Alpha
Consulting Engineers Pte Ltd

PROJECT QUALITY PLAN

HDB AT PUNGGOL NORTH C13

For

HOUSING & DEVELOPMENT BOARD

Copy No.	1

Prepared By: Chong Lai Meng/Low Qi Fan/Benedict Lim

Authorised By: Loh Fook Yuen

Date: 8 December 2023

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SECTION 1

QUALITY PLAN CONTROL AND DISTRIBUTION

1.1 List of Copy Holders

Copy No.	Copy Holder	Date of Issue
1	6263	8 December 2023

1.2 Revision Record

Revision	Date of Issue	Section Reference	Page(s)	Remarks
0	10 May 2019	1 to 11	30	+ 6 pages (Section 4.1 – Overall Programme)
1	29 January 2021	1 to 11	30	+ 42 pages (Section 4.1 – Overall Programme) + 34 pages (Section 9.1 – Sustainable Design Features / Criteria)
2	11 March 2022	1 to 11	30	+ 3 pages (Section 4.1 – Overall Programme – Critical Contractual Information)
3	8 December 2023	1 to 11	30	+ 3 pages (Section 4.1 – Overall Programme – Critical Contractual Information) + 34 pages (Section 9.1 – Sustainable Design Features / Criteria)

SECTION 2

PROJECT INFORMATION

2.1 Project Description

Type of Development	Residential

Statistics of Development	
Site Area, m²	27,755.000
Nett Floor Area, m²	-
Gross Floor Area, m²	104,217.2486
Covered Carpark, m²	-
No. of Covered Carpark Lots	-
No. of Apartments/Houses	940
No. of Beds (for Hospitals)	-
No. of Guestroom (for Hotels)	-
No. of Blocks / No. of Storeys	6 Blocks/range from 6 storeys to 22 storeys
Green Mark Category	Gold Plus
No. of Phases	-

2.2 Project Cost

M&E Services Cost Plan (S$ x 1M)										
Services	EI	ACVI	LEI	FFAI	PSI	SPFI				
Estimate	-	-	-	-	-	-				
Awarded	-	-	-	-	-	-				

Total Project Construction Cost (S$ x1M)			
	Site Clearance	Piling Works	Main Contract
Estimate	-	-	$119.738
Awarded	-	-	-

Site Clearance shall include earth work, soil improvement, service diversion and termination.

2.3 Scope of Works

2.3.1 Scope of Consultancy Services

Conceptual/Schematic Design	✓
Detailed Design	✓
Tender Documentation	-
Tender Evaluation	-
Contract Supervision	✓
M&E Costing	✓
Submissions to Authority	✓

(✓*where applicable*)

2.3.2 Scope of M&E Services

ELECTRICAL	✓	AIR CONDITIONING		SPRINKLER	✓	SANITARY	✓	SWIMMING POOL	
LIFT	✓	MECHANICAL VENTILATION	✓	FIRE ALARM	✓	COLD WATER	✓	STEAM BOILER	
ESCALATOR		MECHANICAL SMOKE EXTRACT	✓	HOSEREEL	✓	HOT WATER	✓	FUEL STORAGE	
PABX		COMPUTER A/C		WET RISER		TOWN GAS	✓		
SECURITY		BST CARPARK EXH		DRY RISER	✓	LPG GAS			
TELELIFT		HEATING				MEDICAL GAS			
DATA COMM.		URBANWATER HARVESTING	✓						
FLUSHFLOOR TRUNKING									

(✓*where applicable*)

2.3.3 Submission to Relevant Authorities by Others

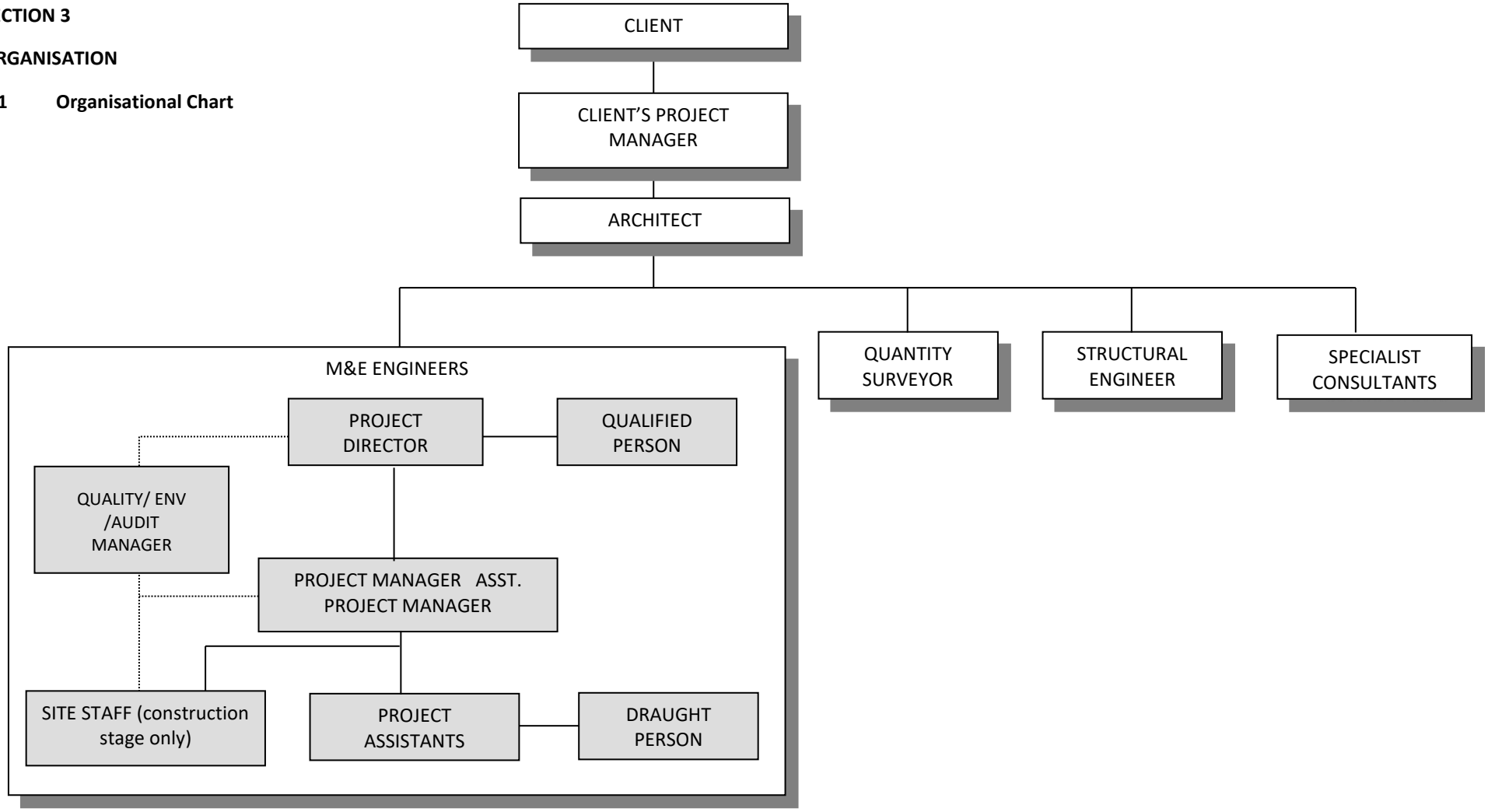
EJECTOR & DIVERTER	✓	SUMP PUMP	✓	FUEL OIL TANK		LIFT & ESCALATOR		PRESSURE VESSEL		HOISTS		FOAM	

(✓*where applicable*)

SECTION 3

ORGANISATION

3.1 Organisational Chart



SECTION 3

ORGANISATION

3.2 ACEPL's Project Team Member

TITLE		NAME
Project Director		Loh Fook Yuen (LFY)
Qualified Person	Mechanical	Choong Choon Guan (CCG)
	Electrical	Loh Fook Yuen (LFY)
Project Manager		Chong Lai Meng (CLM)
Assistant Project Manager		-
Project Assistant (Mech)		Low Qi Fan (LQF)
Project Assistant (Elect)		Benedict Lim Sheng (LSH)
Draughtsperson		Common Pool
Resident Engineer (M&E)		-
Assistant Resident Engineer (M&E)		-
Clerk-of-Work (M&E)		-

3.3 Client/Client's Representatives

Client: Housing & Development Board

Address: HDB Hub
480 Lorong 6 Toa Payoh
Singapore 310480

Tel: 6490 2043

Fax: 6490 2030

Client's Representatives:

Name of Company	Contact Person	Contact
Housing & Development Board	Name: Mr Andrew Ting Position: Principal Project Manager	Tel: 6490 3152 Fax: – Handphone: – Email: Ting_Lai_Ong@hdb.gov.sg
	Name: Ms Tasmia Khan Position: Senior Architect	Tel: 6490 2158 Fax: –- Handphone: – Email: Tasmia_Eshita_Khan@hdb.gov.sg
	Name: Ms Shimon Seng Position: Senior Engineer	Tel: 6490 3165 Fax: – Handphone: 9119 7795 Email: Doreen_HL_LIM@hdb.gov.sg
	Name: Mr Kenneth Seow Jun Han Position: Senior Engineer	Tel: 6490 3200 Fax: - Handphone: - Email: Kenneth_JH_SEOW@hdb.gov.sg
	Name: Position:	Tel: Fax: Handphone: Email:

3.4 **Other Consultants** (Local)

Function/Name of Company	Contact Person	Contact
Architect LAUD Architects Pte Ltd	Name: Mr Matthew Yeo Position: Associate Architect (Qualified Person)	Tel: 6259 2122 (Ext. 126) Fax: 6259 1151 Handphone: 9188 2555 Email: 208-pnc13@laudarchitects.com
	Name: Ms Karen Wong Position: Senior Architectural Assistant	Tel: 6259 2122 (Ext. 119) Fax: 6259 1151 Handphone: 9298 2725 Email: 208-pnc13@laudarchitects.com
	Name: Ms Bow Pisamai Position: Project Architect	Tel: 6259 2122 (Ext. 113) Fax: 6259 1151 Handphone: 9325 7073 Email: 208-pnc13@laudarchitects.com
	Name: Mr Astley Png Yap Position: Architectural Assistant	Tel: 6259 2122 (Ext. 120) Fax: 6259 1151 Handphone: 9675 2763 Email: 208-pnc13@laudarchitects.com
Quantity Surveyor WT Partnership Quantity Surveyors and Construction Cost Consultants	Name: Ms Christine Siew Position: Quantity Surveyor	Tel: 6533 0822 Fax: 6533 2833 Handphone: +60 12-530 8471 Email: christinechew@wtpartnership.com.sg
Structural Engineer BECA Carter Hollings & Ferner (S.E.A) Pte Ltd	Name: Mr U Kyaw Thiha Lwin Position: Structural Engineer	Tel: 6220 7588 Fax: – Handphone: 9820 9334 Email: Kyaw.ThihaLwin@beca.com
Interior Designer	Name: Position:	Tel: – Fax: – Handphone: – Email: –
Lighting Consultant	Name: Position:	Tel: – Fax: – Handphone: – Email: –
Acoustic Consultant	Name: Position:	*Tel:* – *Fax:* – *Handphone:* – *Email:* –
Landscape Consultant PDAA Design Pte Ltd	Name: Ms Yoly C. Estomata Position: President	Tel: 6297 8128 Fax: – Handphone: 9088 6453 Email: yoly@pdaadesign.com
Project Consultant Arcadis Pte Ltd	Name: Ms Li Peijun Position: Senior Project Manager	Tel: 6222 3888 Fax: 6224 7089 Handphone: 8808 6259 Email: li.peijun@asiainfrasolutions.com

3.4 Other Consultants (Overseas) – **NOT APPLICABLE**

Function/Name of Company	Contact Person	Contact
Architect	Name: Position:	Tel: Fax: Handphone: Email:
M&E Consultant	Name: Position:	Tel: Fax: Handphone: Email:
Quantity Surveyor	Name: Position:	Tel: Fax: Handphone: Email:
Structural Engineer	Name: Position:	Tel: Fax: Handphone: Email:
Interior Designer	Name: Position:	Tel: Fax: Handphone: Email:
Lighting Consultant	Name: Position:	Tel: Fax: Handphone: Email:
Acoustic Consultant	Name: Position:	Tel: Fax: Handphone: Email:
_____	Name: Position:	Tel: Fax: Handphone: Email:

3.5 Contractors/Sub-Contractors

Function/Name of Company	Contract *	Contact Person	Contact
Main Contractor BHCC Consturction Pte Ltd		Name: Lin Yu Xiang Position: Senior Project Manager	Tel: – Fax: – Handphone: 8188 1884 Email: yuxiang.lin@bhcc.com.sg
Air Conditioning & Ventilation Installation Sub-Contractor Fortuna Air-conditioning & Electrical Pte Ltd		Name: Mr Patrick Chan Position: Project Manager	Tel: 6457 7888 Fax: 6459 4555 Handphone: 9764 1193 Email: patrick@fortuna.com.sg
Plumbing & Sanitary Installation Sub-Contractor Tat Lee Sanitary & Plumbing Pte Ltd		Name: Mr Seah Ai Lee Position: -	Tel: – Fax: – Handphone: 9783 6929 Email: ailee@tlsp.com.sg
Electrical Installation Sub-Contractor Khoon Engineering Contractor Pte Ltd		Name: Mr Ong Qi Jie Position: Project Manager	Tel: – Fax: – Handphone: +65 9863 9265 Email: qjong@khoon.com.sg
Lift & Escalator Installation Sub-Contractor Hitachi Elevator Asia Pte. Ltd.		Name: Mr Ben Koh Position: –	Tel: 6416 1907 Fax: 6561 0766 Handphone: 9488 2050 Email: benkoh.ch.rb@hitachi.com
Fire Fighting & Alarm Installation Sub-Contractor Sprinkler Engineering Pte Ltd		Name: Mr Rodney Goh Position: Senior Project Manager	Tel: – Fax: – Handphone: 9637 3377 Email: rodney@sprinkler-eng.com.sg
Swimming Pool Filtration Plant Installation Sub-Contractor		Name: Position:	Tel: – Fax: – Handphone: – Email: –
Carpark System Installation Sub-Contractor		Name: Position:	Tel: – Fax: – Handphone: – Email: –
_____		Name: Position:	Tel: – Fax: – Handphone: – Email: –

