C1.1: Form of Offer & Acceptance

Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of:

DESCRIPTION OF THE WORKS: THE CONVERSION OF THE UNUSED LAB BUILDING INTO THE OFFICE SPACE FOR THE REQUIRED PURPOSE AT TPL DURBAN DEPOT

The tenderer, identified in the Offer signature block, has examined the documents listed in the Tender Data and addenda thereto as listed in the Returnable Schedules, and by submitting this Offer has accepted the Conditions of Tender

By the representative of the tenderer, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance the tenderer offers to perform all of the obligations and liabilities of the *Contractor* under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the *conditions of contract* identified in the Contract Data.

The offered total of the Prices exclusive of VAT is	
Value Added Tax @ 15% is	
The offered total of the Prices inclusive of VAT is	
(in words)	

This Offer may be accepted by the Employer by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document including the Schedule of Deviations (if any) to the tenderer before the end of the period of validity stated in the Tender Data, or other period as agreed, whereupon the tenderer becomes the party named as the *Contractor* in the *conditions of contract* identified in the Contract Data.

Signature(s) .....

Name(s) .....

Capacity .....

For the tenderer: .....

Name & signature of witness .....

Date .....

Tenderer's CIDB registration number: .....

Acceptance

By signing this part of this Form of Offer and Acceptance, the *Employer* identified below accepts the tenderer's Offer. In consideration thereof, the *Employer* shall pay the *Contractor* the amount due in accordance with the *conditions of contract* identified in the Contract Data. Acceptance of the tenderer's Offer shall form an agreement between the *Employer* and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract, are contained in:

Part C1	Agreements and Contract Data, (which includes this Form of Offer and Acceptance)
Part C2	Pricing Data
Part C3	Scope of Work: Works Information
Part C4	Site Information

and drawings and documents (or parts thereof), which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Returnable Schedules as well as any changes to the terms of the Offer agreed by the tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Form of Offer and Acceptance. No amendments to or deviations from said documents are valid unless contained in this Schedule.

The tenderer shall within two weeks of receiving a completed copy of this agreement, including the Schedule of Deviations (if any), contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the *conditions of contract* identified in the Contract Data at, or just after, the date this agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed original copy of this document, including the Schedule of Deviations (if any).

Unless the tenderer (now *Contractor*) within five working days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the Parties.

Signature(s)			
Name(s)			
Capacity			
for the Employer	Transnet SOC Ltd 202 Anton Lembede Street Durban, 4001		
Name & signature of witness		Date	

Schedule of Deviations

Note:

1. To be completed by the Employer prior to award of contract. This part of the Offer & Acceptance would not be required if the contract has been developed by negotiation between the Parties and is not the result of a process of competitive tendering.
2. The extent of deviations from the tender documents issued by the Employer prior to the tender closing date is limited to those permitted in terms of the Conditions of Tender.
3. A tenderer's covering letter must not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid be the subject of agreement reached during the process of Offer and Acceptance, the outcome of such agreement shall be recorded here and the final draft of the contract documents shall be revised to incorporate the effect of it.

No.	Subject	Details
1		
2		
3		
4		

By the duly authorised representatives signing this Schedule of Deviations below, the Employer and the tenderer agree to and accept this Schedule of Deviations as the only deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules, as well as any confirmation, clarification or changes to the terms of the Offer agreed by the tenderer and the Employer during this process of Offer and Acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the tenderer of a completed signed copy of this Form shall have any meaning or effect in the contract between the parties arising from this Agreement.

	For the tenderer:	**For the Employer**
Signature	.....	.....
Name	.....	.....
Capacity	.....	.....
On behalf of	.....	Transnet SOC Ltd 202 Anton Lembede Street Durban, 40009
Name & signature of witness	.....	.....
Date	.....	.....

C1.2 Contract Data

Part one - Data provided by the *Employer*

Clause	Statement	Data	
1	**General**		
	The *conditions of contract* are the core clauses and the clauses for main Option		
		A:	**Priced contract with activity schedule**
	dispute resolution Option	**W1:**	**Dispute resolution procedure**
	and secondary Options		
		X2	**Changes in the law**
		X5:	**Sectional Completion**
		X7:	**Delay damages**
		X13:	**Performance Bond**
		X16:	**Retention**
		X18:	**Limitation of liability**
		Z:	***Additional conditions of contract***
	of the NEC3 Engineering and Construction Contract June 2005 (amended June 2006 and April 2013)		
10.1	The *Employer* is:	**Transnet SOC Ltd (Registration No. 1990/000900/30)**	

	Address Having elected its Contractual Address for the purposes of this contract as:	Registered address: **Transnet Corporate Centre** **138 Eloff Street** **Braamfontein** **Johannesburg** **2000** **Transnet Pipelines** **202 Anton Lembede Street** **Durban, South Africa** **4001**
10.1	The *Project Manager* is: (Name) Address Tel e-mail	**Khulekani Ndlela** **202 Anton Lembede Street, Durban, 4001** **031 361 1116** **Khulekani.Ndlela@transnet.net**
10.1	The *Supervisor* is: (Name) Address Tel No. e-mail	**TBA**
11.2(13)	The *works* are	**The Design, Supply, Installation, And Commissioning of a Solar PV Renewable Energy Project at Transnet Pipelines Alrode and Ladysmith Workshops**
11.2(14)	The following matters will be included in the Risk Register	**None**
11.2(15)	The *boundaries of the site* are	**Included in Part C3.1." Description of the Site and it surroundings"**
11.2(16)	The Site Information is in	**Included in Part C3.1**
11.2(19)	The Works Information is in	**Part C3**
12.2	The *law of the contract* is the law of	**the Republic of South Africa subject to the jurisdiction of the Courts of South Africa.**
13.1	The *language of this contract* is	**English**
13.3	The *period for reply* is	**4 weeks**

2	**The *Contractor*'s main responsibilities**	**No additional data is required for this section of the *conditions of contract*.**
3	**Time**	
11.2(3)	The *completion date* for the whole of the *works* is	**30 November 2024**
11.2(9)	The *key date*s and the *condition*s to be met are:	***Condition* to be met** / ***key date*** **1 Completion of the works at Ladysmith** / **30 April 2024** **2 Completion of the works at Alrode** / **30 November 2024**
30.1	The *access dates* are	**Part of the Site** / **Date** **1 Ladysmith Workshop** / **02 October 2024** **2 Alrode Workshop** / **01 May 2024**
31.1	The *Contractor* is to submit a first programme for acceptance within	**2 weeks of the Contract Date.**
31.2	The *starting date* is	**02 October 2023**
32.2	The *Contractor* submits revised programmes at intervals no longer than	**4 weeks.**
4	**Testing and Defects**	
42.2	The *defects date* is	**52 (fifty two) weeks after Completion of the whole of the *works*.**
43.2	The *defect correction period* is	**2 weeks**
5	**Payment**	
50.1	The *assessment interval* is monthly on the	**15th (fifteenth) day of each successive month.**
51.1	The *currency of this contract* is the	**South African Rand.**
51.2	The period within which payments are made is	**Payment will be effected on or before the last day of the month following the month during which a valid Tax Invoice and Statement were received.**

51.4	The *interest rate* is	**the prime lending rate of Standard Bank of South Africa.**
6	**Compensation events**	
60.1(13)	The *weather measurements* to be recorded for each calendar month are,	**the cumulative rainfall (mm)**
		the number of days with rainfall more than 10 mm
		the number of days with minimum air temperature less than 0 degrees Celsius
		the number of days with snow lying at 08:00 hours South African Time
	The place where weather is to be recorded (on the Site) is:	**The *Contractor*'s Site establishment area**
	The *weather data* are the records of past *weather measurements* for each calendar month which were recorded at:	**The closest weather station to the Contractor's Site establishment area**
	and which are available from:	**South African Weather Service 012 367 6023 or info3@weathersa.co.za.**
7	**Title**	**No additional data is required for this section of the *conditions of contract*.**
8	**Risks and insurance**	
80.1	These are additional *Employer*'s risks	**None**
84.1	The *Employer* provides these insurances from the Insurance Table	
	1 Insurance against:	**Loss of or damage to the *works*, Plant and Materials is as stated in the Insurance policy for Contract Works/ Public Liability.**

	Cover / indemnity:	**to the extent as stated in the insurance policy for Contract Works / Public Liability**
	The deductibles are:	**as stated in the insurance policy for Contract Works / Public Liability**
2	Insurance against:	**Loss of or damage to property (except the *works*, Plant and Materials & Equipment) and liability for bodily injury to or death of a person (not an employee of the *Contractor)* arising out of or in connection with the performance of the Contract as stated in the insurance policy for Contract Works / Public Liability**
	Cover / indemnity	**Is to the extent as stated in the insurance policy for Contract Works / Public Liability**
	The deductibles are	**as stated in the insurance policy for Contract Works / Public Liability**
3	Insurance against:	**Loss of or damage to Equipment (Temporary Works only) as stated in the insurance policy for contract Works and Public Liability**
	Cover / indemnity	**Is to the extent as stated in the insurance policy for Contract Works / Public Liability**
	The deductibles are:	**As stated in the insurance policy for Contract Works / Public Liability**
4	Insurance against:	**Contract Works SASRIA insurance subject to the terms, exceptions and conditions of the SASRIA coupon**
	Cover / indemnity	**Cover / indemnity is to the extent provided by the SASRIA coupon**
	The deductibles are	**The deductibles are, in respect of each and every theft claim, 0,1% of the contract value subject to a minimum of R2,500 and a maximum of R25,000.**

	Note:	**The deductibles for the insurance as stated above are listed in the document titled "Certificate of Insurance: Transnet (SOC) Limited Principal Controlled Insurance."**
84.1	The minimum limit of indemnity for insurance in respect of death of or bodily injury to employees of the *Contractor* arising out of and in the course of their employment in connection with this contract for any one event is	**The *Contractor* must comply at a minimum with the provisions of the Compensation for Occupational Injuries and Diseases Act No. 130 of 1993 as amended.**
	The *Contractor* provides these additional Insurances	**1 Where the contract requires that the design of any part of the *works* shall be provided by the *Contractor* the *Contractor* shall satisfy the *Employer* that professional indemnity insurance cover in connection therewith has been affected** **2 Where the contract involves manufacture, and/or fabrication of Plant & Materials, components or other goods to be incorporated into the *works* at premises other than the site, the *Contractor* shall satisfy the *Employer* that such plant & materials, components or other goods for incorporation in the *works* are adequately insured during manufacture and/or fabrication and transportation to the site.** **3 Should the *Employer* have an insurable interest in such items during manufacture, and/or fabrication, such interest shall be noted by endorsement to the *Contractor's* policies of insurance as well as those of any sub-contractor** **4 Motor Vehicle Liability Insurance comprising (as a minimum) "Balance of Third Party" Risks including Passenger and Unauthorised Passenger Liability indemnity with a minimum indemnity limit of R 5 000 000.**

		5 The insurance coverage referred to in 1, 2, 3 and 4 above shall be obtained from an insurer(s) in terms of an insurance policy approved by the *Employer*. The *Contractor* shall arrange with the insurer to submit to the *Project Manager* the original and the duplicate original of the policy or policies of insurance and the receipts for payment of current premiums, together with a certificate from the insurer or insurance broker concerned, confirming that the policy or policies provide the full coverage as required. The original policy will be returned to the *Contractor.*
84.2	The minimum limit of indemnity for insurance in respect of loss of or damage to property (except the works, Plant, Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the *Contractor*) caused by activity in connection with this contract for any one event is	**Whatever the *Contractor* requires in addition to the amount of insurance taken out by the *Employer* for the same risk.**
84.2	The insurance against loss of or damage to the works, Plant and Materials as stated in the insurance policy for contract works and public liability selected from:	**Principal Controlled Insurance policy for Contract**
9	**Termination**	**There is no additional Contract Data required for this section of the *conditions of contract*.**
10	**Data for main Option clause**	
A	**Priced contract with Activity Schedule**	**No additional data is required for this Option.**
11	**Data for Option W1**	

W1.1	The *Adjudicator* is	**Both parties will agree as and when a dispute arises. If the parties cannot reach an agreement on the *Adjudicator*, the Chairman of the Association of Arbitrators will appoint an *Adjudicator*.**
W1.2(3)	The *Adjudicator nominating body* is:	**The Chairman of the Association of Arbitrators (Southern Africa)**
	If no *Adjudicator nominating body* is entered, it is:	**the Association of Arbitrators (Southern Africa)**
W1.4(2)	The *tribunal* is:	**Arbitration**
W1.4(5)	The *arbitration procedure* is	**The Rules for the Conduct of Arbitrations of the Association of Arbitrators (Southern Africa)**
	The place where arbitration is to be held is	**Durban, South Africa**
	The person or organisation who will choose an arbitrator - if the Parties cannot agree a choice or - if the arbitration procedure does not state who selects an arbitrator, is	**The Chairman of the Association of Arbitrators (Southern Africa)**
12	**Data for secondary Option clauses**	
X2	**Changes in the law**	**No additional data is required for this Option**
X5 & X7	**Sectional Completion and delay damages used together**	
X7.1 X5.1	Delay damages for late Completion of the *sections* of the *works* are:	

Section	**Description**	**Amount per day**
1	**Completion of the works at Ladysmith**	**R 1000/day**
2	**Completion of the works at Alrode**	**R 1000/day**

X13	**Performance bond**	
X13.1	The amount of the performance bond is	**5% of the total of the Prices**
X16	**Retention**	
X16.1	The retention free amount is	**Nil**
	The retention percentage is	**10% on all payments certified.**
X18	**Limitation of liability**	
X18.1	The *Contractor*'s liability to the *Employer* for indirect or consequential loss is limited to:	**Nil**
X18.2	For any one event, the *Contractor's* liability to the *Employer* for loss of or damage to the *Employer's* property is limited to:	**The deductible of the relevant insurance policy**
X18.3	The *Contractor's* liability for Defects due to his design which are not listed on the Defects Certificate is limited to:	**The cost of correcting the Defect**
X18.4	The *Contractor's* total liability to the *Employer* for all matters arising under or in connection with this contract, other than excluded matters, is limited to:	**The Total of the Prices**
X18.5	The *end of liability date* is	**5 years after Completion of the whole of the *works***

Z	***Additional conditions of contract* are*:***	
Z1	**Additional clause relating to Performance Bonds and/or Guarantees**	
Z1.1		**The Performance Guarantee under X13 above shall be an irrevocable, on-demand performance guarantee, to be issued exactly in the form of the Pro Forma documents provided for this purpose under C1.3 (Forms of Securities), in favour of the *Employer* by a financial institution reasonably acceptable to the *Employer.***

Z2 Additional clauses relating to Joint Venture

Z2.1 **Insert the additional core clause 27.5**

27.5. In the instance that the *Contractor* is a joint venture, the *Contractor* shall provide the *Employer* with a certified copy of its signed joint venture agreement, and in the instance that the joint venture is an 'Incorporated Joint Venture,' the Memorandum of Incorporation, within 4 (four) weeks of the Contract Date.
The Joint Venture agreement shall contain but not be limited to the following:

- **A brief description of the Contract and the Deliverables;**
- **The name, physical address, communications addresses and domicilium citandi et executandi of each of the constituents and of the Joint Venture;**
- **The constituent's interests;**
- **A schedule of the insurance policies, sureties, indemnities and guarantees which must be taken out by the Joint Venture and by the individual constituents;**
- **Details of an internal dispute resolution procedure;**
- **Written confirmation by all of the constituents:**
  - **i. of their joint and several liabilities to the *Employer* to Provide the Works;**
  - **ii. identification of the lead partner in the joint venture confirming the authority of the lead partner to bind the joint venture through the *Contractor's* representative;**
  - **iii. Identification of the roles and responsibilities of the**

		constituents to provide the Works. • **Financial requirements for the Joint Venture:** **iv.** **the working capital requirements for the Joint Venture and the extent to which and manner whereby this will be provided and/or guaranteed by the constituents from time to time;** **v.** **the names of the auditors and others, if any, who will provide auditing and accounting services to the Joint Venture.**
Z2.2		**Insert additional core clause 27.6** **27.6. The *Contractor* shall not alter its composition or legal status of the Joint Venture without the prior approval of the *Employer.***
Z3	**Additional obligations in respect of Termination**	
Z3.1		**The following will be included under core clause 91.1:** **In the second main bullet, after the word 'partnership' add 'joint venture whether incorporate or otherwise (including any constituent of the joint venture)' and** **Under the second main bullet, insert the following additional bullets after the last sub-bullet:** • **commenced business rescue proceedings (R22)** • **repudiated this Contract (R23)**

Z3.2	**Termination Table**	**The following will be included under core clause 90.2 Termination Table as follows:** **Amend "A reason other than R1 – R21" to "A reason other than R1 – R23"**
Z3.3		**Amend "R1 – R15 or R18" to "R1 – R15, R18, R22 or R23."**
Z4	**Right Reserved by the *Employer* to Conduct Vetting through SSA**	
Z4.1		**The *Employer* reserves the right to conduct vetting through State Security Agency (SSA) for security clearances of any *Contractor* who has access to National Key Points for the following without limitations:** **1. Confidential – this clearance is based on any information which may be used by malicious, opposing or hostile elements to harm the objectives and functions of an organ of state.** **2. Secret – clearance is based on any information which may be used by malicious, opposing or hostile elements to disrupt the objectives and functions of an organ of state.** **3. Top Secret – this clearance is based on information which may be used by malicious, opposing or hostile elements to neutralise the objectives and functions of an organ of state.**
Z5	**Additional Clause Relating to Collusion in the Construction Industry**	
Z5.1		**The contract award is made without prejudice to any rights the *Employer* may have to take appropriate action later with regard to any declared tender rigging including blacklisting.**

Z6	**Protection of Personal Information Act**	
Z6.1		**The *Employer* and the *Contractor* are required to process information obtained for the duration of the Agreement in a manner that is aligned to the Protection of Personal Information Act.**

C1.2 Contract Data

Part two - Data provided by the *Contractor*

The tendering *Contractor* is advised to read both the NEC3 Engineering and Construction Contract - June 2005 (with amendments June 2006 and April 2013) and the relevant parts of its Guidance Notes (ECC3-GN) in order to understand the implications of this Data which the tenderer is required to complete. An example of the completed Data is provided on pages 156 to 158 of the ECC3 Guidance Notes.

Completion of the data in full, according to Options chosen, is essential to create a complete contract.

