

Scope for Estimate

Mid West Energy Project

South Section

(Formerly NCR South Section)

Signed Copy is V4 of this document & contained in pdf: [DM#7280062](#)

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Document Control

Record of Revisions

Revision number	Date	DMS version	Revised by	Description
002	6 Jun 10	7170020v2	C Julian	Initial version
003	22 Jun 10	7170020v3	C Julian	Revised TST single line
004	25 Jun 10	7170020v4	C Julian	Authorised & Signed Version for Estimating
005	29 Jul 10	7170020v5	C Julian	Updated Distribution scope to include TST-TS81 crossings, TST station supply. Updated NBT and TST single line diagrams

Documents Referenced In This Document

DMS#	Title of Document
	DMS and other document reference in this document are indicated in blue underlined text.

Stakeholders (people to be consulted when document is updated)

Position / Title
Section Manager – Transmission Lines Design
Branch Manager – Transmission Primary Engineering & Construction
Group Manager – Transmission Delivery

Notification List (people to be consulted when document is updated)

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1. MWEF (NCR) high level scope breakdown

- 1.1. Underground all Distribution lines crossings under the PJR-RGN81, RGN-CTB81 and CTB-ENB81 lines. Underground all Distribution lines crossing under TST-TS81 line. Provide station supply connection to Three Springs Terminal station.
- 1.2. Relocate Emu Downs 801 circuit from CTB-ENB/EMD81 to PJR-ENB/EMD81 line.
- 1.3. Demolish PJR-RGN81, RGN-CTB81 and CTB-ENB81 line (old Cricket Wicket Line).
- 1.4. Construct new 330kV Double Circuit transmission line PJR-ENB
- 1.5. Construct new 330kV Double Circuit transmission line ENB-ENT
- 1.6. Line crossing of the new 330kV line over PJR-WNO81
- 1.7. Line crossing of the new 330kV line over PJR-CTB81/PJR-ENB/EMD81
- 1.8. Design & Construct TST
- 1.9. Design & Construct new 330kV line circuit at NBT
- 1.10. Design & Construct new 132kV line circuit at TS
- 1.11. Design & Construct a double circuit 132kV line between TST & TS to be energised one side as part of ENB-TS81 and the other TST-TS81
- 1.12. Line Entries and associated 132kV connections at PJR, RGN, CTB and ENB
- 1.13. Associated Substation works
- 1.14. Associated Communications System works

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2. Related Projects

These Works are related but are NOT INCLUDED in the MWEP Project Scope.

Karara Mining Limited (KML – A subsidiary of Gindalbie Metals) are presently in negotiations with Western Power to reach agreement on 330kV connection arrangements for their Karara Mine site. The KML works will include the following:

- 2.1. Design and Construct new 330kV Double Circuit transmission line ENT-TST (to be energised split phase 132kV via MWEP newly constructed ENB-ENT line).
- 2.2. Design and Construct new 330kV TST-KRA91 line (constructed Double circuit where easement is shared with TS-GGV81 line & single circuit to Karara Mine site substation - KRA)
- 2.3. Design & Construction of new 132kV line circuit at ENB
- 2.4. **Early Delivery of** works of some aspects of TST including:
 - 2.4.1. 330kV yard earthworks, fencing, drainage & site works
 - 2.4.2. Communications system
 - 2.4.3. Installation of 490MVA, 330:132kV Transformer
 - 2.4.4. Installation of 132kV Transformer circuit breaker & associated isolators & earth switches etc (in 330kV yard)
 - 2.4.5. Design & construction of 330kV line bay for TST-KRA91 line.
 - 2.4.6. Design & construction of 330kV line bay for future NBT-TST91 line.
 - 2.4.7. Design & construction of 330kV Transformer bay.
 - 2.4.8. Design of Layout of TST ultimate arrangements, including 132kV yard
 - 2.4.9. Associated substation & Communication works.
- 2.5. **Early Delivery of** design and construction of the ENB-ENT 330kV line section
- 2.6. Energise new ENB – TST81 line split phase, at 132kV
- 2.7. Energise TST 490MVA 330:132kV Transformer from 132kV side
- 2.8. Energise TST 330kV switchyard
- 2.9. Energise TST-KRA91 line at 330kV
- 2.10. Demolish ENB-TS81 line
- 2.11. Demolish redundant section of TS-GGV81 line

KML project works affect the timing costing and implementation of the MWEP project & both projects are interconnected & interrelated.