** Type of Contract*
- *NSC (Nominated Sub-Contract)*
- *DSC (Domesticated Sub-Contract)*
- *DC (Direct Contract)*
- *NS (Nominated Supplier)*

3.6 Authorities

Authorities/Department	Contact Person	Tel/Fax Nos./E-mail
SP PowerGrid:		
(a) Sub-Station	Mr Abbas Mohd Supian	6916 8557/ abbasmohdsupiah@spgroup.com.sg
(b) Diversion		
SP Services:		
(a) Customer Supply		
(b) Installation		
(c) Meter Section		
(d) Road Lighting		
TFCC:		
(a) SCV		
(b) SingTel		
(c) IDA	Mr Seah Koon Chye	6211 1751/ SEAH_Koon_Chye@imda.gov.sg
BCA:		
(a) Building Plan		
(b) Green Mark		
FSSD:		
(a) Building Plan		
(b) M&E Plan		
PUB (Water Supply) Network Dept:		
(a) Water Conservation		
(b) Plumbing Plan	Mr Ng Kor Peng Mr Zhafri Mr Kelvin Phua	6380 9843/ NG_Kor_Peng@pub.gov.sg 8127 8715/ Muhd_Zhafri_MOHD_SHAHARUDDIN@pub.gov.sg 9826 1943/ Kelvin_PHUA@pub.gov.sg
(c) Diversion		
(d) NEWater		

3.6 Authorities (Cont'd)

Authorities/Department	Contact Person	Tel/Fax Nos./E-mail
PUB Water Reclamation (Network) Dept:		
(a) Building Plan/CBPU		
(b) M&E Plan		
(c) Diversion		
City Gas Pte Ltd:		
(a) Planning/Submission	Mr Jackson Houng Mr Misnal Bin Pagi	6595 5925/ jacksonhoung@citygas.com.sg 9686 4513/ misnal@citygas.com.sg
(b) Installation/Inspection		
PowerGas Pte Ltd		
(a) Diversion	Mr Mohamed Jamil Bin Mohamed Arsad Mr Oh Zheng Jie	9004 4821/ MOHAMEDJAMIL@spgroup.com.sg ohzhengjie@spgroup.com.sg
NEA (Pollution Control)		
(a) Planning/Submission		
(b) Inspection		

SECTION 4

PROGRAMME

4.1 Overall Programme (Refer to attached Master Programme)

ID	TASK NAME	MONTHS	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1.	Preliminary Planning																									
2.	Planning Submission																									
3.	Detail Design																									
4.	BP Submission																									
5.	BP Submission (Amendments)																									
6.	Tender Period for Piling																									
7.	Tender Period for Sub-Structure																									
8.	Tender Period for Super-Structure																									
9.	Piling Period																									
10.	Sub-Structure Construction Period																									
11.	Super-Structure Construction Period																									
12.	TOP																									
13.	CSC																									

PNC13

PART A: BUILDING WORKS AT PUNGGOL NORTH CONTRACT 13 (TOTAL: 940 DWELLING UNITS)

PART B: CONTINGENCY WORKS

Critical Contractual Information

Critical Contractual Information			
Contract No	**D/076/19**	Site Handover Date/ Site Possession	29 March 2019
Letter of Award Date	26 March 2019	Contract Commencement Date	16 April 2019
Total Contract Period	44.5 Months	First Cast Date	03 May 2019
Timber Mock up Completion date	Approved on Nov/ Dec 2020.	Timber Mock up 1st Inspection date	10 Sep 2019
Sample Unit Completion date	TBC	Sample Unit 1st Inspection date	TBC
BHCC Builder's License (UEN)	200311975W	BHCC Builder's License Expiry Date	16/06/2021
BHCC Factory Permit No.	200311975W0043	BCA Permit to commence Work for Piling [Section 6]	20/09/2019

Phase	**Work Description**	**Original Completion date (OCD)**	**Extended Original Completion date (EOCD)**	**Estimated Completion Date (ECD)**	**Committed Completion Date by BHCC (Refer to attachment for full LOA phases)**	**Delivery Possession Date (DPD)**
1	Electrical Sub-Station 1 at Block 430 & Electrical Sub-Station 2 at Blk 433, including adjacent driveways & Fire engine access	16 April 2019 to 15 November 2021	05 May 2022			
2	Pneumatic Waste Conveyance System (including Block 430 Bin Centre, RC trenches, Section Valve, Discharge Valve Rooms)	16 April 2019 to 15 January 2022	05 July 2022			
3	Civil Engineering Works, Service Roads, Drainage, Fire Engine Access	16 April 2019 to 15 March 2022	02 Sep 2022			
4	• Minor Sewer Works • Detention Tank 1 & Detention Tank 2 & Rainwater Harvesting Tank	16 April 2019 to 15 May 2022	02 Nov 2022			
5	Block 433 1-storey Carpark with Basement (including Sprinkler pump and tank including all related fire safety provisions serving Blk 433 with basement)	16 April 2019 to 15 July 2022	02 Jan 2023			

PNC13

PART A: BUILDING WORKS AT PUNGGOL NORTH CONTRACT 13 (TOTAL: 940 DWELLING UNITS)

PART B: CONTINGENCY WORKS

Phase	Work Description	Original Completion date (OCD)	Extended Original Completion date (EOCD)	Estimated Completion Date (ECD)	Committed Completion Date by BHCC (Refer to attachment for full LOA phases)	Delivery Possession Date (DPD)
6	Blk 433-B (including Drop-off Porch with green roof, CCC at 1st Storey, Playground 1 at 1st Storey, Shelter 1 & 2 at 1st Storey, Staircases and Ramp Access to Future Heritage Trail, Green Slope along Future Heritage Trail, Roof Garden at 2nd Storey, Roof Garden at 6th Storey with Elderly Fitness Station 2 and Shelter 5, Link bridge between Blk 433B & Blk 433 at 2nd Storey)	16 April 2019 to 15 August 2022	02 Feb 2023	28 Feb 2023	30 Sep 2023	28 Feb 2024
7	• Blk 433-A (including Drop off porch with green roof, Roof Garden at 10th Storey with Shelter 9, High Linkway between Blk 433A & Blk 433B) • Blk 432-B (including Roof Garden at 10th Storey with Adult Fitness Station 3, Link bridge between Blk 432-B & Blk 433 at 2nd Storey)	16 April 2019 to 30 August 2022	17 Feb 2023	28 Feb 2023	30 Sep 2023	28 Feb 2024(433A) 31 Mar 2024(432B)
8	Blk 431-A Commercial Facilities (including Super market, Eating House with green roof, Shops at 1st Storey of Blk 432-B)	16 April 2019 to 15 September 2022	05 Mar 2023	31 Mar 2023	30 Sep 2023	
9	• Blk 432-A (including green roof at 21st Storey, Link bridge between Blk 432-A & Blk 433 at 2nd Storey) • Blk 432 Precinct Pavilion with green roof	16 April 2019 to 30 September 2022	20 Mar 2023	31 Mar 2023	30 Sep 2023	31 Mar 2024

PNC13

PART A: BUILDING WORKS AT PUNGGOL NORTH CONTRACT 13 (TOTAL: 940 DWELLING UNITS)

PART B: CONTINGENCY WORKS

Phase	Work Description	Original Completion date (OCD)	Extended Original Completion date (EOCD)	Estimated Completion Date (ECD)	Committed Completion Date by BHCC (Refer to attachment for full LOA phases)	Delivery Possession Date (DPD)
10	• Blk 431-B (including Link bridge between Blk 431-B to Blk 431-C at 2nd storey, Link bridge between Blk 431-B to Blk 431/ Blk 431-A Roof Garden) • Blk 431 Precinct Pavilion with roof garden at 2nd Storey with Shelter 7 & 8 • Blk 433 Roof garden (including Playground 2, Adult fitness station 1, Community Garden, Shelter 3 & 4, Link bridge between Blk 431/431-A & Blk 433 at 2nd Storey)	16 April 2019 to 15 October 2022	04 Apr 2023	30 Apr 2023	30 Nov 2023	30 Apr 2024
11	Blk 431-C (including Elderly Fitness Station 1 at 1st Storey, Roof Garden at 2nd Storey, Drop-off Porch with Green Roof at 3rd Storey, Roof Garden at 6th Storey with Adult Fitness Station 2 & Shelter 6, High Linkway between Blk 431C & Blk 433B)	16 April 2019 to 30 October 2022	19 Apr 2023	30 Apr 2023	30 Nov 2023	30 Apr 2024
12	• Link bridge connecting to Punggol Digital District's POB • Link bridge connecting to POB to Punggol NC14 (up to site boundary)	16 April 2019 to 30 November 2022	20 May 2023			
13	All other Site Works (including POB to Punggol North C14, External Linkways to bus stops, Landscaping Works)	16 April 2019 to 30 December 2022	19 Jun 2023			

SECTION 4

PROGRAMME

4.2 Authority Submission Status for M&E Services – 1st Submission

Service	Authority	Original Submission		Comments/Resubmission						Approval/
		Scheduled	Actual	Comment	Resubmit	Comment	Resubmit	Comment	Resubmit	Clearance
Application for Electricity Supply for SS1	SP Services Ltd	July 2018	24 Jul 2018							25 Jul 2020
Application for Electricity Supply for SS2	SP Services Ltd	July 2018	24 July 2018							25 Jul 2020
Power Supply Substation for SS1	SP Group Ltd	Sep 2020	17 Sept 2018	28 Sep 2018	29 Apr 2019	7 May 2019	19 Jul 2019	29 Jul 2019	30 Mar 2020	31 Mar 2020
Power Supply Substation for SS2	SP Group Ltd	Sep 2020	17 Sept 2018	28 Sep 2018	20 Jun 2019	1 July 2019	24 Jan 2020			13 Feb 2020
Metering Layout	SP Services Ltd	NA								
Sanitary Installation	PUB Water Reclamation (Network) Dept	Jun 19	13 Dec 2019							16 Dec 2019
Overall Plumbing Installation	PUB (Water Supply) Network Dept		Aug 18	Sep 18	Apr 19	May 19				27 Nov 2020
Domestic Water Supply		Aug 19	10 Aug 2021							15 Dec 2021
Overall Gas Supply Installation	City Gas Pte Ltd		Sep 18	Oct 18						
Gas Supply Installation		Aug 19	27 Apr 2020	30 Jun 2020	27 Oct 2020	16 Dec 2020				29 Dec 2021
Fire Fighting & Alarm Installation	FSSD	April 21	23 Feb 2022							8 Mar 2022
Car Park Mechanical Ventilation Installation	FSSD	Dec 19	25 Oct 2022							7 Dec 2022
Telephone Installation	TFCC	May 19	2 Aug 2020	14 Aug 2020	23 Aug 2020					26 Sep 2020

SECTION 4

PROGRAMME

4.3 Authority Submission Status for M&E Services (Amendments) – 2nd Submission – NOT APPLICABLE

Service	Authority	Original Submission		Comments/Resubmission						Approval/
		Scheduled	Actual	Comment	Resubmit	Comment	Resubmit	Comment	Resubmit	Clearance
Application for Electricity Supply	SP Services Ltd									
Power Supply Substation	SP PowerGrid Ltd									
Metering Layout	SP Services Ltd									
Sanitary Installation	PUB Water Reclamation (Network) Dept									
Domestic Water Supply	PUB (Water Supply) Network Dept									
Gas Supply Installation	City Gas Pte Ltd									
Air Conditioning & Ventilation Inst.	FSSD									
Fire Fighting & Alarm Installation	FSSD									
Telephone Installation	TFCC									
Broadband Co-axial Cable System (BCS)	Starhub Cable Vision									
Fuel Storage	FSSD									
	NEA (Pollution Control)									

SECTION 5

PROJECT RECORDS

5.1 List of Internal Files

Standard Files

File Ref:		File Ref:	
- Owner	✓	- Architect	✓
- Authorities	✓	- Other Consultants	✓
- Contractors	✓	- CC	✓
- CF	✓	- PQP/QSP	✓

Project Files to be initiated by PM as and when required

File Ref:		File Ref:		File Ref:	

(✓*where applicable*)

SECTION 5

PROJECT RECORDS

5.2 Filing of Drawings

The following team members shall take charge of filing of drawings, stamping "SUPERSEDED" drawings, etc.

