

TRANSMISSION CONSTRUCTION ELECTRICITY DESIGN MANAGEMENT FOR LEGACY PROJECTS

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PURPOSE AND SCOPE

This procedure specifies the detailed requirements of TP146 – Investment Process with reference to both the design production tasks undertaken by the Suppliers, and the design assurance tasks undertaken by Core Construction (Technical Assurance).

This procedure excludes the system design requirements undertaken by Electrical Network Investment.

The purpose of this procedure is to define arrangements that ensure the following.

- a) That National Grid discharges its legal obligations with reference to health, safety and environmental requirements – with particular focus upon the objective of 'zero by design' – see NSBP199.
- b) That project design is undertaken in accordance with National Grid technical policy and the suite of technical specifications and supporting documents.
- c) That the design solution is fully specified, integrated and holistic across all technical disciplines, and is executed efficiently both to negate errors and to optimise the use of design engineering resources and skills.
- d) That for reasons of maximising both SHES performance and power system reliability those undertaking project design tasks possess a requisite minimum skill set, which is displayed either through a certificate of authorisation (Construction) or other formal means (Asset Management).

- e) That project design is undertaken with a demonstrable level of technical governance – resulting in an effective audit trail.

This procedure shall apply to all technical disciplines across all schemes which comprise the National Grid Electrical capital programme undertaken by Transmission Electricity Legacy Projects.

A diagram showing the key stages of the project design process relevant to this procedure is provided in Appendix A.

PART 1 – PROCEDURAL

1 RESPONSIBILITIES

1.1 Technical Assurance Manager (TAM) – Core Construction, Technical Assurance

To ensure that a Lead Design Assurance Engineer and Design Assurance Engineer for each technical discipline are appointed for each scheme during development and each site/route following sanction.

1.2 Design Manager – Supplier

To ensure that both a Lead Design Engineer (Supplier) and Design Engineers (Supplier) for each technical discipline are appointed both for each scheme at Contract Award for each site/route.

1.3 Lead Design Assurance Engineer

- a) To lead the Assurance design team in terms of representation, spokesman, technology coordination and interfacing for a specific scheme/site(s).
- b) To agree and sign on behalf of the Assurance design team the following.
 - i) Design Justification Report (DJR) (approval stage).
 - ii) Design Specification – Investment Proposal (DS) (approval stage).
 - iii) Design Intent Document – Investment Proposal (DID) (DID freeze stage).
- c) To chair Design Review meetings and HAZID reviews prior to Contract award.
- d) Support the CDM Coordinator in discharging their duties as defined by the Construction (Design and Management) Regulations during the project delivery of the scheme.
- e) Brief design members of the project delivery team.
- f) Have overview understanding of National Grid's technical documentation suite and contract processes.
- g) Supervise technical input into the enquiry documents.
- h) Address technical queries during the tender period.
- i) Provide commentary on the technical suitability of tendered designs.
- j) Review the design programme.

- k) Advise Project Manager of changes to the design membership of the project delivery team.
- l) Maintain the Design Status Report.
- m) Instigate design compliance audits.
- n) Confirm the Contractor discharges all design related contractual obligations.
- o) Provide scheme related technical support to National Grid site staff as agreed with the Project Manager.
- p) Attend site and monitor related activities as agreed with the Project Manager.
- q) Advise the Project Manager on all contract related design issues.
- r) Provide technical support to commissioning and/or decommissioning activities.
- s) Review the 'As Constructed' records as agreed with the Project Manager
- t) The Lead Design Assurance Engineer may delegate some of these responsibilities to a Design Assurance Engineer. In this instance the Project Manager shall be notified.

1.4 Lead Design Engineer (Supplier)

To both lead the Supplier design team on behalf of the Supplier(s) in terms of representation, spokesman, technology coordination and interfacing for a specific scheme/site(s), and to call for and chair both design review and Hazard in Design (HAZID) review meetings (see 6.3).

To agree/approve as signatory on behalf of the Supplier design team the Design Intent Document – Investment Proposal (DID) (DID freeze stage)

1.5 Design Assurance Engineer

The authorised Design Assurance Engineer authorised to the requirements of TP141, with responsibility for the design assurance role for a specific technology (ie. P&C, Substation HV, Civil, OHL or HV Cable). For each scheme every Design Assurance Engineer allocated to the scheme and/or site/route will confirm satisfactory adherence to National Grid policy and process at the key stages of:

- a) DJR
- b) DS
- c) DID
- d) Design Compliance Audit

In addition agreement will be given to any proposed changes to design following any of the above stages and during installation and commissioning.