Portions of the KML project will be undertaken by Western Power for the Customer & other portions (most notably all 330kV line design and construction works) will be undertaken by KML

[DM#7263366](#) shows agreed list of roles and responsibilities as per Karara & Western Power signed Heads of Agreement.

Appendix 1 ([DM#7250906](#)) shows the two projects & timing diagrammatically.

3. Project Timing

The MWEP project is subject to a number of regulatory & government reviews & tests including 'pre'NFIT. Due to the constraints of these tests & the need to reach firm agreement with Karara Mining before project approval it is anticipated that final go ahead will not be received until early January 2011. Energisation of the NBT-TST91 line, TST terminal & TST-TS81 line is expected by the first quarter of 2013.

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4. MWEF Detailed scope breakdown

4.1. Distribution undergrounding

To allow safe demolition of the existing 132kV lines & construction of the new 330kV double circuit lines the existing distribution HV (22 & 33kV) & LV (415V) overhead lines that come in close proximity to the line easement are to be made safe during construction. To achieve this all distribution network that comes within the line easement is to be undergrounded. (Undergrounding vs alternatives options are outlined in DM 7408005.)

The project scope also includes design and construction of a 315KVA station supply to the new Three Springs Terminal substation.

The Distribution undergrounding scope has been split into five sections coinciding with the PJR-RGN, RGN-CTB, CTB-ENB, ENB-ENT and TST-TS81 line sections. Designs are complete for RGN-CTB & CTB-ENB sections.

- 4.1.1. PJR-RGN part includes undergrounding of **8 sections** of Distribution network – [DM#6114296](#) contains detailed scope description. Design has not been completed for this section. Some relevant documentation of this section is contained within AM/119/NR010699(DQM)V1
- 4.1.2. RGN-CTB part includes undergrounding of **8 sections** of Distribution network – [DM#5026445](#) contains detailed scope description. Design is completed for this section. DQM project number is NR010671. DMS file # is AM/119/NR010671(DQM)V1
- 4.1.3. CTB-ENB part includes undergrounding of **9 sections** of Distribution network – [DM#4905892](#) contains detailed scope description. Design is completed for this section. DQM project number is NR010671. DMS file # is AM/119/NR010678(DQM)V1
- 4.1.4. ENB-ENT part includes undergrounding of **NIL sections** of Distribution network – No Distribution assets are in close proximity to this section of the line & hence none require undergrounding.
- 4.1.5. TST-TS81 line – [DM#7389416](#) contains a diagram showing the sections of 33kV undergrounding that are required to allow construction of the TST-TS81 line.

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4.1.6. 315KVA station supply is required for the new Three Springs Terminal substation. [DM#7315055](#) shows the connection proposed.

4.2. Relocate Emu Downs 801 circuit from CTB-ENB/EMD81 to PJR-ENB/EMD81 line.

To allow demolition of the existing CTB-ENB/EMD81 cricket wicket line it is necessary to relocate the Emu Downs substation connection to the existing PJR-ENB81 line. In preparation of this the PJR-ENB81 line protections have been recently upgraded. Line designs are completed for this portion of the project and can be found in DM#4813227.

4.3. Demolish PJR-RGN81, RGN-CTB81 and CTB-ENB81 line (old Cricket Wicket Line).

To allow construction of the new 330kV line the existing ‘Cricket Wicket Line’ from Pinjar to Eneabba requires demolition. However, to retain supply to Regans Substation it will be necessary to co-ordinate the demolition of the line as follows:

- 4.3.1. Ensure undergrounding of distribution is completed for RGN-CTB section (this is not a strict requirement, but is the preferred methodology)
- 4.3.2. Demolish RGN-CTB section
- 4.3.3. Ensure undergrounding of distribution is completed for CTB-ENB section (this is not a strict requirement, but is the preferred methodology)
- 4.3.4. Demolish CTB-ENB section (this may occur concurrently with RGN-CTB section)
- 4.3.5. Ensure undergrounding of distribution is completed for PJR-RGN section (this is not a strict requirement, but is the preferred methodology)
- 4.3.6. Ensure RGN-CTB section of new 330kV line is completed and RGN-CTB81 has been re-energised.**
- 4.3.7. Demolish PJR-RGN section

4.4. Construct new 330kV Double Circuit transmission line ENB-ENT

Conductor is Lacrosse, profiled at 85 Degrees
 Line tower locations, types & anticipated foundations for this section are contained in [DM#7130932](#).

Tower outlines and details are included in T201/... series of drawings

Site access and construction will be constrained by the project agreed environmental management plan (EMP) contained in DM#5345016 & die back hygiene management plant contained in DM#6679276.

Anticipated Delivery Method:

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Internal design. WP procurement of conductor, insulators & line hardware. Fixed price contract for line construction including all other material procurement.

4.5. Construct new 330kV Double Circuit transmission line PJR-ENB

Conductor is Lacrosse, profiled at 85 Degrees

Line tower locations, types & anticipated foundations for this section are contained in [DM#7130932](#).

Tower outlines and details are included in T201/... series of drawings

Site access and construction will be constrained by the project agreed environmental management plan (EMP) contained in DM#5345016 & die back hygiene management plan contained in DM#6679276.

Anticipated Delivery Method:

Internal design. WP procurement of conductor, insulators & line hardware. Fixed price contract for line construction including all other material procurement.

4.6. Line crossing of the new 330kV line over PJR-WNO81 and PJR-YP81 lines

The new line shall cross these lines as shown in drawings contained DM# 7271031.

It will be possible to take short and separate (~4-8hr) outages of the PJR-WNO81 and PJR-YP81 lines provided that this occurs outside of high load times (this typically implies that line outages will need to occur either late at night or during weekends & public holidays).

4.7. Line crossing of the new 330kV line over PJR-CTB81/PJR-ENB/EMD81

The new line shall follow the line route of the PJR-RGN81 line between PJR & RGN. It also crosses the PJR-CTB81/PJR-ENB/EMD81 double circuit line approximately 4km North of PJR substation.

The PJR-CTB81/PJR-ENB/EMD81 lines are to be undergrounded to overcome critical network limitations.

This undergrounding must occur prior to commencement of demolition works on the PJR-RGN81 line section & cut-over's to the underground cables will need to occur between energisation of the CTB-RGN line section & demolition of the PJR-RGN81 line. Works shall include demolition, removal and making safe of the redundant 132kV line tower and foundations.

DM#7269671 shows the detail for this line crossing

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4.8. Design & Construct TST

TST 330kV yard will be two bays of 1.5CB construction & include:

- Line circuit for NBT line
- Line circuit for KRA line
- 490MVA, 330/132kV Transformer
- 330kV Transformer Circuit
- 132kV Transformer CB & associated isolator & switchgear (installed in or adjacent to 330kV yard)
- 2x 25MVAR tertiary connected (22kV) reactors (with individual CBs)
- 1x 50MVAR 330kV line connected reactor (with neutral reactor & associated CB & switchgear)
- Control & Relay room

Note: DM7238261 contains detailed discussions on arrangement decisions.

