

MASTER

How to bring BREEAM to China?

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Appendix

How to bring

BREEAM to China

**October 2011
Rui Zha**

**Master Thesis
Real Estate Management and Development
Eindhoven University of Technology
The Netherlands**

**An assignment of
Grontmij Nederland B.V**



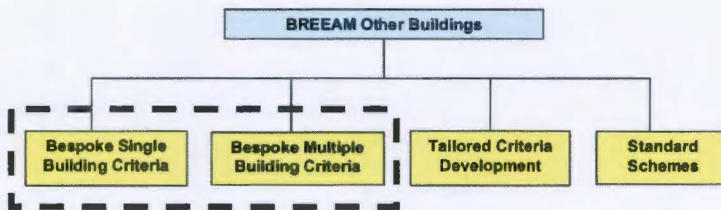
Appendix 4.1

Standard BREEAM within the United Kingdom (UK)	
Non Domestic	Domestic
BREEAM Offices	Eco Homes
BREEAM Retail	BREEAM Eco Homes XB
BREEAM Industrial	BREEAM Multi-residential
BREEAM Education	The Code for Sustainable Homes
BREEAM Healthcare	

Standard BREEAM assessments outside the United Kingdom (UK)

BREEAM International
BREEAM Gulf
BREEAM Europe Retail
BREEAM Europe Offices
BREEAM Europe Industrial
BREEAM Europe Toyota Retail Units

All other building types are currently assessed under the BREEAM Other Buildings



(breeam bespoke)

With a Bespoke assessment, there is no fixed set of criteria that can be immediately used by a BREEAM Assessor to assess a building.

Bespoke building criteria	
BREEAM UK Bespoke &	Bespoke Single Building Criteria
BREEAM International Bespoke	Bespoke Multiple Building Criteria

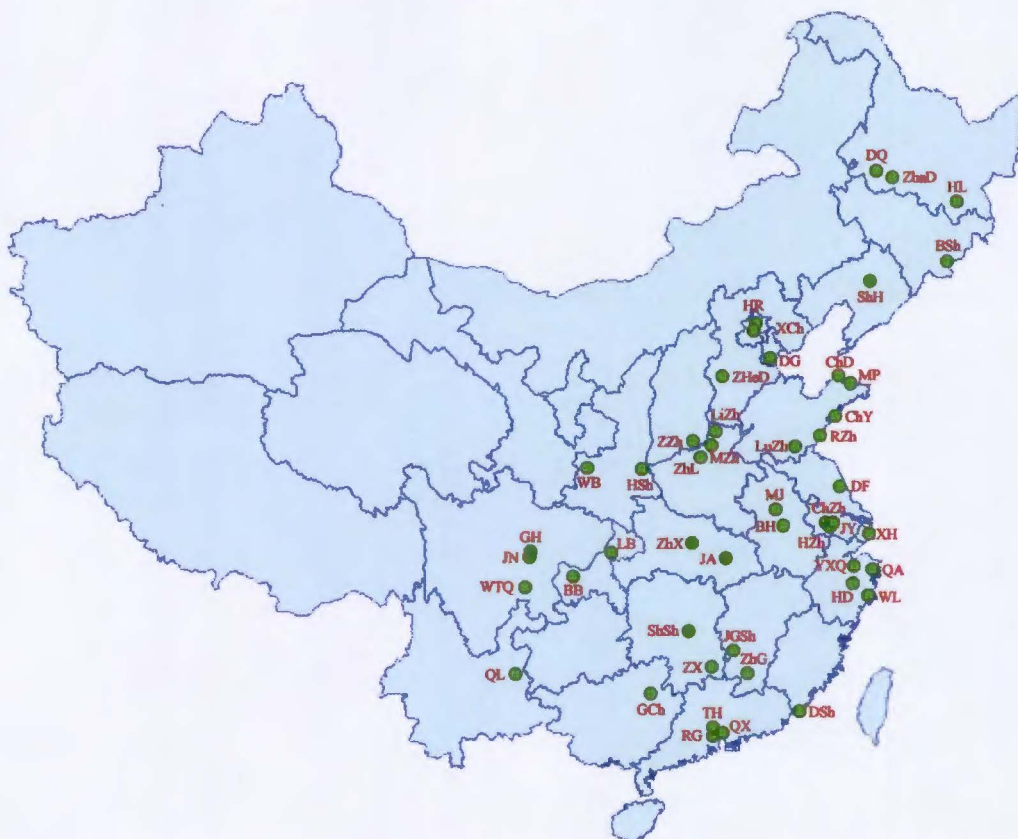
These schemes represent standard BREEAM schemes that are perhaps smaller in scale and not large enough to warrant a separate licence and training course.

Standard/Exiting schemes
BREEAM Courts
BREEAM Prisons
BREEAM Data Centers



Appendix 5.4 National Sustainable Communities of China

National Sustainable Communities of China



BB:	Beibei District	HD:	Hongshan Town	MJ:	Maoji Town	WL:	Wenling City
BH:	Baobe District	HL:	Hailin City	MP:	Mouping District	WTQ:	Wutongqiao District
BSb:	Baishan City	HR:	Huairou District	MZh:	Mengzhuang Town	XCh:	Xichong District
ChD:	Changde County	HSh:	Huanhua District	QA:	Qin'ai Town	XH:	Xuhai District
ChY:	Chengyang District	HZh:	Huanhuang Town	QL:	Qilin District	YXQ:	Yangxunqiao Town
ChZh:	Changzhou City	JA:	Jiang'an District	QX:	Qingxi Town	ZhaD:	Zhaodong City
DF:	Dafeng City	JGSh:	Jinggangshan City	RG:	Ronggai Town	ZhaD:	Zhengding County
DG:	Dagang District	JN:	Jinxi District	RZh:	Rizhao City	ZhG:	Zhanggong District
DQ:	Daqing City	JY:	Jiangyin City	ShH:	Shenhe District	ZhL:	Zhulin County
DSb:	Dongshan County	LB:	Longbao Commission	ShSh:	Shaoshan City	ZhX:	Zhongxiang City
GCh:	Gongcheng County	LZh:	Linzhou City	TH:	Tianhe District	ZX:	Zixing City
GH:	Guanghan City	LuZh:	Laozhutang Town	WB:	Weibin District	ZZh:	Zezhou County



Appendix 5.5

Location of Hubei



Location of Wuhan



China railway network





Appendix 6.1 a Example of a BREEAM Communities Issue

In the following three pages are the examples of a BREEAM Communities Issue. These materials are directly quoted from the SD5065B Technical Guidance Manual of BRE Global.