Clause	Statement	Data
10.1	The *Contractor* is (Name):	
	Address	
	Tel No.	
	Fax No.	
11.2(8)	The *direct fee percentage* is	**%**
	The *subcontracted fee percentage* is	**%**
11.2(18)	The *working areas* are the Site and	
24.1	The *Contractor's* key persons are:	
	1 Name:	
	Job:	
	Responsibilities:	
	Qualifications:	
	Experience:	
	2 Name:	
	Job	
	Responsibilities:	
	Qualifications:	
	Experience:	

		CV's (and further key persons data including CVs) are appended to Tender Schedule entitled .		
11.2(14)	The following matters will be included in the Risk Register			
31.1	The programme identified in the Contract Data is			
A	**Priced contract with activity schedule**			
11.2(20)	The *activity schedule* is in			
11.2(30)	The tendered total of the Prices is	**(in figures)** **(in words), excluding VAT**		
A	**Priced contract with activity schedule**	**Data for the Shorter Schedule of Cost Components**		
41 in SSCC	The percentage for people overheads is:	**%**		
21 in SSCC	The published list of Equipment is the last edition of the list published by			
	The percentage for adjustment for Equipment in the published list is	**%** (state plus or minus)		
22 in SSCC	The rates of other Equipment are:	**Equipment**	**Size or capacity**	**Rate**
61 in SSCC	The hourly rates for Defined Cost of design outside the Working Areas are	**Category of employee**	**Hourly rate**	

62 in SSCC	The percentage for design overheads is	**%**	
63 in SSCC	The categories of design employees whose travelling expenses to and from the Working Areas are included in Defined Cost are:		

C1.3 Forms of Securities

Pro forma Performance Guarantee

For use with the NEC3 Engineering & Construction Contract - June 2005 (with amendments June 2006 and April 2013)

The *conditions of contract* stated in the Contract Data Part 1 include the following Secondary Option:

Option X13: Performance bond

The pro forma document for this Guarantee is provided here for convenience but is to be treated as part of the *Works Information*.

The organisation providing the Guarantee does so by copying the pro forma document onto its letterhead without any change to the text or format and completing the required details. The completed document is then given to the *Employer* within the time stated in the contract.

The Performance Bond needs to be issued by an institution that are reasonably acceptable to the *Employer*.

Transnet may choose to not to accept an Issuer. Should the issuer not being accepted, the performance bond needs to be replaced by an issuer that are acceptable to Transnet. Issuers need to be verified for acceptance by Transnet before a performance bond is issued.

Pro-forma Performance Bond (for use with Option X13)

(to be reproduced exactly as shown below on the letterhead of the Surety)

Transnet SOC Ltd
C/o Transnet Pipelines
Transnet Corporate Centre
138 Eloff Street
Braamfontein
Johannesburg
2000

Date:

Dear Sirs,

Performance Bond for Contract No. TPL/2022/02/0070/RFP

With reference to the above numbered contract made or to be made between

Transnet SOC Limited, Registration No. 1990/000900/30 (the *Employer*) and

{Insert registered name and address of the *Contractor*} (the *Contractor*), for

{Insert details of the *works* from the Contract Data} (the *works*).

I/We the undersigned .....

on behalf of the Guarantor .....

of physical address .....

.....

and duly authorised thereto do hereby bind ourselves as Guarantor and co-principal debtors in solidum for the due and faithful performance of all the terms and conditions of the Contract by the *Contractor* and for all losses, damages and expenses that may be suffered or incurred by the *Employer* as a result of non-performance of the Contract by the *Contractor*, subject to the following conditions:

1. The terms *Employer*, *Contractor*, *Project Manager*, *works* and Completion Certificate have the meaning as assigned to them by the *conditions of contract* stated in the Contract Data for the aforesaid Contract.

2. We renounce all benefits from the legal exceptions "Benefit of Excussion and Division", "No value received" and all other exceptions which might or could be pleaded against the validity of this bond, with the meaning and effect of which exceptions we declare ourselves to be fully acquainted.

3. The *Employer* has the absolute right to arrange his affairs with the *Contractor* in any manner which the *Employer* deems fit and without being advised thereof the Guarantor shall not have the right to claim his release on account of any conduct alleged to be prejudicial to the Guarantor. Without derogating from the foregoing compromise, extension of the construction period, indulgence, release or variation of the *Contractor's* obligation shall not affect the validity of this performance bond.

4. This bond will lapse on the earlier of

- the date that the Guarantor receives a notice from the *Project Manager* stating that the Completion Certificate for the whole of the *works* has been issued, that all amounts due from the *Contractor* as certified in terms of the contract have been received by the *Employer* and that the *Contractor* has fulfilled all his obligations under the Contract, or

- the date that the Surety issues a replacement Performance Bond for such lesser or higher amount as may be required by the *Project Manager*.

5. Always provided that this bond will not lapse in the event the Guarantor is notified by the *Project Manager*, (before the dates above), of the *Employer's* intention to institute claims and the particulars thereof, in which event this bond shall remain in force until all such claims are paid and settled.

6. The amount of the bond shall be payable to the *Employer* upon the *Employer's* demand and no later than 7 days following the submission to the Guarantor of a certificate signed by the *Project Manager* stating the amount of the *Employer's* losses, damages and expenses incurred as a result of the non-performance aforesaid. The signed certificate shall be deemed to be conclusive proof of the extent of the *Employer's* loss, damage and expense.

7. Our total liability hereunder shall not exceed the sum of:

(say) _____

R _____

8. This Performance Bond is neither negotiable nor transferable and is governed by the laws of the Republic of South Africa, subject to the jurisdiction of the courts of the Republic of South Africa

Signed at _____ on this _____ day of _____ 201_

Signature(s)		
Name(s) (printed)		
Position in Guarantor company		
Signature of Witness(s)		
Name(s) (printed)		

PART 2: PRICING DATA

Document reference	Title	No of pages
C2.1	Pricing instructions: Option A	3
C2.2	Activity Schedule	2

C2.1 Pricing Instructions: Option A

1. The *conditions of contract*

1.1. How the contract prices work and assesses it for progress payments

Clause 11 in NEC3 Engineering and Construction Contract, June 2005, (with amendments June 2006 and April 2013) (ECC) Option A states:

Identified and defined terms	11 11.2	(20) The Activity Schedule is the *activity schedule* unless later changed in accordance with this contract. (22) Defined Cost is the cost of the components in the Shorter Schedule of Cost Components whether work is subcontracted or not excluding the cost of preparing quotations for compensation events. (27) The Price for Work Done to Date is the total of the Prices for • each group of completed activities and • each completed activity which is not in a group A completed activity is one which is without Defects which would either delay or be covered by immediately following work. (30) The Prices are the lump sums for each of the activities on the Activity Schedule unless later changed in accordance with this contract.

1.2. Measurement and Payment

1.2.1 The Activity Schedule provides the basis of all valuations of the Price for Work Done to Date, payments in multiple currencies, price adjustments for inflation and general progress monitoring.

1.2.2 The amount due at each assessment date is based on **completed activities and/or milestones** as indicated on the Activity Schedule.

1.2.3 The Activity Schedule work breakdown structure provided by the *Contractor* is based on the Activity Schedule provided by the *Employer*. The activities listed by the *Employer* are the minimum activities acceptable and identify the specific activities which are required to achieve Completion. The activity schedule work breakdown structure is compiled to the satisfaction of the *Project Manager* with any additions and/or amendments deemed necessary.

1.2.4 The *Contractor's* detailed Activity Schedule summates back to the Activity Schedule provided by the *Employer* and is in sufficient detail to monitor completion of activities related to the Accepted Programme in order that payment of completed activities may be assessed.

1.2.5 The short descriptions in the Activity Schedule are for identification purposes only. All work described in the Works Information is deemed included in the activities.

1.2.6 The Activity Schedule is integrated with the Prices, Accepted Programme and where required the forecast rate of payment schedule.

1.2.7 Activities in multiple currencies are separately identified on both the Activity Schedule and the Accepted Programme for each currency.

1.2.8 The tendered total of the prices as stated in the Contract Data is obtained from the Activity Schedule summary. The tendered total of the prices includes for all direct and indirect costs, overheads, profits, risks, liabilities and obligations relative to the Contract.

1.3. Pricing assumption

1.3.1 Each Alrode and Ladysmith Workshop (site) is to be priced separately using the below activity schedules.

1.3.2 All Prices are to be shown excluding VAT unless instructed otherwise by the Employer before the Tenderer enters his Prices.

1.3.3 If the *Contractor* has included trenching and excavation in his design implementation, this must be outlined and its price must be included as part of the full installation as per the works information.

C2.2 Activity Schedule

The Tenderer details his Activity Schedule below or makes reference to his Activity Schedule and attaches it to this schedule.

The details given below serve as guidelines only and the Tenderer may split or combine the activities to suit his particular methods.

2.2.1 Activity Schedule for Alrode Workshop

Activity No	Activity Description	Unit	Rate	Qty	Price of each activity
A1	Site Hail Risk Assessment	sum		1	
A2	Site Establishment	sum		1	
A3	Safety, Health and Environment Compliance File	sum		1	
A4	Development and approval of designs and reports as per works information	sum		1	
A5	Material supply, delivery and full installation as per works information	sum		1	
A6	Training of two people	sum		1	
A7	Testing, commissioning and handover onsite as per works information	sum		1	
A8	All required documentation and drawings as per works information	sum		1	
				Total Price	

2.2.2 Activity Schedule for Ladysmith Workshop

Activity No	Activity Description	Unit	Rate	Qty	Price of each activity
B1	Site Hail Risk Assessment	sum		1	
B2	Site Establishment	sum		1	
B3	Safety, Health and Environment Compliance File	sum		1	
B4	Development and approval of designs and reports as per works information	sum		1	
B5	Material supply, delivery and full installation as per works information	sum		1	
B6	Training of two people	sum		1	
B7	Testing, commissioning and handover onsite as per works information	sum		1	
B8	All required documentation and drawings as per works information	sum		1	
				Total Price	

Summary

Activity	Activity Descript	Total
A	Alrode Workshop	
B	Ladysmith Workshop	
	Total	
	VAT	
	Total incl. VAT to be carried to the Form of Offer and Acceptance	

SCOPE OF WORKS
FOR THE TRANSNET PIPELINES SOLAR PV RENEWABLE ENERGY PROJECT
AT TRANSNET PIPELINES ALRODE AND LADYSMITH WORKSHOPS

PL 690

REV. 02

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1 General

1.1 Introduction

1.1.1 *Transnet Pipelines* (TPL) intends to initialise a solar PV project at its Alrode and Ladysmith workshops. The primary objective is to reduce energy consumption and cost and secondly to implement an initiative which contribute positive to the environment.

1.1.2 This enquiry is for the appointment of a design, supply, installation, commissioning and handover *Contractor* to conduct and complete the project as per the TPL requirements.

1.1.3 The *Contractor* must cost the works per task so as to facilitate part payment for work as it is completed.

1.2 Scope of Work

1.2.1 This scope of works covers the design, supply, delivery, unloading / receiving, installation, construction, assembly, system testing, quality assurance, commissioning and handover of a 250kWp and 129kWp solar PV project at Alrode and Ladysmith workshops respectively.

1.3 Abbreviations & Definitions

For the purpose of understanding this scope of works, the following abbreviations apply in addition to the NEC.

Abbreviation	Meaning given to the abbreviation
AC	Alternating Current
CAD	Computer Aided Design
COVID-19	Corona Virus Disease 2019
DC	Direct Current
FAT	Factory Acceptance Test
GA	General Arrangement
I/O	Input or Output
LV	Low Voltage
NEC	New Engineering Contract
PDF	Portable Document Format
PPE	Personal Protective Equipment
Pr Eng	Professional Engineer
Pr Tech	Professional Engineering Technologist
PV	Photovoltaic
SAT	Site Acceptance Test
SHE	Safety, Health and Environment
TPL	Transnet Pipelines
UV	Ultra Violet

1.4 General Notes

1.4.1 All work as described in this specification represents works on existing facilities that will be in operation during the course of the Contract, for this reason all necessary precautions are to be taken to ensure that normal business operation is not disrupted in any way.

1.4.2 The *Contractor* shall supply adequate and competent labour, supervision, tools, equipment, services and testing devices for each and every item necessary to complete the work. TPL reserves the right to terminate the contract at any point if it is found that the *Contractor's* performance, supervision, tools, equipment, services, testing devices and material do not comply with specified requirements. The *Contractor* will only be allowed to claim for work completed to the specified applicable standard.

1.4.3 *Contractors* are to note that the responsibility for the Selection, Design, Supply, Installation and Commissioning of all elements of Equipment, Hardware and Software as included in the *Contractors* offer shall remain with the *Contractor*. In this regard, the *Contractor* is required to satisfy himself that all elements of the Equipment, Hardware and Software as offered are capable of complying with all Specifications as included in the Tender Documents. Failure to meet specification shall render the successful *Contractor* liable to rectify the problem at no cost to TPL.

1.4.4 The *Contractor* is to note with regards to works onsite, that responsibility for the protection of all existing equipment and services shall rest solely with the *Contractor*. The *Contractor* shall be required to bear all cost which may arise as a result of damage which may have been caused to equipment or services or which may arise as a result of his operation on the respective sites.

1.4.5 The *Contractor* shall only utilise testing devices and measuring equipment that are certified and carries a valid calibration certificate as issued by an approved calibration authority. Documentation reflecting the type, name and calibration certificate of the test equipment that will be utilised to complete the work, shall be available at the request of the *Project Manager.*

1.4.6 Where control equipment, peripherals or instrumentation from various suppliers or manufacturers are offered for controlling the various sub-systems or portions of a sub-system, it shall be the responsibility of the *Contractor* to ensure the various portions are fully integrated into a single coherent system. Where specific project development is required, TPL shall first approve these.

1.4.7 *Contractors* are to note that no system or sub-systems shall be designed especially for this project, as it is a requirement that only proven systems and sub-systems be installed.

1.4.8 The *Contractor* shall submit the required Safety, Health and Environment (SHE) Compliance File for approval by TPL, before any works can commence. The content of the SHE Compliance File is dictated by the work undertaken and shall ensure full compliance to the requirements of applicable legislation and best practice standards. The *Contractor* is also to refer to the attached SHE Compliance file review-guidelines for the SHE Compliance file in order to fulfil the requirements of applicable legislation and best practice standards.

1.4.9 The *Contractor* and his personnel and/or sub-contractor(s) shall attend the compulsory TPL induction training sessions, before commencement of the work. Standing time is approximately 2 hours for the TPL *Contractor* Induction and approximately 1 hour for the site specific induction. TPL *Contractor* Induction training can either be conducted at TPL Alrode or Ladysmith workshop. Site specific induction will be conducted at on the respective two sites prior to obtaining the site access certificate and work commencing. Induction training will be arranged by the *Project Manager* in liaison with the *Contractor.*

1.5 Notes to Contractors

1.5.1 The *Contractor* shall submit a LUMP SUM price for completion of all elements of the works as per the attached activity schedule. *Contractors* are to note that TPL will entertain no additional claims of any nature.

1.5.2 The *Contractor* shall supply a detailed breakdown of all costs to complete all the work as specified in this document. With reference to the attached activity schedule, cost shall include all travel, accommodation, labour, supervision, tools, equipment, services, testing devices and specified equipment. *Contractor* to note: with reference to the above mentioned labour cost; TPL will not entertain any additional claims for labour cost over weekends, public holidays or after hours labour. Any work not complying with specifications as contained herein and elsewhere in the contract document shall be redone at the *Contractor's* own expense. *Contractors* are required to complete the attached activity schedule.

1.5.3 The *Contractor* shall furnish proof of actual experience in the class of work for which they have tendered and must submit with the tender along with other relevant required documents as requested on the relevant form(s) attached to the tender documents.

1.6 Project Time Schedule

1.6.1 Programme Logical Flow

The Programme must be structured to also reflect without limitation the commencement, meetings, design, initial grid connection application, procurement, manufacture, delivery to site, installation, inspections and testing, factory acceptance testing, site acceptance testing, defect correction, commissioning with final grid connection application, handover and closure of the 129kWp Ladysmith Solar PV project and the 250kWp Alrode Solar PV project respectively. One site at the time starting the 129kWp Ladysmith Solar PV project and then the 250kWp Alrode Solar PV project.

1.6.2 Programme To Be Furnished After Contract Award

1.6.2.1 The order in which the works are to be carried out shall be as directed by the *Project Manager*. Within fourteen (14) days after the acceptance of his Tender, the *Contractor* shall submit to the *Project Manager* for his approval a detailed work programme conforming to the *Project Manager*'s requirements, showing the order of procedure and method in which he proposes to carry out the works, and shall, whenever required by the *Project Manager*, furnish for his information, particulars of the *Contractor*'s arrangement for carrying out the works, of the construction plant and temporary works which the *Contractor* intends to supply, use or construct as the case may be. The programme shall cater for duration(s) by which information is to be supplied by the *Project Manager*. This programme shall be referred to as the Programme, be issued as a Gantt chart based on a detailed activity linked programme and be subdivided into operations of day(s) or week(s) duration. The programme shall be manloaded by crafts and craft mix ratio of skilled and unskilled. The submission to and approval by the *Project Manager* of such programme or the furnishing of such particulars, shall not relieve the *Contractor* of any of his duties or responsibilities under the Contract.

1.6.2.2 This programme, when accepted the *Project Manager* will be binding on the *Contractor*. Amendment to the programme can only be effected by the *Project Manager's* acceptance of the *Contractor's* revised programme.

1.6.2.3 The programme shall be used to monitor progress. The programme shall remain in force but the *Contractor* resources to achieve the programme shall be updated at each site meeting and the *Contractor* shall report progress to date and what steps shall be taken to ensure adherence to programme.

1.6.2.4 Should the successful *Contractor* at any time during the contract fall behind the approved programme, then the *Project Manager* may require the *Contractor* to adjust his manner of working and/or employ additional staff, at NO additional cost to TPL, in order that the approved programme can be achieved.

1.6.3 Programme To Be Furnished With Tender

1.6.3.1 The tender programme shall be in Gantt chart format programme. Contract award shall be designated week 0. The tender programme shall not be less than the the commencement, meetings, design, initial grid connection application, procurement, manufacture, delivery to site, installation, inspections and testing, factory acceptance testing, site acceptance testing, defect correction, commissioning with final grid connection application, handover and closure of the 129kWp Ladysmith Solar PV project and the 250kWp Alrode Solar PV project respectively. One site at the time starting the 129kWp Ladysmith Solar PV project and then the 250kWp Alrode Solar PV project.

1.7 Reference Documentation

1.7.1 The requirements of the materials, design, installation, commissioning, examination, inspection and testing of equipment and facilities on these sites shall be in accordance with the relevant sections of the below mentioned codes.

1.7.2 Where Government, Local authorities and other statutory body's regulations, laws and requirements are more stringent than those specified hereunder, the aforementioned regulations, laws and requirements shall take precedence.

1.7.3 Where no specific rules, regulations, codes or requirements are contained in this specification nor covered by the below mentioned codes, the *Contractor* shall, in consultation with TPL, adhere to internationally accepted engineering practices or original manufacturers specification.

