52ST.305

PNG POWER Ltd

TENDER FORM

The Chairman – Tender Opening Committee
PNG Power Ltd
P. O. Box 1105
BOROKO 111 NCD
Papua New Guinea
Phone: (675) 324 3381
Fax: (675) 3250791
Email: supplyhelpdesk@pngpower.com.pg

We (full name of company).....

.....

.....

.....

hereby tender for the undermentioned goods and services subject to the conditions of tendering and at the prices quoted in the scheduled therein

TENDER No. 21/2019

CLOSING AT 4.00 PM FRIDAY 24th MAY 2019

FOR

FOR CONSTRUCTION OF 22KV HIGH VOLTAGE LINE FROM GALOMARUPU TO HULA VILLAGE, COVERING 22 KILOMETRES – CENTRAL PROVINCE.

PNG POWER Ltd

CONSTRUCTION SCOPE OF WORKS FOR GALOMARUPU TO HULA DISTRIBUTION LINE EXTENSION

THIS PROJECT IS FUNDED BY THE NEW ZEALAND GOVERNMENT UNDER THE MINISTRY OF FOREIGN AFFAIRS AND TRADE (NZ MFAT)

(THIS DOCUMENT IS VALID FOR RURAL ON GRID EXTENSON PROJECTS IN CENTRAL PROVINCE ONLY)

RURAL ON GRID EXTENSION PROGRAM (ROGEP)
PNG POWER LIMITED

PROJECT TITLE:

GALOMARUPU TO HULA DISTRIBUTION LINE EXTENSION

CAPEX NUMBER:
CAP80377

NOTE

IT IS A STRICT REQUIRMENT THAT THE CONTRACTOR MUST BE FAMILIAR AND WELL VERSED WITH ALL THE CONTSTRUCTION TYPES USED BY PNG POWER LIMITED IN DOING ALL THE DISTRIBUTION LINE CONSTRUCTIONS USING 11KV AND 22KV.

Table of Contents

1.0 INTRODUCTION

An experienced and qualified contractor is hereby requested to submit tender bidding documents and express its interest to be awarded the construction contract for the scope of works contained in this document.

The works involve the construction of distribution line extension from Galomarupu to Hula, a 22 kilometer section along the Magi Highway in Central province. The primary aim of this work is to provide power to households, schools , aid posts and health centers in the Rigo area.

Construction work consists of 22kV high voltage extension, covering 22km and installation of 10 (ten) distribution transformers at specified locations.

This project is a donor project, funded by the New Zealand Government's Ministry of Foreign Affairs and Trade (MFAT) and coordinated by Rural On Grid Extension Program (ROGEP) section within PNG POWER Limited.

ROGEP team has prepared this scope of works to be implemented by the contractor. All correspondences regarding this project and scope shall be directed to ROGEP Team.

Details of various standard construction types used by PPL shall not accompany this scope as these were incorporated into the standard construction design. As such, the contractor is required to read and understand the design drawings attached. All the design specifications and necessary documentations are attached as part of this scope of works.

It is also a requirement that the contractor supply all necessary bidding documentations as specified in this scope of works in section 15.

2.0 CONTENTS OF THE SCOPE

The following documents and or information accompany this scope of works. The contractor is required to check that all these documents are attached as part of this scope of works and more so, understand them.

- Survey Profile for the line route
- Design Drawings for the line route
- Drawings and Technical Specifications
- Transformer Locations Information

3.0 SCOPE OF WORKS

Scope of service the contractor shall render to PPL are covered in this section. Tender pricing shall be determined as per the following scope details.

3.1 SITE MOBILISATION

- The contractor shall be required to mobilise its labour, tools and equipment to and from construction site (s). List of manpower and equipment to be mobilised to the site must be provided to the project manager prior to mobilisation.
- PPL shall supply materials such as poles, conductors, transformers, HV/LV cables and connection materials.
- Materials such as power poles, cables, transformers and others to be supplied by PPL shall be transported to site by the contractor from the materials storage site at PPL's Hohola storage yard.

- The contractor is required to make sure all personal are fit and healthy to work and every equipment and machinery are of proper working condition, valid and safe.
- All materials required to complete the works, including poles, conductors and transformers, shall be issued to the contractor by PPL.

3.2 SURVEY/DUMMPY PEGG IDENTIFICATION

- The contractor shall ensure that all the survey/dumpy pegs installed by the survey works along the surveyed line route are identified.
- The survey drawings shall be used to identify the locations.
- The contractor shall locate the survey pegs and check the design drawings to confirm heights and sizes of poles.

3.3 LINE CLEARANCE

The contractor will be required to ensure that the line route is properly cleared for the power lines to run through. This could be achieved by:

- Engaging local casual labours to carry out clearance work.
- Hire of chain saws and other tools to cut trees and bushes which are deemed as possible obstruction to the proposed or planned power line route.

No line clearance shall be undertaken without obtaining prior understanding and agreement from the relevant community via its leaders such as council or council president (see Section 8.0). The Contractor must advise the Project Team Leader immediately should any required agreement for line clearance fail or delay.

3.4 POLE MOVEMENT

Power poles shall be transported from the PNG Power materials storage yard at Hohola. The contractor shall be responsible for transportation of these poles from Hohola (PPL storage area) to the project site. It is deemed the responsibility of the contractor to arrange for equipment such as cranes, forklifts and trucks for pole movement within PPL yard and Pole installation sites.

Safety of both equipment and personal are important and the contractor is required to employ proper safe working practices to ensure all the poles are moved safely.

3.5 POLE HOLE DIGGING

The contractor shall dig up appropriate pole holes as per the requirements stated below:

- For 9 meter poles, hole depths should be 1.5 meters deep.
- For 10 meter poles, hole depts. Should be 1.6 meters deep.
- For 11 meter poles, hole depts. Should be 1.7 meters deep.
- For 12 meter poles, hole depth should be 1.8 meters deep.
- For 14 meter poles, hole depth should be 2 meters deep.

3.6 POLE ERECTION

The contractor shall be required to erect the poles as straight as possible and must ensure that correct poles are positioned in their respective locations. A total of 156 Universal columns steel poles will be constructed and installed. The contractor must make sure that;

- Poles are carefully lifted and placed into position.
- Poles are lifted using crane truck.
- Poles are appropriately numbered if not done by PPL.

3.7 STAY & BOLARD POLES ERECTION

The contractor shall erect and install all stay poles as well as bollard poles as per the design drawing. The contractor must ensure that all stay poles and bollard poles are correctly erected and installed.

3.8 STAY WIRE ATTACHING

The contractor shall carry out all stay wire fixtures and installation as per the design drawing. The contractor must understand that it is a standard requirement that all guy insulators to be affixed onto the stay wire. Lengths shall be specified by the Project Team Leader.

3.9 HV CONDUCTOR STRINGING

The contractor shall perform the duties of cable stringing. As such, the contractor must be able to string the conductor appropriately using cables cradles, pulleys, rollers, and other pulling devises where applicable. The contractor must note that;

- Cherry conductor (6/4.75 + 7/1.6) shall be used for this project for HV line.
- Cable rollers must be placed on each cross arms to ensure smooth pulling of the conductors.

3.10 HV LINE TENSION & SAGGING

The contractor shall tension the conductor to achieve the desired sag after the conductor has been run through and left hanging for some time.

3.11 HV TYING & ARMOURING

The contractor shall do proper tying and armouring to ensure that conductor is fully protected at where the HV pin insulators are.

3.12 HV BRIDGING & TERMINATIONS

The contractor shall ensure that all the bridging and terminations are neatly done. There shall be no stray end. Curves should be as smooth as possible.

3.13 LV CONDUCTOR STRINGING

The contractor engaged shall also run the low voltage underhung conductor as per the design drawing. The LV length of cable run will be based on the design drawing as well and very much be based on the number of houses, buildings and other communal set ups.

The low Voltage (LV) conductor shall be Aluminium Conductor Steel Reinforced (ACSR) Apple (6/3 + 1/3).

3.14 LV LINE TENSION & SAGGING

The contractor shall tension the low voltage conductor to suit the required sag. This will be done after the conductor has been run through the rollers and left hanging for some time.

3.15 LV TYING & ARMOURING

The contractor should do a good tying and armouring to ensure that conductor is fully protected at where the LV pin insulators are.

3.16 LV BRIDGING & TERMINATIONS

The contractor will ensure that all the bridging and terminations are neatly done. There should be no stray end and that curves are required to be as smooth as possible.

3.17 TRANSFORMERS INSTALLATION

The contractor shall also be involved in installation of eight (8) 22kV/240 V distribution transformers with various sizes along this line route. All of these transformers will be pole mounted. These transformers shall be installed at locations specified and mapped out in the project plan. Contractor is required to be sure to install correct size and phase as required.

3.18 EARTHING AND MEN

The contractor shall ensure that the following are correctly done:

- Multiple Earth Neutral (MEN) earthing points shall be done every poles specified by the project engineer or the team leader.
- Resistance check on HV earthing points.
- Resistance check on LV earthing points.
- Earth resistance readings for MEN and transformer should be recorded.

3.19 INSPECTION & COMPLIANCE

The contractor will make sure physical inspection is carried out on all installation works to make sure that construction complies with PPL standards. The contractor is required to arrange with the Project Team Leader and have the PPL Test and Standards team carry out final checks and inspections.

3.20 TEST AND ENERGISE

The contractor and PPL project team leader will coordinate with Port Moresby system controllers that the line would be energised so that the system is being closely monitored in case any fault be generated to trip the respective feeder.

3.21 COMMISSION

Upon successful test and energise, the line and the transformers would be commissioned. The following is part of the works the contractor shall do;

- All as built drawings properly compiled and submitted to PPL;
- All defects must be noted and arranged for repair.

A schedule shall be provided showing all earth resistance measurements, with the location of each measurement clearly and unambiguously identified.

3.22 DESIGN CHANGES

- The contractor shall advise the Project Team Leader should it find an error in the design provided or should it consider it necessary to deviate from the design shown in the drawings for any reason.
- The contractor shall obey the instructions of the Project Team Leader in respect of any changes to the specified design.

4.0 EQUIPMENT

All necessary tools and equipment required for the construction work shall be supplied by the contractor. All equipment must be in proper working condition and safe.

5.0 ACCESS TO THE SITE

This construction will be along the Hiritano Highway ending Hula in the Central province. Access to the project site is along this highway and as such, materials delivery, manpower, equipment and any other machinery such as cranes can access the construction site by road.

6.0 TRANSPORT AND ACCOMMODATION

Vehicle and accommodation is the responsibility of the contractor. The contractor shall provide all vehicles and accommodation required to complete the construction and costs shall be included in the fixed price quotation.

7.0 CASUAL LABOURERS

Hiring of unskilled casual laborers is the responsibility of the contractor but it is advisable to engage locals comprising of both man and woman as casual laborers and should be factored in the contract price. Preference will be given to bidders that propose to engage casual laborers from villages along the proposed power line route. Bidders shall indicate in their bids the number of person-days that they propose to engage local laborers during the course of the contract and also the percentage of these person-days that will be available to females.

Contractors shall liaise with Councilors/Community Leaders/Land Chiefs before engaging local laborers to avoid conflict between locals due to tribal boundaries.

8.0 AWARENESS/PUBLIC RELATIONS

The council presidents for the concerned areas have been engaged by PNG Power Limited to carry out awareness on the project's implementation and also importance of this project to the people and community along this section. Names and contact details will be provided by PPL on award of contract.

9.0 COMPLIANCE TO STANDARDS

The contractor shall comply with PPL's standards and other relevant standards used by PPL in executing all scope of works. The contractor is required to understand PPL's standards used in construction of such projects or works.

10.0 SAFETY STANDARDS

Safety of all construction personal, pedestrian, bystanders, people and community livestock are important. The contractor is required to be proactive and demonstrate due diligence and care in working in these areas. As such, before any construction works begin, the contractor will;

- Carry out Job Safety Analysis (JSA) for all jobs undertaken.
- Carry out Risk Assessment (RA) for the job.

The contractor is required to prepare risk mitigation plans including plans of emergency and evacuation if any safety risks materializes.

It is a requirement that all construction personnel doing PPL work at sites have the proper Personal Protective Equipment (PPEs) such as safety boots, hard hats, googles, glasses, harness, first aid kits etc. that are required to perform work safely. It is the responsibility of the contractor to provide all of these safety equipment.

PPL requires work to be done safely and will make sure safe work procedures are undertaken in performing its construction works.

11.0 SCHEDULE

The contractor shall submit as part of the bidding documents in MS Project, its construction schedule for this project. The following is PPL's project deadlines which the contractor can incorporate in its project schedule.

- 29th June 2019-Construction to start.
- 29th December 2019-Construction to complete.

The schedule should clearly indicate mobilisation, HV installation, LV installation, transformer installation works and LV connection works. Tasks should also include resources such as labour required with durations indicated.

12.0 PAYMENT

This will be a fixed price contract. The contract is being funded by the New Zealand Ministry of Foreign Affairs and Trade as part of the New Zealand Aid Programme and payment will be paid through the

external project account. The successful contractor will be provided with a letter from MFAT confirming this, which will be issued in place of the normal PPL purchase order.

The contractor shall be entitled to progress payments, which shall be payable as follows:

Milestone No.	Milestone Activity	Percentage of Contract Amount
1	Award of contract & Mobilisation	20%
2	98 power fabricated and installed	20%
3	Rest of the power poles installed	20%
4	All HV/LV conductors stringed ,sagged and transformers installed	15%
5	All transformers energised, Works accepted by PPL, as built drawings and earth resistance test records submitted and identified defects rectified	15%
7	After one year defect liability period	10%

Invoices shall be submitted to PPL through the Project Manager. Payment will be made within 20 working days following receipt of a valid invoice.

13.0 CONTRACT MANAGEMENT

13.1 PPL

PPL's representative for the contract will be Mr Nick Mapun, the Project Manager for ROGEP and all commercial issues shall be directed to him.

Mr Mapun will delegate day to day responsibility for the contract, including the management of the construction depot and the issue of materials to the Contractor to the Project Team Leader. The name and mobile phone number of the Project Team Leader will be provided to the contractor on award of contract.

The contractor shall comply with all reasonable instructions of the Project Team Leader in undertaking the Works.

14.2 CONTRACTOR

The contractor shall nominate a Contractor's Representative, who shall have overall responsibility for the Contract and a Field Supervisor responsible for the management of the implementation of the Works and also of the Contractor's field staff. The Field Supervisor must be able to demonstrate successful prior experience in the management of works of a similar nature.

The Contractor's Representative and the Field Supervisor may be the same person.

15.0 INFORMATION TO BE PROVIDED WITH BID

Bidders shall include the following information with their bids:

- Bid price, which must be a fixed price **inclusive of GST**;
- A profile of the bidder, demonstrating experience in construction activities similar to the Works;
- The most recent audited annual accounts of the bidder;

- Details of any contacts previously undertaken by the bidder for PPL;
- The name and contract details of the proposed Contractor's Representative;
- The name and curriculum vitae of the proposed Field Supervisor. The curriculum vitae must demonstrate the successful supervision of construction activities similar to the Works;
- The number of person-days by unskilled, casual labourers recruited from villages along the route of the line and the percentage of these person days that will be available to females;
- The construction schedule in Microsoft Project of the works indicating all tasks and durations.
- A statement confirming that the bidder has:
  - Read and understood the contents of the Scope of Works;
  - Visited the site of the Works; and
  - The technical and financial resources to complete the Works by 15 December 2017.
- Confirmation that the bid conforms fully with the requirements of this Scope of Works and associated documents or, alternative, full details on any non-conformances.

16.0 VISITS TO THE SITE OF THE WORKS

Bidders are expected to have visited the site of the Works before submitting their bids. As the Works are to be constructed along a public road there is no impediment to this. Nevertheless, bidders may contact the Project Manager if they wish to visit the site accompanied by a member of the project team. Accompanied visits will be arranged at the convenience of the Project Manager, who may require more than one bidder to be present for a single visit. Requests for accompanied visits shall be made as early as possible and no later than 8 working days prior to the bid closing date.

17.0 BID EVALUATION

The evaluation of bids shall take into account:

- The technical and financial capability and resources of the bidder;
- The bidder's previous history in undertaking similar contracts for PPL;
- The experience of the nominated Field Supervisor;
- The extent to which the bidders proposes to use locally recruited, unskilled casual labour including woman;
- The extent to which the bid complies with this Scope of Work and the assessed impact of any non-compliance;
- The contract price.

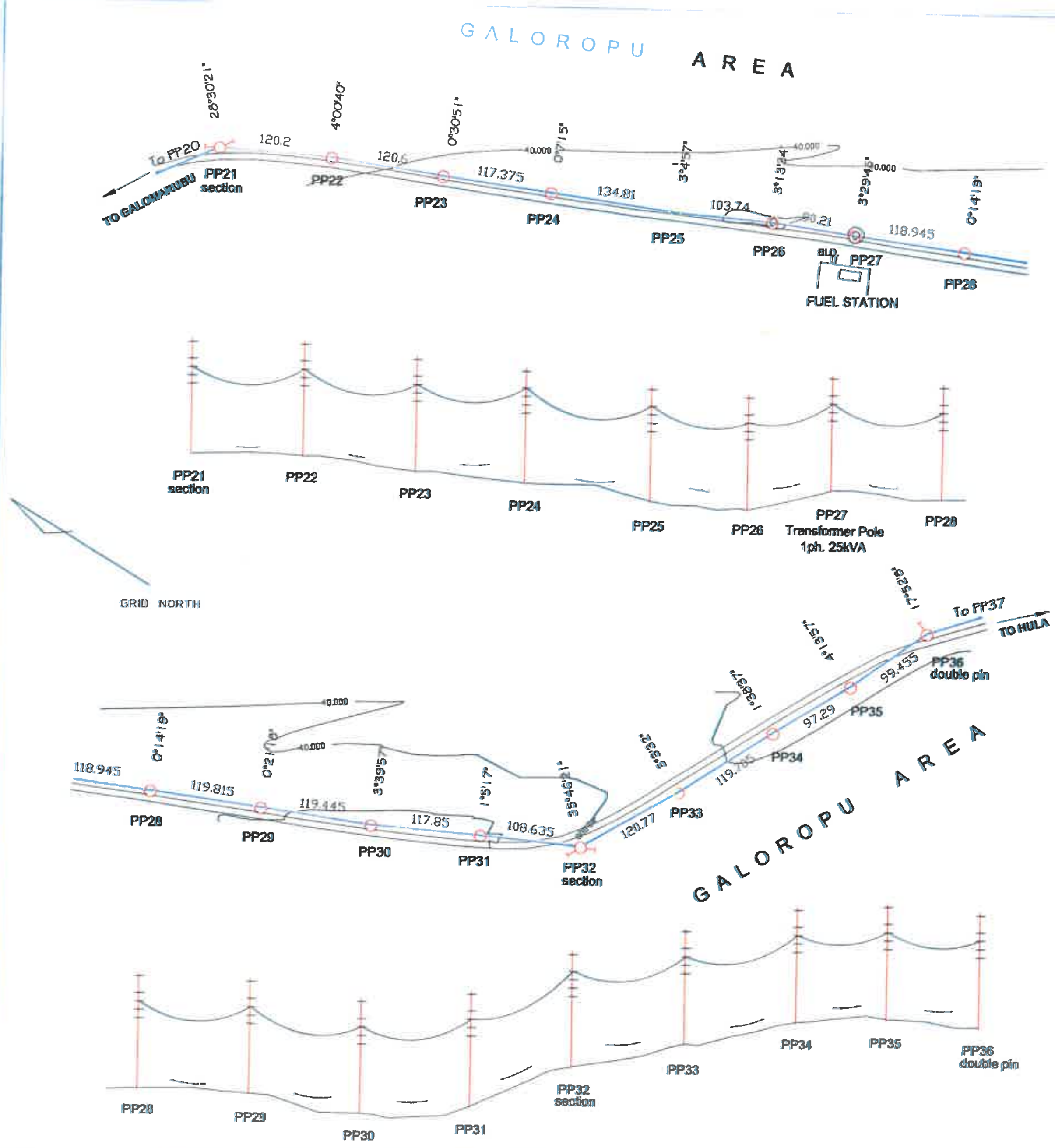
On this basis the contract will not necessarily be awarded to the lowest priced bidder. PPL reserves the right to seek clarification or further information from any bidder during the evaluation process.

18.0 SUBMISSION OF BIDS

Bids shall be submitted to the address below;

The Project Manager
Rural On Grid Extension Project
PNG Power Limited
P O Box 1105
BOROKO 411
National Capital District

Bids must be submitted no later than **4.00pm on 24th May 2019**.



NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1. COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.
2. Section poles at No's; P21, P32 & P46

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P21 – P32	117	972 (900 temp. used)	7000 (714)	6490 (662)	6000 (612)
P32 – P46	119	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
   2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.
7. LV single phase line extension from poles PP26 – PP27.
8. Install 1 x 25kVA single phase Transformer on pole PP27.

PNG POWER LIMITED APPROVED

POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY: WIRE	STAY: TYPE & SLOPE	WEIGHT SPAN(ws) (m)	WIND SPAN(ww) (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP36	X150/11	X240C4	X192.00G	1XT80	—	107.7	17°52'	5030.9					DOUBLE PIN
PP35	X150/11	X235C4	—		—	98.4	4°13'	4939.5	99.455	698	752	811	BREAST & HEEL
PP34	X150/11	X235C4	—		—	108.5	1°38'	4842.2	97.29	668	720	775	BREAST & HEEL
PP33	X150/11	X235C4	—		—	120.2	3°3'	4722.5	119.705	1011	1090	1175	BREAST & HEEL
PP32	X200/12	X238C3	X192.75G	2XL45	—	114.7	35°46'	4601.7	120.77	1029	1110	1196	SECTION
PP31	X150/11	X235C4	—		—	113.2	1°5'	4490.1	108.635	835	901	974	BREAST & HEEL
PP30	X150/11	X235C4	—		—	118.6	3°39'	4375.2	117.85	983	1060	1146	BREAST & HEEL
PP29	X150/11	X235C4	—		—	119.6	0°21'	4255.8	119.445	1009	1089	1179	BREAST & HEEL
PP28	X150/11	X235C4	—		—	119.4	0°14'	4136	119.815	1016	1095	1185	BREAST & HEEL
PP27	X150/11	X235C4	—		—	104.6	0°29'	4017	118.945	1001	1080	1168	BREAST & HEEL / 1ph. 25kVA TX POLE
PP26	X150/11	X235C4	—		—	97	3°13'	3926.9	90.21	575	621	672	BREAST & HEEL
PP25	X150/12	X235C4	—		—	119.3	3°4'	3823.1	103.74	761	821	886	BREAST & HEEL
PP24	X150/12	X235C4	—		—	126.1	0°7'	3688.3	134.81	1286	1387	1500	BREAST & HEEL
PP23	X150/11	X235C4	—		—	119	0°30'	3570.9	117.375	975	1051	1137	BREAST & HEEL
PP22	X150/11	X235C4	—		—	120.4	4°0'	3450.3	120.6	1029	1110	1201	BREAST & HEEL
PP21	X200/11	X238C3	X192.00G	2XL45	—	120.7	28°30'	3330.1	120.2	1022	1100	1193	SECTION

Drawn	John Patrick	Project	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Haau Vabua	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond Posepo	A1	
Endorsed	Unsen Ikana	Number	D - 3455
Approved	Pild Ravuwa	Revision	Sheet 3 OF 14

CAD Filename		Material:	Rev.	Revision	By	Chk'd	Date
Date Drawn:	02.05.2018	Finish:	A.	Original Issue	JRP	HV	12.06.18
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Drafting Standard:	AS 1100	Angular:					

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PNG POWER Ltd

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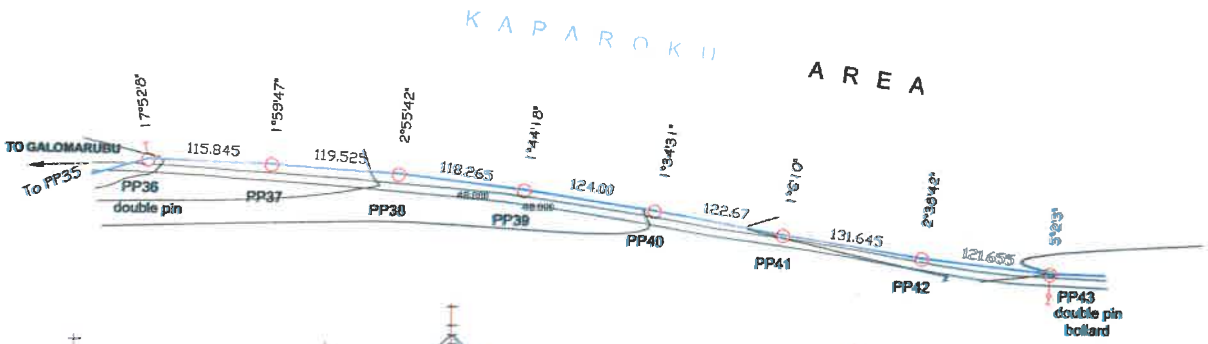

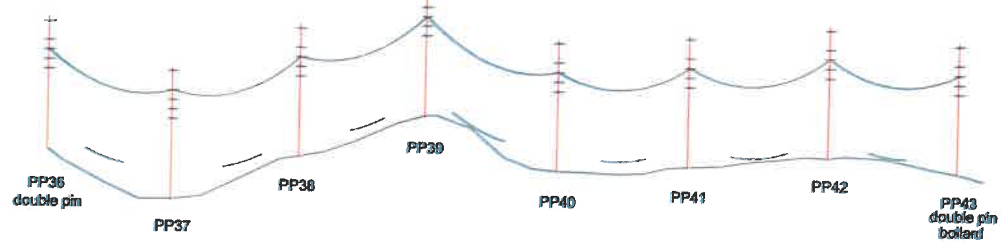

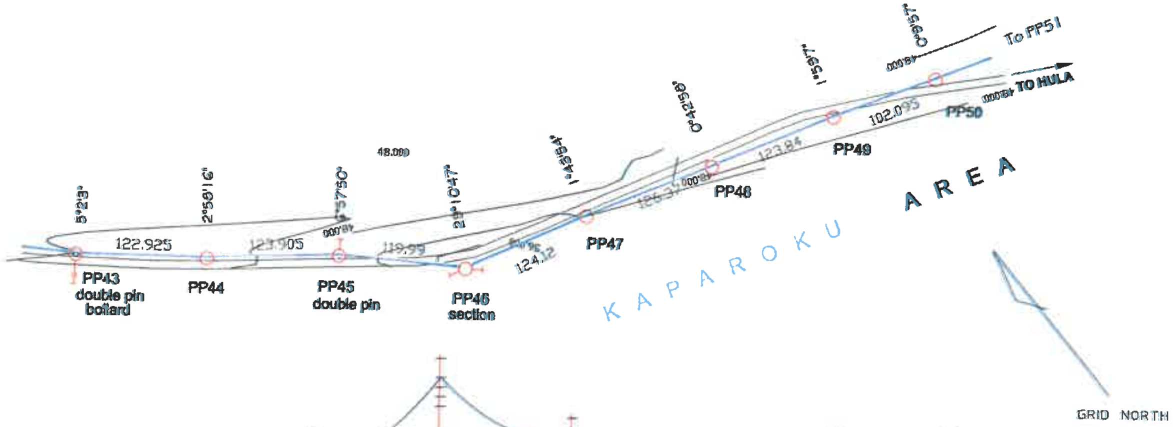

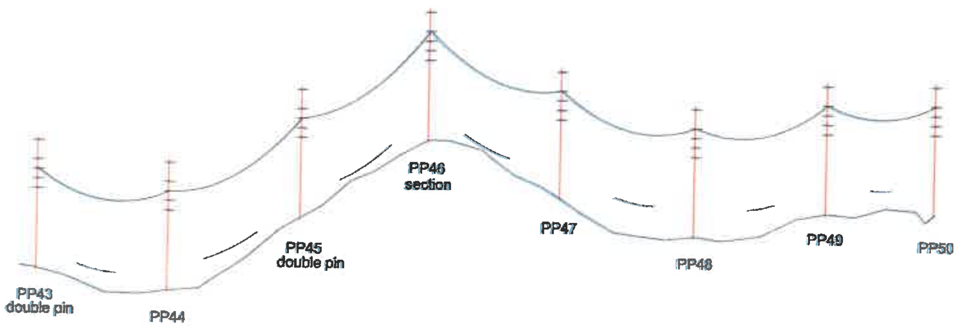

NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.
2. Section poles at No's; P46

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P32 – P46	119	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)
P46 – P50	119	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm. All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.

POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY WIRE	STAY TYPE & SLOPE	WEIGHT SPAN(m) (m)	WIND SPAN(m) (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP50	X150/12	X235C4	—		—	103.4	0°9'	6795.8					BREAST & HEEL
PP49	X150/12	X235C4	—		—	110	1°59'	6633.7	102.095	735	793	855	BREAST & HEEL
PP48	X150/12	X235C4	—		—	125.1	0°42'	6509.8	123.84	1082	1167	1258	BREAST & HEEL
PP47	X150/12	X235C4	—		—	125.2	1°43'	6383.5	126.37	1127	1215	1309	BREAST & HEEL
PP46	X200/12	X238C3	X192.75G	2X145	—	122.1	29°10'	6259.4	124.12	1087	1172	1263	SECTION
PP45	X150/11	X240C4	X192.00G	1XT80	—	121.9	6°57'	6139.4	119.99	1016	1095	1181	DOUBLE PIN
PP44	X150/11	X235C4	—			123.4	2°58'	6015.5	123.905	1083	1168	1259	BREAST & HEEL
PP43	X150/11	X240C4	X192.00H	1XT80	—	122.3	5°2'	5892.5	122.925	1066	1150	1239	DOUBLE PIN, BOLLARD
PP42	X150/11	X235C4	—			126.7	2°38'	5770.9	121.655	1044	1126	1214	BREAST & HEEL
PP41	X150/11	X235C4	—			127.2	1°6'	5639.2	131.645	1223	1318	1421	BREAST & HEEL
PP40	X150/11	X235C4	—			123.3	1°34'	5516.5	122.67	1062	1145	1234	BREAST & HEEL
PP39	X150/11	X235C4	—			121.1	1°44'	5392.5	124.0	1085	1170	1261	BREAST & HEEL
PP38	X150/11	X235C4	—			118.9	2°55'	5274.3	118.265	987	1064	1147	BREAST & HEEL
PP37	X150/12	X235C4	—			117.7	1°59'	5154.8	119.525	1008	1087	1171	BREAST & HEEL
PP36	X150/11	X240C4	X192.00G	1XT80	—	107.7	17°52'	5038.3	115.845	947	1021	1100	DOUBLE PIN

CAD Filename		Material:	
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Date Plotted:	11.05.2018	Tolerance:	
Scale:	Vert. 1 : 250 Hor. 1 : 2500	Linear:	
Drafting Standard:	AS 1100	Angular:	

DO NOT SCALE FOR WORKING DIMENSIONS

Rev.	Revision	By	Chk'd	Date
A.	Original Issue	JRP	HV	12.06.18

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Drawn	John Patrick	Project	RIGO DISTRICT CENTRAL PROVINCE
Designed	Heau Vatuei	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond Pohon	A1	
Endorsed	Urasen Bazy	Number	D - 3455
Approved	Pild Ravusiro	Revision	Sheet 4 OF 14

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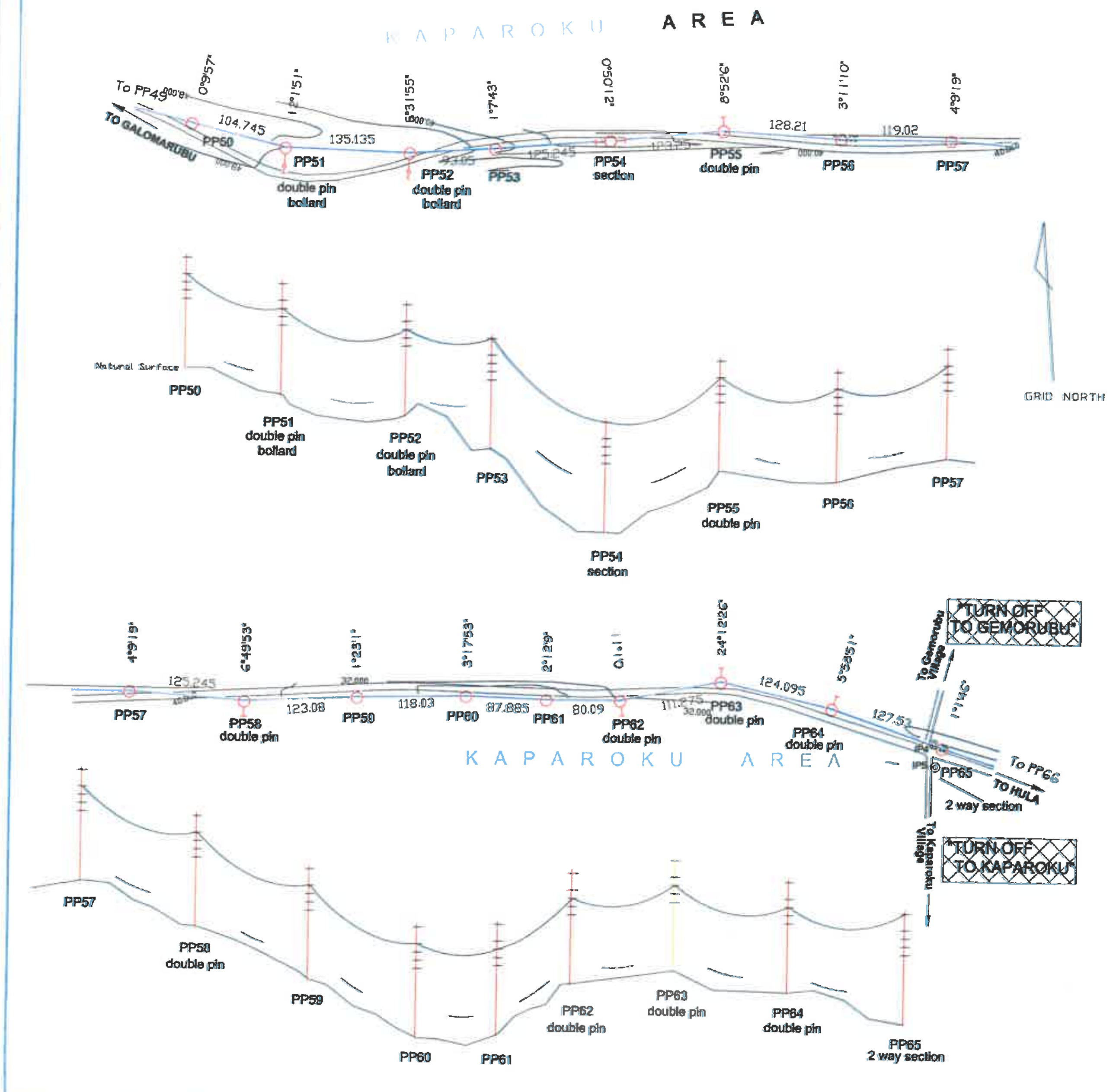


NOTES

1. Line designed for CHERRY 6/4.75-7/1.60 ACSR erected to SAG TENSION CHART SD 4/18-1, COASTAL. E.D.T. - 22% UTS, 20°C using POLE SELECTION CHART SD-5/7/2.
2. Section poles at No's; P54

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P52 - P54	119	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)
P54 - P65	118	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)

3. For details of pole construction refer to SPW-2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
   2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.

PNG POWER LIMITED APPROVED

POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY WIRE	STAY TYPE & SLOPE	WEIGHT SPAN (m)	WIND SPAN (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP65	X200/14	X237C1	X192.75G	2XL45	——	123.6	1°1'	8461.7					SECTION, 2 WAY
PP64	X150/11	X240C4	X192.00G	1XT60	——	125.9	5°58'	8334.1	127.53	1147	1237	1334	DOUBLE PIN
PP63	X150/11	X240C4	X192.00G	1XT80	——	117.7	24°12'	8210	124.095	1086	1172	1263	DOUBLE PIN
PP62	X150/11	X240C4	X192.00G	1XT80	——	95.7	11°1'	8098.3	111.275	874	942	1015	DOUBLE PIN
PP61	X150/11	X235C4	——			84	2°12'	8018.7	80.09	453	488	526	BREAST & HEEL
PP60	X150/12	X235C4	——			103	3°17'	7930.8	87.885	545	588	633	BREAST & HEEL
PP59	X150/12	X235C4	——			120.5	1°23'	7812.8	118.03	983	1060	1142	BREAST & HEEL
PP58	X150/12	X240C4	X192.00G	1XT80	——	124.2	6°49'	7689.7	123.08	1069	1152	1242	DOUBLE PIN
PP57	X150/12	X235C4	——			122.1	4°9'	7564.4	125.245	1107	1193	1286	BREAST & HEEL
PP56	X150/12	X235C4	——			123.5	3°11'	7445.4	119.02	999	1079	1162	BREAST & HEEL
PP55	X150/12	X240C4	X192.00G	1XT80	——	125.7	8°52'	7317.2	128.21	1160	1251	1349	DOUBLE PIN
PP54	X200/14	X238C3	X192.75G	2XL45	——	124.2	0°50'	7194	123.25	1072	1156	1246	SECTION
PP53	X200/14	X235C4	——			109.1	1°7'	7068.7	125.245	1107	1193	1286	BREAST & HEEL
PP52	X150/11	X240C4	X192.00G	1XT80	——	114.1	5°31'	6975.7	93.95	611	659	710	DOUBLE PIN
PP51	X150/11	X240C4	X192.00G	1XT80	——	119.9	12°1'	6840.5	135.135	1288	1389	1497	DOUBLE PIN
PP50	X150/12	X235C4	——			103.4	0°9'	6715.3	104.745	774	835	900	BREAST & HEEL

CAD Filename	
Date Drawn:	02.05.2018
Date Plotted:	11.05.2018
Scale:	Vert. 1 : 200 Hor. 1 : 2000
Drafting Standard:	AS 1100
Material:	
Finish:	
Tolerance:	
Linear:	
Angular:	

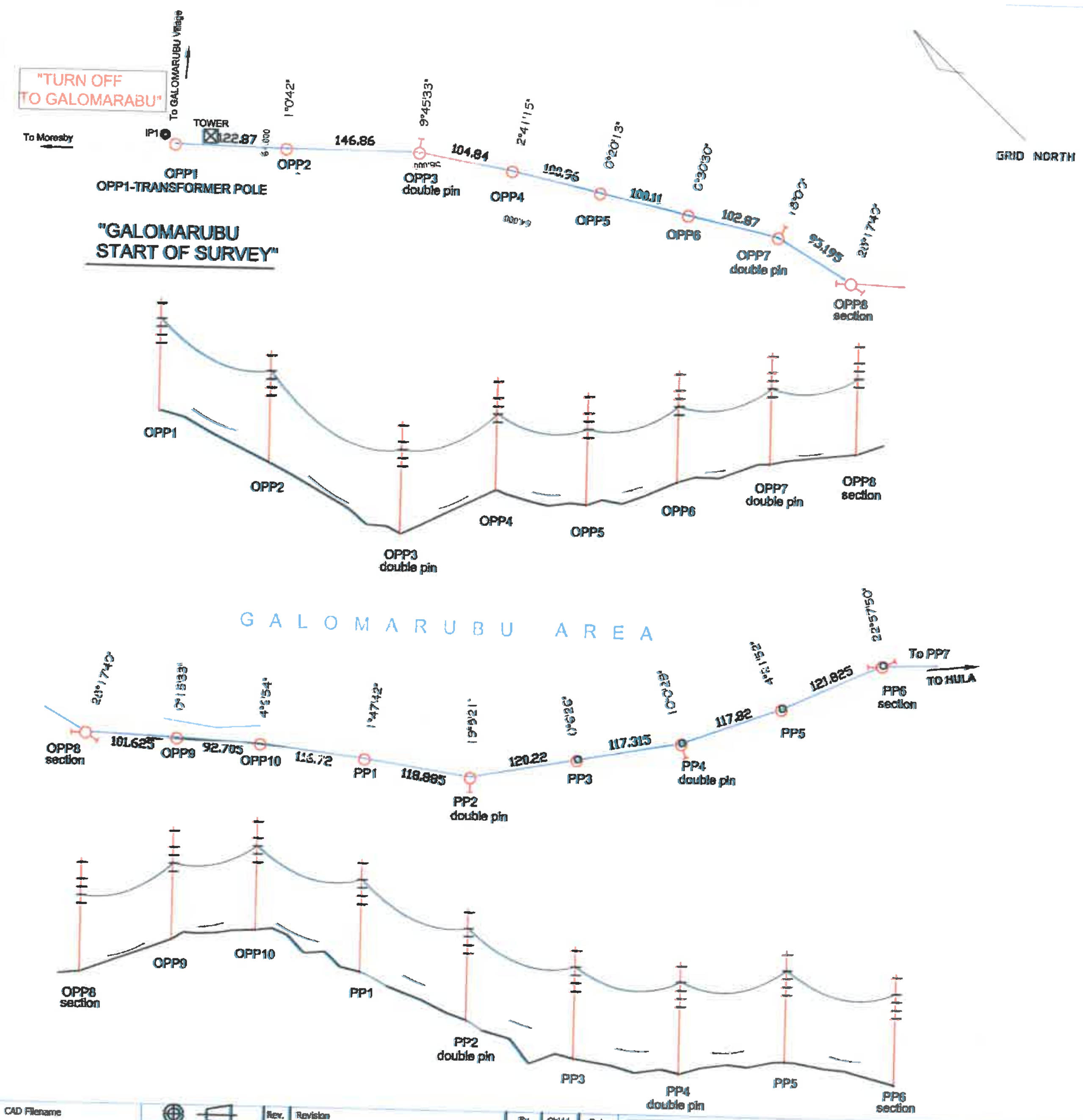
. DO NOT SCALE FOR WORKING DIMENSIONS

Rev.	Revision	By	Chk'd	Date
A	Original Issue	JRP	HV	12.06.18

PNG POWER Ltd

P.O. Box 1105 BOROKO - National Capital District, Papua New Guinea

Drawn	John Patrick	Project	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Hazu Vaburi	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond	A1	
Endorsed	Urasen	Number	D - 3455
Approved	Pild Ravu	Revision	Sheet 5 OF 14



NOTES

1. Line designed for CHERRY 6/4.75-7/1.60 ACSR erected to SAG TENSION CHART SD 4/16-1, COASTAL E.D.T. - 22% UTS, 20°C using POLE SELECTION CHART SD-5/7/2.
2. Section poles at No's; OPP1, OPP8 & P6

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
OPP1 – OPP8	115	972 (900 temp. used)	7000 (714)	6490 (662)	6000 (612)
OPP8 – PP6	115	972 (900 temp. used)	7000 (714)	6490 (662)	6000 (612)

3. For details of pole construction refer to SPW-2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.
7. LV single phase line extension from poles PP3 – PP6.

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POLE No.	POLE SIZE (m/kN)	CONST TYPE	STAY WIRE	STAY TYPE & SLOPE	WEIGHT SPAN(ad) (m)	WIND SPAN(sw) (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP6	X200/12	X238C3	X192.75G	2X1.45	—	121.4	22°57'	1680.8					SECTION
PP5	X150/12	X235C4	—	—	—	119.8	4°21'	1559	121.825	1050	1133	1225	BREAST & HEEL
PP4	X150/12	X240C4	X192.00G	1XT80	—	117.6	10°0'	1441.2	117.82	982	1058	1146	DOUBLE PIN
PP3	X150/12	X235C4	—	—	—	118.8	0°6'	1323.9	117.315	974	1050	1136	BREAST & HEEL
PP2	X150/12	X240C4	X192.00G	1XT80	—	119.6	19°6'	1203.6	120.22	1023	1103	1193	DOUBLE PIN
PP1	X150/12	X235C4	—	—	—	117.8	1°47'	1084.8	118.885	1000	1079	1167	BREAST & HEEL
OPP10	X150/11	X235C4	—	—	—	104.7	4°6'	968	116.72	964	1040	1125	BREAST & HEEL
OPP9	X150/10	X235C4	—	—	—	97.2	0°15'	875.3	92.705	608	656	709	BREAST & HEEL
OPP8	X200/10	X238C3	X192.75G	2X1.45	—	98.4	28°17'	773.7	101.625	731	788	852	SECTION
OPP7	X150/10	X240C4	X192.00G	1XT80	—	99	18°0'	678.5	95.195	641	692	748	DOUBLE PIN
OPP6	X150/10	X235C4	—	—	—	101.5	0°30'	575.6	102.87	749	808	873	BREAST & HEEL
OPP5	X150/10	X235C4	—	—	—	100.5	0°20'	475.5	100.11	709	765	827	BREAST & HEEL
OPP4	X150/10	X235C4	—	—	—	102.9	2°41'	374.6	100.56	721	778	841	BREAST & HEEL
OPP3	X150/11	X240C4	X192.00G	1XT80	—	125.9	9°45'	269.7	104.84	778	839	907	DOUBLE PIN
OPP2	X150/12	X235C4	—	—	—	134.9	1°0'	122.9	146.86	1526	1646	1780	BREAST & HEEL
OPP1	X200/12	—	—	—	—	—	—	—	122.87	1088	1152	1246	TX POLE

CAD Filename		Rev.	Revision	By	Chk'd	Date
Date Drawn: 02.05.2018	Material:	A.	Original Issue	JRP	HV	12.06.18
Date Plotted: 11.05.2018	Finish:					
Scale: Vert. 1:200 Hor. 1:2000	Tolerance:					
Drafting Standard: AS 1100	Linear:					
	Angular:					

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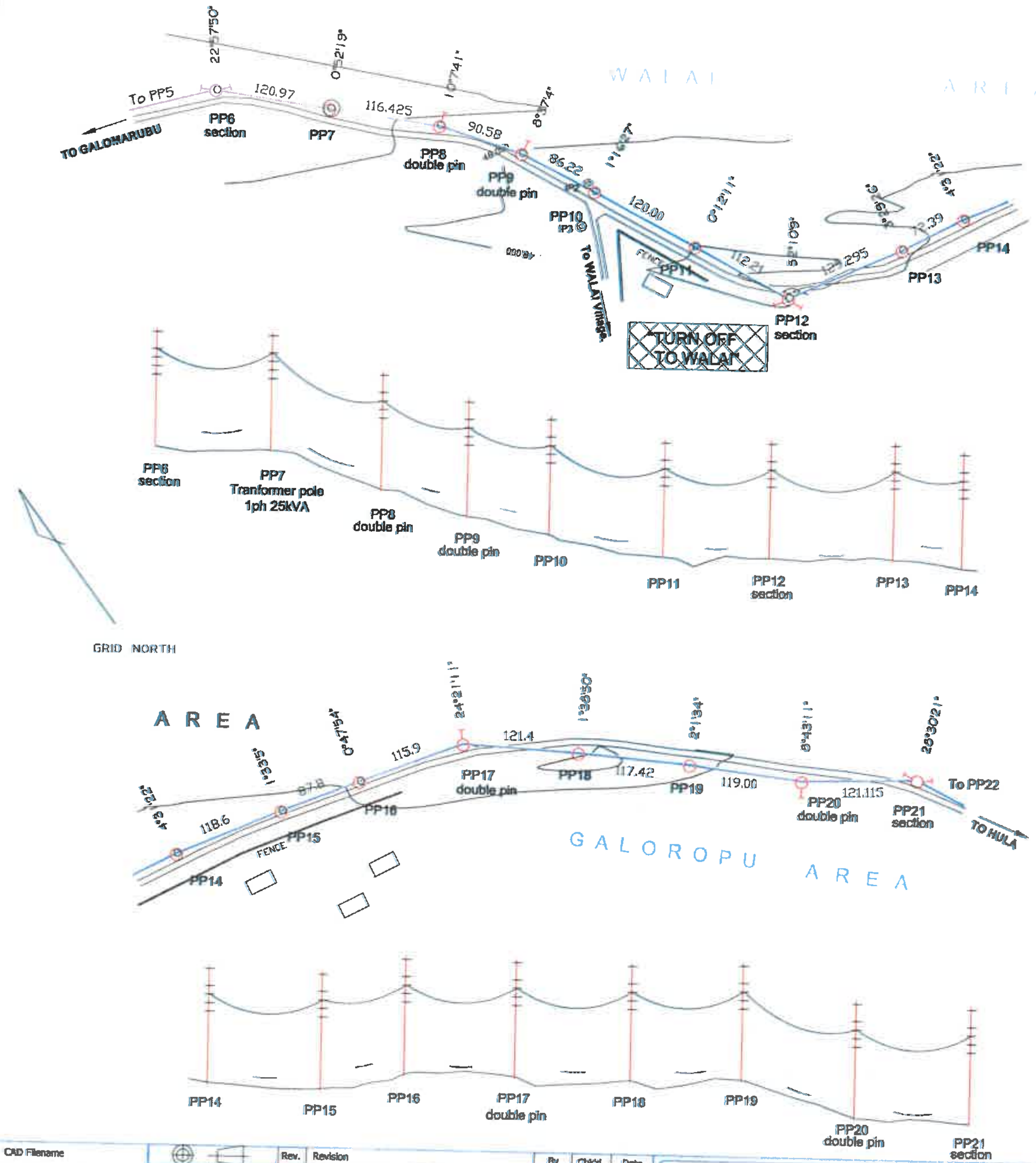
Drawn	John Patrick	Location	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Hesu Vabue	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond Paspa	A1	
Endorsed	Urasen Bano	Number	D - 3455
Approved	Pild Ravuaro	Revision	Sheet 1 OF 14



NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.
2. Section poles at No's; PP6, PP12 & PP21

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
PP6 – PP12	110	946 (900 temp. used)	6990 (713)	6450 (657)	5950 (607)
PP12 – PP21	115	972 (900 temp. used)	7000 (714)	6490 (662)	6000 (612)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.
7. LV single phase line extension from poles PP6 – PP16.
8. Install 1 x 25kVA single phase Transformer on pole PP7.

