1.0 EXECUTIVE SUMMARY

Aseania Linear District Cooling System Sdn Berhad ("Company") operates the Bandar Perda district cooling plant since end of 2005 for over 1 ½ years. Installed capacity of plant is currently 2,000RT. Under the plant capacity development plan, the district cooling plant is mapped to be built up by 3 Phases with estimated total development cost of RM94 million.

Phases	Description	Cumulative plant capacity	Year in service	Capital expenditure RM million
Phase 1	Two (2 nos) 1,000 RT centrifugal chillers	2,000RT	End-2005	26.0
Phase 2A	Two (2 nos) 2,100 RT centrifugal chillers	6,200RT	2008	40.0
Phase 2B	Two (2 nos) 1,500 RT dual evaporator chillers with 24,000 ton-hours of ice thermal storage	11,600RT	2009	
Phase 3	Two (2 nos) 1,500 RT dual evaporator chillers with 24,000 ton-hours of ice thermal storage	17,000RT	2011	24.0
				90.0

Based on the financial projections prepared, the following are the estimated financial parameters of the district cooling business

Capital expenditure budget		RM90 million
Contribution from developer(s)		(RM10 million)
Net investment	:	RM80 million
Equity payback period (from first year of investment)	:	13.7 years
Net present value (@9% disc.rate)	:	+ve RM3.4 million
Internal rate of return	:	9.7%
Operational profit (breakeven)	:	Year 5 onwards
Average EBITDA margin	:	34%

The following are the key construction milestones:

	Key milestones	Phase 2A	Phase 2B	Phase 3
1	Ice tank tender & construction	N.A.		
2	M&E Installation tender & installation			
3	Procurement (chillers, cooling towers, pumps, ice coils)			
4	Control & Instrumentation			
5	Testing & Commissioning			

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2.0 OVERVIEW OF BANDAR PERDA DEVELOPMENT

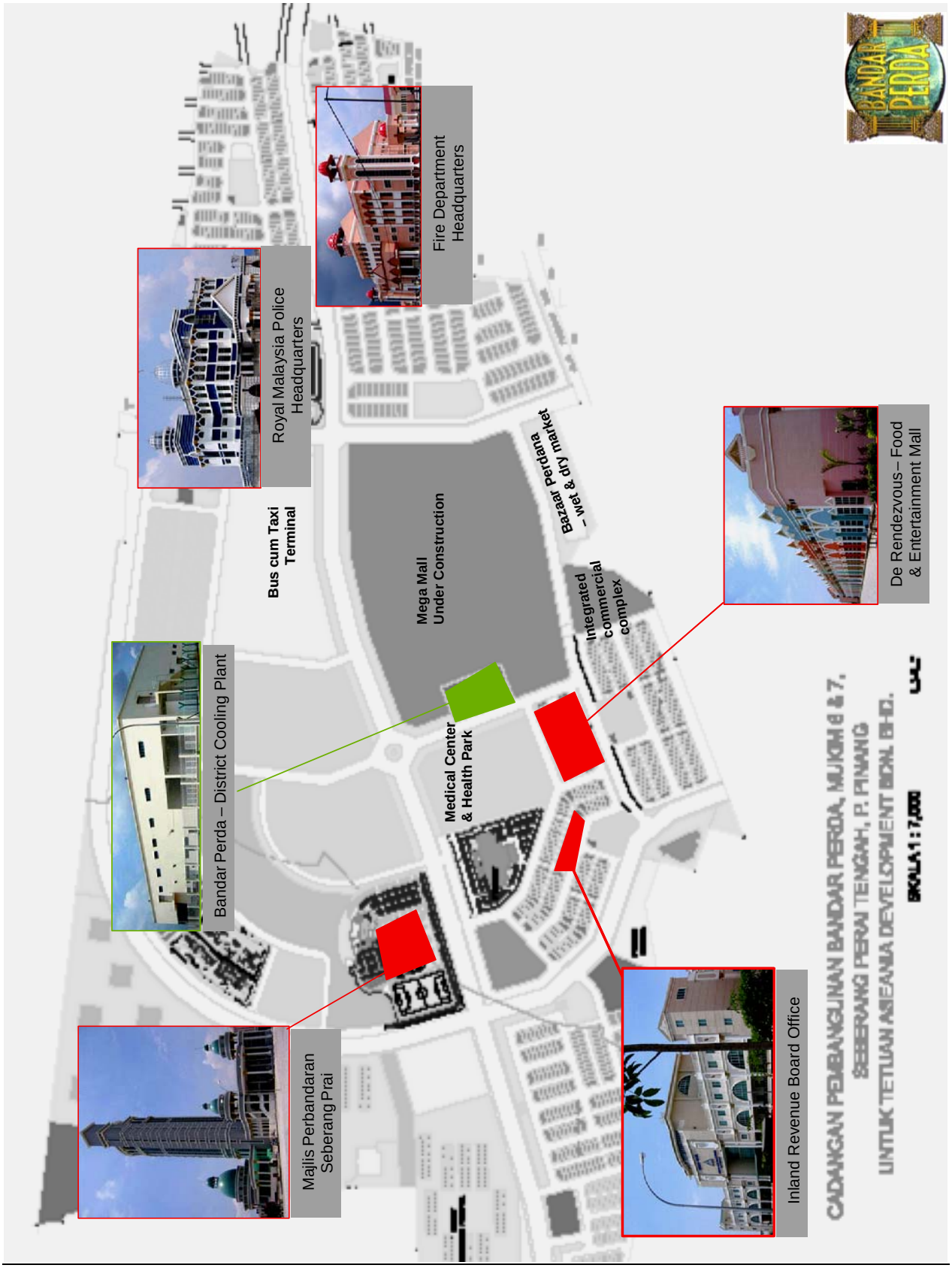
Endorsed by the Penang Regional Development Authority (PERDA), this 456-acre development at the prime land in central Seberang Perai, Northern Peninsular Malaysia, named after the authority – Bandar Perda, is a self contained township.

Bandar Perda, touted to be the governmental administrative capital of the North, is a futuristic integrated one-stop regional center designed to hub the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT). When completed, the township is projected to house a population of 70,000 and will be accessible to a catchment area of 2.5 million people.

Within the RM3 billion-master plan of Bandar Perda are the following developments:

(i) Head office for Majlis Pebandaran Seberang Prai (MPSP), local council for Seberang Prai;
(ii) Northern head office for the Inland Revenue Board of Malaysia;
(iii) Head quarters of the Royal Police Force headquarters
(iv) Head quarters of the Fire & Rescue Department
(v) Medical Center & Health Park
(vi) De Rendezvouz Mall –food & entertainment mall
(vii) Mega Mall
(viii) Bus cum Taxi Terminal
(ix) Puncak Aseania (the head office of the developer of Bandar Perda)
(x) Aseania Mall (integrated commercial complex with offices, hotel & shopping points)
(xi) Bazaar Perdana (wet & dry market)
(xii) The largest district cooling facility with ice-based external melt thermal storage in the region.

