asia College



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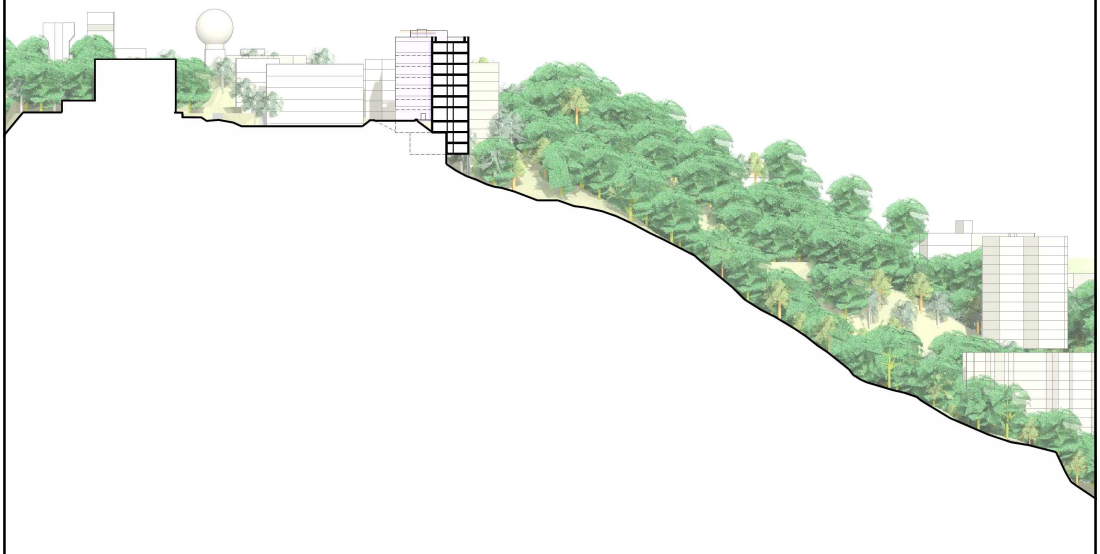
Enhancing College Life 校園生活添姿采

New Asia College 新亞書院

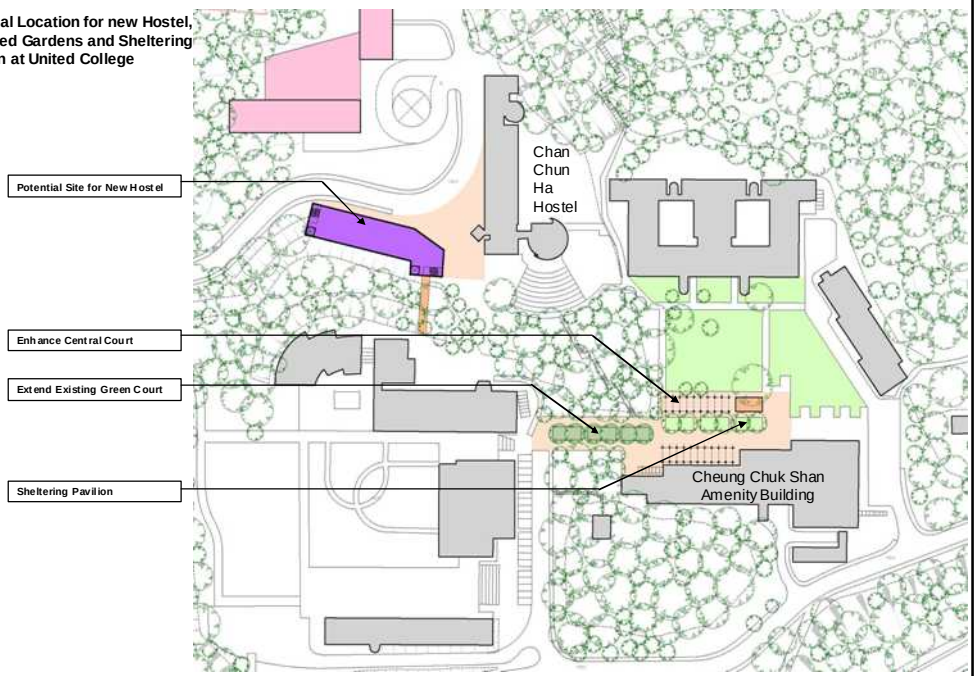
Potential Location for new Hostel, Learning Commons, Extended Gardens and Pavilion at New Asia College



Enhancing College Life 校園生活添姿采

United College 聯合書院

Potential Location for new Hostel, Extended Gardens and Sheltering Pavilion at United College



This document shall be read in conjunction with the presentation of the consultant.

Enhancing College Life 校園生活添姿采

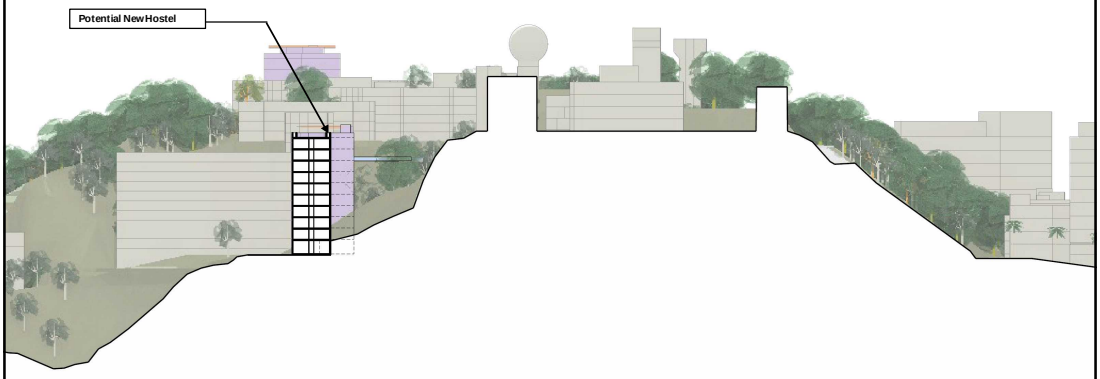
United College 聯合書院

Potential Location for new Hostel

Enhancing College Life 校園生活添姿采

United College 聯合書院

Potential Location for new Hostel, Extended Gardens and Sheltering Pavilion at United College