Design Assurance Engineer will attend Design Review meetings and will support the Lead Design Assurance Engineer to discharge his/her responsibilities.

- NB:**
- 1. Wherever possible the Design Assurance Engineer will cover the whole scheme lifecycle – see Appendix B.
 - 2. See TP107 for relay settings assurance.

3. See Commissioning Handbook N°21 and TP106 for Type Registration/FAT assurance.

1.6 Site Engineer / Site Engineer (Civil) / Site Engineer (OHL)/Site Engineer Cables

Liaise with the Lead Design Assurance Engineer to:

- a) Ensure construction activities are carried out only to drawings that have been subject to a satisfactory Design Compliance Audit.
- b) Provide comment on the buildability, inspectability and maintainability of permanent and temporary works proposals as appropriate.

Ensure all design changes are subjected to this procedure and 'ad hoc' changes do not take place on site.

1.7 Assurance Design Team

The Lead Design Assurance Engineer and Design Assurance Engineer with responsibility for the assurance role for a specific scheme/site or route.

1.8 Design Coordinator

Design Coordinators will be appointed by the Design Assurance Manager for each scheme to undertake the following roles with reference to Protection and Control.

- a) To ensure Design Assurance Engineer are identified and allocated to all capital projects.
- a) To ensure project design workload is balanced across all Design Assurance Engineer
- b) To ensure design work is allocated to Design Assurance Engineer to facilitate training and development.
- c) To ensure regular meetings are held with the allocated project team to review and plan resource requirement.
- d) To be the point of coordination for technical issues and to provide guidance on National Grid technical policies and procedures for the respective project team.

2 PROCEDURE

This procedure details the design activities and responsibilities at the key stages in the scheme lifecycle. To provide an audit trail to confirm that each stage has been satisfactorily completed the Design Confirmation Schedule provided in Appendix C shall be completed. Responsibility for obtaining the signatures from their respective engineers (or an email to confirm completion) will be vested in Lead Design Assurance Engineer.

Integral to the design process is the objective of Zero (SHES incidents/hazards) by Design. To facilitate this objective this procedure must be read and implemented in conjunction with TP137 (CDM) and NSBP199 (Zero by Design).

2.1 Design Development

As soon as practicable the Project Manager shall, in conjunction with the Design Assurance Manager, appoint a Lead Design Assurance Engineer to assist in assessing the design produced at all phases of the scheme.

The Project Manager and Lead Design Assurance Engineer) shall agree the frequency of the Client side design review meetings, which as a minimum shall be at the stages detailed in section 9.1. These shall be called by the Project Manager or Lead Design Assurance Engineer who shall ensure all relevant parties attend and chaired by the Lead Design Assurance Engineer (or a nominated Design Assurance Engineer).

2.2 Sanction

At or immediately prior to sanction the Legacy Team Senior Project Manager shall agree with the Project Manager the full scope of the design management activities and the extent of the necessary support.

Immediately post sanction the Project Manager shall, in conjunction with the Design Assurance Engineer, appoint all members of the design management team as appropriate. The Project Manager shall ensure the names of those with design responsibilities is communicated (and updated as appropriate) to the Technical Assurance Manager.

2.3 Handover

At the TP146 handover the Project Manager and Lead Design Assurance Engineer shall agree the adequacy of the sanctioned design and related TP146 defined deliverables.

2.4 Tender Process

2.4.1 The Lead Design Assurance Engineer shall, as directed by the Project Manager, review the Scheme Design Specification and associated documentation including, where appropriate, any technical requirements forming part of the CUSC as implemented via a Bilateral Connection Agreement, Bilateral Embedded Generation Agreement or Construction Agreement (see TP146 for full details and model documents). These shall be developed and augmented as necessary for inclusion in the enquiry documents.

2.4.2 The Project Manager shall ensure all technical queries generated during the tender process are forwarded to the Lead Design Assurance Engineer for consideration and response. Both parties shall agree a mutually suitable response period.

2.4.3 The Project Manager shall ensure that (as a minimum) the Lead Design Assurance Engineer attends all tender meetings either internal to National Grid or with Contractors or other third parties in which design or other project related technical issues are discussed.

2.4.4 The Lead Design Assurance Engineer shall provide advice on the technical suitability of the tendered design solutions to timescales agreed with the Project Manager.