Figure 1: Master Layout of Bandar Perda Development



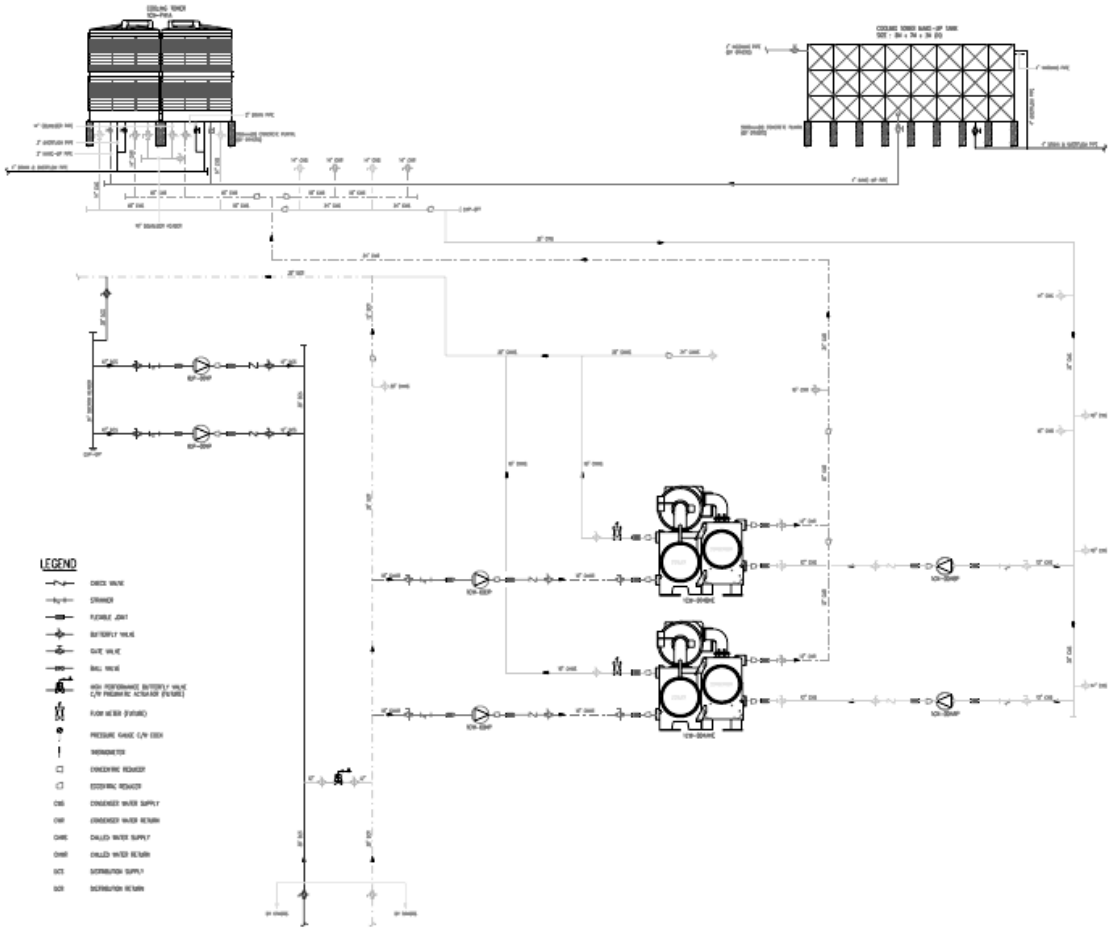
3.0 CURRENT DISTRICT COOLING OPERATION

3.1 Overview of the District Cooling Plant

Designed, built, operated and full owned by Linear Corporation Berhad, the plant will have eventual rated capacity of 17,000 refrigeration tons featuring 48,000 ton-hours of ice based thermal storage.

Owner	:	Aseania Linear District Cooling System Sdn Bhd (100% owned by Linear)
Location	:	Bandar Perda, Seberang Prai
Rated output capacity of cooling plant	:	17,000 tons
Water supply/return temperatures	:	34°F/54°F (1.1°C/12.2°C)
Description of project	:	22,000 square foot, single level, stand-alone building that contains two (2 nos) 2,000 ton and two (2 nos)2,100 ton centrifugal water chillers, four 1,500 ton dual evaporator chillers and 48,000 ton-hours of external melt ice-based thermal storage. Connecting all clients' premises is the completed 7.0 kilometers in length supply & return insulated piping network.

3.2 Current Plant Configuration



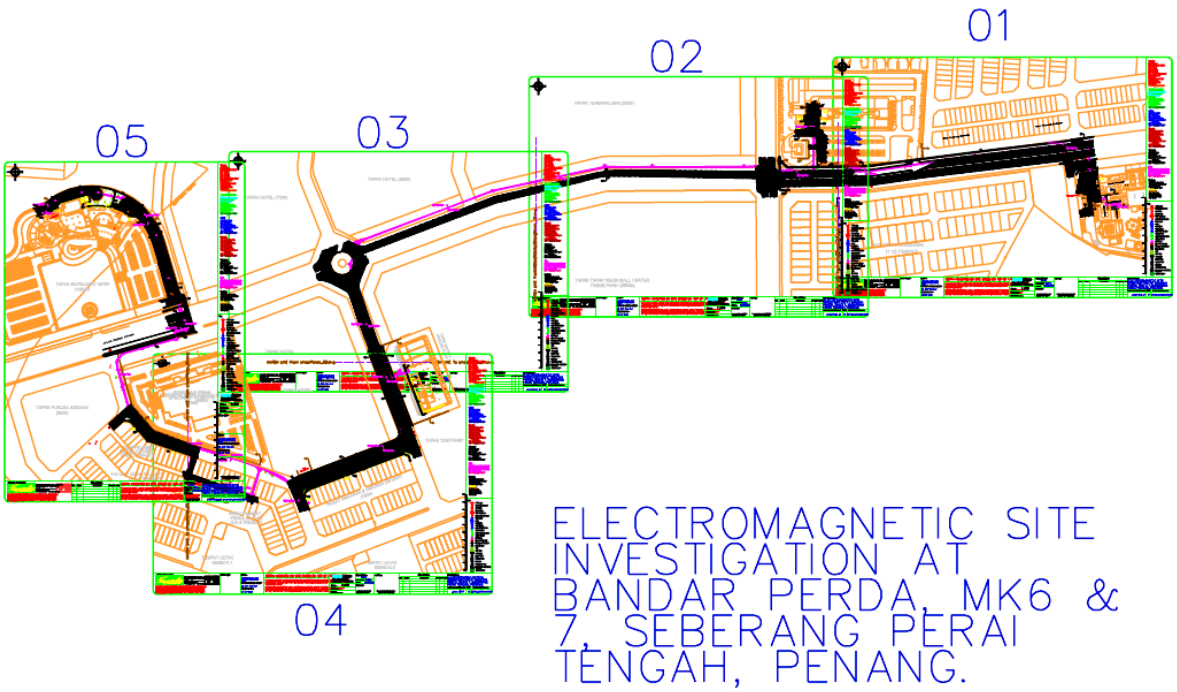
Summary of current plant capacity:

a) Chillers	-	2 x 1,000RT
b) Cooling towers	-	2 x 1,055 HRT

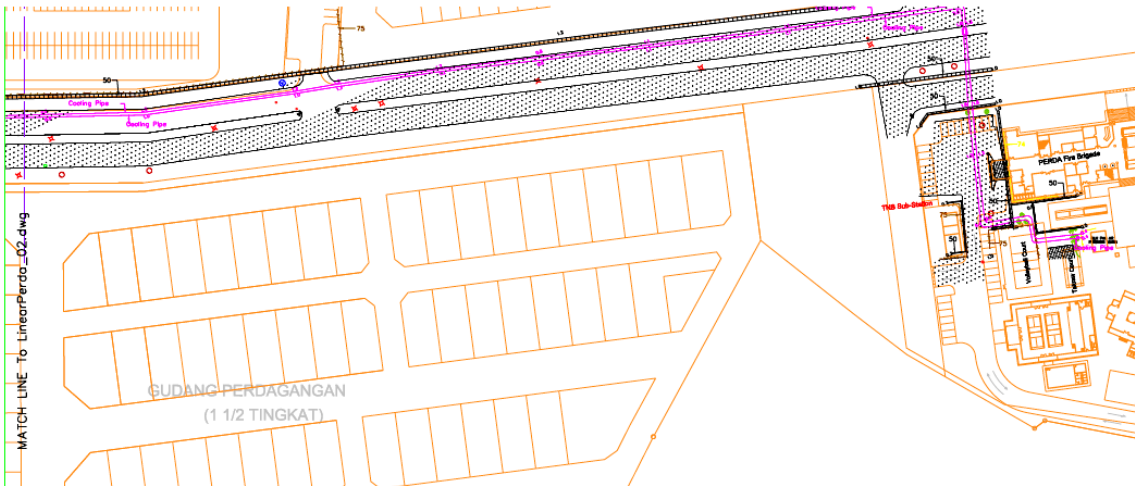
Full details of the equipment installed are enclosed in Appendix 1.