PNG POWER LIMITED APPROVED

POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY: WIRE	STAY: TYPE & SLOPE	WEIGHT SPAN (m)	WIND SPAN (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP21	X200/11	X238C3	X192.75G	2XL45	—	120.7	25°30'	3330.1	121.115	1038	1119	1211	SECTION
PP20	X150/11	X249C4	X192.00G	1XT80	—	120.1	6°43'	3209	119.0	1002	1081	1169	DOUBLE PIN
PP19	X150/11	X235C4	—		—	118.2	2°1'	3090	117.42	975	1052	1138	BREAST & HEEL
PP18	X150/11	X235C4	—		—	119.4	1°36'	2972.6	121.4	1043	1125	1216	BREAST & HEEL
PP17	X150/11	X249C4	X192.00G	1XT80	—	118.5	24°21'	2851.2	115.86	950	1024	1108	DOUBLE PIN
PP16	X150/11	X235C4	—		—	101.8	0°47'	2735.3	87.815	546	589	637	BREAST & HEEL
PP15	X150/11	X235C4	—		—	103.2	1°33'	2647.5	118.565	995	1073	1160	BREAST & HEEL
PP14	X150/11	X235C4	—		—	95.5	4°31'	2520.9	72.39	371	400	433	BREAST & HEEL
PP13	X150/11	X235C4	—		—	100.8	3°29'	2456.5	129.295	1183	1276	1380	BREAST & HEEL
PP12	X200/11	X238C3	X192.75G	2XL45	—	120.8	52°10'	2327.2	112.21	892	967	1046	SECTION
PP11	X150/11	X235C4	—		—	116.1	0°12'	2215	120.00	1030	1106	1199	BREAST & HEEL
PP10	X150/11	X235C4	—		—	100.1	1°16'	2095	86.22	527	571	619	BREAST & HEEL
PP9	X150/11	X249C4	X192.00G	1XT80	—	88.4	8°37'	2008.8	90.58	581	630	683	DOUBLE PIN
PP8	X150/11	X249C4	X192.00G	1XT80	—	103.5	10°7'	1918.2	116.425	980	1041	1128	DOUBLE PIN
PP7	X150/12	X235C4	—		—	118.7	0°52'	1801.8	120.97	1037	1124	1218	BREAST & HEEL 1ph. 25kVA TX. POLE
PP6	X200/12	X238C3	X192.75G	2XL45	—	121.4	22°57'	1680.8					SECTION

CAD Filename		Material:	
Date Drawn:	02.05.2018	Finish:	
Date Plotted:	11.05.2018	Tolerance:	
Scale:	Vert. 1 : 250 Hor. 1 : 2000	Linear:	
Drafting Standard:	AS 1100	Angular:	

DO NOT SCALE FOR WORKING DIMENSIONS

Rev.	Revision	By	Chk'd	Date
A.	Original Issue	JBP	HV	12.06.18

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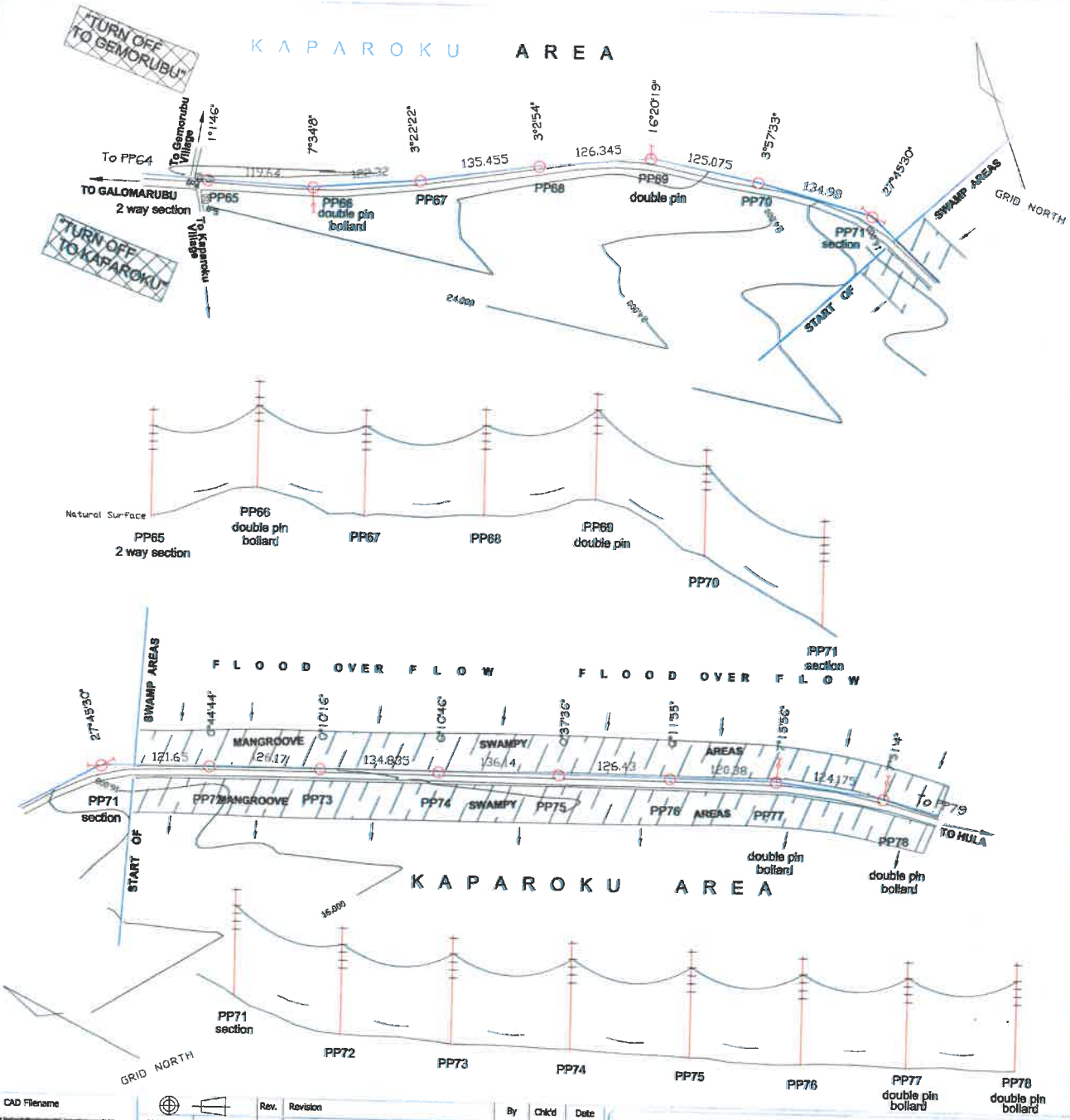
Drawn	John Patrick	Project	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Heau Vaboi	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond	A1	
Endorsed	Urasen	Number	D - 3455
Approved	Pild Ravu	Revision	Sheet 2 OF 14



NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.
2. Section poles at No's;

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P66 – P71	128	1035 (975 temp. used)	7050 (719)	6560 (669)	6120 (624)
P72 – P78	125	1022 (975 temp. used)	7035 (717)	6535 (666)	6080 (620)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
   2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.

PNG POWER LIMITED APPROVED

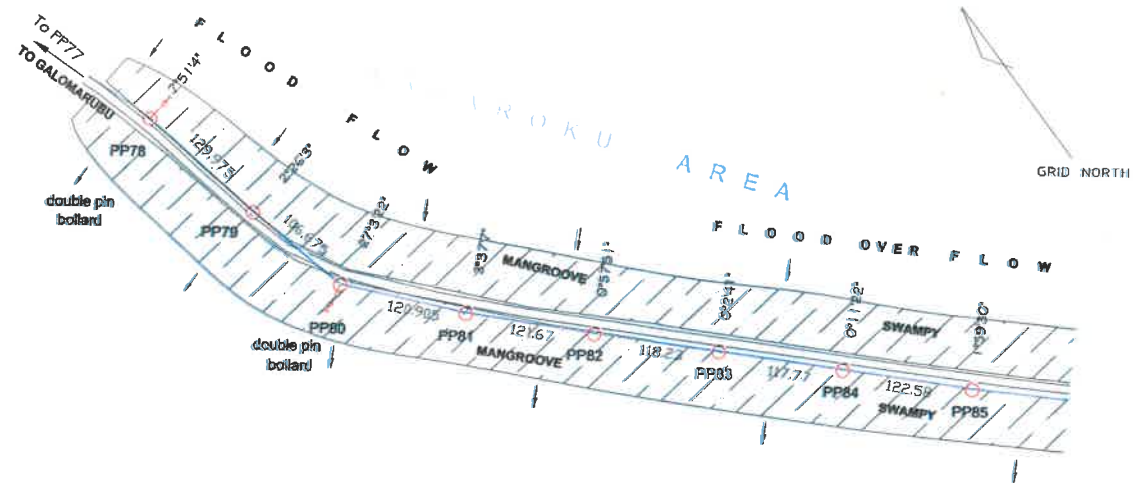
POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY WIRE	STAY TYPE & SLOPE	WEIGHT SPAN(adj) (m)	WIND SPAN(max) (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP76	X150/12	X240C4	X192.00H	1XT60	——	127.1	7°51'	18115.3	124.175	1085	1169	1256	DOUBLE PIN, Bollard
PP77	X150/12	X240C4	X192.00H	1XT60	——	122.3	7°19'	9991.1	120.38	1023	1098	1180	DOUBLE PIN, Bollard
PP78	X150/12	X230C4			——	123.4	0°11'	9870.7	126.43	1125	1211	1302	BREAST & HEEL
PP75	X150/12	X230C4				131.3	0°37'	9744.3	136.14	1305	1405	1510	BREAST & HEEL
PP74	X150/12	X230C4				135.5	0°10'	9808.1	134.835	1280	1378	1481	BREAST & HEEL
PP73	X150/12	X230C4				130.5	0°10'	9473.3	126.17	1121	1206	1297	BREAST & HEEL
PP72	X150/12	X230C4				123.9	0°44'	9347.1	121.65	1042	1122	1205	BREAST & HEEL
PP71	X200/12	X230C3	X192.73G	2XL45	——	128.3	27°45'	9225.5	134.98	1280	1375	1474	SECTION
PP70	X150/12	X230C4				130	3°57'	9090.5	125.075	1099	1181	1266	BREAST & HEEL
PP69	X150/12	X240C4	X192.00G	1XT60	——	125.7	16°20'	8965.4	126.345	1121	1205	1292	DOUBLE PIN
PP68	X150/12	X230C4				130.9	3°2'	8839.1	135.455	1289	1385	1485	BREAST & HEEL
PP67	X150/12	X230C4				126.9	3°22'	8703.6	122.32	1051	1130	1211	BREAST & HEEL
PP66	X150/11	X240C4	X192.00G	1XT60	——	121	7°34'	8581.3	119.64	1006	1081	1158	DOUBLE PIN
PP65	X200/12	X230C1	X192.73G	2XL45	——	123.6	1°1'	8461.7					SECTION, 2 WAY

CAD Filename		Material:	Rev.	Revision	By	Chk'd	Date
Date Drawn:	02.05.2018	Finish:	A.	Original Issue	JRP	HV	12.06.18
Date Plotted:	11.05.2018	Tolerance:					
Scale:	Ver. 1 : 200 Hor. 1 : 2000	Linear:					
Drafting Standard:	AS 1100	Angular:					

DO NOT SCALE FOR WORKING DIMENSIONS

PNG POWER Ltd

Drawn	John Patrick	Project	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Heau Vatau	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond	Size	A1
Endorsed	Urasen	Number	D - 3455
Approved	Pkd Rawuina	Revision	Sheet 6 OF 14

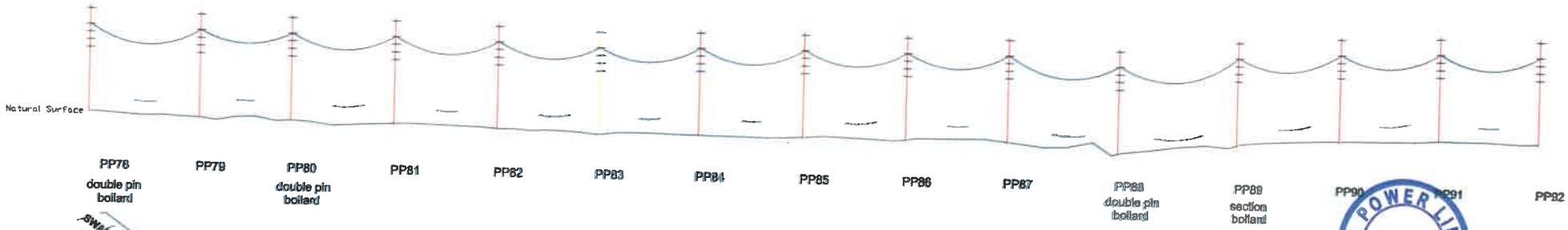


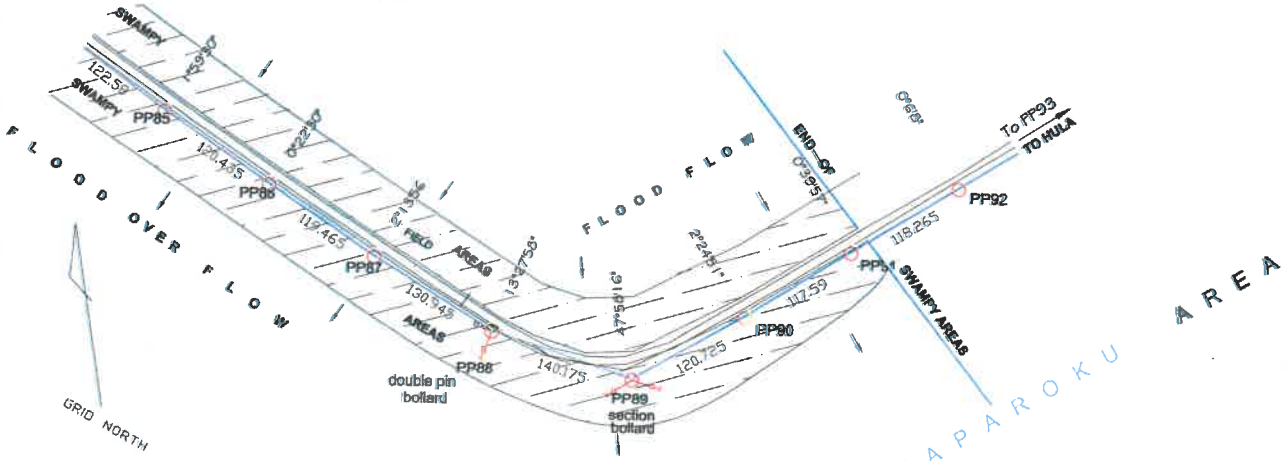
NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.
2. Section poles at No's;

SECTION	M.E.S	T/60°	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
PP78 – PP89	125	1022 (975 temp. used)	7035 (717)	6535 (666)	6080 (620)
PP90 – PP92	119	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
   2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.





PNG POWER LIMITED APPROVED

POLE No.	POLE SIZE (m/kN)	CONST. TYPE	WIRE	STAY TYPE & SLOPE	STAY	WEIGHT SPAN(eq) (m)	WIND SPAN(eq) (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP92	X150/12	X239C4				59.1	0°8'		11028.2	118.265	987	1064	1147	BREAST & HEEL
PP91	X150/12	X239C4				117.9	0°39'		11701.9	117.59	975	1052	1134	BREAST & HEEL
PP90	X150/12	X239C4				119.2	2°24'		11584.3	120.725	1005	1089	1195	BREAST & HEEL
PP89	X200/12	X239C3	X192.75H	2XL45	——	130.5	47°58'		11463.5	140.175	1383	1489	1601	SECTION, Bolted
PP88	X150/12	X240C4	X192.00H	1XT80	——	135.6	13°27'		11323.4	130.945	1207	1299	1397	DOUBLE PIN, Bolted
PP87	X150/12	X239C4				125.2	2°13'		11192.5	119.465	1005	1082	1163	BREAST & HEEL
PP86	X150/12	X239C4				120	0°22'		11073	120.435	1021	1099	1181	BREAST & HEEL
PP85	X150/12	X239C4				121.5	1°59'		10952.6	122.58	1038	1139	1224	BREAST & HEEL
PP84	X150/12	X239C4				120.2	0°11'		10830	117.77	976	1051	1130	BREAST & HEEL
PP83	X150/12	X239C4				118	0°2'		10712.2	118.23	984	1059	1138	BREAST & HEEL
PP82	X150/12	X239C4				119.7	0°57'		10594	121.67	1034	1113	1195	BREAST & HEEL
PP81	X180/12	X238C4				121	3°37'		10472.8	120.905	1029	1108	1191	BREAST & HEEL
PP80	X150/12	X240C4	192.00H	1XT80	——	113.8	27°3'		10351.9	106.675	861	862	927	DOUBLE PIN, Bolted
PP79	X150/12	X239C4				118.3	2°26'		10245.2	129.975	1189	1280	1375	BREAST & HEEL
PP78	X150/12	X240C4	X192.00H	1XT80	——	127.1	7°52'		10115.3					DOUBLE PIN, Bolted

CAD Filename		Rev.	Revision	By	Chk'd	Date
Date Drawn:	02.05.2018	A.	Original Issue	JRP	HV	12.06.18
Date Plotted:	11.05.2018					
Scale:	Vert. 1 : 250 Hor. 1 : 2000					
Drafting Standard:	AS 1100					

Material: Finish: Tolerance: Linear: Angular:

DO NOT SCALE FOR WORKING DIMENSIONS

Drawn	John Patrick
Designed	Heau Vitua
Checked	Desmond [illegible]
Endorsed	Uraaen Ba[illegible]
Approved	Pkd Ravunga

PNG POWER Ltd

Project: RIGO DISTRICT - CENTRAL PROVINCE

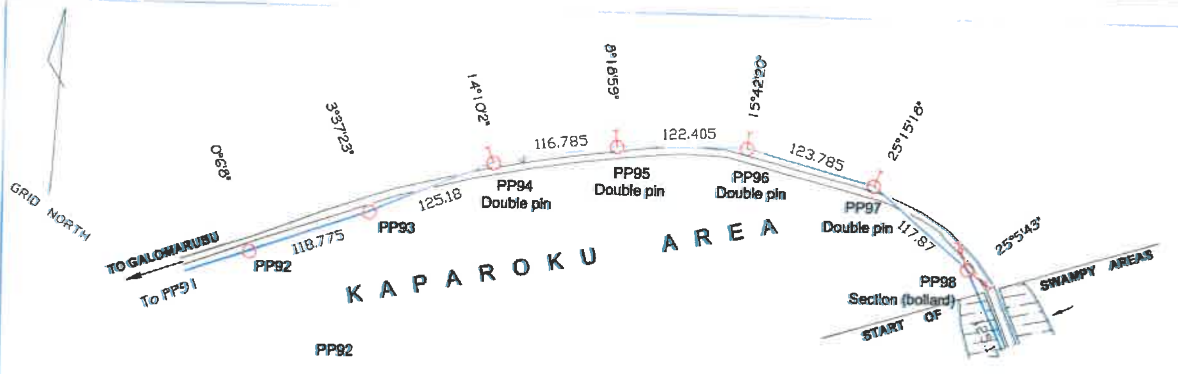
Title: 22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.

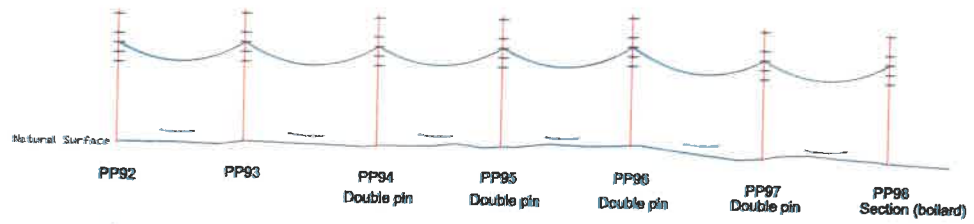
Size: A1

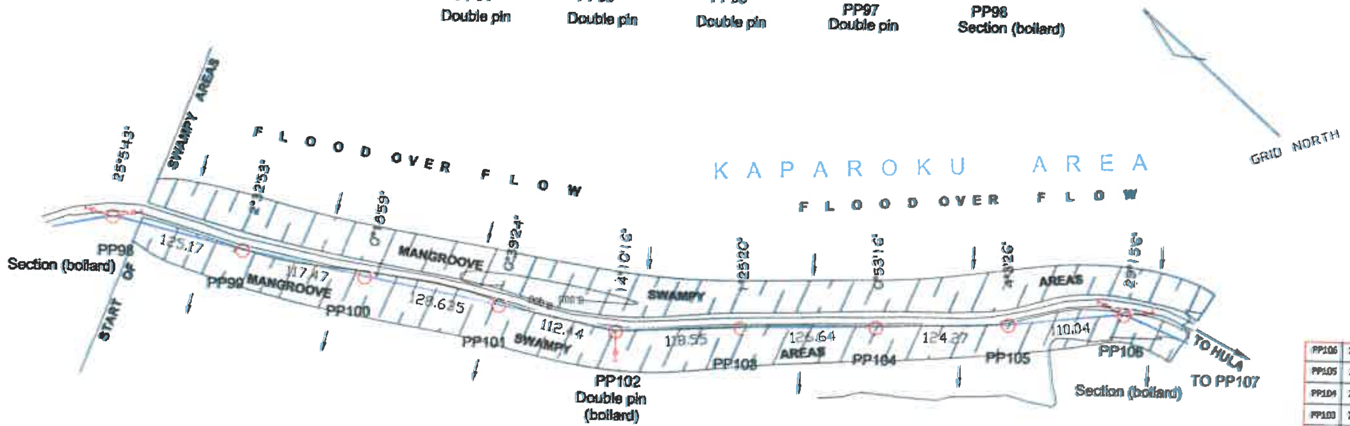
Number: ID - 3455

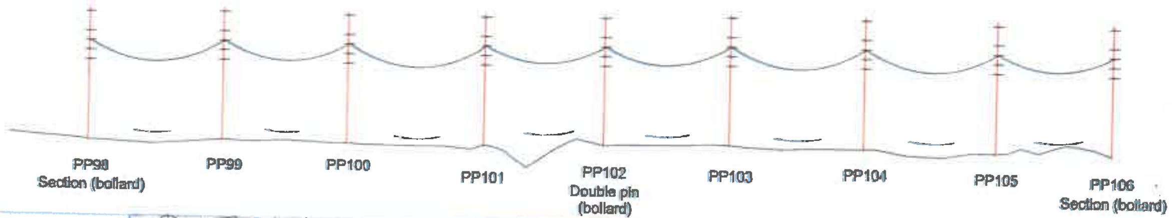
Revision:

Sheet: 7 OF 14









NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.

2. Section poles at No's;

SECTION	M.E.S	T/60° / W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P92 – P98	121	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)
P99 – P106	121	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.