Description	Team Member
Incoming Architectural Floor Plans	Softcopy saved in the server
Incoming Architectural Sketches/Details	
Incoming Structural Drawings	
M&E Drawings - Electrical Installation - Lift & Escalator Installation - Air Conditioning & Ventilation Installation - Fire Fighting & Alarm Installation - Plumbing & Sanitary Installation	
Other Drawings	

SECTION 6

INTERFACING

6.1 Method of Interface

Description	Method of Interface	
Client's Review & Approval	M&E Design Report	✓
	Pre-planned meeting at fixed intervals	✓
	Telefax, letter and telephone	✓
	Email	✓
Interface With External Design Teams	M&E Design Report	✓
	Pre-planned meeting at fixed intervals	✓
	Telefax, letter and telephone	✓
	Email	✓
Interface Between Internal Design Teams	Telephone	✓
	Email	✓
	Internal Project Team Meeting	✓
	Circulation of Information	✓

(✓*where applicable*)

SECTION 6

INTERFACING

6.2 Internal Design Interface – NOT APPLICABLE

Item No.	Description*	Required From	Required By	Date Required	Remarks

** Information required by INTERNAL DESIGN TEAM MEMBERS*

SECTION 6

INTERFACING

6.3 Circulation of Documents to External Parties

	Code: A – Approval Required C – For Comments I – For Information Only	Client/ Client Rep.	* Client's Project Manager	Architect	Structural Engineer	Quantity Surveyor	
1.	**Letters/Fax:**						
a.	Project Design	A	A	A	C	I	
b.	Project Administration	A	A	C	I	I	
c.	Project Cost Estimate/Contract Cost	A	A	C	I	C	
2.	**Drawings**						
a.	Outline Design Drgs.	A	A	A	C	-	
b.	Sketch Design Drgs.	A	A	A	C	-	
c.	Final Design Drgs.	A	A	A	C	-	
d.	Shop Drawings	I	I	A/C	A/C	-	
e.	As Built Drgs.	I	I	I	I	-	
3.	**Other Document**						
a.	Specification	-	-	-	-	-	
b.	Tender Document	-	-	-	-	-	
c.	Tender Evaluation Report	-	-	-	-	-	
d.	Design Report	-	-	-	-	-	
e.	Progress Report	-	-	-	-	-	
f.	Financial Report	-	-	-	-	-	
g.	Minutes of Meeting	I	I	I	I	I	
h.	Inspection Report	I	I	I	-	-	
i.	Testing & Comm. Report	I	I	I	-	-	
j.	O & M Manual	I	I	I	-	-	

*Note: Applicable only, if the client engaged a Project Manager.

SECTION 7

WORK AUTHORISATION

Activity \ Authorised Signatories	PD	QP	PM	AE	SS
General Correspondences with Client			✓	✓	
General Correspondences with Other Consultants			✓	✓	
M&E Cost Estimate Report	✓	✓	✓		
M&E Design Report	✓	✓	✓		
Check Prints		✓			
Tender Drawing Approval	✓	✓	✓		
Tender Specification Approval	✓	✓	✓		
List of Tenderers	✓	✓	✓		
Tender Questionnaires	✓	✓	✓		
Tender Reports	✓	✓	✓		
Draft Letter of Award	✓	✓	✓		
Review of Contractor's Shop Drawing			✓	✓	
Review of Contractor's Technical Submittal			✓	✓	
Review of Contractor's Sample Submittal			✓	✓	
Contractor's Request for Deviation		✓	✓		
Progress Payment Valuation Form	✓		✓		
Final Account Valuation	✓		✓		
Draft Variation Order	✓		✓		
Engineer/Architect's Instruction/Direction	✓		✓		
Site Instruction/Direction			✓		
Correspondence/Submission to Authorities	✓	✓			

(✓*where authorised*)

Key to abbreviations:-

PD : Project Director
QP : Qualified Person
PM : Project Manager/Assistant Project Manager
AE : Assistant Engineer
SS : ACEPL Site Staff

SECTION 8

DESIGN INPUT & METHODOLOGY

8.1 List of Client's Standards, Reference Documents or Brief

ITEM	KEPT BY
HDB Guide Drawings & Specification	Softcopy saved in the server

8.2 List of Applicable Code of Practice and Regulations

Services	Title of Code of Practice/Standard
Electrical Wiring	SS 638
Lightning Protection System	SS 555
Earthing	SS 551
Standby Generator System	SS 535
Emergency Voice Communication System	–
Air Conditioning & Ventilation Installation	SS 553
Lift Installation	SS 550
Sprinkler System	SS CP 52
Dry/~~Wet~~ Riser System	SS 575
Automatic Fire Alarm System	SS CP 10
Sanitary System	Code of Practice on Sewerage & Sanitary Works
Plumbing System	SS CP 48
Town Gas/LPG Supply System	SS 608
Boiler and Steam Supply System	–
Mechanical Smoke Control System	–

SECTION 8

DESIGN INPUT & METHODOLOGY

8.3 List of Design Guide or Handbook Used

Carrier's Handbook of Air Conditioning System Design

ASHRAE Handbooks

Institute of Plumbing's Plumbing Services Design Guide

The Vertical Transportation Handbook Third edition

8.4 List of Pre-Consultation and Waiver – NOT APPLICABLE

S/N	Description	Date of Application	Date of Approval	Remarks
1	*Clause number in Code of Practice for (Services) which require clarification or waiver. Consultation Ref No. Waiver Ref. No.			
2	*Clause number in Code of Practice for (Services) which require clarification or waiver. Consultation Ref No. Waiver Ref. No.			
3	*Clause number in Code of Practice for (Services) which require clarification or waiver. Consultation Ref No. Waiver Ref. No.			

*To fill in actual information

8.5 List of Applicable Quality System Procedures

Alpha Consulting Engineers Pte Ltd's Quality Management System Procedures

Section	Title	✓ where applicable
M1	Preparation of Consultancy Offer	✓
M2	Project Commissioning and Service Agreement	✓
M3	Design Control	✓
M4	Design Change Control	✓
M5	Tender Process and Evaluation	
M6	Authority Submission	✓
M7	Construction Process Control	✓
M8	Testing and Commissioning	✓
S1	Document Control	✓
S2	Documentation of Quality & Environmental Management System Procedure	✓
S3	Documentation of Project Quality Plan	✓
S4	Specification Control	
S5	Library Control	
S6	Archive Control	✓
S7	Filing Control	✓
S8	Drawing Control	✓
S9	Administration Control	✓
S10	Purchasing Control	
S11	Training Control	
S12	Computer Control	
S13	Non-Conformity and Corrective Action Procedures	✓
S14	Quality & Environmental System Audit	✓
S15	Feedback Reporting	✓
S16	Clients Feedback	✓
S17	Management Review	✓
S18	Risk Identification, Assessment & Control	✓

8.6 List of Software Used For Design/Analysis

DESCRIPTION/ PACKAGE NAME	VERSION	SUPPLIER/ SOURCE	PURPOSE	
Cophos	3.31	Zumtobel	Lighting design	
Carrier E20-II	3.21	Carrier	Programme for determination of heat load, duct size and its losses, etc.	
Gensize 2	2.1	Onan	Generator sizing	
Hyena	4.00.1	ACADS-BSG	Fire Sprinkler & Hydrant Analysis	
Dialux	4.11	Freeware	Lighting design	
Lift Traffic	7.18	Elevate	Lift traffic calculation	
Fault Level Calculation	11.11	ETAP	Calculation of fault level and voltage drop	

(✓*where applicable*)

SECTION 9

ENVIRONMENTAL CONSIDERATIONS

9.1 Sustainable Design Features / Criteria

Item	Remarks
Green Mark criteria	Gold Plus
Green Design Features	Refer to attached list

9.2 Site PPE Requirement

The necessary Personal Protective Equipment (detailed below) shall be provided by the main contractor/Company in accordance to the site EHS requirements prior to the site monitoring.

PPE	✓ where applicable
Safety Helmet	✓
Safety Shoes	✓
Eye Protection	–
Ear Protection	–
Safety Harness / Belt	–
Others:	–

9.3 Site Emergency Preparedness

Site staff shall comply with the site emergency preparedness and response procedure, established by the main contractor/owner, which shall include the following details.

Items	✓ where applicable
Evacuation Route	✓
Emergency Exit	✓
Assembly Point	✓
Emergency Contact List / Person	✓
Alarm system / methods	✓

General Information

Project Title :	**PUNGGOL NORTH C13**
Architect	LAUD Architects Pte Ltd
M&E	Alpha Consulting Engineers Pte LTd (ACE)
C&S	BECA
Main Contractor	BHCC
Quantity Surveyor	Arcardis Singapore Pte Ltd
Landscape consultant	PDAA Design Ptd Ltd
ESD consultant	Building System & Diagnostics Pte Ltd (BSD)
GFA (sqm):	**104217.24**
Site Area (sqm):	**27750.00**
Edited as per:	**17 April 2020**

	Green Mark Rating	Green Mark Score
Received & Checking	Green Mark Platinum	70 and above
Crucial Items for Final Assessment	**Green Mark GoldPLUS**	**60 to < 70**
To note	Green Mark Gold	50 to < 60

BSD building system & diagnostics

Pre-requisites		S/N	Documentation Checklist	Action By	Status	Remarks as per 13/2/19
Prerequisites for ALL Projects						
Others		1	Architectural Drawings (PDF and Autocad) (Elevation and Plan view) & Artist impression	**LAUD**		To update with latest drawings if any changes
		2	M&E Drawings (PDF & Autocad)	**Alpha**	received	
		3	C&S Drawings (PDF & Autocad)	**BECA**		
		4	Landscape Drawings (PDF & Autocad)	**PDAA**		
		5	Project information: GFA documentation evidence, Project timeline (Sales launch)	**LAUD**	received	
Part 1 - P.01	Greenery Provision	6	Refer to respective sub-indicators under 1.02b Integrated Landscape and Waterscape	**PDAA**	received	
Part 1 - P.02	Residential Envelope and Roof Thermal Transfer	7	RETV and roof U-value calculation	**Alpha/Maincon**	received	
		8	Architectural elevation drawings showing the composition of the different façade or wall systems that are relevant for the computation of RETV and roof U-value	**LAUD**	received	
		9	Architectural plan layouts and elevations showing all the air-conditioning areas	**LAUD**	received	
		10	Extracts of the tender specification or material schedules showing the material properties of the façade, external walls and roof	**LAUD/Maincoon**	received	
Part 1 - P.04	Air Tightness and Leakeage	12	Extracts of the tender specification showing compliance to SS212 or SS381 air leakage rates.	**LAUD**		
Part 2 - P.05	Vertical Transportation Efficiency	13	Submission of extracts of specifications that indicate the types of lifts and related features used	**Alpha/Maincon**	received	
Part 2 - P.07	Lighting Efficiency	19	Lighting layout plan (with legends)	**Alpha/Maincon**	received	
		20	Lighting schedules showing the numbers, locations and types of luminaries used	**Alpha**		
		21	Calculation of the proposed lighting power budget and the percentage improvement	**Alpha**		
		22	Technical product information of the lighting luminaries used (showing ballast loss, driver loss etc)(Cut Sheets)	**Alpha/Maincon**		
		23	Lux calculation for each space type.	**Alpha**		
Part 2 - P.08	Renewable Energy Feasibility Study	25	Solar feasibility report acknowledged by the QP/PE (Electrical)/PV specialist, and the project manager	**Maincon**		
Part 3 - P.09	Water Fittings for Common Facilities	26	Extracts of the tender design specification showing the provisions of all water fittings for common facilities;	**LAUD**		
		27	Water fittings WELS rating certificated	**LAUD**		
		28	Product catalogue of water fixtures	**LAUD**		
		29	Water fittings/products schedules showing the numbers, types and WELS rating of proposed fittings/products in the prescribed tabulated format	**LAUD/Maincoon**		
Part 3 - P.10	Sustainable Construction	30	As per requirements under Indicator 3.02a Sustainable Construction	**BECA**		
Part 3- P.11	Embodied Energy	31	Embodied carbon footprint computation saved and exported in PDF/ xlsx format via BCA's Carbon Calculator	**BECA/Maincon**		
		32	Bills of quantities	**BECA/Maincon**		
		33	Preliminary design cut sheets and Design Mix	**BECA/Maincon**		
Part 3 - P.12	Sustainable Products	34	As per requirements under Indicator 3.02c Sustainable Products	**LAUD/BECA/Maincon**		
Part 4 - P.13	Low Volatile Organic Compound (VOC) Paints	35	Low VOC paints product catalogue	**LAUD/Maincon**		
		36	Provide Green label certifications for low VOC paint	**Maincon**		Received: Fosroc Proofex GP/ Proofex Engage [Coating]
		37	Undertaking letter	**LAUD/Maincon**		

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Crucial Items for Final Assessment	**Green Mark GoldPLUS**	**60 to < 70**
To note	Green Mark Gold	50 to < 60