3.3 Installed Chilled Water Piping Network

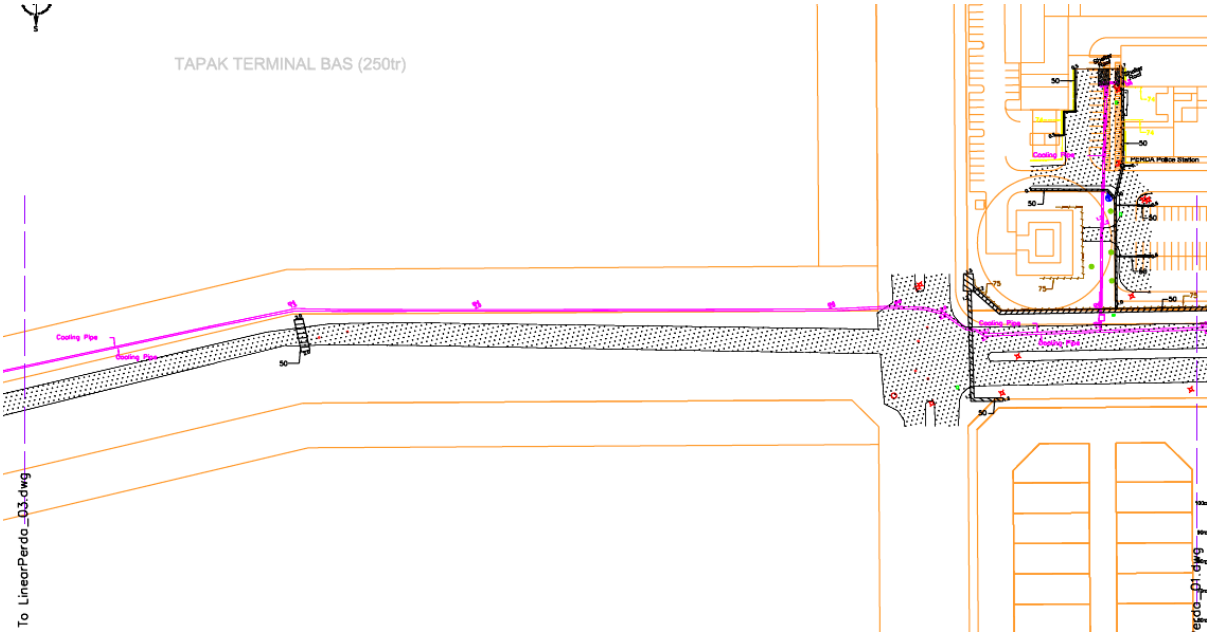
Below is an overview of the chilled water piping network installed in Bandar Perda.



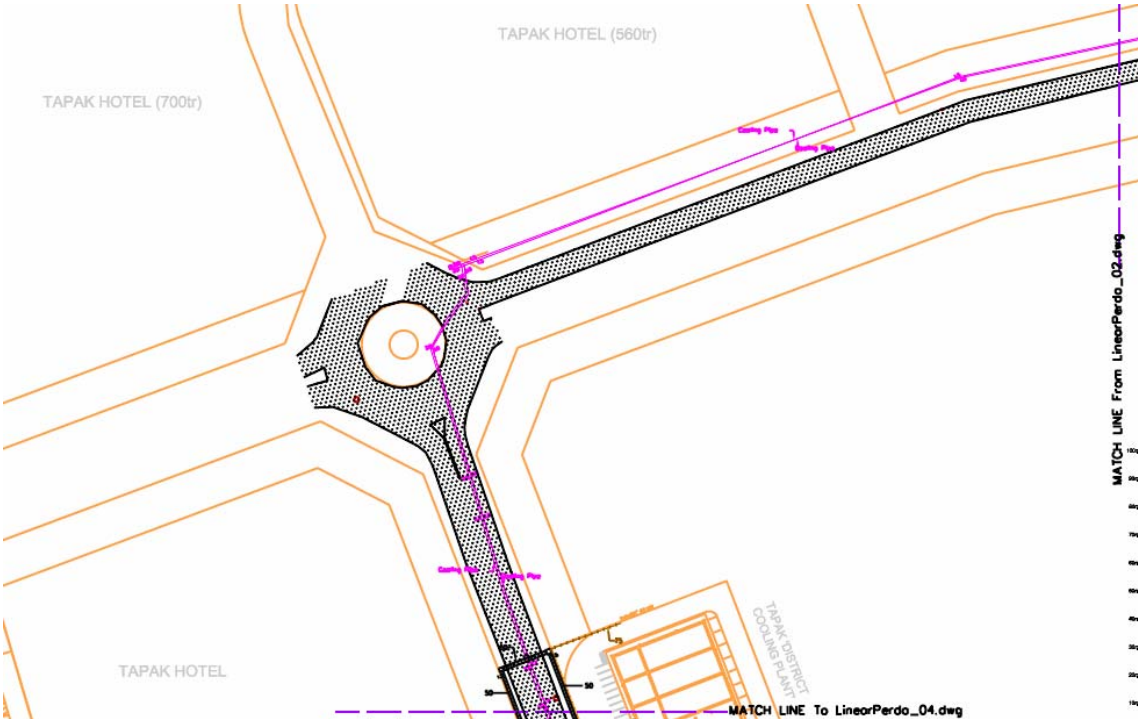
Note: Pink lines represent main distribution piping network installed in Bandar Perda



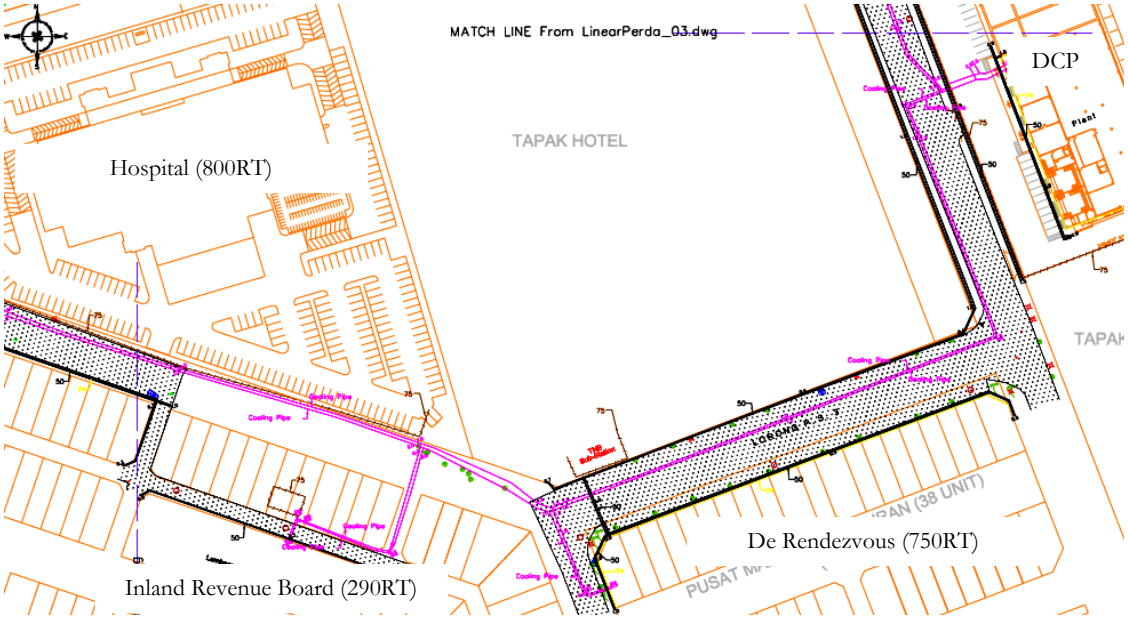
Drawing 1: Piping Network Connecting to Perda Fire Brigade