4. BURIAL DEPTH
2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.

5. Angle poles without stays to be BREAST and HEEL BLOCKED

6. STAY TYPE T = Transverse , L = Inline.

PNG POWER LIMITED APPROVED

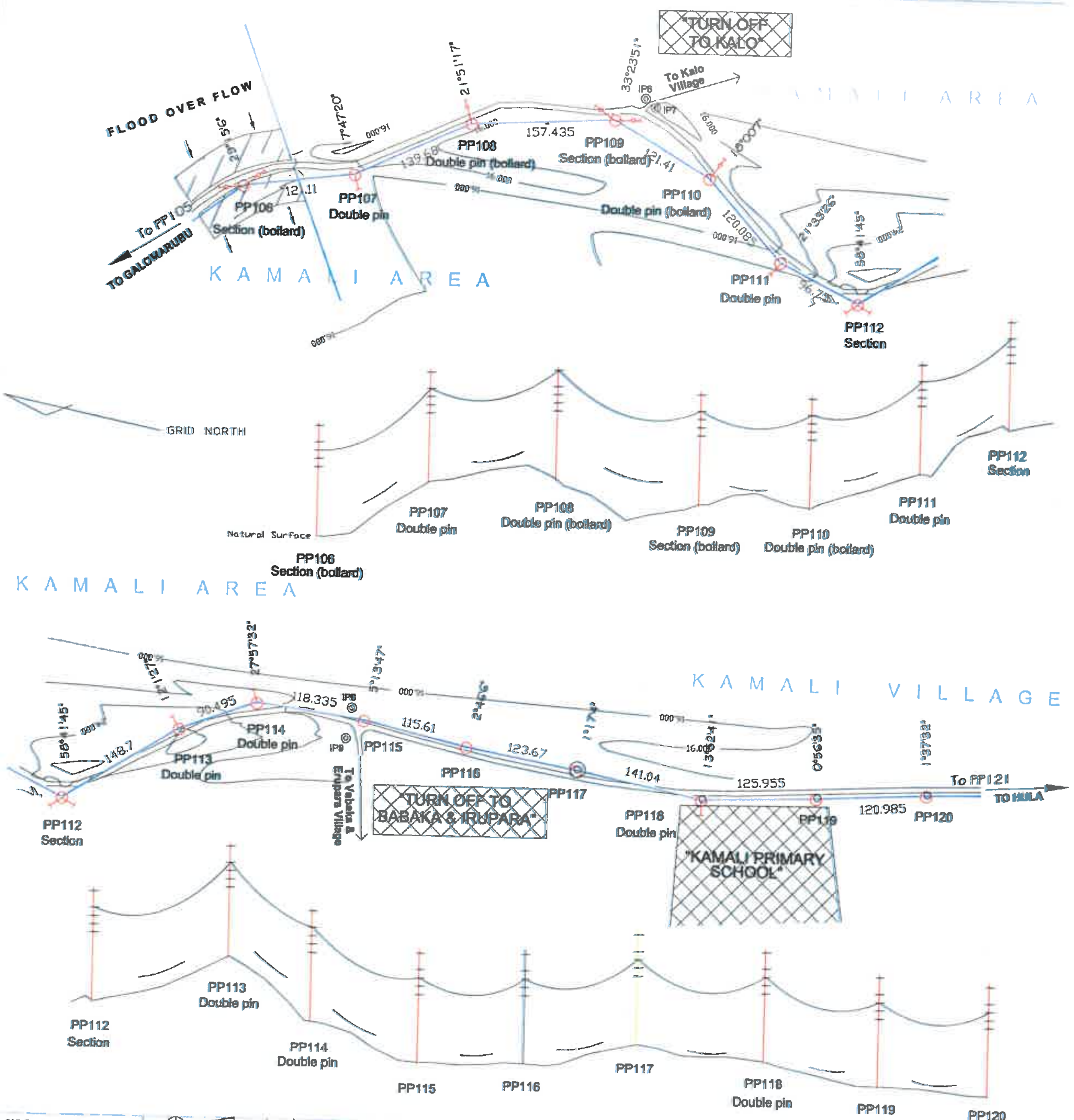
POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY WIRE	STAY TYPE & SLOPE	WEIGHT SPAN(m)	WIND SPAN(m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP106	X200/11	X238C3	X192.75H	2XL45		115.5	25°15'	13626.5	119	854	921	993	SECTION (bollard)
PP105	X150/11	X235C4				117.2	4°0'	13516.4	124.3	1089	1175	1266	BREAST & HEEL
PP104	X150/11	X235C4				125.5	0°53'	13392.2	126.6	1131	1220	1315	BREAST & HEEL
PP103	X150/11	X235C4				122.6	1°25'	13265.95	118.6	991	1069	1152	BREAST & HEEL
PP102	X150/11	X240C4	X192.00H	1XT80	———	115.5	14°10'	13147	112.4	892	962	1037	DOUBLE PIN (Bollard)
PP101	X150/11	X235C4	———		———	120.5	0°39'	13034.5	128.6	1167	1259	1357	BREAST & HEEL
PP100	X150/11	X235C4				123.1	0°18'	12905.9	117.5	974	1050	1131	BREAST & HEEL
PP99	X150/11	X235C4				121.3	2°32'	12788.4	125.2	1105	1192	1285	BREAST & HEEL
PP98	X200/11	X238C3	X192.75H	2XL45		121.5	25°5'	12663.3	117.9	980	1057	1139	SECTION (bollard)
PP97	X150/11	X240C4	X192.00G	1XT80		120.8	25°15'	12545.4	123.8	1081	1166	1256	DOUBLE PIN
PP96	X150/11	X240C4	X192.00G	1XT80		123.1	15°42'	12421.6	122.4	1057	1140	1229	DOUBLE PIN
PP95	X150/11	X240C4	X192.00G	2XT80		119.6	8°18'	12299.2	116.8	962	1038	1118	DOUBLE PIN
PP94	X150/11	X240C4	X192.00G	1XT80		121	14°10'	12182.4	125.2	1105	1192	1285	DOUBLE PIN
PP93	X150/11	X235C4				122	3°37'	12057.2	118.9	995	1073	1157	BREAST & HEEL
PP92	X150/11	X235C4				118.5	0°9'	11938.5					BREAST & HEEL

CAD Filename		Material:	Rev.	Revision	By	Chk'd	Date
Date Drawn:	02.05.2018	Finish:	A	Original Issue	JRP	HV	14.06.18
Date Plotted:	11.05.2018	Tolerance:					
Scale:	Ver. 1 : 200 Hor. 1 : 2000	Linear:					
Drafting Standard:	AS 1100	Angular:					

DO NOT SCALE FOR WORKING DIMENSIONS

PNG POWER Ltd
P.O.Box 1105 BOROKO · National Capital District, Papua New Guinea
TEL ... · FAX ... · Email: pngpower@pngpower.com.pg

Drawn	John Patrick	Project	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Heau Vabuki	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond P...	A1	
Endorsed	Urasen ...	Number	D - 3455
Approved	Piki Ravusiro	Revision	Sheet 8 OF 14



NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.

2. Section poles at No's;

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P107 – P109	142	1073 (1050 temp. used)	7080 (722)	6600 (673)	6200 (632)
P110 – P112	114	972 (900 temp. used)	7000 (714)	6490 (662)	6000 (612)
P113 – P120	111	946 (900 temp. used)	6990 (713)	6450 (657)	5950 (607)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.

4. BURIAL DEPTH
2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.

5. Angle poles without stays to be BREAST and HEEL BLOCKED

6. STAY TYPE T = Transverse , L = Inline.

7. LV single phase line extension from poles PP117 – PP120.

8. Install 1 x 25kVA single phase Transformer on pole PP117.

PNG POWER LIMITED APPROVED

POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY WIRE	STAY TYPE & SLOPE	WEIGHT SPAN(m) (m)	WIND SPAN(m) (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP120	X150/11	X235C4				120.9	1°37'	15367.7	121	1037	1124	1219	BREAST & HEEL
PP119	X150/11	X235C4				123.5	0°58'	15246.8	126	1124	1218	1320	BREAST & HEEL
PP118	X150/11	X240C4	X192.00G	1XT60		133.5	13°52'	15120.8	141	1409	1527	1656	DOUBLE PIN
PP117	X150/11	X235C4				132.4	1°17'	14979.8	123.7	1094	1174	1273	BREAST & HEEL
PP116	X150/11	X235C4				119.6	2°46'	14856.1	115.6	947	1026	1112	BREAST & HEEL
PP115	X150/11	X235C4				117	5°13'	14740.5	118.3	992	1075	1166	BREAST & HEEL
PP114	X150/12	X240C4	X192.00G	1XT60		104.4	27°57'	14622.1	90.5	580	629	682	DOUBLE PIN
PP113	X150/12	X240C4	X192.00G	1XT60		119.6	12°1'	14531.7	148.7	1567	1698	1840	DOUBLE PIN
PP112	X200/12	X238C3	X192.75G	2XL45		122.7	58°41'	14383	96.8	662	714	773	SECTION
PP111	X150/12	X240C4	X192.00G	1XT60		108.4	21°33'	14286.2	120.1	1020	1108	1199	DOUBLE PIN
PP110	X150/12	X240C4	X192.00H	1XT60		120.7	16°0'	14166.1	121.4	1043	1125	1217	DOUBLE PIN (Bollard)
PP109	X200/12	X238C3	X192.75H	2XL45		139.4	33°23'	14044.7	157.4	1734	1880	1980	SECTION (Bollard)
PP108	X200/14	X240C4	X192.00H	1XT60		148.6	21°51'	13887.3	139.7	1365	1464	1558	DOUBLE PIN (Bollard)
PP107	X150/12	X240C4	X192.00G	1XT60		130.4	17°47'	13747.6	121.1	1026	1101	1172	DOUBLE PIN
PP106	X200/11	X238C3	X192.75H	2XL45		115.6	29°15'	13626.5					SECTION (Bollard)

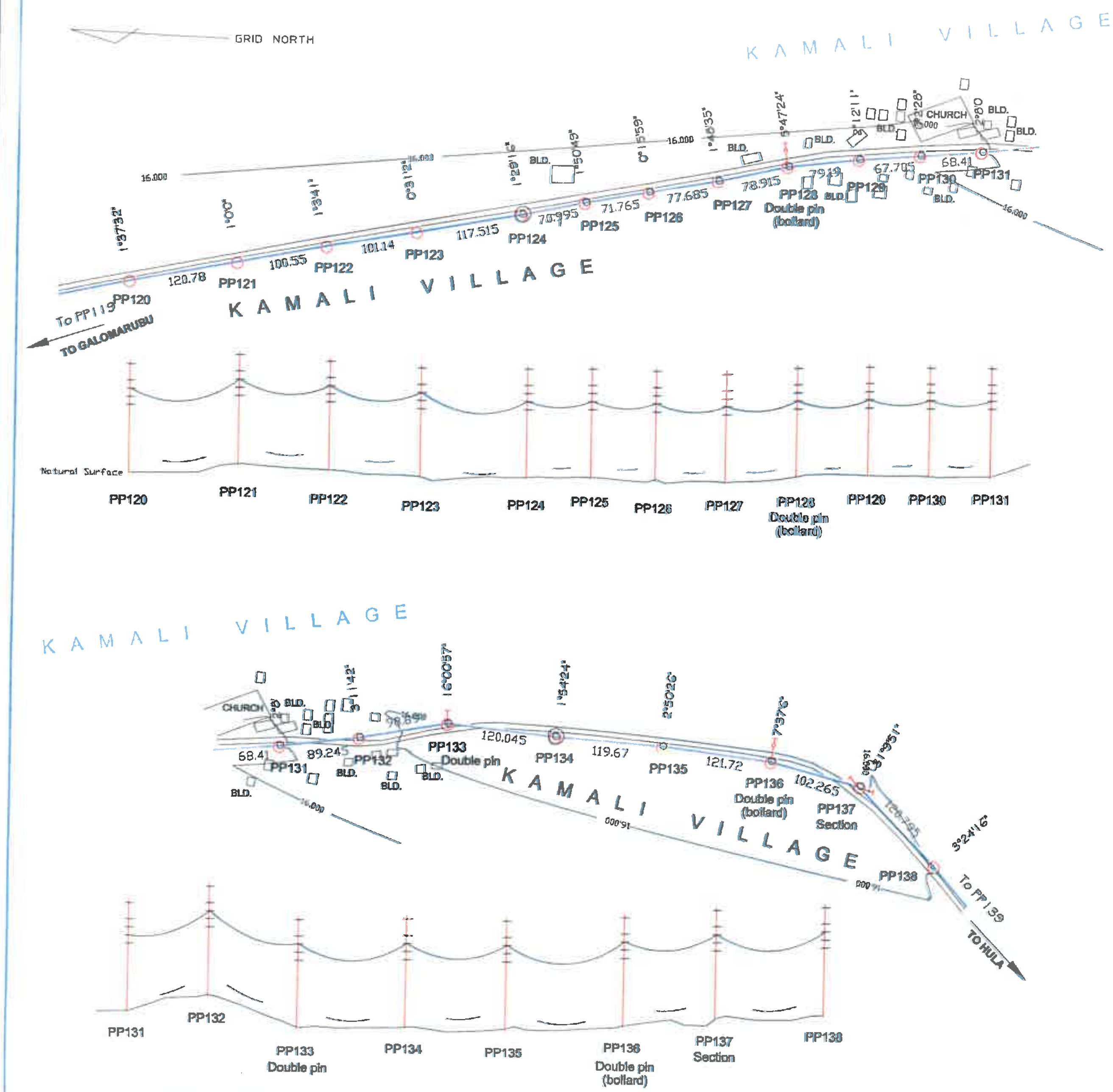
CAD Filename		Material:	
Date Drawn:	02.05.2018	Finish:	
Date Plotted:	11.05.2018	Tolerance:	
Scale:	Vert. 1 : 250 Hor. 1 : 2500	Linear:	
Drafting Standard:	AS 1100	Angular:	

DO NOT SCALE FOR WORKING DIMENSIONS

Rev.	Revision	By	Chk'd	Date
A.	Original Issue	JRP	HV	14.06.18

PNG POWER Ltd

Drawn	John Patrick	Project	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Heau Vatuin	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond	A1	
Endorsed	Urasen	Number	D - 3455
Approved	Pild Ravuaiiro	Revision	Sheet 9 OF 14



NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.
2. Section poles at No's;

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P121 – P137	111	946 (900 temp. used)	6990 (713)	6450 (657)	5950 (607)
P137 – P138	106	921 (900 temp. used)	6980 (712)	6420 (654)	5900 (601)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm. All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.
7. LV three phase line extension from poles PP124 – PP137.
8. Install 2 x 100kVA three phase Transformer on poles PP124 & PP134.

APPROVED — PNG POWER LIMITED

POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY: WIRE	STAY: TYPE & SLOPE	WEIGHT SPAN(ab) (m)	WIND SPAN(sw) (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP138	X150/11	X235C4				122	3°24'	17095					BREAST & HEEL
PP137	X200/11	X238C1	X192.75G	2X145		111.5	31°9'	16974.2	120.8	1035	1125	1225	SECTION
PP136	X150/11	X240C4	X192.80H	1XT80		112	7°37'	16872	102.1	741	803	870	DOUBLE PIN (Bollard)
PP135	X150/11	X235C4				120.7	2°50'	16750.2	121.7	1050	1138	1233	BREAST & HEEL
PP134	X150/11	X235C4				119.9	1°54'	16630.6	119.7	1015	1100	1192	BREAST & HEEL
PP133	X150/11	X240C4	X192.09G	1XT80		109.5	16°0'	16510.5	120	1021	1107	1199	DOUBLE PIN
PP132	X150/11	X235C4				94.1	3°11'	16411.6	98.9	693	751	814	BREAST & HEEL
PP131	X150/10	X235C4				78.8	2°8'	16322.4	89.2	564	612	663	BREAST & HEEL
PP130	X150/10	X235C4				68.1	0°2'	16254	68.4	332	359	390	BREAST & HEEL
PP129	X150/10	X235C4				73.4	2°12'	16186.3	67.7	325	352	382	BREAST & HEEL
PP128	X150/10	X240C4	X192.80H	1XT80		79.1	5°47'	16107.1	79.2	444	482	522	DOUBLE PIN (Bollard)
PP127	X150/10	X235C4				78.3	1°48'	16028.2	78.9	441	479	518	BREAST & HEEL
PP126	X150/10	X235C4				74.7	0°15'	15950.5	77.7	428	463	502	BREAST & HEEL
PP125	X150/10	X235C4				71.4	1°50'	15878.7	71.8	365	395	429	BREAST & HEEL
PP124	X150/10	X235C4				94.3	1°29'	15807.7	71	357	387	420	BREAST & HEEL
PP123	X150/11	X235C4				109.3	0°31'	15690.2	117.5	978	1060	1149	BREAST & HEEL
PP122	X150/11	X235C4				100.8	1°3'	15589.1	101.1	725	785	851	BREAST & HEEL
PP121	X150/11	X235C4				110.7	1°0'	15488.5	100.6	716	776	842	BREAST & HEEL
PP120	X150/11	X235C4				120.9	1°37'	15367.7	120.8	1034	1120	1214	BREAST & HEEL

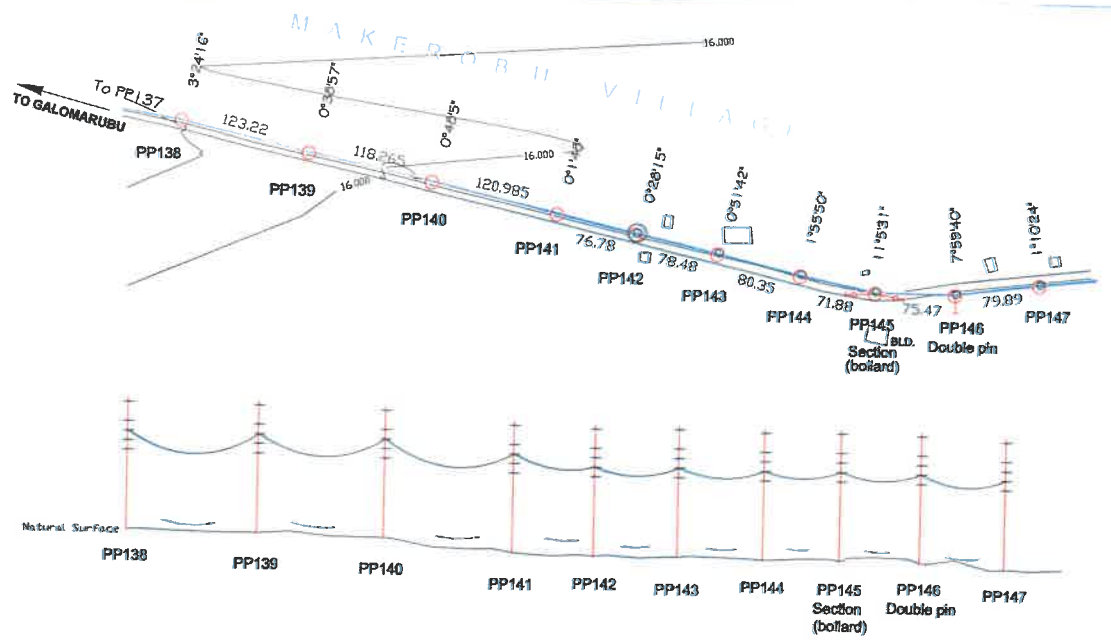
CAD Filename		Material:	
Date Drawn:	02.05.2018	Finish:	
Date Plotted:	11.05.2018	Tolerance:	
Scale:	Vert. 1 : 250 Hor. 1 : 2500	Linear:	
Drafting Standard:	AS 1100	Angular:	

DO NOT SCALE FOR WORKING DIMENSIONS

Rev.	Revision	By	Chk'd	Date
A.	Original Issue	JRP	HV	14.06.18

PNG POWER Ltd

Drawn	John Patrick	Project	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Heau Vatuel	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond	A1	
Endorsed	Urasen	Number	D - 3455
Approved	Piki Ravusiro	Revision	Sheet 10 OF 14



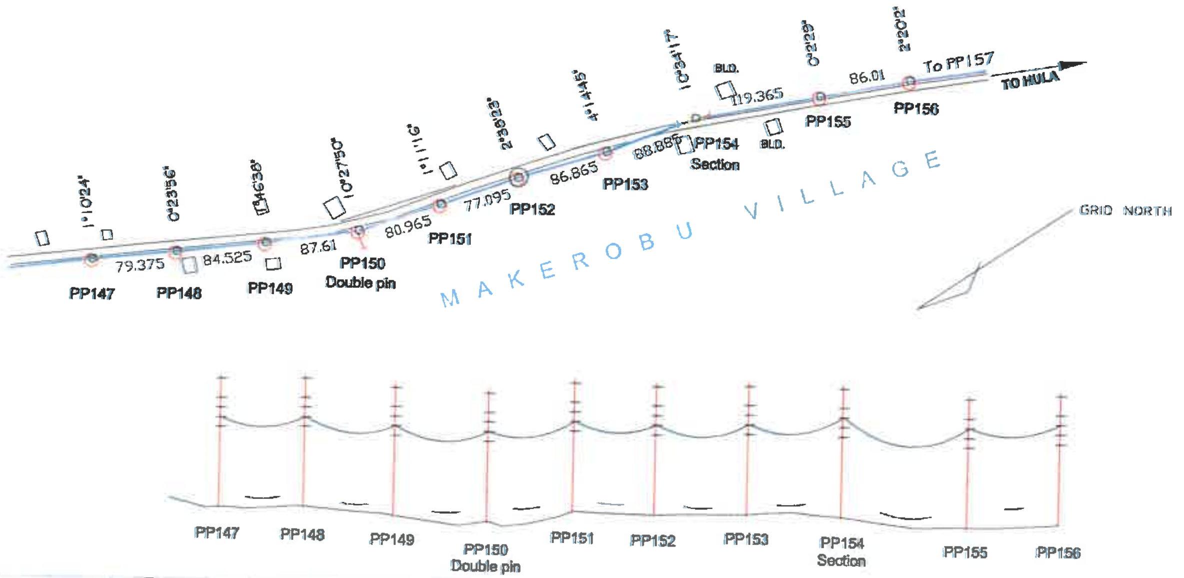
NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.
2. Section poles at No's;

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P139 – P145	106	921 (900 temp. used)	6980 (712)	6420 (654)	5900 (601)
P146 – P154	83	820 (825 temp. used)	6890 (702)	6290 (641)	5730 (584)
P155 – P156	117	972 (900 temp. used)	7000 (714)	6490 (662)	6000 (612)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
   2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.
7. LV three phase line extension from poles PP142 – PP156.
8. Install 2 x 100kVA three phase Transformer on poles PP142 & PP152.

PNG POWER LIMITED APPROVED



POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY WIRE	STAY TYPE & SLOPE	WEIGHT SPAN(ab) (m)	WIND SPAN(aw) (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP156	X150/11	X235C4				114.7	2°20'	18711					BREAST & HEEL
PP155	X150/11	X235C4				102.7	0°2'	18625	86.01	523	565	611	BREAST & HEEL
PP154	X200/11	X238C3	X192.75G	2XL45		104.1	10°34'	18505.7	119.37	1008	1087	1175	SECTION
PP153	X150/10	X235C4				87.9	4°14'	18416.8	88.885	589	622	683	BREAST & HEEL
PP152	X150/10	X235C4				82	2°38'	18329.9	86.865	542	594	652	BREAST & HEEL
PP151	X150/10	X235C4				79	1°11'	18252.8	77.095	427	468	514	BREAST & HEEL
PP150	X150/10	X240C4	X192.00G	1XT60		84.0	10°27'	18171.9	80.965	471	516	567	DOUBLE PIN
PP149	X150/10	X235C4				86.1	1°46'	18084.2	87.61	552	604	663	BREAST & HEEL
PP148	X150/10	X235C4				82	0°23'	17999.7	84.525	514	563	619	BREAST & HEEL
PP147	X150/10	X235C4				79.5	1°10'	17920.3	79.375	453	496	545	BREAST & HEEL
PP146	X150/10	X240C4	X192.00G	1XT60		77.7	7°59'	17840.5	79.89	459	503	552	DOUBLE PIN
PP145	X200/10	X238C3	X192.75H	2XL45		73.7	11°5'	17765	75.47	409	448	492	SECTION (Bollard)
PP144	X150/10	X235C4				76.1	1°55'	17693.1	71.88	367	399	434	BREAST & HEEL
PP143	X150/10	X235C4				79.4	0°51'	17612.8	80.35	458	498	542	BREAST & HEEL
PP142	X150/10	X235C4				77.6	0°28'	17534.3	78.48	437	475	517	BREAST & HEEL
PP141	X150/11	X235C4				98.9	0°1'	17457.5	76.78	418	455	495	BREAST & HEEL
PP140	X150/11	X235C4				119.6	0°46'	17336.5	120.99	1039	1129	1229	BREAST & HEEL
PP139	X150/11	X235C4				120.7	0°30'	17218.2	118.3	992	1079	1174	BREAST & HEEL
PP138	X150/11	X235C4				122	3°24'	17095	123.2	1077	1171	1274	BREAST & HEEL

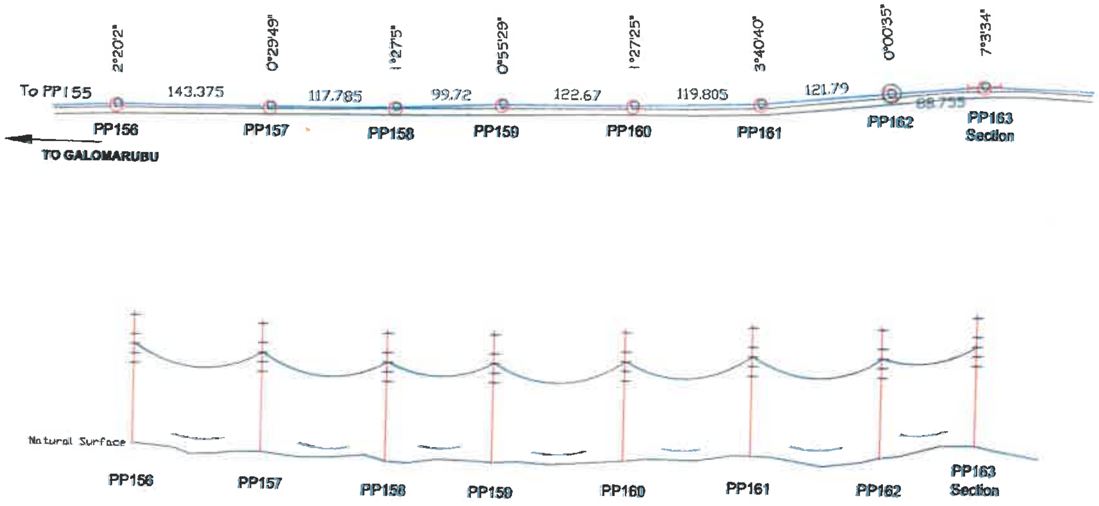
CAD Filename	Material:	Rev.	Revision	By	Chk'd	Date
Date Drawn: 02.05.2018	Finish:	A.	Original Issue	JRP	HV	14.06.18
Date Plotted: 11.05.2018	Tolerance:					
Scale: Vert. 1 : 250 Hor. 1 : 2500	Linear:					
Drafting Standard: AS 1100	Angular:					

DO NOT SCALE FOR WORKING DIMENSIONS

PNG POWER Ltd

Drawn	John Patrick	Project	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Heau Vabun	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond	A1	
Endorsed	Urasen	Number	D - 3455
Approved	Piki Ravuiam	Revision	Sheet 11 OF 14

M A K E R O B U   V I L L A G E



NOTES

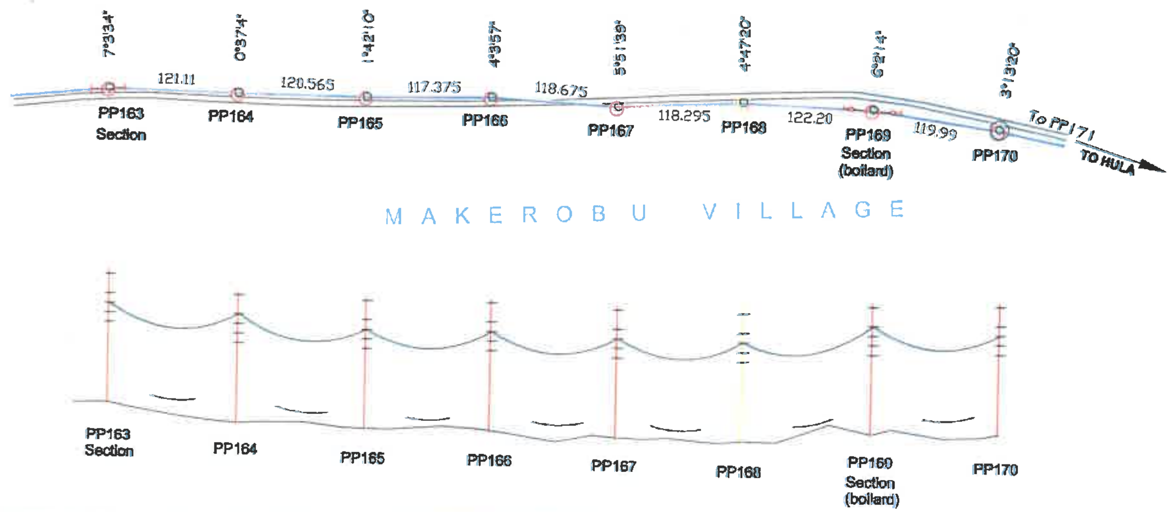
1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.
2. Section poles at No's;

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P157 – P163	117	972 (900 temp. used)	7000 (714)	6490 (662)	6000 (612)
P164 – P169	120	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)
P169 – P170	121	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm. All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
   2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE   T = Transverse , L = Inline.
7. LV three phase line extension from poles PP157 – PP170.
8. Install 2 x 100kVA three phase Transformer on poles PP162 & PP170.