1.7.4 For the purpose of understanding these Standards, the following abbreviations apply.

- SANS - South African National Standards
- SABS - South African Bureau of Standards
- BS - British Standards
- IEC - International Electrotechnical Commission
- IEEE - Institute of Electrical and Electronics Engineers
- NRS - National Regulatory Standards
- NERSA - National Energy Regulator of South Africa
- NOSA - National Occupational Safety Association
- NEC - New Engineering Contract

General:

TITLE	SABS	IEC	BS	OTHER
Code of Practice for Wiring of Premises and incorporated standards	SANS 10142-1			
Protection against lighting: Physical damage to structures and life hazard	SANS 10313			
Protection against lighting	SANS 62305			
Protection against lighting (EMI)	SANS 61312			
Basis of structural designs and actions for buildings and industrial structures	SANS 10160			
Grid interconnection for embedded generation: Small-scale embedded generation (Utility interface)				NRS 097-2-1: 2017

TITLE	SABS	IEC	BS	OTHER
Grid interconnection for embedded generation: Small-scale embedded generation (Simplified utility connection critea for low-voltage connected generators)				NRS 097-2-3: 2014
Quality of supply part 2: Voltage characteristics, compatibility levels, limits and assessment methods				NRS 048-2
Quality of supply part 4: Application guidelines for utilities				NRS 048-4
Grid connection code for Renewable Power Plants (RPPs) connected to the Electricity Transmission System (TS) or the Distribution System (DS) in South Africa.				NERSA Version 3.1 (January 2022)
IEEE Standard for interconnecting distributed resources with electric power systems				IEEE 1547
Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval		IEC 61215		
Electrical Installation Regulation, 2009				Republic of South Africa
Electrical Regulation Act 4 of 2006				Republic of South Africa
Municipal Electricity Supply by-law				Alfred Duma municipality and City of Ekurhuleni
Occupational Health and Safety Act and Regulations, Act 85 of 1993				
Conditions of Contract				NEC

1.7.5 The latest revision of the following TPL standard specifications, where applicable, shall apply. It is a requirement that *Contractors* comply with all applicable clauses of the specifications in the execution of the work they undertake.

- PL100 Drawing Standard Document
- PL101 Plant & Equipment Tag Numbering Standards
- PL102 Equipment, Instrument & Electrical Symbology Standards
- PL103 General Drawing Standards
- PL631 Specification for Low Voltage Distribution Boards and Switchgear
- PL666 Electrical Design Criteria
- PL667 Measurement and Payment
- PL727 Specification for Cable, Racking, Trenching & Earthing Reticulation
- PL711 Specification for Equipment Cabinets to House Electronic Equipment
- PL804 General welding specification

2 General Works Execution and Site Requirements

2.1 Site Meetings

2.1.1 The *Contractor* shall attend site meetings when convened by the *Project Manager*. Such meetings will be for the purpose of discussing progress, delays, materials, conditions and specifications, as well as the co-ordination of site activities. The meetings will be chaired by the *Project Manager* or his Deputy and the proceedings shall be noted and circulated by the *Project Manager*.

2.2 House Keeping

2.2.1 The *Contractor* shall maintain the work sites clean and tidy at all times.

2.2.2 The *Contractor* shall take all reasonable precautions to protect existing equipment while work is in progress. Protection of existing equipment shall include protection against dust or any other harmful matter.

2.3 Materials

2.3.1 The *Contractor* shall ensure that all metal items other than stainless steel or other non-ferrous metals is hot dipped galvanised.

2.3.2 The *Contractor* shall ensure that precaution is taken against electrolytic corrosion where different metals are used on items of equipment.

3 General Operating Conditions

3.1 Climatic Conditions

3.1.1 Unless otherwise specified, all control equipment, peripherals and ancillary equipment shall be capable of operating in an uncontrolled environment, and at ambient temperatures, which vary between -10 degrees Celsius and 50 degrees Celsius.

3.1.2 *Contractors* must state the heat, power and environment requirements for all equipment offered in the tender.

3.1.3 The equipment must operate satisfactorily between sea level and 2000 metres above sea level.

3.1.4 The equipment must be capable of operating in a relative humidity range from 5% RH to 95% RH.

3.1.5 Dust and vapours accumulate rapidly.

3.1.6 Severe lightning may occur in the Alrode and Ladysmith area in which the equipment will operate. TPL will not regard damage to equipment resulting from a lightning strike or a power surge as unavoidable except where such a strike is a "direct strike" and sufficient evidence is available to prove such.

4 Scope of Works

4.1 Hail Risk Assessment

The *Contractor* is to conduct a site hail risk assessment for each site for a significant period of atleast 10 years. If the site hail risk assessment for each site shows that, the risk of hail is more than the solar panel hail bearing capability then the *Contractor* is to outline this risk, implement proper and maintenance friendly mitigations in the design implementation which will be accepted by TPL and the project will continue for that site. The *Contractor* is also to ensure the protection of all project equipment (e.g. Inverters) from any degree of hail, if it exist for the site where the hail risk assessment shows that the risk of hail is less than or more than the solar panel bearing capabilities. A site specific hail risk assessment report (with mitigations where needed) is to be furnished by the *Contractor* for each site.

4.2 Design

4.2.1 The *Contractor* is to design a 250kWp and 129kWp rooftop solar plant using 550Wp solar panels and the appropriate sizes of the string and/or central inverters or similar with or without internal junction box depending on the approved design type base on sites evaluation.

4.2.2 The *Contractor* shall use a 550Wp mono percium solar panels with an efficiency of greater than 21%, a 12-year product guarantee and a 30-year linear power guarantee of atleast 80% solar panel power production for the last 20 years. The *Contractor* should provide a datasheet for the solar panel for TPL acceptance prior to completion of the designs.

4.2.1 The *Contractor* shall use the appropriate sizes (e.g. 50kW) of the string and/or central inverters or similar with or without internal junction box depending on the approved design type base on sites evaluation. The minimum number of inverters to use per site should be three. The inverters sizing is upon the TPL accepted design type based of sites evaluation. TPL has the right to suggest a better inverters sizing to the *Contractor*.

4.2.2 The *Contractor* is to provide design simulations, all relevant design calculations, Pr Eng or Pr Tech approved design drawings and Local Municipalities grid connection application form(s) with supporting documents (filled, submitted and approved by the Local Municipalities). The *Contractor* will be given a go ahead in writing to proceed with the project procurement and implementation once the design simulations, design calculations, design drawings and Local Municipalities grid connection application form(s) with supporting documents (filled, submitted and approved by the Local Municipalities) have been accepted by TPL for construction.

4.2.3 The *Contractor* is to use and expose TPL engineer(s) during the development all design simulations, all relevant design calculations, design drawings and Local Municipalities grid connection application form(s) with supporting documents where the *Contractor* will sign as an approver. The TPL engineer(s) will sign as responsible personnel.

4.2.4 The *Contractor* is to provide as-built: design simulations, all relevant design calculations and Pr Eng or Pr Tech approved design drawings and Local Municipalities grid connection application form(s) with supporting documents (filled, submitted and approved by the Local Municipalities) for acceptance by TPL.

4.2.5 TPL reserve the right to reject unsatisfactory design drawing, design simulations and design calculation, Local Municipalities grid connection application form(s) with supporting documents (filled, submitted and approved by the Local Municipalities), reports and documentation and this shall be redone at the *Contractors* own cost. TPL will not entertain additional claims expect those original submitted by the *Contractor* in the original Tender documents.

4.2.6 The design must comply with NRS 097-2-1-2017, NRS 097-2-3-2014 as well as all the applicable standards mentioned in clause 1.7.4, clause 1.7.5 and other applicable engineering standards.

4.2.7 Local Municipalities grid connection application form(s) with supporting documents (filled, submitted and approved by the Local Municipalities) must comply with the relevant applicable standards mentioned in clause 1.7.4.

4.2.8 The programme supplied by the *Contractor* will also be used to also track the progress of the design phase.

4.3 System components, supply and installation

4.3.1 The *Contractor* shall provide all equipment, system component and material associated with the approved design as per this scope of works and the associated approved drawings.

4.3.2 The *Contractor* shall ensure the following regarding each item of the equipment or system component:

4.3.2.1 Alrode and Ladysmith Workshops roofs

The *Contractor* shall install all solar panels on the most suitable roofs of the TPL Alrode and Ladysmith workshops also ensuring that no shading of the solar panels in all sun conditions and seasons. The solar panels will be mounted on a structure specifically designed for the mounting of the solar panels.

The *Contractor* is to ensure the following but not limited pertaining the existing TPL Alrode and Ladysmith workshops roofs:

a. That the existing roofs can withstand the weight of the solar panels, the solar panel mounting structure and an additional minimum weight of 400kg per square metre. Evidence to prove this must be shown, approved and certified by a Structural Engineer in a form. A structural roof assessment report must be furnished by the *Contactor* for TPL acceptance.

b. That any penetration or drilling made on the roof is seal properly to eliminate any water leaks.

4.3.2.2 Solar panel mounting structure

The *Contractor* shall supply a structure suitable for the mounting of the solar panels in compliance with applicable engineering standards.

The *Contractor* is to ensure the following but not limited pertaining the solar panel mounting structure:

a. That an off the shelf, modular, pre-certified, pre-tested solar panel mounting structure is to be used. It must be made of aluminium or hot dipped galvanized mild steel. Hot dipped galvanized mild steel material is only to be used if the aluminium material cannot withstand the weight of the solar panels and all extreme weather conditions. All pre-certifications and pre-tests documentations must be provided and certified by the relevant body(s) and professionals.

b. That the solar panel mounting structure must withstand extreme weather conditions and the weight of the solar panels when drilled, bolted or welded on the respective roofs. Evidence to prove this must be shown, approved and certified by a Structural Engineer. A solar panel mounting structure withstanding extreme weather conditions and the weight of the solar panels report for all considered roofs per each specific site must be furnished by the *Contractor* for TPL accepted acceptance.

c. That the solar panel mounting structure is to be drilled, bolted or welded and positioned on the respective roofs of the TPL Alrode and Ladysmith workshops. The welding must be in accordance with the TPL PL804A specification.

d. That the solar panel mounting structure should be positioned such that the solar panels face due north and oriented at an angle and azimuth that allows for the sunrays to penetrate the panel at a 90˚ angle by 12 midday.

4.3.2.3 Solar panel

The *Contractor* shall use a 550Wp mono percium solar panels with an efficiency of greater than 21%, a 12-year product guarantee and a 30-year linear power guarantee of atleast 80% solar panel power production for the last 20 years.

The *Contractor* is to ensure adequate spacing between the solar panels rows (strings) and columns to ensure that no row or column of the solar panels, shades the other in all sun conditions and seasons. The *Contractor* is also to ensure that this spacing allows for a person to suitably walk between the solar panels rows and columns to enable easy cleaning of the solar panels.

The *Contractor* is to ensure that the maximum solar panels string voltage does not exceed 1000V.

The *Contractor* is to ensure that the two output cable terminals from the solar panel are 90˚C wet rated and that their polarities are clearly visible.

The *Contractor* shall ensure that the solar panel has a minimum of an IEC 61215 certification.

The *Contractor* is to ensure that each solar panel has a nameplate or label with at least the following ratings:

a. Rated open-circuit voltage.

b. Rated short circuit current.

c. Rated maximum power.

d. Voltage at maximum power.

e. Current at maximum power.

f. Maximum series fuse per module protection.

g. Maximum permissible system voltage.

h. Bypass diodes current ratings.

i. Fire rating.

j. Type of connectors used

k. Weight

The *Contractor* shall liaise with the solar panel manufacturer to ensure that all pre-site inspections are carried out timeously. The *Contractor* shall accompany the solar panel manufacturer on all site inspections. This action requires a competent *Contractors'* employee to avoid unnecessary delays.

4.3.2.4 Inverter

The *Contractor* shall use the appropriate sizes (e.g. 50kW) of the inverters, three phase, transformer-less, string and/or central inverters or similar (IP 65 at least) to provide 250kWp and 129kWp of solar PV power for the Alrode and Ladysmith Workshops respectively. The minimum number of inverters to use per site should be three. The selection of whether to use inverters with an internal or external junction box is upon the approved design type based on sites evaluations.

The inverter is to have the following minimum features:

a. MPPT tracker.

b. Must be grid tied.

c. High Maximum DC input voltage of up to 1000V or 1100V or 1500V.

d. Have grid support functions.

e. Have safe and intuitive user interface.

f. Have a robust enclosure with an IP rating of at least 65, suitable for outdoor installation.

g. Must be wall mountable.

h. Have a power factor above 0.99.

i. Have high efficiency above 98%.

j. Must be NRS 097-2-1-2017 certified.

k. Must comply with grid connection code requirement for renewable power plants in South Africa.

l. Must exclude the occurrence of DC earth fault currents on any phase, neutral or earth connection through it circuit design.

m. Must not be able to feed DC fault current into the electrical installation.

n. Must have an automatically and safely disconnect device as per NRS 097-2-1-2017 which separates the solar plant from the grid due to abnormal conditions:

1) Network voltage or frequency out-of-bounds conditions

2) Loss-of-grid conditions

3) DC current injection threshold exceeded (per phase)

4) Residual DC current (phase and neutral currents summated)

The *Contractor* shall liaise with the inverter manufacturer to ensure that all pre-site inspections are carried out timeously. The *Contractor* shall accompany the inverter manufacturer on all site inspections. This action requires a competent *Contractors'* employee to avoid unnecessary delays.

4.3.2.5 Junction box

The *Contractor* shall use the appropriate number of external junction boxes to connect the solar panel arrays to the inverter(s). The decision of whether to use an external junction box is upon the approved design type based on sites evaluations.

If an external junction box is to be used, it should entail the following minimum features:

a. Must be able to connect a minimum of 8 strings in parallel.

b. Have a minimum of 8 input channels for a minimum of 8 strings of solar PV modules.

c. Have current monitoring for a minimum of 8 strings.

d. Have positive and negative string fuses as standard with easy to open fuse holders.

e. Have overvoltage protection, surge arrestors and circuit breaker.

f. Have extensive I/O connections for additional sensors and alarms.

g. Have at least IP 66 rated enclosure to protect the cable against extremes of heat and humidity.

h. Have robust screw clamp terminals to make easy cable connection.

i. Have high DC input voltage of up to 1000V or 1100V or 1500V.

j. Have main DC disconnector switch/breaker/isolator to disconnect the whole array on the secondary side of the junction box going to the inverter.

4.3.2.6 Solar LV Panel and Site Solar Display Screen

The *Contractor* shall supply a Solar LV panel tier to be situated close to the existing main LV panel and must tie-in parallel the TPL existing energy meter in order to facilitate all the new solar inverters feed interface. This Solar LV panel will consists of the associate inverters three phase AC circuit breakers with an AC combiner/busbar to combine the associate inverters three phase AC output breakers cables to one three phase AC output. The one three phase AC output will be connected to a central disconnection device and will be metered using a bi-directional energy meter that has two separate registers. The one three phase AC output will also be connected to three an analog single phase ammeters, a single an analog three phase voltmeter, will be coupled to the appropriate site solar display screen and a three phase output circuit breaker. The meter readings and the whole site combined solar plant production will be shown on the site solar display screen. The site solar display screen will be located at the most suitable location which will be advised and accepted by TPL. The three analog single phase ammeters and a single three phase voltmeter will be displaying the currents and voltages produced by the associate combined inverters. Also on this Solar LV panel will be a three phase surge arrestor protecting any surge from and to the associate combined inverters. The *Project Manager* in agreement with the *Contractor* will approve the most appropriate ammeters and voltmeter to use.

4.3.2.6.1 Circuit breakers requirements

All the three phase AC circuit breakers on this Solar LV panel which will be isolating the power which flows in both directions.

4.3.2.6.2 Central disconnection device requirements

The central disconnection device shall disconnect the solar plant from the network by means of two series connected robust automated load disconnect switches. Both switches shall be electromechanical switches. Each electromechanical switch shall disconnect the solar plant on the neutral and live wires. Any programmable parameters of the central disconnection device switching unit shall be protected from interference by third parties, e.g. password protected or access physical sealed. The network and system grid protection voltage and frequency relay for the central disconnection device will be type-tested and certified on it own (stand-alone tested), all clauses of 4.2.2, except 4.2.2.4(anti-islanding) of NRS 097-2-1-2017. The central disconnection device must comply with NRS 097-2-1-2017.

4.3.2.6.3 Bi-directional energy meter requirements

The bi-directional energy meter must have two separate registers and must comply with NRS 097-2-1-2017.

4.3.2.6.4 Busbar meter requirements

The busbar should be in accordance with the applicable engineering standards.

4.3.2.6.5 Solar LV panel construction and assembling requirements

The construction and assembling of this Solar LV panel should be in accordance with the TPL PL 631 specification.

4.3.2.6.6 Solar display screen with its communication equipment requirements

The *Contractor* shall advice TPL of the appropriate site solar display screen (e.g. 55-inch FHD TV screen with a micro PC, a wireless keyboard, a wireless mouse, a Wi-Fi router and an Alrode and Ladysmith workshops network coverage SIM card of the appropriate data size and two-year contract) to use for onsite displaying and monitoring purposes and the appropriate display functions, measurements, units and graphs which will be displayed by this site solar display screen. The *Project Manager* in agreement with the *Contractor* will approve the most appropriate site solar display screen to use as well as the.

4.3.2.7 Surge Protection

The *Contractor* shall ensure that all equipment or system components are protected against unexpected surges. Where a surge arrestor does not come as standard on a specific equipment or system component, the *Contractor* shall include surge protection on the primary and secondary side of that specific equipment or system component and should be in accordance with the applicable engineering standards.

4.3.2.8 Lightning Protection

The *Contractor* shall conduct a lightning risk assessment on both the Alrode and Ladysmith workshops sites. Where the lightning risk assessment shows the need for lightning protection, the *Contractor* shall design, build or supply the appropriate lightning protection system for the solar panels component as well as other components of the solar system and should be in accordance with the applicable engineering standards. A site specific lightning risk assessment report is to be furnished by the *Contractor* for each site.

4.3.2.9 Overcurrent, Short circuit current and fault current protection

The *Contractor* shall protect the main system components of this design against overcurrent, short circuit current and fault currents, such as inverters on the primary and the secondary side by means of suitable fuses (primary side of the inverter) and circuit breakers (secondary side of inverter and other components and primary side of other components). The circuit breakers must comply with NRS 097-2-1-2017. The fuses must comply with applicable engineering standards. All overcurrent, short circuit and faults current calculations must be furnished for acceptance by TPL.

4.3.2.10 Racking and Cabling

Where required in the design implementation, all racking and cabling are to be conducted as stipulated in the TPL specification PL727. The racking stand to be supplied by the *Contractor* is to be as specified in the TPL specification PL727.

4.3.2.11 Use of existing onsite cable manhole and cable routing trenches with sleeves

It is preferable where possible that the *Contractor* shall make use of the existing onsite cable manholes and cable routing trenches containing the electrical and communication sleeves. The electrical cables are to be routed in the electrical trench sleeves and the communication cables are to be routed in the communication trench sleeves.

4.3.2.12 Trenching and Excavation

Where not possible to make use of the existing onsite cable manhole and cable routing trenches containing the electrical and communication sleeves and where trenching and excavation is required in the design implementation, all trenching and excavation is to be conducted as stipulated in the TPL specification PL727.