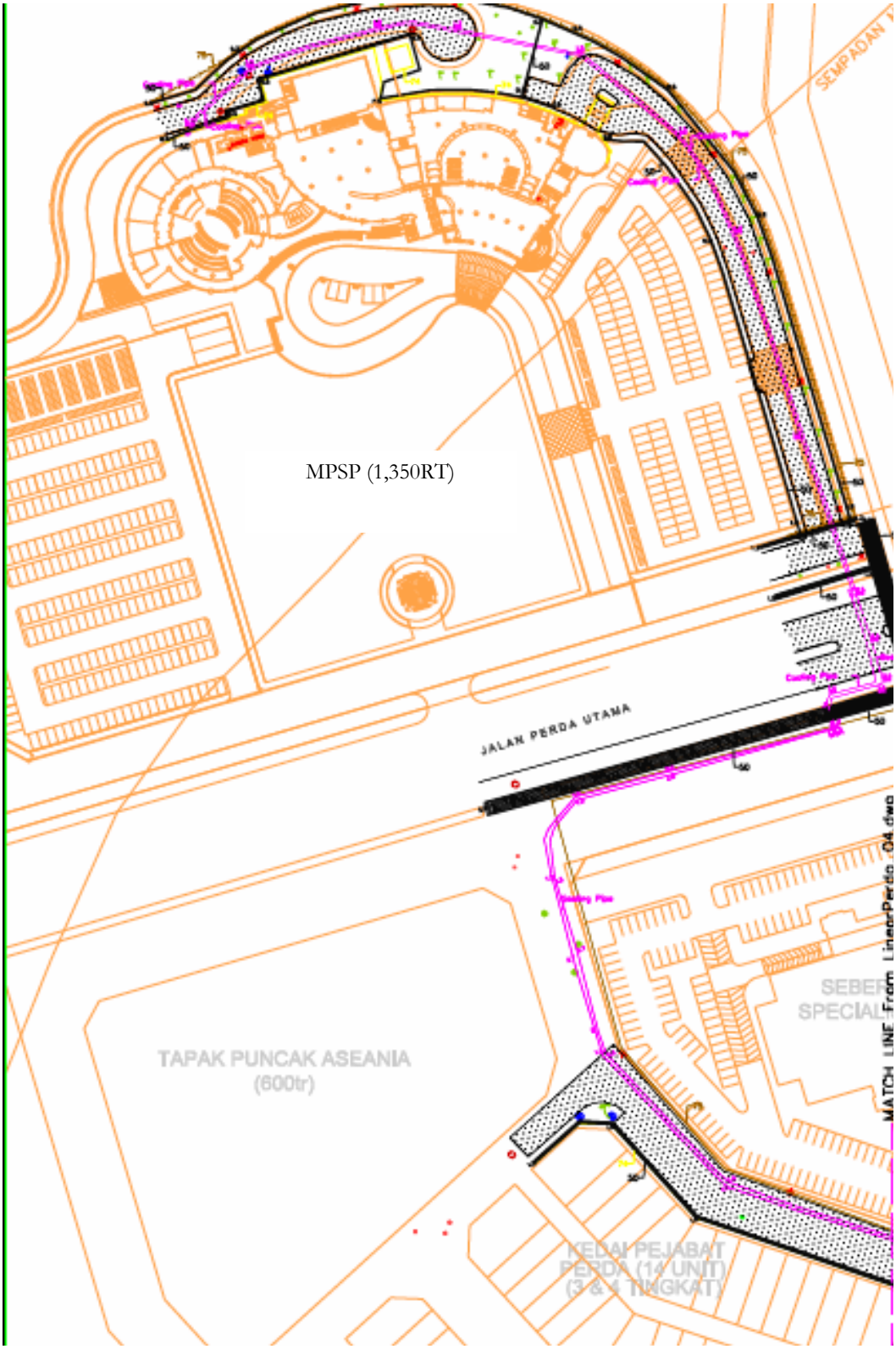
Drawing 2: Piping Network Connecting to Perda Police HQ



Drawing 3: Piping Network From District Cooling Plant to Police HQ & Fire Brigade



Drawing 4: Piping Network from District Cooling Plant to De Rendezvous & Inland Revenue Board's Office



Drawing 5: Continuation of Piping Network from IRB Office to MPSP Office.

4.0 PLANT DEVELOPMENT PROGRAM

4.1 District Cooling Plant Development Program

Bandar Perda district cooling plant is currently mapped to be developed in three phases as follows:

Phases	Description	Cumulative plant capacity	Year in service	Capital expenditure RM'000***
Phase 1	Two (2 nos) 1,000 RT centrifugal chillers	2,000RT	End-2005*	25,631
Phase 2A	Two (2 nos) 2,100 RT centrifugal chillers	6,200RT	2008	44,796
Phase 2B	Two (2 nos) 1,500 RT dual evaporator chillers with 24,000 ton-hours of ice thermal storage	11,600RT	2009**	
Phase 3	Two (2 nos) 1,500 RT dual evaporator chillers with 24,000 ton-hours of ice thermal storage	17,000RT	2011**	23,968

** Completed phase.*
*** Actual implementation of the phasing depends on the physical development in Bandar Perda.*
**** Capital expenditure for Phase 2 & 3 are based on estimates provided by TES Avenue Sdn Bhd.*

4.2 Current Contracted Capacity

(i) MPSP (partial of 1,350RT)
(ii) IRB (290RT)
(iii) De' Rendezvous (partial of 750RT)
(iv) Police HQ (325 RT)

4.3 New Development In Bandar Perda

	Completion	Required RT
• Mega Mall	2008	5,600
• Hospital	2008	800
• Stage 2 (Future building)	2008^	1,500
• Stage 2 (New Building-1)	2009^	2,000
• Stage 3 (New Building-2)	2010^	2,500
• Stage 3 (New Building-3)	2011^	2,000
• Stage 3 (New Building-4)	2012^	2,500
• Stage 3 (New Building-5)	2012^	2,500

^ Depending on the actual development in Bandar Perda by Aseania Development Sdn Bhd

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4.4 *Future Capital Expenditure Budget*