2.5 Manufacture, Installation and Commissioning

2.5.1 The Project Manager shall advise the Contractor of all design appointments and responsibilities relevant to this process as soon as practicable. They shall establish appropriate communication channels to enable the members of the design management team to discharge their responsibilities.

2.5.2 Prior to finalisation of DID the Lead Design Engineer (Supplier) at odds with earlier statement 2.1 shall call for and chair

- a) HAZID review
- b) Design review

- 2.5.3 Prior to the Design Intent Document freeze the Design Assurance Engineer shall review and comment on the Design Intent Document and confirm it correctly interprets and articulates the scheme requirements. Particular attention shall be made to unusual or innovative design solutions and areas of design risk and hazard.
- 2.5.4 Immediately prior to final agreement of the Design Intent Document the Project Manager and the Lead Design Assurance Engineer shall develop and agree a design management strategy.
- 2.5.5 The Lead Design Assurance Engineer shall also attend as requested by the Project Manager or Contractor all other design review meetings necessary to facilitate the detailed design process.
- 2.5.6 During the detailed design and manufacture process the Lead Design Engineer (Supplier) will call for and chair the following review meetings in conjunction with the Design Assurance Team and other representatives, as required, from core National Grid.
- a) HAZID review
 - b) Design review (see chair comment earlier)
- NB: The above does not preclude the Suppliers holding additional reviews internal to themselves in accordance with Supplier Quality Assured procedures.
- 2.5.7 The Lead Design Assurance Engineer shall arrange and coordinate design compliance audits (see section 7.2) and immediately feed back non-conformances to the Project Manager.
- 2.5.8 The Project Manager shall ensure the Contractor is made aware of all design non-conformances and take appropriate measures to facilitate an acceptable resolution.
- 2.5.9 The Lead Design Assurance Engineer shall provide project delivery related technical advice to the Project Manager.
- 2.5.10 The Lead Design Assurance Engineer shall provide project delivery related technical support to National Grid site staff (specifically Site Engineers) as requested.
- 2.5.11 The Project Manager and Design Assurance Engineer shall agree the necessity of site visits. These shall be made to monitor construction activities against the proposed design and resolve technical issues.
- 2.5.12 The Lead Design Assurance Engineer shall provide all necessary technical support to the Commissioning Officer.

2.6 Design Compliance Audit

- 2.6.1 On completion of the detailed design, all drawings, schedules, reports, surveys and other documents used in the manufacture and installation of the works, ie. all those marked 'For Construction' or similar that articulate the 'Detailed Design' shall be forwarded to the relevant Design Assurance Engineer for Design Compliance audit. See Design Compliance Audit guidance notes at the back of this procedure.
- 2.6.2 A Design Compliance Audit strategy defining the extent of the audit will be agreed between the Lead Design Engineer (Supplier) & the Design Assurance Engineer. If during the audit errors are detected, a more comprehensive audit may then be undertaken proportionate to the errors experienced.

- 2.6.3 The timescales for installation commencing for each element of the detailed design shall be at least four working weeks after a satisfactory Design Compliance Audit has been formally confirmed to the Supplier by the Design Assurance Engineer. To meet this timescale all documentation, which must be subject to Design Compliance Audit, must be formally forwarded to the relevant Design Assurance Engineer at least two working weeks prior to the target Design Compliance Audit completion date (ie. six weeks prior to the installation commencing for that element of the work).

NB: The term 'element' refers to any part of the design and its installation whose completion is not dependent upon other parts of the design and installation. That is to say it can be completed in isolation without any impact upon other parts of the design and installation. This enables the drawings etc to be audited incrementally and in turn the installation to progress incrementally.

- 2.6.4 Confirmation to the Supplier that an element of work has been subject to satisfactory audit – and may progress to the installation stage shall be via a Design Compliance Audit Assurance Report – see Appendix E.

NB: Prior to each Design Compliance Audit Assurance Report being issued a HAZID review must be undertaken. This may be undertaken via teleconference and must involve as a minimum representation the Design Verification Engineer and Design Assurance Engineer. It should also preferably include the Lead Design Assurance Engineer.

- 2.6.5 Instances may arise when it is in the interest of the business to move to the installation stage without the above procedural requirements being fully enacted. This must be based upon a risk assessment as defined in Appendix F.

2.7 Civil/Structural Design Verification Certificate

All Civil, Structural & Building Engineering design including that for temporary Works and demolition shall be checked by, or be under the direct supervision of, Chartered Engineers of either the Institution of Civil Engineers or the Institution of Structural Engineers.

