

1. PURPOSE

This procedure mandates the requirements of a robust procedure for the safe production of designs as required by Network Rail/Client Group Standards and Company procedures.

This procedure shall ensure the following:

- Provision of design and design check certification for the design of schemes.
- Approval by Network Rail/Client of the design concept and the principles of design for schemes.
- Provide assurance to Network Rail/Client that construction methods used will not adversely affect:
 - The safety of railway operations.
 - The safety of the public.
 - The integrity of any aspect of the infrastructure.
- Ensure that the design of temporary works is technically adequate, considers buildability and is formally approved where appropriate.
- Compliance with the clients specified requirements, so that the design is robust, fit for purpose and does not impact on other disciplines.
- Where no equivalent industry standard is available, provide assurance to Network Rail/Client to the extent that is reasonably practicable, that the design has been competently engineered.
- Compliance with VolkerRail (VR) requirements for deliverables of the correct quality and allowing adequate timescales to enable installation, testing and commissioning.

2. SCOPE

This procedure sets out the VR's requirements for all design related activities including internal design and those carried out by third party consultants detailed on the VR approved supplier list on behalf of VR.

Temporary works may be considered as an independent commission or as part of a permanent scheme. This procedure may be substituted with a client, Alliance or project specific procedure.

Compliance with this procedure is necessary to ensure the company meets its legal obligations under current legislation such as the Health and Safety at Work Act 1974, Management of Health & Safety at Work Regulations 1999, Construction (Design & Management) Regulations 2015 and The Railways and Other Guided Transport Systems (Safety) Regulations 2011 (ROGS Regulations), Commission Regulations 402/2013 CSM-RA etc.

3. REFERENCES

- CDM Regulations 2015
- NR/L2/INI/P3M/101 Governance for Railway Investment Projects (GRIP)
- NR/L2/INI/0300 Integrated Engineering Lifecycle for Projects (iELC)
- NR/L2/CIV/003 Engineering Assurance of Building and Civil Engineering Works
- NR/L2/ELP/27311 Engineering Assurance Requirements for Design and Implementation of Electrical Power Engineering Infrastructure Projects
- NR/L2/INI/02009 Engineering Management of Projects
- NR/L2/INI/CP0047 Application of the Construction Design and Management Regulations to Infrastructure Investment Projects
- NR/SP/ELP/21074 Overhead Line Equipment Allocation Design for Railway Electrification
- NR/SP/ELP/21130 Technical Competency Requirements for Design of Overhead Line Equipment
- NR/SP/ELP/27300 Specification for Computer Aided Design formats for Electrification and plant documentation
- NR/L2/INI/EDT/CP0091 Specification for Computer Aided Design
- NR/SP/ELP/27030 Overhead Line Equipment as Installed Data Records (Formerly RT/E/C/27030)
- NR/L2/SIG/11201 Signalling Design Handbook
- NR/L2/EBM/STP001/04 How to manage deviations to Network Rail and Railway Group Standards
- PAN/PMSE-E-CD-INS-0064 Review of Engineering Deliverables
- NR/L2/TRK/2500 Engineering Assurance Arrangements for Track Engineering projects

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 1 of 24	

4. DEFINITIONS AND ABBREVIATIONS

Term / Abbreviation	Description
Acceptance	An acknowledgement that a submission appears to be satisfactory.
Approval in Principle Design	Confirmation that a professionally competent person or body is satisfied that; <ul style="list-style-type: none"> The design concept proposals for the scheme meet the requirements of the remit. Suitable standards and design criteria are proposed for the detail design and design check.
Approved for Construction Design	Design that has been prepared, checked and approved by competent persons in accordance with all applicable Contract requirements and standards AND successfully completed an Interdisciplinary Check (IDC) process AND successfully completed the Network Rail Acceptance process.
Contractor's Engineering Manager (CEM)	Person within every design and/or construction organisation contracted to Network Rail/Client, (or to a party other than Network Rail/Client where agreed with Network Rail/Client) with overall accountability for all engineering activities applicable to that specific Contract including those undertaken by sub-contracted organisations.
Contractor's Responsible Engineer (CRE)	Person within a design and/or construction organisation contracted to Network Rail/Client, (or to a party other than Network Rail where agreed with Network Rail/Client) with accountability for the day-to-day management and co-ordination of the technical and engineering activities within a specific engineering discipline for a specific Contract.
Construction, Design & Management Regulations	The CDM 2015 Regulations are about focusing attention on effective planning and management of construction projects, from design concept onwards. The aim is for health and safety considerations to be treated as a normal part of a project's development, not an afterthought or bolt-on extra. The object of the CDM 2015 Regulations is to reduce the risk of harm to those that have to build, use, maintain and demolish structures.
Checker	The person responsible for the design check of a scheme who is authorised to sign the design check certificate on behalf of the checking organisation.
Design	Information in the form of drawings, diagrams, photographs, calculations and/or words (including specifications for performance, materials and workmanship) which together describe in detail what is to be constructed and, where applicable, how it is to be constructed. The term is also used to describe the process by which such information is produced, including the carrying out of calculations where necessary.
Design Check	An independent review of the design (including the carrying out of calculations where necessary) to ensure compliance with the remit and to confirm that adequacy and completeness of the Design.
Designer	The person responsible for the design of construction work who is authorised to sign the formal design submissions on behalf of the design organisation.
Design Manager	Person with responsibility for managing the design process on behalf of VR.

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 2 of 24	

Term / Abbreviation	Description
Design Development Review (DDR)	A review undertaken during design development between the CRE's (design and construction) and the client project engineer for a single discipline. The frequency and duration of these meetings will depend on the nature and pace of the design work, however the principle of 'often and short' shall be adopted as a means to avoid surprises, abortive work and to build trust.
Inter-Disciplinary Check (IDC)	An assessment undertaken by the Design Organisation to confirm that the information included in the design is compatible and conforms to the requirements of all other design with which the design is expected to interface. The assessment is multidisciplinary and includes all engineering disciplines with which the design is expected to interface. Each design is assessed in its entirety.
Inter-Disciplinary Review (IDR)	An assessment undertaken by Network Rail to confirm that all information included in the design is compatible with the infrastructure and with other projects being carried out in parallel.
Lead Design Organisation	Where the Client allocates responsibility to a number of Design Organisations for the Design on a given project. One Design Organisation is appointed as a Lead Design Organisation and the CEM in that Design Organisation is accountable for co-ordinating the output from, and managing co-operation between, all Design Organisations producing design for the project.
Risk Register	A management tool, which may be a spreadsheet, database, document or specific software, used for identifying, analysing and managing risks on a particular project. It contains details of design and construction hazards and records the control measures implemented to manage the residual risk to an acceptable level. It is initially produced prior to the first design decision being made and is maintained through the life cycle of a project. Upon completion of the project it forms part of the Health and Safety File.
Scheme	Any planned work which results in permanent change to Network Rail's/Client infrastructure including new construction, relocation, alteration, refurbishment, recovery, decommissioning and demolition unless considered as temporary works.
Temporary works	Parts of the works that allow or enable construction of, protect, support or provide access to, the permanent works and which might or might not remain in place at the completion of the works

5. MANAGEMENT ARRANGEMENTS

5.1 Design and Engineering Assurance

5.1.1 Governance for Railway Investment Projects

NR/L2/INI/P3M/101 "Governance for Railway Investment Projects" (GRIP) describes how Network Rail manages and controls projects that enhance or renew the national rail network. It forms part of the project, programme and portfolio (P3M) framework. The approach is based on best practice within industries that undertake major infrastructure projects and practice recommended by the major professional bodies.

The GRIP lifecycle is split into eight discrete stages, as shown in [Appendix A](#).

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 3 of 24	

5.1.2 Integrated Engineering Lifecycle

NR/L2/INI/0300 “Integrated Engineering Lifecycle” (iELC) enables Network Rail to deliver more successful projects by ensuring completion of the right engineering activities at the right time. The iELC consists of six engineering phases which align with the GRIP stages. The iELC provides a common reference and an integrated systems approach for engineering activities and processes undertaken by the engineering disciplines.

The Engineering Phase Gate Reviews are key checkpoints within a project to establish that a project has delivered the Engineering Deliverables specified and determine whether the project can proceed to the next phase.

Network Rail are required to advise the Level of Control (LoC) applied on each project – this will dictate when the Phase Gate Reviews are required for inclusion in the contract programme.

5.1.3 Roles & Responsibilities

VR will nominate a **Project Manager** who is accountable for the scheme. It is the responsibility of the **Project Manager** to ensure that suitable design and engineering staff are mobilised for each of the four phases of a project lifecycle; [Pre-contract](#), [Mobilisation](#), [Delivery](#) and [Close](#).

The **Project Manager** shall dictate whether a **Design Manager** is required full time or part time based on the size and scope of the scheme. In some instances, the **Design Manager** may be the **Project Manager** or the **CEM**. The **Project Manager** retains all responsibilities for design management under this procedure unless delegated within the RACI that can be found within the Project Management Plan for the scheme.

The **CEM** shall produce an Engineering Management plan that includes a detailed RACI which defines the roles and responsibilities of the design and engineering staff on the scheme. This shall include the design activities that need to be allocated to facilitate compliance with this procedure. The RACI can be used to delegate the roles and responsibilities under this procedure to the arrangements of specific project teams.

5.2 Pre-Contract Phase

A Pre-Contract Phase flow chart can be found in [Appendix A](#).

5.2.1 Client Requirements

NR/L2/INI/P3M/104 “Network Rail Requirements” describes how the project requirements should be presented to VR for each scheme. These requirements will develop and evolve through the GRIP stages but should be finalised following completion of Approval in Principal design. The client shall produce the following internal documents;

- **Client Requirements Document (CRD)** – business requirements set out by the organisation funding the railway enhancement or renewal. Requirements will be defined by the business case and the expected benefits.
- **Route Requirements Document (RRD)** – transforms the client requirements defined at the commencement of the development phase into a set of route requirements. It evolves during the development phase and results in a set of requirements that define the chosen option at a high level of abstraction, ready to hand over into delivery stages.
- **Detailed Route Requirements Document (DRRD)** – contains all detailed requirements for a project, which transform route requirements, as an output of the development stage, into a detailed technical set of requirements to deliver the solution that satisfies the route requirements.

The client shall communicate these requirements to VR in the following document:-

- **Contract Requirements – Technical (CR-T)** A form of agreement and specification for Works, appended to a Contract, which creates and defines obligations between a project and a design and / or construction organisation, in the form of technical requirements.

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 4 of 24	

VR shall price the design services against the Contract Requirements – Technical (CR-T). If this document has not been provided, the **Design Manager** and **CEM** shall clearly define the design and engineering baseline for the scheme. This must be approved by the **General Manager** prior to an Invitation to Tender being issued to our supply chain. If the **General Manager** concludes that the information provided is not sufficient to price the design services, the **Project Manager** shall request further information from the Client before proceeding.

On schemes outside of Network Rail the documents above may be named differently i.e. Technical Work Scope, Design Guide or similar. However, the same principals apply.