4.4.1 Phase 2

(a) Phase 2A

Item	Description	Size	Quantity	Estimates RM
1	**Glycol Chillers -TR**	-	-	-
	Centrifugal Chillers-RT	2,100	2	5,040
2	**Ice Coils - TrH**	-	-	-
3	**Cooling Towers-75 HP**		4	680
4	**Pumps**			500
5	**Control System**			1,200
6	**Mechanical Services Installation**			
a	Piping installation including piping , Chilled water piping, condenser water piping, valves etc.			2,300
b	i)To hoist & move chillers,pumps, cooling towers into position and piping connection ii) including piping connection. iii) Plant ventilation duct installtion iv) Cleaning & flushing of piping v)Testing & Commissioning			750
c	Ice Tank Insulation works			-
7	**Glycol Solution**			-
8	**External Underground Piping Installation**			
a	Underground piping works			1,950
b	Piling & concrete support			350
d	Other works			50
e	Replace 300mm dia. Pipe ~ 300m			1,700
9	**Electrical Services Installation**			
	VCB, Transformers, MSB, cabling etc			2,120
	Motor Control Board			480
	Electrical Cabling works For Mech. Installation			200
10	**Ice Tank Construction**			
a	Piling			806
b	Ice Tank Construction			-
c	Provisional Sum For Roof			-
11	**Provisional Sum For**			
a	Piping To Hospital			335
b	Fiber Optic Control Cable Manholes			140
				18,601
12	**Contribution Charges To TNB**			200
13	**Consultant Fees**			720
				19,521

(b) Phase 2B

Item	Description	Size	Quantity	Estimates RM'000
1	**Glycol Chillers -TR**	1,500	2	8,700
	Centrifugal Chillers-RT			
2	**Ice Coils - TrH**	24,000		3,421
3	**Cooling Towers-75 HP**			519
4	**Pumps**			500
5	**Control System**			1,200
6	**Mechanical Services Installation**			
a	Piping installation including piping , Chilled water piping, condenser water piping, valves etc.			
b	i)To hoist & move chillers,pumps, cooling towers into position and piping connection ii) including piping connection. iii) Plant ventilation duct installtion iv) Cleaning & flushing of piping v)Testing & Commissioning			
c	Ice Tank Insulation works			3,900
7	**Glycol Solution**			500
8	**External Underground Piping Installation**			450
a	Underground piping works			
b	Piling & concrete support			
d	Other works			
e	Replace 300mm dia. Pipe ~ 300m			
9	**Electrical Services Installation**			
	VCB, Transformers, MSB, cabling etc			2,120
	Motor Control Board			600
	Electrical Cabling works For Mech. Installation			100
10	**Ice Tank Construction**			
a	Piling			
b	Ice Tank Construction			900
c	Provisional Sum For Roof			400
				23,310
	Contingency 5%			1,165
b	Fiber Optic Control Cable Manholes			24,475
11	**Contribution Charges To TNB**			200
12	**Consultant Fees**			600
				25,275

(c) Phase 3

Item	Description	Size	Quantity	Estimates RM'000
1	**Glycol Chillers -TR**	1,500	2	8,700
	Centrifugal Chillers-RT			
2	**Ice Coils - TrH**	24,000		3,421
3	**Cooling Towers-75 HP**			519
4	**Pumps**			500
5	**Control System**			1,000
6	**Mechanical Services Installation**			
a	Piping installation including piping , Chilled water piping, condenser water piping, valves etc.			
b	i)To hoist & move chillers,pumps, cooling towers into position and piping connection ii) including piping connection. iii) Plant ventilation duct installtion iv) Cleaning & flushing of piping v)Testing & Commissioning			
c	Ice Tank Insulation works			3,500
7	**Glycol Solution**			500
8	**External Underground Piping Installation**			450
a	Underground piping works			975
b	Piling & concrete support			175
d	Other works			25
e	Replace 300mm dia. Pipe ~ 300m			
9	**Electrical Services Installation**			
	VCB, Transformers, MSB, cabling etc			1,600
	Motor Control Board			600
	Electrical Cabling works For Mech. Installation			100
10	**Ice Tank Construction**			
a	Piling			
b	Ice Tank Construction			
c	Provisional Sum For Roof			
				22,065
	Contingency 5%			1,103
b	Fiber Optic Control Cable Manholes			23,168
11	**Contribution Charges To TNB**			200
12	**Consultant Fees**			600
				23,968

4.5 Construction Schedule

The key milestones of the DCP development are below:

	Key milestones	Phase 2A	Phase 2B	Phase 3
1	Ice tank tender & construction	N.A.		
2	M&E Installation tender & installation			
3	Procurement (chillers, cooling towers, pumps, ice coils)			
4	Control & Instrumentation			
5	Testing & Commissioning			

5.0 COMMERCIAL ARRANGEMENT FOR ADDITIONAL SUPPLY OF CHILLED WATER

5.1 Chilled Water Tariff

Below are the chilled water tariffs applicable for the new development and existing customers

Terms discussed between Aseania Dev. & AEON (as informed by Steven Ong, GM of Aseania Dev.)	**Other Existing Customers and New Customers Chilled Water Supply Terms**
✓ Chilled water rate: RM0.40/ton-hour ✓ No adjustments ✓ Adjustment for utility tariff increase with modification for PBA rates ✓ Penalty when chilled water temperature reaches 12.1 deg.C for 1-hour: RM25,000/hr	✓ Chilled water rate: RM0.548/ton-hour ✓ Adjustment every 3-year (5%) ✓ Adjustment when utility tariff increases ✓ Penalty for failure to supply not quantified

The chilled water supply for the Aseania Mall is to be entered into in a back-to-back arrangement between Aseania Development and the Company and then between Aseania Development and AEON Co (M) Berhad (as the end-user).

Payment of usage of services will made direct by AEON Co (M) Berhad to the Company.

5.2 Cooperation Agreement with Aseania Development

In view of the potential differences between the negotiated terms for chilled water supply as experienced in the Asenia Mega Mall (Jusco), a cooperation agreement is being finalized to capture the basis of cooperation between the development and the Company.

The agreement captures the roles of the developer and the Company in respect of chilled water supply in Bandar Perda. A copy of the Cooperation Agreement is enclosed Appendix 2 for perusal.

Salient Terms:

i) Aseania Development is to ensure that all future buildings in Bandar Perda is designed for exclusive usage of chilled water from the district cooling plant for air-conditioning purposes;

ii) Aseania Development further undertakes that when terms of chilled water has been finalized, the relevant building has to constructed in such a manner that they are exclusively connected to the district cooling plant for chilled water supply for the purposes of air-conditioning and cooling purposes;

iii) Aseania Development is to pay the Company a sum equivalent to twenty five per cent (25%) of the Cost of Conventional Cooling System ("Contribution Sum") of all the buildings to be connected to the district cooling plant. Cost of Conventional Cooling System is set at RM2,100 per RT or such number to be mutually agreed;

iv) Payment of the Contribution Sum shall be made in tandem with development of the relevant buildings;

v) Compensation shall be payable for the delay of payment of the Contribution Sum by the Developer after the expiry of Contribution Sum Payment Schedule to be calculated at the rate of Eight and a Half Percent (8.5%) per annum based on a 365-day year on any sum unpaid up to the date of full settlement;

vi) In the event any of the negotiated chilled water supply terms deviates from the prevailing standard terms, Aseania Development undertakes to provide reasonable adjustments on the Contribution Sum for any compromise made by the Company;

vii) In addition the Contribution Sum, a connection fees calculated at RM100 per RT connected to buildings is payable by Aseania Development to the Company within fourteen (14) days from the completion of testing and commissioning of the connection of each buildings to the plant; and