BSD building system & diagnostics

Pre-requisites		S/N	Documentation Checklist	Action By	Status	Remarks as per 13/2/19
Prerequisites for ALL Projects						
Part 1 - Climatic Responsive Design						
1.01 a	Climatic and Contextually Responsive Brief	38	Written statements/ documentation showing ESD discussion of project team; with client endorsement	**ALL**		
		39	Meeting minutes of Green Mark Workshop	**ALL**		
1.01 b	Integrative Design Process	40	Written statements/ documentation showing ESD discussion of project team; with user endorsement	**ALL**		
		41	Evidences of the implementation of design optimization arising from ESD discussion of project team	**ALL**		
1.01 c	Environmental Credentials of Project Team	42	Valid clear softcopy of ISO 14000 Certificate for Architect/ M&E/Developer/Main Con	**LAUD/Alpha/BECA**		Received: Alpha, BHCC
		43	Extract of SGBC Certified company from SGBC Website	**BSD**		
		44	Valid clear softcopy of GMP Certificate	**BSD**		
		45	Valid clear softcopy of G&G Certifcate for main con	**Maincon**		
1.01 e	User Engagement - Green Fit-out Guideline	47	Building user guide with green fit-out guidelines prepared and endorsed by the client representative, complete with commitment that they will be circulated as specified above	**HDB/BSD**	received	
1.02 a	(iii) Urban Heat Island	50	Layout plan highlighting vegetation, waterbodies, hardscape and roof areas	**LAUD/ PDAA**	received	
		51	Calculation of hardscape areas shaded by vegetation based on a midday sun		received	
		52	Material schedules or specifications of the roof and hardscape finishes with corresponding SRI values.		received	
	(iv) Green Transport	53	Extracts of the tender specifications showing the requirement to provide electric vehicle charging and parking infrastructure	**LAUD**	received	
		54	Plans indicating the location, number and provision of electric vehicle charging and parking infrastructure		received	
		55	Layout plan of sheltered bicycle parking lots and total quantity provided	**LAUD**	received	
1.02 b	(i) Green Plot Ratio (GnPR)	56	Plan or layout showing the site area as well as the greenery that is provided within the development, including a listing of the number of trees, palms, shrubs, turf and the respective sub category and LAI value	**PDAA**	received	
		57	GnPR calculation showing the extent of the greenery provision		received	
	(iii) Sustainable Landscape Management	62	Draft landscape management plan with supporting tender specifications	**PDAA**	received	
	(iv) Sustainable Storm Water Management	63	Design calculation that shows the % of site area that is drained to the infiltration or design features for treatment, with endorsement of an ABC Waters Professional	**PDAA**		
		64	Location plan of the relevant infiltration or design features.		received	
1.03 a	Tropical Façade Performance	65	*Required items are covered in P. 02*	-	received	
1.03 b	Internal Organisation	66	Layout plan to demarcate areas with natural ventilation (lift lobbies and stairs)	**LAUD/BSD**	received	
1.03 c	(i) Demonstrates Effective Natural Ventilation (By Simulation & Modelling)	67	Ventilation Simulation The CFD simulations or wind tunnel testing are to be conducted based on the requirements in the Annex A: Computational Fluid Dynamics Simulation Methodology and Requirements. Ventilation simulation or wind tunnel testing reports summarising the analysis and modelling results for each typical space as well as the recommendations for design. Calculation showing the percentage of units achieving good natural ventilation. Or Thermal Comfort Modelling The simulation results and the recommendations derived are to be implemented to ensure optimised natural ventilation to the Moderate level as stated in the Annex A: Computational Fluid Dynamics Simulation Methodology and Requirements. The project team can further demonstrate meeting the thermal comfort criteria through mechanically assisted ventilation.	**BSD**	received	

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BSD building system & diagnostics

Pre-requisites		S/N	Documentation Checklist	Action By	Status	Remarks as per 13/2/19
Prerequisites for ALL Projects						
Part 2- Building Energy Performance						
2.01 b	Lighting Efficiency	68	*Required items are covered in P. 07*	-		
2.01 c	Car Park Energy		Extracts of the tender design specification showing the provisions of CO Sensors;	**Alpha**	received	
		69	Plans layouts showing all car park provisions for the development with highlights of the car park spaces that are designed mechanical ventilated;	**Alpha**	received	
		70	Carpark layout plan indicating the locations and the number of CO sensors and the mode of ventilation adopted for the design	**Alpha**	received	
		71	MV fan equipment schedules and data showing the motor and fan efficiency and the motor input power	**Alpha**	received	
		72	Type and models of CO sensors and control strategy for ventilation control	**Alpha**	received	
		73	Technical Specifications of MV systems and CO monitoring system	**Alpha**	received	
2.02a	Energy Effectiveness	74	Plans layouts showing all the quantity of energy efficient equipment provided for the development and computation of extent of coverage; (Lift Demarcation)	**BSD**	received	
		75	Extract of the tender specification showing the provision of the proposed energy efficient equipment; (Lift)	**Alpha**	received	
		76	Features and the extent of implementation where applicable; (Lift)	**Alpha**	received	
		77	Technical product information on the energy efficient features used; (Lift)	**Alpha**	received	
		78	Plans layouts showing all the clothes drying facilities	**LAUD**	received	
		79	Calculation of the Energy Efficiency Index (EEI) using the pre-determined daily usage pattern and the prescribed tabulated format as shown in the example.	**Alpha**		
2.03 a (G+: 0.5)	Feasibility Study	80	Solar feasibility report acknowledged by the QP/PE (Electrical)/PV specialist, and the project manager	**Maincon**		
2.03 b	Solar Ready Roof		Detailed drawings showing the roof readiness, including the location and method of provision for structural readiness and electrical readiness. For solar energy, at least 50% of feasible roof area (based on feasible capacity stated in feasibility study report) has to be set aside and considered as the basis for design.	**Alpha**		
Part 3- Resource Stewardship						
3.01 a	Water Efficiency Measure	81	Extracts of the tender design specification showing the provisions of all water fittings for dwelling units;	**LAUD/HDB**		
		82	Water fittings WELS rating certificated	**LAUD/HDB**		
		83	Product catalogue of water fixtures	**LAUD/HDB**		
		84	Water fittings/products schedules showing the numbers, types and WELS rating of proposed fittings/products in the prescribed tabulated format	**LAUD/Maincon**		
3.01 b	Water Usage Monitoring	85	Extracts from tender specification stating the provision of water metering for all major water uses	**Alpha**		
		86	Schematic drawings of cold water distribution system showing the location of the private water metering provided	**Alpha**		
3.01 c	Alternative Water Sources	90	Layouts showing the rainwater harvesting tank, the volume of the tank, the catchment area and usage areas	**Alpha**		
3.02 a	(ii) Resource Optimisation (Part 1. Concrete Usage Index)	95	Architectural and structural layout, elevation and sectional plans showing the type of wall system used, the dimensions and sizes of all the building and structural elements	**BECA**		
		96	Calculation showing the quantity of concrete used for each floor level (BIM) (area and volume)	**BECA/Maincon**		
		97	Confirmation of Concrete Usage Index (CUI) Calculation	**BECA**		
		98	BIM Model of architectural and structural plan layout, elevation and sectional plans showing the type of building elements/ systems used, the dimensions and sizes of all the building and structural elements (Undertake letter)	**BECA/Maincon**		
3.02 b	Embodied Carbon	102	*Required items are covered in P. 11*	-		
3.02 c	Sustainable Products	103	Layout plans showing location for each material / product used	**LAUD**		Received: - Ceiling & Dry wall partition
		104	Summary of products such as brand, applied area, extend of coverage of each material / product used	**Maincon**		Received: - Fosroc Proofex GP coating - Fosroc Proofex engage coating - Formdex Admix building material - Gyproc Panel Board - Joe Green Panel
		105	Green label certificate (SGLS or SGBC) of each material / product used. Ensure that the cert are not expired	**Maincon**		
		106	Catalogue of each material / product used	**Maincon**		Received: - Davco - Gyproc Duraline - Joe Green
3.03 a	Environmental Constructive Management Plan	108	Submission of the environmental construction management plan that would be implemented on site which should include definitive energy, water and waste target set for the construction	**Maincon**		
		109	Undertaking letter	**Maincon**		
3.03 b	Operational Waste Management	110	Plan layout showing the location of the recycling facilities for collection and storage of the relevant recyclables	**LAUD**		

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To note	Green Mark Gold	50 to < 60

BSD building system & diagnostics

Pre-requisites		S/N	Documentation Checklist	Action By	Status	Remarks as per 13/2/19
Prerequisites for ALL Projects						
Part 4- Smart and Healthy Building						
4.01 b	i) Low VOC	111	*Required items are covered in P. 14*	-		
	ii) Waste Disposal	112	Drawings of location of refuse chutes or waste disposal area at open ventilated areas	**BSD**	received	
	iii) IAQ in Wet Areas	113	Layout plans and calculation of % of applicable areas adequate natural ventilation and daylighting in wet areas	**BSD**	received	
4.02 c	Wellbeing	119	Landscape plans of the relevant accessible sky gardens, sky terraces, internal courtyards and rooftop gardens that indicate the outdoor furniture, the outdoor refreshment area	**LAUD/PDAA**		
		120	Plan layouts and perspectives of the interior planting design at the applicable areas with calculations that demonstrate the plant coverage as a percentage of the relevant floor areas			
		121	Short description/ plans/ sketches to demonstrate how building design has adopted biomimicry/ natural shapes and forms			
		122	Short description/ plans/ sketches to demonstrate how building design add a sense of ecological attachment			
		123	Layout identifying common area where images of natures has been incorporated			
4.03 b	Demand Control	126	Extracts of the tender design specification showing the provisions of sensor lights	**Alpha/Maincon**		
		127	Location plans of the relevant sensors that demonstrate that at least 80% of the applicable areas are covered	**Alpha/Maincon**		
		128	Product catalogue for sensors	**Alpha/Maincon**		
4.03 d	System Handover and Documentation	131	List of relevant mechanical, electrical and control systems that are to be tested and verified	**HDB**		
		132	Commitment letter from client to undertake system verification and handover			
		133	Handing over taking over sample form	**HDB**		
Advanced Green Efforts						
5.01	a. Passive Design Strategies	134	Development layout design showing optimizing prevailing wind conditions	**LAUD**		
		135	Drawings showing provision of either void desks or void spaces in between buildings	**LAUD**		
	b. Sustainable Stormwater	116	PUB ABC Waters Certification: PUB ABC Waters 'Gold Class' Certificate			
	g. BIM to tabulate CUI	137	BIM Model of architectural and structural plan layout, elevation and sectional plans showing the type of building elements/ systems used, the dimensions and sizes of all the building and structural elements (Undertake letter)	**Maincon**		
	h. Sustainable Products	138	Extracts from the tender specification and drawings showing the requirements to incorporate the environmentally friendly products that are certified by the approved local certification body;	**Maincon**		
		139	Product certificates from local	**Maincon**		
	i. Embodied Energy	140	*Required items covered in P. 11*	-		

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To note	Green Mark Gold	50 to < 60

BSD
building system & diagnostics

Pre-requisites		S/N	Documentation Checklist	Action By	Status	Remarks as per 13/2/19
Prerequisites for ALL Projects						



NORTHSHORE COURT @ PUNGGOL

PUNGGOL NORTH CONTRACT 13

RB 2016 Final Assessment

GREEN MARK GOLDPLUS

24 Nov 2020

BCA GREEN MARK

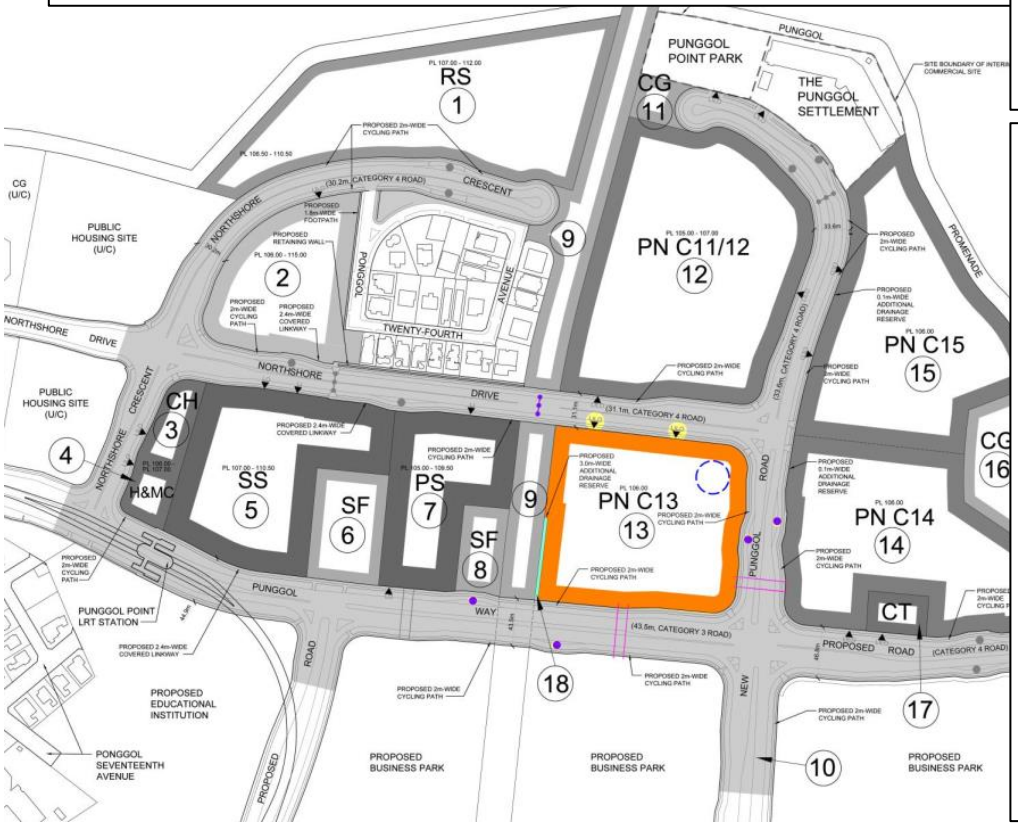
PROJECT | CLIMATIC | ENERGY | RESOURCE | HEALTHY | ADVANCE

PROJECT TEAM

Developer	Housing Development Board
Architect	LAUD Architects Pte Ltd
Structural Engineer	Beca Carter Hollings & Ferner (SEA) Pte Ltd
M&E Consultant	Alpha Consulting Engineers Pte Ltd
Landscape Architect	PDAA Design Pte Ltd
ESD Consultant	Building System & Diagnostics Pte Ltd

PROJECT INFORMATION

Description	Public housing development comprising **1 block of 22-storey, 1 block of 20/22 storey, 2 blocks of 5/22 storey & 2 blocks of 9/22-storey residential building.**
Site Location	Northshore Drive
Gross Floor Area	**104,217.25 m²**