5.2.2 Invitation to Tender

The **Design Manager** shall prepare the Invitation to Tender documentation for the design consultant during the pre-contract phase. The purpose of the Invitation to Tender is to clearly define the services required by VR from the design consultant. The Invitation to Tender shall define the project specific requirements received from our client and shall also define any VR specific requirements. The **Design Manager** is responsible for ensuring the level of detail included within the Invitation to Tender documentation defines the services required for successful completion of the project. The following documents shall be included;

- Cover Letter
- ENQ1 Scope of Works
- ENQ2 Particulars for Main Contract Conditions
- ENQ3 Particulars for Sub-contract Conditions
- ENQ4 Schedule of Documents
- ENQ5 Anticipated Programme
- ENQ6 Tender Deliverables
- ENQ7 Schedule of Attendances
- ENQ8 Supplier Scoring Criteria
- ENQ9 HSQES
- ENQ10 General Matters
- ENQ11 Pricing Document

It is important that the project team define a scope split matrix within the Invitation to Tender to ensure that the project proposals returned by the design consultants include the services/requirements VR need from them. The Invitation to Tender process is iterative but providing this should minimise the quantity and significance of any assumptions / exclusions and allow project proposals from different consultants to be normalised.

[ENG01M002F03](#) shall be used for all design Invitations to Tender and enquiries. This form is inclusive of the documents defined above and provides detailed guidance notes on the requirements that need to be defined during the pre-contract phase based on best practice and lessons learnt from recent projects. The **Design Manager** shall edit and amend the narrative within this form to suit the project specific requirements.

Approval from the **Project Manager** is required prior to issue of the Invitation to Tender to ensure all VR requirements have been included and / or any recent knowledge transfer from other projects in the business has been considered.

5.2.3 Consultant Selection

The choice of sub-contract design consultant can impact on the success of the project and must be an informed decision taken between engineering, commercial and project management members of staff. The following list of considerations should be used to select the right design consultants for the Invitation to Tender process:-

- Recent commercial performance
- Recent programme and delivery performance
- Design quality on recent schemes
- Technical experience in delivery of the specific type of project.
- Availability of competent staff

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 5 of 24	

- Capacity
- Location
- VR split of consultant services

The services can be awarded to a single multidisciplinary design consultant or split between a selection of consultants, dependent on the requirements of each specific project. Where splitting the work between multiple consultants it is important to ensure the engineering management arrangements are clearly understood to ensure all services have been priced to avoid any scope gaps. When procuring multiple consultants on a project consideration should be given to the increased design management and integration hours required to coordinate information between multiple consultants. The procurement of surveys to inform design development and who is planned to undertake this work should be carefully considered at this stage given the key interface with the design consultants scope of works.

The **Project Manager** shall define and agree the procurement strategy for the scheme with the **General Manager**. VR may need comparable offers from multiple design consultants to demonstrate value for money and justification of the designer selection process if audited in the future.

The **Design Manager** shall coordinate and evaluate responses to any tender queries and lead the review of the design consultant offers against the scoring criteria defined in the Invitation to Tender. The **CEM** shall review the technical elements of each project proposal (including the evaluation of responses to tender queries). The **CEM** should lead the technical sections of any consultant interviews during the pre-contract phase. This shall include a review of all proposed senior engineering staff nominated by the consultant. The level of engineering assurance risk shall be established and the cost impact of this shall be used to normalise tender return prices.

Approval from the **General Manager** is required to select the design consultants that are included in the Invitation to Tender and to approve the final consultant selection.

To close out the Invitation to Tender process, the **Project Manager** shall ensure that feedback is given to the consultants that priced the services explaining the reasons for successful or unsuccessful bids.

5.2.4 VolkerRail Settlement

The **Design Manager** shall ensure all design information is incorporated within the VR project proposal and assist the **Project Manager** in preparing for a VR settlement meeting. A key consideration here is to ensure any assumptions / exclusions raised by the consultant in their offer to VR have either been priced by VR and/or passed to our Client.

The **Project Manager** may request that the **Design Manager** attends the settlement meeting. In all circumstances, the **Design Manager** shall closely monitor the outputs and any amendments made to the VR project proposal from the settlement review and/or through any Client negotiation in advance of contract award. This may have an impact on the design services included for in the overall project proposal.

5.3 Mobilisation Phase

A Mobilisation Phase flow chart can be found in [Appendix A](#).

5.3.1 Professional Services Agreement

After the pre-contract phase the following documents should be available to commence mobilisation of the project:-

- Project Proposal Document
- Tender Design Programme
- Risk and Opportunities Register
- Design Deliverables Schedule
- Organisation Chart
- Design Fee Breakdown

The pre-contract or commercial team should have drafted the contract documents for the design consultant.

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 6 of 24	

The **Project Manager** is responsible for ensuring contract award has been completed and a signed Professional Services Agreement has been issued to the design consultant as soon as reasonably practicable following VR's contract award. The **Design Manager** shall assist the **Project Manager** to make this happen. If this is not in place promptly the design consultant cannot fully mobilise resource for successful completion of the project.

The **Design Manager** shall ensure that a signed professional services agreement is in place prior to authorising mobilisation of design resource to commence work. Approval from the **General Manager** is required before any work is undertaken if the signed professional services agreement is not in place.

5.3.2 Contract Programme

The Tender programme shall be developed during the mobilisation phase into the agreed contract programme, normally, within 28 days of contract award. The design programme forms an important part of the overall contract programme managed by VR. Therefore, the **Design Manager** must ensure the design programme is robust and realistic. The design programme shall include the following, this list is not exhaustive:-

- All design deliverables included in the project proposal from the design consultant and within the Scope of Works documents provided (such as deliverables schedule and pricing schedule), including temporary works.
- Sufficient time for production of site survey specifications (where required) with appropriate durations and interface milestones for completion of the site survey activities and production of reports prior to commencement of the proceeding design activities.
- Interface Milestones for all inputs required to inform design development such as existing design information and record drawings.
- Robust engineering assurance logic with links for exchange of information between disciplines and/or other consultants as required.
- Input from the **CEM** and the discipline specialist **CRE**'s to ensure that the durations have been developed in conjunction with the design teams to ensure buy-in from all parties involved.
- Key workshops and meetings as defined in this procedure
- Procurement milestones, where required, to allow early release of design information for purchase of long lead items required for construction.
- Each design deliverable should have a corresponding "AFC required by" milestone so the variance between forecast AFC date and construction start can be monitored.

The **Project Manager** will own and take responsibility for the overall project programme ensuring that the **Project Planner** undertakes updates as appropriate and maintains revision control. The design schedule will be updated on a regular basis with progress reported against the baseline. The **Design Manager** shall input to ensure the design elements of the programme are accurate and correct.

The following activities must be included in all design programmes as a minimum for each design deliverable;

- Stage Gate Review (milestone)
- Planned design start (milestone)
- Production of design deliverable and documentation (duration varies)
- IDC/IDR Meeting (milestone)
- Update design to IDC/IDR comments (nominally 10 working days)
- Submission of design deliverable to VR (milestone)
- VR review period (nominally 5 working days)
- Submission of design deliverable for client review (milestone)
- Client review period (nominally 20 working days)
- Receipt of document review notice (milestone)
- Consultant response to DRN comments with client acceptance / sign-off (nominally 5 working days)
- Update design to client review comments (nominally 10 working days)
- Publish final design (milestone)
- Construction mobilisation period (minimum of 15 working days)

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 7 of 24	

- Construction start or ‘AFC required by’ (milestone)

The project **Planner** shall use the design programme template which is available with the VR database within P6. The **Design Manager** shall ensure all activities, the programme logic and the nominal durations within this template are adhered to in all contract programmes. If there is pressure from the client to reduce these durations and accelerate design assurance this should only be considered after agreement of the contract programme and/or on receipt of formal instruction from the client.

The **Design Manager** shall ensure that a contract programme is in place prior to authorising mobilisation of design resource to commence work. Approval from the **General Manager** is required before any work is undertaken if a contract programme is not in place.

5.3.3 Design Surveys

The **Project Manager** for the scheme shall allocate appropriate resource who is responsible for the planning and delivery of design surveys. The lead for surveys shall maintain a survey register for the project.

The design consultant shall produce survey specifications which clearly define what information is to be collected on site, how this will inform design development and who the information will be used by. The design consultant shall ensure the data format and information management requirements are clearly defined in the survey specifications for onward issue to VR’s supply chain. Where required, these shall be agreed with the Client. The **CEM** shall ensure the content of these specifications are reviewed, challenged and accepted by VR. Surveys can be expensive and access to the railway can be limited. It is important the quantity and level of survey data specified is suitable to inform design development and for its intended purpose. The use of technology should be a primary consideration and implemented whenever possible to reduce safety critical working hours.

The lead for surveys must ensure that an appropriate amount of time is included in the programme for safe delivery of design surveys and ensure that appropriate interface milestones are included. Where possible, all the survey requirements shall be specified to allow efficient use of the access available. Where more than one consultant is being used on the project surveys are to be combined wherever possible. The site surveys shall be undertaken with full knowledge of the proposed solution and work scope, allowing all details to be gathered and recorded. It is difficult to define all the surveys required to inform design development upfront, some are required as a result of the survey data received, therefore, consideration should be given to planning appropriate contingency shifts to cover any unexpected survey requirements.

Where VR are undertaking design surveys, the **CEM** shall ensure that all survey data produced is compliant with the document control and information management requirements on the scheme. The **CEM** must ensure this is checked and verified prior to the data being issued to the design consultant.

The **Design Manager** shall ensure that all survey inputs have been completed for a design deliverable and formally issued to the consultant in the correct format prior to authorising mobilisation of design resource to commence work. Commencing design work without survey inputs is a risk and could lead to abortive design work. The **Design Manager** can authorise a design to commence in advance of the survey input being available but the commercial and programme risk of this must be understood and recorded on the project risk register.

5.3.4 Technical Queries

The project should expect to receive technical queries from the design consultant and the VR project team, some of these require responses from the client, some can be answered by the VR project team and some require responses from the design consultant. This process shall be managed by the project **CEM**.

The **Design Manager** shall ensure that any key technical queries related to a design deliverable have been closed out prior to authorising mobilisation of design resource to commence work. Commencing design work without agreement on the key technical requirements is a risk and will likely lead to abortive design work. The **Design Manager** can authorise a design to commence in advance of a technical query being closed but the commercial and programme risk of this must be understood and recorded on the project risk register.

The **CEM** is responsible for maintaining a single Technical Query register for the project using [ENG01M002F04](#). The register shall be produced during the mobilisation phase and maintained for the lifecycle of the project.

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 8 of 24	

5.3.5 Requests for Information

The project should expect to receive requests for information from the design consultant and the VR project team, some of these require responses from the client, some can be answered by the VR project team and some require responses from the design consultant. This process shall be managed by the project **CEM**.

The **Design Manager** shall ensure that any information required to inform design development is recorded formally on a request for information form. This should detail the level of information required and when the information is required by. The request for information should normally align with an interface milestone in the contract programme, this should be referenced within the request, this enables the project team to identify which design deliverable would be impacted if the information is not received on time.

The **Design Manager** shall ensure that any requests for information related to a design deliverable have been closed out prior to authorising mobilisation of design resource to commence work. Commencing design work without all the information inputs is a risk and could lead to abortive design work. The **Design Manager** can authorise a design to commence in advance of a request for information being closed but the commercial and programme risk of this must be understood and recorded on the project risk register.

The **CEM** is responsible for maintaining a single request for information register for the project using [ENG01M002F05](#). This shall be produced during the mobilisation phase and maintained for the lifecycle of the project.

5.3.6 Engineering Appointments

NR/L2/INI/02009 details the requirement for the appointment of a project **CEM** and discipline specific **CREs**. On all VR projects the procedure detailed in [ENG01M001 - Appointment of CREs and CEMs](#) shall be followed for engineering appointments.

