



Power & Water Planning Division
Power Transmission Planning Department

POWER SUPPLY GUIDELINES FOR MAJOR PROJECTS

(Update – January 2017)



Issue : January 2017 / Revision-3





Our Vision

رؤيتنا

A sustainable innovative world-class utility

مؤسسة مستدامة مبتكرة على مستوى عالمي

Our Mission

رسالتنا

We are committed to the happiness of our stakeholders and promoting Dubai's vision through the delivery of sustainable electricity and water services at a world-class level of reliability, efficiency and, safety in an environment that nurtures innovation with a competent workforce and effective partnerships; supporting resources sustainability

نلتزم بتحقيق السعادة لكافة المعنيين وتعزيز رؤية دبي من خلال تقديم خدمات مستدامة للكهرباء والمياه بمستوى عالمي من الاعتمادية والكفاءة والسلامة ضمن بيئة محفزة للابتكار بكادر مؤهل وشراكات فعّالة، داعمين لديمومة الموارد

Our Motto

شعارنا

For Generations to come

لأجيالنا القادمة

For generations to come لأجيالنا القادمة



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1 Introduction

To ensure the availability of power, it is essential that the load projections, the time of power requirements and other factors from all the potential developers are available with DEWA well in advance.

The purpose of this document is as follows:

- ❖ To provide guidelines to all the major developers and the consultants in regard to the DEWA's power supply requirements.
- ❖ To assist the developers and the consultants in understanding the requirements for submissions of project / development Master Plan documents and to facilitate the project / development power supply on time.



2 Requirements

In order to avail the power supply for any project / development on time, it is necessary to submit and get approved the technical pre-requisites on time as DEWA require lead-time as indicated in Item No. 2.1.11.

2.1 Technical Requirements

The technical requirements that are necessary to be submitted to DEWA for planning any 400/132kV and 132/11kV substations, designing the 11kV Distribution Network and allocating necessary 11kV cables from the 132/11kV substations are listed below:

2.1.1 Location and layout of the development project

- Location (with DLTM coordinates) and project layout shall be shown on Dubai Map.

2.1.2 Nature of the project

- Description of the project along with type of land use (Residential, Industrial, Commercial, etc.) to be mentioned.

2.1.3 Total Connected Load of the project & Expected Maximum Demand

- Total connected load (along with split up of General & Cooling load) and expected peak demand.
- Realistic power requirement date / phasing.
- Split up details of the load like, Residential, Commercial, Industrial, Cooling, etc.
- Plot-wise details like type of development, total connected load, maximum demand and power requirement date for each plot reflecting respective feeding zones of 132/11kV substations.



- In case ultimate load details are not available, the load requirement up to next 5 years should be submitted.
- Details of the District Cooling Plant loads (size, location and the expected phasing of its commissioning).

2.1.4 Distribution Renewable Resources Generation (DRRG)

For project with DRRG, the submittal shall include DRRG plan (PV Rooftop Solar) which consists of ;

- Planned DRRG capacity (kW) per plot and for entire project.
- Expected commissioning dates of PV solar in the project.

For more details, refer to DEWA's DRRG standard issued on DEWA website as shown in below link :

http://www.dewa.gov.ae/images/smartforms/DEWA_Standards_for_Distributed_Renewable_Resources_Generators.pdf

2.1.5 Power Factor

- Power Factor is to be maintained at not less than 0.95 and any capacitor bank installation required at customer end (at 11kV level) shall be by the customer at his own cost.

2.1.6 Load Characteristics (quality of voltage, harmonics, flickering, dents, etc.)

- European Standard EN 50160 gives the main characteristics of the supply voltage to be expected at customer load supply terminals. Customers shall ensure that their equipment can adequately operate in accordance with the supply technical characteristics included in this Standard.
- Voltage drop calculation, harmonic study, fault level calculation, etc., to be submitted by the consumer for any dirty load/ private switchgear (refer to Annex-2 (page 12) : Design Requirements & Guidelines for 11kV supply.