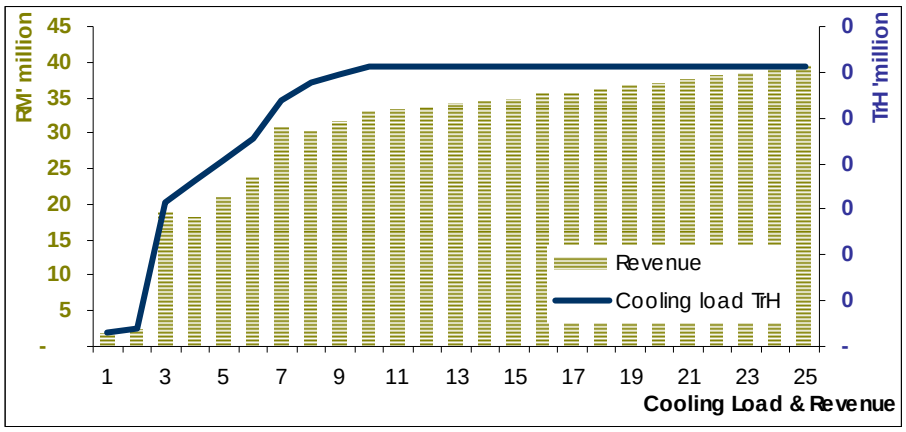
viii) Future development identified by Aseania Development Sdn Bhd for the years 2007 to 2009 are:

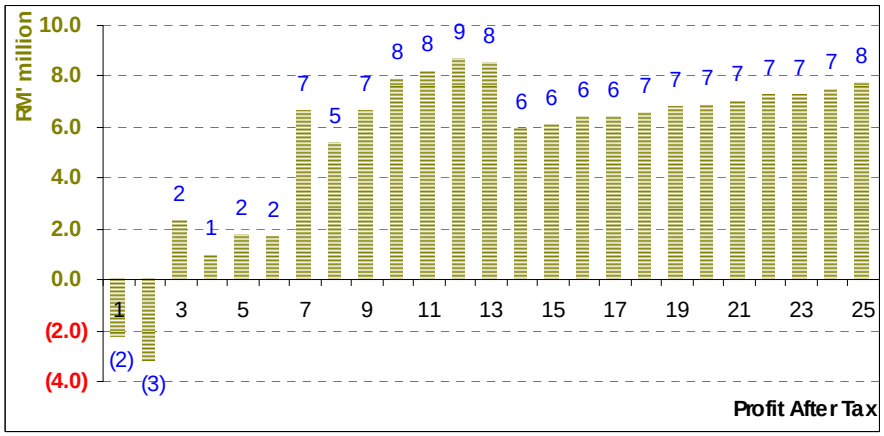
Item	Buildings	Estimated Built-up Area(ft^2)	Estimated Commencement	Estimated Completion
1	Aseania Mega Mall (Jusco)	800,000	Mar-07	Dec-07
2	Hospital	185,000	Mar-07	Jun-08
3	1 Block of 16 Storey Office	180,000	Nov-07	Nov-09
4	Bomba HQ	65,000	Jun-08	Dec-09
5	Aseania Mall (Phase 2)	350,000	Sep-08	Jun-10
	Total	**1,580,000**		

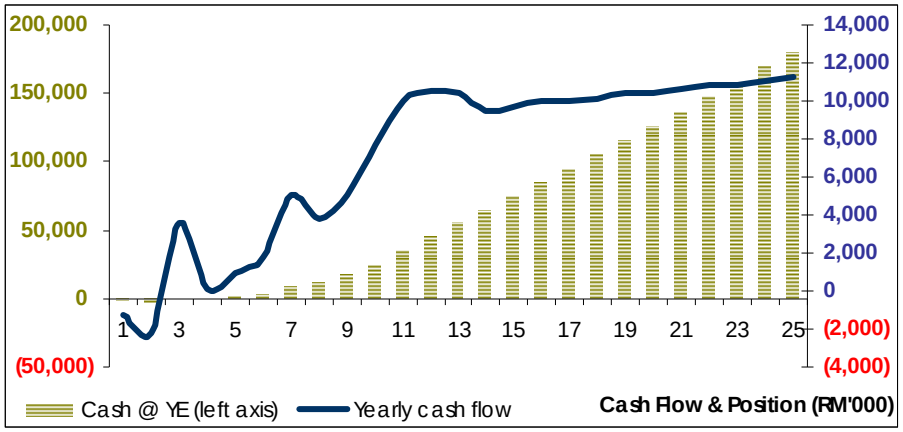
6.0 FINANCIAL PROJECTIONS

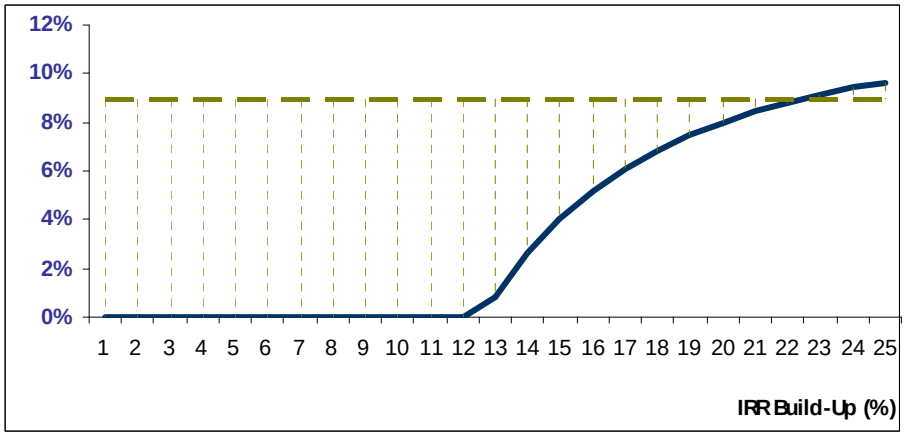
With Jusco being the one of the most successful household name for shopping mall in Malaysia, may bring positive spin off for more commercial buildings development in Bandar Perda. The following evaluations is based certain assumptions which are set out in the financial model printouts (Appendix 3).

Capital expenditure budget		RM90 million
Contribution from developer(s)		(RM10 million)
Net investment	:	RM80 million
Equity payback period (from first year of investment)	:	13.7 years
Net present value (@9% disc.rate)	:	+ve RM3.4 million
Internal rate of return	:	9.7%
Operational profit (breakeven)	:	Year 5 onwards
Average EBITDA margin	:	34%









Key Assumptions:

1. Development of the Bandar Perda requires the following cooling load by the specified timeframe

Phases	Description	Cumulative plant capacity	Year in service	Capital expenditure RM million
Phase 1	Two (2 nos) 1,000 RT centrifugal chillers	2,000RT	End-2005	26.0
Phase 2A	Two (2 nos) 2,100 RT centrifugal chillers	6,200RT	2008	40.0
Phase 2B	Two (2 nos) 1,500 RT dual evaporator chillers with 24,000 ton-hours of ice thermal storage	11,600RT	2009	
Phase 3	Two (2 nos) 1,500 RT dual evaporator chillers with 24,000 ton-hours of ice thermal storage	17,000RT	2011	24.0
				90.0

2. Financing of the DCP is based on the following structure and costs

	Phase 1	Phase 2	Phase 3	Total
	RM'000	**RM'000**	**RM'000**	**RM'000**
Equity	13,631	30,396	11,968	55,995
Borrowings	12,000	14,400	12,000	38,400
	25,631	*44,796*	*23,968*	94,395

Borrowings are based on the cost of 8.30% per annum, with repayment over 7 years after 2 years of deferment of principal repayment.

3. Chilled water tariff applicable are based on the normal tariff structure applicable at Bandar Perda (subject to normal adjustment of 5% every 3 years), except for that for Mega Mall.