The **CEM**, where possible, shall normally be a direct employee of VR, but this can be an employee of the respective design consultant or other party in certain circumstances, in any case the individual shall always be authorised by the **VR Engineering Director**. This appointment should be recorded on [ENG01M001F01 - CEM Assessment Form](#). This applies to individuals undertaking the role of **CEM** design on behalf of VR.

The **CREs** for the design phase shall normally be employees of the respective design consultant who will put forward their proposed candidate for the position to the **CEM** for approval. Ensuring that the individuals carrying the positions of design **CRE** are competent is imperative to the success of the project. The appointment should be a considered decision based on evidence, experience and references which shall all be recorded on [ENG01M001F02 - CRE Assessment Form](#). This form, along with Network Rail's form referenced NR/L2/INI/02009 – F0040, should be issued to the client with the associated CV. All Temporary Works appointments shall be made following the same process.

All VR employees undertaking **CEM** and **CRE** roles shall undertake the VR **CEM** and **CRE** training modules. If this has not been undertaken a training plan should be in place to complete this training as soon as reasonably practicable.

It is the responsibility of the **CRE (Design)** to validate the competency of the designers and checkers under NR/L2/INI/02009. This shall include detail of recent experiences of the proposed individuals who are to work on the contract, and their proposed role for the project i.e. designer, checker, survey or etc. Supporting evidence in the form of CVs and certificates/licenses, CPD Folder/Logbooks shall form part of the competence check. These checks shall be recorded on [ENG01M011F01](#).

The **Design Manager** shall ensure that all Engineering Appointments related to a design deliverable have been closed out prior to authorising mobilisation of design resource to commence work. Commencing design work without agreement on an Engineering Appointment is a risk and could lead to rejection of the nomination and abortive design work. The **Design Manager** can authorise a design to commence in advance of an Engineering Appointment being closed but the commercial and programme risk of this must be understood and recorded on the project risk register.

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 9 of 24	

The **CEM** is responsible for maintaining an Engineering Nominations register for the project using [ENG01M011F01](#). Evidence of all competence checks should be recorded on this register. This shall be produced during the mobilisation phase and maintained for the lifecycle of the project.

5.3.7 Meetings & Workshops

The **Design Manager** shall review the meeting schedule agreed during the Invitation to Tender stage phase and implement during the mobilisation phase. This should define the frequency and attendees of the Progress Meetings and Engineering Meetings. A table which provides guidance on who should be leading the meetings, the frequency, required attendees and the desired output can be found in [Appendix B](#).

All meetings are to be documented and records provided to the **Design Manager**. An action list to resolve issues shall be maintained and reviewed at each meeting. Personnel attending the meetings shall cover all disciplines and both permanent and temporary works (as defined by the **Design Manager** and **CEM**). The client shall be included in these meetings as appropriate. These are to be scheduled in advance at a suitable venue and may be extended to workshops where the nature of the works is suitable. The use of technology should be a primary consideration and implemented whenever possible to avoid unnecessary staff travel.

The following meetings are expected on design projects during the mobilisation phase;

- Start-up Meeting
- Constructability / Buildability Workshops
- Risk Workshops
- Value Engineering Workshops
- Design Out Waste Workshops

The **Design Manager** shall ensure that all the meetings and workshops above have been undertaken during the mobilisation phase and prior to authorising mobilisation of design resource to commence work. The **Design Manager** may determine a workshop is required or they can be combined for efficiency dependent on the project size and scope.

5.3.8 Start-up meeting

The **Design Manager** is responsible for arranging and chairing a design start-up meeting with the design consultant as early as possible in the mobilisation phase to set VR's expectations. The actions recorded at this meeting should be followed through and closed out at the next scheduled progress meeting. A template meeting agenda form is provided with this procedure referenced [ENG01M002F01](#). This details the topics which should be discussed and agreed at the start-up meeting.

5.3.9 Definition of Deliverables

VR should have defined how the Scope of Works should be packaged into design deliverables during the Invitation to Tender process to align with the construction and testing and commissioning strategy. The design deliverables and strategy shall be verified during the mobilisation phase. If this is not undertaken correctly the design packages will not align with the construction strategy which can increase the design fee and delay completion of designs. The **Design Manager** shall arrange a construction and buildability workshop during the mobilisation phase to ensure the strategy is clearly communicated to the design consultant. This should drive the design delivery strategy and priorities in the design programme. The list of design deliverables shall include all items that need to be submitted through the engineering assurance process, including staged, temporary and permanent design deliverables.

The IDC/IDR strategy shall be agreed by the **Design Manager** and **CEM** to align with the construction and delivery strategy, where possible the number of IDC/IDR meetings should be minimised.

The **Design Manager** may determine a workshop is not required if the level of information available robustly demonstrates the interface between design and construction.

Each deliverable shall have, in so far as is practical, a list of documents associated with it i.e. drawings, specifications risk assessments, calculations etc.

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 10 of 24	

The **Design Manager** is responsible for maintaining a Design Deliverables register for the project using [ENG01M002F06](#). This can be generated and updated using exports from the P6 programme. This shall be produced during the mobilisation phase and maintained for the lifecycle of the project.

5.3.10 Risk and Opportunities

The **Project Manager** for the scheme is responsible for maintaining a risk and opportunities register for the project. The **Design Manager** shall review the pre-contract design risk and opportunities register during the mobilisation phase and ensure all design and engineering risks and opportunities are recorded in the main project register. The **Design Manager** shall ensure these items are reviewed and updated throughout the project lifecycle from regular reviews with the design consultant and the engineering team.

The **CEM** shall ensure a Risk Workshop is undertaken during the mobilisation phase. The output of this workshop shall be the Risk Register. This may be an integrated risk register with the Client on Network Rail projects. The Risk Register is a management tool, which may be a spreadsheet, database, document or specific software, used for identifying, analysing and managing risks. It shall contain details of design and construction hazards and records the control measures implemented to manage the residual risk to an acceptable level.

The **CEM** is responsible for maintaining the Risk Register for the project using [ENG01M002F02](#). This shall be produced during the mobilisation phase and maintained for the lifecycle of the project. Upon completion of the project it forms part of the Health and Safety File.

5.3.11 Value Engineering

VR's clients expect that value engineering and innovation are considered during the design period. VR welcomes innovative ideas whether they are through use of different materials, plant or delivery mechanisms. Value Engineering Workshops shall be carried out during the mobilisation phase of the project. Value engineering workshops shall be attended by key design representatives, potential subcontractors and the client. A formal record of workshops are to be taken and maintained in the project files. A key element of value engineering can be standardisation which can avoid design duplication and help retain a common competency. Each design discipline is to consider how this may be addressed.

Before implementing any optimisation on the project, the **Design Manager** shall ensure that the Internal Changes / Optimisation Process Guidance is followed. The goal of this process is to ensure that all interdisciplinary changes that have an impact on the direct costs, programme or risk profile of the project are identified, analysed and approved in a practical manner, before the change is executed (improved traceability). Key Project Team members will be in charge of discussing the internal change proposals weekly or as generated to determine whether these should be executed.

STEP 1 A team member within the project organisation identifies a possible change or optimisation.

STEP 2 The team member discusses this possible change within their team for a second opinion.

STEP 3 If the idea seems to be positive for the project, the team member fills in the Change Impact Analysis form as a Change Proposal which is submitted to the right Key Project Team members.

STEP 4 The Key Project Team members will discuss the proposal to determine whether the change should be executed or not and finally give feedback to the originator of the Change Proposal

The Key Project Team members on a given project should be selected so that the main project disciplines are represented when making the decision on an Internal Change proposal:

- E.g. (Project Manager)
- E.g. (Construction Manager)
- E.g. (Design/Engineering Manager)
- E.g. (Commercial)
- E.g. (Planner)

The **CEM** is responsible for maintaining a Value Engineering register for the project using [ENG01M002F07](#).

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 11 of 24	

This shall be setup during the mobilisation phase and maintained for the lifecycle of the project. The CEM shall ensure Value Engineering Workshops are undertaken during the mobilisation phase so that the opportunities generated are assessed and ready for implementation in advance of the Design Manager authorising mobilisation of design resource to commence work. Any opportunities raised post commencement of design work will likely result in some abortive design work.

The **Design Manager** is responsible for implementation of the Change Impact Assessment process to ensure all opportunities are properly assessed before they are implemented and recorded on proforma [ENG01M002F08](#).

5.3.12 Environment and Sustainability

All projects should aim to ensure we meet the sustainability requirements of the rail industry, our regulators and stakeholders in every piece of work that we deliver to create a sustainable railway fit for the future. Multi discipline designers as well as construction contractors shall seek to embed best practice in sustainability and social value in our engineering processes.

The following specific areas should be considered when developing the engineering deliverables:

- Site environmental management
- Minimise pollution
- Energy and carbon reduction
- Responsible sourcing and use of low environmental impact materials
- Waste management
- Water use
- Community impact and engagement
- Ecology and positive biodiversity

The **Design Manager** shall ensure that the design consultant undertakes:

- A Design out Waste Workshop in each GRIP stage
- A sustainable design management plan setting out arrangements for considering a range of sustainability criteria throughout the design process as set out in NR/L2/ENV/015 and accepted by Network Rail.
- For all new schemes over £20,000 or more than 150 metres in length, a Phase 1 habitat survey must be conducted for use in biodiversity accounting alongside the Rail Biodiversity Calculator. Recalculations take place as necessary to take account of change of scope. Ecologist to ensure habitat assessments are sufficient to use in the Biodiversity Calculator. VR require an ecologist to ensure the habitat assessments are sufficient for use in the calculator and to undertake the accounting using the Network Rail calculator tool. If new sites or scope has been added to the scheme then further ecological support will be required to assess new sites.
- For all new schemes with works over £1million shall identify opportunities for carbon reduction using the Rail Carbon Tool. Information from the carbon assessment should be used to influence design decisions. Evidence required of the implementation of the Carbon Tool and any outcomes forthcoming.

For the output of these to be used during design production these activities should be progressing or completed in advance of the **Design Manager** authorising mobilisation of design resource to commence work.

5.3.13 Document Control

Workspace is the document control system used within VR.

The **Design Manager** shall ensure that all project documentation is uploaded to Workspace. Please refer to [PMS02 - Project Document Control](#). The **Design Manager** must also ensure compliance with any project specific information management requirements imposed by the Client i.e. Common Data Environments (CDE), Computer Aided Design (CAD) and Building Information Modelling (BIM) Standards. The project team must be briefed in advance of the **Design Manager** authorising the mobilisation of design resource to commence work.

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 12 of 24	

The Power BI report detailed below in the [Design Reporting](#) section requires the live source registers to be updated and maintained within Microsoft Teams (backed up by SharePoint). This allows the files to be collaboratively edited by the project team and also allows the Power BI report to be updated automatically for each project. The **Design Manager** must ensure that copies of these files are regularly uploaded to Workspace and that this process is captured within the Document Control section of the Project Management Plan.

5.3.14 Design Fee

The **Design Manager** shall support the commercial management of the design sub-contract account on the project. In liaison with the relevant **commercial lead**, the **Design Manager** shall monitor on a period basis against the contract value; cost to date, cost to complete and anticipated final cost. It is important the project team clearly understand commercial performance targets. The **Design Manager** shall monitor these metrics by design consultant and by design discipline. The project team must be briefed on the commercial targets in advance of the **Design Manager** authorising the mobilisation of design resource to commence work.