- Installation of special equipment and devices if required to maintain the same as per the standards shall be by the consumer at his own cost.

2.1.7 Supply Voltage

- Dedicated / shared 132/11kV substation is required for meeting the power supply requirement of any Major Development. Large loads might require 400/132kV source at a voltage level of 400kV. The project developer should allocate plots for the required number of substations and associated corridors for necessary overhead lines/cable circuits.
- 11kV shall be the general distribution voltage.

2.1.8 Substation Plot Sizes

- 400/132kV substation : 200m x 200m.
- 132/11kV substation : 50m x 60m
- 11/0.4kV substation : Refer to Distribution Substation Guidelines.

2.1.9 Location of Substation Plot

400/132kV Substation location

- The 400/132kV substation plot should have access to heavy vehicles.
- Enough space/corridors for taking 400kV overhead lines IN/OUT.
- Enough space/corridors for taking 132kV cables IN/OUT.

132/11kV Substation location

- The 132/11kV substation plot shall have access from two major roads or one major road and Sikka (min 7m wide). The longer side to face the road.
- Enough space/corridors for taking 132kV cables IN/OUT.



- Enough space/corridor for taking out 80 numbers of 11kV outgoing cables with proper duct arrangement with minimum 150mm space between the cables.
- Location of 132/11kV substations should be provided at the load centre and close to district cooling plants if available.
- When a project requires more than one 132/11kV substation, the feeding zone of each substation shall be specified.

2.1.10 Site Plan for 400/132kV and 132/11kV Substation

- Approved site plan /affection plan (in the ownership of DEWA) of the substation plot is required from the concerned authority. The developer shall confirm, whether the building permit for the substation building will be issued by Dubai Municipality or other Authorities.

2.1.11 Undertaking to clear services within the substation plot

- The developer to submit an undertaking letter to clear / divert all services within the plot allocated for the 132/11 kV substation (if any), well in advance prior to the issuance of the Project Parameter Report (PPR) and also to bear all the associated costs by the developer.

2.1.12 Corridors

400 kV overhead lines

- 80m wide corridor (double circuit tower line).

132 kV underground cables

- 2.5m for each circuit.
- Minimum clearance of 3 meters shall be maintained between 132kV corridor and nearby pressure pipelines.



- Minimum gap of 1m shall be ensured between 132kV corridor and nearest foundation / permanent structure.
- 132kV cable under the dual carriageway is not acceptable. The surface above 132kV corridors shall be either soft landscaped or interlock tiled only.

11 kV underground cable

- Exclusively 11kV corridor of 7m (2x2.5m + 2m gap) width to be provided at two adjacent sides of 132/11kV substations up to the roads.
- Exclusive 11kV corridors of 2.5m width to be provided on both sides of the road around the 132/11kV substations.
- A single stretch of 11kV corridor width should not exceed 2.5m.
- A minimum clearance of 2m to be maintained between 11kV corridors / 132kV and 11kV corridors.
- Dedicated 11kV corridors to be provided from the source 132/11kV substation to the District Cooling Plant (DCP).
- The 11kV corridors under carriageway, median, curbstone and service road are not acceptable. The surface above 11kV corridors shall be either soft landscaped or interlock tiled only.
- Protection barriers to be provided between 11kV corridors and big trees / street lighting poles, wherever they are adjacent.
- Cross-section to be provided for each road section, dedicated 11kV corridors should be available on both sides of road.
- Duct arrangement for each road crossing is to be provided.
- In case of 132/11kV substation away from the road Right-of-Way (ROW), the party shall provide sufficient corridor from the substation boundary to the road.



2.1.13 Policy on Construction of 400kV and 132kV substations.

400/132kV substation

DEWA requires 48 months lead time to construct a 400/132kV substation.