4. Contribution from Aseania Development Sdn Bhd is as per the Cooperation Agreement.

5. Utility costs per ton-hour of chilled water produced is assumed to be RM0.25/ton-hour and RM0.016/ton-hour for electricity and water respectively. No tariff adjustment is factored into the projection as it is assumed that any tariff adjustment will be effectively pass-on to customers based on the prevailing chilled water agreement with existing customers.

6. Maintenance of the plant is assumed to be at 2.5% of the respective phase of district cooling plant development subject to inflation of 3.5% per annum.

Appendix 1

Schedule of currently installed equipment specifications:

1.0 **Chiller (2 in nos)**

Maker	CARRIER
Country of Manufacturer	USA
Model	19XR-8081566ELH52S
Type	Hermetic Centrifugal Liquid Chiller
Total Cooling Capacity (RT)	1000
Input Power Required (kW)	665
kW/RT	0.665
Overall Dimensions L X W X H (mm)	5455 X 1645 X 2750
Type of Anti-Vibration Mounting	Spring Isolators
Total Operating Weight (Kg)	23826

1.1 **Refrigerant Compressor (2 in nos)**

Maker	CARRIER
Country of Manufacturer	USA
Type	Hermetic Centrifugal
Model	566
Type of Refrigerant Used	134a
Total Cooling Capacity (Btu/hr)	
Suction Temperature (°C)	4.1
Condensing Temperature (°C)	37.2
Speed (Rpm)	VFD

1.2 **Compressor Motor (2 in nos)**

Maker	CARRIER
Country of Manufacturer	USA
Type	Hermetic Drive
Model	EL
Horse Power Rating	
Speed (Rpm)	VFD
Volts/Phase/Hz	400/3/50
Rated Full Load Current (Amps)	1072

1.3 **Water Cooled Condenser (2 in nos)**

Maker	CARRIER
Country of Manufacturer	USA
Type	Shell & Tube
Model	81
Total Heat Rejection Capacity,MBH	14269
No. of Tubes	1080
No. of Passes	2
Diameter of Tube (inches)	0.025
Tubing Material	Copper
Fouling Factor	0.00025
Water Flowrate (gpm)	3000
Water Entering Temperature (°F)	88
Water Leaving Temperature (°F)	97.5
Pressure Drop (ft water)	13.8

1.4 **Water Cooler (2 in nos)**

Maker	CARRIER
Country of Manufacturer	USA
Type	Shell & Tube
Model	80
No. of Tubes	829
No. of Passes	2
Diameter of Tube (inches)	0.025
Tubing Material	Copper
Fouling Factor	0.0001
Water Flowrate (gpm)	1711.2
Water Entering Temperature (°F)	54
Water Leaving Temperature (°F)	40
Pressure Drop (ft water)	9.5

2.0 **Distribution Pump (2 in nos)**

Maker	Bell & Gossett
Country of Manufacture	UK
Local Agent	Water-Line System Sdn Bhd
Type	VSCS
Model	10 x 12 x 17L
Casing Material	Cast Iron
Impeller Material	Bronze
Shaft Material	Stainless Steel
Mechanical Seal Yes/No	Yes
Impeller Diameter (inches)	17.13
Capacity (usgpm)	3000
Total Head (ft water)	200
Pump Speed (Rpm)	1450
Pump Efficiency (%)	85
Pump BHP at specified conditions	171.93
Casing Design Pressure (psi)	175

Pump Motor (2 in nos)

Maker	Brook Crompton
Country of Manufacturer	UK
Local Agent	Water-Line System Sdn Bhd
Type/Model	Squirrel Cage Induction
Name Plate HP	250
Rated Speed (Rpm)	1450
Volts/Phase/Hz	415/3/50
Rated Full Load Current (Amp)	311
Enclosure/Protection	TEFC / IP 55
Class of Insulation	F
Power Factor at Specified Conditions	NA
Efficiency at Specified Conditions	85
Type of anti-vibration mounting	Spring Isolators
Operating Weight (Kg)	NA
Dimensions L X W X H (mm)	NA

3.0 **Chilled Water Pump (2 in nos)**

Maker	Bell & Gossett
Country of Manufacture	UK
Local Agent	Water-Line System Sdn Bhd
Type	VSCS
Model	8 x 10 x 11.75L
Casing Material	Cast Iron
Impeller Material	Bronze
Shaft Material	Stainless Steel
Mechanical Seal Yes/No	Yes
Impeller Diameter	10.875
Capacity (usgpm)	1714
Total Head (ft water)	62
Pump Speed (Rpm)	1450
Pump Efficiency (%)	82
Pump BHP at specified conditions	33.24
Casing Design Pressure (psi)	175

Pump Motor (2 in nos)

Maker	Brook Crompton
Country of Manufacturer	UK
Local Agent	Water-Line System Sdn Bhd
Type/Model	Squirrel Cage Induction
Name Plate HP	40
Rated Speed (Rpm)	1450
Volts/Phase/Hz	415/3/50
Rated Full Load Current (Amp)	52
Enclosure/Protection	TEFC / IP 55
Class of Insulation	F
Power Factor at Specified Conditions	NA
Efficiency at Specified Conditions	82
Type of anti-vibration mounting	Spring Isolators
Operating Weight (Kg)	NA
Dimensions L X W X H (mm)	NA

4.0 **Condenser Water Pump (2 in nos)**

Maker	Bell & Gossett
Country of Manufacture	UK
Local Agent	Water-Line System Sdn Bhd
Type	VSCS
Model	10 x 12 x 13L
Casing Material	Cast Iron
Impeller Material	Bronze
Shaft Material	Stainless Steel
Mechanical Seal Yes/No	Yes
Impeller Diameter	12.625
Capacity (usgpm)	3000
Total Head (ft water)	90
Pump Speed (Rpm)	1450
Pump Efficiency (%)	85
Pump BHP at specified conditions	81.58
Casing Design Pressure (psi)	175

Pump Motor (2 in nos)

Maker	Brook Crompton
Country of Manufacturer	UK
Local Agent	Water-Line System Sdn Bhd
Type/Model	Squirrel Cage Induction
Name Plate HP	100
Rated Speed (Rpm)	1450
Volts/Phase/Hz	415/3/50
Rated Full Load Current (Amp)	127
Enclosure/Protection	TEFC / IP 55
Class of Insulation	F
Power Factor at Specified Conditions	NA
Efficiency at Specified Conditions	85
Type of anti-vibration mounting	Spring Isolators
Operating Weight (Kg)	NA
Dimensions L X W X H (mm)	NA

5.0 **Water Filtration Pump (1 in no)**

Maker	GRUNDFOS
Country of Manufacture	UK
Local Agent	
Type	Centrifugal
Model	E 125 x 100 x 260
Casing Material	Cast Iron
Impeller Material	Bronze
Shaft Material	Stainless Steel
Mechanical Seal Yes/No	Yes
Impeller Diameter	243 mm
Flow Rate (gpm)	136.4 m^3/hr
Total Head (ft water)	18 m
Pump Speed (Rpm)	1457
Pump Efficiency (%)	88.9
Pump BHP at specified conditions	

Pump Motor (1 in no)

Maker	Western Electric
Country of Manufacturer	UK
Local Agent	
Type/Model	3 Ph Induction Motor
Name Plate HP	11 Kw
Rated Speed (Rpm)	1456
Volts/Phase/Hz	415/3/50
Rated Full Load Current (Amp)	20.7
Stator Temperature Cut Out Protection Yes/No	
Class of Insulation	F
Power Factor at Specified Conditions	0.84
Efficiency at Specified Conditions	88.9
Type of anti-vibration mounting	Rubber Mounting
Operating Weight (Kg)	
Dimensions L X W X H (mm)	