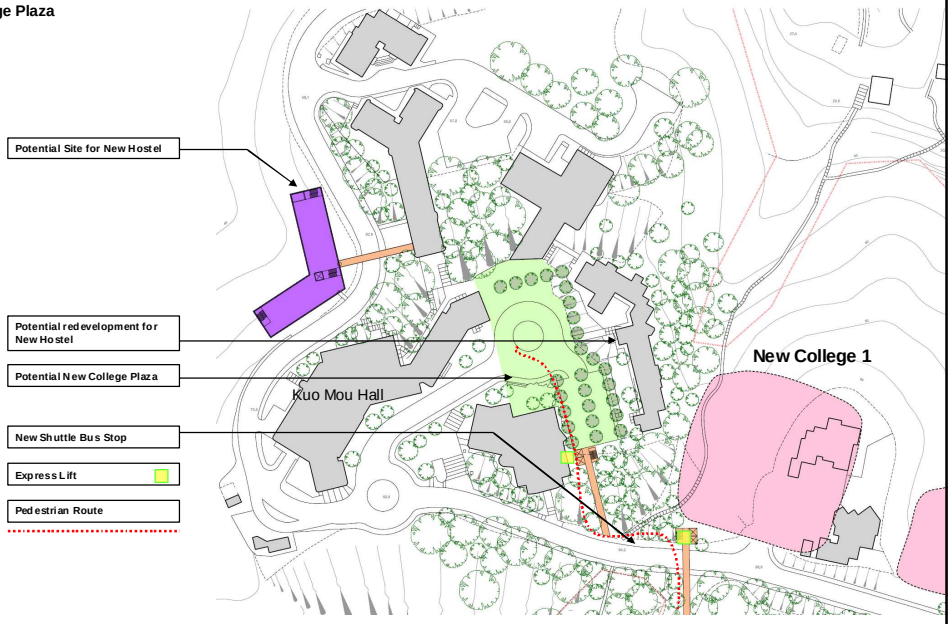


This document shall be read in conjunction with the presentation of the consultant.

Enhancing College Life 校園生活添姿采

Shaw College 逸夫書院

Potential Location for new Hostel and New college Plaza



Enhancing College Life 校園生活添姿采

Shaw College 逸夫書院

Potential Location for new Hostel and New college Plaza

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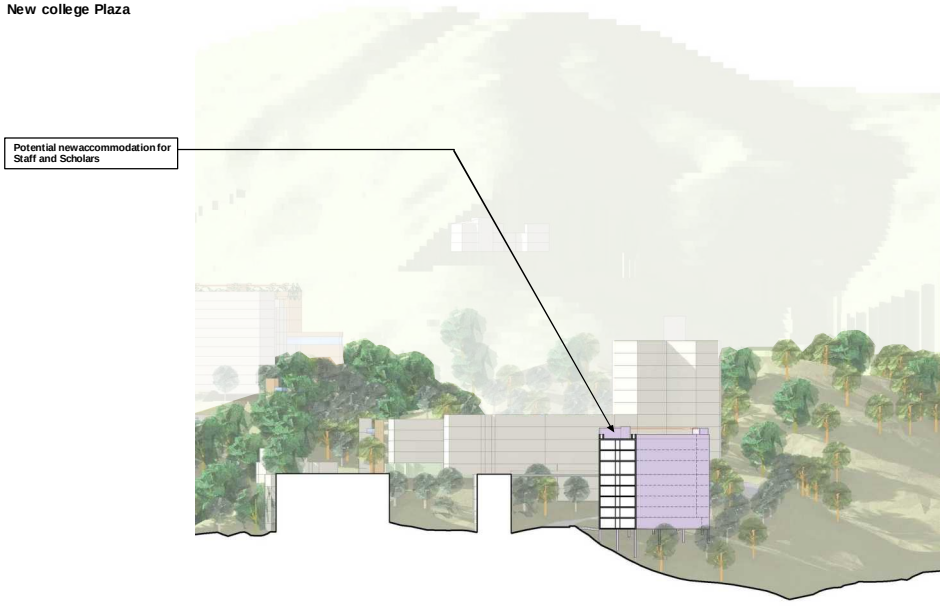
Enhancing College Life 校園生活添姿采

Shaw College 逸夫書院

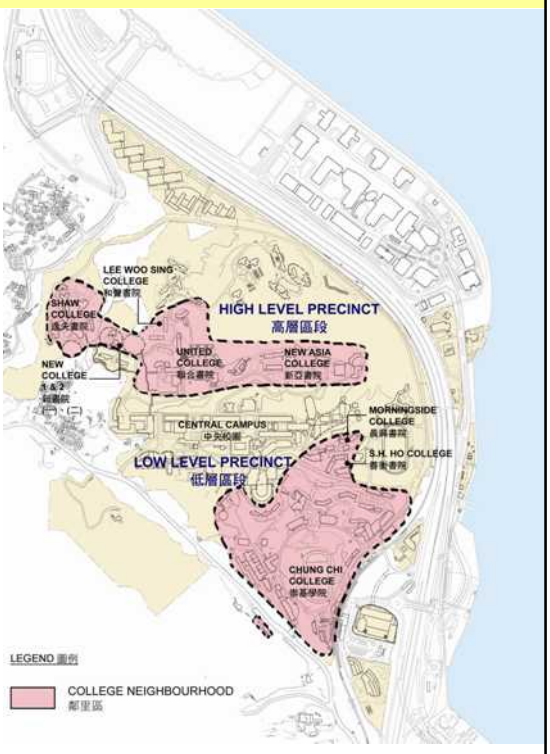
Potential Location for new Staff Hostel and New college Plaza



Enhancing College Life 校園生活添姿采

College Neighbourhood 鄰里區

- 5 new colleges have been established to cater for the increase intake of undergraduate students
- Two Neighbourhood Zones are proposed:
  1. Low-level Precinct - Morningside College and S. H. Ho College form a college neighbourhood with the existing Chung Chi College
  2. High-level Precinct - Lee Woo Sing College and two new colleges form a college neighbourhood with the existing New Asia College, United College and Shaw College



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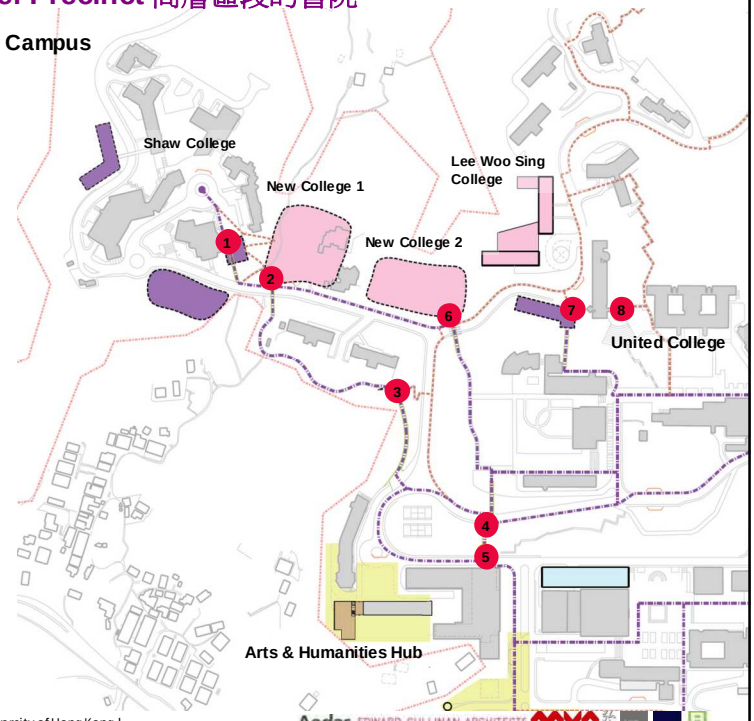
Enhancing College Life 校園生活添姿采