The **Design Manager** shall make sure the Commercial Performance register for the project is updated regularly by the **commercial lead** using [ENG01M002F09](#). This shall be produced during the mobilisation phase and maintained for the lifecycle of the project.

5.3.15 Change Control

The **Design Manager** shall ensure that the design consultant does not undertake any work outside of the contracted scope without instruction from VR. The design consultant shall formally notify VR of any potential Scope Change on an Early Warning Notice in advance of the event occurring to give VR the opportunity to mitigate any impact on cost or programme. If this cannot be resolved and results in a Scope Change event, the design consultant shall notify VR formally on a Change Request Form which details both the cost and programme impact. No work shall be undertaken on the Scope Change without formal instruction from VR. The project team must be briefed on Scope Change and escalation process in advance of the **Design Manager** authorising the mobilisation of design resource to commence work.

The **Design Manager** shall make sure that an Early Warning Notice Register and a Change Request Register are updated regularly by the commercial lead using [ENG01M002F10](#) & [ENG01M002F11](#). This shall be produced during the mobilisation phase and maintained for the lifecycle of the project.

The **Project Manager** must inform the **General Manager** if significant Scope Change is introduced on the project which requires VR to engage an additional Design Consultant not considered during the Pre-Contract Phase. The selection of a design consultant is critical to project success and must be an informed decision taken between engineering, commercial and project management members of staff as detailed in section [5.2.3 Consultant Selection](#) of this procedure. For clarity, approval from the **General Manager** is required to select the design consultants that are included in any Invitation to Tender and to approve all final consultant selection both pre-contract and post contract award.

5.4 Delivery Phase

A Delivery Phase flow chart can be found in [Appendix A](#).

5.4.1 Design Resource

The **Design Manager** shall ensure that the design consultant provides sufficient detail on the design delivery strategy so VR clearly understands the level of design resource required to deliver the scope of works. The **Design Manager** will need to mobilise a level of design resource in advance of the Delivery Phase of the project to complete the activities detailed in the Mobilisation Phase of this procedure. It is anticipated this will be predominately management staff and key engineering staff only during the mobilisation phase. The **Design Manager** shall undertake a “Stage Gate Review” and make a decision to commence production of core design deliverables based on readiness and completion of the key design inputs during the mobilisation phase. Once satisfied, the **Design Manager** will mobilise the core design resource to commence production of the design deliverables. If the mobilisation phase is not fully complete the **Design Manager** must ensure that the

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 13 of 24	

commercial and programme risk of this is understood and recorded on the project risk register.

5.4.2 Undertaking Design

The project **CEM** is accountable for managing the engineering team so that the design is undertaken using the appropriate engineering assurance standards:-

- Engineering Management of Projects from Network Rail standard NR/L2/INI/02009
- Civils design will use Form F001 (Approval in Principal), F002 (Statement of Design Intent) and F003 (Detailed Design) from Network Rail standard NR/L2/CIV/003
- Track Design will use Form A (Approval in Principal) and Form B (Detailed Design) from Network Rail standard NR/L2/TRK/2500
- Telecoms design will use Form A (Approval in Principal) and Form B (Detailed Design) from Network Rail standard NR/SP/TEL/30022
- Power and OLE design will use Form A (Approval in Principal) and Form B (Detailed Design) from Network Rail standard NR/L2/ELP/27311).

The design shall be thoroughly checked by the designer consultant prior to being issued to VR. This shall include a check, review and approve process. The **CRE (Design)** must sign-off the design submission as the nominated discipline specialist and demonstrate that design submissions;

- have followed the correct process when producing the deliverable;
- comply with any discipline-specific standards;
- reference adequate survey information to inform the design
- have conclusions and qualifications that are clearly documented and understood including deviations from standards and the need for any product approvals;
- include supporting paperwork that is accurate and complete;
- are prepared collaboratively with the relevant Client engineering representative, exercising reasonable professional care and skill;
- consider safety by design, constructability, sustainability and environmental responsibility;
- comply with the contract requirements and where applicable the requirements documentation, i.e. CRD/RRD/DRRD;
- are compliant with the Computer Aided Design (CAD) and Building Information Modelling (BIM) Standards;
- integrate with other engineering deliverables and disciplines as demonstrated through the IDC/IDR process;
- can be successfully installed, tested, commissioned, operated, maintained and disposed of in the conditions which exist in the operational railway environment.
- have been through a constructability review to identify non-standard installation practices and any requirements for staged detail design submissions and temporary works designs

Risk assessments shall be documented giving consideration to construction, impact of the operational railway, access, maintenance and demolition/decommissioning. In accordance with the CDM Regulations 2015, the designer must consider all elements of significant hazards throughout the life of the designed item i.e. through construction, maintenance and demolition.

5.4.3 Design Decision Logs

The design team shall create and update a log of design decisions which shall be supplied to VR with each design submission.

The logs shall cover the following areas;

- Submission reference
- Log number
- Details of the issue

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 14 of 24	

- Details of resolution
- Date raised
- Date closed
- CRE details

Records shall be maintained and provided to VR upon request.

When additional work is found to be necessary, or instructed by the client, this is to be logged and the safety implications assessed and mitigated against. The associated risks are to be recorded in the designer's risk assessment. Please also refer to the [Change Control](#) section of this procedure.

5.4.4 Safe by Design

It is imperative that the design team understand their responsibilities in respect of 'Safe by Design'. They shall do this through applying the following principles to design development;

- Hazard Identification and Mitigation
- Embracing the lifesaving rules
- Continuous Improvement
- Design Change Management
- Collaboration
- Site Knowledge
- Professional Values & Leadership
- Unsafe Situations

Notwithstanding design responsibilities under the CDM regulations;

- The design team shall have had certified and demonstrable CDM training within the last three years.
- The design team shall produce [Design Decision Logs](#) as detailed in this procedure.
- The design team shall produce a Designers Risk Assessment for every design submission.

In carrying out the design the design team shall evidence the following;

- That they have been able to reduce risk to the construction team in building to their design proposals.
- That they have considered risk associated with the end user or operator of their design.
- That they have considered the maintenance requirements of the end user of their design.
- That they have considered hazards associated with demolition of the design at the end of its life.

VR has a responsibility to ensure that the designer is competent and use the Rail Industry Supplier Qualification Scheme assurance, along with the VR approved Supplier process to help discharge this responsibility.

It is the responsibility of the project engineering team, specifically the **CREs**, to discharge the responsibility of ensuring that all individuals involved in the design & delivery of the project are competent. Please see [Engineering Appointments](#) section above.

5.4.5 Common Safety Method for Risk Evaluation and Assessment (CSM)

All Network Rail projects are required to comply with the CSM Regulations. The requirements of these regulations shall be implemented in accordance with NR/L2/RSE/100/02. A précis of these requirements is provided below, but the procedure should be consulted for more details on process, roles and responsibilities and access to template documentation.

A 'System Definition Document' and 'Project System Safety Plan' shall be created by Network Rail to document the safety activities that are to be undertaken, and the associated timescales and responsibilities. A 'Project Hazard Record' shall be created and maintained throughout the project lifecycle. This will take input from hazard identification workshops, Designer's Risk Assessments and any other available source. If a project is deemed to be Significant, by the Network Rail Assurance Panel (NRAP) then an Independent Assessment Body (AsBo) shall be appointed.

Before a project is commissioned (at the various stages) any associated residual hazards (i.e. those that affect

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 15 of 24	

the ongoing railway) shall be formally handed over to the Network Rail Operations and Maintenance teams or any 3rd parties, e.g. Station Operator, Metrolink, Highway Agency, Environment Agency, City Councils, etc. Network Rail shall produce a 'Declaration of Control of Risk' in line with the NR/L2/RSE/100/02/F09 template to formally acknowledge that all the identified hazards are controlled to an acceptable level. This Declaration of Control of Risk shall be presented in order to gain approval for the associated commissioning.

This process is led by Network Rail but the **VR CEM** and **Design Manager** shall ensure that VR input into the process as defined in the Scope of Works and agreed in the specific contract arrangements during the [Pre-Contract](#) phase. This will normally consist of attendance at hazard identification workshops and assistance in providing statements and evidence to close out items on the 'Project Hazard Record'.

5.4.6 Design Development Reviews

During the development of design deliverables frequent Design Development Reviews (DDR) shall take place between the **CRE's (design and construction)** and the client project engineer for a single discipline. The frequency and duration of these meetings will depend on the nature and pace of the design work, however the principle of 'often and short' shall be adopted as a means to avoid surprises, abortive work and to build trust. Agreed records of the review and any associated actions shall be maintained by either party. The purpose of the DDR is to:

- Promote collaboration & efficiency between the Supplier and Client by providing the engineer responsible for design acceptance an opportunity for early review and input into the developing design;
- Identify potential areas of non-compliance with the Requirements Documents and CR-Ts;
- Identify where variations to procedures are unavoidable so the Client can seek early agreement with the appropriate Asset/Procedure Owner;
- Identify any deficiencies with the contract design and engineering baseline that may result in additional effort for design or construction
- Identify opportunities for value engineering, innovation and hazard/risk avoidance that can be incorporated into the design;
- Review the ongoing Designer's Risk Assessments and 'Safety by Design' checklists;
- Identify and promote sustainable design solutions that may include low carbon or renewable energy generation, use of low environmental impact materials, designing out waste, increasing biodiversity and reducing the construction site impacts for local neighbours;
- Significantly increase the likelihood of first-time acceptance of the completed design and to reduce the Client formal design review timescales.
- Align designs with construction and temporary works strategy

Whilst VR sub-contract production of design to consultants, VR are accountable for delivery of these design submissions for our clients. The submissions are Consultant to VR, then VR to Client. It is important to note that our Clients view these as VR design submissions. The **Construction CRE's** are the discipline specialists for VR and must take accountability for management of the sub-contract designs consultants during these reviews to ensure the design is being produced to the standard VR and our clients expect. All single discipline issues should be resolved during these reviews in an attempt to reduce the number of comments and issues later in the design assurance process. The design consultant shall ensure all DDR comments are closed out in advance of IDC/IDR.

The **CRE** is responsible for maintaining an DDR comments register for the project using [ENG01M002F12](#). This shall be produced after the first DDR meeting and maintained for the lifecycle of the project. All comments raised must be tracked and closed out in advance of the subsequent IDC/IDR meetings.

The **CEM** is responsible for ensuring these reviews are undertaken and for ensuring the actions and issues raised are recorded, tracked and closed out. Authority is required from the **CEM** to confirm that all actions associated with a given design deliverable are completed and closed out before the IDC/IDR is undertaken.

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 16 of 24	

5.4.7 IDC / IDR Meetings

Inter-Disciplinary Check and Inter-Disciplinary Review meetings shall be undertaken and certificates produced in accordance with NR/L2/INI/02009. These meetings are focused on design integration with other design disciplines. All single discipline issues should be resolved during the [Design Development Reviews](#) as detailed above so the engineers representing the contractor, consultant and client are aligned in advance of any IDC / IDR meeting. Given the collaborative nature of the Design Development Reviews the **CEM** shall aim to undertake combined IDC/IDR meetings where possible.

The **Design Manager** shall coordinate these meetings in line with the project programme. The **CEM** shall confirm the required attendees for each meeting. The **Design Manager** shall ensure that meeting invites are circulated to all attendees a minimum of two weeks in advance of the meeting date and ensure the IDC packs are issued to the attendees a minimum of one week in advance of the meeting.