132/11kV substation

Any 132/11kV substation for development projects shall be constructed by the project developer matching their power requirement phasing of the project, through a DEWA approved consultant and contractor. However, DEWA requires adequate lead time for arranging 132kV cables to any new 132kV substations after finalization of load requirements, substation locations, cable corridors and receiving the original affection plan of the plot for the substation in the ownership of DEWA.

2.1.14 Requirement for 11kV Network/Design Approval

- Latest planning of the development (with both hard & soft copy).
- 11kV Substation location, refer to Distribution Substation Guideline for approval of 11kV substations.
- Total connected load, maximum demand and capacity for individual 11kV substation.
- Realistic power requirement date.
- Zone-wise/phase-wise load details with respective 132/11kV substations to be provided if the number of 132/11kV substations is two or more.
- In case of number of 132/11kV substations are more, project loads should be allocated to respective 132/11kV substations for effective network design (Phase wise). Also the 132/11kV substations need to be planned for commissioning to match the power requirement date of projects.



- District cooling loads (if any) should be located adjacent to the related 132/11kV substation.
- No source metering is allowed (metering equipment to be arranged in the 11kV switchgear room).
- 11kV corridors details for all the roads within the project boundary.
- Approved cross section of all the roads (with 11kV corridor indicated) to be submitted at the time of 11kV network design request.
- Generally, in case of private switchgear, approval for single line diagram should be obtained prior to purchase.
- All the distribution network requirements and guidelines for 11kV supply mentioned in Annexure - 2 shall be strictly followed.

2.2 General Requirements

1. The main developer shall appoint a reputed consultant to prepare the infrastructure including power supply Master Plan of their Major Project development, in order to avail DEWA approval.
2. The developers or their consultants shall submit the documents as listed in Annexure – 1 for DEWA review to Power Transmission Planning Department:

Addressed to:

Dr. Nasser Tleis
Vice President – Power Transmission Planning
Dubai Electricity and Water Authority
P O Box – 564, Dubai
Fax: 04 - 3249206

3. In order to schedule meetings / discussions in regard to power supply Master Plans for Major Projects, the followings may be contacted :



- o **Mr. Mohamed Naceur Marzouki** (Senior Manager-System Planning
Tel : 04 322 2900 Email: Mohamed.Naceur@dewa.gov.ae)
 - o **Mr. Vijayan Ayappan** (Dy. Manager–Planning Coordination
Tel : 04 322 2909 Email: Vijayan.Ayappan@dewa.gov.ae)
 - o **Mr. Ahammed Sadique** (Sr. Engineer – Planning Coordination
Tel : 04 322 2904 Email: Ahammed.kuttiadi@dewa.gov.ae)
4. The listed documents shall be submitted in three sets of hard copies and 1 set of soft copy (*drawings in AutoCad/Microstation & PDF and load details in Ms Excel format*).
 5. The details as mentioned above shall be submitted well in advance to DEWA and got approved to avoid any delay in starting the project.
 6. Once approved, DEWA expects that the developer will adhere to the plan and any minor changes in the project plan, changes in phasing, etc. shall be informed to DEWA in time and got approved. Changes on works during the execution stage shall not be entertained.
 7. Any power supply requirement for the project shall be from the 132/11kV substation built for the project. The developer shall phase the developments and accordingly the power requirements matching the commissioning schedule of the source 132/11kV substation for the project.
 8. During the progress of the Project, bi-annual updated information shall be submitted by the party which shall include:
 - i. Energized load details till date.
 - ii. 11kV substation approvals under process (not energized).
 - iii. HV Building NOC load applied (*not yet submitted for 11kV substations approval*) less than or more than 5MW.
 - iv. The developer shall issue confirmation on the individual party's loads (who had applied for HV Building NOC) as a part of their Master Plan in terms of magnitude and time. Load under design/approval but not approved for HV Building NOC including the