GRID NORTH

PNG POWER LIMITED APPROVED



M A K E R O B U   V I L L A G E

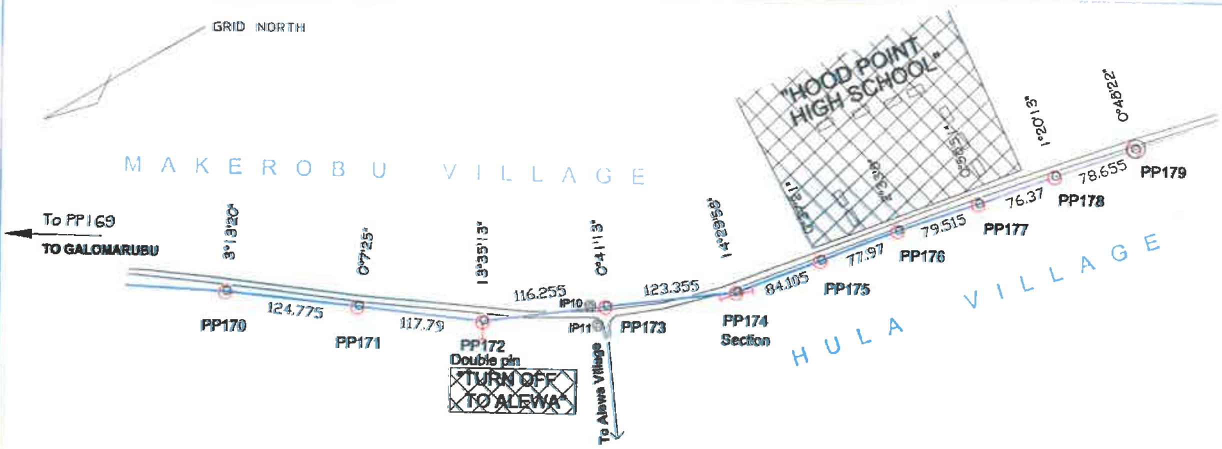
POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY WIRE	STAY TYPE & SLOPE	WEIGHT SPAN (m)	WIND SPAN (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP170	X150/11	X239C4				122.4	3°13'	20245.4					BREAST & HEEL
PP169	X200/12	X238C3	X192.75H	2X145		121.1	6°2'	20125.4	119.99	1016	1095	1181	SECTION (Bollard)
PP168	X150/11	X239C4				120.2	4°47'	20003.2	122.2	1053	1136	1224	BREAST & HEEL
PP167	X150/11	X239C4				118.5	5°51'	19884.9	118.3	987	1065	1147	BREAST & HEEL
PP166	X150/11	X239C4				119	4°3'	19766.2	118.68	994	1071	1155	BREAST & HEEL
PP165	X150/11	X239C4				119	1°42'	19648.8	117.38	972	1048	1131	BREAST & HEEL
PP164	X150/12	X239C4				120.8	0°37'	19528.3	120.57	1025	1106	1192	BREAST & HEEL
PP163	X200/11	X238C3	X192.75G	2X145		104.9	7°3'	19407.2	121.11	1035	1116	1203	SECTION
PP162	X150/11	X239C4				105.3	0°0'	19318.4	88.755	557	601	690	BREAST & HEEL
PP161	X150/11	X239C4				120.8	3°40'	19196.6	121.79	1049	1132	1224	BREAST & HEEL
PP160	X150/11	X239C4				121.2	1°27'	19076.8	119.81	1015	1095	1185	BREAST & HEEL
PP159	X150/11	X239C4				111.2	0°55'	18954.1	122.67	1065	1148	1242	BREAST & HEEL
PP158	X150/11	X239C4				108.8	1°27'	18828.8	99.72	704	759	821	BREAST & HEEL
PP157	X150/11	X239C4				121.5	0°29'	18854.4	117.79	982	1059	1145	BREAST & HEEL
PP156	X150/11	X239C4				114.7	2°20'	18711	143.38	1454	1569	1697	BREAST & HEEL

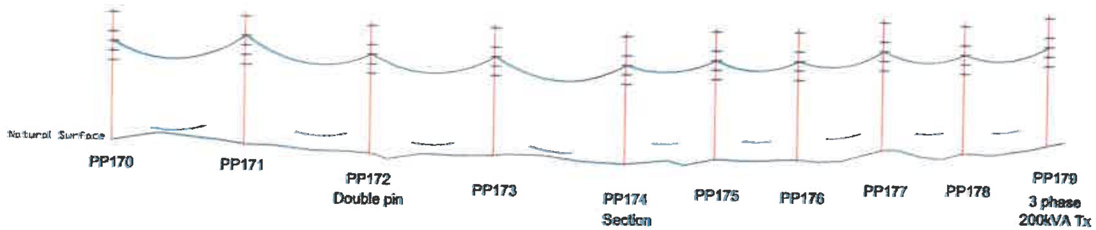
CAD Filename		Material:		Rev.	Revision	By	Chk'd	Date
Date Drawn:	02.05.2018	Finish:		A.	Original Issue	JRP	HV	14.06.18
Date Plotted:	11.05.2018	Tolerance:						
Scale:	Vert. 1:250 Hor. 1:2500	Linear:						
Drafting Standard:	AS 1100	Angular:						

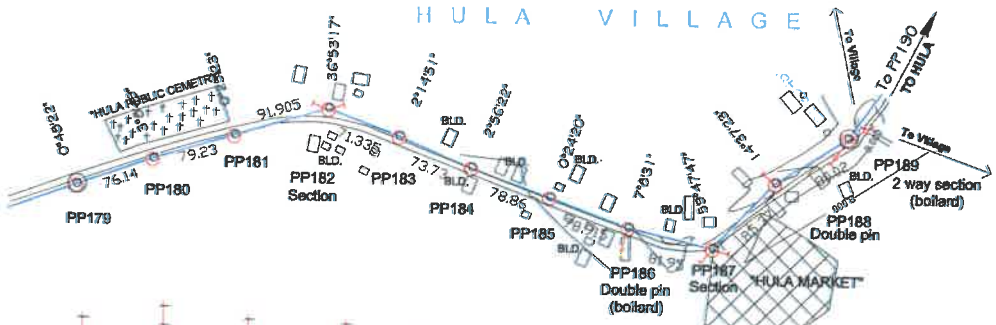
DO NOT SCALE FOR WORKING DIMENSIONS

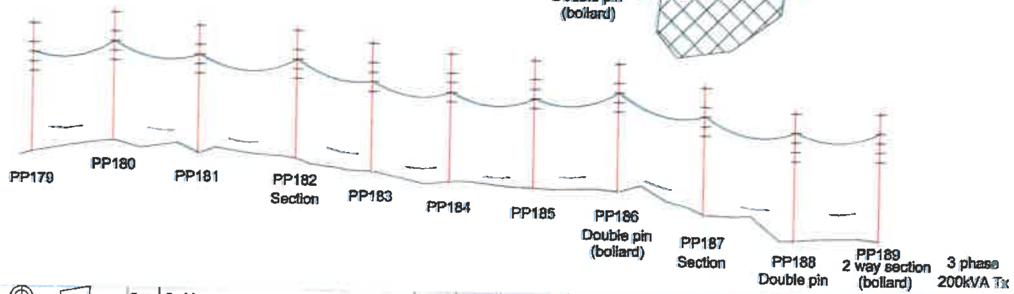
PNG POWER Ltd

Drawn	John Patrick	Project	RIGO DISTRICT CENTRAL PROVINCE
Designed	Heau Vaburi	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond Rowasa	A1	
Endorsed	Urasen Baru	Number	D - 3455
Approved	Piki Ravusiro	Revision	Sheet 12 OF 14









NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.
2. Section poles at No's;

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P171 – P174	121	997 (975 temp. used)	7020 (716)	6510 (664)	6040 (616)
P175 – P182	81	793 (825 temp. used)	6870 (700)	6250 (637)	5680 (579)
P183 – P187	77	767 (825 temp. used)	6850 (698)	6220 (634)	5640 (575)
P188 – P189	83	820 (825 temp. used)	6890 (702)	6290 (641)	5730 (584)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.
7. LV three phase line extension from poles PP171 – PP189.
8. Install 2 x 200kVA three phase Transformer on poles PP179 & PP189.

PNG POWER LIMITED APPROVED

POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY WIRE	STAY TYPE & SLOPE	WEIGHT SPAN(ab) (m)	WIND SPAN(ab) (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP189	X200/12	X237C1	X192.75H	2XL45		83.1	21°30'	21921.5					SECTION, 2 WAY (Bollard) 3ph. 200kVA Tx
PP188	X150/12	X240C4	X192.00G	1XT60		82.7	14°37'	21841.5	80.02	460	504	553	DOUBLE PIN
PP187	X200/11	X238C3	X192.75G	2XL45		83.7	59°47'	21756.2	85.37	524	574	630	SECTION
PP186	X150/11	X240C4	X192.00H	1XT60		80.4	7°8'	21674.3	81.95	485	535	590	DOUBLE PIN (Bollard)
PP185	X150/10	X239C4				78.9	0°24'	21595.4	78.915	450	495	547	BREAST & HEEL
PP184	X150/10	X239C4				76.3	2°56'	21516.5	78.86	450	495	546	BREAST & HEEL
PP183	X150/10	X239C4				72.5	2°14'	21442.9	73.73	393	433	477	BREAST & HEEL
PP182	X200/11	X238C3	X192.75G	2XL45		81.6	36°53'	21371.4	71.335	364	405	447	SECTION
PP181	X150/11	X239C4				85.5	0°25'	21279.5	91.905	600	669	736	BREAST & HEEL
PP180	X150/11	X239C4				77.7	3°9'	21200.3	79.20	453	497	547	BREAST & HEEL
PP179	X150/11	X239C4				77.4	0°48'	21124.2	76.14	418	459	505	BREAST & HEEL
PP178	X150/11	X239C4				77.5	1°20'	21045.5	78.655	446	490	539	BREAST & HEEL
PP177	X150/11	X239C4				77.9	0°58'	20969.1	76.37	420	462	509	BREAST & HEEL
PP176	X150/11	X239C4				78.7	2°33'	20889.6	79.515	456	501	551	BREAST & HEEL
PP175	X150/11	X239C4				81	0°37'	20811.5	77.97	439	482	530	BREAST & HEEL
PP174	X200/11	X238C3	X192.75G	2XL45		103.7	14°29'	20727.5	84.105	510	561	617	SECTION
PP173	X150/11	X239C4				119.8	0°41'	20604.2	123.36	1073	1158	1249	BREAST & HEEL
PP172	X150/11	X240C4	X192.00G	1XT60		117	13°35'	20487.9	116.26	953	1028	1108	DOUBLE PIN
PP171	X150/12	X239C4				121.3	0°7'	20370.1	117.79	979	1056	1138	BREAST & HEEL
PP170	X150/11	X239C4				122.4	3°13'	20245.4	124.78	1098	1184	1277	BREAST & HEEL

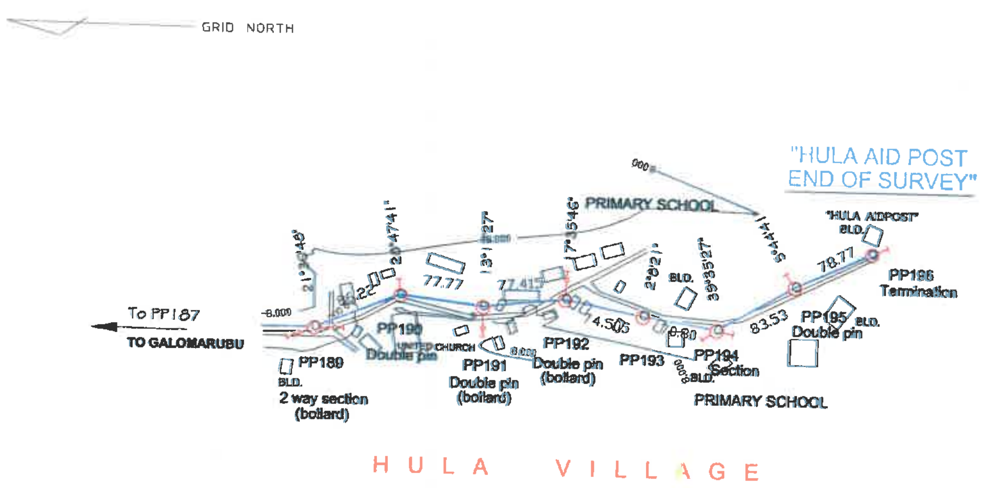
Rev.	Revision		By	Chk'd	Date
A.	Original Issue		JRP	HV	14.06.18

CAD Filename	
Date Drawn:	02.05.2018
Date Plotted:	11.05.2018
Scale:	Vert. 1 : 200 Hor. 1 : 2500
Drafting Standard:	AS 1100
Material:	
Finish:	
Tolerance:	
Linear:	
Angular:	

DO NOT SCALE FOR WORKING DIMENSIONS

PNG POWER Ltd

Drawn	John Patrick	Project	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Heau Vaboa	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond	A1	
Endorsed	Unsen	Number	D - 3455
Approved	Pild Ravusiro	Revision	Sheet 13 OF 14

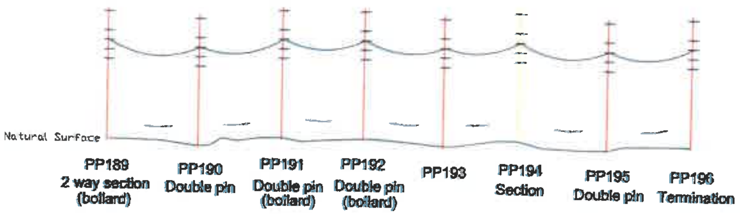


NOTES

1. Line designed for CHERRY 6/4.75–7/1.60 ACSR erected to SAG TENSION CHART SD 4/18–1, COASTAL. E.D.T. – 22% UTS, 20°C using POLE SELECTION CHART SD–5/7/2.
2. Section poles at No's;

SECTION	M.E.S	T/60° W	STRINGING TENSION (N) 25° (KG)	30° (KG)	35° (KG)
P190 – P194	78	793 (825 temp. used)	6870 (700)	6250 (637)	5680 (579)
P195 – P196	81	793 (825 temp. used)	6870 (700)	6250 (637)	5680 (579)

3. For details of pole construction refer to SPW–2 series. Use 2100mm crossarms except where scheduled. All pin crossarms 100 x 100mm, All strain crossarms 100 x 125mm.
4. BURIAL DEPTH
2.0m for 14m poles, 1.8m for 12m poles, 1.7m for 11m poles, 1.6m for 10m poles and 1.5m for 9.0m poles.
5. Angle poles without stays to be BREAST and HEEL BLOCKED
6. STAY TYPE T = Transverse , L = Inline.
7. LV three phase line extension on ABC from poles PP189 – PP196.



PNG POWER APPROVED LIMITED

POLE No.	POLE SIZE (m/kN)	CONST. TYPE	STAY: WIRE	STAY: TYPE & SLOPE	WEIGHT SPAN (m)	WIND SPAN (m)	ANGLE (Deg)	TOTAL LENGTH (m)	SPAN LENGTH (m)	STRINGING SAG (mm) 25°	30°	35°	REMARKS
PP196	X200/11	X238C3	X192.75G	1XL45		39.4	0°0'	22470.6	78.77	447	492	541	TERMINATION
PP195	X150/11	X240C4	X192.00G	1XT60		81.2	5°44'	22391.8	83.53	503	553	608	DOUBLE PIN
PP194	X200/11	X238C3	X192.75G	2XL45		77.2	39°35'	22308.3	70.8	361	397	437	SECTION
PP193	X150/11	X235C4				72.7	2°8'	22237.5	74.505	400	440	484	BREAST & HEEL
PP192	X150/11	X240C4	X192.00H	1XT60		76	17°35'	22163	77.415	432	475	523	DOUBLE PIN (Bollard)
PP191	X150/11	X240C4	X192.00H	1XT60		77.6	13°17'	22085.6	77.77	436	479	527	DOUBLE PIN (Bollard)
PP190	X150/11	X240C4	X192.00G	1XT60		82	20°47'	22007.8	86.22	536	589	648	DOUBLE PIN
PP189	X200/12	X237C1	X192.75H	2XL45		83.1	21°30'	21921.6					SECTION, 2 WAY (Bollard)

CAD Filename		Material:		Rev.	Revision	By	Chk'd	Date
Date Drawn:	02.05.2018	Finish:		A.	Original Issue	JRP	HV	14.06.18
Date Plotted:	11.05.2018	Tolerance:						
Scale:	Vert. 1 : 250 Hor. 1 : 2500	Linear:						
Drafting Standard:	AS 1100	Angular:						

DO NOT SCALE FOR WORKING DIMENSIONS

PNG POWER Ltd

P.O Box 1105 BOROKO · National Capital District, Papua New Guinea
PH (675) 324 3115 · FAX (675) 325 0185 · Email: ...@pngpower.com.pg

Drawn	John Patrick	Location	RIGO DISTRICT - CENTRAL PROVINCE
Designed	Heau Vabun	Title	22KV DISTRIBUTION HV LINE EXTENSION FROM GALOMARUBU TO HULA VILLAGE.
Checked	Desmond Bosco	A1	
Endorsed	Urasen Bazo	Number	D - 3455
Approved	Piki Ravusiro	Revision	Sheet 14 OF 14

MC CHRIS SURVEYS LIMITED
LOT 36, SECTION 9, WYONE STREET
P.O.BOX 639, MT HAGEN 281, WHP, PAPUA NEW GUINEA
PH:5420838/5421600.FAX:5420838 MOBILE No.-6757369[illegible]
Email: mccrissurveys@yahoo.com

Consulting Surveyors and Town Planners

MC CHRIS SURVEYS PAPUA NEW GUINEA

DATE: 10th-04-2018

THE MANAGER ROGEP
PNG POWER LIMITED
P. O. BOX 1105
BOROKO,
NCD,

Dear Sir,

SUBJECT: **<u>REPORT FOR HULA SURVEY</u>**

We are pleased to submit to you our report for the survey work carried out from Galomarupu to Hula Village.

Full Distance Surveyed.
As per the TOR, the full length surveyed is 22.4 km and will take about 196 poles. The end point of survey is at Hula Aid Post.

Current Road Works.
There is currently a road upgrade also starting from Galomarupu to Hula village. This involves drainage works, back filling, gravelling and road side clearance of shrubs and vegetation.

Road Easement.
We have also assessed the road and identified that this road is a rural district road, and this means there will be no issue with the road easement. We have also cross checked with Central Works Department and Lands Department Survey Records, regarding mainly the road easement and proved that there is no records for road easement or road corridor boundary survey done.

The reason the Road easement is not critical is that it is a Rural District road and that currently there is a road upgrade taking place. Therefore, we believe that there will be no road upgrade in the near future to remove the power poles.

Our Method of Survey.
Given the current road works, we have carried out the survey with the limits of the road corridor.

This report is submitted for your information.

Yours sincerely,

[signature]

Paul Kup
Managing Director
(Registered Surveyor)

PNG POWER LIMITED
APPROVED

Sighted
Thirs
26/04/18

PNG POWER Ltd

PO Box 1185, BOROKO NCD
Papua New Guinea

Telephone: (675) 324 3200
Facsimile: (675) 325 0185
E-mail:
pngpower@pngpower.com.pg

PNG POWER RURAL ELECTRIFICATION PROJECT

INDEPENDENT STATE
OF
PAPUA NEW GUINEA

(145M3)

NOTE: ALL PLANS SIGHTED & APPROVED TA

PNG POWER LIMITED APPROVED

JOHN FINIS
SURVEYOR
ED
26/04/18

PORT MORESBY
NATIONAL CAPITAL DISTRICT

PROJECT TITLE: SURVEY FOR ENTENSION OF 22KV ELECTRICITY DISTRIBUTION LINES FROM GALOMARUBU TO HULA START CHAINAGE: 0.00KM, END CHAINAGE 22.47KM PORT MORESBY, NATIONAL CAPITAL DISTRICT

FILE NAME: HULA PPL

DRAWING NAME: PLANS AND PROFILES

SURVEYED & PREPARED BY:

MC CHRIS SURVEYS LIMITED

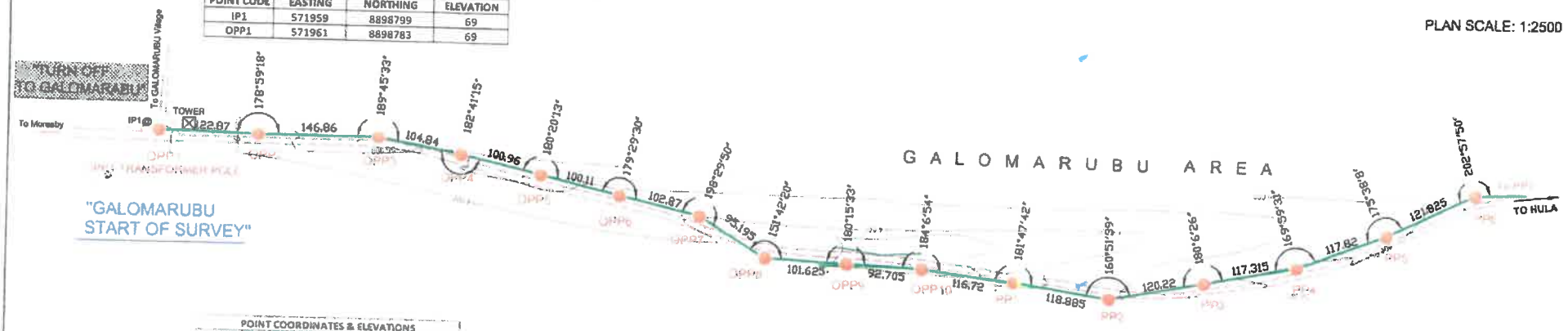
LOT 45, SECTION 9, WYONE STREET
P.O.BOX.689, MT HAGEN 281, WHP.PAPUA NEW GUINEA
PH:5420838/5421600.FAX:5420838.MOBILE No:-67573690221
email:*mechrissurveys@yahoo.com*

Consulting Surveyors and Town Planners

MC CHRIS SURVEYS PAPUA NEW GUINEA

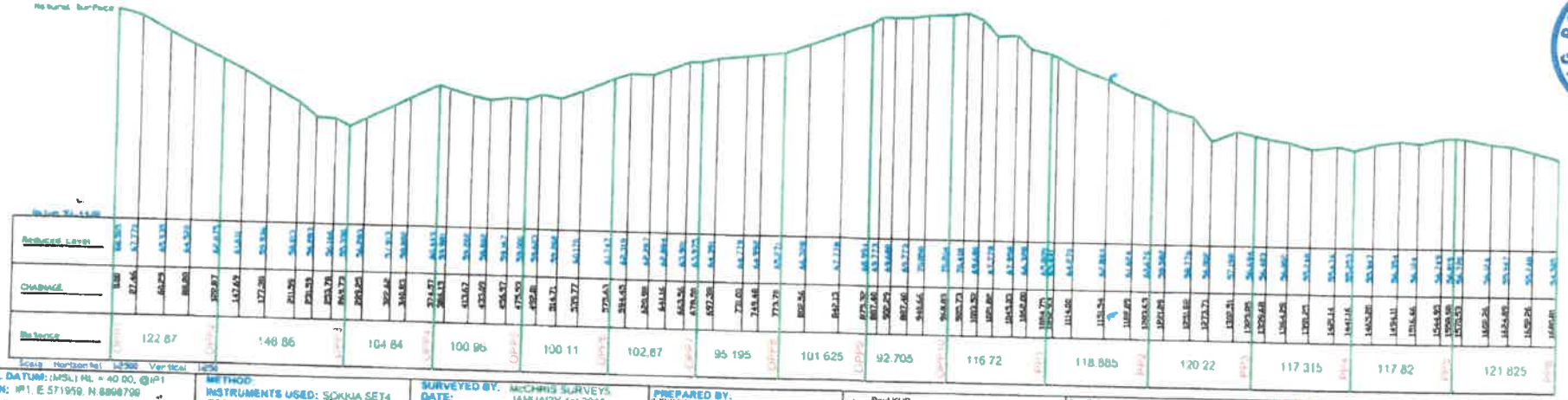
PLAN SCALE: 1:2500

REFERENCE IRON PINS COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
IP1	571959	8898799	69
OPP1	571961	8898783	69



POINT COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
OPP1	571961	8898783	69
OPP2	572043	8898692	63
OPP3	572144	8898585	55
OPP4	572202	8898498	60
OPP5	572254	8898411	59
OPP6	572304	8898325	62
OPP7	572357	8898236	64
OPP8	572378	8898144	65
OPP9	572444	8898067	69
OPP10	572504	8897996	70
PP1	572574	8897902	66
PP2	572641	8897804	61
PP3	572738	8897734	57
PP4	572833	8897664	55
PP5	572938	8897611	57
PP6	573051	8897566	55

GRID NORTH



PNG POWER LIMITED APPROVED

LEVEL DATUM: (MSL) RL = 40.00, @IP1
ORIGIN: IP1, E 571959, N 8898799
AZIMUTH: IP1 - OPP1 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 55
SURVEY CATEGORY: RURAL CLASS 1

METHOD:
INSTRUMENTS USED: SOKKIA SET4 TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURMIL: GRANVILLE
MILIMCH: MORESBY

SURVEYED BY: McCHRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K. SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON BY

PREPARED BY:

CONTOUR INTERVAL: 8.0m

I, Paul KUP
have been carried out by me or under my direct supervision and is a true and accurate representation of field work carried. The survey complies in all respects with the Standard Survey Instructions, July 1985, and all amendments thereto.