The *Contractor* shall ensure that all excavations are performed by hand. There is an allowance to detect services along a route prior to trenching. Any existing services damaged during excavation will be repaired at the *Contractor's* cost.

The *Contractor* shall ensure that all excavations across road crossings / hardened surfaces are re-instated to the original standards.

4.3.2.13 Earthing and Bonding

All earthing and bonding must comply with the TPL specification PL727, applicable SANS 10142 and applicable NRS 097-2-1-2017.

4.3.2.14 Cabling

4.3.2.14.1 Cable to connect solar panels to the Junction box or the Inverters

The type of cable to use to connect the solar panel strings/array to the Junction box or the Inverters. is steel wire armoured, PVC insulated, single core. This cable is to be UV protected, fire retardant, low halogen, blue striped, DC cable with clearly visible polarities. The size of the cable must match that of the solar panel in diameter and is to be verified by the *Project Manager* using the appropriate calculations supplied by the *Contractor*. This cable should be able to withstand high temperature of up to 90˚C. This cable is to be racked as specified in on the racking and cabling section of the TPL specification PL727.

4.3.2.14.2 Cable from the Junction box to the Inverters

The type of cable to use to connect each Junction box output to the Inverters is steel wire armoured, PVC insulated, single core, fire retardant, low halogen, blue stripe DC cable, with clearly visible polarities. The size of the cable is to be provided by the *Contractor* based on the approved design drawings and is to be verified by the *Project Manager* using the appropriate calculations supplied by the *Contractor*. This cable is to be routed via the cable rack or existing cable sleeves or the new cable sleeves as per the TPL specification PL727.

4.3.2.14.3 Cable from the inverters to the Solar LV panel

The type of cable to use to connect each Inverter output to the Solar LV Panel is steel wire armoured, PVC insulated, four core, fire retardant, low halogen, blue stripe AC cable. The size of the cable is to be provided by the *Contractor* based on the approved design drawings and is to be verified by the *Project Manager* using the appropriate calculations supplied by the *Contractor*. This cable is to be routed via the cable rack or existing cable sleeves or the new cable sleeves as per the TPL specification PL727.

4.3.2.15 Weather Station

The *Contractor* shall include a weather station to display the site ambient temperature, panel temperature, global irradiance, plane of array irradiance, wind speed and wind direction. The weather station parameters will be displayed on the site solar display screen and on the remote monitoring system. The *Project Manager* in agreement with the *Contractor* will approve the most appropriate weather station to use and the location to be used onsite to install this weather station.

4.3.2.16 System Integration and Monitoring

The *Contractor* shall integrate all the system components of the design to form one complete system which will be monitored. The *Contractor* shall implement the most relevant and cost effective monitoring system to use. The monitoring system must allow for onsite display and monitoring through the site solar display screen as well as remote monitoring. This remote monitoring must be able to integrate with the existing Pinetown Solar PV plant that communicate through ABB Aurora Vision as well as enable integration with future Solar PV Plants. The remote monitoring must be monitored through the desktop, laptop, cellphone and tablet anywhere in the world. It would be an added advantage if this monitoring system can also perform predictive maintenance.

4.3.2.17 System labels and Warning Signs

All labels and warning signs must be permanent with lettering of height of at least 8mm.

4. 2.2.16.1 System labels

a) Solar Panel

The *Contractor* is to ensure that a permanent label appears on each of the solar panels containing the following information:

- Rated open-circuit voltage
- Rated short circuit current
- Rated maximum power
- Voltage at maximum power
- Current at maximum power
- Maximum series fuse per module protection
- Maximum permissible system voltage
- Bypass diodes current ratings
- Fire rating
- Type of connectors used
- Weight

b) Junction box

The *Contractor* is to ensure that a permanent label appears on each of the junction box containing the following information:

- Operating Current (System maximum-power current)
- Operating Voltage (System maximum-power voltage)
- Minimum system Voltage
- Maximum system Voltage
- Short Circuit Current

4. 2.2.16.2 Warning Signs

The *Contractor* shall include all relevant warning signs and should position them accordingly. The warning signs shall comply with NRS-097-2-1-2017. The *Project Manager* will advise the

Contractor as to where the warning signs should be placed/positioned. The warning signs should consist of the following but not limited labels:

a. Main PV system AC disconnect

b. WARNING: ON-SITE EMBEDDED GENERATION. DO NOT WORK ON THIS EQUIPMENT UNTIL IT IS ISOLATED FROM BOTH MAINS AND ON-SITE GENERATION SUPPLIES

c. NOTE: ON-SITE EMBEDDED GENERATION (EG) CONNECTED. READ IMPORT AND EXPORT REGISTERS SEPARATELY

d. Warning: Electrical shock hazard - Do not touch terminals, terminals on both lines and load sides may be energized in the open position - DC voltage is always present when solar modules are exposed to sunlight

4.3.2.18 Additional Machinery

The *Contractor* is to include all necessary machinery needed for the lifting and positioning of the solar panels, the solar panels mounting structure, all relevant components and personnel and must cost for it. This cost must be included in the original tender document.

4.3.2.19 Safety, Health and Environment

The *Contractor* shall ensure at all times compliance with SHE requirements prescribed by applicable legislation and best practice standards. The scope of work includes disposal of waste generated as a result of the project in a permitted landfill site and submission of proof of disposal to TPL. The *Contractor* will be responsible for the SHE rules that TPL may require to be implemented. The *Contractor* shall ensure that no person or employees are allowed to enter Alrode and Ladysmith workshops sites on their behalf, unless that employee or person has undergone SHE induction pertaining to the hazards prevalent to the site at the time of entry.

4.3.2.19.1 Corona Virus Disease 2019

The *Contractor* is also to ensure compliance to COVID-19 related regulations and mitigations where applicable. The *Contractor* will need to provide their COVID-19 management and risk plan. The COVID-19 risk are also outlined on the attached Annexure C: Solar PV Project Baseline Assessment with COVID-19 Risks (IMS risk assessment register)

4.3.2.19.2 Personal Protective Equipment

The *Contractor* shall also ensure that the correct PPE is worn at all times.

4.3.2.19.3 Working at height

The *Contractor* shall also note that it would be installing new solar panels which will be located on several roofs of the Alrode and Ladysmith workshops which are at different heights up to 14m. The *Contractor* shall also ensure that all necessary authorisations and precautions are taken to ensure that the work is completed in a compliant and safe manner.

4.4 Hold Points

4.4.1 Prior to commencement of procurement and manufacture, design approval shall be obtained from the *Project Manager*. Hold points for approval to proceed shall entail as a minimum submission of the following documentation:-

- Provision of a complete cost estimate as per activity schedule. The activity schedule is also to include designs (drawings, simulation and calculation) and training for two people per site.
- Provision of all Pr Eng or Pr Tech approved structural and electrical assessments, reports, forms and certifications.

- Provision of all design simulations.
- Provision of all relevant design calculations.
- Provision of all relevant electrical, mechanical and civil Pr Eng or Pr Tech approved drawings associated with the design showing all electrical components involved in the design including the exact number of solar panels, cable sizes, junction box, inverters, all circuit breakers, surge arrester, Solar LV Panel (with all circuit breakers, ac combiners, central disconnection device, meters, surge arrester, etc), Solar display screen, weather station, bidirectional energy meters, point of connection to the municipality supply, etc.
- Drawings are to be provided in an A3 PDF format and should include General Arrangement drawings of equipment in or on panels, boards and cubicles and Marked up Building Layout drawings indicating routing of cables and positioning of equipment.
- Local Municipalities grid connection application form(s) with supporting documents filled, submitted and approved.

4.4.2 The *Contractor* should take note that acceptance by the *Project Manager* of submitted drawings, designs and documentation does not relieve the *Contractor* of responsibility for errors in drawings, design and documentation issued.

4.4.3 The *Contractor* shall note that all documentation and drawings issued by TPL are supplied in good faith and may not be complete in every detail. The *Contractor* shall be responsible for ascertaining the validity and correctness of all drawings and document issued.

4.5 Quality Requirements

4.5.1 This section outlines the minimum requirements to ensure that products and services supplied to TPL are manufactured, provided, constructed or installed in accordance with all specified requirements as defined in this scope of works.

4.5.2 The *Contractor* is responsible for all quality activities necessary to ensure the work meets the requirements specified in this scope of works and shall manage and coordinate all quality aspects of the work in accordance with the requirements of this scope of works, together with the *Contractor's* PQP and QCPs once reviewed and accepted by TPL.

4.5.3 Project Quality Plan

The PQP shall entail the following as a minimum:

- Overview and understanding of scope of works and key requirements
- Organogram with positions, roles and responsibilities
- Procedures:
    - Document control – the *Contractor* to provide a description of how documents provided by TPL will be managed e.g. management tools and databases, internal and external distribution of documents to TPL, third parties, internal review and approval routes and authorities, receipts, registration and maintained, codes, standards and specifications.
    - Design control – where the *Contractor* is responsible for any aspects of design related to the scope of works, they must provide procedures for the control of these design activities. This must also factor in the roles and responsibilities
- Project Schedule - As per this scope of works requirements
- Commissioning and training plan.

4.5.4 Quality Control Plans

The QCPs shall be submitted before the commencement of the project.

QCPs must clearly identify all inspections, tests and verification requirements to meet this scope of works including destructive and non-destructive testing, witness and hold points. The *Contractor* prepares and submits QCPs to TPL for review in accordance with the requirements of this scope of works and PQP.

The QCP shall include:

- QCPs shall include reference to all tests specified in the scope of works.
- ***Inspection and Testing***
    - The *Contractor* is responsible for the conduct of all *Contractor* inspections and tests. This responsibility includes:
        - Documenting inspection and test results in the QCPs and relevant FICs.
        - Progressively inspecting the quality of the scope of works performed, including that of all Sub-Contractors.
        - Inspecting to meet all scope of works requirements, in number, type and form
        - Inspecting day to day activities, material receipts, issue of material for installation, in-process inspections, and final inspections.
    - Schedule of Inspection - The *Contractor* shall submit a schedule showing the proposed dates for inspections and tests nominated in the QCP where witness and hold points are required. The schedule shall be regularly updated with progress and issued to TPL to show the current inspection and test status.
    - Field Inspection Checklists - For site installation and construction activities, the *Contractor* prepares FICs to permit inspection and testing of installed equipment and constructed facilities in accordance with the respective QCPs.
    - Inspection Points - The QCP identifies points in the fabrication, manufacturing and/or installation process that are selected for inspection. Hold Point (H), Witness Point (W) Review Point (R), Surveillance (S). A TPL Sample QCP can be used as a reference which is attached to this scope of works.
    - Welding Procedures - Where the *Contractor's* scope of works includes fabricated weldments, WPS defining the method, preparation and sequences to be adopted to achieve a satisfactory welded joint shall be provided for all weld types required in the execution of this scope of works.
    - Material Traceability - Where, and to the extent that material traceability is required, the *Contractor* shall provide its procedures for the maintenance of material identification throughout all phases of manufacture.
    - Material Certification - Where specified in this scope of works the following certificates shall also be provided to TPL: certificates of compliance, certificates issued by a laboratory or test facility independent of the *Contractor's* work, any other form of certification affecting the scope of works.

- ***Non-Conforming Products***

  The *Contractor* shall establish and maintain procedures to control material or products that do not meet the specified requirements.

  All *Contractor* product and/or materials identified as not conforming to requirements shall be dealt with promptly as follows:

  - If the *Contractor* discovers material or product which is not in accordance with the requirements of the scope of works e.g. a non-conformance, the *Contractor* shall immediately initiate the non-conformance procedure. If TPL or its agent identifies a non-conformance, a *Transnet* NCR may be raised.

- ***Corrective and Preventative Action***

  - If the *Contractor* proposes a disposition of any non-conforming materials or product which varies from the requirements of this scope of works, such a proposal shall be submitted in writing to TPL whose decision on the proposal shall be obtained in writing before the non-conforming material or product is covered up or incorporated into the works, or is the subject of any other disposition.

  - The disposition of non-conformances which do not vary the requirements of the *Contract*, specification or drawings may be approved by the *Contractor* following discussion and agreement with TPL.

- **Inspection, Measuring and Test Equipment**

  Calibration - The *Contractor* shall ensure the calibration of test and measuring equipment is performed and maintained in accordance with the relevant *Contractor* procedures and/or the equipment manufacturer's specifications.

  Use of Inspection, Measuring and Test Equipment - The *Contractor* shall ensure that authorized equipment users:

  - Use the equipment in accordance with manufacturer's instructions, and accepted industry practices
  - Ensure the equipment is covered by a current calibration certificate
  - Conduct the measurements or tests in accordance with the equipment manufacturer's specifications or other relevant specification
  - Prior to commencement of each inspection or test activities:
    - Identify the measurements to be made
    - Determine the accuracy required
    - Select the appropriate inspection, measuring or test equipment for this scope of works.

4.4.5 Quality Records

Contractors shall maintain quality records necessary to provide objective evidence that demonstrates and verifies achievement of the QA/QC requirements associated with this scope of works. All quality records including original source material test certificates and non-destructive test reports, shall be retained by the *Contractor* during the project, and be provided to TPL at the times, and in the quantities specified in this scope of works.

4.6 Documentation and Drawing Requirements

4.6.1 The *Contractor* is to provide the drawing in an A3 PDF format (3 copies) and Auto CAD format. The drawing should be in accordance with TPL standards PL 100, 102, 103, 104 and 666.

4.6.2 The *Contractor* shall furnish the following documentation as a minimum:

a. Datasheets.
b. Electrical, Mechanical and Civil Detailed Design Documentation.
c. General Assembly Drawing with foundation load data, cable connection and support details. This includes cable and racking drawings, Single line drawings, hook-up drawings, schematics, solar panels roofs layout drawings, overall solar plant site layout drawings, Solar LV panel tie to the TPL energy meter drawings.
d. Site design simulation reports.
e. Local Municipalities grid connection application form(s) with supporting documents filled, submitted and approved.
f. List of Operational Spare Parts.
g. Operation and Maintenance Manuals.
h. Solar PV plant Certificate of Compliance for each site.
i. All required FAT and SAT documentations

4.7 Installation and Site Works

4.7.1 The *Contractor* shall prior to making any design changes to the existing equipment submit drawings to the *Project Manager* for prior approval. Drawings shall include equipment schedules detailing all major components.

4.7.2 The *Contractor* shall ensure that general arrangement (GA) drawings are received timeously from the panel manufacturer to ensure that sufficient time is available for acceptance of the GA drawings by TPL prior to manufacture. The *Project Manager* will require a minimum of five (5) working days to obtain TPL acceptance of the GA drawings.

4.7.3 The *Contractor* shall ensure that all equipment and electrical panels arrive timeously onsite. The *Contractor* shall be responsible for any damages to all equipment and electrical panels prior to completion and hand over. Should such a delay occur the *Contractor* shall immediately inform the *Project Manager* in writing such that action can be taken to mitigate the delay.

4.7.4 The *Contractor* shall ensure that all circuits are labelled according to TPL specification PL727. The *Contractor* shall ensure that all cables are labelled at both ends according to TPL specification PL727 (Laser engraved 316 stainless steel tags, tied with stainless steel cable ties). Once all terminations have been completed, the *Contractor* shall liaise with the equipment and panel manufacturer to ensure that correct labelling is delivered to site and correctly installed.

4.7.5 The *Contractor* shall, in the presence of the *Project Manager* and any other TPL staff deemed necessary test and commission the upgraded installation and all associated equipment.

4.8 Site Testing, Certification and Commissioning

4.8.1 It shall be the responsibility of the *Contractor* to compile a complete Site Acceptance Test (SAT) schedule. The *Contractor* is also required to use, conduct, complete, submit and pass the respective municipalities commissioning reports. Both the SAT and the respective municipalities commissioning reports are to be used for site acceptance testing, certification and commissioning of the equipment to be installed by the *Contractor*.

4.8.2 The site test schedule shall be comprehensive and shall cover all aspects of the equipment to be tested and shall be submitted to the *Project Manager* for approval, prior to commencement of site acceptance testing.

4.8.3 The *Contractor* shall be responsible for providing all test equipment and facilities required for the period of the site acceptance testing and commissioning such as the *Project Manager* may deem necessary, and to produce a report of the site acceptance testing and commissioning completed.

4.8.4 The *Project Manager* reserves the right to add or delete any item or test on the test schedule in order to verify that the installed equipment complies with the applicable specification.

4.8.5 The *Contractor* shall perform the site acceptance testing, electrical compliance certification and commissioning of the supplied/installed equipment. The *Contractor* shall at his own expense rectify all defects. Should a defect result in time delays and additional material/labour cost, such additional cost incurred shall be for the *Contractor's* account.

4.8.6 Site Acceptance and Handover of all items of the equipment shall be concluded once site acceptance testing, certification and commissioning of all supplied/installed equipment has been completed, all fault lists have been completed to compliance and the following documentation has been submitted to and accepted by the *Project Manager*:

- Complete Site Acceptance testing documentation, comprising of test schedules.
- Complete and receive approval of the respective municipalities commissioning reports.
- Completed Electrical Certificates of Compliance.
- Energy conversion type test certificate of compliance according to NRS 097-2-1, issued by accredited 3rd party test house.
- Central disconnection device type-test and certification.
- Final Contract Documentation, inclusive of as-built marked up drawings and
- A formal completion certificate signed and dated by both the *Contractor* and the *Project Manager* shall be provided.

Documentation format and number of copies shall be in accordance with TPL Specifications PL 101, 102, 103, 104 and 666.

5 Appendices

The following TPL documentation shall be read in conjunction with this scope of works

- Annexure A: Alrode Workshop roofs layout drawings**.**
- Annexure B: Ladysmith Workshop roofs layout drawings.
- Annexure C: Solar PV Project Baseline Risk Assessment with COVID-19 Risks (IMS Risk Register).
- Annexure D: Sites Info.
- Annexure E: SHE Compliance file review-guidelines.
- Annexure F: Alrode and Ladysmith Workshops overall and DB's SLD's.
- Annexure G: Alrode and Ladysmith Workshops sites layout cable routing drawings.
- Annexure H: Transnet Contractor Management Procedure (TRN-IMS-GRP-PROC-014)

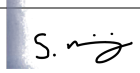
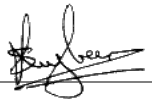
6 Guarantee

Guarantee initiation shall be from the date recorded on the *Contractors* completion certificate. The completion certificate shall for validity purposes contain the signature of both the *Contractor* and the *Project Manager*.

All electrical components supplied under this scope of works shall be warranted for 10 years from date of completion. Mechanical and Civil equipment shall be warranted for 20 years from date of completion. Workmanship shall be guaranteed for a period of 12 months. Upon receiving a warranty claim from TPL, the *Contractor* shall at its own cost and expense and without reimbursement by TPL promptly correct, repair or replace the items, which are not in

conformance with this scope of works. *Contractor's* warranty shall cover all costs (including, without limitation, those costs associated with parts, labour, technical support, travel, transportation, and shipping and handling).