Information box appears in the top of each BREEAM Communities issue contains:

- Category
- Issue unique ID
- Issue Title
- Sub Category

BREEAM Communities	
Risee Shaping	
PS1 – Sequential Approach	
Effective Use of Land	

Guidance			
Mandatory	Status	Size	Type
Yes	National	SML	ALL

Guidance box provides information on whether the issues are:

- mandatory or not mandatory
- origin of policy driver
- size of development applicable
- type of development

Aim

To ensure the most effective and efficient use of land, applying a sequential approach:

- How can the site be best characterised? (NB for biodiversity issues see the ecology section)
 - Contaminated land - remediated or awaiting remediation
 - Brownfield - derelict urban land
 - Undeveloped - includes residential garden
 - Other including Brownfield - rural land, designated open space, designated sports pitches or recreation land, green belt, high quality agricultural land, land designated as of ecological importance, land with workable or potentially workable minerals

Assessment Criteria

Credits	
1 (Minimum)	Size and tenure needs of current and future community demographics have been investigated and addressed
2 (Good)	The site can be best characterised as: C – Undeveloped - Includes residential garden
3 (Best)	The site can be best characterised as: A - Contaminated land - remediated or awaiting remediation Or B - Brownfield - derelict urban land

Compliance Requirements

The following demonstrates compliance:

Each BREEAM issue contains further information on the *Compliance Requirements* table. It provides additional guidance on the application and interpretation of the *Assessment Criteria*.

The Assessment Criteria details the requirements that the assessed development must demonstrate compliance with for the available BREEAM credits to be awarded.



Additional Information

Peer review: Is defined as the process employed by a professional body to demonstrate that potential or current full members maintain a standard of knowledge and experience required to ensure compliance with a code of conduct and professional ethics.

Full members of the following organisations, who meet the above requirements, are deemed suitably qualified ecologists for the purposes of BREEAM:

- A. Association of Wildlife Trust Consultancies (AWTC)
- B. Chartered Institution of Water and Environmental Management (CIWEM)
- C. Institute of Ecology and Environmental Management (IEEM)
- D. Landscape Institute (LI)
- E. Institute of Environmental Management and Assessment (IEMA)

The Additional Information section contains definitions of terms used in the Assessment Criteria and Compliance Notes section. This section will also contain further information relevant to the issue e.g. assessment guidance and relevant websites

BREEAM Communities
Place Shaping
PS2 – Land Reuse
Effective Use of Land

Guidance			
Mandatory	Status	Size	Type
No	Regional	SML	ALL

The Schedule of Evidence Required table describes the types of information that must be provided to the BREEAM assessor as evidence of the assessed building's compliance with the Assessment Criteria.

The Schedule of Evidence table is split in to two sections. The first details the type(s) of evidence required at the outline planning stage of assessment. The second describes the type(s) of evidence required at the detailed planning stage of assessment. The numbers in the table correspond to the numbered assessment criteria in the above sections

Schedule of Evidence Required		
Req.	Outline Planning Stage	Detailed Planning Stage
All		
Req. 1	<ul style="list-style-type: none"> ▪ Details of previous land use, e.g. maps, reports and site photographs. 	<ul style="list-style-type: none"> ▪ Details of previous land use, e.g. maps, reports and site photographs. ▪ The overall site wide plan including the footprint areas (m²) of all buildings, hard landscaping, access roads and parking areas.
Req. 2	<ul style="list-style-type: none"> ▪ A letter from the developer or project team to the Local Authority with a commitment to the percentage of the development site built on previously developed/ Brownfield land that will be brought back into use. 	<ul style="list-style-type: none"> ▪ Confirmation from the developer or project team the percentage of the development site built on previously developed/ Brownfield land that will be brought back into use.



Appendix 6.1 b Local Amenities

Local Amenities	Walking distance (m)	
	UK	China
Shop selling food and fresh groceries	500	500
Post box	500	NG ¹
Children's playground / amenity area	500	NG
Postal facility	1000	NG
Bank or cash machine	1000	NG
Pharmacy	1000	NG
Primary school	1000	500
Medical center	1000	1000
Leisure facilities	1000	1000
Local meeting place/community center	1000	1000
Public house	1000	1000
Public park or public access space or village green	1000	1000
Children's facilities (nursery/crèche)	1000	3000
Places of religious worship (incl. Parish halls)	1000	NG

Dai. (1999)

¹ "NG" means "Not Given".



Appendix 6.1c Eligibility Criteria for Innovation Credits

The following criteria will be used to evaluate the eligibility of claims for proposed Innovation credit status:

- a. Does the feature, system or process aim to reduce the building's impact on one of the following overarching environmental/social issues?
- Mineral Resource Depletion
 - Fossil Fuel Depletion
 - Acidification
 - Climate Change
 - Nuclear Waste
 - Stratospheric Ozone Depletion
 - Eco-toxicity
 - Eutrophication
 - Human Toxicity
 - Photochemical Ozone Creation (Summer Smog)
 - Waste Disposal
 - Water Use
 - Deforestation
 - Urban Sprawl
 - Reduction of Biodiversity
 - Noise and Nuisance
 - Loss of Heritage
 - Indoor comfort
 - Health and Safety
 - Access and Inclusion
- b. Can the impact of the feature, system or process be assessed objectively using clearly defined criteria?
- c. Can the sustainability benefits of the feature, system or process be demonstrated?
- d. Have a draft aim, credit criteria, compliance requirements and information required to demonstrate compliance been developed (in accordance with the *Innovation credit* application form)?

A BREEAM assessor can obtain the *Innovation credit* application form from the BREEAM Office at BRE Global. The form details the eligibility criteria listed above and the fee payable for each submitted application for an *Innovation credit*.

Innovation credits cannot be awarded until written approval is received from the BREEAM Office.



Appendix 6.2a 5 sets of Questionnaire A

Name list of Chinese ecological experts

Name	Gender	Professional field	Questionnaire code
Zhu Yingxin	Female	Green building design; Air Conditioning system Optimization Design	1
Lin Borong	Male	Green building design; Air Conditioning system Optimization Design	2
Shi Wenxing	Male	Green building design; Air Conditioning system Optimization Design	3
Pan Song	Male	Energy-efficient design; Green building design	4
Chen Chao	Male	Energy-efficient design; Green building design	5

1	Climate & Energy	Community	Place shaping	Ecology & Biodiversity	Transport	Resources	Business	Buildings
Climate & Energy	1	1/3	1	1	1/5	1/3	1	3
Community	3	1	3	3	1	1	3	9
Place shaping	1	1/3	1	1/3	1	1	3	9
Ecology & Biodiversity	1	1/3	3	1	1/5	1/3	1	3
Transport	5	1	1	5	1	1	5	9
Resources	3	1	1	3	1	1	3	9
Business	1	1/3	1/3	1	1/5	1/3	1	3
Buildings	1/3	1/9	1/9	1/3	1/9	1/9	1/3	1

By calculating from Excel, the outcome is:

$$\omega_1 : 0.0668, \omega_2 : 0.2111, \omega_3 : 0.1294, \omega_4 : 0.0908, \omega_5 : 0.2350, \omega_6 : 0.1872, \omega_7 : 0.0589, \omega_8 : 0.0208$$

$\lambda_{\max} = 8.691$, $C.I. = 8.691 - 8/8 - 1 = 0.098$, $C.R. = 0.098/1.41 = 0.0695 < 0.1$. So this Paired comparison matrix is effective.