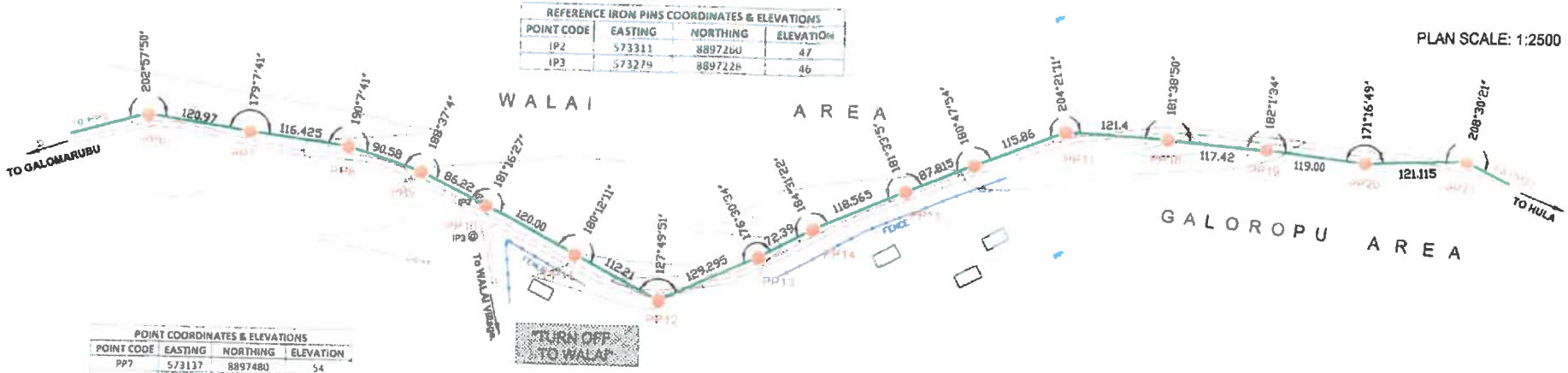
CLIENT: PNG POWER Ltd

REFERENCE PLANS:

SURVEY OF: GALOMARUBU TO HULA RURAL ELECTRIFICATION SURVEY PROJECT
PORT MORESBY, NATIONAL CAPITAL DISTRICT
SCALE 1: AS SHOWN
SHEET 1 OF 14 SHEET
COMP JOB NAME: HULA PP1
DWG NAME: PLAN & PROFILE.dwg
PLAN NO: A1/NCD/GALO-HULA

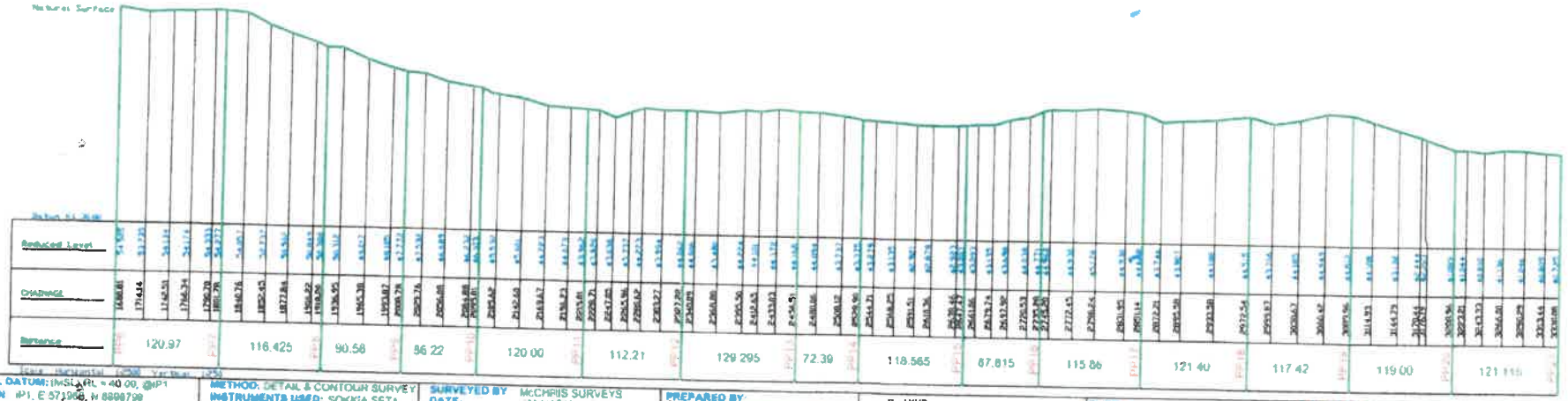
PLAN SCALE: 1:2500

REFERENCE IRON PINS COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
IP2	573311	8897260	47
IP3	573279	8897228	46



POINT COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
PP7	573137	8897480	54
PP8	573220	8897399	50
PP9	573273	8897326	48
PP10	573313	8897249	46
PP11	573365	8897161	44
PP12	573414	8897040	44
PP13	573540	8897013	44
PP14	573612	8897002	43
PP15	573727	8896975	43
PP16	573812	8896953	45
PP17	573924	8896922	45
PP18	574017	8896844	45
PP19	574105	8896766	44
PP20	574191	8896684	41
PP21	574345	8896597	41

GRID NORTH



PNG POWER LIMITED APPROVED

LEVEL DATUM: IMSL (RL = 40.00, @IP1
ORIGIN: IP1, E 571966, N 8898798
AZIMUTH: IP1 - OPP1 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 55
SURVEY CATEGORY: RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET4
TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURMIL: GRANVILLE
MILINCH: MORESBY

SURVEYED BY: McCHRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K. SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON: BY

PREPARED BY:

CONTOUR INTERVAL: 8.0m

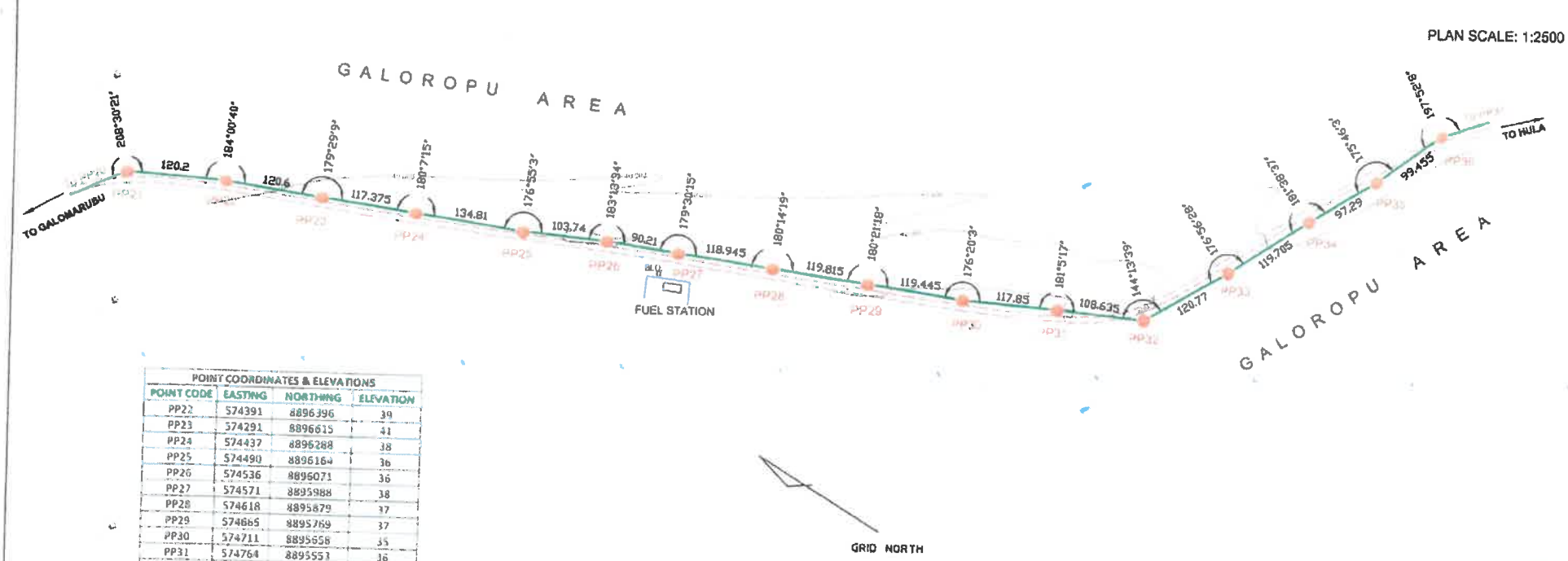
I, Paul KUP
has been carried out by me or under my direct supervision and is a true and accurate representation of fields work carried. The survey complies in all respects with the Standard Survey Regulations. Any THIS and all abandonments thereto

CLIENT: PNG POWER Ltd

REFERENCE PLANS:

SURVEY OF: GALOMARUBU TO HULA
RURAL ELECTRIFICATION SURVEY PROJECT
PORT MORESBY, NATIONAL CAPITAL DISTRICT
SCALE 1 : AS SHOWN
SHEET 2 OF 14 SHEET
COMP JOB NAME: HULA PPL
DWG NAME: PLAN & PROFILE.dwg
PLAN NO: A1/NCD/GALO-HULA

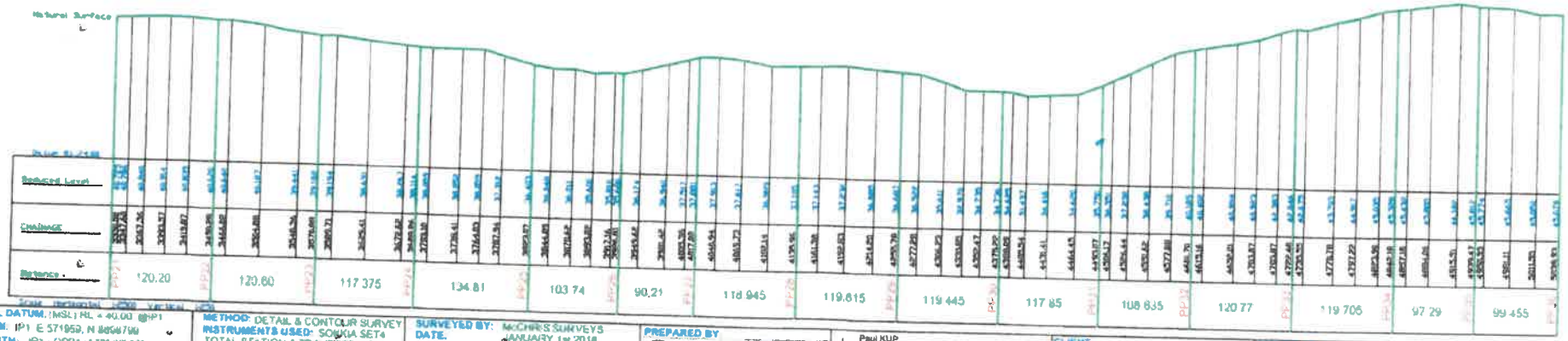
PLAN SCALE: 1:2500



POINT COORDINATES & ELEVATIONS

POINT CODE	EASTING	NORTHING	ELEVATION
PP22	574391	8896396	39
PP23	574291	8896615	41
PP24	574437	8896288	38
PP25	574490	8896164	36
PP26	574536	8896071	36
PP27	574571	8895988	38
PP28	574618	8895879	37
PP29	574665	8895769	37
PP30	574711	8895658	35
PP31	574764	8895553	36
PP32	574811	8895455	40
PP33	574916	8895397	43
PP34	575024	8895344	45
PP35	575110	8895300	46
PP36	575202	8895261	45

PNG POWER LIMITED
APPROVED



LEVEL DATUM: (MSL) RL = 40.00 @HP1
ORIGIN: IP1 E 571952, N 8896799
AZIMUTH: IP1 - OPP1 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 55
SURVEY CATEGORY: RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET4
TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURMIL: GRANVILLE
MILINCH: MORESBY

SURVEYED BY: McCRIES SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K. SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON: BY

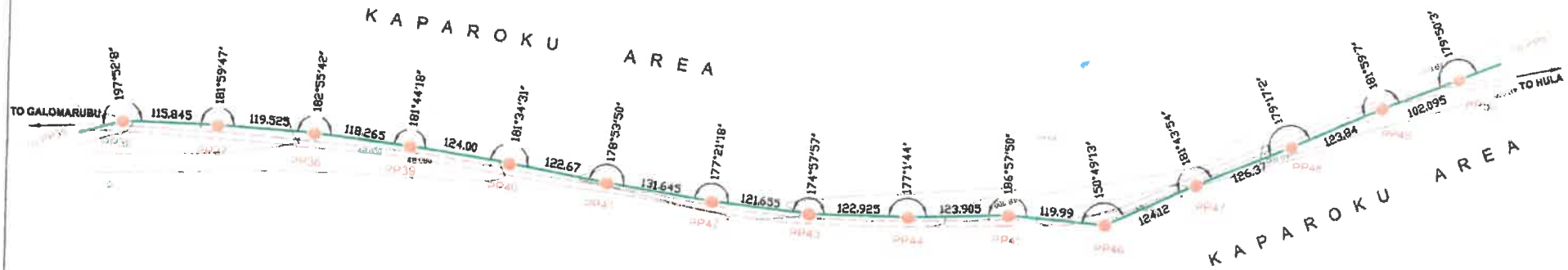
PREPARED BY
CONTOUR INTERVAL: 8.0m

Paul KUP
"Data have carried out by me or under my direct supervision and is a true and accurate representation of field work carried. The survey complies in all respects with the Standard Survey Instructions, July 1995, and all amendments thereto."

CLIENT: PNG POWER LTD
REFERENCE PLANS:

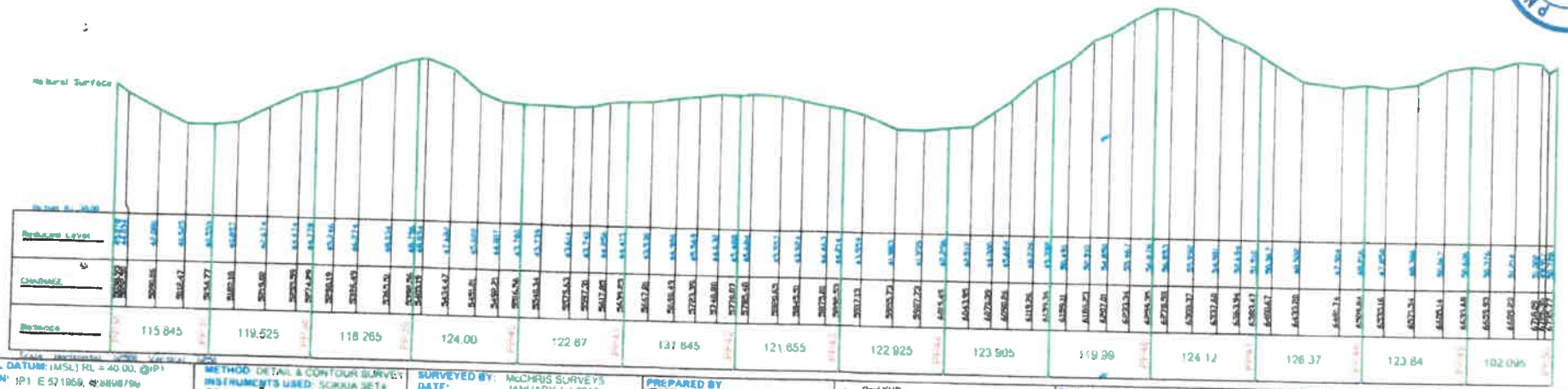
SURVEY OF: GALOMARUBU TO HULA
RURAL ELECTRIFICATION SURVEY PROJECT
PORT MORESBY, NATIONAL CAPITAL DISTRICT
SCALE: 1 AS SHOWN
SHEET 3 OF 14 SHEET
COMP JOB NAME: HULA PPI
PLAN NO: A1/NCD/GALO-HULA
DWG NAME: PLAN & PROFILE

PLAN SCALE: 1:2500



POINT COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
PP37	575289	8895184	41
PP38	575377	8895103	45
PP39	575459	8895018	49
PP40	575542	8894926	44
PP41	575622	8894833	44
PP42	575710	8894735	45
PP43	575795	8894648	44
PP44	575889	8894568	42
PP45	575987	8894493	49
PP46	576072	8894409	57
PP47	576192	8894376	52
PP48	576313	8894339	48
PP49	576432	8894304	51
PP50	576529	8894272	51

PNG POWER LIMITED APPROVED



LEVEL DATUM: (MSL) RL = 40.00, @PP1
ORIGIN: PP1 E 571959, N 8898796
AZIMUTH: PP1 - PP2 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 55
SURVEY CATEGORY: RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET 4
TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURMIL: GRANVILLE
MILINCH: MORESBY

SURVEYED BY: McCHRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K. SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON: BY

PREPARED BY

CONTOUR INTERVAL: 6.0m

I, Paul KUP
this been carried out by me or under my direct supervision and is a true and accurate representation of field work carried. The survey complies in all respects with the Standard Survey Instructions, July 1985, and all amendments thereto.
Surveyor ___/___/2018

CLIENT: PNG POWER Ltd

REFERENCE PLANS

SURVEY OF: GALOMARUBU TO HULA
RURAL ELECTRIFICATION SURVEY PROJECT
PORT MORESBY, NATIONAL CAPITAL DISTRICT
SCALE: 1 AS SHOWN
SHEET: 4 OF 14 SHEET
COMP JOB NAME: HULA PPL
DWG NAME: PLAN & PROFILE
PLAN NO: A1/NCD/GALO-HULA

PLAN SCALE: 1:2500

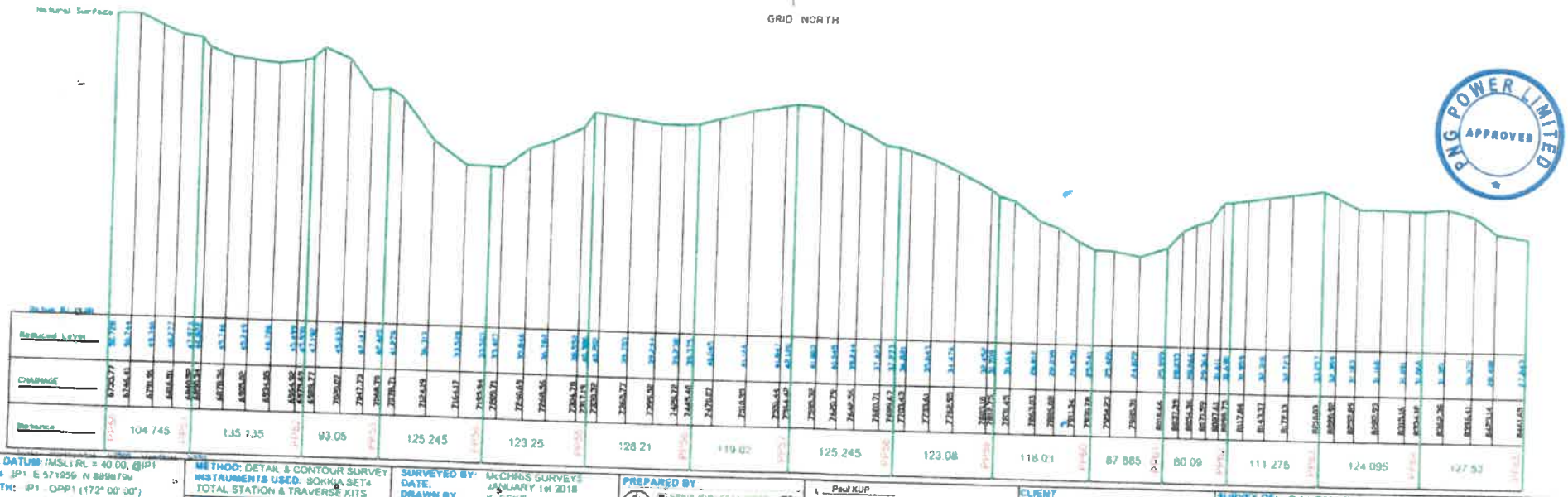
POINT COORDINATES & ELEVATIONS

POINT CODE	EASTING	NORTHING	ELEVATION
PP51	576628	8894239	48
PP52	576762	8894225	46
PP53	576856	8894224	42
PP54	576981	8894225	34
PP55	577104	8894228	40
PP56	577231	8894211	39
PP57	577350	8894202	42
PP58	577474	8894183	37
PP59	577597	8894180	32
PP60	577715	8894174	26
PP61	577802	8894164	26
PP62	577882	8894158	32
PP63	578111	8894135	31
PP64	577992	8894172	33
PP65	578228	8894084	28

REFERENCE IRON PINS COORDINATES & ELEVATIONS

POINT CODE	EASTING	NORTHING	ELEVATION
IP4	578218	8894089	27
IP5	578217	8894064	29

GRID NORTH



PNG POWER LIMITED APPROVED

LEVEL DATUM: (MSL) RL = 40.00, @P1
ORIGIN: P1 E 571956 N 8898796
AZIMUTH: P1 - OPP1 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 55
SURVEY CATEGORY: RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET4 TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURAMIL: GRANVILLE
MILINCH: MORESBY