7. Signatures

	Name	Title	Signature	Date
Compiled by	K. Ndlela	Electrical Specialist		21/04/2023
Reviewed by	K. Nthoba	Civil Specialist		21/04/2023
Reviewed by	M. Du Sart	Manager: SHEQ (South)		21.04.2023
Reviewed by	P. Selwane	Environmental Specialist		24/04/2023
Reviewed by	L. Majozi	SHEQ Specialist		04/05/2023
Approved by	S. Rugbeer	Principal Engineer		04/052023

Annexure H - SITES INFORMATION

1: Sites specification and locations

No.	Site Name	Physical Address	Co-ordinates
1.	Alrode Workshop	3 Akasia Rd, Alberton, 1451	26°17'52.9464"S (Latitude), 28°07'11.8918"E (Longitude)
2.	Ladysmith Workshop	7 Hamilton Road, Ladysmith, 3370	28°32'03.9309"S (Latitude), 29°47'58.3945"E (Longitude)

ALRODE WORKSHOP

TRANSNET pipelines

WORKSHOP	LATITUDE	LONGITUDE
ALRODE	26°17'52.9464"S	28°07'11.8918"E

LADYSMITH WORKSHOP

TRANSNET
pipelines

WORKSHOP	LATITUDE	LONGITUDE
LADYSMITH	28°32’03.9309”S	29°47’58.3945”E

LEGEND

SYMBOL	DESCRIPTION
	TRANSFORMER
	CIRCUIT BREAKER

FED FROM
TPL
SUBSTATION

TPL OPERATIONS LV PANEL 18LV01

=TPL OPERATIONS SUB
VOLTAGE = 400V,230V;3ph+N+Pe
FAULT LEVEL= 15kA
FREQUENCY= 50Hz

MANUFACTURER	: N/A
TAG No.	: =18LV01.11F1
MAIN INCOMER	: 160/400A
VOLTAGE	: 400V,230V;3ph+N+Pe; 50HZ
FAULT LEVEL	: 15kA
MOUNTING	: FLOOR MOUNTED
COLOUR	: ORANGE
IP RATING	: IP55

-11F1
160/400A

FEEDER
TO WORKSHOP

TPL WORKSHOPS SUBSTATION

=TPL WORKSHOP SUB
VOLTAGE = 400V,230V;3ph+N+Pe
FAULT LEVEL= 5kA
FREQUENCY= 50Hz

INCOMER
MAIN SWITCH

-DBA
160/400A

-DB 1
125/160A
5kA

-DB H
80/100A
5kA

-DB E
80/100A
5kA

-DB B
50/63A
5kA

-DB
80/100A
5kA

DB SECTION
DB A

MC& I W/SHOP
DB 1

MAIN STORES
DB H

WORKSHOP
DB E

WORKSHOP
STORE DB B

TPL WORKSHOPS DB B

=TPL WORKSHOP DB B
VOLTAGE = 400V,230V;3ph+N+Pe
FAULT LEVEL= 5kA
FREQUENCY= 50Hz

-DB C
50A
5kA

-DB F
16A
5kA

-DBD
50A
5kA

ABLUTION
BLOCK DB C

SERVITUDE
STORE DB F

WORKSHOP
OFFICE DB D

A2

FOR INFORMATION PURPOSES

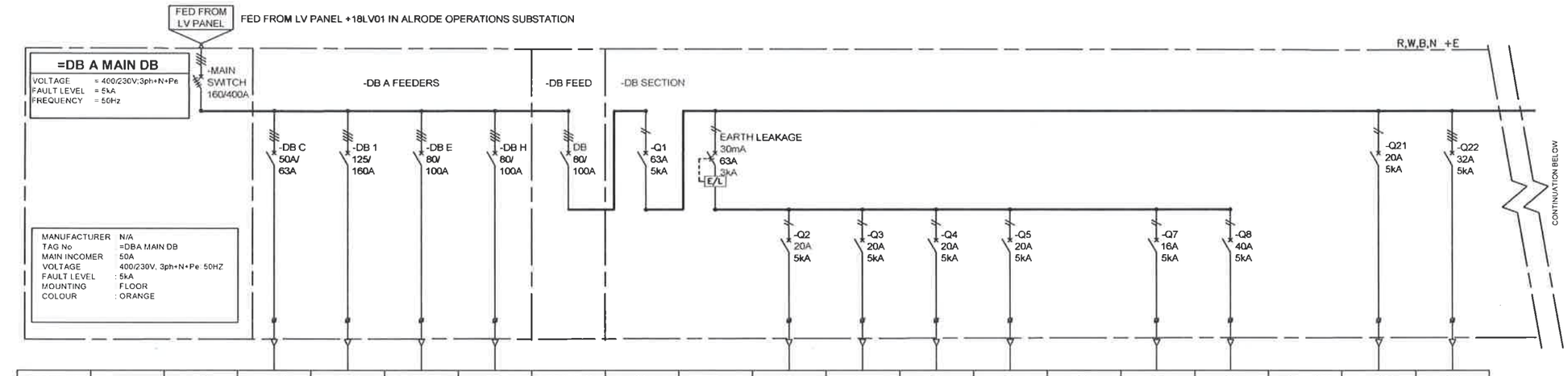
TRANSNET
pipelines

OVERALL SINGLE LINE DIAGRAM
ALRODE WORKSHOP

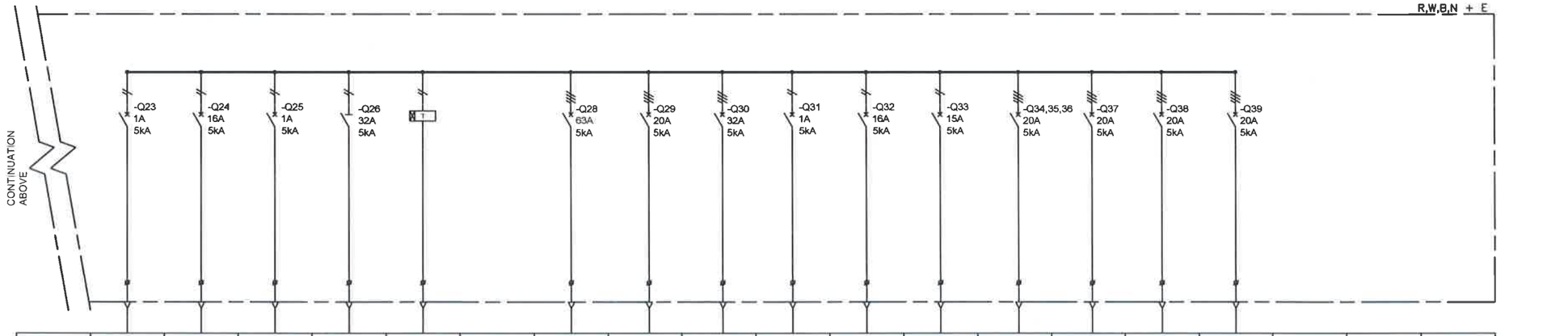
REVISIONS
PROJECT NAME

DRAWN	W.D	REF.	
TRACED	CAD	DATE	26.11.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	N.T.S		

DRAWING No. PL 121506 REV



CIRCUIT No.		-M/S	-DB C	-DB 1	-DB E	-DB H	-DB LOCAL	-Q1	-E/L	-Q2	-Q3	-Q4	-Q5	-Q6	-Q7	-Q8	-Q9 to Q20	-Q21	-Q22
PHASE		3PH + N	3PH + N	3PH + N	3PH + N	3PH + N	3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N		1PH + N	1PH + N		1PH + N	1PH + N
DESCRIPTION		INCOMER (MAIN SWITCH)	SUPPLY TO DB C WORKSHOP STORES	SUPPLY TO MC& I WORKSHOP	SUPPLY TO DB E WORKSHOP	SUPPLY TO DB H MAIN STORES	SUPPLY TO LOCAL DB SECTION	LOCAL SWITCH	EARTH LEAKAGE	PLUGS	PLUGS	SPARE	PLUGS	BLANK	LIGHTS	SPARE	BLANKS	SPARE	LIGHTS



CIRCUIT No.	-Q23	-Q24	-Q25	-Q26	-TS	-Q27	-Q28	-Q29	-Q30	-Q31	-Q32	-Q33	-Q34,35,36	-Q37	-Q38	-Q39			
PHASE	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N		3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	3PH + N	3PH + N	3PH + N	3PH + N			
DESCRIPTION	CONTROL LIGHTS	LIGHTS	CONTROL TIMER	BYPASS	TIMER	BLANK	WELDING PLUG	SPARE	HIGH BAY LIGHTS	CONTROL COIL CONTACTOR	LIGHTS	LIGHTS	SPARE	BENCH GRINDER ISOLATOR	LATHE ISOLATOR	CARNE ISOLATOR			

LEGEND

SYMBOL	DESCRIPTION
	ISOLATOR
	CIRCUIT BREAKER
	TIMER
E/L	EARTH LEAKAGE UNIT

REVISIONS

PROJECT NAME

TRANSNET pipelines

DBA – MAIN DB

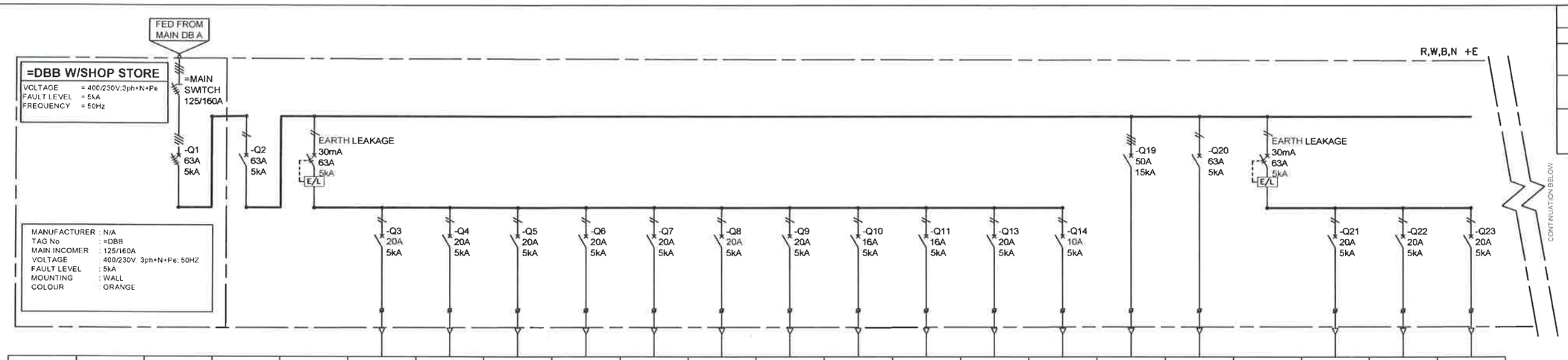
ALRODE WORKSHOP–SINGLE LINE DIAGRAM

DRAWN	W.D	REF.	
TRACED	CAD	DATE	02.11.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	NTS		

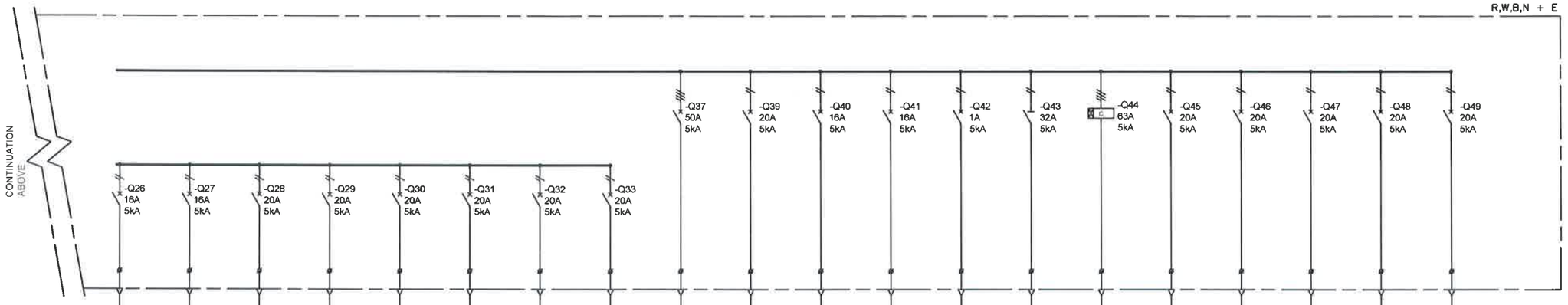
DRAWING No. PL 121499 REV

A1

FOR INFORMATION PURPOSES



CIRCUIT No.		-Q1	-Q2	ELR5	-Q3	-Q4	-Q5	-Q6	-Q07	-Q08	-Q09	-Q10	-Q11	-Q13	-Q14	-Q19	-Q20	ELR6	-Q21	-Q22	-Q23
PHASE		3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N
DESCRIPTION		INCOMER (MAIN SWITCH)	LOCAL SWITCH	EARTH LEAKAGE UNIT	OFFICE	LIGHTS OFFICE 3	GATE MOTOR	PLUGS OFFICE 5	PLUGS OFFICE 5	SPARE	LIGHTS PASSAGE	FEED DB F	LIGHTS PASSAGE	SPARE	ALARM	SPARE	PLUGS OFFICE 3	EARTH LEAKAGE 6	PLUGS OFFICE 12 &13	PLUGS SECURITY KIOSK	LIGHTS



CIRCUIT No.	-Q26	-Q27	-Q28	-Q29	-Q30	-Q31	-Q32	-Q33	-Q37	-Q39	-Q40	-Q41	-Q42	-Q43	-Q44	-Q45	-Q46	-Q47	-Q48	-Q49	-Q12,15 to Q18 -Q34 to Q36 -Q50 to Q54
PHASE	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	
DESCRIPTION	SPARE	SPARE	LIGHTS	LIGHTS	LIGHTS OFFICE 15	SPARE	LIGHTS OFFICE 5	SPARE	1ST FLOOR DB OFFICE SUPPLY	PLUGS	LIGHTS	SPARE	SECURITY LIGHTS	BYPASS SECURITY LIGHTS	CONTACTOR LIGHTS	LIGHTS OFFICE 11 & 12	SECURITY KIOSK LIGHT	SPARE	SPARE	SPARE	BLANKS

LEGEND	
SYMBOL	DESCRIPTION
	ISOLATOR
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

A1

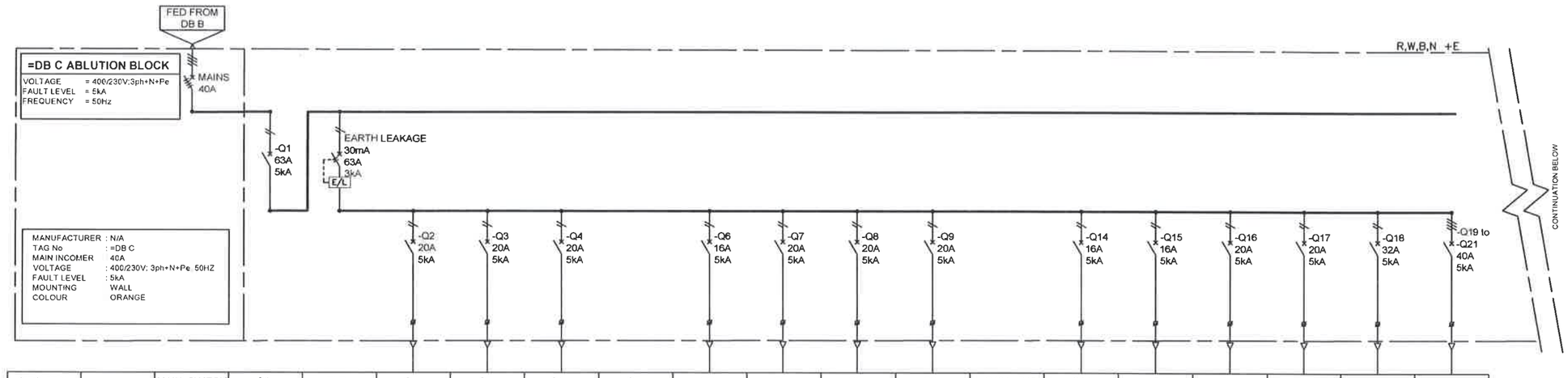
FOR INFORMATION PURPOSES

TRANSNET pipelines

DB B–WORKSHOP STORE

ALRODE WORKSHOP–SINGLE LINE DIAGRAM

REVISIONS			
PROJECT NAME			
DRAWN	W.D	REF.	
TRACED	CAD	DATE	09.11.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	NTS		
DRAWING No.			REV
PL 121500			



CIRCUIT No.		MAIN SWITCH	-Q1	ELR	-Q2	-Q3	-Q4	-Q5	-Q6	-Q7	-Q8	-Q9	-Q10 to Q13	-Q14	-Q15	-Q16	-Q17	-Q18	-Q19 to Q21
PHASE		3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N		1PH + N	1PH + N	1PH + N	1PH + N			1PH + N	1PH + N	1PH + N	1PH + N	3PH + N
DESCRIPTION		INCOMER (MAIN SWITCH)	LOCAL S/W	EARTH LEAKAGE	PLUGS	PLUGS	GATE MOTOR	BLANK	FANS	AIRCON	SPARE	SPARE	BLANKS	SPARE	LIGHTS	DEDICATED PLUG	ECTRACTOR FAN	ECTRACTOR FAN	ENERGISER SUPPLY

CIRCUIT No.	-Q22 to Q28	-Q29	-Q30	-Q31	-Q32	-Q33 to Q43												
PHASE		1PH + N	1PH + N	1PH + N	1PH + N													
DESCRIPTION	BLANKS	LIGHTS	LIGHTS	EXTRACTOR FAN	AIRCON	BLANKS												