Site Area

27,750 m²

Building Height

74.0 AMSL

Carpark

Basement 1 and 1st Storey – 410 Cars, 125 Motorcycle Lots

Greenery

Communal Garden – Storey 5 and 10

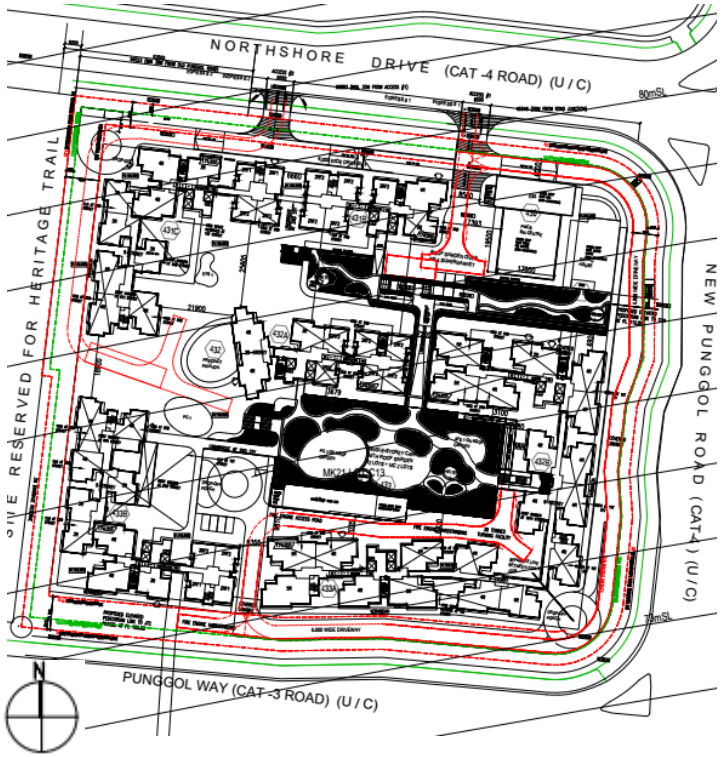
Roof garden – Storey 21

Carpark – Roof Garden , Storey 2

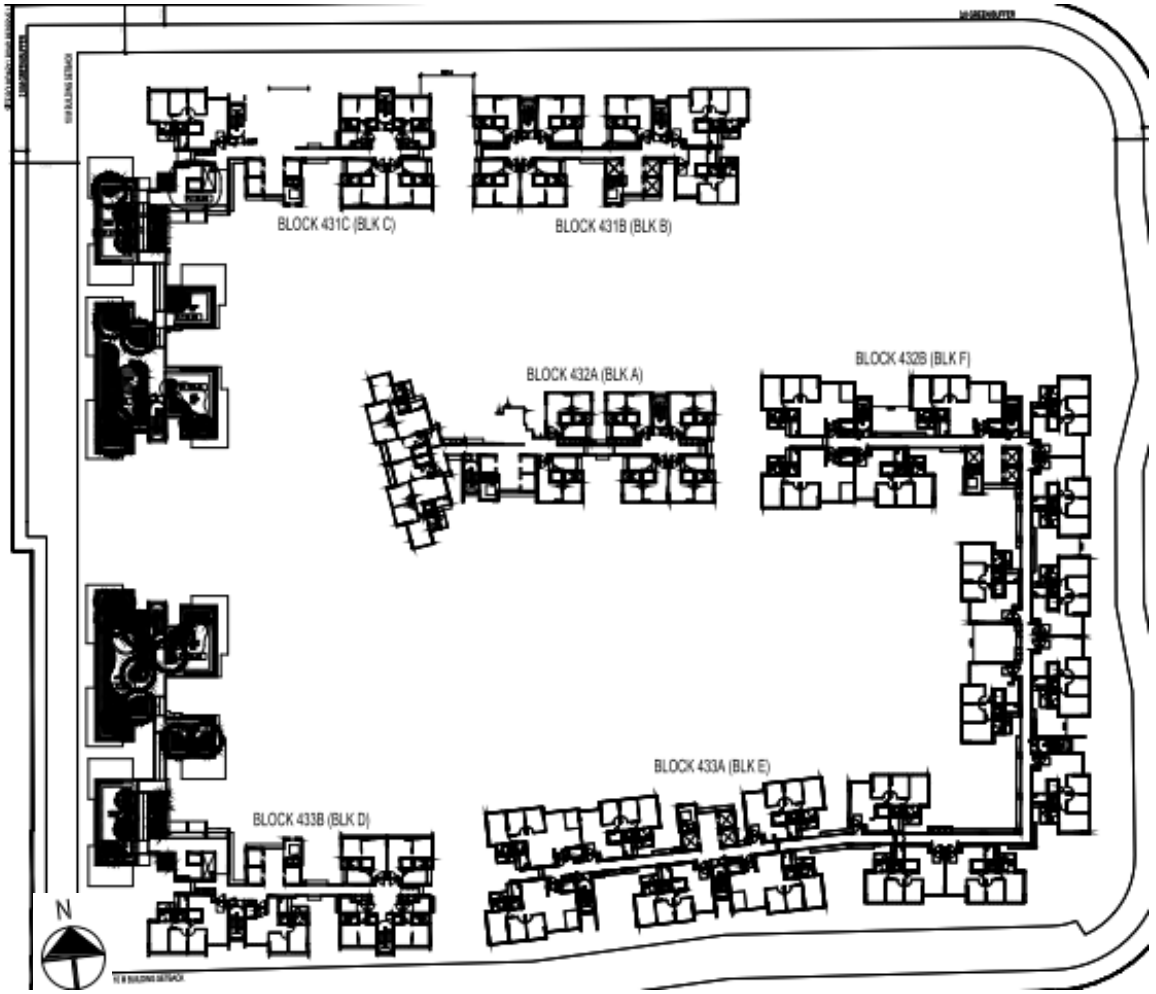
Other Ammenities

Supermarket and Eating house – Block 431A

Site Layout plan



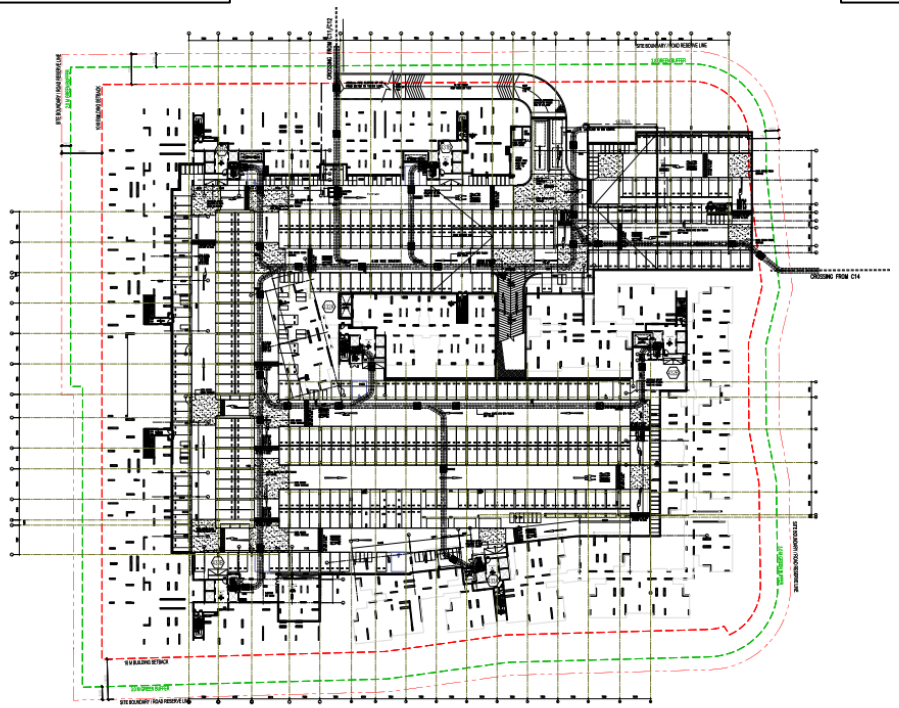
Overall



Overall Blocks

Carpark Layout

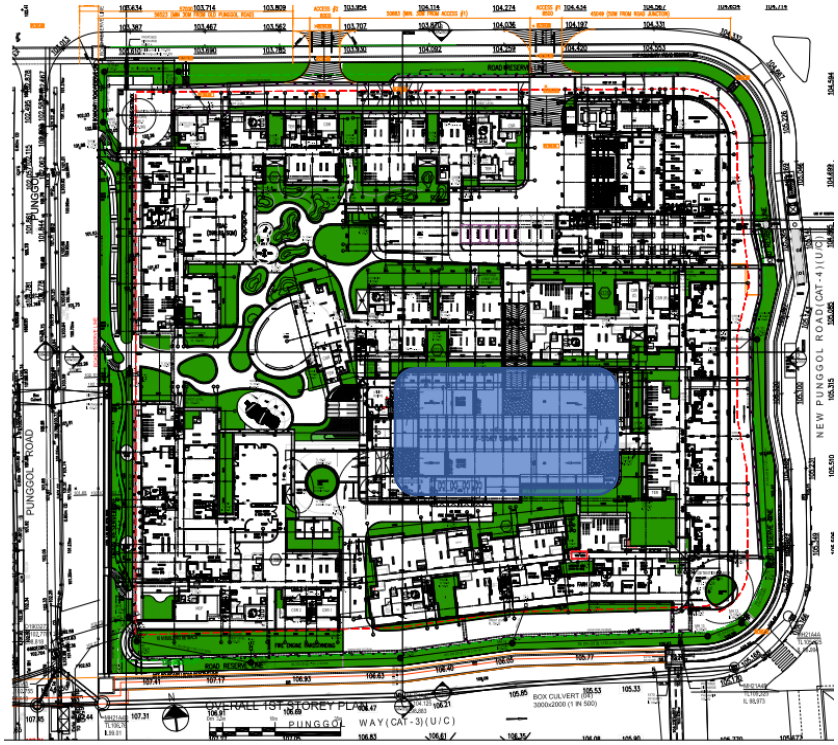
Basement Storey



OVERALL BASEMENT PLAN

BICYCLE LOT TABULATION	
	NO. OF BICYCLE LOT
BLK 431B	28
BLK 431C	28
BLK 432A	32
BLK 432B	28
BLK 433A	26
BLK 433B	26
COMMERCIAL	30
TOTAL PROVISION	198

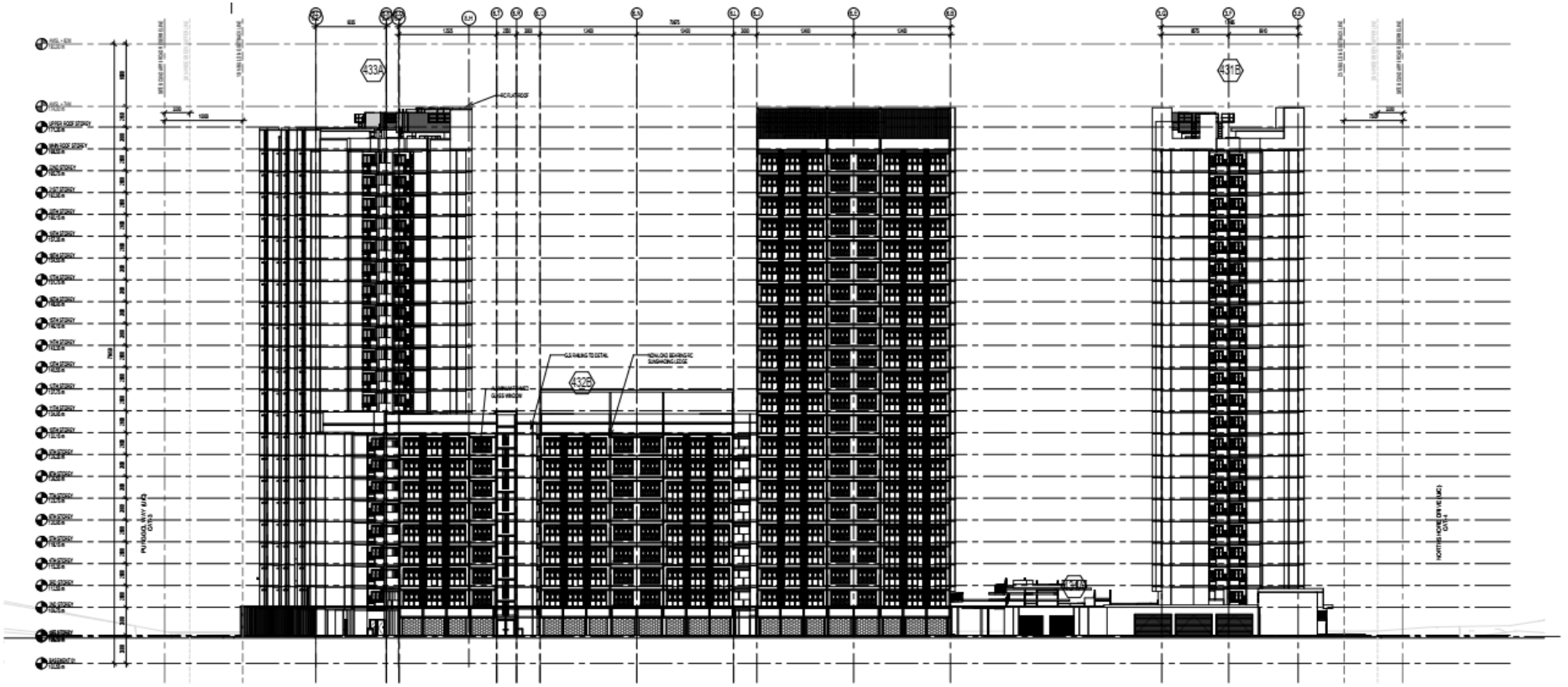
1st Storey



OVERALL 1ST STOREY PLAN

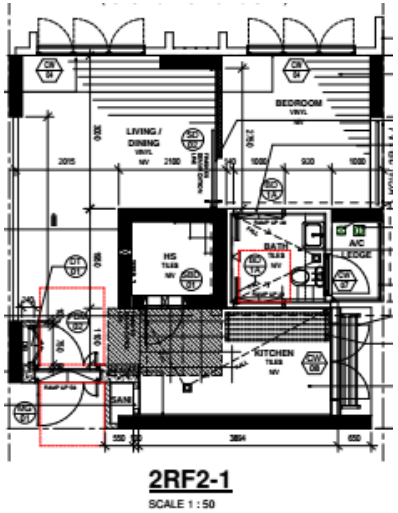
PARKING SPACE TABULATION				
	CAR PARK	ACCESSIBLE LOT	MOTORCYCLE LOT	LOADING BAY
BASEMENT	352	6	119	0
1ST STOREY	58	0	6	12 CAR LOT + 3 LORRY LOTS
TOTAL	410	6	125	12 CAR LOT + 3 LORRY LOTS