In addition, a Chartered Civil or Structural Engineer shall carry out an independent verification of the design, drawings and supporting documentation prior to the Supplier Design Engineer submitting the same for design compliance audit purposes. The Independent Verification Engineer shall not have been directly involved in the production of the calculations or drawings.

When evaluating the status of the design the Independent Verification Engineer shall ensure that it conforms to National Grid requirements, specifically the CDS and the DID, and is fit for purpose. In addition, confirmation shall be obtained that the design assumptions are valid, that the concepts are sound and that all design work has been checked.

The Independent Verification Engineer shall demonstrate compliance with the requirements of this clause by completing and signing the Civil/Structural Design Check Certificate which shall be countersigned by the Supplier Design Engineer, a copy of which is included as Appendix G.

The first formal issue of a drawing or drawings representing Civil, Structural or Building Engineering design both for Design Compliance Audit and subsequent installation or construction purposes shall be accompanied by the appropriate Civil/Structural Design Check Certificate (see Appendix G). Design details without such supporting documentation shall not be incorporated into any part of the works. Civil/Structural Design Check Certificates for subsequent revisions to drawings shall only be required where significant change to the design philosophy and/or construction methods has been made or where specifically requested by the Design Assurance Engineer

The independent verification does not negate the requirement for the design calculations to be checked within the Supplier design team working under the customary supervision and following appropriate quality procedures.

2.8 Type Registration / Factory Acceptance Test (FAT)

The procedural arrangements for Type Registration are defined in NSBP189 and for FAT in Commissioning Handbook N°21 and TP106.

2.9 Relay Settings

The procedure arrangements for relay settings are defined in TP107.

2.10 Site Installation and Commissioning

During the site installation and commissioning phases any proposed changes to the design must be referred to both the appropriate Supplier Design Engineer and Design Assurance Engineer for agreement.

2.11 Scheme Closure

The Lead Design Assurance Engineer shall review and comment on as constructed record documents (where appropriate – see section 1.3) and provide technical input, as directed by the Project Manager, into the National Grid contractor performance database.

The Lead Design Assurance Engineer shall, as required by the Project Manager, attend the post project review (refer to NSBP134E).

3 DESIGN CHANGE CONTROLS

Changes to design which has already been agreed earlier in the design process must be subject to design change control and must be agreed with the Design Assurance Engineer.

4 DESIGN ASSURANCE

To ensure that all design work undertaken complies with National Grid requirements Core Construction Technical Assurance will carry out an audit of the following key stages of each and every project. Confirmation of satisfactory audit will be by Construction Design Assurance signing on to the documentation relevant to the particular stage of the project, as shown in the following table.

Stage of the project	Documentation to be signed by Design Assurance
Option selection	Design Justification Report (DJR)
Development	Design Specification (DS)
Project design	Design Intent Document (DID)
Detail design	Design Compliance Audit Assurance Report

The audit will be carried out by the authorised Design Assurance Engineer. Alternatively, an authorised Consultant Engineer may be nominated.

Engineers carrying out the role of design assurance shall also attend design review meetings and be an integral part of the project team. In addition to carrying out an audit role, design assurance engineers will additionally provide advice and guidance on National Grid documentation and requirements.

To facilitate both Protection & Control assurance resource planning, and technical coordination and policy/process issue resolution within each project, a Design Coordinator will be appointed by the Technical Assurance Manager.

5 AUTHORISATION

All engineers carrying out the role of Design Engineer (Supplier) and Design Assurance Engineer must be authorised for this purpose in accordance with the requirements of TP141A.

6 HAZID REVIEW MEETINGS

6.1 The term HAZID is used significantly throughout the construction industry with reference to design – it stands for Hazard in Design.

A HAZID Review is a brainstorming session with representation as defined in Appendix H. The purpose of the HAZID Review is to identify potential SHES hazards arising from design, both during the site installation and commissioning phase, and later during operational use of the equipment, with a view to defining measures for the removal or management of the hazards. During the review the design must be systematically examined section by section. Checklists and documentation such as site layouts must be available to stimulate a free ranging discussion.

An essential part of the HAZID Review will be two way communications between designers – and those responsible for installation and commissioning – to ensure that the design is completely integrated and fully satisfies SHES requirements – see TP189A Zero by Design.