IDC / IDR meetings involve getting together all the discipline engineering leads on the project to review and integrate the design proposals. The **Design Manager** must work closely with the **CEM** and regularly review the planned meeting schedule to verify that the designs are ready to be integrated to avoid a failed meeting at abortive cost and programme delay.

The **CEM** is responsible for maintaining an IDC comments register for the project using [ENG01M002F12](#). If combined IDC/IDR meetings are being undertaken this should be a combined IDC/IDR register. This shall be produced after the first IDC/IDR meeting and maintained for the lifecycle of the project. All comments raised must be tracked and closed out in advance of the subsequent submissions for client review.

5.4.8 Progressive Assurance

Progressive assurance occurs by taking the outputs from one design before their full approval and using them to develop another design.

For projects that require accelerated delivery a process of progressive assurance can be adopted when the risk of rework, cost escalation and programme delay following a retrospective review is tolerable.

To enable progressive assurance to take place, a Programme of Engineering Deliverables shall be produced showing those deliverables that are planned to be accepted without a full check/review of associated deliverables because they have not yet been produced.

The control of risk shall be achieved by identifying, recording and subsequently closing out the unresolved interfaces between deliverables, including same discipline deliverables, on the IDR/IDC Register or equivalent. These risks shall be detailed in the Project Risk Register.

When the relevant Engineering Deliverable is produced a retrospective review shall be carried out and any issues that arise shall be resolved to achieve compliance.

Where a retrospective review identifies unsatisfactory or sub-standard design then a revised submission or detailed amendments shall be submitted.

The **CEM** shall managed this process on a project when applicable.

5.4.9 Design Submissions

All submissions from the design consultant to VR shall be subject to assurance checks for completeness. Only the **project CEM** can authorise the submission for issue to the client. All submissions shall be accompanied with an IDC certificate. The **CEM** is responsible for ensuring that all actions raised through the assurance process have been closed out in advance of authorising submission to the Client.

The **Design Manager** is responsible for facilitating the design submission process following confirmation from the **CEM**. The component parts of the design submission such as drawings, risk assessments and forms shall be individually recorded in the document transmittal issued to the client. The document transmittal shall also clearly state the date by which VR required client comments returned.

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 17 of 24	

5.4.10 DRNs

The Document Review Notice (DRN) is used by the Client to record a review of the design submission as presented. Comments on each design submission are recorded and the DRN is returned with an overall category of response based on the quality of the design submission and/or any client preference;

- Category 0 – rejected as non-compliant to contract
- Category 1 – Accepted
- Category 2 – Accepted with amendments
- Category 3 – Not accepted – Revise and Resubmit

The **CRE (Design)** shall address all Client comments and provide supplier responses to close out these comments with the client. The **CEM** will provide oversight to resolve any issues as required.

VR should be undertaking [Design Development Reviews](#) and [IDC/IDR meetings](#) as described above, therefore, it is expected that compliance with the process will avoid submission rejection or extensive comments on DRNs. The **Design Manager** shall monitor this process and where this does occur, shall document an action plan to avoid recurrence with the **CEM** and those involved.

The **CEM** is responsible for maintaining a Document Review Notice register for the project using [ENG01M002F13](#). This shall be maintained for the lifecycle of the project.

5.4.11 Completed Design Deliverables

Design deliverables are completed once the DRN comments have been agreed and closed out and all assurance signatures are in place. All the associated design documentation shall be updated and published as complete. Outline design drawings will be clearly marked to describe the form with which they are issued i.e. 'APPROVAL IN PRINCIPLE ISSUE' or 'STATEMENT OF DESIGN INTENT'. Approved for Construction design drawings shall be clearly marked 'FOR CONSTRUCTION' and signed off by the **CEM** in accordance with NR/L2/INI/02009 before they are issued to the wider project team by the **Design Manager**.

The **CEM** must ensure that all the comments raised by the client through the [Document Review Notice](#) process have been closed out and agreed with the Client representative and that all assurance is in place to complete the certificate of design and checking.

5.4.12 Site Design Queries

Following issue of the Approved for Construction design the construction team may identify issues or design discrepancies with the submission. These issues should be raised by the **CRE (Construction)**, recorded on a Technical Query and issued to the **CEM** for approval before onward submission to the design consultant for resolution. The **Design Manager** must be kept informed to allow management of any programme or commercial impact. The production of site design queries can be a result of failings in the engineering assurance process and may need to be investigated so that the lessons learnt can be shared to avoid reoccurrence. The **Design Manager** shall monitor this process and where this does occur, shall document an action plan to avoid recurrence with the **CEM** and those involved.

This process should be managed by the **project CEM**, see [Technical Query](#) section above. Whilst these shall be maintained on a single Technical Query Register – the site design queries must be clearly identifiable.

5.4.13 Temporary Works

This procedure does not differentiate between Temporary Works Design and Permanent Design. If the Temporary Works Design is sub-contracted design then it shall be managed to comply with this procedure.

Please also refer to VR procedure [CIV510 - Management of Temporary Works](#).

5.5 Close

A Close Phase flow chart can be found in [Appendix A](#).

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design		Workspace file:	N/A	Page 18 of 24

5.5.1 As Built Drawings

The **CEM** shall ensure that “red line drawings” are produced by the relevant **CRE (Construction)** for each design deliverable produced on the scheme. These should be “signed” and “dated” by the **CRE (Construction)** to verify that the marked-up drawing reflects the actual constructed works as installed inclusive of any technical queries that were agreed post issue of the Approved for Construction designs. The list of drawings that need to be As Built should be agreed between the **CEM** and Client for each specific project.

The **Design Manager** shall coordinate issue of the “red line drawings” to the design consultant for production of the final “As Built Drawings”.

5.5.2 Engineering Compliance Certificate

The **CEM** shall produce Engineering Compliance Certificates (ECC) - Section 1 in accordance with form NR/L2/INI/02009/F0048. The ECC Section 1 demonstrates that the requirements in the contract have been met or details any deviations. ECC Section 1s shall be produced at the relevant stages as defined in the contract; normally single option selection, reference design, detailed design, entry into service and completion. Network Rail shall review and, if appropriate, accept the Section 1s.

Network Rail shall complete the ECC - Section 2 in accordance with form NR/L2/INI/02009/F0048 to support GRIP Stage Gate Reviews carried out between the Sponsor and **Project Manager**. The Section 2 confirms that the project requirements (or applicable subset thereof) as detailed in the RRD/DRRD have been achieved for the particular lifecycle stage in question or details any deviations.

Confirmation that requirements have been met must be based on a robust body of verification and validation evidence. Network Rail are ultimately responsible for ensuring that the collated body of evidence adequately addresses each requirement. However, much of this evidence will original from VR and / or our design consultant. Further guidance on compiling a body of verification and validation evidence can be found within [ENG01 - Engineering Assurance Handbook](#).

Network Rail shall confirm that all Engineering Deliverables specified in the RRD have been produced and shall only declare the project complete when all of the required ECCs have been completed.

5.6 Design Reporting
5.6.1 Design Channel

Microsoft Teams shall be used to communicate design progress to the wider project team. The **Project Manager** will ensure that a group is established for the project during the tender period. The **Design Manager** shall create a design channel within the group that shall be used for design reporting throughout the project lifecycle.

5.6.2 Period Reporting

The **Design Manager** is responsible for producing the Design Performance Dashboard for reporting at the monthly contract reviews. The report shall be completed in the defined Power BI template [ENG01M002F14](#). Power BI pulls together design and engineering data from different sources and presents the data in an interactive report to aid explanation of the design progress each period. The Power BI report is generated from the following data sources:-

- Design Deliverables Register
- TQ / RFI Register
- DRN Register
- Value Engineering Register
- Engineering Nomination Register
- Commercial Performance Register
- EWN / Change Registers

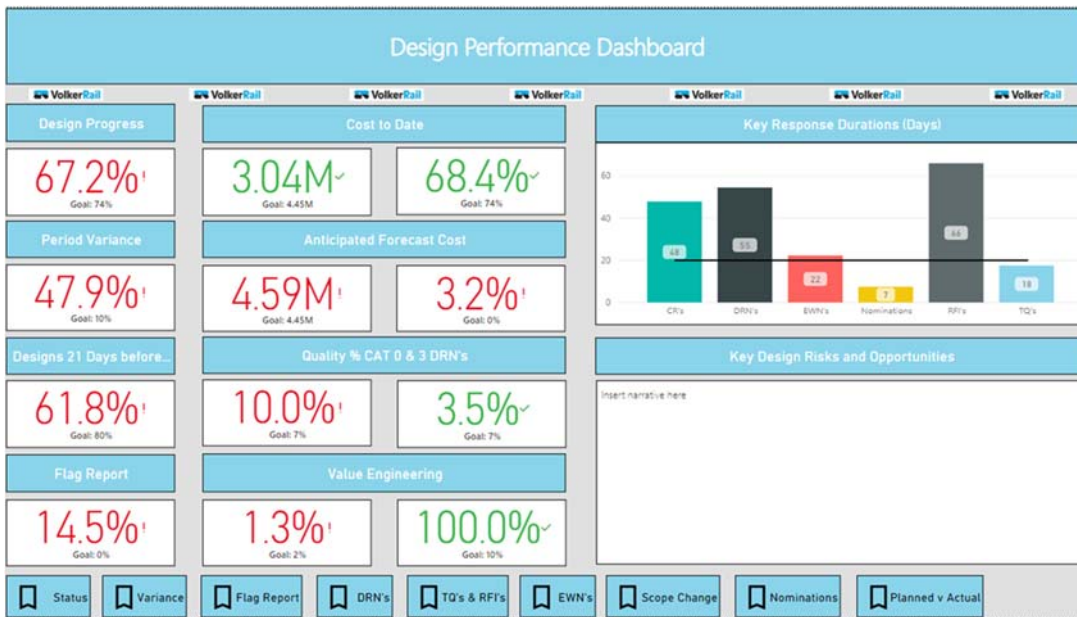
The Engineering Management Plan for the scheme should clearly define who is responsible for updating and

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 19 of 24	

managing each register on the project. This is normally a split between the **Design Manager, CEM, Commercial and Document Control**. The registers above are mandated templates within [ENG01 - Engineering Assurance Handbook](#). The Power BI report generates automatically once linked to the project sources files. However, the templates must be completed in full. Please note that these are controlled documents so shall not be modified in any way.

Once the report has generated it is the responsibility of the **Design Manager** to check and verify the data is accurate in advance of presentation at the contract review.

An example of the summary page from the Power BI report is shown below. This page includes Key Performance Indicators on sub-contract design management performance along with a narrative on key design risks and opportunities.



The **Design Manager** shall monitor project performance against the following KPI's:-

- % design progress against previous period forecast
- Period variance < 10% of design deliverables have negative variance
- 80% of design deliverables have > 21 days between AFC and construction commencement
- 0% of design deliverables have negative float between AFC and construction commencement
- % cost to date against previous period forecast and latest agreed contract value
- % anticipated forecast cost against latest agreed contract value
- Design quality < 7% of design deliverables have CAT0 or 3 DRN's
- Value engineering opportunities > 2% of original contract value
- Value engineering converted > 10% of opportunities identified
- Response durations to key documents (i.e. TQ, RFI, EWN, CR, DRN, Nominations) are < 20 working days.

