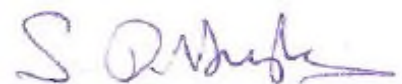


Construction
Design Handbook 19

Design Assurance Generic Resource Estimates for Capital Delivery Projects

DH 19

Issue 2



Authorised by: _____

Technical Assurance Manager

Date: 25th March 2014

Guidance on Design Assurance Generic Resource Estimates

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AVADocuments

1. PURPOSE

The purpose of this document is to provide resource estimates against all the Design Assurance tasks stated in UKBTP188 and Design Handbook 24. The document is to be used by any party undertaking future required resource / manpower forecasts to match the ongoing capital plan. The document includes resource estimates for four substation type projects of differing nature. These projects have been chosen to give a good range of work type and can be used by workload coordinators involved in forecasting / planning these activities.

It should be however noted that resource estimates of this type are generic in nature and can be greatly influenced in out turn by a range of factors not limited to the following:-

- i) Project Complexity
- ii) Competence and experience of the chosen delivery partner
- iii) Chosen contracting strategy
- iv) Novelty / standard nature of the design solution
- v) Design changes / rework
- vi) Other external factors influencing programme

2. REFERENCES

UKBP/TP/ 106: Equipment Commissioning and Decommissioning
 UKBP/TP/ 107: Protection and Control Relay Settings
 UKBP/TP/ 141: Commissioning and Design Engineer Assessments and Authorisations
 UKBP/TP/ 188: Transmission Construction Electricity Design Management
 Design Handbook 24 Guidance to Design Assurance Engineer

3. RESPONSIBILITIES

The following NG role is involved with the use of this Design Handbook to provide project estimates. All other roles mentioned in the Project profiles have been described in the above references.

It is anticipated that other users of this Design Handbook will be mainly confined to Project Development Engineers and Project Engineers.

Other than directly employed NG staff, Assurance Engineers will be allocated to schemes using Lot4 of the Design services (FEED) framework. These contracts will be established in collaboration between Technical Assurance Design Assurance coordinator, the Development Engineer or Project Engineer on the specific investment and Global Procurement. Specific purchase orders will be raised and managed by the scheme Project Engineer.

3.1 Design Assurance Coordinator NG

Design coordinators are appointed by Engineering Assurance Manager(s) for each development and delivery teams to undertake the following tasks:-

- a) Ensure Design Engineers (Assurance) are identified and allocated to all capital projects at commencement of NDP 4.2 stage.
- b) Balance the workload of all Design Engineers (Assurance),
- c) Allocate design work to Design Engineers (Assurance) to facilitate training and development,
- d) Arrange and chair regular meetings with the allocated development and/or CD-DV team to review and plan design assurance resource requirement.
- e) To act as a single point of contact for technical issues and to provide guidance on National Grid policies and procedures for their respective teams.

4. REQUIREMENTS

The following Projects types are defined in the attached appendixes along with their generic resources estimates:

Project Type 1: Light Current feeder protection asset replacement.

Project Type 2: 400kV 225MVar MSC cable connected to an extended existing AIS Double Busbar Substation.

Project Type 3: Additional 400/132kV SGT with a new HV and LV bay extension and 132kV cable

Project Type 4: New 9 Bay Green field GIS Substation with circuits transferred over 2 outage seasons.

5. ACKNOWLEDGEMENTS

The resource estimates contained within this document were put together by all parties that have had significant experience in delivering Design Assurance tasks. The figures were then collated, normalised and then summarised in table form as shown in the Appendices. These estimates have been continually revised to reflect changes in the project delivery process (NDP TP500) and also the changes in contract delivery (Alliance to Client/Contractor working).

Appendix A: Project Type 1

DESIGN ASSURANCE
Generic Resource Profiles

Project Type 1:-

Light Current feeder protection asset replacement.

SCHEME DESIGN INFORMATION

Scheme Numbers:	11407 Feeder Protection change
Project Title:	Thorpe Park – Warwick 400kV Feeder Protection replacement

Description of Scheme:

At Thorpe Park 400kV replace the Warwick feeder bay protection equipment with a new Integrated Light Current Bay Solution. At Warwick 400kV replace the Thorpe Park feeder bay protection equipment with a new Integrated Light Current Bay Solution. Both Substations are Double Busbar with dispersed relay rooms.

Scope of Works Required:

Assurance roles supplied shall be in accordance with UK/BP188, UKBP/TP106 and UKBP/TP107. All roles are specified as being required within this document.

Assumptions to be made / Additional information:

1. The above works will be undertaken within a six week outage with four weeks of pre-outage work and one week of post outage work.
2. The project has been allocated off an existing framework no tender evaluation.
3. The light current solution to be used has previously been type registered and applied successfully on a number of previous occasions.
4. The solution will be subject to a two day Factory Acceptance Test in the UK.
5. Four commissioning panels will be held on this project.
6. Two design reviews and two design compliance audits will be held as part of the design management.
7. Two on site DID freeze meetings will be held.
8. Two database changes will be required (one per end).
9. The project cost will be approximately £480k.
10. Most design submissions i.e. DID will be subject to two reviews the second being a non meeting check on issue one comment incorporation.
11. The total project duration shall be around 12 months.
12. It has been assumed for this model that the Lead Design Engineer is also acting as one of the design roles. Efficiencies are gained as a result of combining meeting attendances etc.

1. Design Assurance for:

Design Management TP188

Lead Design Assurance Engineer	Yes
Design Assurance Engineer: OHL	No
Civil / Structural	No
Protection & Control	Yes
Cable	No
HV Plant	No

Commissioning Panel Management TP106

Commissioning Officer – Advanced	No
Commissioning Officer – Basic	Yes
Commissioning Panel Chairman Advanced	No
Commissioning Panel Chairman Basic	No

Settings TP106

Settings Engineer (NG)	Yes
Settings Engineer (Supplier)	No

Note: All the Roles outlined above are authorised as detailed within TP141.

Location:

It should be assumed that the above roles shall be based at the Providers Officer location.

Generic Resources Estimates: (total hours)**4.2 Stage**

Assurance Category	Roles	4.2 (Average)	4.2 (Minimum)
Design Engineer	Lead	8	4
	OHL		
	Civil Structural		
	Protection and Control	12	4
	Cable		
	HV Plant		
Commissioning	CO Adv		
	CO Bas	0	0
	CPC Adv		
	CPC Bas		
Relay Settings	Setting Eng (NG)	0	0
	Setting Eng (Supplier)		

4.3 Stage

Assurance Category	Roles	4.3 (Average)	4.3 (Minimum)
Design Engineer	Lead	18	4
	OHL		
	Civil Structural		
	Protection and Control	38	12
	Cable		
	HV Plant		
Commissioning	CO Adv		
	CO Bas	6.5	4
	CPC Adv		
	CPC Bas		
Relay Settings	Setting Eng (NG)	6	3
	Setting Eng (Supplier)		

4.4 Stage

Assurance Category	Roles	4.4 (Average)	4.4 (Minimum)
Design Engineer	Lead	52	25
	OHL		
	Civil Structural		
	Protection and Control	80	68
	Cable		
	HV Plant		
Commissioning	CO Adv		
	CO Bas	120	110
	CPC Adv		
	CPC Bas		
Relay Settings	Setting Eng (NG)	42	30
	Setting Eng (Supplier)		