2	Climate & Energy	Community	Place shaping	Ecology & Biodiversity	Transport	Resources	Business	Buildings
Climate & Energy	1	1	3	1/3	1	1/3	1	1
Community	1	1	3	1/3	1/3	1/3	1	1
Place shaping	1/3	1/3	1	1/9	1/5	1/9	1/5	1/3



Ecology & Biodiversity	3	3	9	1	3	1	3	3
Transport	1	3	5	1/3	1	1/3	3	1
Resources	3	3	9	1	3	1	3	5
Business	1	1	5	1/3	1/3	1/3	1	1
Buildings	1	1	3	1/3	1	1/5	1	1

By calculating from Excel, the outcome is:

$$\omega_1 : 0.0842, \omega_2 : 0.2758, \omega_3 : 0.0251, \omega_4 : 0.2527, \omega_5 : 0.1285, \omega_6 : 0.2715, \omega_7 : 0.0824, \omega_8 : 0.0797$$

$\lambda_{\max} = 8.22$, $C.I = 9.22 - 8/8 - 1 = 0.031$, $C.R = 0.031/1.41 = 0.0220 < 0.1$. So this Paired comparison matrix is effective.

3	Climate & Energy	Community	Place shaping	Ecology & Biodiversity	Transport	Resources	Business	Buildings
Climate & Energy	1	1/3	3	3	1/3	1/3	3	1
Community	3	1	3	3	1/3	1/3	3	1
Place shaping	1/3	1/3	1	1	1/9	1/3	1	1/3
Ecology & Biodiversity	1/3	1/3	1	1	1/9	1/9	1	1/3
Transport	3	3	9	9	1	1	9	3
Resources	3	3	3	9	1	1	9	3
Business	1/3	1/3	1	1	1/9	1/9	1	1/3
Buildings	1	1	3	3	1/3	1/3	3	1

By calculating from Excel, the outcome is:

$$\omega_1 : 0.0836, \omega_2 : 0.1212, \omega_3 : 0.0416, \omega_4 : 0.0404, \omega_5 : 0.3045, \omega_6 : 0.2732, \omega_7 : 0.0338, \omega_8 : 0.1015$$

$\lambda_{\max} = 8.32$, $C.I = 8.31 - 8/8 - 1 = 0.046$, $C.R = 0.046/1.41 = 0.0326 < 0.1$. So this Paired comparison matrix is effective.

4	Climate & Energy	Community	Place shaping	Ecology & Biodiversity	Transport	Resources	Business	Buildings
Climate & Energy	1	3	1	3	3	1/3	5	1/3
Community	1/3	1	1/3	1	1	1/9	1	1/9
Place shaping	1	3	1	1	3	1/3	5	1/3
Ecology & Biodiversity	1/3	1	1	1	3	1/3	5	1/3
Transport	1/3	1	1/3	1/3	1	1/9	1	1/3
Resources	3	9	3	3	9	1	9	1
Business	1/5	1	1/5	1/5	1	1/9	1	1/9
Buildings	3	9	3	3	3	1	9	1



By calculating from Excel, the outcome is:

$\omega_1 : 0.1268, \omega_2 : 0.0399, \omega_3 : 0.1068, \omega_4 : 0.0888, \omega_5 : 0.0411, \omega_6 : 0.2996, \omega_7 : 0.0285, \omega_8 : 0.2684$

$\lambda_{max} = 8.39, C.I = 8.39 - 8/8 - 1 = 0.056, C.R = 0.056/1.41 = 0.0397 < 0.1$. So this Paired comparison matrix is effective.

5	Climate & Energy	Community	Place shaping	Ecology & Biodiversity	Transport	Resources	Business	Buildings
Climate & Energy	1	1/7	1/7	3	1/9	1/3	1/7	1/5
Community	7	1	1	5	1/3	3	1/3	3
Place shaping	7	1	1	5	1/3	3	1	3
Ecology & Biodiversity	1/3	1/5	1/5	1	1/7	1/5	1/7	1/5
Transport	9	3	3	7	1	3	1	3
Resources	3	1/3	1/3	5	1/3	1	1/5	1/3
Business	7	3	1	7	1	5	1	3
Buildings	5	1/3	1/3	5	1/3	3	1/3	1

By calculating from Excel, the outcome is:

$\omega_1 : 0.298, \omega_2 : 0.1396, \omega_3 : 0.1597, \omega_4 : 0.0231, \omega_5 : 0.2592, \omega_6 : 0.0640, \omega_7 : 0.2307, \omega_8 : 0.0939$

$\lambda_{max} = 8.63, C.I = 8.63 - 8/8 - 1 = 0.09, C.R = 0.09/1.41 = 0.0638 < 0.1$. So this Paired comparison matrix is effective.



Appendix 6.2c Screen shot of BREEAM Communities regional weightings

		Mandatory or Optional	National/Regional/Local	Mixed or Domestic	Regional Weightings								Development
					London	South East	South West	North East	North West	East Mids	West Mids	East England	
CE1	Water Management - Flood Risk Assessment [Location]	M	N	M/D	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	SML
CE2	Water Management - Surface Water Runoff	M	N	M/D	0.9	0.8	0.9	N/A	N/A	1.0	N/A	1.0	SML
CE3	Water Management - Rainwater	D	N	M/D	0.8	0.7	N/A	N/A	0.7	N/A	N/A	1.0	SML
CE10	Water Management - Flood Control	D	L	M/D	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.0	ML
CE11	Water Management - Sustainable Urban Drainage	D	L	M/D	0.9	0.8	0.8	N/A	0.9	0.9	N/A	0.6	SML
CE9	Water Management - Consumption	M	N	M/D	1.0	1.0	0.8	0.9	0.8	N/A	0.9	0.8	SML
CE4	Design - Heat	M	R	M/D	1.0	0.7	0.7	0.6	0.7	0.9	0.9	0.7	SML
CE12	Design -	D	L	M/D	0.7	0.8	0.9	N/A	1.0	N/A	0.9	0.8	SML
CE13	Design - Weather Resilience	D	L	M/D	0.5	0.7	0.7	N/A	N/A	N/A	N/A	N/A	ML
CE5	Energy - Efficiency	M	N	M/D	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	SML



Appendix 6.2 d 40 Sets of Questionnaire B

5 Sets of Questionnaire B₁

Name list of interviewees for "Climate and Energy" category

Name	Gender	Qualification	Questionnaire code
Li Yonggao	Male	Officer in Wuhan, Hongshan district Water Authority. In charge of environment monitoring.	1
Qu Youcai	Male	Officer in Wuhan, Hongshan district Water Authority. In charge of flood prevention and control	2
Liu Yingfang	Female	Officer in Wuhan, Hongshan district Water Authority. In charge of flood prevention and control	3
Li Chunmei	Female	Officer in Wuhan, Hongshan district Water Authority. In charge of environment monitoring.	4
Jin Qiao	Female	Officer in Wuhan, Hongshan district Water Authority. In charge of environment monitoring.	5

$$AE_i = \frac{\sum_{j=1}^m E_{ij}}{5}, \quad i = 1, \dots, n \text{ and } j = 1, \dots, m$$