Colleges at High-level Precinct 高層區段的書院

Pedestrian Links to Central Campus

1. Express lift from Shaw College to Campus Circuit West
2. Express lift from New College 1 to new path at rear of Residence 3 & 4
3. Express lift from path at rear of Residence 3 & 4 to Residence Road
4. Express lift from United Road to bridge
5. Express lift from bridge to Central Avenue
6. Express lift from New College 2 to new bridge link with United College
7. New Express lift in new potential hostel at United College
8. Existing lift from Chan Chun Ha Hostel to United College



| STAGE 3 | Campus Master Plan | The Chinese University of Hong Kong |

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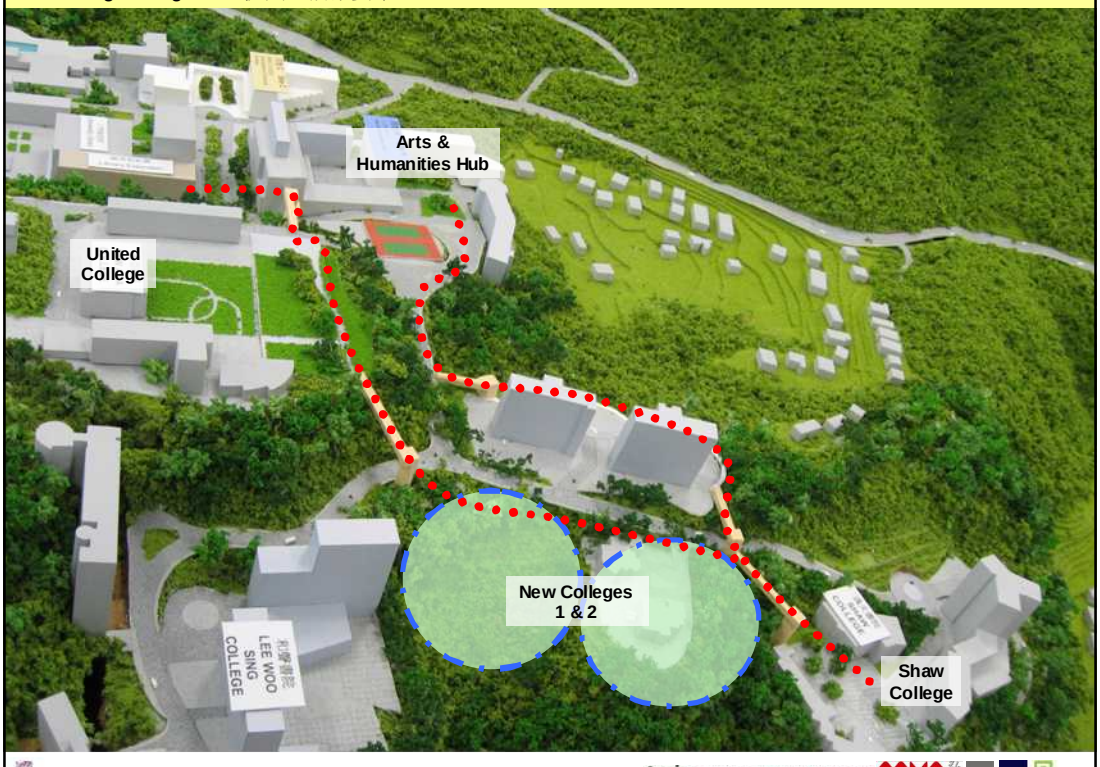

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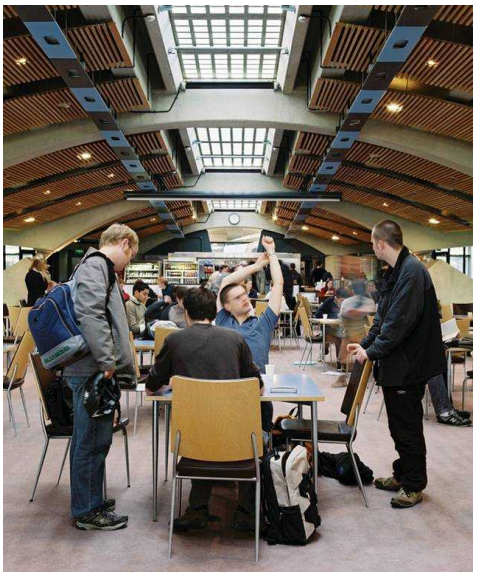
Enhancing College Life 校園生活添姿采

Learning Commons 學習開放空間

New learning spaces to accommodate:

- Changing curriculum demands
- More collaborative learning, problem solving, managing information, knowledge generation, etc.
- Changing student demographics and increased numbers & diversity
- Decreasing cost of technology and increasingly widespread use of new technologies



Learning Commons at ECA's Centre for Mathematical Sciences, Cambridge

Enhancing College Life 校園生活添姿采

Learning Commons 學習開放空間

Shifting Paradigms in Universities

Old Paradigm	New Paradigm
Knowledge is presented objectively to students	Knowledge is (co)-constructed by individuals and groups
Education process - timetabled by institution & controlled by a teacher	Learning occurs at a time and a place convenient to the learner
Students dependent on institution to guide them through their study	Students independent and have greater choice what they study
Education process - timetabled by institution & controlled by a teacher	Learning occurs at a time and a place convenient to the learner