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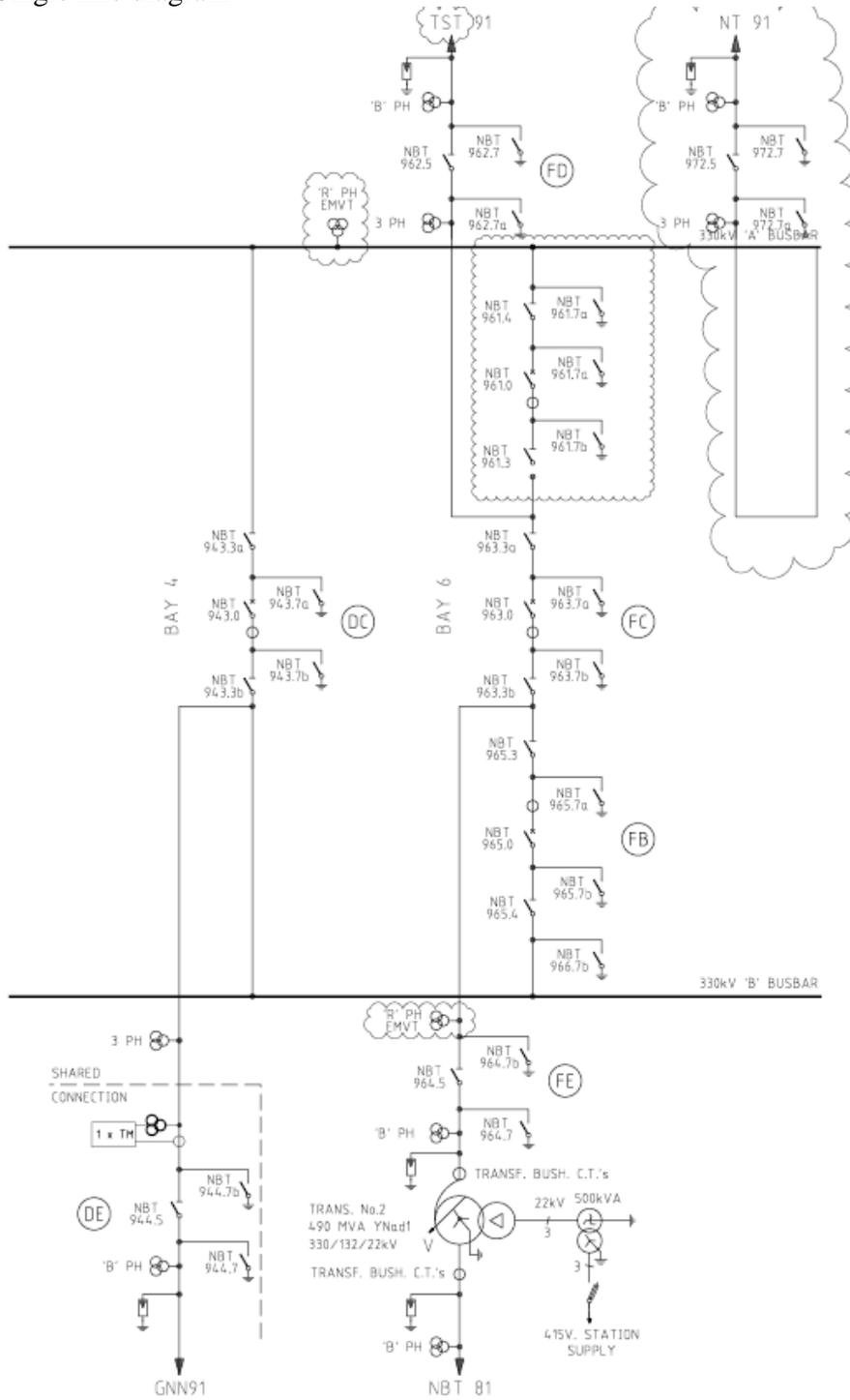
Single line diagram

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4.9. Design & Construct new 330kV line circuit at NBT