Climate and Energy										
E _{ij}		Flood Risk Assessment	Surface Water Runoff	Rainwater SUDS	Heat Island	Energy Efficiency	Onsite Renewables	Future Renewable	Services	Water Construction
	i	1	2	3	4	5	6	7	8	9
j										
1		0.9	1	0.8	0.7	0.9	1	0.9	0.8	0.8
2		1	0.9	0.9	0.7	1	0.7	0.8	1	0.8
3		0.9	0.9	0.8	0.6	0.8	0.9	0.9	0.8	0.8
4		1	0.9	1	0.9	0.8	0.9	0.8	0.9	0.7
5		1	0.9	1	0.8	0.7	0.9	1	0.9	0.7
Sum		4.8	4.6	4.5	3.7	4.2	4.4	4.4	4.4	3.8
AE (average)		0.96	0.92	0.9	0.74	0.84	0.88	0.88	0.88	0.76
Rounding-off		1	0.9	0.9	0.7	0.8	0.9	0.9	0.9	0.8

5 Sets of Questionnaire B₂



Name list of interviewees for “Community” category

Name	Gender	Qualification	Questionnaire code
Huang Chengli	Female	Editor from “Changjiang Daily”	1
Li Rui	Male	Journalist from “Changjiang Daily”	2
Dai Hongbing	Female	Journalist from “Wuhan Evening News”	3
Peng Xuewu	Male	Editor from “Wuhan Morning News”	4
Hu Jiquan	Male	Journalist from “Wuhan Morning News”	5

$$AF_i = \frac{\sum_{j=1}^m F_{ij}}{5}, \quad i = 1, \dots, n \text{ and } j = 1, \dots, m$$

Community					
F_ij		Inclusive Design	Consultation	Development User Guide	Management and Operation
	i	1	2	3	4
j					
1		1	0.8	0.7	0.9
2		0.9	0.9	0.7	1
3		1	0.7	0.8	0.8
4		0.9	0.9	0.9	0.8
5		1	0.7	0.8	0.9
Sum		4.8	4	3.9	4.4
AF (average)		0.96	0.8	0.78	0.88
Rounding-off		1	0.8	0.8	0.9

5 Sets of Questionnaire B₃

Name list of interviewees for “Place shaping” category

Name	Gender	Qualification	Questionnaire code
Fu Jingjing	Female	Master student in Landscape design	1
Zhang Zuoqian	Female	Mater student in Urban design	2
Wu Dan	Female	Mater student in Urban design	3
Huang Tingting	Female	Mater student in Urban design	4
Ding Lan	Female	Mater student in Urban design	5



$$AG_i = \frac{\sum_{j=1}^m G_{ij}}{5}, \quad i = 1, \dots, n \text{ and } j = 1, \dots, m$$

Place shaping												
G _{ij}		Sequential Approach	Land Reuse	Building reuse	Landscaping	Design and Access	Green Area	Local Demographics	Affordable Housing	Security by Design	Active Frontages	Defensible Spaces
	i	1	2	3	4	5	6	7	8	9	10	11
	j											
1		1	0.8	0.7	0.9	0.8	1	0.9	1	0.9	0.8	1
2		0.9	0.9	0.9	1	0.7	1	0.8	0.8	0.7	0.6	0.7
3		0.9	0.7	0.8	0.8	0.7	1	1	1	1	0.7	0.8
4		0.8	0.9	0.9	0.9	0.9	0.9	0.7	0.7	0.8	1	0.7
5		0.9	1	1	0.9	0.8	0.8	0.9	1	0.7	0.8	0.7
Sum		4.5	4.3	4.3	4.5	3.9	4.7	4.3	4.5	4.1	3.9	3.9
AG		0.9	0.86	0.86	0.9	0.78	0.94	0.86	0.9	0.82	0.78	0.78
Rounding-off		0.9	0.9	0.9	0.9	0.8	1	0.9	0.9	0.8	0.8	0.8

5 Sets of Questionnaire B₄

Name list of interviewees for "Ecology and Biodiversity" category

Name	Gender	Qualification	Questionnaire code
Wang Hui	Male	Master student in "Biodiversity Conservation"	1
Wang Wenqing	Female	PHD student in "Aquatic plant research"	2
Hu Di	Female	PHD student in "Wetland Conservation"	3
Chen Xiao	Female	Engineer in "Ecology protection"	4
Chen Dong	Male	Engineer in "Biodiversity research"	5

$$AH_i = \frac{\sum_{j=1}^m H_{ij}}{5}, \quad i = 1, \dots, n \text{ and } j = 1, \dots, m$$

Ecology and Biodiversity				
H _{ij}		Ecological Survey	Biodiversity action plan	Native Flora
	i	1	2	3
	j			
1		1	0.8	1
2		1	0.9	0.9



3		0.9	0.9	1
4		0.7	0.8	0.9
5		1	1	1
Sum		4.6	4.4	4.8
AH		0.92	0.88	0.96
Rounding-off		0.9	0.9	1

5 Sets of Questionnaire B₅

Name list of interviewees for "Transport and Movement" category

Name	Gender	Qualification	Questionnaire code
Zhang Li	Female	Transportation network planner	1
Jiang Chenming	Male	Transportation network planner	2
Zhang Qiang	Male	Transportation network planner	3
Li Hao	Male	Transportation network planner	4
Hu Gege	Female	Transportation network planner	5

$$AI_i = \frac{\sum_{j=1}^m I_{ij}}{5}, \quad i = 1, \dots, n \text{ and } j = 1, \dots, m$$

Transport & Movement												
I _{ij}	Location/Capacity	Availability/Frequency	Facilities	Local Amenities	Network	Facilities	Car Clubs	Flexible Parking	Local Parking	Home Zones	Transport Assessment	
i	1	2	3	4	5	6	7	8	9	10	11	
j												
1	1	1	0.7	0.9	0.8	1	0.8	1	1	1	1	
2	0.9	0.9	0.9	1	0.7	1	0.6	0.8	0.8	0.8	0.7	
3	0.9	1	1	0.8	1	1	1	0.9	1	0.7	0.8	
4	1	1	0.9	0.9	0.9	0.9	0.7	1	0.9	0.8	1	
5	0.9	1	1	1	1	0.8	0.6	1	0.7	0.8	0.8	
Sum	4.7	4.9	4.5	4.6	4.4	4.7	3.7	4.7	4.4	4.1	4.3	
AI	0.94	0.98	0.9	0.92	0.88	0.94	0.74	0.94	0.88	0.82	0.86	
Rounding-off	0.9	1	0.9	0.9	0.9	0.9	0.7	0.9	0.9	0.8	0.9	

5 Sets of Questionnaire B₆

Name list of interviewees for "Resources" category

Name	Gender	Qualification	Questionnaire code
Xiong Chuanxi	Male	Expert in "Energy-efficient materials"	1
Wang Jie	Female	Master student in "Construction waste"	2



		treatment and recycling”	
Fang Jingwen	Female	Master student in “Solar panel Research & Development”	3
He Zhiqing	Female	Master student in “Energy-efficient materials”	4
Meng Yajuan	Female	Master student in “Energy-efficient materials”	5

$$A_j = \frac{\sum_{j=1}^m J_{ij}}{5}, \quad i = 1, \dots, n \text{ and } j = 1, \dots, m$$