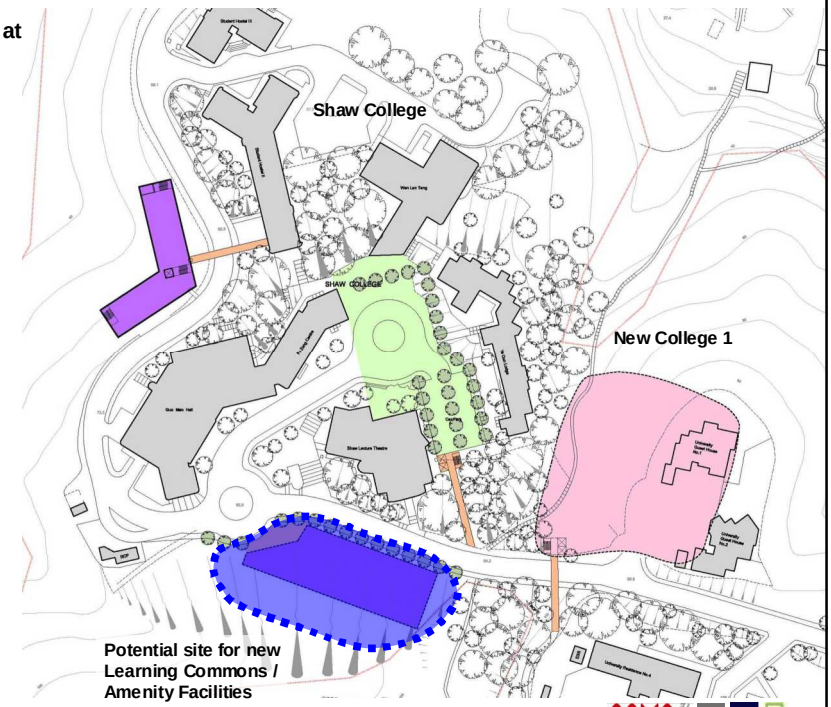
Semi-outdoor learning space at Singapore Management University

This document shall be read in conjunction with the presentation of the consultant.

Enhancing College Life 校園生活添姿采

Learning Commons 學習開放空間

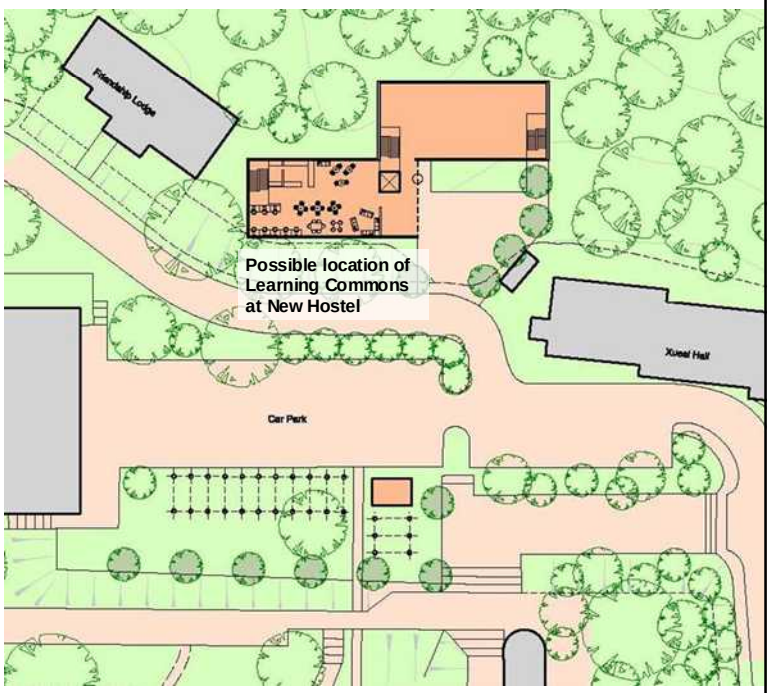
Learning Commons at High-level Precinct



Enhancing College Life 校園生活添姿采

Learning Commons 學習開放空間

Learning Commons at New Hostels



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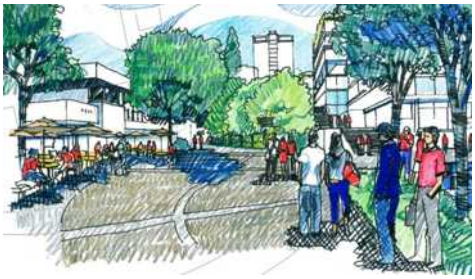
Enhancing College Life 校園生活添姿采

Learning Commons 學習開放空間

Learning Commons at Anchoring Space

- University Health Centre – to be converted into Learning Commons, intergraded with the new Plaza, Eastside Outlook, at the end of Clinic Road
- Possible site for relocation of University Health Centre :
  - Carpark adjacent to Staff Quarters E & Interuniversity Hall



Flexible outdoor space at Eastside Outlook at Clinic Road

Flexible Learning Space at ECA's St John's College, UK

Specific Proposal具體建議 –
Making a Sustainable Campus 可持續發展校園

Making a Sustainable Campus 可持續發展校園

Objective on Campus Sustainability
校園可持續發展規劃目標

To create '*A model for a sustainable campus that reduces energy use, minimises waste* and reduces the dependency on transport' for CUHK

The sustainability framework refers to overall reductions in and benchmarks for energy consumption across the campus, as well as providing design guidelines for the sustainable development of individual buildings.

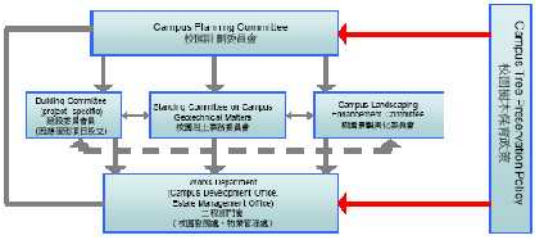
This document shall be read in conjunction with the presentation of the consultant.

Making a Sustainable Campus 可持續發展校園

Current Structure 現行架構

Policy Making

The University Steering Committee on Environment (USCE) continues to promote environmental awareness and champions new initiatives.



Implementation

The University Safety and Environment Office coordinates relevant offices such as the Estates Management Office, the Campus Development Office and the Transport Unit in implementing environmental projects.

Making a Sustainable Campus 可持續發展校園

Sustainability underway 現行工作

Already CUHK has made significant progress:

- Current Policies include:
  - Environmental Policy
  - Tree Preservation on Campus
  - Policy on recycling
- building electricity use fell by ~10% from 2000-2005 to 260kWh/m2
- new building projects follow *HK BEAM & Building Energy Code*
- annual carbon audits & sustainability monitoring record progress
- substantial recycling and waste reduction programs (ISO 14000)
- use of recycled materials in paving (Eco-Glass blocks)
- rainwater storage at Wei Yuen Lake
- low energy appliance and sensor controls installed
- environmentally-friendly bio-pesticides
- reduced waste building practices
- preservation of biodiversity (particularly bird & butterfly species)

This document shall be read in conjunction with the presentation of the consultant.