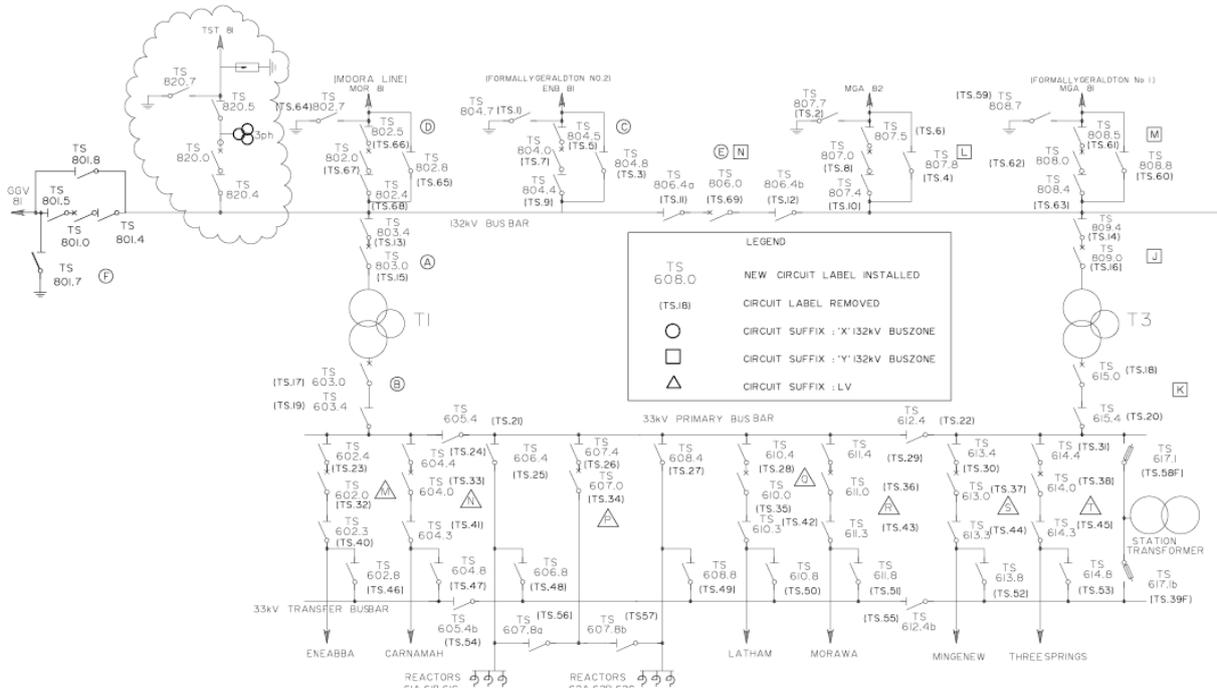
A new 330kV line circuit is to be constructed at NBT.

Single line diagram



4.10. Design & Construct new 132kV line circuit at TS

A new 132kV line circuit is to be constructed at TS.



4.11. Design & Construct a double circuit 132kV line between TST & TS to be energised one side as part of ENB-TS81 and the other TST-TS81

Two new line circuits are to be constructed between TST and TS (built as double circuit steel pole line). One circuit will be energised as part of the ENB-TS81 line & the other circuit will be energised as the new TST-TS81 line (connecting the 132kV side of the TST power transformer into the main 132kV grid at TS zone substation). Initial design is provided in DM#7272240

4.12. Line Entries and associated 132kV connections at PJR, RGN, CTB and ENB

The new 330kV construction between PJR, RGN, CTB and ENB zone substations must replace the existing wood pole line connections. As such various final connections



rearrangements must be made. Diagrams & details of the proposed connection works are provided in DM#7270996

4.13. Associated Substation & Protection works

This project includes all substation & protection works that may be required at NT (Northern Terminal), NBT, PJR, CTB, EMD, ENB, TS & other substations to allow the new line to be safely integrated into the network.