Resources Section							
J_ij		Low impact	Locally Sourced Materials	Road Construction	Composting	Master planning Strategy	Ground water
	i	1	2	3	4	5	6
j							
1		1	0.9	0.8	0.9	1	0.9
2		0.9	0.8	0.8	0.8	0.7	1
3		1	0.7	1	0.8	1	0.7
4		1	0.7	0.9	0.9	0.9	0.9
5		0.9	0.9	0.8	1	0.9	0.8
Sum		4.8	4	4.4	4.4	4.5	4.4
AJ		0.96	0.8	0.86	0.88	0.9	0.86
Rounding-off		1	0.8	0.9	0.9	0.9	0.9

5 Sets of Questionnaire B₇

Name list of interviewees for “Business and Economy” category

Name	Gender	Qualification	Questionnaire code
Yu Li	Male		1
Yan Yan	Female		2
Xie Jiabin	Female		3
Li Xiyang	Male		4
Xu Fan	Female	Master student in “Sales and Marketing”	5

$$AK_i = \frac{\sum_{j=1}^m K_{ij}}{5}, \quad i = 1, \dots, n \text{ and } j = 1, \dots, m$$

Business and Economy						
K_ij		Business Priority	Labor and Skills	Employment	New Business	Investment



	i	1	2	3	4	5
j						
1		1	0.8	0.7	0.8	0.9
2		0.9	0.9	0.7	0.9	0.8
3		0.9	1	0.9	0.7	0.9
4		1	0.7	0.9	0.8	0.9
5		1	0.9	0.9	0.9	0.8
Sum		4.8	4.3	4.1	4.1	4.3
AK		0.96	0.86	0.82	0.82	0.86
Rounding-off		1	0.9	0.8	0.8	0.9

5 Sets of Questionnaire B₈

Name list of interviewees for "Buildings" category

Name	Gender	Qualification	Questionnaire code
He Wenxia	Female	Architect designer	1
Pan Lingfeng	Male	Architect designer	2
Zhang Kai	Male	Architect designer	3
Zhang Cheng	Male	Architect designer	4
Wang Ran	Male	Architect designer	5

$$AL_i = \frac{\sum_{j=1}^m K_{ij}}{5}, \quad i = 1, \dots, n \text{ and } j = 1, \dots, m$$

Building		
L _{ij}	Domestic	Non-domestic
1	1	0.9
2	0.8	1
3	0.9	1
4	1	0.8
5	0.8	1
Sum	4.5	4.7
AL	0.9	0.94
Approximation	0.9	0.9



Appendix 7.3.3a Landscape Framework



构成景观系统的四个组成部分是建立一个充满吸引力的生活和工作城市的重要因素。
All four functions are important ingredients to develop an attractive living and working city.

水: 长江决定了景观结构; 河流、小溪和湖泊决定了景观模式。水体有丰富的景观价值, 并有利于休闲娱乐和渔业。
Water: Yangtze river dominated the making of the landscape; rivers, creeks and lakes made the landscape pattern and are nowadays of value for nature development, leisure, and fishery.

生态走廊: 沿着自然河流、湖泊重要自然区域的动植物, 使这些区域能吸引居民贴近自然。

Ecological corridors: significant natural areas of flora and fauna along the natural water stream or canal. These zones attract inhabitants for a nature experience.

环境走廊: 左岭和相邻城市的绿色缓冲区。分布有高压线、铁路线、高速公路和其他道路等主要基础设施。

Environmental corridor: a large green buffer between Zuoling and the neighbouring city. A rest zone for main infrastructure lines as electricity power line, railroad, expressway and other roads.

休闲走廊: 大型(连接)地区(城市和自然公园), 吸引人们前来休闲(运动, 骑自行车、散步、划船、独木舟等), 同时也能创造经济效益。

Recreational corridors: large and / or long (connecting) areas (urban and nature parks) to attract people to spend their free time, (sports, biking, wandering, sailing, canoeing, ...), education, and also for economic benefits.

Resource: Grontmij portfolio



Appendix 7.3.3b



City centers and landmarks



Residential high density



Residential middle density



Residential low density



Industry



Research & Development

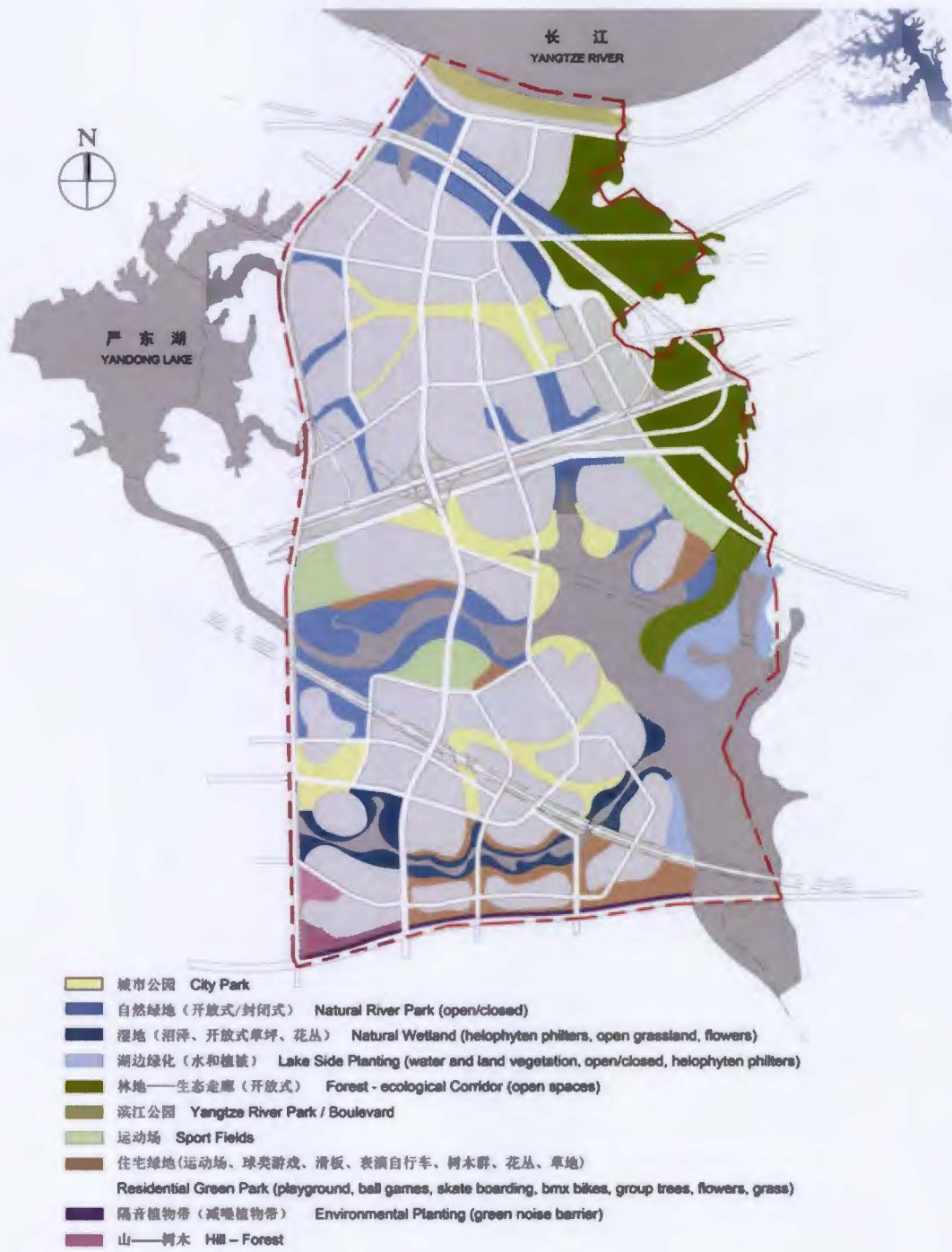
	Floors	Height(m)	Plot ratio	Total area(m ²)	Inhabitants
Area High Density	10	30	3.0	530.000	26.238
Area Middle Density1	7	21	1.6	480.000	12.672
Area Middle Density2	5	15	1.2	2.440.000	49.149
Area Low Density	3	9	0.5	180.000	493
Total Residential area				3.630.000	88.551