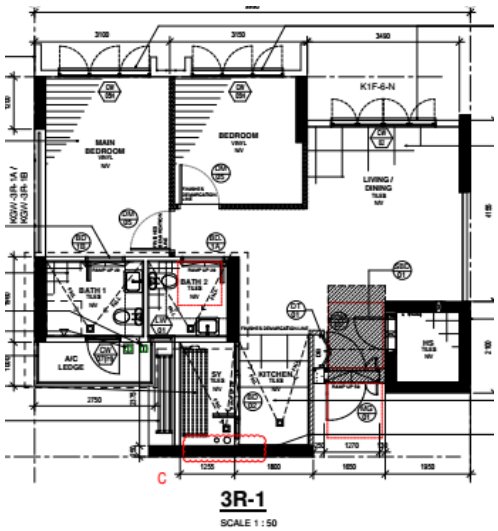
Elevation View

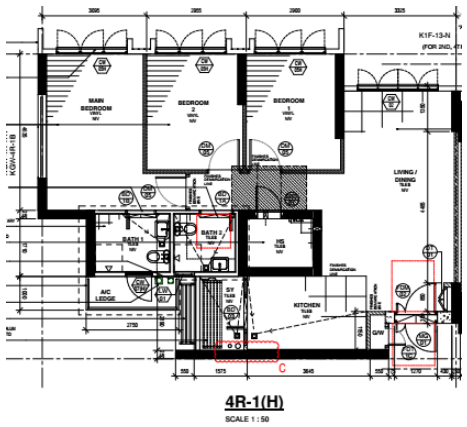


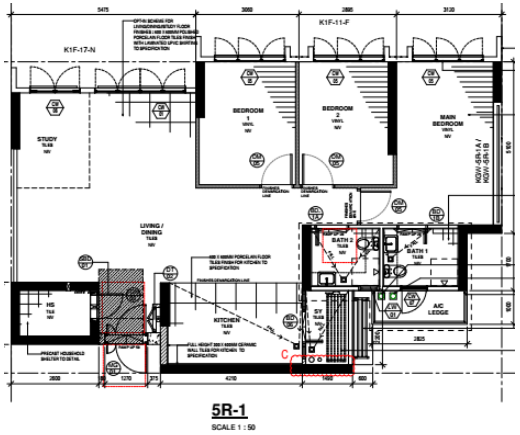
2 AR-114 **ELEVATION 2**
1 : 350

Typical Units and Unit Distribution





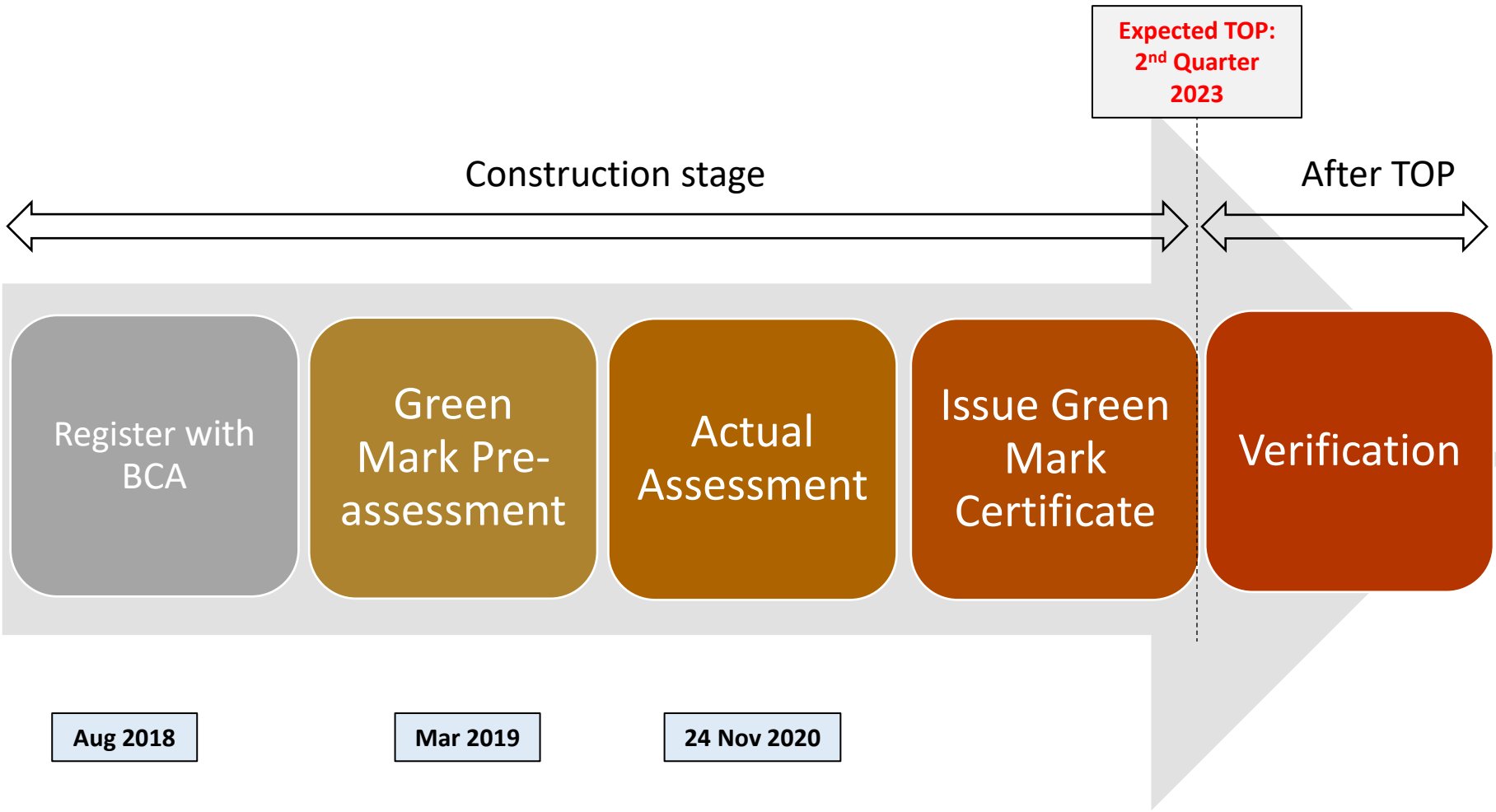




OVERALL				
2RM-1	36 SQM	84	2RM-1	84
2RM-2	45 SQM	303	2RM-2	303
3RM-1	66 SQM	60	3RM	98
3RM-2	65 SQM	26	4RM	333
3RM-3	BAL OPTION	12	5RM	122
4RM-1	90 SQM	285	**Total**	**940**
4RM-2	93 SQM	12		
4RM-3	BAL OPTION	36		
5RM	110 SQM	122		

Green Mark Timeline

PROJECT | CLIMATIC | ENERGY | RESOURCE | HEALTHY | ADVANCE



PART 1 CLIMATIC RESPONSIVE DESIGN

Pre-requisite

- Greenery: Option 2 - GM scoring under 1.02b (3 pts)
  - GNPR=5.68 , ABC Waters Certification
- RETV: <22W/m^2 (18.52W/m^2) with W,SW and NW facade < 25 W/m^2
- Air Tightness and leakage compiles with SS212 and SS381

AVERAGE BUILDING RETV FOR WHOLE DEVELOPMENT:

FACADE ORIENTATION	Area (Ao)	RETV	Ao*RETV
BLK 431B	4,873.37	17.37	84,645.63
BLK 431C	5,653.15	18.56	104,933.73
BLK 432A	6,014.72	18.98	114,169.09
BLK 432B	8,536.56	19.55	166,865.94
BLK 433A	8,008.54	17.73	141,960.14
BLK 433B	5,611.11	18.57	104,196.53
	38697.45		**716,771.06**

AVERAGE RETV	Ao*RETV/Ao	**18.52**	W/m^2

1.01 - Leadership

- Preparation of climatic and culturally responsive brief (1 point)
- Design team will demonstrate an integrated design process, inclusive of: (2 points)
  - Appointment of all relevant consultants early in the design phase
  - Identification of responsible parties within the team to implement relevant sustainability goals and targets
  - Detailing of sustainable design methodology action plans and progress
  - Addressing of opportunities and challenges with integrative team strategies to achieve the targets
  - Organising of design charrettes at key stages within the project design

PART 1 CLIMATIC RESPONSIVE DESIGN

- Project team with specialist green credentials, consisting of:
  - Green Individuals – Green Mark Professional: BSD (0.5 point)
  - Main builder - Excellent Green & Gracious Builder Certified (0.5 point)
  - ISO14001 certified (0.5 point)
  - SGBC green services certified firms: BSD (0.5 point)

Certified Green Mark Professional

BCA ISO 14000 CERT. NO.: 2004/082 SS ISO 14001 : 2004

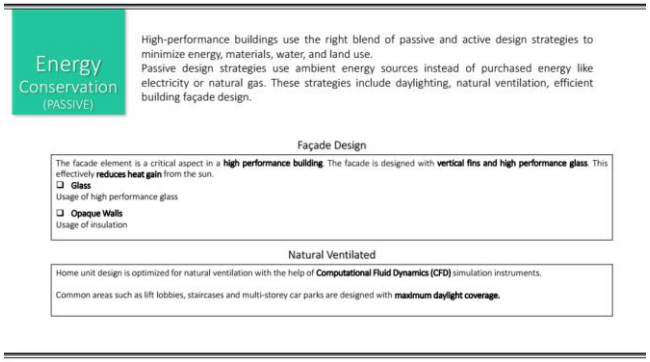
GREEN AND GRACIOUS BUILDER

- User Engagement:
  - Provision of building user guide– to incorporate sustainable design strategies and green features employed in the building (1 point)



Green Building User Guide





1.01 Leadership – 6 points

1.02 - Urban Harmony

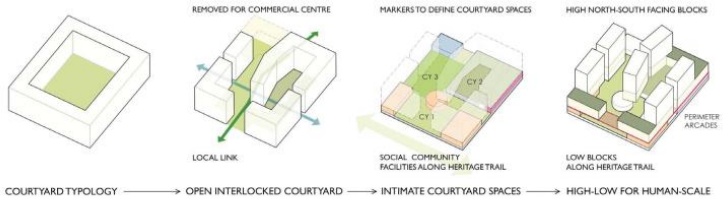
- Sustainable Urbanism
  - Response to site context (Level 1 analysis) (1 points)
  - Urban Heat Island – Mitigation 62.47% (0.5 points)
  - Green Transport – 198 Sheltered bicycle lots (1 points)
- Integrated Landscape and Waterscape
  - Green Plot Ratio – GnPR ~ 5.68 (3 points)
  - Sustainable Landscape Management – Landscape management plan (0.5 points)
  - Sustainable Storm Water Management (1 point) –
    - Provision of rain gardens as rainwater infiltration system
    - Provision of 25% of site areas being treated
    - ABC water certification