Making a Sustainable Campus 可持續發展校園

Recommendation for Sustainable Campus 對可持續發展校園的建議

Towards a Low Carbon Campus

Target to be established by CUHK:

- **Reduction in energy use per student**
- **Reduction in annual greenhouse gas (GHG) emission per student**

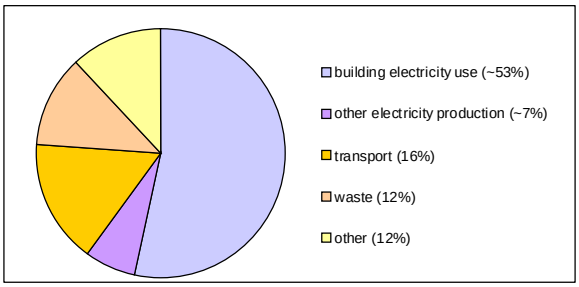
Making a Sustainable Campus 可持續發展校園

Reference for Consideration
參考知料

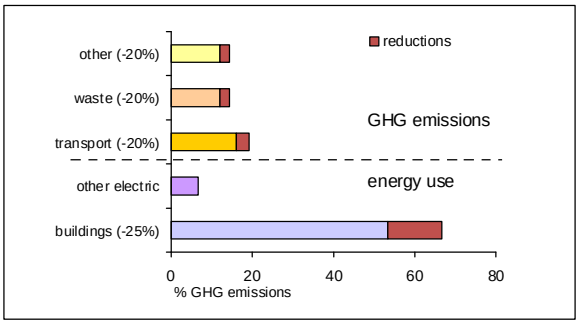
Hong Kong, as a member of APEC, is working towards a **25%** reduction in energy use by 2030.

For greenhouse gas (GHG) emissions in Hong Kong:

- 60% comes from the production of *electricity* of which 89% is used to power <u>buildings</u>
  16% comes from <u>*transport*</u>
  12% comes from <u>*waste*</u>
  12% comes from other uses



Hong Kong Greenhouse Gas emissions



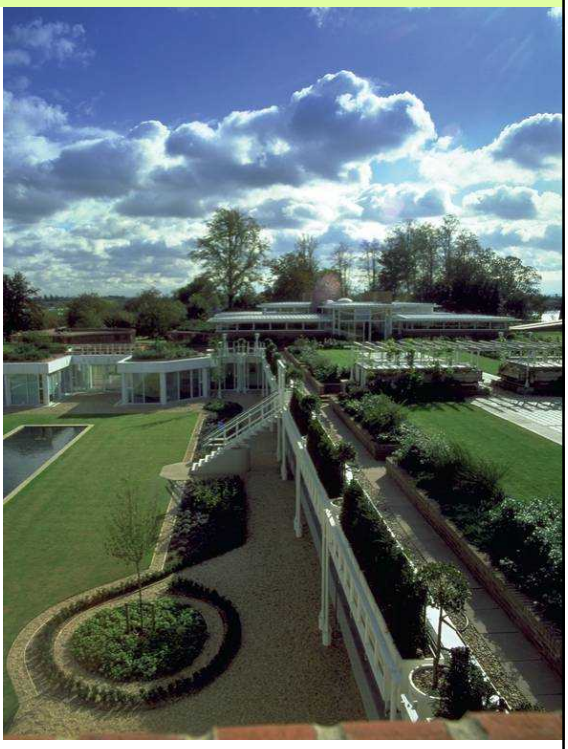
Possible reductions in energy use & GHG emissions at <u>CUHK</u>

This document shall be read in conjunction with the presentation of the consultant.

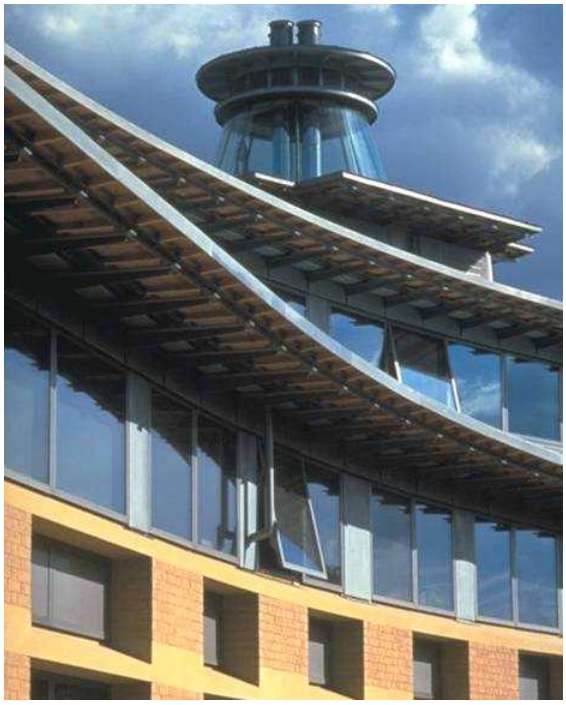
Making a Sustainable Campus 可持續發展校園

How to become a Low Carbon Campus? 怎樣成爲低碳校園?

1. Enforce current policies on sustainability
2. Identify energy efficiency potential in existing and new buildings
   - sustainable building design
   - appoint a qualified assessor to guide building design towards the highest viable Green Star™ ratings
3. Minimize waste and resource consumption
4. Commission a Renewable Energy Feasibility Study to include the viability of on-site power generation (CCHP) and the production of on-site alternative fuels (Biogas)



Making a Sustainable Campus 可持續發展校園



Making a Low-carbon Building

This document shall be read in conjunction with the presentation of the consultant.

Making a Sustainable Campus 可持續發展校園

Sustainable Building Design:

Shading

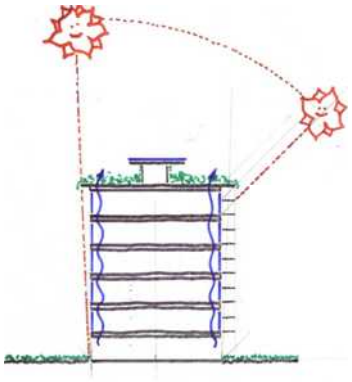
North-south building orientation

Deep eaves and balconies

Vegetation for shading & evaporative cooling

Covered walkways and colonnades

Natural daylighting



Natural Ventilation

Breezeways, courtyards, colonnades, balconies & atria

Large openings for cross-ventilation

High ceilings for good air circulation

Double skin facades for stack effect cooling

Shallow floor plates

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Sustainable Building Design:

Planted roofs

For biodiversity

For rainwater attenuation

For solar insulation

To reduce Heat island effect

For an attractive "5th elevation"

Materials

Lightweight structures

Night time cooling & insulated thermal mass

Design for longevity & conserve buildings where possible

Build using recycled / recyclable materials

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Sustainable Building Design:
Energy

Energy efficient appliances to minimise energy demands

Movement / daylight sensors to reduce demand on artificial lighting

Rooftop **photovoltaics, solar water heaters and wind turbines** may supplement the University's energy demands through micro-generation

Sea or Lake source heat pumps may help to stabilise internal temperatures.