- load of project shall be as per the agreement already signed between party and developer.
- v. The updated information shall be submitted by the party in area maps indicating plot numbers, power requirement dates and comparison with the original information received as per the approved Master Plan of the project / development.
9. DEWA will not be responsible for any delay in commissioning due to any change/ revision of loads, which might result in re-design of 11kV cable circuits.
10. After approval of power supply Master Plan, the developer / consultant to submit 6 sets of final / approved power supply Master Plan (hard & soft copy) of the project, for DEWA records.
11. The 11kV substations, connected loads, demand loads / diversity factors, locations, networks etc. related to the LV design approval, the relevant drawings, load schedules, single line diagrams etc. shall be uploaded through on-line Getting Electricity application system (www.dewa.gov.ae).
12. On approval of power supply Master Plan, the plot owners / consultant may apply for power supply NOC for their plot, through E-Services for **"Getting Electricity"** on DEWA Website (*as per normal practice*), along with the main developer's letter confirming the load figures indicated in NOC application are same as that in the approved project Master Plan (*Refer Annexure-3, for sample format*).
13. On finalization of power supply Master Plan for entire or portion (Phase) of any Major Development, the project developer / consultant to approach concerned Zoning Authority as well as DEWA Infrastructure Information & Permits (II&P) Department (*at Al Warsan Office*) to upload the project landbase in GIS. II&P department's requirements are listed in Annexure-4.
14. The project developer / consultant to obtain design / construction NOC from DEWA Infrastructure Information & Permits (II&P) Department during infrastructure-design / approval / execution stage.



3 Annexures

3.1 Annexure – 1

List of documents to be submitted

Sr. No.	Documents	Remarks
1	Key Plan showing the location and layout of the project in Dubai Map with co-ordinates.	
2	Power requirements in terms of Total connected load and expected Peak Demand.	
3	Phasing	
4	Nature of Load	
5	Details of District Cooling Loads (location / capacity, power requirement date etc)	
6	Plot-wise loads and power requirement date	Excel sheet and marked in drawing
7	Locations of proposed 132/11kV substation(s)	
8	Locations of proposed 400/132kV substation(s)	
9	400kV corridors details within the project area	
10	132kV corridors details with detailed road cross-sections	
11	11kV corridors details with detailed road cross-sections	
12	11kV ducts arrangements	
13	PV Solar requirements in terms of capacity per plot	

The above documents shall be submitted in form of 3 sets of Hard Copies + 1 Digital Copy



3.2 Annexure – 2

Design Requirements & Guidelines for 11kV Supply

In line with DEWA's power distribution network design, the following guidelines shall be followed strictly:

1. Ring supply consisting of two feeders (*two-feed ring*) is mainly granted for power supply as normal feeding arrangement. Three-feed ring arrangement may be adopted for cases where all 11kV switchgears/RMUs are installed in one location to ensure the specific supply reliability.
2. For reliable power supply; N-1 offline criterion is considered. Hence, in case of power failure in one of the feeders, the other feeder should be capable to meet whole demand for maximum 6 hours duration.
3. DEWA standard 11 kV cable sizes are 3/C 300mm² Copper XLPE, 3/C 240mm² Copper XLPE, and 3/C 240mm² Aluminum XLPE.
4. The maximum sustained load of 11kV feeder is 175A/3MW (for 300mm² Copper XLPE cables – summer rating).
5. The maximum sustained load of 11kV feeder is 160A/2.7MW (for 240mm² Copper XLPE cables – summer rating).
6. For bulk loads such as furnaces or district cooling requiring direct 11kV supply (private equipment's), space for metering units at party's premises/substation shall be considered. Necessary documents, drawings, SLD shall be submitted for DEWA's comments/approval at design stage.
7. Single unit load demand shall not exceed the maximum sustained current of DEWA's 11kV cable/feeder, which is maximum 175A/3MW for 11kV feeder.