The Power Bi report also includes additional pages to explain and clarify the design performance as required. These include data on the following:-

- Design deliverable status and latest forecast dates
- Design deliverable variance and latest programme performance
- Flag report of latest AFC dates against construction start dates
- Document review notices
- TQ / RFI's

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 20 of 24	

- Early warning notices
- Scope change requests
- Engineering nominations

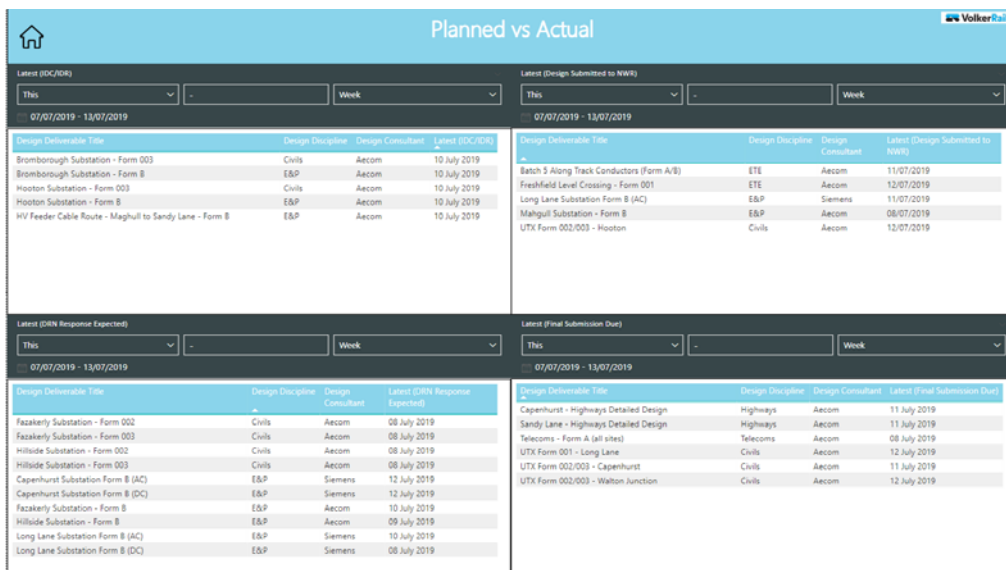
The **Design Manager** shall explain any variance from these measures and advise what action has been taken in the period to mitigate.

5.6.3 Weekly Reporting

The Power BI report also includes a Planned vs Actual report that identifies all key activities due in the specified date range. This can be used to micromanage subcontract design consultants and closely monitor programme performance on a weekly basis in between the periodic programme updates. This has worked effectively on recent design projects to record activities and the reasons for any variance when the design consultant consistently fails to complete activities to programme.

This can be implemented at the discretion of the **Design Manager**. When implemented, the **Design Manager** shall issue the report weekly to the project team and “red pen” the activities that were not completed in the previous week and document the reasons why. This report should be shared with the commercial team to generate formal notifications as required under the contract.

An example of the planned vs actual page from the Power BI report is shown below.



Latest (DC/DR)				Latest (Design Submitted to NWR)			
Design Deliverable Title	Design Discipline	Design Consultant	Latest (DC/DR)	Design Deliverable Title	Design Discipline	Design Consultant	Latest (Design Submitted to NWR)
Bromborough Substation - Form 003	Civils	Aecom	10 July 2019	Batch 5 Along Track Conductors (Form A/B)	ETE	Aecom	11/07/2019
Bromborough Substation - Form B	E&P	Aecom	10 July 2019	Freshfield Level Crossing - Form 001	ETE	Aecom	12/07/2019
Hooton Substation - Form 003	Civils	Aecom	10 July 2019	Long Lane Substation Form B (AC)	E&P	Siemens	11/07/2019
Hooton Substation - Form B	E&P	Aecom	10 July 2019	Mahgull Substation - Form B	E&P	Aecom	08/07/2019
HV Feeder Cable Route - Mahgull to Sandy Lane - Form B	E&P	Aecom	10 July 2019	UTX Form 002/003 - Hooton	Civils	Aecom	12/07/2019

Latest (DRN Response Expected)				Latest (Final Submission Due)			
Design Deliverable Title	Design Discipline	Design Consultant	Latest (DRN Response Expected)	Design Deliverable Title	Design Discipline	Design Consultant	Latest (Final Submission Due)
Fazakerly Substation - Form 002	Civils	Aecom	08 July 2019	Capenhurst - Highways Detailed Design	Highways	Aecom	11 July 2019
Fazakerly Substation - Form 003	Civils	Aecom	08 July 2019	Sandy Lane - Highways Detailed Design	Highways	Aecom	11 July 2019
Hillside Substation - Form 002	Civils	Aecom	08 July 2019	Telecoms - Form A (all sites)	Telecoms	Aecom	08 July 2019
Hillside Substation - Form 003	Civils	Aecom	08 July 2019	UTX Form 001 - Long Lane	Civils	Aecom	12 July 2019
Capenhurst Substation Form B (AC)	E&P	Siemens	12 July 2019	UTX Form 002/003 - Capenhurst	Civils	Aecom	11 July 2019
Capenhurst Substation Form B (DC)	E&P	Siemens	12 July 2019	UTX Form 002/003 - Walton Junction	Civils	Aecom	12 July 2019
Fazakerly Substation - Form B	E&P	Aecom	10 July 2019				
Hillside Substation - Form B	E&P	Aecom	09 July 2019				
Long Lane Substation Form B (AC)	E&P	Siemens	10 July 2019				
Long Lane Substation Form B (DC)	E&P	Siemens	08 July 2019				

5.6.4 Knowledge Transfer

The production and collation of this data at project level gives VR access to more information than ever before to make informed business decisions on how to improve design management processes across the business. The data from each project, along with feedback from the **Design Managers** will be collated for the **Engineering Director** into a VR business report so that the data can be analysed and key trends monitored. The output of this review will generate a knowledge transfer presentation that will be shared with the design and engineering teams within the business at the quarterly engineering forums. VR strives for continuous improvement and will use this forum to share both best practice and any lessons learnt.

The **Design Manager** is responsible for determining where the source information is stored in scenarios where internal design is being produced by VR to avoid duplication of data in the VR summary report.

VR are also part of the VolkerWessels UK design management steering group which is working to standardise and align design management procedures across the group. The **Heads of Design Management** from each

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design		Workspace file:	N/A	Page 21 of 24

business within the group meet regularly to share best practice and lessons learnt which further improves VR's design management procedures.

The **Design Manager** shall ensure that best practice and key lessons learnt are recorded throughout the project lifecycle. The design consultant should be sharing best practice and key lessons learnt shared with VR throughout the project. At the end of a project a workshop should be undertaken between VR and the Design Consultant to review project performance and document best practice and lessons learnt for distribution to the wider VR business. These outputs should be shared with the **Head of Design Management**.

5.6.5 Design and Engineering Close Calls

The **Design Manager** shall ensure that the design consultants are fully engaged with the VR design and engineering close call initiative.

5.6.6 National Performance Metrics

The **Design Managers** are responsible for collation of evidence to comply with Engineering and Design National Performance Metrics, on certain Network Rail schemes, as applicable. The specific requirements for each scheme should be detailed in the project management plan.

5.6.7 Design Management Network

The **Design Manager** shall ensure that they are active within the [Design Management Network](#) on Yammer to share best practice and lessons learnt across the VolkerWessels UK group to help collaboratively improve design management.

The **Design Manager** on each of VR's projects shall support the **Heads of Design Management** and provide evidence for the VolkerWessels UK Design Management Key Performance indicators on a periodic basis.

5.7 Monitoring

5.7.1 Proactive

Audit compliance with the management of the system will be carried out in line with the VR Cat 1 Audit programme conducted by the **Head of Quality Systems**.

5.7.2 Reactive

Reactive audits will be carried out following incident or at the request of the **Engineering Director, Project Manager or General Manager** using ENG01F001.

5.8 Retention of Records

Records are to be retained in accordance with the contractual requirements.

6. ASSOCIATED GUIDANCE & INFORMATION

- Appendix A – Flowcharts
- Appendix B – Design & Engineering Meetings

7. DOCUMENTATION (OUTPUTS)

- ENG01M002F001 - Start Up Meeting Agenda Form
- ENG01M002F002 - Design Project Risk Register
- ENG01M002F003 - Invitation to Tender Forms
- ENG01M002F004 - TQ Register
- ENG01M002F005 - RFI Register
- ENG01M002F006 - Design Deliverables Register

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 22 of 24	

- ENG01M002F007 - Value Engineering Register
- ENG01M002F008 - Change Impact Assessment Form
- ENG01M002F009 - Commercial Performance Register
- ENG01M002F010 - EWN Register
- ENG01M002F011 - CR Register
- ENG01M002F012 - DDR IDC IDR Comments Register
- ENG01M002F013 - DRN Register
- ENG01M002F014 - Design Performance Dashboard
- ENG01M011F001 - Engineering Competency Register

8. ISSUE RECORD

Issue	Date	Comments
1	11/11/2015	New standard
1.1	05/02/2016	Minor change to Briefing Note (not re-issued as no change to procedure)
2	30/01/2020	Complete re- work of the module and inclusion of forms 3 to 14. Now called Design management Handbook.

9. WHAT HAS CHANGED IN THIS LATEST ISSUE AND WHY?

This module has undergone a complete revision and re-name to Design Management Handbook (previously known as Management of Sub-contract Design).

Amended forms:

- ENG01M002F001 - Start Up Meeting Agenda Form
- ENG01M002F002 - Design Project Risk Register
- ENG01M011F001 - Engineering Competency Register

New forms:

- ENG01M002F003 - Invitation to Tender Forms
- ENG01M002F004 - TQ Register (Previously PMS02F05)
- ENG01M002F005 - RFI Register (Previously PMS02F05)
- ENG01M002F006 - Design Deliverables Register
- ENG01M002F007 - Value Engineering Register
- ENG01M002F008 - Change Impact Assessment Form
- ENG01M002F009 - Commercial Performance Register
- ENG01M002F010 - EWN Register (Previously PMS02F03)
- ENG01M002F011 - CR Register
- ENG01M002F012 - DDR IDC IDR Comments Register
- ENG01M002F013 - DRN Register)
- ENG01M002F014 - Design Performance Dashboard

Appendices:

- Amended Appendix A
- New Appendix B

Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 23 of 24	

10. BRIEFING REQUIREMENTS

All new employees will receive an introduction to the Integrated Management System (IMS) at induction, according to the nature of the role.

All employees with an email address receive the 'Record of Revisions' each month, which details changes to the IMS. All Line Managers retain the responsibility to ensure their staff are briefed on changes as appropriate.

The following table defines how revised issues of this document are briefed to existing employees according to related specific responsibilities.

This is determined using the 'RACI' principle. Those roles identified as 'Responsible' and 'Accountable' should receive a formal awareness briefing facilitated by the Document Owner.