"Mixed-mode" services strategy to combine air conditioning with natural ventilation to provide comfort cooling for occupied main internal spaces

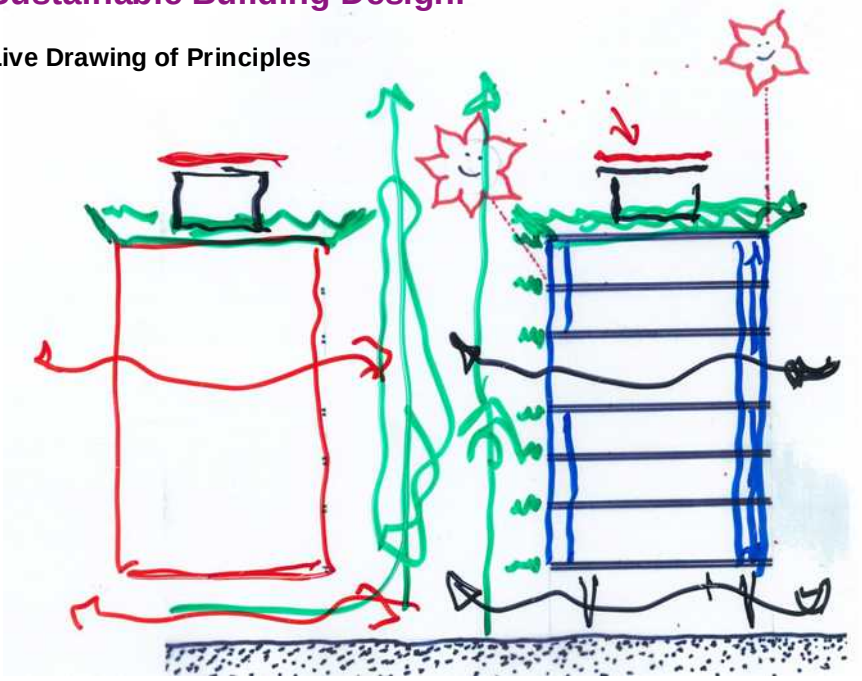
Improve building management to increase efficiency

Intelligent energy metering

Making a Sustainable Campus 可持續發展校園

Sustainable Building Design:

Live Drawing of Principles



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Making a Sustainable Campus 可持續發展校園

SUSTAINABILITY MATRIX

Environmental Element		Included	Further Study	Ownership	Description	Benefit	Possible Drawbacks	Capital Cost	Operating Cost	Visibility	Environmental Benefit
BUILDING ENVELOPE + STRUCTURE											
	Natural Ventilation				Operable windows allow the building to ventilate naturally.	Reduces fan loads when weather is suitable. Connects building to external environment, a benefit that is hard to quantify.	Requires operable windows.	= / + £	=		
	Passive Solar Design				Locate shading devices to allow useful gain in winter but control excessive gain in summer.	Takes advantage of passive heating in winter and shading in summer. Allows building performance to vary with the season.	Depends on architecture. External shading preferable; maintenance issue.	+ £	- ££		
	High Performance Glazing				Use selective performance of glazing to maximize daylight but control heat gains and losses. Balance glazed to opaque elements 50 / 50.	Reduce heating and cooling demands, improves comfort. Reduces CO_2 production.		+ £	- £££		
	Daylighting				Provide appropriate levels of daylight through optimisation of fenestration.	Reduces energy used for artificial lighting, improves indoor environment and provides connection to outdoors.	Daylighting has been improved wherever possible, given the constraints of the exisiting building	=	- £		
	Exposed Thermal Mass				Leave concrete slabs exposed internally to act as thermal flywheel and store heat coolth diurnally.	Reduced demand on heating and cooling systems, and storage of recovered heat in winter. Benefits last life of building.	Need for high quality construction and detailed coordination of M + E services; must fix services in structure early. Some acoustic issues.	=	- ££		
	Extra Insulation				Increase building insulation above typical levels.	Reduces heating and cooling demands and CO_2 production. Benefits last for life of building.	Thicker roof and wall constructions. Influences net and gross areas.	+ ££	- £££		
BUILDING SERVICES + ENERGY											
	Heat Recovery Ventilation				Whole house heat recovery ventilation uses heat from extract air to heat up incoming fresh air supply	Uses the available resources of people / appliances / passive solar gain as heat sources.	Space for plant and risers necessary.	+ ££	- £££		
	Ground Source Heat Pump (Closed loop)				Water pumped through an closed loop system is heated / cooled by the ground.	Efficient source of thermal energy. Potential path to project carbon neutrality if supplied with green electricity.	Requires multiple wells and space for heat pump (either in apartments or in a central plant room)	+ ££	- ££		
	River Water Source Heat Pump (Closed loop)				Water pumped through enclosed loop system is heated / cooled by water drawn from the River	Efficient source of thermal energy. Potential path to project carbon neutrality if supplied with green electricity.	Requires water intakes and discharges to river which will require permits and are high maintenance. Requires heat pump as above.	+ ££	- ££		
	Combined Heat and Power (CHP)				Gas fired engine generates electric power for building. Waste heat as a by product used to heat the building and hot water.	Very efficient use of energy content of fuel when compared to power station + heating.	Capital cost, noise and maintenance issues. Payback is normally less than 3 years for a Hotel.	+ ££	- ££		
	Radiant Heating / Cooling systems				Bedroom conditioning using radiant chilled ceilings rather than fan-coil units.	Lower energy consumption, better comfort if building fabric loads can be controlled. Silent.	Integration into finishes and lighting. May not satisfy US visitor market - too quiet!	+ £	- £		
	Solar Water Heating (min. area)				Solar panels on roof	Reduces demand on fossil fuels for hot water heating and reduces CO_2 production.	Space for panels at roof level. Maintenance	+ £	- £		
	Energy Efficient Lighting				Specify lighting fittings that only take high efficiency lamps	Reduces energy used for lighting	Restricts choice of lighting fittings. Requires more attention to lighting types and sourcing.	= / + £	- ££		

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Making a Sustainable Campus 可持續發展校園