6.0 **Condenser Water Filtration Pump (1 in no)**

Maker	GRUNDFOS
Country of Manufacture	UK
Local Agent	
Type	Centrifugal
Model	E 150 x 125 x 260
Casing Material	Cast Iron
Impeller Material	Bronze
Shaft Material	Stainless Steel
Mechanical Seal Yes/No	Yes
Impeller Diameter	255 mm
Flow Rate (gpm)	218.2 m^3/hr
Total Head (ft water)	18.3
Pump Speed (Rpm)	1450
Pump Efficiency (%)	90.1
Pump BHP at specified conditions	

Pump Motor (1 in no)

Maker	Western Electric
Country of Manufacturer	UK
Local Agent	
Type/Model	3 Ph Induction Motor
Name Plate HP	15 Kw
Rated Speed (Rpm)	1457
Volts/Phase/Hz	415/3/50
Rated Full Load Current (Amp)	27.6
Stator Temperature Cut Out Protection Yes/No	
Class of Insulation	F
Power Factor at Specified Conditions	0.83
Efficiency at Specified Conditions	90.1
Type of anti-vibration mounting	Rubber Mounting
Operating Weight (Kg)	
Dimensions L X W X H (mm)	

7.0 **Cooling Tower (2 in nos)**

Maker	BAC Baltimore Aircoil
Country of Manufacturer	Malaysia
Type	Gross Flow
Model	331055
Heat Rejection Capacity (Btu/hr)	
Water Flowrate (gpm)	3000
Water Temperature In (°F)	97.5
Water Temperature Out (°F)	88
Fan Type	Axial
Number of Fans	1 (each)
Fan Diameters (inches)	156
Fan Speed (Rpm)	
Fan BHP	
Fan Capacity (Cfm)	290,050
Fan Motor Maker	TECO
Fan Motor HP	75
Fan Motor Efficiency %	
Housing Material	Fiber FRP

	Infill Material	PVC
	Basin Material	Galvanized Epoxy Coating
	Fan Blade Material	Fiber Glass and Mild Steel
	Drift Loss (gpm)	
	Evaporation Loss (gpm)	
	Type of Water Treatment	
	Type of Anti-Vibration Mounting	
	Operating Weight (Kg)	44,600
	Dimension L X W X H (inches)	13' - 11 1/8" X 24 - ' 0 1/2" X 19' - 0 3/8"

8.0 **Heat Exchanger MPSP (02 in nos)**

Required Coling Capacity (RT)	1350
Designed Pressure (bar)	10
Heat Exchanged (Btu/h)	16,269,434
Plate Type	NT150LHV
Total Heat Transfer Area (ft²)	4925.13
Number of Plates / Frames	281
Plate Thickness (In)	0.02
Surface Margin (%)	7
Plate Material	AISI316
Gasket Material / Type	NBR / Glueless
Internal Flow (passes x channels)	1 x 140
Overall Dimensions L x W x H (mm)	2696 x 640 x 2137
Operating Weight (kg)	2804
Main Pipe Size (mm)	200
Secondary Temperature In (°F)	54
Secondary Temperature Out (°F)	44
Calculated Secondary Flow (gpm)	3240
Pressure Drop (psi)	11.17
Working Pressure Inlet (psig)	72.5
Mass Flow (lb/h)	1,621,850
Volume Flow (US gpm)	3240
Primary Temperature In (°F)	38
Primary Temperature Out (°F)	52
Calculated Primary Flow (gpm)	2314.3
Pressure Drop (psi)	5.94
Working Pressure Inlet (psig)	72.5
Mass Flow (lb/h)	1,158,482
Volume Flow (US gpm)	2314

8.1 **Heat Exchanger LHDN (01 in no)**

Required Coling Capacity (RT)	270
Designed Pressure (bar)	10
Heat Exchanged (Btu/h)	3,248,606
Plate Type	NT150LHV
Total Heat Transfer Area (ft²)	856.16
Number of Plates / Frames	99
Plate Thickness (In)	0.02
Surface Margin (%)	7
Plate Material	AISI304
Gasket Material / Type	NBR / Glueless
Internal Flow (passes x channels)	1 x 49
Overall Dimensions L x W x H (mm)	1496 x 640 x 2137
Operating Weight (kg)	1549

Main Pipe Size (mm)	100
Secondary Temperature In (°F)	54
Secondary Temperature Out (°F)	44
Calculated Secondary Flow (gpm)	648
Pressure Drop (psi)	10.73
Working Pressure Inlet (psig)	72.5
Mass Flow (lb/h)	324,370
Volume Flow (US gpm)	648
Primary Temperature In (°F)	38
Primary Temperature Out (°F)	52
Calculated Primary Flow (gpm)	462.9
Pressure Drop (psi)	6
Working Pressure Inlet (psig)	72.5
Mass Flow (lb/h)	231,296
Volume Flow (US gpm)	462

8.2 **Heat Exchanger Rendezvous (01 in no)**

Required Coling Capacity (RT)	750
Designed Pressure (bar)	10
Heat Exchanged (Btu/h)	9,029,115
Plate Type	NT150LHV
Total Heat Transfer Area (ft²)	2762.66
Number of Plates / Frames	315
Plate Thickness (In)	0.02
Surface Margin (%)	7
Plate Material	AISI304
Gasket Material / Type	NBR / Glueless
Internal Flow (passes x channels)	1 x 157
Overall Dimensions L x W x H (mm)	2996 x 640 x 2940
Operating Weight (kg)	3039
Main Pipe Size (mm)	150
Secondary Temperature In (°F)	54
Secondary Temperature Out (°F)	44
Calculated Secondary Flow (gpm)	1800
Pressure Drop (psi)	11.02
Working Pressure Inlet (psig)	72.5
Mass Flow (lb/h)	901,028
Volume Flow (US gpm)	1800
Primary Temperature In (°F)	38
Primary Temperature Out (°F)	52
Calculated Primary Flow (gpm)	1285.7
Pressure Drop (psi)	5.94
Working Pressure Inlet (psig)	72.5
Mass Flow (lb/h)	643,323
Volume Flow (US gpm)	1285

8.2 **Heat Exchanger Police Station (01 in no)**

Required Coling Capacity (RT)	325
Designed Pressure (bar)	10
Heat Exchanged (Btu/h)	2,916,018
Plate Type	NT150LHV
Total Heat Transfer Area (ft²)	767.9
Number of Plates / Frames	89
Plate Thickness (In)	0.02

Surface Margin (%)	7
Plate Material	AISI304
Gasket Material / Type	NBR / Glueless
Internal Flow (passes x channels)	1 x 44
Overall Dimensions L x W x H (mm)	1796 x 640 x 2087
Operating Weight (kg)	1693
Main Pipe Size (mm)	150
Secondary Temperature In (°F)	54
Secondary Temperature Out (°F)	44
Calculated Secondary Flow (gpm)	780
Pressure Drop (psi)	12.61
Working Pressure Inlet (psig)	72.5
Mass Flow (lb/h)	390,445
Volume Flow (US gpm)	780
Primary Temperature In (°F)	38
Primary Temperature Out (°F)	52
Calculated Primary Flow (gpm)	557.1
Pressure Drop (psi)	7
Working Pressure Inlet (psig)	72.5
Mass Flow (lb/h)	278,857
Volume Flow (US gpm)	557

> Ice coils & Make-up Water Tank location


> Chiller No. 1

> Chiller No. 2

> Cooling towers

> Distribution Pumps

> Water filtration pump