8. Parallel operation of DEWA 11kV feeders is not allowed at any circumstances, and accordingly proper interlocking (Electrical & Mechanical) shall be provided where required.
9. Standby generators are not allowed to operate in parallel with DEWA network. Therefore, proper interlocking shall be provided where it is required.
10. The planning levels of voltage flicker shall be in compliance with **IEC 61000-3-7: ED.2.0-2008**. Accordingly, voltage dip calculations during motor starting shall be submitted along with the motor specification, starting characteristics, number of motor starts per day, SLD drawings etc. for approval at design stage.
11. For loads that injects harmonics currents into DEWA's network, harmonic study shall be prepared by the party and approved by DEWA at the design stage. The party to comply with the planning limits of Harmonic Emissions for voltage and current based on **IEC 61000-3-6: ED.2.0-2008** and **IEC 61000-3-12: ED.2.0-2011** respectively.
12. Harmonics and Flickers measurements shall be conducted by the party after commissioning of project and report of measurements shall be submitted to DEWA.
13. Maximum allowable number of cables per trench for 11kV cables is 20 arranged in maximum two layers. (2.5 to 3-meter trench width on both sides of the road, close to 132/11kV S/S and 2.0/1.5 meters elsewhere depending on load distribution).
14. Clearance of minimum 2 meters shall be maintained between any 11kV cable trench and the surrounding heat sources such as 132kV cable trench.
15. Horizontal spacing between 11kV cables is 150mm (edge to edge for 11kV cables) and vertical spacing between layers is 100mm (edge to edge applicable for 11kV cables).



16. Separate corridor shall be allocated for 11kV cable laying within party's premises along the road to ensure avoiding crossing between 132kV and 11kV cables.
17. Backfilling to be used for 11kV cables with soil resistivity below 1.6°C-m/W with the following conditions:
 - a. At maximum moisture content of 2% or less.
 - b. At 90% of compaction.
18. Single line diagram illustrating the protection schemes along with relay setting calculation shall be submitted for DEWA's comments and approval at design stage.



3.3 Annexure – 3

Main Developer's load confirmation format for HV-NOC approval

Developer Letter Head

Ref:

Date :

To,

Dr. Nasser Tleis

Vice President – Power Transmission Planning
Dubai Electricity & Water Authority
P.O Box: 564, Dubai

Sub: Load Confirmation for NOC Ref. -----

Reference to the NOC -----, we hereby confirm that the total connected load requirement of ----- MW for the plot No. ----- by (power requirement date) ----- is complying with the data mentioned in our latest / approved project Master Plan for ----- Project.

Further, we confirm the type of development on the above indicated plot is ----- (industrial / commercial / residential etc.).

For any clarification / details, please contact :

Name : Tel: Mobile:

With Regards,

For and On behalf of ----- (developer name)

(Sign. & Stamp)

Authorized signatory name & designation



3.4 Annexure – 4

Infrastructure Information & Permits Department Requirements for updating Major Project Landbase in DEWA GIS

II&P Department requires below listed in order to update Major Project Landbase in DEWA GIS ;

1. Project Layout
2. Parcels / plots along with parcel / plot IDs.
3. DEWA ESS plots with plot IDs.
4. Road Facilities ;
 - Road Centre Line
 - Right Of Way
 - Dividers (Road medians / roundabouts)
 - Road Cross-sections
 - Approved corridors with clear indications of width from ROW.

Layer features are given below ;

LANDBASE DATA LAYERS			
S.N.	Layer Name	Description	Geometry Type
1	Project Boundary	The entire / phase of the project	Polygon
2	Parcel / plots	The plot boundary as designed / approved by the developer and issued to individual owner.	Polygon
3	DEWA ESS plot	The plots designed/approved by the developer for the purpose of building DEWA 11kV substations	
4	Utility corridor	The area allotted by developer within the ROW for accommodating DEWA utilities.	Polygon
5	Road_centre line	<u>Single Carriageway</u> : A line representing the physical centre of the roadway between road shoulders. <u>Dual Carriageway</u> : A line representing the physical centre of the roadway between road shoulder and median (road divider).	Line
6	Sikka / Alley	Represents a small road between buildings and generally connect two parallel streets / roads (usually less than or equal to 20 ft width)	Line