SUSTAINABILITY MATRIX

Environmental Element		Included	Further Study	Ownership	Description	Benefit	Possible Drawbacks	Capital Cost	Operating Cost	Visibility	Environmental Benefit
	Controls, Daylight and PIR Sensors				Measures available daylight occupancy and adjusts artificial lights accordingly. Switches lighting on / off depending if spaces are occupied	Reduces energy used for artificial lighting and allows maximum benefit from daylighting.	Requires dimmed, stepped, or automatic lighting controls in addition to manual controls.	+ £	- ££		
	Photovoltaics				Solar PV's on roof (as part of the shading) or facade (embedded in glazing) for power generation.	Power generation without CO_2 production.	Space at roof level or on facade. PV panels are expensive and currently not self-financing in their own lifetime without grants	+ £££	- £		
	Wind Turbines				Horizontal or vertical axis turbines integrated into either building or landscape	Power generation without CO_2 production. Can be integrated as part of the street furniture / external lighting design	Maintenance and safety issues.	+ ££	- £		
	Green Power				Purchase power from a green energy supplier.	Ensures carbon-neutrality power; if combined with electric mechanical equipment (i.e. GSHP), could provide a carbon-free building.	Cost. Restricts choice of power supplier	=	+ £££		
	Biofuel / Biomass				Boilers for space and water heating are supplied by biofuel rather than gas	Carbon neutral; Carbon Dioxide is required to initially grow the fuel before consumption releases that Carbon Dioxide back into the atmosphere.	Storage space for fuel required; Boilers require higher level of maitenance	+ £	+ £		
MATERIALS + RECYCLING											
	Re-use Demolition Waste				Crushed concrete / bricks from demolition are re-used for re-fill, sub-bases etc. on site.	Reduces the use of virgin materials; reduces transport to and from site	Requires crushing facility on site. Requires assessment of amount and quality of demolition material.	=	=		
	Recycling				Designated easy-to-access recycling areas for residents, retail and public spaces.	Encourages recycling. Reduces waste going to landfill.	Space for recycling facilities in private and public areas.	= / + £	=		
	Sustainable Materials in Building Structure				Materials with low embodied energy, cement substitutes (GGBS, PFA), recycled gabion walls, recycled steel, wood etc.	Reduces environmental footprint of building. Supports market for 'green' materials.	Requires more attention to material types and sourcing.	= / + £	=		
	Sustainable Materials in Building Finishes				Materials with low embodied energy (local extract, recycled, rapidly renewable sources). I.e. recycled glass, recycled plastic etc.	Reduces environmental footprint of building. Supports market for 'green' materials.	Requires more attention to material types and sourcing.	= / + £	=		
	FSC Certified Wood				All specified wood to be FSC (Forest Stewardship Council) certified	Ensures that wood comes from managed forests only. Avoids depletion of natural forests and endangered wood.	Possible restriction on wood types / products which can be specified.	=	=		
	Low VOC and Urea-Formaldehyde Materials				Materials with low volatile organic compound content and no added urea-formaldehyde.	Improves indoor air quality and occupant health.	Requires more attention to material types and sourcing.	=	=		
	Construction Waste Management				Contractors sort and recycle construction waste.	Minimize construction waste going to landfill or incineration. Often saves money.	Requires on-site sorting and a site waste management plan	= / - £	=		
	Green Street Furniture				Street Furniture with recycled content, local materials, sustainable manufacturing processes, design for recyclability, etc.	Reduces environmental footprint of street furniture package. Supports market for 'green' materials.	Requires more attention to material types and sourcing.	= / + £	=		

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| STAGE 3 | Campus Master Plan | The Chinese University of Hong Kong |

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Making a Sustainable Campus 可持續發展校園

SUSTAINABILITY MATRIX

10P1737 / April 2006

Environmental Element		Included	Further Study	Ownership	Description	Benefit	Possible Drawbacks	Capital Cost	Operating Cost	Visibility	Environmental Benefit
	'A' rated appliances				Appliances that use less energy, avoid some toxins, and avoid ozone-depleting substances.	Lowers operating energy and resultant CO_2 production.	Requires more attention to appliance selection.	= / + £	- £	◑	
WATER											
	Rainwater Harvesting				Rainwater collected from roof / hard landscaping and stored for non-potable uses (irrigation / car park / store wash down points)	Reduces demand on stormwater infrastructure. Reduces potable water use. Lagune can be used as part of storage system.	Space for storage tank, filters and pumps.	+ £	- £	○	
	Greywater System				Greywater (wash hand basins, showers, baths) from building cleaned and reused for non-potable uses (irrigation and/or toilet flushing).	Reduces wastewater flow from building and potable water use.	Space for tanks, filters; requires regular maintenance.	+ ££	- £	○	
	Blackwater Treatment				System of waste decomposition tanks treats blackwater (toilets) and uses it for non-potable uses.	Eliminates waste flow from building and reduces potable water use. Solid wastes produced can be used as compost.	Space for tanks, filters; requires regular maintenance.	+ £££	- ££	○	
	Water Saving Fixtures				Sensor and low-flow taps, low flush toilets, waterless urinals, etc.	Reduces demand on waste water infrastructure and potable water use.	Maintenance requirements may be higher or lower, depending on fixtures.	= / + £	- £	◑	
LANDSCAPING											
	Native /Adapted Vegetation				Use of plants that are native to the ecosystem or adapt to local conditions without extensive need for fertilizing and watering.	Reduces landscape maintenance, provides habitat, reduces stress on local ecosystem.	Requires more attention to plant selection and may limit options.	= / + £	- £	●	
	Green Roof				Extensive vegetation on building roof. TBC by landscape architects	Reduces stormwater runoff, improves roof insulation, increases roof life-span, enhances microclimate and biodiversity.	Increases roof load and requires some maintenance depending on green roof type.	+ ££	- £	●	
	Drip Irrigation				Permanent irrigation system using less water than conventional systems.	Saves water.		= / + £	=	○	
SOCIAL SUSTAINABILITY											
	Building User Education				Teach building occupants how to use building systems efficiently. (Heating, cooling, ventilation, shading, water saving, recycling etc.)	Higher level of user satisfaction, less maintenance, lower energy / water use.	Requires training.	=	- £	●	
	Electric Car Charging Points				Dedicated electric car parking area with car charging points	Encourages the use of electric cars. Reduces pollution.	Requires dedicated car parking areas with electric charge points.	= / + £	=	●	
	Carpool System				Car sharing scheme which allows residents to book cars on hourly / daily rates	Encourages car sharing and reduces individual car use.	Requires dedicated car parking areas for car pool. Requires car management system.	= / + £	=	●	
	Cycle Parking				Dedicated secure bicycle storage areas.	Encourages cycling. Reduces the dependency on cars thus reducing emissions.	Requires dedicated area. Takes up space.	+ £	=	●	