LEGEND

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

FOR INFORMATION PURPOSES

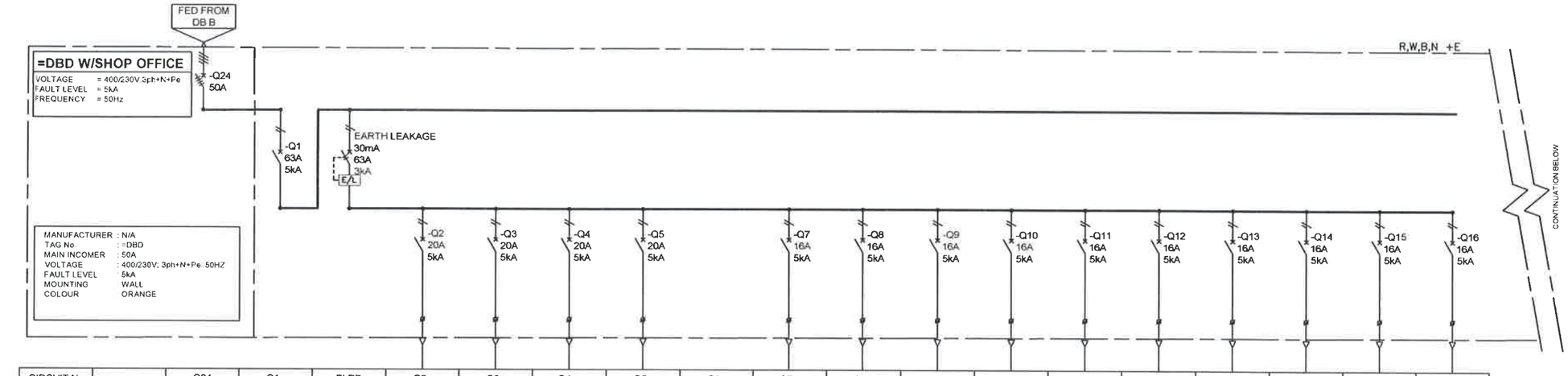
TRANSNET pipelines

DB C– ABLUTION BLOCK

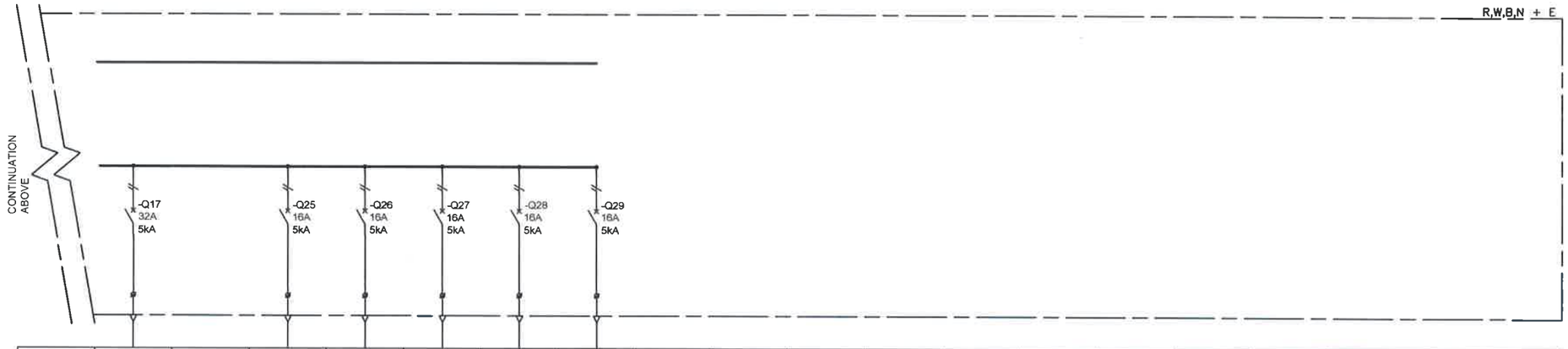
ALRODE WORKSHOP–SINGLE LINE DIAGRAM

REVISIONS			
PROJECT NAME			
DRAWN	W.D	REF.	
TRACED	CAD	DATE	05.11.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	NTS		
DRAWING No. PL 121501			REV

A1



CIRCUIT No		-Q24	-Q1	ELR7	-Q2	-Q3	-Q4	-Q5	-Q6	-Q7	-Q8	-Q9	-Q10	-Q11	-Q12	-Q13	-Q14	-Q15	-Q16
PHASE		3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N
DESCRIPTION		INCOMER (MAIN SWITCH)	LOCAL S/W	EARTH LEAKAGE 7	PLUGS	PLUGS	PLUGS	PLUGS	BLANK	DEDICATED PLUG	AIRCON OFFICE 9	SPARE	SPARE	SPARE	LIGHTS	DEDICATED PLUG	AIRCON 7	AIRCON 6	AIRCON



CIRCUIT No.	-Q17	-Q18 to Q24	-Q25	-Q26	-Q27	-Q28	-Q29	-Q30 to Q38
PHASE	1PH + N		1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	
DESCRIPTION	AIRCON OFFICE	BLANKS	DEDICATED PLUG	AIRCON OFFICE 10	DEDICATED PLUGS	LIGHTS	SPARE	BLANKS

LEGEND

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

FOR INFORMATION PURPOSES

TRANSNET pipelines

DBD–WORKSHOP OFFICES

ALRODE WORKSHOP–SINGLE LINE DIAGRAM

REVISIONS			
PROJECT NAME			
DRAWN	WD	REF.	
TRACED	CAD	DATE	18.11.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	NTS		
DRAWING No.	PL 121502	REV	

A1

LEGEND

SYMBOL	DESCRIPTION
C	CONTACTOR
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

FED FROM MAIN DBA

=DBE WORKSHOP

VOLTAGE = 400/230V;3ph+N+Pe
FAULT LEVEL= 5kA
FREQUENCY= 50Hz

R,W,B,N +E

-Q26 80A

MANUFACTURER	: N/A
TAG No.	: =DBE WORKSHOP DB
MAIN INCOMER	: 80A
VOLTAGE	: 400/230V; 3ph+N+Pe; 50HZ
FAULT LEVEL	: 5kA
MOUNTING	: WALL MOUNTED
COLOUR	: ORANGE
IP RATING	: IP42

-Q1 15A 5kA
-Q2 32A 5kA
-Q3 32A 5kA
-Q4,5,6 20A 5kA
-Q14,15,16 63A 5kA
-Q19 32A 5kA
-Q20 32A 5kA
-Q21 16A 5kA
-Q22,23,24,25 63A 5kA E/L
-Q27 16A 5kA
-Q28 16A 5kA
-Q29 1A 5kA
-Q30 32A 5kA
-Q31 16A 5kA
-Q32 C 63A 5kA
-Q33-Q35 63A 5kA

CIRCUIT No.	-Q7 to-Q13 -Q17,18	-Q26	-Q1	-Q2	-Q3	-Q4,5,6	-Q14,15,16	-Q19	-Q20	-Q21	-Q22,23,24,25	-Q27	-Q28	-Q29	-Q30	-Q31	-Q32	-Q33,34,35
PHASE		3PH + N	1PH + N	1PH + N	1PH + N	3PH + N	3PH + N	1PH + N	3PH + N	1PH + N	1PH + N	1PH + N	3PH + N	1PH + N	1PH + N	3PH + N	3PH + N	3PH + N
DESCRIPTION	BLANKS	INCOMER (MAIN SWITCH)	SPARE	AIRCON	AIRCON	GATE MOTOR	COMPRESSOR	PLUGS	PLUGS	SPARE	EARTH LEAKAGE	SPARE	SPARE	WORKSHOP LIGHTS	LIGHTS BYPASS	WORKSHOP LIGHTS	CONTACTOR LIGHTS	ACTUATOR BENCH

A2

FOR INFORMATION PURPOSES

TRANSNET pipelines

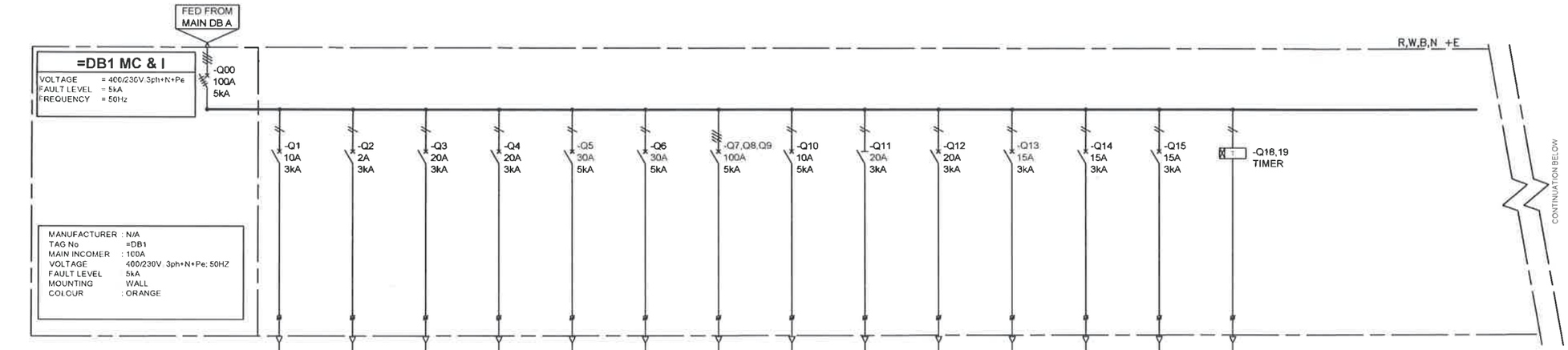
DBE WORKSHOP

ALRODE WORKSHOP SINGLE LINE

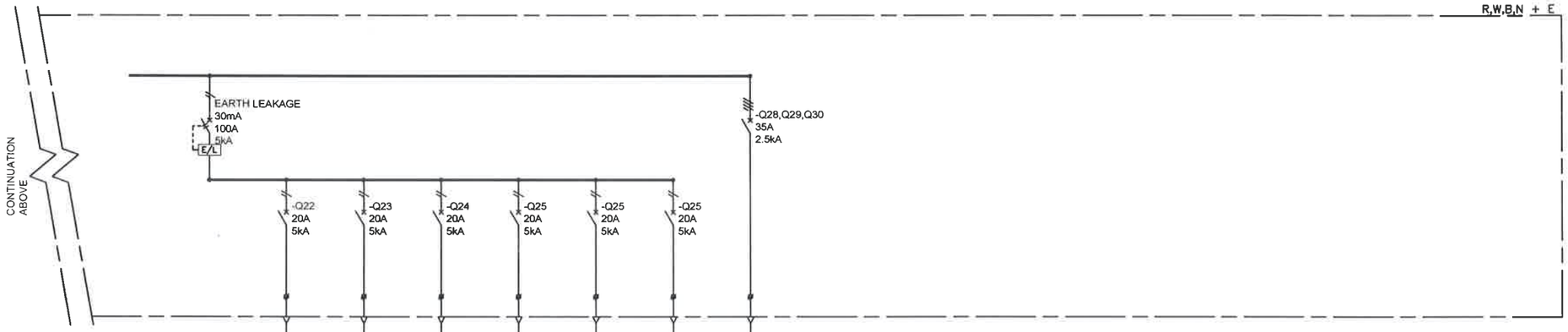
REVISIONS
PROJECT NAME

DRAWN	W.D	REF.	
TRACED	CAD	DATE	16.11.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	N.T.S		

DRAWING No. PL 121503 REV



CIRCUIT No.			-Q1	-Q2	-Q3	-Q4	-Q5	-Q6	-Q7,Q8,Q9	-Q10	-Q11	-Q12	-Q13	-Q14	-Q15	-Q18,Q19			
PHASE			1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N			
DESCRIPTION		INCOMER (MAIN SWITCH)	P1 PLUG	P2 PLUG	WORKSHOP LIGHTS	WORKSHOP LIGHTS	WORKSHOP LIGHTS	R ROOM	AIRCON	OUTSIDE LIGHTS	SEWER PUMP	SEWER PUMP	OFFICE LIGHTS	COMP ROOM STORE	EARTH LEAKAGE	TIME SWITCH			



CIRCUIT No.		-Q20,21	-Q22	-Q23	-Q24	-Q25	-Q26	-Q27	-Q28,Q29,Q30										
PHASE		1PH + N	3PH + N	3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N										
DESCRIPTION		EARTH LEAKAGE	GEYSER	PLUGS W/ ROOM	AIRCON	PLUGS	PLUGS	PLUGS	POWER TO IM ROOM										

LEGEND	
SYMBOL	DESCRIPTION
T	TIMER - BATTERY BACKUP
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

TRANSNET pipelines

DB1 – MC&I

LADYSMITH WORKSHOP – SINGLE LINE DIAGRAM

FOR INFORMATION PURPOSES

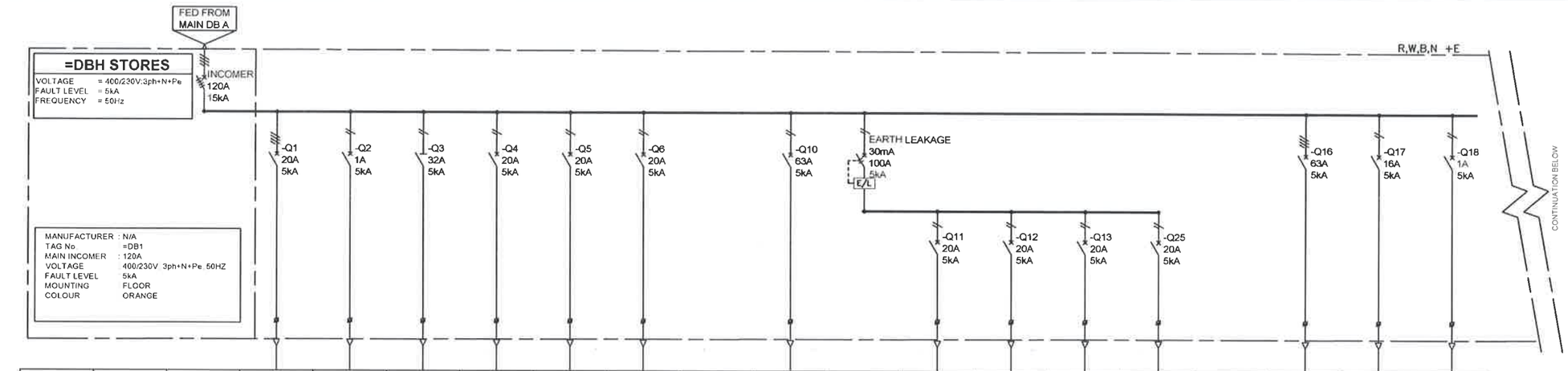
A1

REVISIONS

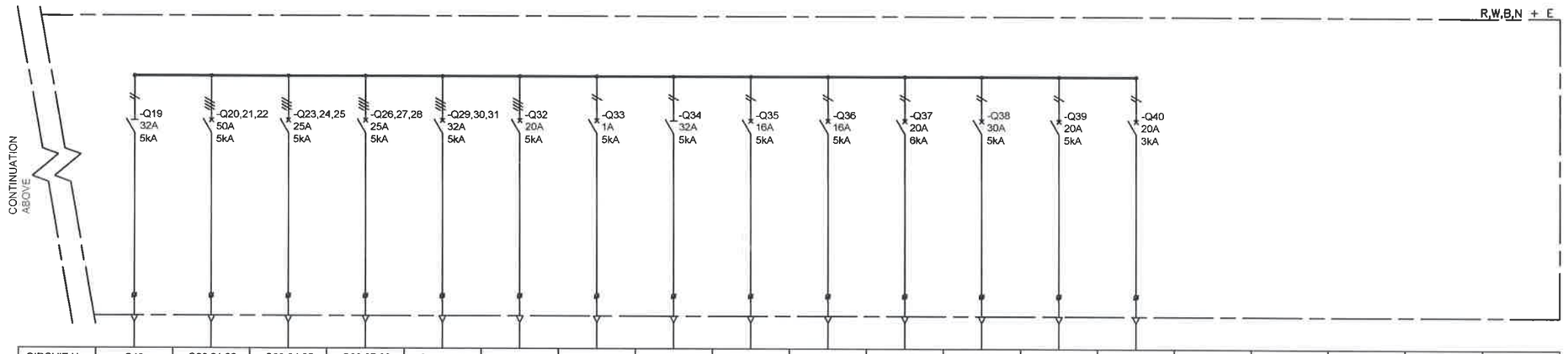
PROJECT NAME

DRAWN	WD	REF.	
TRACED	CAD	DATE	09.11.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	NTS		

DRAWING No. PL 121204 REV



CIRCUIT No.			-Q1	-Q2	-Q3	-Q4	-Q5	-Q6	-Q7,Q8,Q9	-Q10	E/L	-Q11	-Q12	-Q13	-Q14	-Q15	-Q16	-Q17	-Q18
PHASE			3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N		1PH + N		1PH + N	1PH + N	1PH + N	1PH + N		3PH + N	1PH + N	1PH + N
DESCRIPTION		INCOMER (MAIN SWITCH)	SPARE-TP 20AMP	COIL CONTACTOR	OVERIDE WORKSHOP LIGHTS CONATCTOR	LIGHTS	LIGHTS	PLUGS S09 &10	BLANKS	63A MAIN	EARTH LEAKAGE	PLUGS S05,S06,S01,S02	PLUGS S07,S08	PLUGS S03,S04	SPARE	BLANK	63A TP	SPARE	COIL CONTACTOR



CIRCUIT No.	-Q19	-Q20,21,22	-Q23,24,25	-Q26,27,28	-Q29 30 31	-Q32	-Q33	-Q34	-Q35	-Q36	-Q37	-Q38	-Q39	-Q40					
PHASE	1PH + N	3PH + N	3PH + N	3PH + N	3PH + N	3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N					
DESCRIPTION	OVERIDE ROLL UP DOOR LIGHTS CONTACTOR	SPARE-TP 50AMP	SPARE-TP 25AMP	SPARE -TP 25AMP	FORKLIFT BATTERY CHARGER	TP 20AMP	COIL CONTACTOR	OVERIDE FOR SECURITY LIGHTS CONTACTOR	EMERGENCY LIGHT	ALARM	SPARE	SPARE	SPARE	GEYSER					

LEGEND

SYMBOL	DESCRIPTION
	ISOLATOR
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

FOR INFORMATION PURPOSES

TRANSNET pipelines

DBH–MAIN STORES

LADYSMITH WORKSHOP–SINGLE LINE DIAGRAM

REVISIONS

PROJECT NAME

DRAWN	WD	REF.	
TRACED	CAD	DATE	09.11.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	NTS		

DRAWING No. PL 121505 REV

A1

LEGEND

SYMBOL	DESCRIPTION
	TRANSFORMER
	CIRCUIT BREAKER

400V

FED FROM
MUNUCIPALITY
MINI SUB

TPL MINI SUB

=TPL MINI SUB

VOLTAGE = 400V,230V;3ph+N+Pe
FAULT LEVEL= 5kA
FREQUENCY= 50Hz

MANUFACTURER	: N/A
TAG No.	: =TPL MINI SUB
MAIN INCOMER	: 250A
VOLTAGE	: 400V,230V;3ph+N+Pe; 50HZ
FAULT LEVEL	: 6kA
MOUNTING	: FLOOR MOUNTED
COLOUR	: GREY
IP RATING	: IP65