1.02 Urban Harmony – 7 points

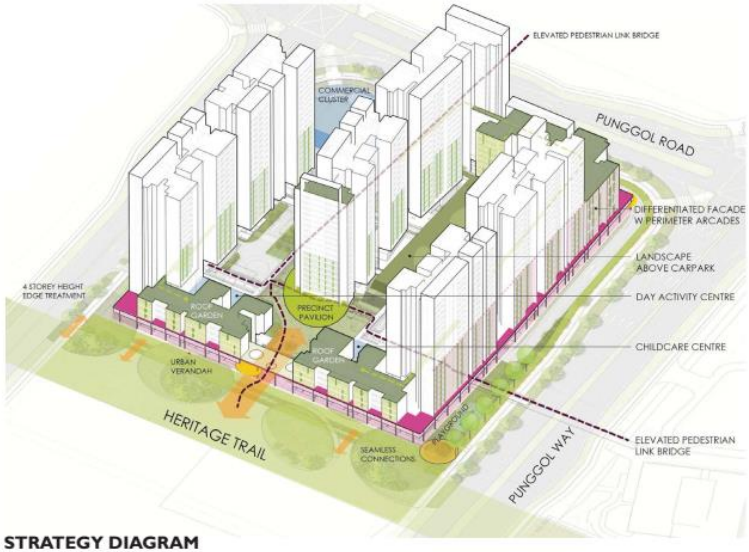
PART 1 CLIMATIC RESPONSIVE DESIGN

Site Analysis

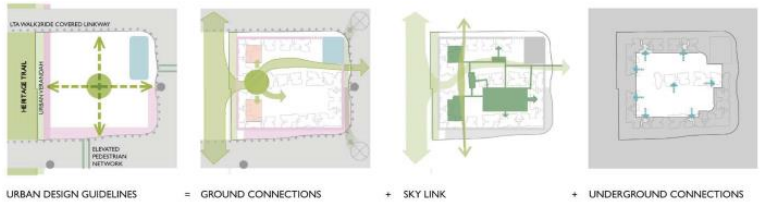




CONCEPT DIAGRAM: INTERLOCKED COURTYARDS



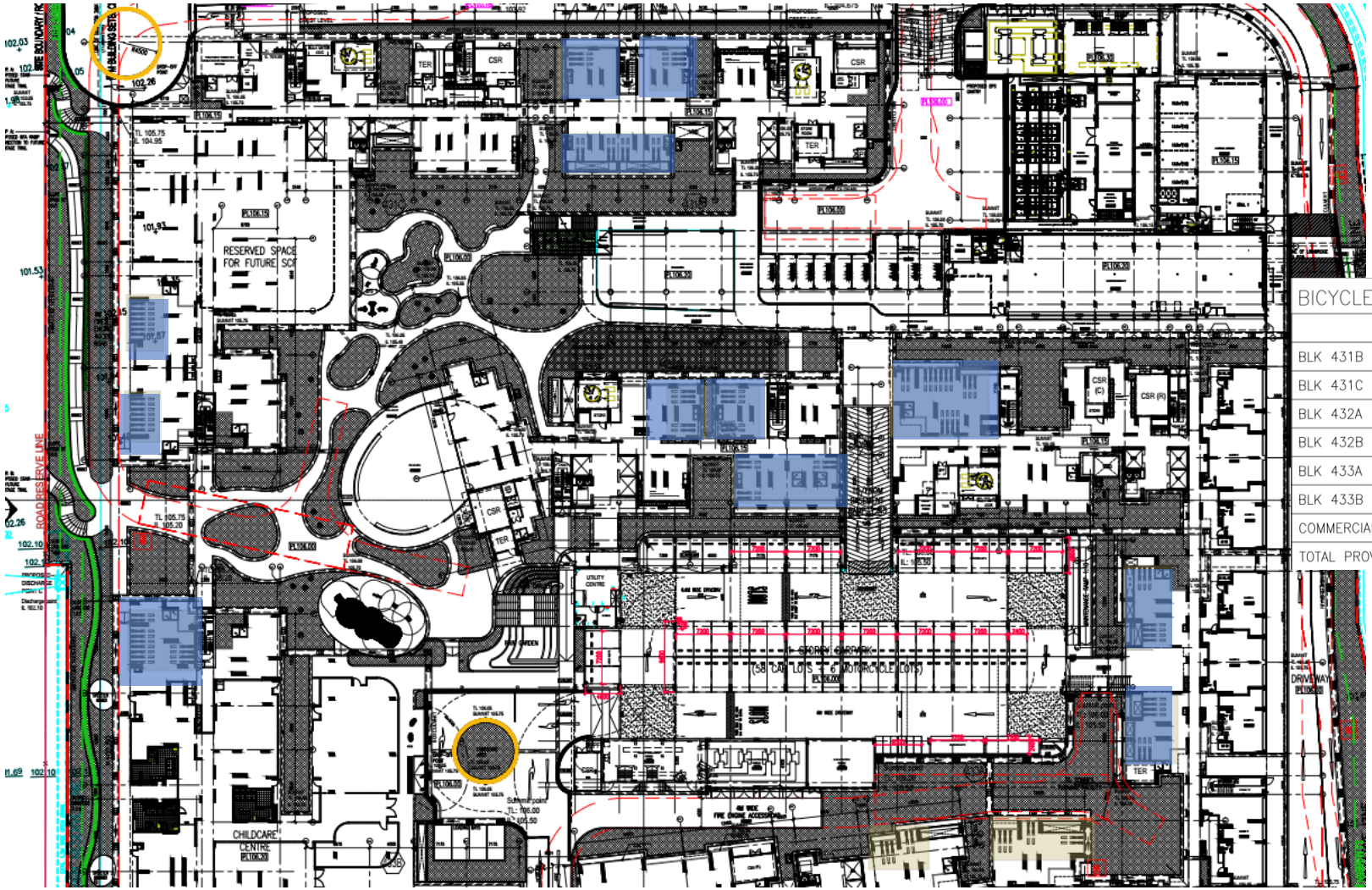
SITE STRATEGY DIAGRAM



MULTIPLE CONNECTIONS

PART 1 CLIMATIC RESPONSIVE DESIGN

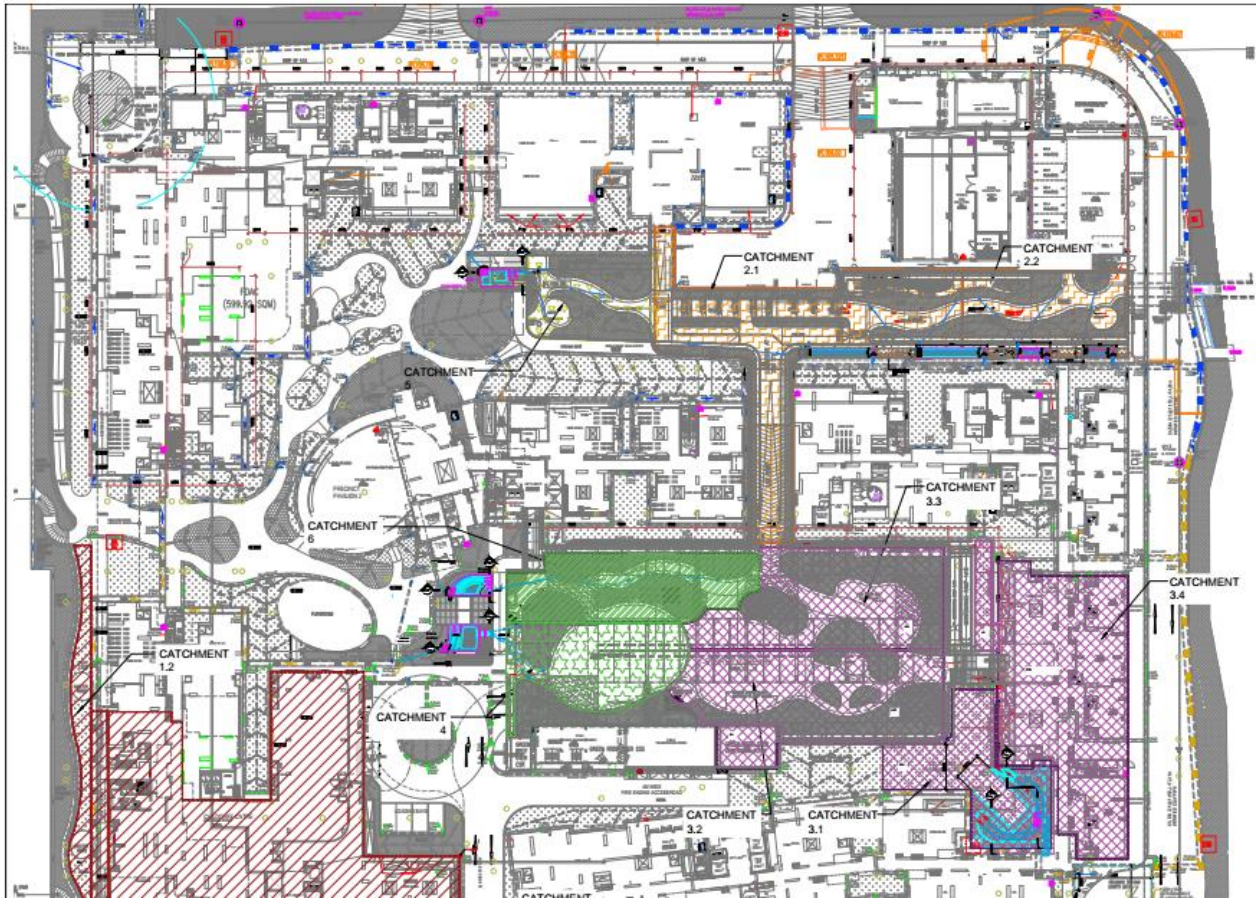
Bicycle lots (Highlighted)



BICYCLE LOT TABULATION	
	NO. OF BICYCLE LOT
BLK 431B	28
BLK 431C	28
BLK 432A	32
BLK 432B	28
BLK 433A	26
BLK 433B	26
COMMERCIAL	30
TOTAL PROVISION	198

PART 1 CLIMATIC RESPONSIVE DESIGN

Stormwater Management

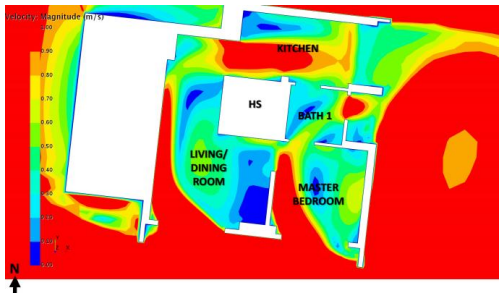


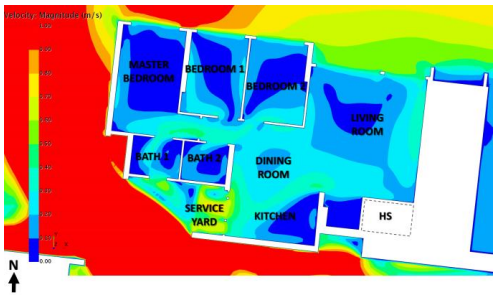
TOTAL CATCHMENT AREA	6,949 M²
TOTAL SITE AREA	27, 755 M²
CATCHMENT VS. SITE AREA	25%

Overall Catchment Area

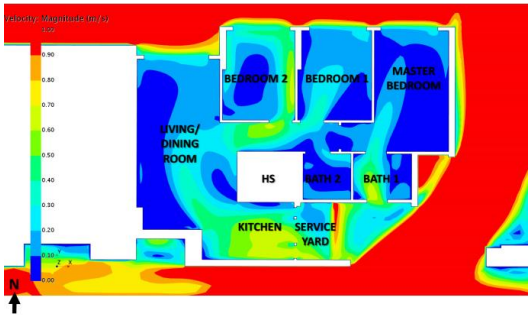
1.03 - Tropicality

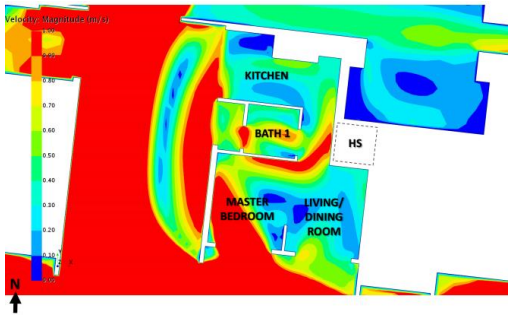
- Tropical Facade Performance – RETV = 18.52W/m^2 (5 points)
- Internal Spatial Organisation (2 point)
  - Naturally ventilated corridors & lift lobbies
  - Naturally ventilated stairs
- Ventilation performance (6.49 point)
  - Step 2- Ventilation Simulation Modelling
    - Percentage of selected typical units with weighted average velocity of 0.6m/s : 45.4%











1.03 Tropicality– 13.49 points

Pre-requisite

- Vertical Transportation Efficiency – Lift with VVVF and Sleep mode
- Lighting Efficiency – 72.37% improvement from baseline
- Renewable Energy Feasibility Study – Complete feasibility study for solar renewable energy as per requirements under indicator 2.03a feasibility study.

JOYMORE-Ⅳ TECHNIC DATA
无机房乘客电梯技术参数

序号 No.	规格 Specification	630(8人/p)			800(10人/p)				1000(13人/p)			
01	载重(kg) Rated capacity(kg)	630			800				1000			
02	速度(m/s) Speed(m/s)	1.0	1.6	1.75	1.0	1.6	1.75	2.0	1.0	1.6	1.75	2.0
03	控制方式 Control system	全集选控制 Full collective operation										
04	驱动方式 Driving system	VVVF 驱动 VVVF Driving										

SOLAR FEASIBILITY STUDY REPORT



Punggol North Contract 13

PART 2 BUILDING ENERGY PERFORMANCE

2.01 – Energy Efficiency

- Lighting System Efficiency (4 points)
  - Full LED lighting, to have lighting power budget of 72.37% improvement from SS530:2014

- Carpark System Efficiency (1.5 points)
  - Mechanical ventilation with fume extract

2.01 Energy Efficiency– 5.5 points

2.02 – Energy Effectiveness

- Energy Efficient Practices, design and features
  - Provision of lifts with regenerative drive system (1 point)
  - Calculation of EEI for common facilities (0.5 point)
  - Provision of clothes drying facilities (1 point)

2.02 Energy Effectiveness – 2.5 points

2.03 – Renewable Energy

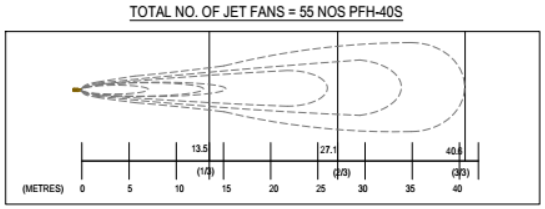
- Feasibility Study (0.5 points)
- Solar Ready Roof (1.5 points)

2.03 Renewable Energy – 2 points

Solar ready roof- Proposed panel location



Carpark with Fume Extract



CALCULATION FOR BASEMENT

TOTAL AIR VOLUME = 11,651 x 2.5 x 6 = 174,765 CMH (NORMAL)
TOTAL AIR VOLUME = 11,651 x 4.4 x 12 = 615,240 CMH (EMERGENCY)
18 NOS. OF EAF @ 9,710 CMH EACH (N) / 34,180 CMH EACH (E)
18 NOS. OF FAF @ 9,710 CMH EACH (N) / 34,180 CMH EACH (E)