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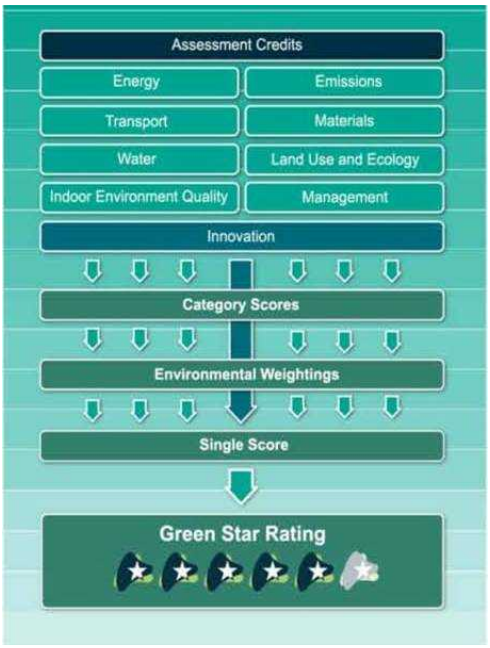
Making a Sustainable Campus 可持續發展校園

Design Performance Benchmarking - Green Star™

The master plan recommends using the Australian ***Green Star™*** rating scheme for holistic building performance.

The scheme is more **geographically appropriate** to Hong Kong's climate than LEED (USA) or BREEAM (UK).

A **5 star *Green Star™*** rating for all new buildings will be an internationally recognised mark of sustainable design achievement.



Reducing
The target energy reduction can be greater than the basic Green Star scoring scheme.

Reporting
Greenhouse gas emissions & reductions should be reported according to the Hong Kong Environmental Protection Department guidelines.

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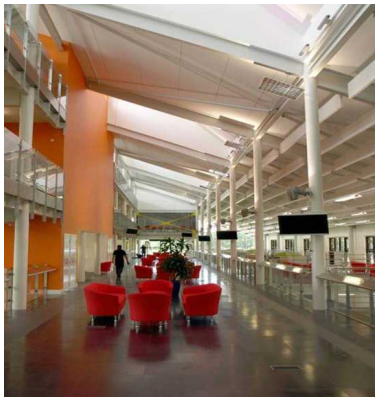
Making a Sustainable Campus 可持續發展校園

UK Experience: ECA's Warwick University Digital Laboratory

BREEAM Excellent
Completed in 2008, the building achieved the highest rating – the UK equivalent of a **Green Star 5 or 6 Star** rating. The scoring considered management, energy, pollution, transport, land use, ecology, materials & water.

Low carbon footprint:
The building uses just 19.21 kgCO2/m2.
(This is an approximate **84% reduction** from a typical UK office building which uses ~125 kgCO2/m2.)



Making a Sustainable Campus 可持續發展校園

UK Experience: ECA's Warwick University Digital Laboratory

How was this achieved?

Photovoltaic panels provide on-site energy production

Highly efficient light fittings, LEDs & sensors

Combined Cooling Heat & Power (CCHP)

"Living Roof" brings 13 grass species & biodiversity to the site, and reduces rainwater run-off

North-facing orientation maximises **natural daylighting** & minimises solar heat gain

Enhanced insulation minimises heating loads

Flexible & adaptable to future wall / floor / services changes (e.g. demountable mezzanine floors)

High thermal mass floors & under-slab labyrinth provide temperature stability & support **natural ventilation**

Reinforced grass vehicle surfaces & natural soakaways attenuate rainwater run-off

Water-efficient fittings, controls & management (e.g. infrared flushing controls & leak detection systems)

Water quality assessments during construction ensured against site contamination

Making a Sustainable Campus 可持續發展校園

Making a Low-carbon, Low-Waste, Low Emission Campus

Making a Sustainable Campus 可持續發展校園

Transport

A pedestrian friendly campus

More energy-efficient buses & simplified bus network

Park n Ride to reduce private car use

Cycle Track & secure cycle storage

This document shall be read in conjunction with the presentation of the consultant.

Making a Sustainable Campus 可持續發展校園

Water

Water storage to retain rainwater on and around buildings

Water reservoirs to gather from natural hill streams

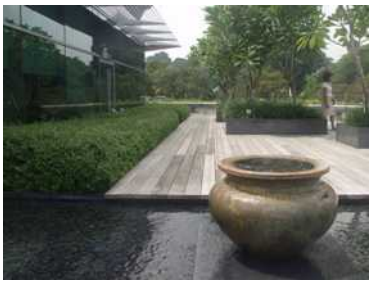
Water recycling to use grey water (or sea water) in WCs

Water attenuation to reduce storm surges

Water conservation through efficient and aerated fittings

Water cooling to draw air over internal & external pools

Water efficient appliances in all new buildings



Making a Sustainable Campus 可持續發展校園

Waste & Resources

Recycle & reuse day-to-day materials to reduce landfill

Reduce construction waste

Source building materials responsibly and locally

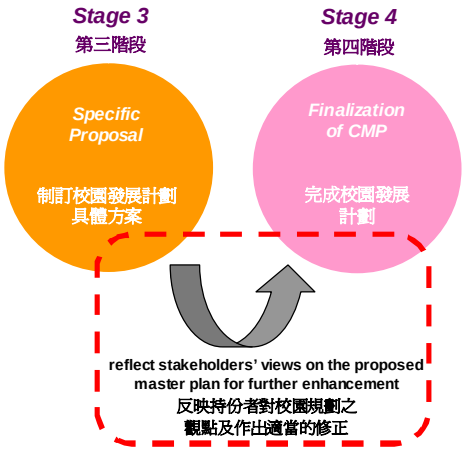
Expanding the on-site **Combined Cooling Heat & Power (CCHP)** plant will avoid the significant transmission losses associated with centralised power supply, whilst using surplus heat for heating or absorption cooling.

Biogas may represent a feasible energy source, making gas and power out of biological waste

This document shall be read in conjunction with the presentation of the consultant.

The next steps

Final Submission of Campus Master Plan
發展計劃顧問最後報告



- *The masterplan will now be further refined to following the comments received from the Stage 3 events*
- *The masterplan will then remain a 'Live' document, evolving to acknowledge gradual changes in the development of the Campus*
- *The masterplan will serve as a guide for future development within the University, by providing planning guidelines on the potential of each Development site for future architects*
- *The masterplan will contain information to support the implementation process for each development, including funding, phasing and environmental impact.*


2012


Thank you
Sources of Illustration:
Professor Cheung Chan Fai
CUHK
Aedas Limited
Edward Cullinan Architects