-Q01 INCOMER
250A MAIN SWITCH

-Q10
100A
6kA

-Q11
100A
6kA

STORES
DB A

MAIN DB
DB 1A

-Q01
45A
6kA

OIL STORE
DB B

MAIN DB DB 1

-Q008
15A
5kA

-Q009
70A
5kA

-Q014
60A
5kA

-Q002
30A
5kA

MC& I
DB 2

MOTOR STORE
DB 3

GUARD HOUSE
DB 4

COMPRESSOR
ROOM
DB 5

A2

FOR INFORMATION PURPOSES

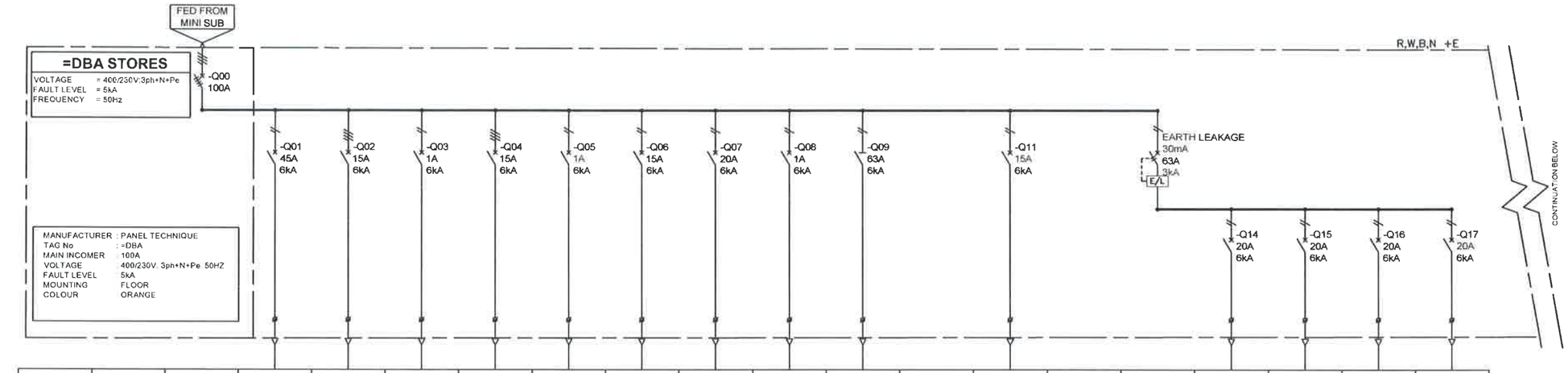
TRANSNET pipelines

OVERALL SINGLE LINE DIAGRAM
LADYSMITH WORKSHOP

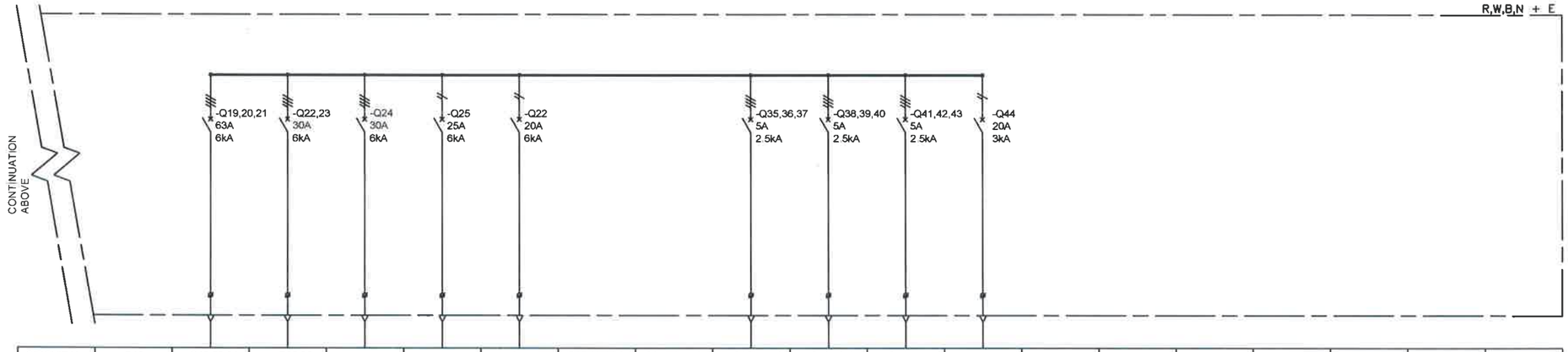
REVISIONS
PROJECT NAME

DRAWN	W.D	REF.	
TRACED	CAD	DATE	07.09.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	N.T.S		

DRAWING No. PL 121481 REV



CIRCUIT No.			-Q01	-Q02	-Q03	-Q04	-Q05	-Q06	-Q07	-Q08	-Q09	-Q10	-Q11	-Q12,Q13	E/L	-Q14	-Q15	-Q16	-Q17
PHASE			1PH + N	3PH + N	1PH + N	3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N		1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N
DESCRIPTION		INCOMER (MAIN SWITCH)	SUPPLY TO DB B	HIGH BAY LIGHTING CIRCUIT 1	CONTROL CIRCUIT	HIGH BAY LIGHTING CIRCUIT 2	CONTROL CIRCUIT	EMERGENCY LIGHTING CIRCUIT	EXTERIOR LIGHTING CIRCUIT	CONTROL CIRCUIT	DAY NIGHT SWITCH BYPASS	BLANK	OFFICE LIGHTS	BLANK	EARTH LEAKAGE	PLUG CIRCUIT 2	PLUG CIRCUIT 2	PLUG CIRCUIT OFFICE	DEDICATED PLUG CIRCUIT



CIRCUIT No.	-Q18	-Q19,20,21	-Q22,23	-Q24	-Q25	-Q26	-Q27,28,29,30	-Q31,32,33,34	-Q35,36,37	-Q38,39,40	-Q41,42,43	-Q44							
PHASE	1PH + N	3PH + N	3PH + N	3PH + N	1PH + N	1PH + N			1PH + N	3PH + N	3PH + N								
DESCRIPTION	BLANK	CRANE ISOLATOR	WELDING PLUG 1	WELDING PLUG 2	AIRCON	SPARE	BLANKS	BLANKS	ROLLER DOOR MOTOR 1	ROLLER DOOR MOTOR 2	ROLLER DOOR MOTOR 3	CAMERA							

LEGEND

SYMBOL	DESCRIPTION
T	TIMER - BATTERY BACKUP
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

A1

FOR INFORMATION PURPOSES

TRANSNET pipelines

DBA–STORES

LADYSMITH WORKSHOP–SINGLE LINE DIAGRAM

REVISIONS

PROJECT NAME

DRAWN	WD	REF.	
TRACED	CAD	DATE	30.09.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	NTS		

DRAWING No. PL 121489 REV

LEGEND	
SYMBOL	DESCRIPTION
	CIRCUIT BREAKER
	ISOLATOR

FED FROM
DBA STORES

L,N +E

=DBB OIL STORE

VOLTAGE = 230V+N+Pe
FAULT LEVEL= 5kA
FREQUENCY= 50Hz

MANUFACTURER	: PANEL TECHNIQUE
TAG No.	: =DB B OIL STORE
MAIN INCOMER	: 63A
VOLTAGE	: 230V+N+Pe; 50HZ
FAULT LEVEL	: 5kA
MOUNTING	: WALL MOUNTED
COLOUR	: ORANGE
IP RATING	: IP42

-Q00 63A

-Q01 15A 6kA

-Q02 20A 6kA

-Q03 1A 6kA

-Q04 63A 6kA

-Q05 15A 6kA

-Q06 15A 6kA

CIRCUIT No.			-Q00	-Q01	-Q02	-Q03	-Q04	-Q05	-Q06		
PHASE			1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N		
DESCRIPTION			INCOMER (MAIN SWITCH)	INSIDE LIGHTS	OUTSIDE LIGHTS	DAYNIGHT SWITCH	SPARE	BYPASS	SPARE	BLANK	BLANK

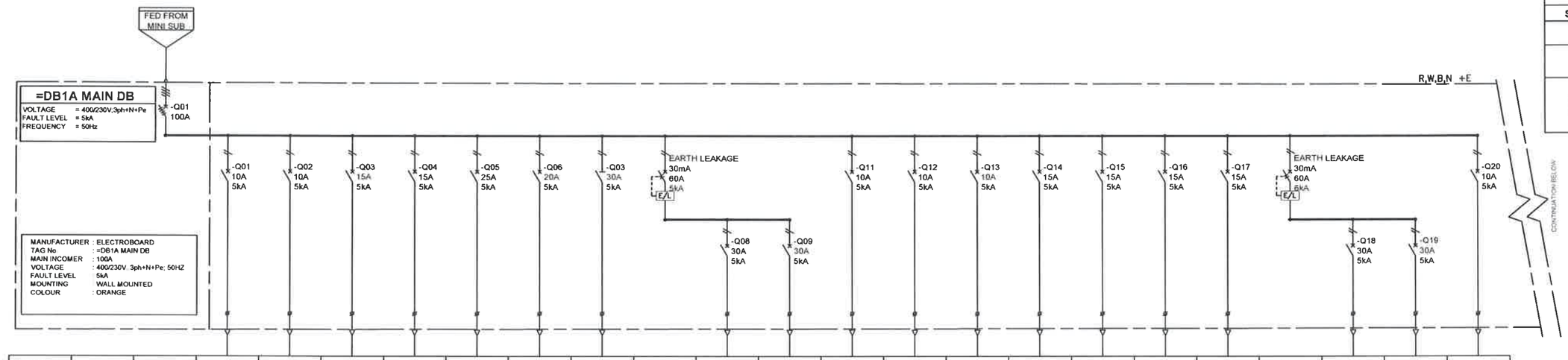
A2

FOR INFORMATION PURPOSES

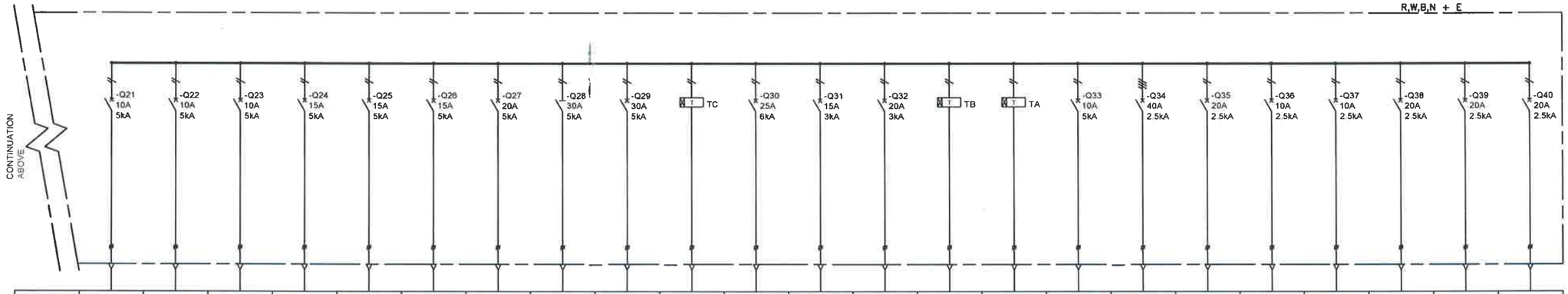
TRANSNET pipelines

DB–B OIL STORE
LADYSMITH WORKSHOP SINGLE LINE

REVISIONS			
PROJECT NAME			
DRAWN	W.D	REF.	
TRACED	CAD	DATE	17.09.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	N.T.S		
DRAWING No. PL 121484			REV



CIRCUIT No.			-Q01	-Q02	-Q03	-Q04	-Q05	-Q06	-Q07	E/L	-Q08	-Q09	-Q11	-Q12	-Q13	-Q14	-Q15	-Q16	-Q17	E/L	-Q18	-Q19	-Q20
PHASE			1PH + N	1PH + N	1PH + N	1PH + N		1PH + N	1PH + N	1PH + N			1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N
DESCRIPTION		INCOMER (MAIN SWITCH)	LIGHTS-CHANGE ROOM, TOILETS,KITCHEN	LIGHTS- MANAGERS OFFICE	SPARE	SPARE	SPARE	AIRCON KITCHEN	GEYSER B	EARTH LEAKAGE	PLUGS-ADMIN,MECH OFFICE	PLUGS-MECH SUP OFFICE, MANAGERS OFFICE, KITCHEN	LIGHTS-PASSAGE AND FOYER	LIGHTS-PASSAGE AND FOYER	LIGHTS-FEMALE CHANGE ROOM	SPARE	HEATER 1 WORKSHOP	HEATER 2 WORKSHOP	SUPPLY PHOTO CELL	EARTH LEAKAGE	PLUGS-WORKSHOP	PLUGS-WORKSHOP	SPARE



CIRCUIT No.	-Q21	-Q22	-Q23	-Q24	-Q25	-Q26	-Q27	-Q28	-Q29	TC	-Q30	-Q31	-Q32	TB	TA	-Q33	-Q34	-Q35	-Q36	-Q37	-Q38	-Q39	-Q40
PHASE	1PH + N	1PH + N	1PH + N		1PH + N	1PH + N	1PH + N	1PH + N	1PH + N			1PH + N	1PH + N			1PH + N	3PH + N	1PH + N	1PH + N	1PH + N			
DESCRIPTION	LIGHTS WORKSHOP	LIGHTS WORKSHOP	LIGHTS WORKSHOP	HEATER 3 WORKSHOP	HEATER 4 WORKSHOP	HEATER 5 WORKSHOP	SPARE	GEYSER A	HEATER 6 WORKSHOP	GEYSER TIMER C	AIRCON NEW BUILDING	LIGHTS-KITCHEN,MENS CHANGE ROOM	PLUGS-BOARDROOM, KITCHEN	GEYSER TIMER B	GEYSER TIMER A	SUPPLY TRANSTEL	3 PHASE STOVE-KITCHEN	SPARE	LIGHTS-BOARDROOM & BOARDROOM KITCHEN	LIGHTS-MENS & WOMENS TOILET	GEYSER C	SPARE	PLUGS-KITCHEN BOARDROOM

LEGEND

SYMBOL	DESCRIPTION
T	TIMER - BATTERY BACKUP
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

TRANSNET pipelines

DB1A MAIN DB

LADYSMITH WORKSHOP–SINGLE LINE DIAGRAM

FOR INFORMATION PURPOSES

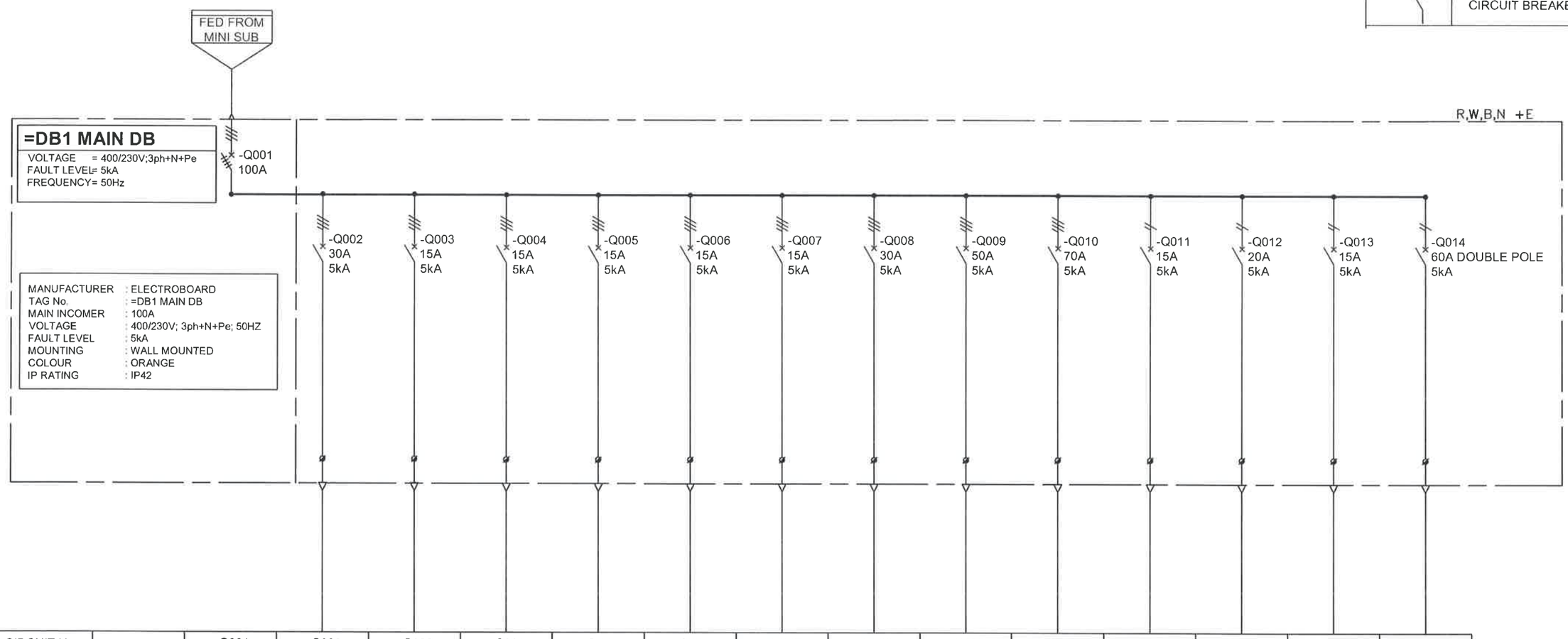
A1

REVISIONS

PROJECT NAME

DRAWN	WD	REF.	
TRACED	CAD	DATE	14.09.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	NTS		
DRAWING No.	PL 121483		REV

LEGEND	
SYMBOL	DESCRIPTION
	CIRCUIT BREAKER



CIRCUIT No.		-Q001	-Q002	-Q003	-Q004	-Q005	-Q006	-Q007	-Q008	-Q009	-Q010	-Q011	-Q012	-Q013	-Q014
PHASE		3PH + N	3PH + N	3PH + N	3PH + N	3PH + N	3PH + N	3PH + N	3PH + N	3PH + N	3PH + N	1PH + N	1PH + N	1PH + N	1PH + N
DESCRIPTION		INCOMER (MAIN SWITCH)	SUPPLY COMPRESSOR	LATHE	SECURITY LIGHTS	SPARE	DRILLING MACHINE	GRINDER	SUPPLY M&I BUILDING	WELDING PLUG	SUPPLY TO MOTOR STORE	SECURITY LIGHTS	SECURITY LIGHTS	BYPASS	SUPPLY-GUARD HOUSE

A2

FOR INFORMATION PURPOSES

TRANSNET pipelines

DB1 MAIN DB

LADYSMITH WORKSHOP–SINGLE LINE DIAGRAM

REVISIONS			
PROJECT NAME			
DRAWN	W.D	REF.	
TRACED	CAD	DATE	09.09.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	N.T.S		
DRAWING No. PL 121482			REV

LEGEND

SYMBOL	DESCRIPTION
T	TIMER - BATTERY BACKUP
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

FED FROM
DB1 MAIN DB

R,W,B,N +E

=DB2 MC& I + ELEC
VOLTAGE = 400/230V;3ph+N+Pe
FAULT LEVEL= 5kA
FREQUENCY= 50Hz

-Q00
50A

MANUFACTURER	: ELECTROBOARD
TAG No.	: =DB2 MC&I+ELEC DB
MAIN INCOMER	: 50A
VOLTAGE	: 400/230V; 3ph+N+Pe; 50HZ
FAULT LEVEL	: 5kA
MOUNTING	: WALL MOUNTED
COLOUR	: ORANGE
IP RATING	: IP42