Discipline	Role	RACI	Type of briefing
Project Management	Project Manager	Responsible	Detailed
Engineering	Design Manager	Responsible	Detailed
Engineering	Head of Design Management	Responsible	Detailed
Engineering	Engineering Director	Responsible	Detailed
Senior Management	General Manager	Responsible	Detailed
Planning & Programming	Planner	Responsible	Detailed
Commercial	Commercial Manager	Informed	Awareness
Commercial	Quantity Surveyor	Informed	Awareness
Procurement	Procurement	Informed	Awareness

Competence	RACI	Type of briefing
CRE	Responsible	Detailed
CEM	Responsible	Detailed

Document Control	Type of briefing
VR/EAH/Elect	Electronic issue

11. IMS AUTHORISATION
Document owner approval:

Ben Mather, Professional Head of Civil Engineering and Multidisciplinary Design, 30/01/2020

Document author:

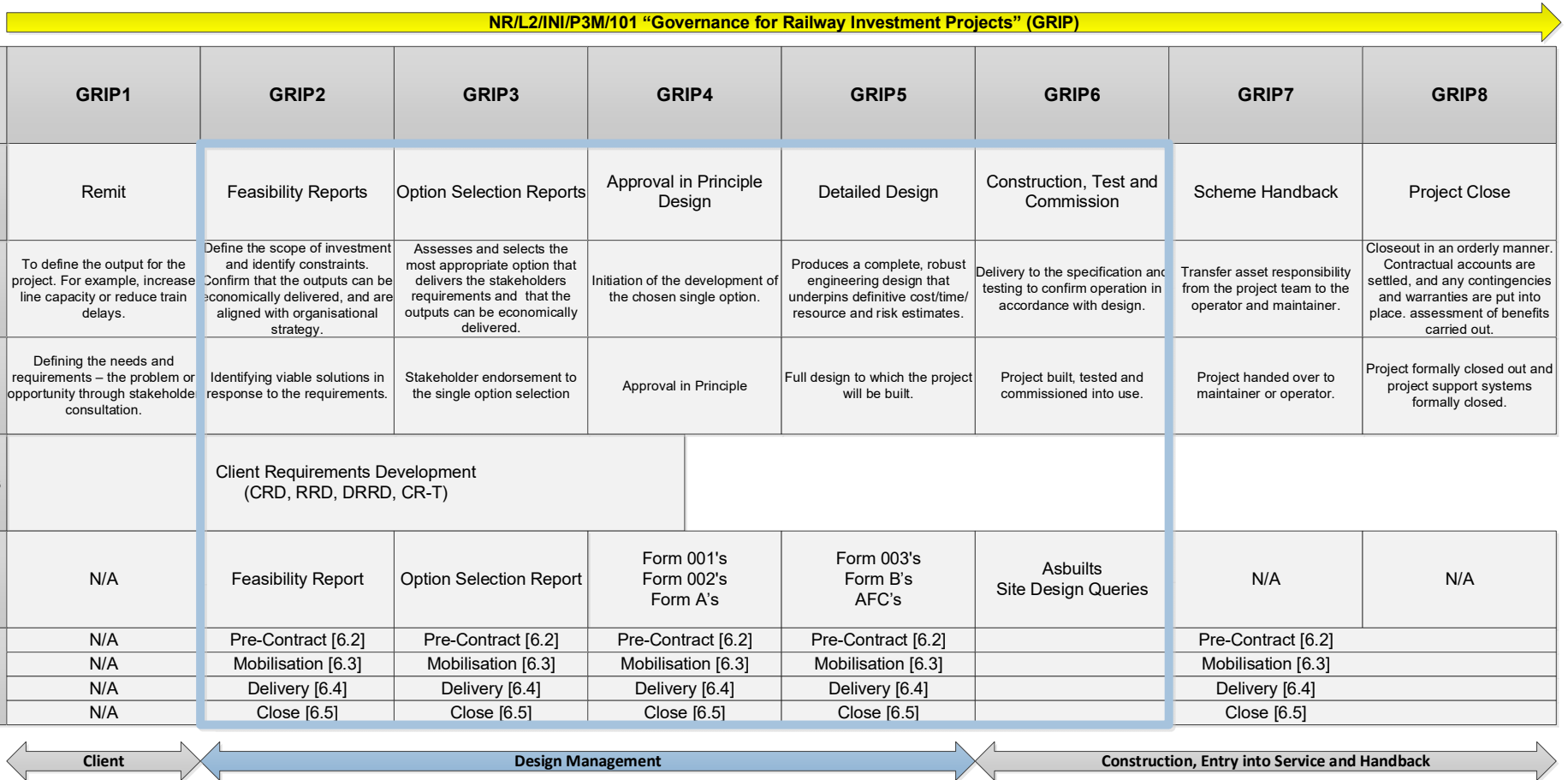
Michael Dunderdale, Head of Design Management, 30/01/2020

Approval for IMS:

Paula Roberts, IMS Coordinator, 30/01/2020

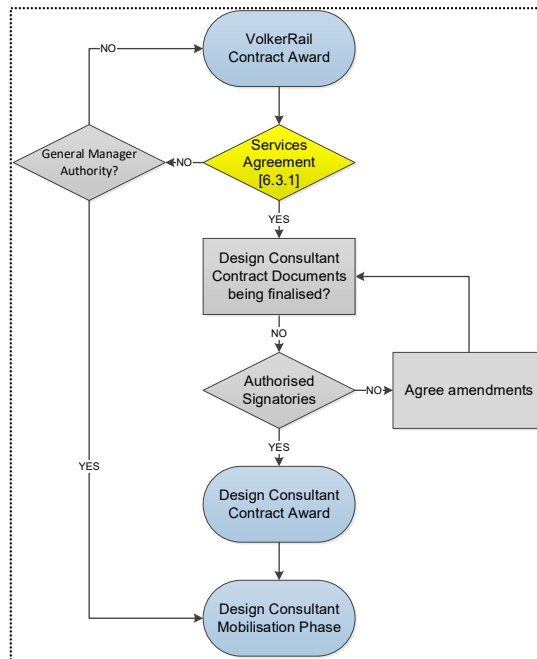
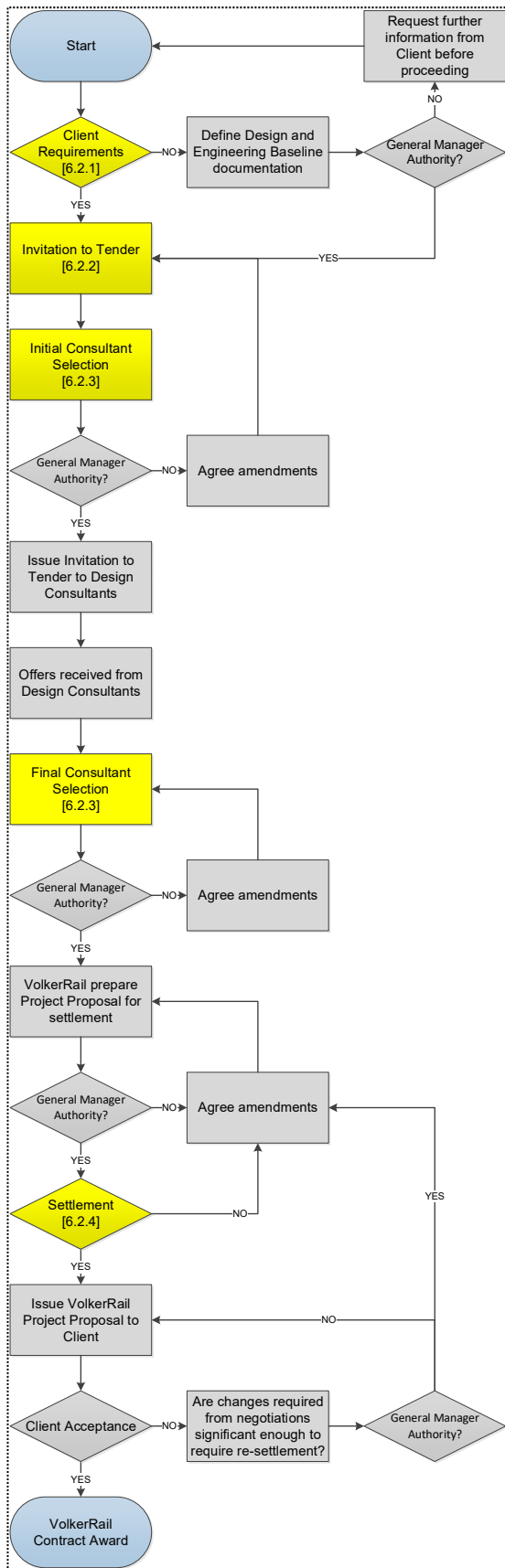
Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 24 of 24	

GRIP Cycle



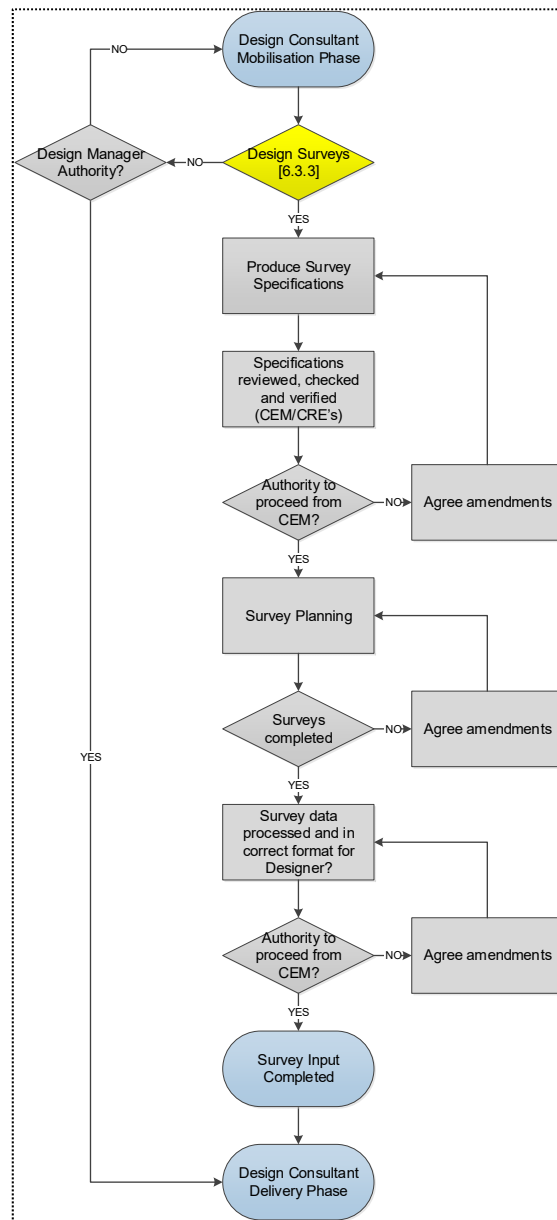
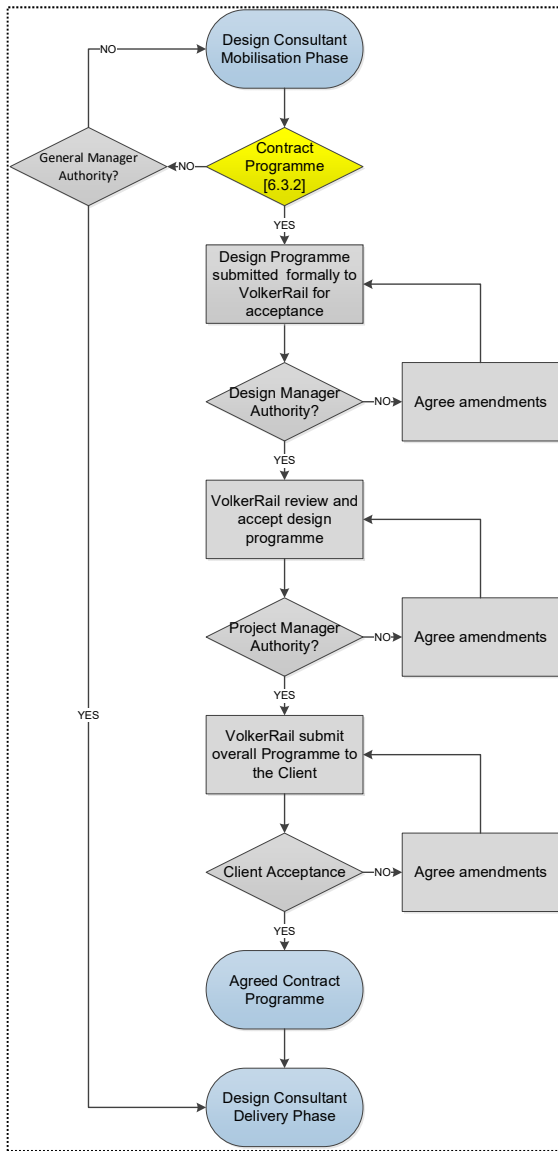
Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design		Workspace file:
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					Page 1 of 7