SURVEYED BY: MCCHRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON: BY

PREPARED BY

CONTOUR INTERVAL: 8.0m

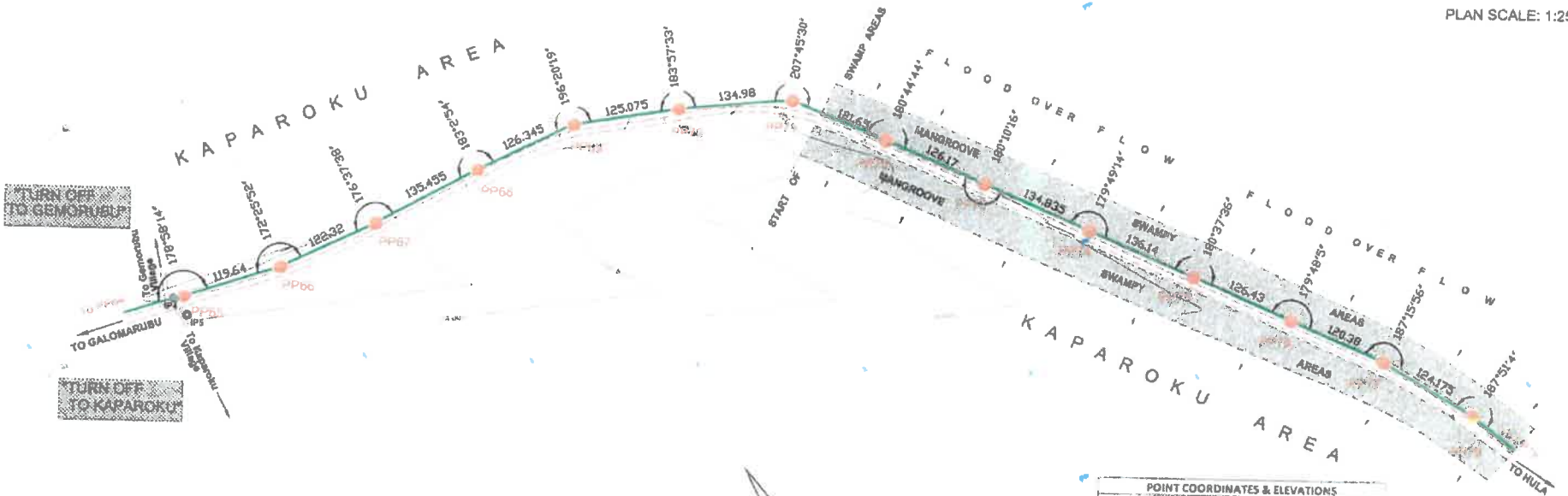
I, Paul KUP
hold [illegible] carried out by me or under my direct supervision and is a true and accurate representation of field work carried. The survey complies in all respects with the Standard Survey Instructions, July 1985, and all amendments thereto
Surveyor ____/____/ 2018

CLIENT: PNG POWER Ltd

REFERENCE PLANS

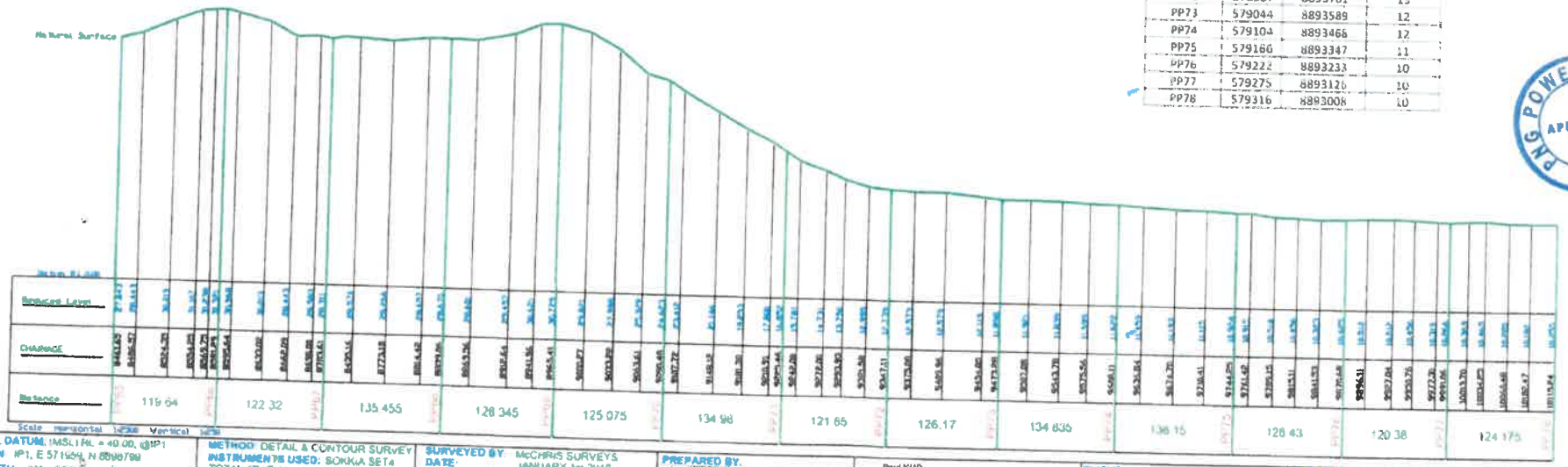
SURVEY OF: GALOMARUBU TO HULA
RURAL ELECTRIFICATION SURVEY PROJECT
PORT MORESBY, NATIONAL CAPITAL DISTRICT
SCALE: 1 AS SHOWN
SHEET 1 OF 14 SHEET
COMP JOB NAME: HULA PSL
DWG NAME: PLAN & PROFILE
PLAN NO: A1/NCD/GALO-HULA

PLAN SCALE: 1:2500



GRID NORTH

POINT COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
PP66	578339	8894039	31
PP67	578457	8894008	28
PP68	578590	8893981	29
PP69	578712	8893950	31
PP70	578820	8893886	25
PP71	578931	8893809	17
PP72	578987	8893701	15
PP73	579044	8893589	12
PP74	579104	8893466	12
PP75	579166	8893347	11
PP76	579222	8893233	10
PP77	579275	8893126	10
PP78	579316	8893008	10



PNG POWER LIMITED APPROVED

LEVEL DATUM: MSL | PL = 40.00, @IP1
ORIGIN: IP1, E 571504, N 8898799
AZIMUTH: IP1 - OEP1 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 55
SURVEY CATEGORY: RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET4 TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURNIL: GRANVILLE
MILIEUX: MORESBY

SURVEYED BY: McCHRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON: BY

PREPARED BY:

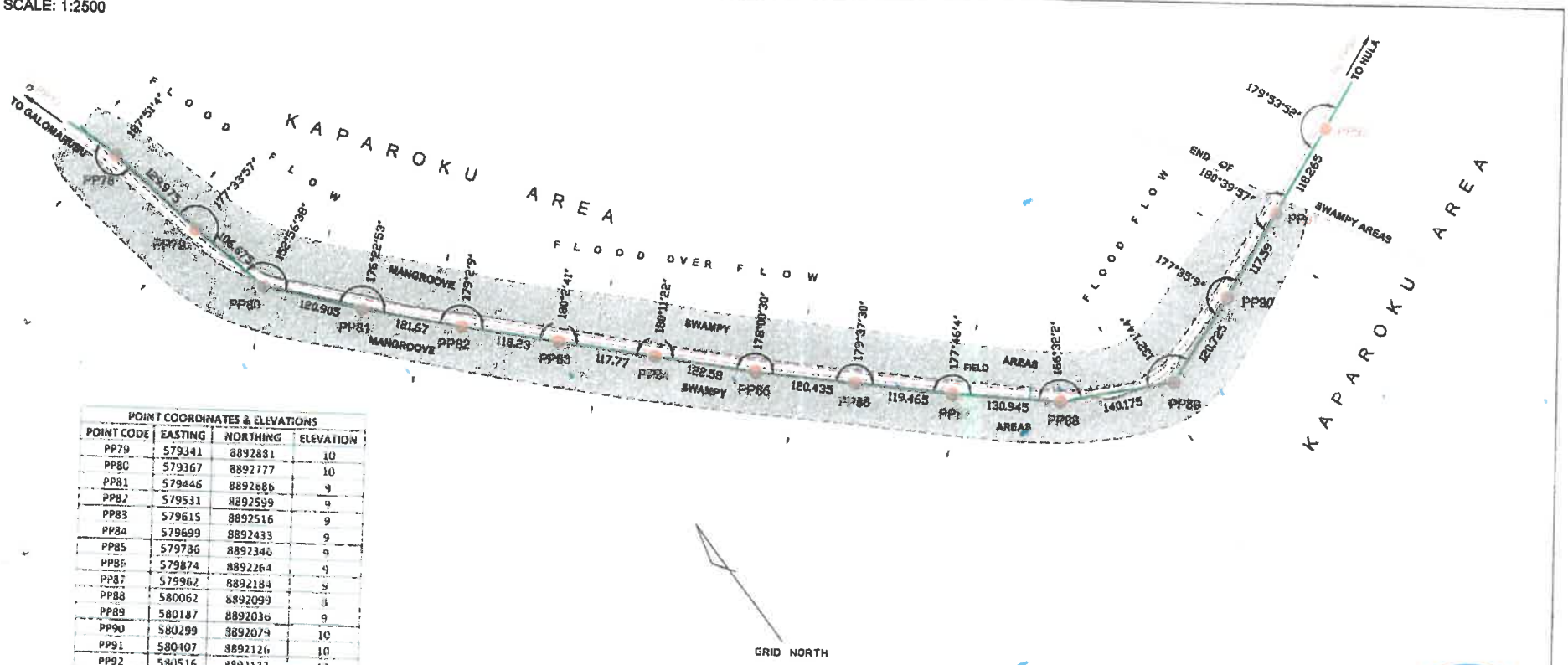
CONTOUR INTERVAL: 8.0m

I, Paul KUP
have been carried out by me or under my direct supervision and is a true and accurate representation of field work carried. The survey complies in all respects with the Standard Survey Instructions, July 1995, and all amendments thereto.
Surveyor ___/___/ 2018

CLIENT: PNG POWER Ltd
REFERENCE PLANS

SURVEY OF: GALOMARUBU TO HULA
RURAL ELECTRIFICATION SURVEY PROJECT
PORT MORESBY, NATIONAL CAPITAL DISTRICT
SCALE: 1 AS SHOWN
SHEET 6 OF 14 SHEET
COMP JOB NAME: HULA PPL
DWG NAME: PLAN & PROFILE.dwg
PLAN NO: A1/NCD/GALO-HULA

PLAN SCALE: 1:2500

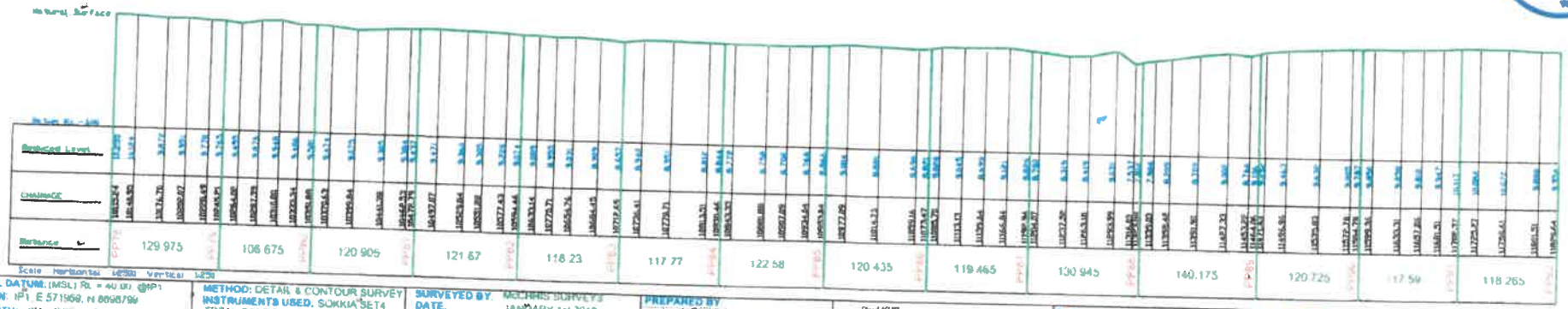


GRID NORTH

POINT COORDINATES & ELEVATIONS

POINT CODE	EASTING	NORTHING	ELEVATION
PP79	579341	8892881	10
PP80	579367	8892777	10
PP81	579446	8892686	9
PP82	579531	8892599	9
PP83	579615	8892516	9
PP84	579699	8892433	9
PP85	579786	8892346	9
PP86	579874	8892264	9
PP87	579962	8892184	9
PP88	580062	8892099	8
PP89	580187	8892036	9
PP90	580299	8892079	10
PP91	580407	8892126	10
PP92	580516	8892173	10

PNG POWER LIMITED APPROVED



LEVEL DATUM: (MSL) RL = 40.00 @PP1
ORIGIN: PP1, E 571969, N 8898796
AZIMUTH: PP1 - PP91 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 55
SURVEY CATEGORY: RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET4 TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURNIL: GRANVILLE
MILANCH: MORESBY

SURVEYED BY: MORRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED On: BY

PREPARED BY

CONTOUR INTERVAL: 8.0m

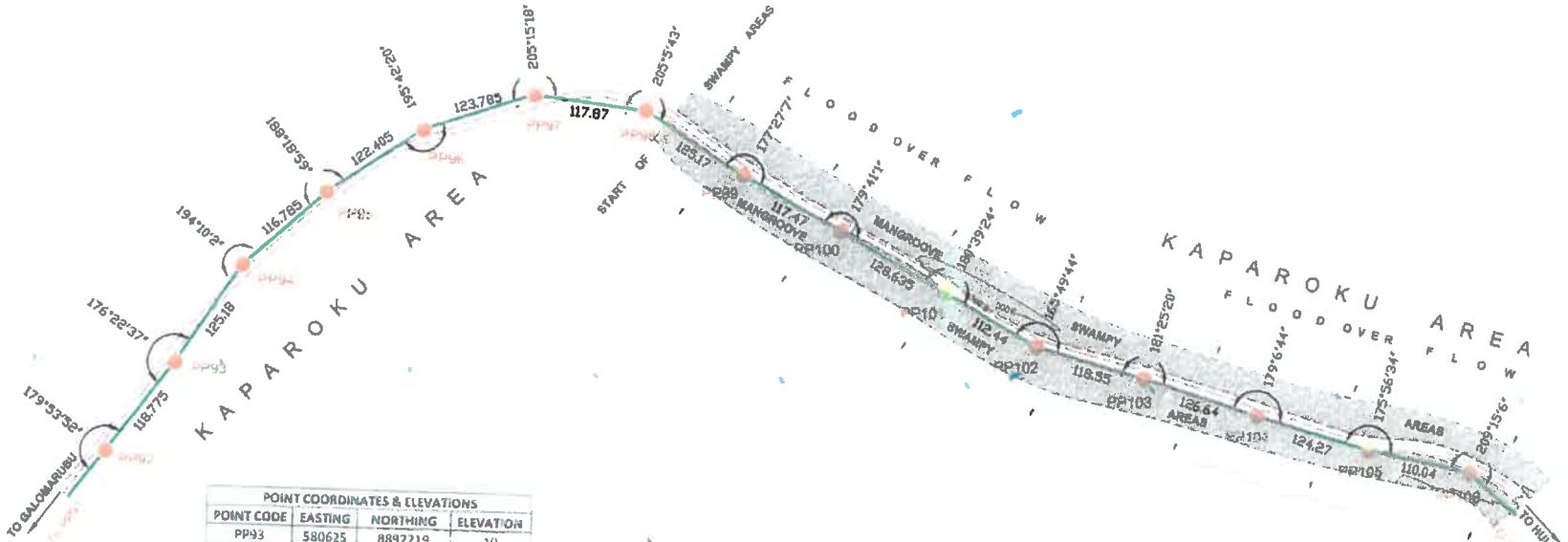
I, Paul KUP
have carried out by me or under my direct supervision and is a true and accurate representation of field work carried. The survey complies in all respects with the Standard Survey Instructions, July 1985, and all amendments thereto.
Surveyor ___/___/ 2018

CLIENT: PNG POWER Ltd

REFERENCE PLANS

SURVEY OF: GALOMARUBU TO HULA
RURAL ELECTRIFICATION SURVEY PROJECT
PORT MORESBY, NATIONAL CAPITAL DISTRICT
SCALE: 1 AS SHOWN
SHEET 1 OF 14 SHEET
COMP JOB NAME: HULA PPL
DWG NAME: PLAN & PROF R.E.dwg
PLAN NO: A1/NCD/GALO-HULA

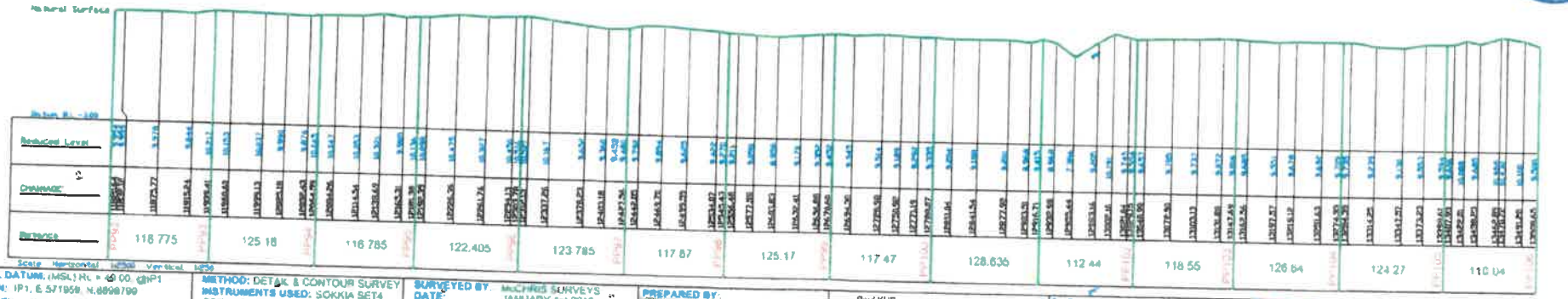
PLAN SCALE: 1:2500



POINT COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
PP93	580625	8892219	10
PP94	580737	8892275	10
PP95	580851	8892300	10
PP96	580973	8892309	11
PP97	581095	8892284	9
PP98	581189	8892214	9
PP99	581248	8892103	9
PP100	581308	8892002	9
PP101	581374	8891892	9
PP102	581431	8891795	10
PP103	581514	8891710	10
PP104	581600	8891618	10
PP105	581687	8891525	10
PP106	581768	8891455	10

GRID NORTH

PNG POWER LIMITED APPROVED



LEVEL DATUM: (MSL) RL = 00. @P1
ORIGIN: IP1, E 571959, N 8898799
AZIMUTH: IP1 - UPP1 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 55
SURVEY CATEGORY: RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET4 TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURMIL: ORANVILLE
MILIMON: MORESBY

SURVEYED BY: McCHRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K. SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON: BY

PREPARED BY:

CONTOUR INTERVAL: 8.0m

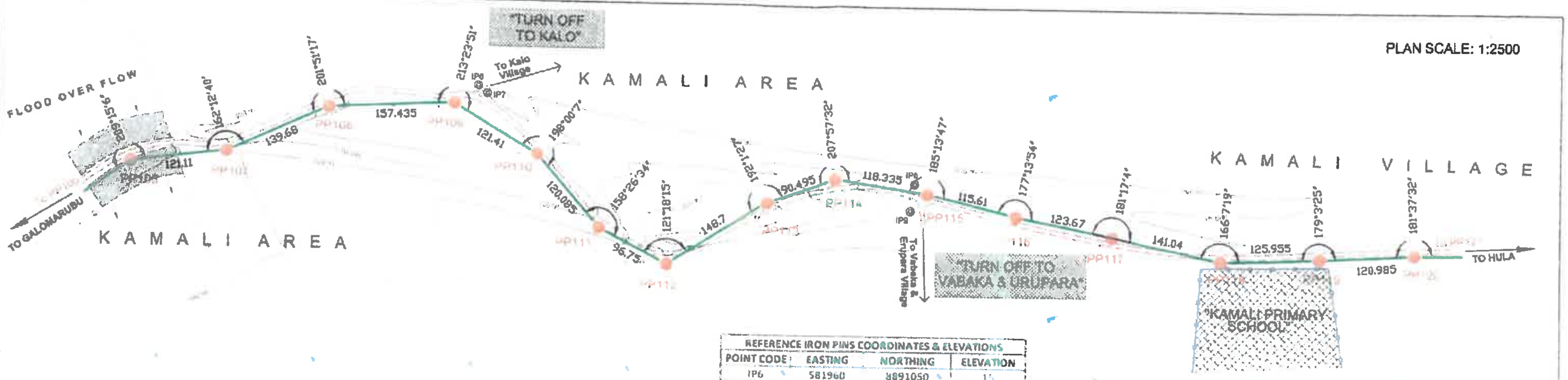
I, Paul KUP
was been carried out by me or under my direct supervision and is a true and accurate representation of field work carried. The survey complies in all respects with the Standard Survey Instructions, July 1985, and all amendments thereto.
Surveyor 2018

CLIENT: PNG POWER Ltd

REFERENCE PLANS

SURVEY OF: GALOMARUBU TO HULA
RURAL ELECTRIFICATION SURVEY PROJECT
PORT MORESBY, NATIONAL CAPITAL DISTRICT
SCALE 1: AS SHOWN
SHEET 8 OF 14 SHEET
COMP JOB NAME: HULA PPL
DWG NAME: PLAN & PROFILE (2sq)
PLAN NO: A1/NCD/GALO-HULA

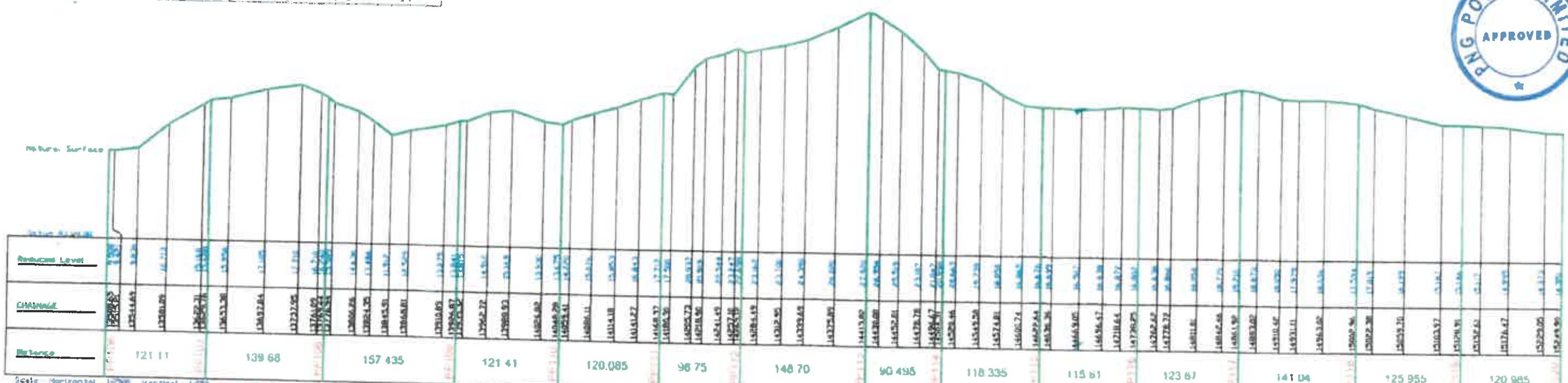
PLAN SCALE: 1:2500



POINT COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
PP107	581807	8891340	16
PP108	581890	8891228	16
PP109	581930	8891076	14
PP110	581891	8890961	14
PP111	581820	8890864	18
PP112	581794	8890771	23
PP113	581897	8890663	28
PP114	581944	8890566	21
PP115	581951	8890468	17
PP116	581948	8890352	17
PP117	581950	8890229	19
PP118	581950	8890088	18
PP119	581980	8889965	15
PP120	582010	8889848	14

REFERENCE IRON PINS COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
IP6	581960	8891050	15
IP7	581952	8891037	16
IP8	581961	8890486	17
IP9	581926	8890484	18

GRID NORTH



PNG POWER LIMITED APPROVED

LEVEL DATUM: (MSL) RL = 40.00 @IP1 ORIGIN: IP1 E:571958, N:8898799 AZIMUTH: IP1 - OPP1 (172° 00' 00") ORIGIN: WGS 84 "MAGELLAN GPS" ZONE: 56 SURVEY CATEGORY: RURAL CLASS 1	METHOD: DETAIL & CONTOUR SURVEY INSTRUMENTS USED: SOKKIA SET4 TOTAL STATION & TRAVERSE KITS PROVINCE: NCD DISTRICT: HULA FOURMIL: GRANVILLE MILINCH: MORESBY	SURVEYED BY: McCHRIS SURVEYS DATE: JANUARY 1st 2018 DRAWN BY: K. SEKE DATE: 15th FEBRUARY 2018 CHECKED BY: PAUL KUP DATE: 20th FEBRUARY 2018 NOTED ON: BY	PREPARED BY: CONTOUR INTERVAL: 8.0m	I, Paul KUP ... has been carried out by me or under my direct supervision and is a true and accurate representation of field work carried ... the survey complies in all respects with the standard survey instructions ... and all amendments thereto Surveyor	CLIENT: PNG POWER Ltd REFERENCE PLANS:

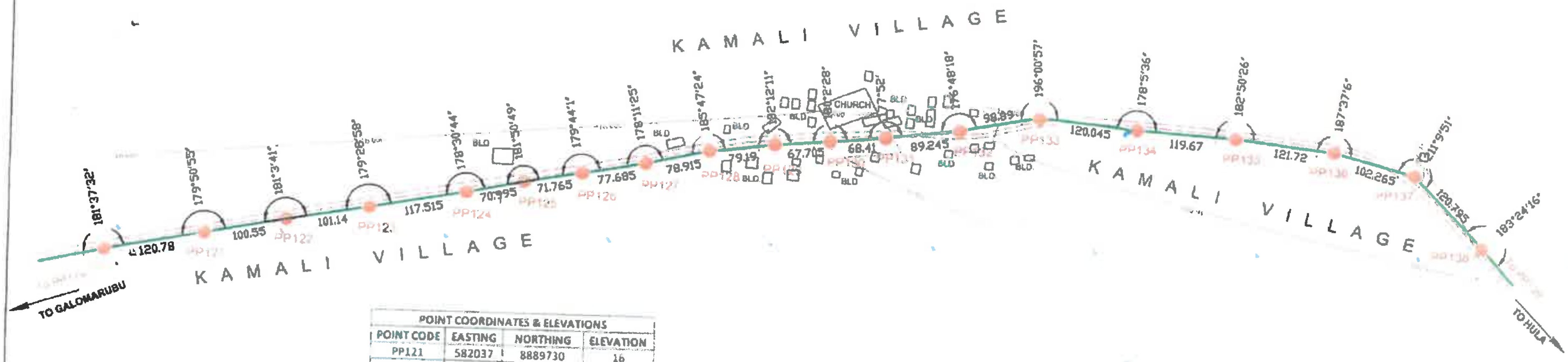
SURVEY OF: GALOMARUBU TO HULA RURAL ELECTRIFICATION SURVEY PROJECT PORT MORESBY, NATIONAL CAPITAL DISTRICT

SCALE: 1 AS SHOWN | SHEET 9 OF 14 SHEET

COMP JOB NAME: HULA PPL | PLAN NO: A1/NCD/GALO-HULA

DWG NAME: PLAN & PROFILE dwg

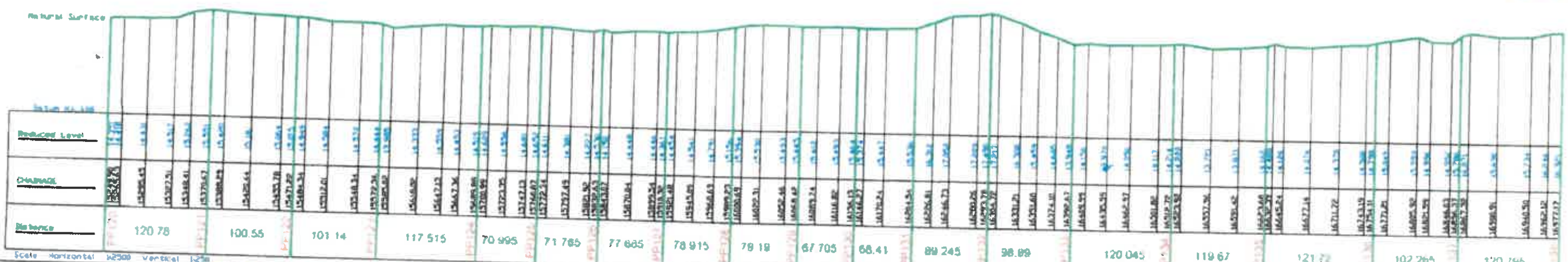
PLAN SCALE: 1:2500



POINT COORDINATES & ELEVATIONS

POINT CODE	EASTING	NORTHING	ELEVATION
PP121	582037	8889730	16
PP122	582060	8889633	15
PP123	582082	8889534	14
PP124	582107	8889419	15
PP125	582124	8889350	15
PP126	582140	8889280	15
PP127	582157	8889204	14
PP128	582177	8889128	15
PP129	582189	8889050	15
PP130	582198	8888982	15
PP131	582206	8888915	16
PP132	582220	8888826	17
PP133	582241	8888730	14
PP134	582232	8888610	14
PP135	582228	8888490	14
PP136	582218	8888369	15
PP137	582196	8888269	16
PP138	582113	8888182	16

GRID NORTH



PNG POWER LIMITED APPROVED

LEVEL DATUM: (MSL) RL = 40.00, @P1
ORIGIN: IP1 E 571959 N 8888799
AZIMUTH: IP1 - OPP1 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 55
SURVEY CATEGORY: RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET4 TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURMIL: GRANVILLE
MILINCH: MORESBY

SURVEYED BY: McCHRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON: BY

PREPARED BY:

CONTOUR INTERVAL 8.0m

I, Paul KUP

CLIENT: PNG POWER Ltd

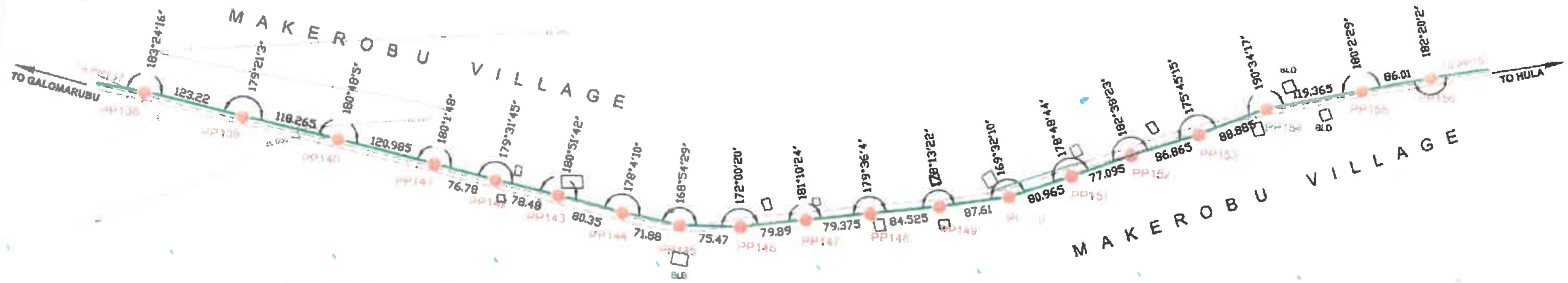
REFERENCE PLANS:

SURVEY OF: GALOMARUBU TO HULA RURAL ELECTRIFICATION SURVEY PROJECT PORT MORESBY, NATIONAL CAPITAL DISTRICT

SCALE 1 : AS SHOWN | SHEET 10 OF 14 SHEET

COMP JOB NAME: HULA PPL
DWG NAME: PLAN & PROFILE.dwg
PLAN NO: A1/NCD/GALO-HULA

PLAN SCALE: 1:2500



POINT COORDINATES & ELEVATIONS

POINT CODE	EASTING	NORTHING	ELEVATION
PP139	582023	8888098	16
PP140	581938	8888016	16
PP141	581849	8887933	15
PP142	581793	8887881	15
PP143	581736	8887827	15
PP144	581676	8887773	15
PP145	581625	8887723	15
PP146	581582	8887661	15
PP147	581547	8887589	14
PP148	581510	8887519	14
PP149	581471	8887444	14
PP150	581433	8887365	13
PP151	581412	8887286	14
PP152	581394	8887212	14
PP153	581369	8887128	14
PP154	581350	8887041	14
PP155	581210	8886722	13
PP156	581160	8886615	13

LEVEL DATUM: (MSL) RL = 40.00 @P1
ORIGIN: IP1 E.571959, N 8898799
AZIMUTH: IP1 - OPP1 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 55
SURVEY CATEGORY: RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET4
TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURMIL: GRANVILLE
MILINCH: MORESBY

SURVEYED BY: McCHRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K. SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON: BY

PREPARED BY

CONTOUR INTERVAL: 8.0m

I, Paul KUP has been carried out by me or under my direct supervision and is a true and accurate representation of said work carried. The survey complies in all respects with the Standard Survey Instructions.

________ Surveyor ___/___/ 2018

CLIENT: PNG POWER Ltd

REFERENCE PLANS

SURVEY OF: GALOMARUBU TO HULA RURAL ELECTRIFICATION SURVEY PROJECT
PORT MORESBY, NATIONAL CAPITAL DISTRICT

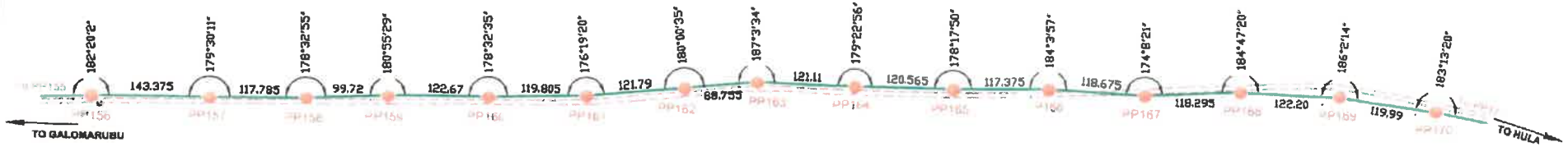
SCALE: 1 AS SHOWN | SHEET 11 OF 14 SHEET

COMP JOB NAME: HULA PPL
DWG NAME PLAN & PROFILE.dwg

PLAN NO: A1/NCD/GALO-HULA

PLAN SCALE: 1:2500

MAKEROBU VILLAGE



MAKEROBU VILLAGE

POINT COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
PP157	581304	8886931	14
PP158	581271	8886852	14
PP159	581122	8886523	13
PP160	581071	8886412	13
PP161	581023	8886302	14
PP162	580983	8886187	14
PP163	580953	8886104	15
PP164	580898	8885995	14
PP165	580845	8885887	14
PP166	580797	8885780	13
PP167	580740	8885676	13
PP168	580695	8885567	13
PP169	580639	8885458	14
PP170	580572	8885358	14

GRID NORTH

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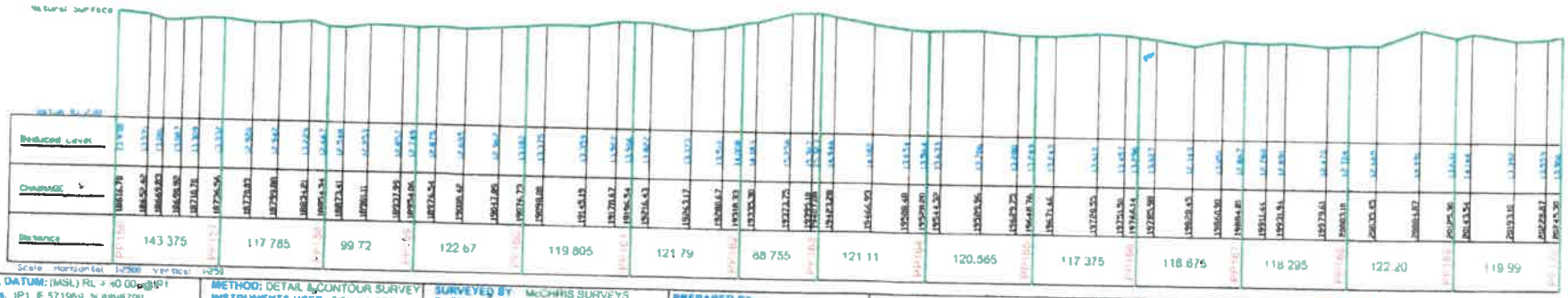


LEVEL DATUM: (MSL) RL = 40.00 @ IP1
ORIGIN: IP1 E 571964, N 8886799
AZIMUTH: IP1 - OPP1 / 172° 00' 00"
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE: 56
SURVEY CATEGORY: RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET4 TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURMIL: GRANVILLE
MILINCH: MORESBY

SURVEYED BY: McCHRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K. SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON: BY

PREPARED BY:

CONTOUR INTERVAL: 8.0m

Paul KUP

CLIENT: PNG POWER Ltd

REFERENCE PLANS:

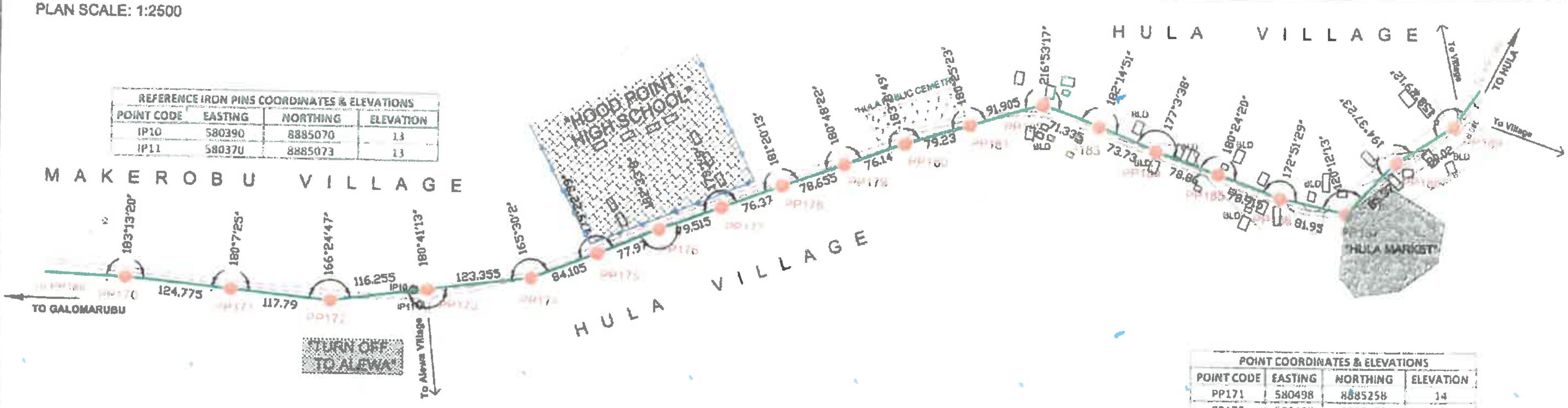
SURVEY OF: GALOMARUBU TO HULA
RURAL ELECTRIFICATION SURVEY PROJECT
PORT MORESBY, NATIONAL CAPITAL DISTRICT

SCALE: 1 AS SHOWN | SHEET 12 OF 14 SHEET

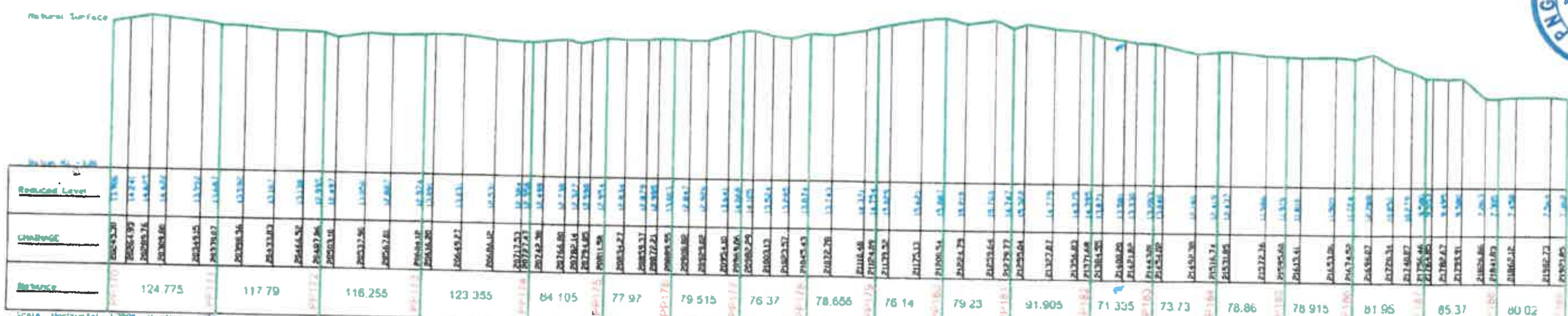
COMP JOB NAME: HULA PPL
DWG NAME: PLAN & PROFILE.dwg
PLAN NO: A1/NCD/GALO-HULA

PLAN SCALE: 1:2500

REFERENCE IRON PINS COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
IP10	580390	8885070	13
IP11	580370	8885073	13



POINT COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
PP171	580498	8885258	14
PP172	580428	8885163	13
PP173	580382	8885057	12
PP174	580332	8884944	12
PP175	580318	8884861	13
PP176	580306	8884784	13
PP177	580291	8884706	14
PP178	580277	8884631	14
PP179	580262	8884553	15
PP180	580247	8884479	16
PP181	580227	8884402	15
PP182	580204	8884313	14
PP183	580146	8884268	13
PP184	580089	8884225	12
PP185	580028	8884175	12
PP186	579966	8884125	12
PP187	579909	8884066	10
PP188	579933	8883984	7
PP189	579934	8883904	7



Scale Horizontal 1:2500 Vertical 1:250

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LEVEL DATUM. (MSL) RL = 40.00 @IP1
ORIGIN: IP1 E 571956 N 8884700
AZIMUTH. IP1 - OPP1 (172° 00' 00")
ORIGIN: WGS 84 "MAGELLAN GPS"
ZONE. 55
SURVEY CATEGORY. RURAL CLASS 1

METHOD: DETAIL & CONTOUR SURVEY
INSTRUMENTS USED: SOKKIA SET4 TOTAL STATION & TRAVERSE KITS
PROVINCE: NCD
DISTRICT: HULA
FOURMIL: GRANVILLE
MILINCH: MORESBY

SURVEYED BY: McCHRIS SURVEYS
DATE: JANUARY 1st 2018
DRAWN BY: K. SEKE
DATE: 15th FEBRUARY 2018
CHECKED BY: PAUL KUP
DATE: 20th FEBRUARY 2018
NOTED ON: BY

PREPARED BY:

CONTOUR INTERVAL 8.0m

I, Paul KUP has been carried out by me or under my direct supervision and is a true and accurate representation of field work carried. The survey complies in all respects with the Standard Survey Instructions July 1995 and all amendments thereto.

_________ Surveyor ___/___/ 2018

CLIENT: PNG POWER Ltd

REFERENCE PLANS

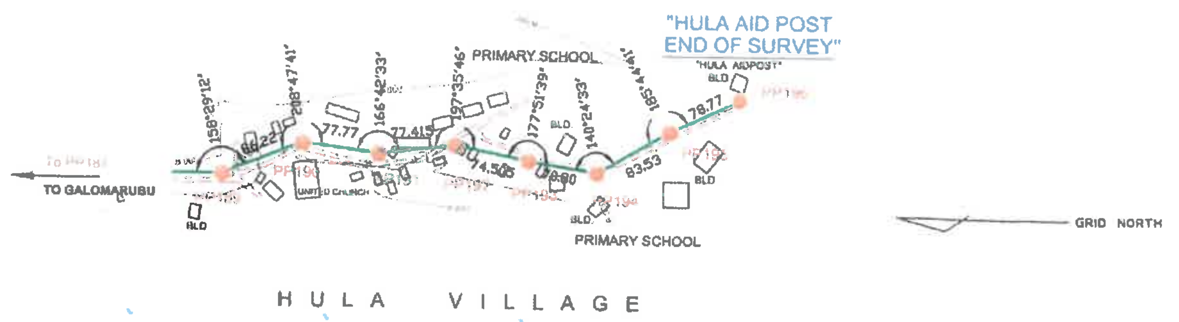
SURVEY OF: QALOMARUBU TO HULA RURAL ELECTRIFICATION SURVEY PROJECT PORT MORESBY, NATIONAL CAPITAL DISTRICT

SCALE 1 AS SHOWN | SHEET 13 OF 14 SHEET

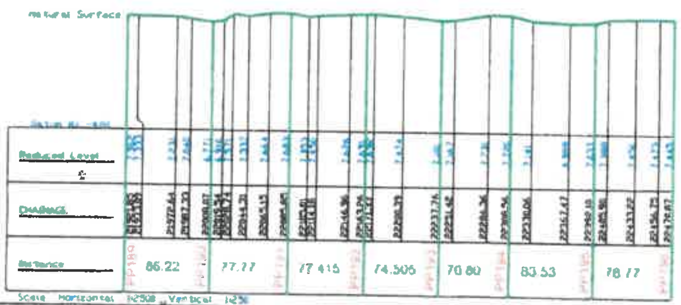
COMP JOB NAME: HULA PPL
DWG NAME: PLAN & PROFILE.dwg

PLAN NO: A1/NCD/GALO-HULA

PLAN SCALE: 1:2500



POINT COORDINATES & ELEVATIONS			
POINT CODE	EASTING	NORTHING	ELEVATION
PP190	579967	8883825	7
PP191	579959	8883747	6
PP192	579969	8883671	8
PP193	579955	8883597	7
PP194	579945	8883527	6
PP195	579988	8883456	7
PP196	580022	8883385	7



LEVEL DATUM: (MSL) RL = 40.00, @IP1 ORIGIN: IP1 E 571950, N 8898786 AZIMUTH: IP1 - OPP1 (172° 00' 00") ORIGIN: WGS 84 "MAGELLAN GPS" ZONE: 56 SURVEY CATEGORY: RURAL CLASS 1	METHOD: DETAIL & CONTOUR SURVEY INSTRUMENTS USED: SOKKIA SET4 TOTAL STATION & TRAVERSE KITS PROVINCE: NCD DISTRICT: HULA FOURMIL: GRANVILLE MILINCH: MORESBY	SURVEYED BY: McCHRIS SURVEYS DATE: JANUARY 1st 2018 DRAWN BY: K. SEKE DATE: 15th FEBRUARY 2018 CHECKED BY: PAUL KUP DATE: 20th FEBRUARY 2018 NOTED ON: BY	PREPARED BY: CONTOUR INTERVAL 8.0m	I, Paul KUP has been carried out by me or under my direct supervision and is a true and accurate representation of field work carried. The survey complies in all respects with the Standard Survey Instructions ... 1985 and all amendments thereto. Surveyor ___/___/ 2018	CLIENT: PNG POWER Ltd REFERENCE PLANS	SURVEY OF: GALOMARUBU TO HULA RURAL ELECTRIFICATION SURVEY PROJECT PORT MORESBY, NATIONAL CAPITAL DISTRICT SCALE: 1 AS SHOWN / SHEET 14 OF 14 SHEET COMP JOB NAME: HULA PPL / PLAN NO: A1/NCD/GALO-HULA DWG NAME: PLAN & PROFILE.dwg

PNG POWER LIMITED APPROVED

HULA PROJECT - MATERIALS LIST AND CONSTRUCTION TYPES

	PPL VOCAB	CONSTRUCTION TYPE	QTY	UOI	COST
1		X235C4	127	ea	
2		X236C3	1	ea	
3		X237C1	2	ea	
4		X238C3	20	ea	
5		X240C4	46	ea	
		TOTAL	**196**		
		TRANSFORMERS	**QTY**		
1		25kVA/22kV/1Phase	3	ea	
2		100kVA/22kV/3Phase	8	ea	
			11		
		STEEL POLES	**QTY**		
1		Steel Pole UC150/9m	0	ea	
2		Steel Pole UC150/10m	22	ea	
3		Steel Pole UC150/11m	97	ea	
4		Steel Pole UC150/12m	51	ea	
5		Steel Pole UC200/9m	0	ea	
6		Steel Pole UC200/10m	1	ea	
7		Steel Pole UC200/11m	12	ea	
8		Steel Pole UC200/12m	9	ea	
9		Steel Pole UC200/14m	4	ea	
			196		
		STAY	**QTY**		
1		X192.00G	33	ea	
2		X192.00H	13	ea	
3		X192.75G	17	ea	
4		X192.75H	7	ea	
			70		
		ACSR CONDUCTORS			
1		APPLE 6/1/3/1	70,000	meters	
2		CHEERY	40000	meters	
		LINES HARDWARE LIST			
1	132001A	Insulator, strain "Polymer" 22KV	Each	81	
2	132006	Insulator, 22KV Pin type	Each	688	
3	132016	Pin, insulator HV type c/200/11	Each	688	
4	132029	Bracket, Mild Steel, X-Arm LV/Hv	Each	282	
5	132029A	Bracket,Strain Insulator, Steel Pole	Each	27	
6	132031	Hook, tougue for 16MM clevis insulators	Each	81	
7	132054	Cross arm, 2700x100x125MM Hard wood	Each	8	
8	132056	Cross arm, 2100x100x125MM Hard wood	Each	46	
9	132057	Cross arm, 2100x100x100MM Hard wood	Each	228	
10	132137	Armour rod, 6/4.75-7/1.60 ACSR 'Cherry'	Set	540	
11	132143	Clamp, Parallel Groove for Al 9-16MM Dia.	Each	6	
12	132157	Dead-end, 6/4.75 - 7/1.60 ACSR 'Cherry'	Each	81	
13	132180	Wire-tie, aluminium 5.18MM dia.	Kg	63.7	
14	132182	Clevis-thimble, 16MM forpreformed Deadend	Each	81	
15	139241	Nail, knuckle, shunt plate 89 x 159 MM	Each	796	
16	140091	Bolt & Nut, M16 160MM hexagen galvanised	Each	108	
17	140093	Bolt & Nut, M16 140MM galvanised	Each	456	
18	140657	Stud, M20 x 600MM galvanised	Each	54	
19	140660	Stud, M20 x 500MM galvanised	Each	96	
20	141024	Eye nut, M20 galvanised	Each	54	
21	141051	Washers, round flat galvanised M16	Kg	11.28	
22	141053	Washers, square flat 75 x 75MM M20 galvanised	Each	600	