-EARTH LEAKAGE
30mA
63A
3kA
E/L

-Q01 20A 2.5kA
-Q02 20A 2.5kA
-Q03 20A 2.5kA
-Q04 20A 2.5kA
-Q06 10A 2.5kA
-Q07 10A 2.5kA
-Q08 20A 2.5kA
-Q09 15A 5kA
-Q10 25A 5kA
-Q12 30A 5kA
-Q13 20A 3kA
-Q14 T
-Q15 50A 2.5kA

CIRCUIT No.		-Q00	-Q05 & -Q11	-E/L	-Q01	-Q02	-Q03	-Q04	-Q06	-Q07	-Q08	-Q09	-Q10	-Q12	-Q13	-Q14	-Q15
PHASE		3PH + N		1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	3PH + N
DESCRIPTION		INCOMER (MAIN SWITCH)	BLANKS	EARTH LEAKAGE	PLUGS M&I OFFICE	PLUGS M&I OFFICE	PLUGS ELECTRICAL OFFICE	PLUGS M&I OFFICE	LIGHTS M&I OFFICE	LIGHTS ELECTRICAL OFFICE	GEYSER ELECTRICAL OFFICE	SUPPLY CONTAINER BAR	AIRCON-ELECTRICAL	SPARE	AIRCON M&I OFFICE	TIMER GEYSER	SPARE-3 PHASE POINT

REVISIONS
PROJECT NAME

DRAWN	W.D	REF.	
TRACED	CAD	DATE	21.09.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	N.T.S		
DRAWING No.	PL 121485	REV	

TRANSNET pipelines

DB2 M&I + ELEC OFFICES
LADYSMITH WORKSHOP

A2

FOR INFORMATION PURPOSES

LEGEND

SYMBOL	DESCRIPTION
	TIMER - BATTERY BACKUP
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

FED FROM DB1 MAIN DB

=DB3 MOTOR STORE

VOLTAGE = 400/230V;3ph+N+Pe
FAULT LEVEL= 5kA
FREQUENCY= 50Hz

R,W,B,N +E

-Q01 60A

MANUFACTURER	: ELECTROBOARD
TAG No.	: =DB3 MOTOR STORE DB
MAIN INCOMER	: 60A
VOLTAGE	: 400/230V; 3ph+N+Pe; 50HZ
FAULT LEVEL	: 5kA
MOUNTING	: WALL MOUNTED
COLOUR	: ORANGE
IP RATING	: IP42

-EARTH LEAKAGE 20mA 60A 5kA
-Q03 30A 5kA
-Q04 30A 5kA
-Q05 30A 5kA
-Q06 50A 3kA
-EARTH LEAKAGE 20mA 30A 5kA
-Q07 5A 3kA
-Q08 30A 5kA
-Q09 30A 5kA
-Q10 30A 5kA
-Q13 10A 3kA
-Q14 15A 5kA
-Q15 10A 5kA
-Q16 15A 5kA
-Q17 63A 6kA

CIRCUIT No.	-Q02, Q11, -Q12, Q13	-Q01	E/L	-Q03	-Q04	-Q05	-Q06	-E/L	-Q07	-Q08	-Q09	-Q10	-Q13	-Q14	-Q15	-Q16	-Q17
PHASE		3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	3PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	3PH + N	1PH + N	1PH + N	1PH + N	3PH + N
DESCRIPTION	BLANKS	INCOMER (MAIN SWITCH)	EARTH LEAKAGE	PLUGS	PLUGS	SUPPLY TO EMERGENCY CONTAINER	ACTUATOR BENCH	EARTH LEAKAGE	CONTACTOR CONTROL CIRCUIT	PLUGS	PLUGS	SPARE	WATER PUMP	LIGHTS	LIGHTS	SPARE	CRANE

REVISIONS
PROJECT NAME

DRAWN	W.D	REF.	
TRACED	CAD	DATE	01.09.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	N.T.S		
DRAWING No.	PL 121486		REV

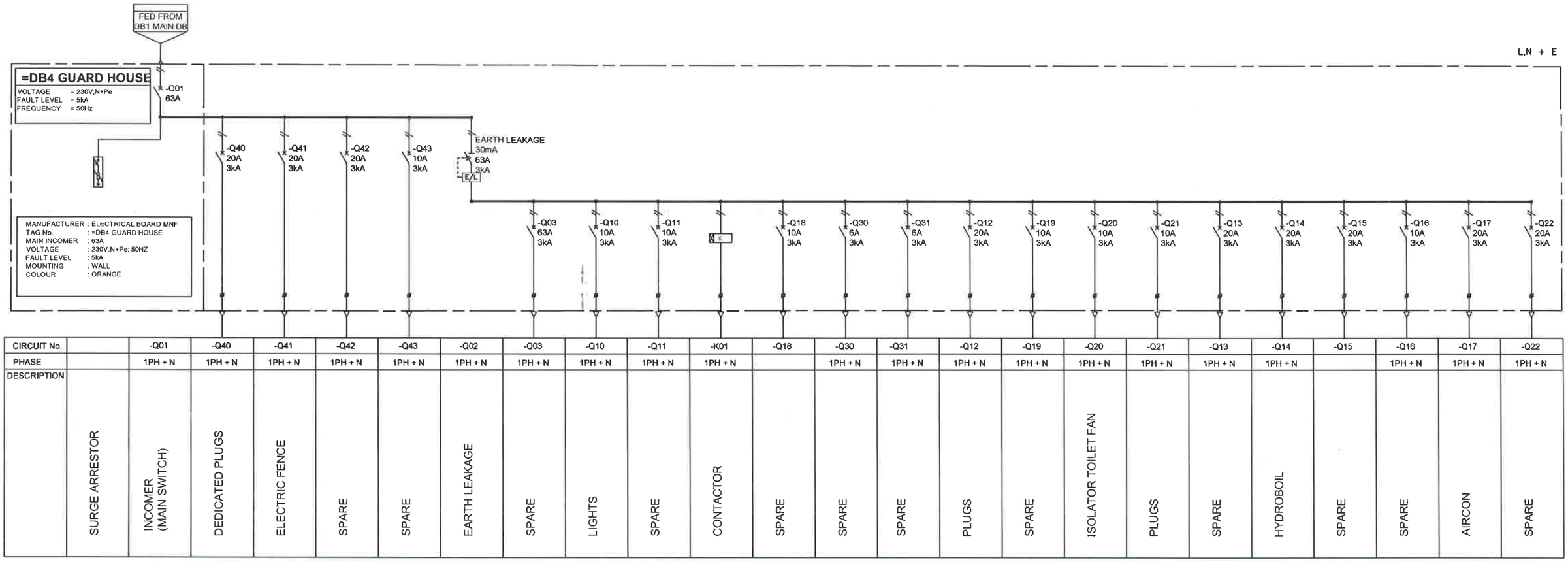
TRANSNET pipelines

DB3 MOTOR STORE
LADYSMITH WORKSHOP SINGLE LINE

A2

FOR INFORMATION PURPOSES

LEGEND	
SYMBOL	DESCRIPTION
K	CONTACTOR
	CIRCUIT BREAKER
K	SURGE ARRESTOR
E/L	EARTH LEAKAGE UNIT



CIRCUIT No.		-Q01	-Q40	-Q41	-Q42	-Q43	-Q02	-Q03	-Q10	-Q11	-K01	-Q18	-Q30	-Q31	-Q12	-Q19	-Q20	-Q21	-Q13	-Q14	-Q15	-Q16	-Q17	-Q22
PHASE		1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N		1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N	1PH + N		1PH + N	1PH + N	1PH + N
DESCRIPTION	SURGE ARRESTOR	INCOMER (MAIN SWITCH)	DEDICATED PLUGS	ELECTRIC FENCE	SPARE	SPARE	EARTH LEAKAGE	SPARE	LIGHTS	SPARE	CONTACTOR	SPARE	SPARE	SPARE	PLUGS	SPARE	ISOLATOR TOILET FAN	PLUGS	SPARE	HYDROBOIL	SPARE	SPARE	AIRCON	SPARE

FOR INFORMATION PURPOSES

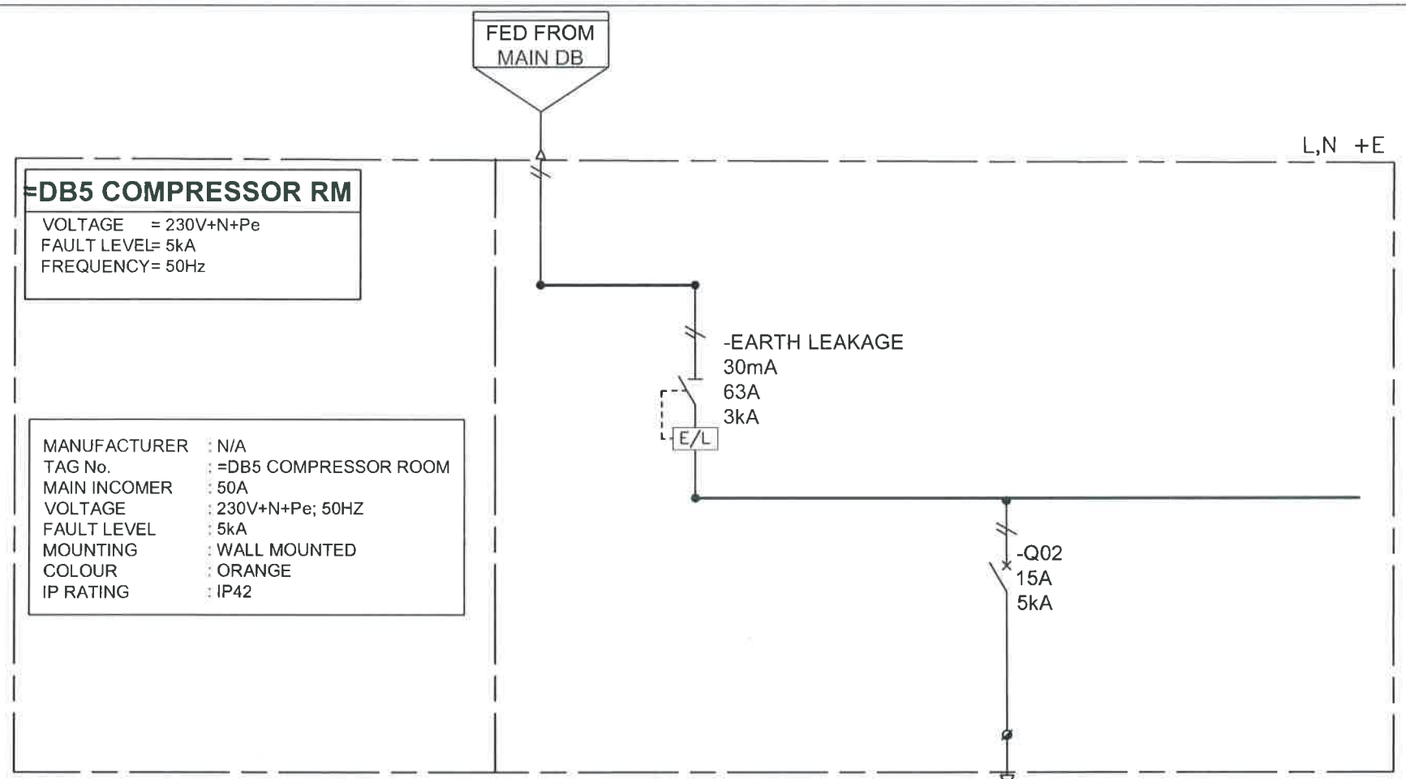
A1

TRANSNET pipelines

DB4 GUARD HOUSE

LADYSMITH WORKSHOP–SINGLE LINE DIAGRAM

REVISIONS			
PROJECT NAME			
DRAWN	W.D	REF.	
TRACED	CAD	DATE	28.09.2020
CHECKED	K.N	APPROVED	Z.M
SCALE	NTS		
DRAWING No.	PL 121487	REV	



LEGEND

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER
E/L	EARTH LEAKAGE UNIT

CIRCUIT No.				-E/L	-Q01	-Q02	-Q03	
PHASE				1PH + N	1PH + N	1PH + N	1PH + N	
DESCRIPTION				EARTH LEAKAGE (MAIN SWITCH)	BLANK	PLUGS-BATTERY CHARGER	BLANK	

A2

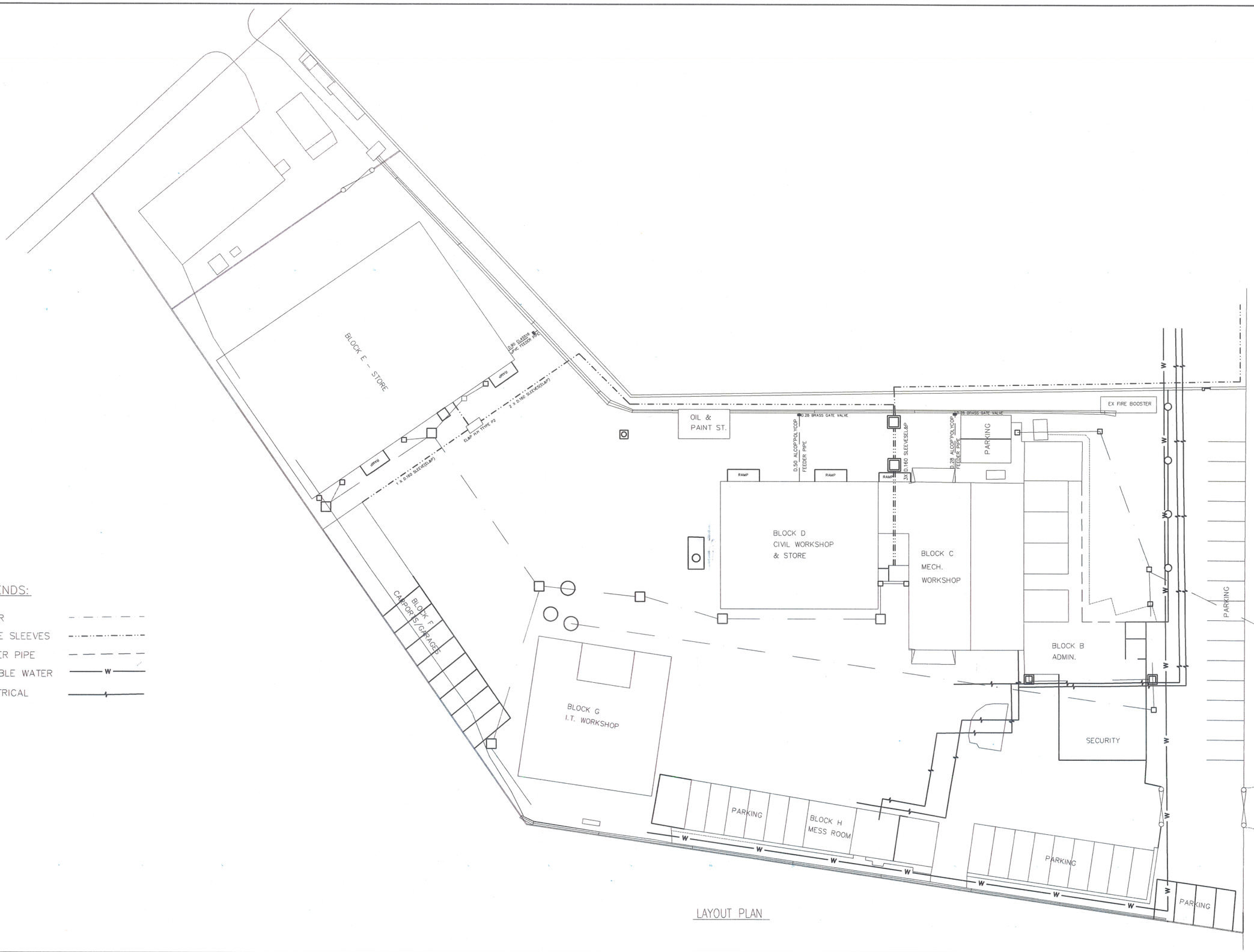
FOR INFORMATION PURPOSES

TRANSNET pipelines

DB5–COMPRESSOR ROOM

LADYSMITH WORKSHOP

REVISIONS			
PROJECT NAME			
DRAWN	W.D	REF.	
TRACED	CAD	DATE	03.09.2020
CHECKED	K.N	APPROVED	Z.M
SCALE			
DRAWING No. PL 121488			REV



LEGENDS:

- SEWER
- CABLE SLEEVES
- FEEDER PIPE
- POTABLE WATER — W —
- ELECTRICAL

LAYOUT PLAN

FOR INFORMATION PURPOSES

REVISIONS			

TRANSNET pipelines

ALR MAINTENANCE

SITE LAYOUT

PROJECT NAME	ALRODE MAINTENANCE DEPOT		
DRAWN	MM	REF.	DRG.NO. DA6c0101
TRACED	CAD	DATE	18/02/2019
CHECKED	ZM	APPROVED	ZM
SCALE	N.T.S		
DRAWING No. PL		REV	A

KEY

	PERIMETER FENCE
	SECONDARY FENCE
	MANUAL GATE
	AUTOMATED GATE
	EMERGENCY EXIT GATE
	PROPOSED CABLE TRENCH
	JUNCTION BOX FOUNDATION
	CABLE DRAW BOX

SENSITIVE BUILDINGS
STORE
FAN HOUSE
GENERATOR ROOM
SWITCHGEAR ROOM
PUMPHOUSE
LABORATORY

INFORMATION PURPOSES

IMPORTANT:

1. All architectural drawings to be read in conjunction with engineers drawings.
2. Architectural drawings to take precedence over consultants drawings during construction.
3. All boundaries, dimensions and levels are to be checked on site before construction and any discrepancies are to be reported to the Architect.
4. Partial Service: Any discrepancies with site or other information is to be advised to the Architect and direction or approval is to be sought before the implementation of the detail.
5. For the purpose of coordination, all relevant parties must check this information prior to implementation and report any discrepancies to the Architect.
6. Any discrepancies MUST be reported to the ARCHITECT immediately prior to any commencement of work. P.G.A. will not be responsible for work carried out without the ARCHITECT's consent as well as deviations from the approved plans.
7. Any plans removed from ARCHITECT'S office without his prior authorization will be deemed unchecked and thereafter invalid.
8. The attention of the owner is drawn to the fact that changes to the plan and/or specifications after official approval are likely to invalidate that approval.
9. No construction is to be carried out on site prior to approval of submissions from relevant authorities.
10. Do not scale this drawing.
11. All Revisions made by engineer must be indicated in a revision cloud and the date the revision was made.

AS-BUILT

Owners Signature

Signature :

Date :

Checked by Architectural Consultants (PGA Architects):

Name: Prak Govender

Signature:

Date:

LDM
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Client: TRANSNET

Project:

TRANSNET PIPELINE
GUARD HOUSE

Drawing description:

SITE PLAN- LADYSMITH

Drawn: K.G. Date: 05-04-2018

Scale/s: **1:250**

Drawing Number: **A4XY29-LAY-10-CD-002**

Revision: **00**