4.14. Associated Communications system works

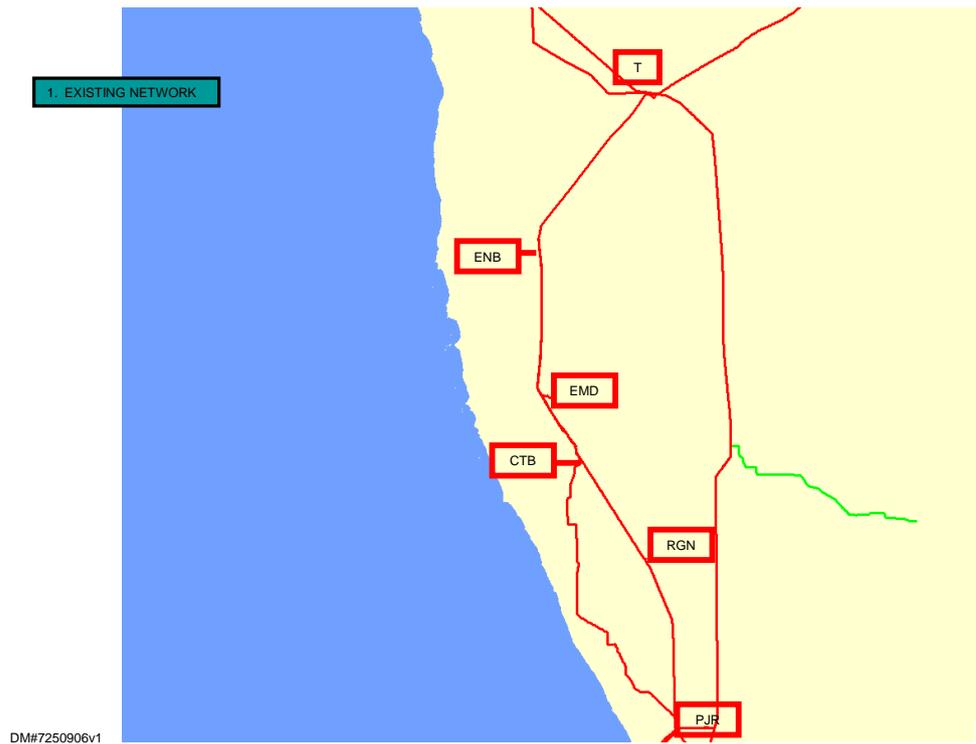
This project includes all works that may be required at NT (Northern Terminal), NBT, PJR, CTB, EMD, ENB, TS, TST & other substations to allow the new line to be safely integrated into the network. TST establishment related costs to be separable.