	Floors	Height(m)	Plot ratio	Total area(m ²)
Area R&D	5	15	1.8	104.000
Area Industry	5	15	1.0	396.000
Total industrial area				550.000

Resource: Grontmij portfolio



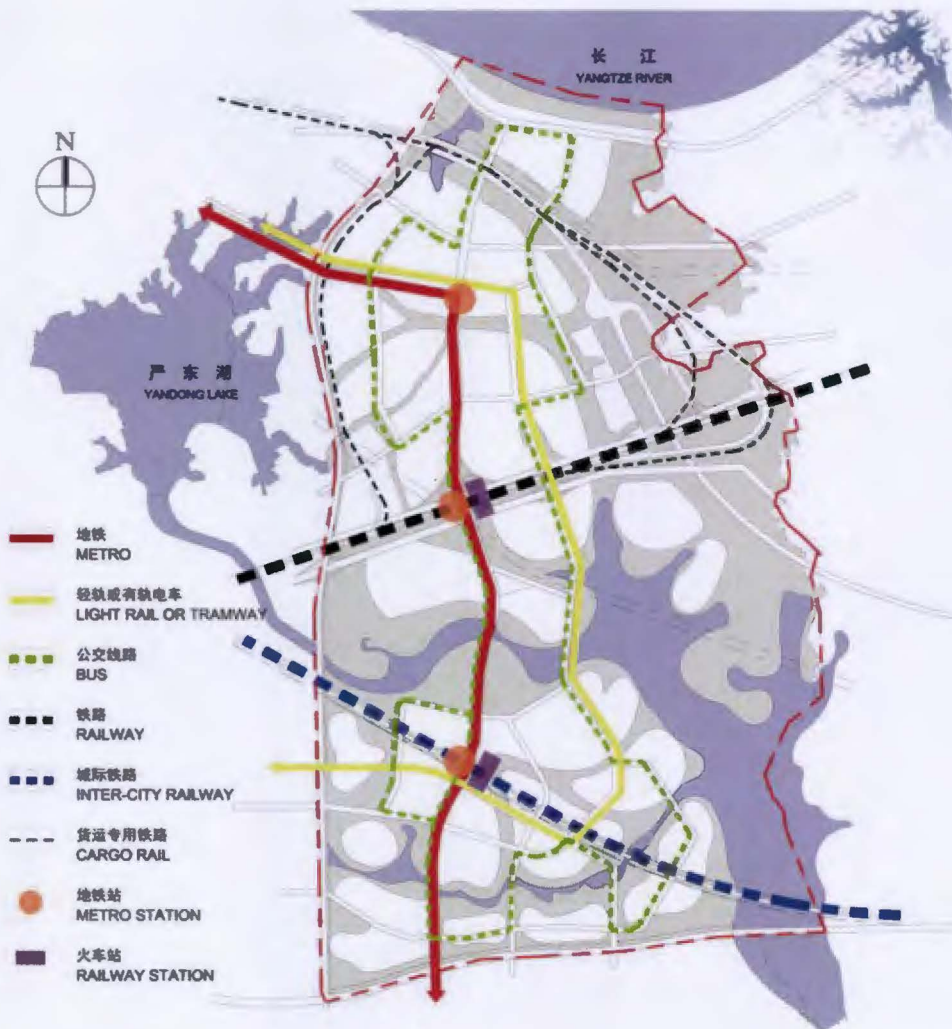
Appendix 7.3.3 c Green Structure



Resource: Grontmij portfolio



Appendix 7.3.5a Public Traffic Network



Resource: Grontmij portfolio



Appendix 7.3.5b Local Amenities



Resource: Grontmij portfolio



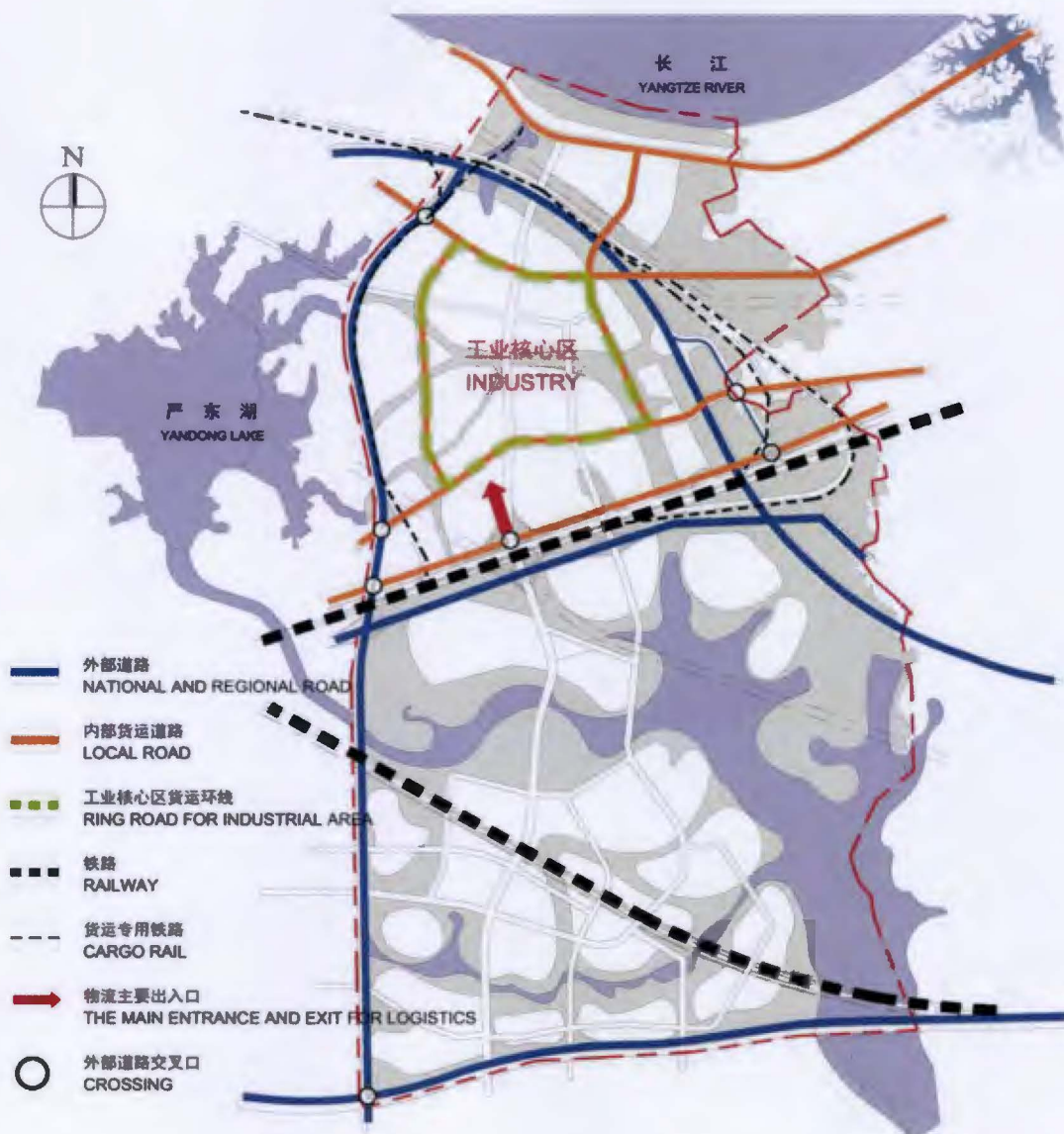
Appendix 7.3.5c Slow traffic network



Resource: Grontmij portfolio



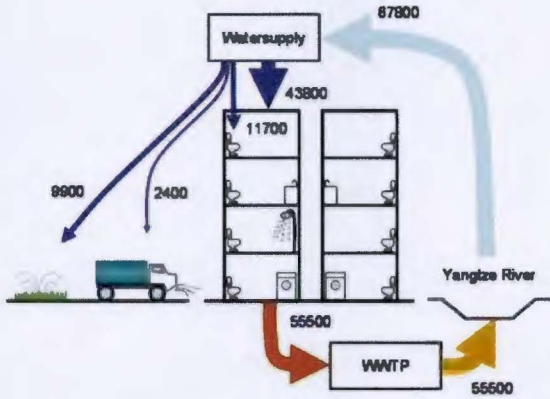
Appendix 7.3.5d Transport Assessment



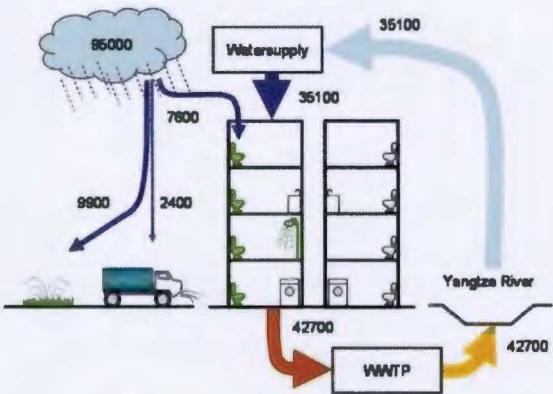
Resource: Grontmij portfolio



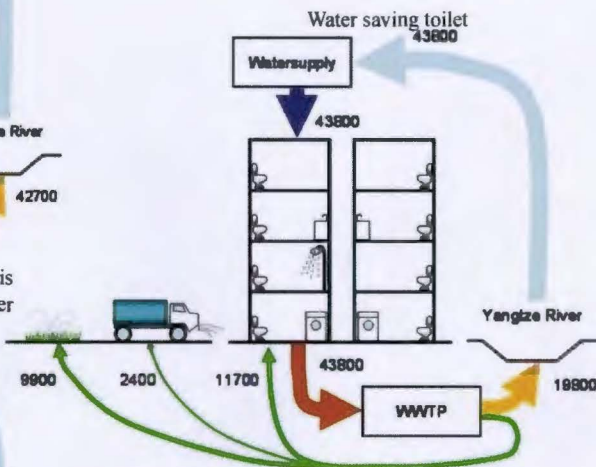
Appendix 7.3.6 Water treatment system



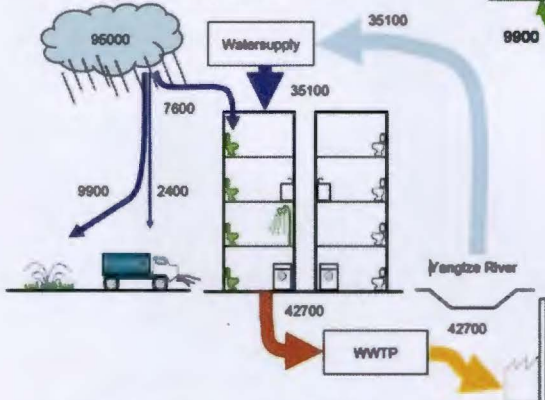
In conventional system, the 11,700 m³/day is used for toilet flushing, 43,800m³/day is for other domestic use, and in total is 55,500m³/day.



Toilets are flushed by rain water, 55,500m³/day is reduced to 42,700m³/day when using water saving toilets and shower heads.



Reuse the waste water from the wwtp for industry



Reuse the waste water from the wwtp for irrigation and washing streets.

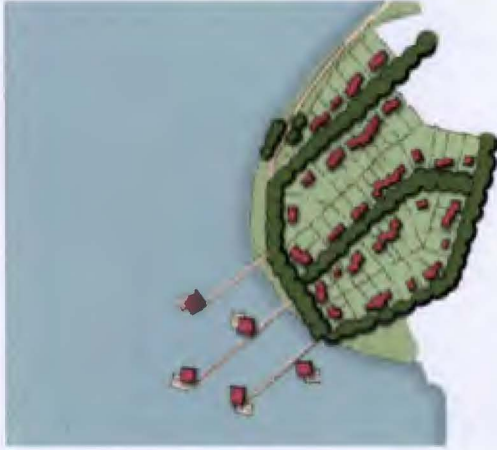