7	Road_Island	Non-pedestrian islands in the road surface, such as centre island, roundabout etc. that normally contains grass, trees, flowers or other plantations.	Polygon
8	Road_Median	The area which separates opposing lanes of traffic on divided roadways. It is also called as central reservation or divider.	Polygon
9	Right-Of-Way	The land on which the roadway and its associated facilities and appurtenances are located. Highway ROW accommodates the entire roadway (i.e. carriageway and shoulders), as well as adjacent sidewalks and the roadside corridors on which utilities are located.	Polygon
10	Pavements	A path consisting of a paved area on the side of a road for pedestrians, it is also called a sidewalk.	Polygon
11	Building / Property Line	The outline of a building. Distances from the ends and / or sides of the lot beyond which construction may not extend.	Line
12	Parking Space	Vehicle parking lot boundaries	Polygon

Data formats : The format of the data may be any common GIS format such as Shape file, ESRI Geodatabase or a common CAD format such as AutoCAD Drawing File (DWG) or MicroStation Design File (DGN). However, road cross0-sections must be provided in CAD / DGN formats only.

If the Data is unable to provide in ESRI shape file format, below are few guidelines should be followed when preparing CAD / DGN data for submission to DEWA.

Each Feature class (Layer) and / or its sub-types need to be in a separate layer/level in the CAD / DGN file.

- o Each CAD layer / level must represent only one class of feature.
- o Each text representing information about plot/road/etc and should fit well inside it.
- o All data attributes (tabular data) for a corresponding CAD ID will be also be found and documented in an associated MS Excel spreadsheet. A worksheet for each CAD layer will be created. The worksheet should contain the CAD ID (ex: handle which must be unique) and one or more fields that contain the associated attribute data.



Topological Rules :

- o Ellipse and Spline shall not be used at all.
- o Overlapping, self-intersecting and zero length are not allowed.
- o Where two polylines logically join, intersecting features within the same layer these shall be snapped at the point of intersection.
- o Lines should run continuously from Point object to Point object. All line features shall be of a continuous line-type, such that each individual line feature (i.e each segment) is only broken at the ends where a node/structure is located.
- o Lines should not be broken for the purpose of annotations. Annotation for each layer shall be placed in annotation layers as specified in the template file.
- o Straight lines must be represented by only the beginning and ending x- and y-coordinate points. The exception to this is a line where the coordinates differ only in the z values (ex: developed from multiple traverses on the same bearing). Lines stings must not cross back on themselves or have a zero length (i.e points).
- o Polyline features that logically join shall be snapped to each other at the joining ends. This is, no dangles (overshoots and undershoots) are allowed.
- o All polyline features shall be created as closed polylines.
- o All edges on polygon features must be snapped together at the vertices. Gap in polygon boundaries will not be accepted.
- o Polygon features in the same layer cannot overlap each other.
- o The completed CAD drawing file should contain text in standard fonts that can be read without third-party software.

Coordinate System : Features in DEWA GDS compliant files must be represented in real world locations as referenced by Dubai Local Transverse Mercator Projection (DTLM) parameters as given below :



Projection :

Transverse Mercator

Parameters :

Longitude of Origin 55:20:00:00 d:m:s

Latitude of Origin 0:00:00:000 d:m:s

False Easting 500,000.000 m

False Northing 0.000 m

Scale Factor along Longitude of Origin 1.0000

Geodetic Datum: WGS84

Ellipsoid WGS84 (standard parameters)

Equatorial Radius: 6378137.000 m

Polar Radius: 6356752.314 m

Eccentricity: 0.0818191908426215

Flattening: 0.00335281066474746

Flattening Inverse: 298.257223563002

Units and Formats :

Geographic Units: d:m:s

Format: Long/lat. Precision: 4, Positive N,E

Projection Units: m

Format: Easting/Northing Precision: 3

Height Units: m Precision: 3

Geocentric Units: m Precision: 3

Distance Units : m Precision: 3

Angular Units: deg Precision: 6