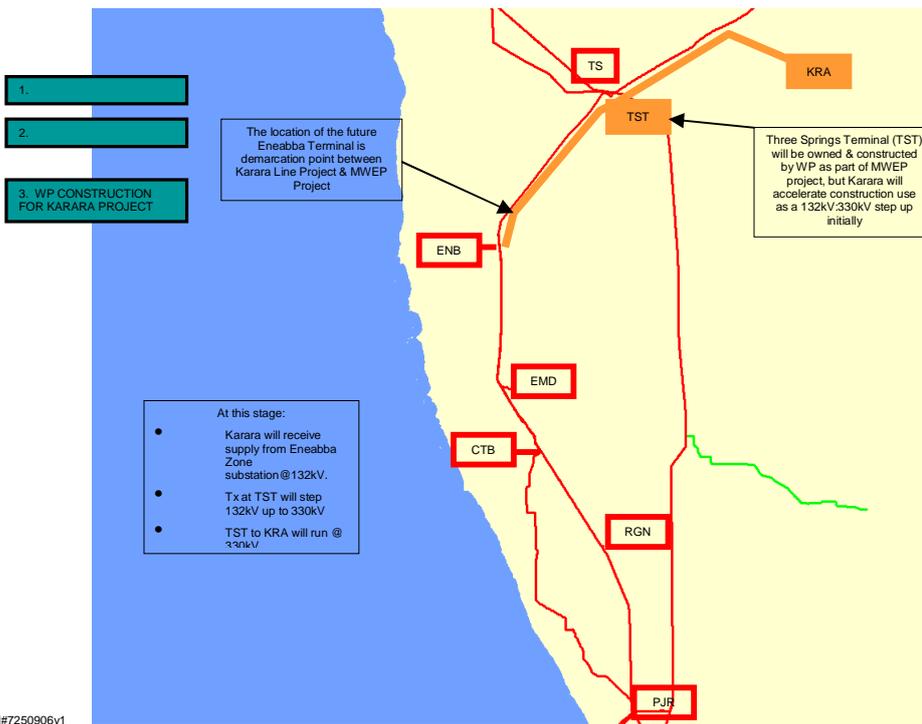
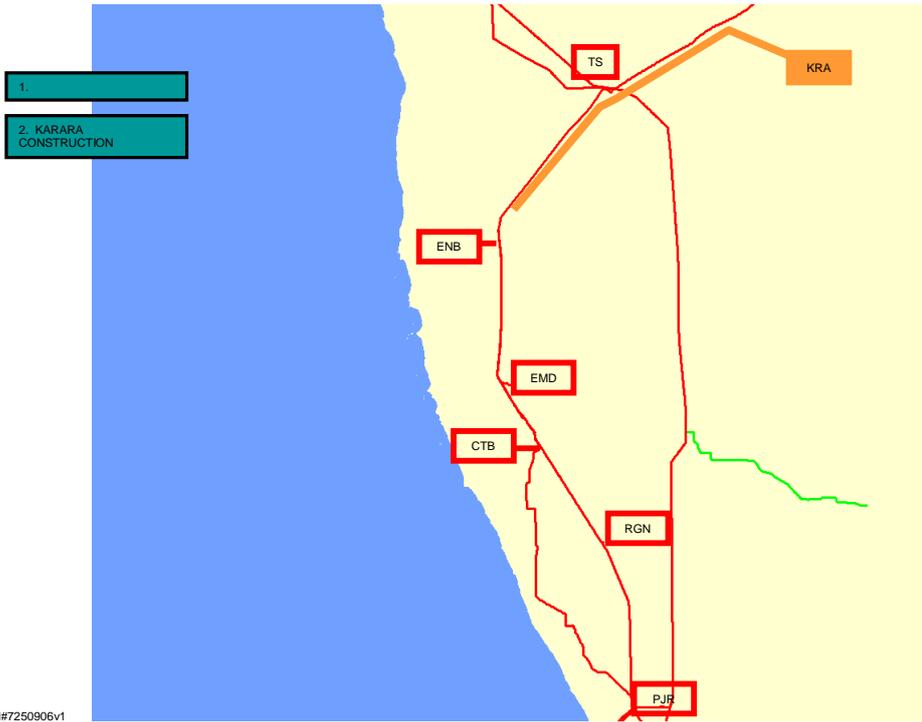
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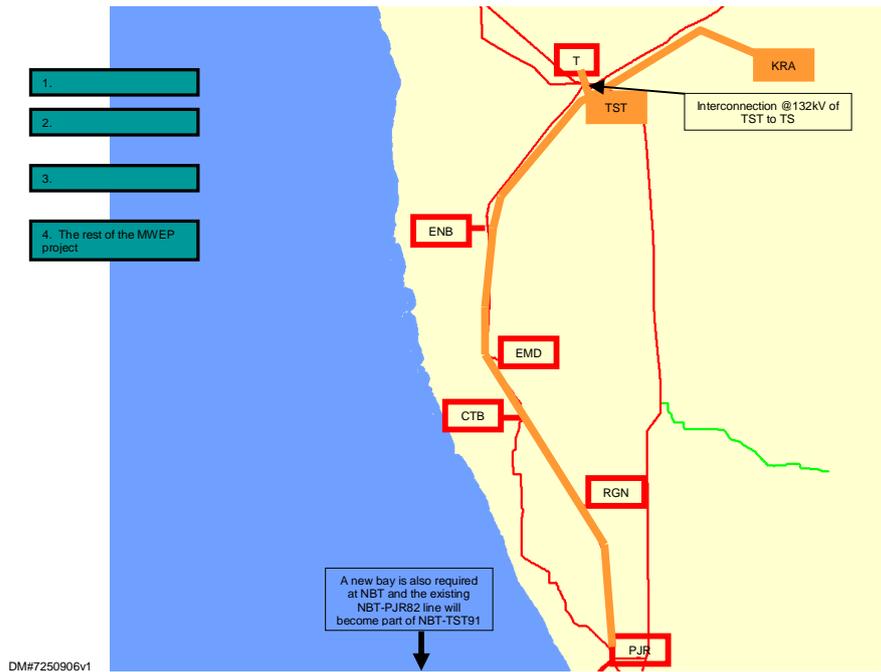
Appendix 1 – Staging & interface with Karara project. FOR INFORMATION ONLY

See [DM#7250906](#) for Full & latest version of this set of diagrams.

STAGING – For information only. MWEF Project is scope as defined in main document.







Ownership – Ownership of the various components has not yet been agreed. **MWEP Scope is shown in purple.**