Resource: Grontmij portfolio



Appendix 7.3.8 Patten of the area and buildings

Domestic (BLD1):

Low density area: In low density area, the type of house is villa or semi-detached.



Area(m2)	Footprint	m2/house	Number of house	Average number of floors	Average Height(m)	Plot Ratio	Inhabitants	Total area m2	Total Inhabitants
35.000	3.800	180	21	3	9	0.5	63	180.000	493

Middle density area:





Area(1)(m2)	Footprint	m2/apartment	Apartment per floor	Average number of floors	Average height	Plot Ratio	Inhabitants	Total area m2	Total Inhabitants
35.000	9.000	180	44	7	21	1.6	924	480.000	12.672

Area(2)(m2)	Footprint	m2/apartment	Apartment per floor	Average number of floors	Average height	Plot Ratio	Inhabitants	Total area m2	Total Inhabitants
35.000	8.400	180	47	5	15	1.2	705	2.440.000	49.149

High density area:



Area(m ²)	Footprint	m ² /apartment	Apartment per floor	Average number of floors	Average height	Plot Ratio	Inhabitants	Total area m ²	Total Inhabitants
50.502	15.000	180	83	10	30	3.0	2.500	530.000	26.238

Non-Domestic (BLD2):



The factories in Industry park:



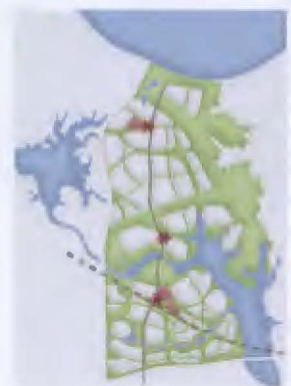
Average floors	Average Height(m)	Plot ratio	Total area m ²
5	15	1.0	396.000

Office buildings in R&D center.