6.2 HAZID reviews will be undertaken at the following key stages of design lifecycle.

- a) Option Definition and Development
- b) Project Design
- c) Type Registration
- d) Through the detailed design and manufacture stage
- e) Detailed Design – Design Compliance Audit
- f) Others, as the requirements of the design dictate

6.3 The HAZID reviews will usually be called for and chaired by the Lead **Design Assurance Engineer**. They should usually be held in advance of, and independent of, the associated Design Review meeting (but the Design Review meeting may immediately follow the HAZID Review).

6.4 Appendix H defines the agenda and requirements and Appendix I defines a HAZID Review Report for record, control and audit purposes.

7 DESIGN REVIEW MEETINGS

7.1 Design Review meetings shall be held at frequent intervals throughout the scheme lifecycle to evaluate and review the technical health of the design – particularly from a National Grid policy and process adherence perspective.

7.2 Design Review meetings may be convened to consider the holistic design (ie. all technologies) or on a technology by technology basis.

- 7.3** Design Review meetings may be chaired by either the Design Engineer (Supplier) or **Design Assurance Engineer**.
- 7.4** All Design Review meetings shall be formally documented and include a list of actions and action owners.
- 7.5** Design Reviews shall be undertaken at the following key stages (or more frequent if requested) of the design lifecycle.
- a) Option Definition and Development *
 - b) Project Design *
 - c) Through the detailed design and manufacture stage
 - d) Detailed Design – Design Compliance Audit *
 - e) Others, as the requirements of the design dictate

* Following production of documentation but prior to approval.

8 FORMS AND RECORDS

The following documents are available as forms.

Design Confirmation Schedule – UKBP/TP188.01 (Appendix C).

Design Compliance Audit Assurance Report – UKBP/TP188.02 (Appendix E).

Civil Structural Design Verification Certificate – UKBP/TP188.03 (Appendix G).

HAZID Review Report – UKBP/TP188.04 (Appendix I).

PART 2 – DEFINITIONS AND DOCUMENT HISTORY

9 DEFINITIONS

9.1 Design Assurance

The process undertaken by Core Construction (Technical Assurance) which both provides guidance to the Supplier in achieving design solutions that satisfy National Grid policies and processes, and then subsequently confirms that the proposed design solutions are indeed compliant. The latter is usually achieved through audit.

9.2 Design Production

The process undertaken by the Suppliers in both preparing and producing the design solutions.

9.3 Design Compliance Audit

Systematic and independent examinations to confirm that the detailed design conforms to the specified technical requirements. The outcome of these shall be formally recorded as detailed in this procedure. Design compliance audits are not necessarily a detailed or fully exhaustive check of the detailed design but comprise a risk management strategy.

9.4 Design Compliance Audit Strategy

A plan prepared by Design Assurance Engineer defining the breadth and depth of the Design Compliance Audit on a technical discipline by discipline basis. This shall take as its basis the DID document and the guidelines detailed in this document.

The strategy shall be initially included in the DID prior to DID freeze and subject to constant appraisal via design review meetings throughout the project.

9.5 Design Review Meeting

Formally documented meetings, chaired by the Design Assurance Engineer, comprising systematic evaluations of the design through the TP146 lifecycle. The purpose of the design review meetings is both to formulate project specific design and to be reassured the proposed design accords with National Grid policy and process – and where this is not the case to propose corrective action.

With reference to this procedure design review meetings shall include Design Assurance Engineer and the Design Engineer (Supplier).

9.6 Design Programme

The Supplier's programme that defines the specific design activities to be undertaken to realise the project design in its entirety. This shall be broken into stages indicating the resources required and associated timescales.

9.7 Hazard In Design Reviews (HAZID)

Design review meetings with the specific objective of identifying and eliminating hazards from, and reducing risks in, the design.

10 AMENDMENTS RECORD

Issue	Date	Summary of Changes / Reasons	Author(s)	Approved By (Inc. Job Title)
1	April 2006	Separate procedures for Gas and Electricity projects created from the original document NSBP135 and suffixed (G) and (E) respectively. Procedural changes as follows. - Scope of procedure extended into development - Lead Project Engineer (Design) appointment now pre-sanction - Design Review meeting section expanded. H&S aspects of design to be specifically considered. - Forms section added. Design Compliance Audit section modified.	Nick Tobin	Keith Harker Technical Assurance Manager
2	September 2006	Reference to technical sections of CUSC added. Notes on voltage transformers added to section 7.2.4	Nick Tobin	Keith Harker Technical Assurance Manager
3	April 2008	Update to reflect CDM 2007 and new Construction structure.	Martyn Hanlon	Keith Harker Technical Assurance Manager

PART 3 – GUIDANCE NOTES AND APPENDICES

11 DESIGN COMPLIANCE AUDIT GUIDANCE

11.1 Design Compliance Audit

This section defines a minimum, generic scope of the Design Compliance Audit for each of the technical disciplines that may comprise the Detailed Design.