SCHEDULE OF MECHANICAL VENTILATION FANS (PRO-JET FAN & MECHNICAL VENTILATION FAN)

S/N	AREA SERVED	FAN DESIGNATION	TYPE	MODEL	FAN CAPACITY (CMH)	MOTOR INPUT (kw)	RPM	POWER SUPPLY (VOLT/PH/Hz)	OUTLET VELOCITY (m/s)	REMARKS
1	MAIN CARPARK AREA	JF/B 1 TO 55	JET FAN	PFH-40S	1260 EACH	0.15	2850	230/1/50	14.3	MJ AIRTECH CLASS - H
2	MAIN CARPARK AREA	EAF B-1 TO B-18	AXIAL	-	9,710/34,180 EACH	-	-	-	-	CLASS - H
3	MAIN CARPARK AREA	FAF B-1 TO B-18	AXIAL	-	9,710/34,180 EACH	-	-	-	-	CLASS - H

PART 3 RESOURCE STEWARDSHIP

Pre-requisite

- Water fitting to comply with prescribed minimum WELS rating
- Sustainable Construction – 3.02a Sustainable construction >2 points
- Embodied Carbon – Project declaring Concrete, steel and glass
- Sustainable Products – 3.02c Sustainable products > 3 points

SINGAPORE GREEN BUILDING PRODUCT SGBC ✓✓✓✓ LEADER

Type of Water Fittings	Prescribed Rating based on Water Efficiency Labelling Scheme (WELS)
Basin Taps & Mixers	✓✓✓
Sink Taps & Mixers	✓✓
Shower Taps, Mixers or Showerheads	✓✓
Dual Flush Flushing Cisterns	✓✓

3.01 – Water

- Water Efficiency Measures
  - Water fittings 80% 2/3 ticks (4.86 points)
  - 40.97% of landscape areas served by automatic drip irrigation system (0.82 points)
- Private monitoring water meters (0.5 points)
- Alternative Water Sources
  - Rainwater Harvesting (1 point)

Rainwater Treatment System

The specialist shall adopt the following stages of filtration technology or other equivalent technology as a form of treatment system. All alternative technologies shall have equivalent treatment efficiency and are subjected to S.O.Rep's approval.

Stages	Processes
1	Pipe Strainer
2	High Efficiency Filter
3	Ultra Filtration
4	Disinfection

3.01 Water – 7.18 points

3.02 – Material

- Resource Efficient Building Design
  - Project target to adopt Sustainable building system of CFA (1 point)
  - SGBC Certified Green Concrete (1 points)
- Embodied Carbon
  - Declaration of Concrete, Glass and Steel (1 point)
  - Declaration of additional building materials (1 point)
- Sustainable Products
  - Use of SGBP or SGLS products (4 points)
  - Use of hardscape, building services and M&E products certified by SGBP (2 points)

3.02 Material – 10 points

3.03 – Waste

- Environmental Construction Management Plan
  - Implementation of an environmental construction management plan on construction sites through specific target setting, monitoring of energy and water use and construction waste minimisation measures (1 point)



- Operational Waste Management
  - Facilities for the collection and storage of different recyclable (1 point)





3.03 Waste – 2 points



Pre-requisite

- Low VOC paint will be used

4.01 – Indoor Air Quality

- Indoor Contaminants
  - Provision of more stringent VOC limits for Interior fittings and finishes (1 point)
  - Refuse chute location at open ventilated spaces (1 point)

4.01 Indoor Air Quality – 2 points

4.02 – Spatial Quality

- Acoustics Planning (1 point) – Surrounding no Cat 1/cat 2 and MRT tracks

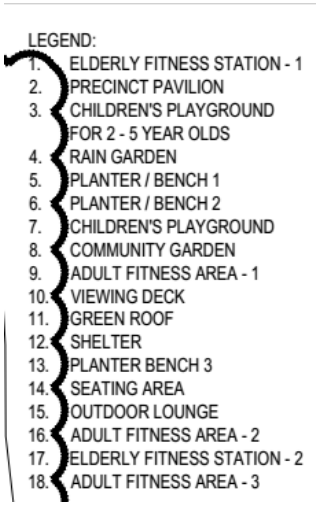


4.02 – Spatial Quality

- Biophilic Design (1 point)
  - Daylighting and natural ventilation, Water Features, Extensive greenery, Natural Landscape and Ecosystems(0.6)
  - Provision of sheltered walkway to carpark (0.15)
  - Garden, Playground, Fitness corner (0.45)



Basement Carpark, sheltered throughout



4.02 Wellbeing – 2 points

4.03 – Smart Building Operation

- Lighting Demand Control (0.5 point)
- System Handover and Documentation (2 points)

The Smart Lighting System shall include but not limited to the following:

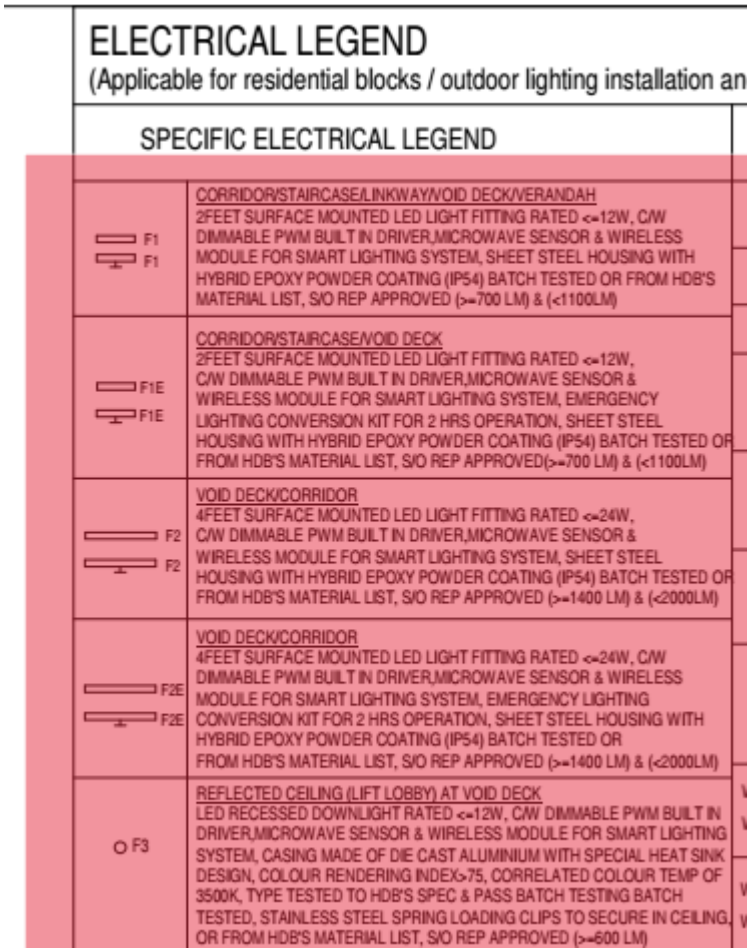
(a) Designed for lighting management in both indoor and outdoor environment:

  (i) indoor lighting shall include (but not limited to) common areas lighting in public housing estate (void decks, corridors, lift lobbies, staircase etc), namely, residential blocks, link ways and sheltered car park.
  (ii) outdoor lighting shall include (but not limited to) lighting at surface car park, garden and footpath etc.

(b) consist of wireless networked occupancy sensors, LED luminaires, network management devices and central controller.

(c) achieve minimum average 40% in energy saving of LED luminaires.

(d) respond to motion detection and turn on lights in the vicinity of movement in less than 1 sec.



ELECTRICAL LEGEND

(Applicable for residential blocks / outdoor lighting installation an

SPECIFIC ELECTRICAL LEGEND

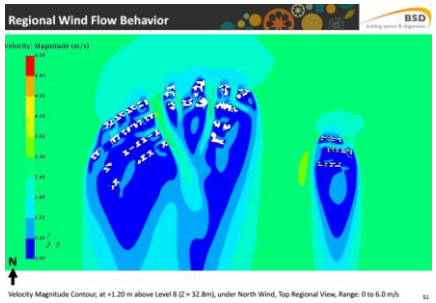
F1 F1	CORRIDOR/STAIRCASE/LINKWAY/VOID DECK/VERANDAH 2FEET SURFACE MOUNTED LED LIGHT FITTING RATED <=12W, C/W DIMMABLE PWM BUILT IN DRIVER,MICROWAVE SENSOR & WIRELESS MODULE FOR SMART LIGHTING SYSTEM, SHEET STEEL HOUSING WITH HYBRID EPOXY POWDER COATING (IP54) BATCH TESTED OR FROM HDB'S MATERIAL LIST, S/O REP APPROVED (>=700 LM) & (<1100LM)
F1E F1E	CORRIDOR/STAIRCASE/VOID DECK 2FEET SURFACE MOUNTED LED LIGHT FITTING RATED <=12W, C/W DIMMABLE PWM BUILT IN DRIVER,MICROWAVE SENSOR & WIRELESS MODULE FOR SMART LIGHTING SYSTEM, EMERGENCY LIGHTING CONVERSION KIT FOR 2 HRS OPERATION, SHEET STEEL HOUSING WITH HYBRID EPOXY POWDER COATING (IP54) BATCH TESTED OR FROM HDB'S MATERIAL LIST, S/O REP APPROVED(>=700 LM) & (<1100LM)
F2 F2	VOID DECK/CORRIDOR 4FEET SURFACE MOUNTED LED LIGHT FITTING RATED <=24W, C/W DIMMABLE PWM BUILT IN DRIVER,MICROWAVE SENSOR & WIRELESS MODULE FOR SMART LIGHTING SYSTEM, SHEET STEEL HOUSING WITH HYBRID EPOXY POWDER COATING (IP54) BATCH TESTED OR FROM HDB'S MATERIAL LIST, S/O REP APPROVED (>=1400 LM) & (<2000LM)
F2E F2E	VOID DECK/CORRIDOR 4FEET SURFACE MOUNTED LED LIGHT FITTING RATED <=24W, C/W DIMMABLE PWM BUILT IN DRIVER,MICROWAVE SENSOR & WIRELESS MODULE FOR SMART LIGHTING SYSTEM, EMERGENCY LIGHTING CONVERSION KIT FOR 2 HRS OPERATION, SHEET STEEL HOUSING WITH HYBRID EPOXY POWDER COATING (IP54) BATCH TESTED OR FROM HDB'S MATERIAL LIST, S/O REP APPROVED (>=1400 LM) & (<2000LM)
F3	REFLECTED CEILING (LIFT LOBBY) AT VOID DECK LED RECESSED DOWNLIGHT RATED <=12W, C/W DIMMABLE PWM BUILT IN DRIVER,MICROWAVE SENSOR & WIRELESS MODULE FOR SMART LIGHTING SYSTEM, CASING MADE OF DIE CAST ALUMINIUM WITH SPECIAL HEAT SINK DESIGN, COLOUR RENDERING INDEX>75, CORRELATED COLOUR TEMP OF 3500K, TYPE TESTED TO HDB'S SPEC & PASS BATCH TESTING BATCH TESTED, STAINLESS STEEL SPRING LOADING CLIPS TO SECURE IN CEILING, OR FROM HDB'S MATERIAL LIST, S/O REP APPROVED (>=600 LM)

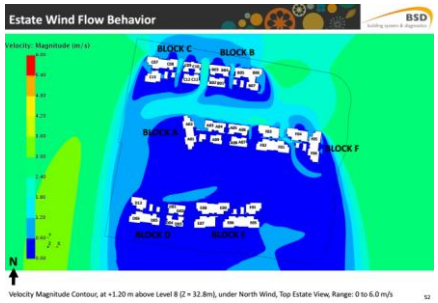
4.03 Smart Building Operation– 2.5 points

PART 5 ADVANCED GREEN EFFORTS

5.01a Passive Design Strategies (2 points)

- Provision of void decks
- Carry out macro ventilation simulation





5.01g Smart BIM(1 points)

- Using of BIM to calculate CUI

5.01h Sustainable Products with Higher Environmental Credential (2 point)

5. Advanced Green Efforts– 5 points

Summary



PART 1	PART 2	PART 3	PART 4	PART 5
26.49 Points	10.00 Points	19.18 Points	6.5 Points	5.00 Points

TOTAL

67.16 Points



Thank you.

Presented by: Vivien Wong |BSD

SECTION 9

ENVIRONMENTAL CONSIDERATIONS

9.4 Reporting of Environmental Non-conformances

When encountering environmental non-conformances, Site Staff shall be responsible to feedback to the main contractor.

9.5 List of Applicable Environmental Management System Procedures

Alpha Consulting Engineers Pte Ltd's Environmental Management System Procedures

Section	Title	✓ where applicable
E1	Aspect / Impact Identification, Risk Assessment & Risk Control	✓
E2	Identifying Legal & Other Requirements	✓
E3	Objectives, Targets & Programmes	✓
E4	Communication	✓
E5	Emergency Preparedness & Response	✓
E6	Monitoring & Measurement	✓
E7	Control of Air & Noise Pollution	✓
E8	Management of Wastes	✓

SECTION 10

CLIENT'S REQUIREMENTS

10.1 List of Output Required by Client:

Item	* Remarks
M&E Design Report	A
M&E Cost Estimate Report	A
Pre-Qualification of Tenderers	–
Tender Documents	–
Tender Report	–
Payment Valuation for QS	A
Certificates of Supervision for TOP/CSC	RE

* *Remarks*

A: for approval *C: for comment* *I: for Information* *Re: for record*

Other purposes and for action: please specify.

10.2 Specific Procedures Required By Client *(If applicable)*

NOT APPLICABLE

SECTION 11

LIST OF SUB-JOB

11.1 List of Sub-Job Numbers – NOT APPLICABLE

Sub Job No	Description	Allocation Details