Average floors	Average height(m)	Plot Ratio	Footprint(m ²)	Total area(m ²)
5	15	1.8	48.000	135.500

Commercial facilities and Landmark



Resource: Grontmij portfolio



Appendix 7.4 Calculating for the total scores:

Credits Available(Regional)=3 × Regional Weighting

Credits Expected(Regional)=Credits Expected × Regional Weighting

Credits Achieved(Regional)= Credits Achieved × Regional Weighting

The Data highlight in green will be quoted in the thesis.

Category	Category weighting(Z)	Issue	Regional Weighting	Credits Available(Regional)	Credits Expected	Credits Expected(Regional)	Credits Achieved	Credits Achieved(Regional)
Climate and Energy	8.04%	CE1-Flood Risk Assessment	1	3	3	3	2	2
		CE2-Surface Water Runoff	0.9	2.7	3	2.7	2	1.8
		CE3-Rainwater SUDS	0.9	2.7	3	2.7	3	2.7
		CE4-Heat Island	0.7	2.1	3	2.1	2	1.4
		CE5-Energy Efficiency	0.8	2.4	2	1.6	2	1.6
		CE6-Onsite Renewable	0.9	2.7	2	1.8	2	1.8
		CE7-Future Renewable	0.9	2.7	2	1.8	2	1.8
		CE8-Services	0.9	2.7	1	0.9	1	0.9
		CE9-Water Consumption	0.8	2.4	3	2.4	3	2.4
		Sum		23.4		19		16.4
Communities	16.63%	COM1-Inclusive Design	1	3	2	2	2	2
		COM2-Consultation	0.8	2.4	2	1.6	2	1.6
		COM3-Development User Guide	0.8	2.4	1	0.8	1	0.8
		COM4-Management and Operation	0.9	2.7	1	0.9	1	0.9
		Sum		10.5		5.3		5.3
Place Shaping	9.73%	PS1-Sequential Approach	0.9	2.7	3	2.7	2	1.8
		PS2-Land Reuse	0.9	2.7	3	2.7	3	2.7
		PS3-Building Reuse	0.9	2.7	3	2.7	0	0
		PS4-Landscaping	0.9	2.7	3	2.7	3	2.7
		PS5-Design and Access	0.8	2.4	3	2.4	3	2.4
		PS6-Green Areas	1	3	3	3	3	3
		PS7-Local Demographic	0.9	2.7	2	1.8	1	0.9



		PS8-Affordable Housing	0.9	2.7	2	1.8	1	0.9
		PS9-Secure by Design	0.8	2.4	2	1.6	2	1.6
		PS10-Active Frontages	0.8	2.4	2	1.6	3	2.4
		PS11-Defensible	0.8	2.4	2	1.6	2	1.6
		Sum	28.8			24.6		20
Ecology and Biodiversity	5.41%	ECO1-Ecological Survey	0.9	2.7	2	1.8	2	1.8
		ECO2-Biodiversity Action plan	0.9	2.7	2	1.8	2	1.8
		ECO3-Native Flora	1	3	1	1	1	1
		Sum	8.4			4.6		4.6
Transport and Movement	20.63%	TRA1-Location/Capacity	0.9	2.7	3	2.7	3	2.7
		TRA2-Availability/Frequency	1	3	3	3	3	3
		TRA3-Facilities(for public transport)	0.9	2.7	1	0.9	1	0.9
		TRA4-Local Amenities	0.9	2.7	3	2.7	2	1.8
		TRA5-Network	0.9	2.7	3	2.7	2	1.8
		TRA6-Facilities(for cycling)	0.7	2.1	1	0.7	1	0.7
		TRA7-Car Clubs	0.9	2.7	2	1.8	1	0.9
		TRA8-Flexible Parking	0.9	2.7	2	1.8	1	0.9
		TRA9-Local Parking	0.9	2.7	2	1.8	3	2.7
		TRA10-Home Zones	0.8	2.4	2	1.6	2	1.6
		TRA11-Transport Assessment	0.9	2.7	3	2.7	3	2.7
		Sum	29.1			22.4		19.7
Resources	22.95%	RES1-Low Impact	1	3	3	3	3	3
		RES2-Locally Sourced Materials	0.8	2.4	3	2.4	3	2.4
		RES3-Road Construction	0.9	2.7	3	2.7	3	2.7
		RES4-Composting	0.9	2.7	1	0.9	1	0.9
		RES5-Masterplanning Strategy(to develop a sustainable water efficiency strategy)	0.9	2.7	3	2.7	3	2.7
		RES6-Groundwater	0.9	2.7	3	2.7	1	0.9



			Sum	16.2		14.4		12.6
Business and Economy	4.53%	BUS1-Business Priority Sectors	1	3	3	3	3	3
		BUS2-Labor and Skills	0.9	2.7	2	1.8	3	2.7
		BUS3-Employment	0.8	2.4	2	1.6	3	2.4
		BUS4-New Business	0.8	2.4	3	2.4	2	1.6
		BUS5-Investment	0.9	2.7	3	2.7	3	2.7
			Sum	13.2		11.5		12.4
Buildings	12.09%	BLD1-Domestic	0.9	2.7	2	1.8	1	1
		BLD2-Non Domestic	0.9	2.7	2	1.8	1	1
			Sum	5.4		3.6		2



Appendix 8.3 BREEAM Communities fees

Project Registration and Certification Fees – Statutory Planning Stage	
Registration of 'Compliant Assessment Framework' (payable by assessor):	
Small	£125
Medium	£250
Large	£500
Bespoke	Contact BRE Global on breeam@bre.co.uk
Note: A development cannot achieve certification against the BREEAM Communities Standard without obtaining approval of the project specific 'Compliant Assessment Framework' – Mandatory Requirement.	
Interim Certificate – Outline (Preliminary) Planning Stage (payable by assessor):	
Small	£625
Medium	£1250
Large	£2500
Bespoke	Contact BRE Global on breeam@bre.co.uk
Note: In the event that a developer decides not to undertake the outline planning stage assessment and decides to start at the detailed planning stage, the fees from the interim certificate assessment stage will be added to the final certificate assessment stage – Optional Requirement.	
Example: Small BfC Project Certification Fees = Total £1250 or (Interim £625 + Final £500)	
Final Certificate – Detailed (Final) Planning Stage (payable by assessor):	
Small	£500
Medium	£1000
Large	£2000
Bespoke	Contact BRE Global on breeam@bre.co.uk
Note: If a project is developed in multiple blocks or phases, each individual block or phase must obtain certification at the detailed planning stage – Mandatory Requirement.	
Example: Large BfC Project Certification Fees: 1 Masterplan and 5 Phases = Total £12500 or (Interim x £2500 + 5 Final x £2000)	
Uncontrolled copy if printed. Valid on day of printing only.	Printed on: 10/08/2009 07:56:09
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