The key purpose of the Design Compliance Audit is to establish that a due process has been followed such that a compliant solution is tabled. In achieving this it is important to recognise the multi-disciplinary nature of the work. Each Design Assurance Engineer must be satisfied that all relevant interfaces are properly managed particularly where different technical disciplines are involved and where the output from one forms the input to another.

The Design Compliance Audit shall generally be restricted to a review of the drawings and supporting documentation issued for construction purposes only, that is the Detailed Design, and all subsequent revisions thereof. A detailed numerical check of calculations or other detailed examination of the design shall only be carried out where specifically defined in the Design Intent Document or the Project Engineer (Design) considers this is necessary to support or substantiate this review.

In carrying out such audits the Design Assurance Engineers shall be expected to comment on the design only. They shall not approve any submissions and are not to act as a parallel or subsidiary design team, and any documents marked as preliminary or similar shall not be reviewed unless a prior agreement has been made and confirmed. Ultimate design responsibility shall remain with the Supplier.

A drawing or document shall not be used for manufacturing, installation or construction purposes unless it has achieved a satisfactory Design Compliance Audit.

11.2 Key Tasks

The following list of key tasks is not necessarily exhaustive but details the main design areas to be addressed based on experience from typical National Grid construction projects. The Design Assurance Engineers shall be expected to use this as the basis of their brief and extend or reduce it as appropriate. Where appropriate the design deliverables necessary to demonstrate compliance against these, or other Scheme specific key tasks should be stated in the Design Intent Document.

Reference is made to National Grid Documents via the following acronyms.

- a) TS Technical Specification (formerly NGTS)
- b) TGN Technical Guidance Note
- c) NSI National Safety Instruction
- d) EATS Electricity Association Technical Specification

11.3 Generic

- a) Confirm the proposals comply with the requirements of the Scheme Design Specification, its associated documentation and the Design Intent Document. Where appropriate ensure any technical requirements forming part of the CUSC, implemented via a Bilateral Connection Agreement, Bilateral Embedded Generation Agreement or Construction Agreement, are correctly interpreted and articulated.
- b) Confirm drawings are signed as checked and approved, annotated with the correct revision letter and marked 'For Construction' or similar.
- c) Confirm all drawing scales are correctly indicated and that these match the annotated dimensions.
- d) Confirm drawings are either 'self contained' or clearly reference all necessary supporting documents. The drawings shall be understandable to the immediate user and, where appropriate, function as an as-built record document. Statements that 'details are to be agreed on site' or similar are not acceptable. All proprietary materials shall be fully referenced.
- e) Confirm suite of drawings is exhaustive.
- f) Confirm that the designs are released in a timely and appropriate manner against the construction programme.
- g) Review the design philosophy adopted and confirm that the basic design principles comply with the relevant Technical Specifications (TS), British or other appropriate standards and are technically sound.
- h) Confirm the buildability and maintainability of the proposals.

- i) Comment on necessity for appropriate planning authorisation.
- j) Confirm suitability of temporary works proposals and method statements.
- k) Make occasional site visits as agreed with the Project Manager to confirm consistency between design theory and construction practise.
- l) Submit written report/summary at intervals agreed with the Project Manager.

11.4 Civil, Building and Structural Engineering

- a) For the purposes of this procedure the term 'Civil, Building and Structural Engineering' shall apply to the design of the following permanent works items.
 - i) Access roads
 - ii) Drainage
 - iii) Oil containment works
 - iv) Fencing
 - v) Site security
 - vi) Surfacing
 - vii) Ducts & trenches
 - viii) Buildings (Operational & Non-operational)
 - ix) Site services (Operational & Non-operational)
 - x) Foundations
 - xi) Earthworks
 - xii) Ground Improvement/Stabilisation
 - xiii) Plant support structures
 - xiv) Fire protection & control
 - xv) Acoustic enclosures
 - xvi) Site Lighting
 - xvii) Landscaping
- b) Enabling infrastructure (Operational & Non-operational) - e.g. retaining structures, bridges, culverts etc.
 - i) Structural integrity (including that of all electrical components)
- c) Unless stated to the contrary this scope shall also apply, as considered appropriate, to all temporary works necessary to facilitate the construction of these.