Pre-Contract Phase



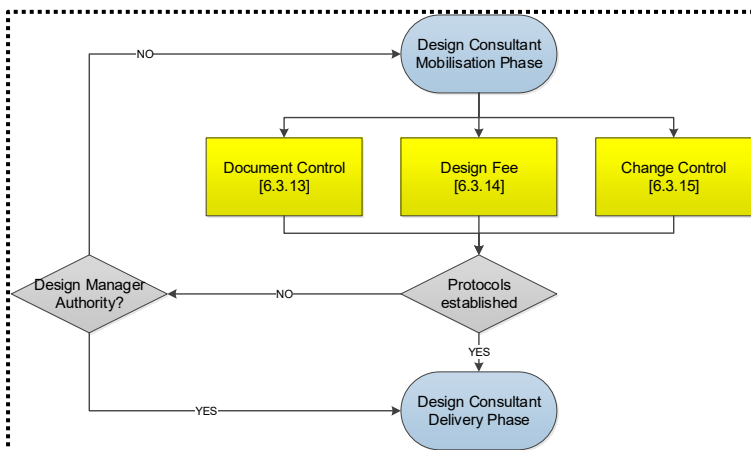
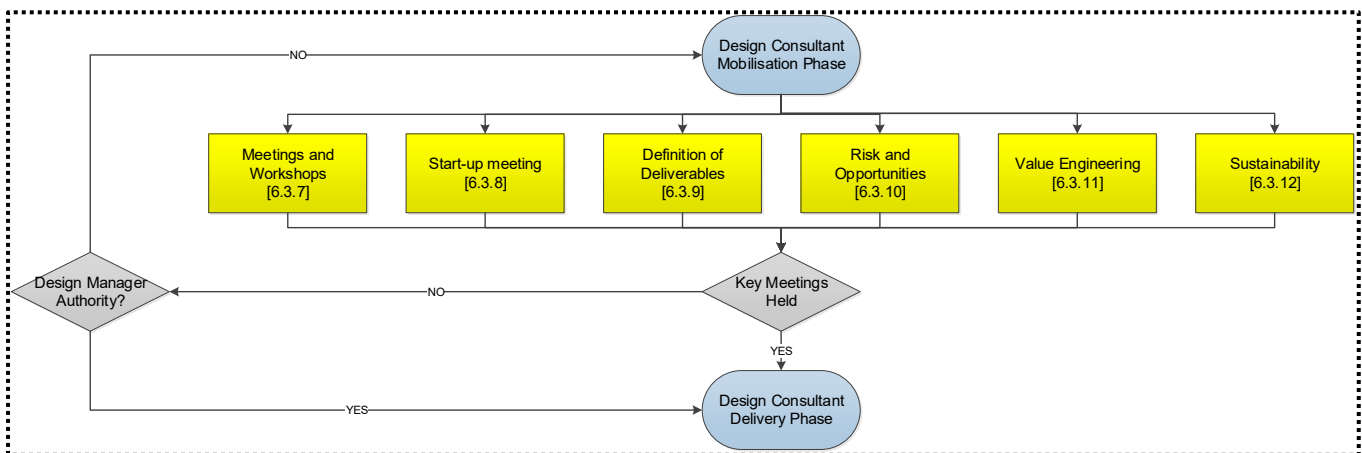
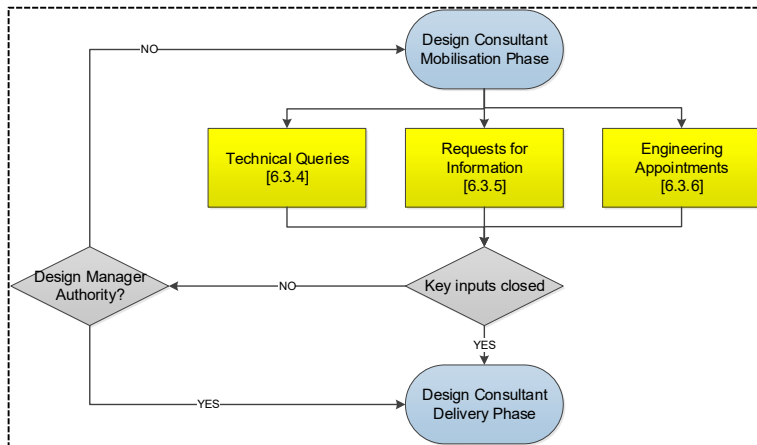
Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 2 of 7	

Mobilisation Phase



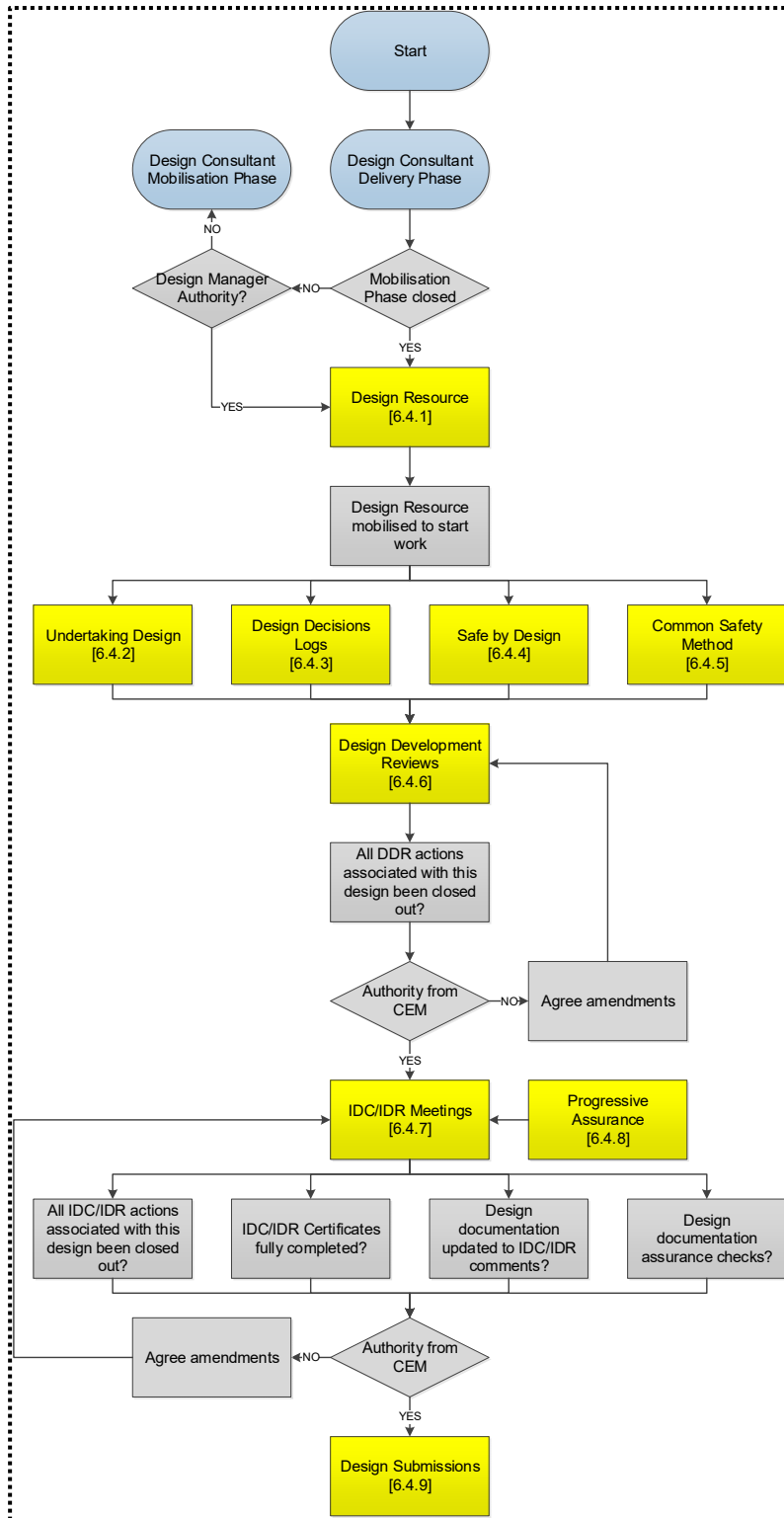
Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 3 of 7	

Mobilisation Phase continued



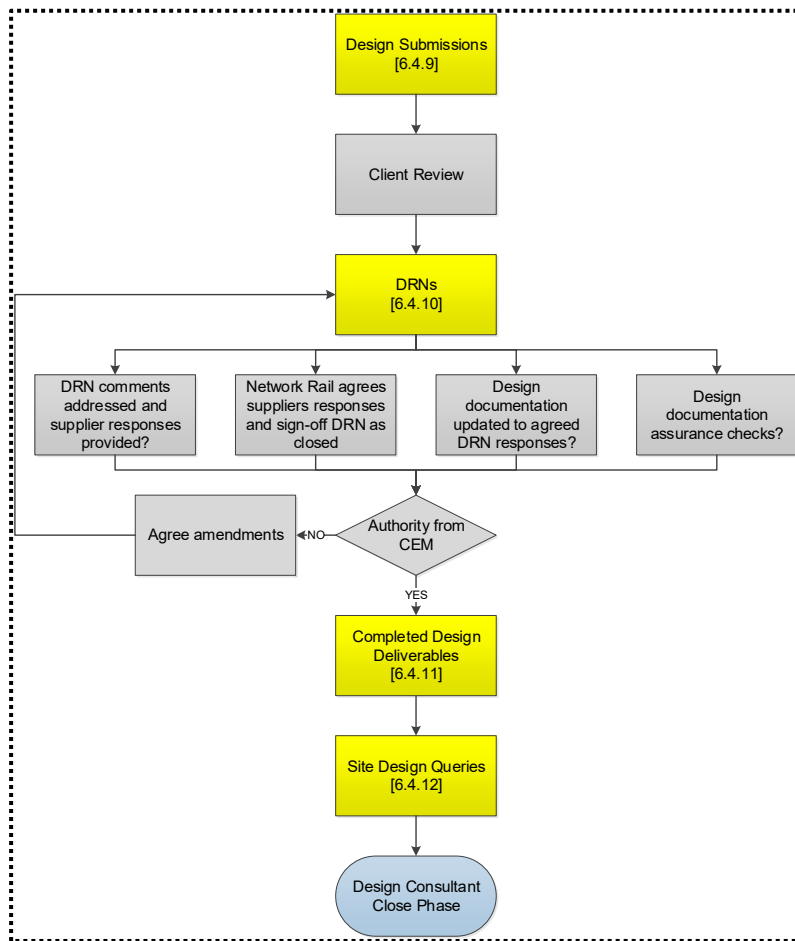
Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 4 of 7	

Delivery Phase

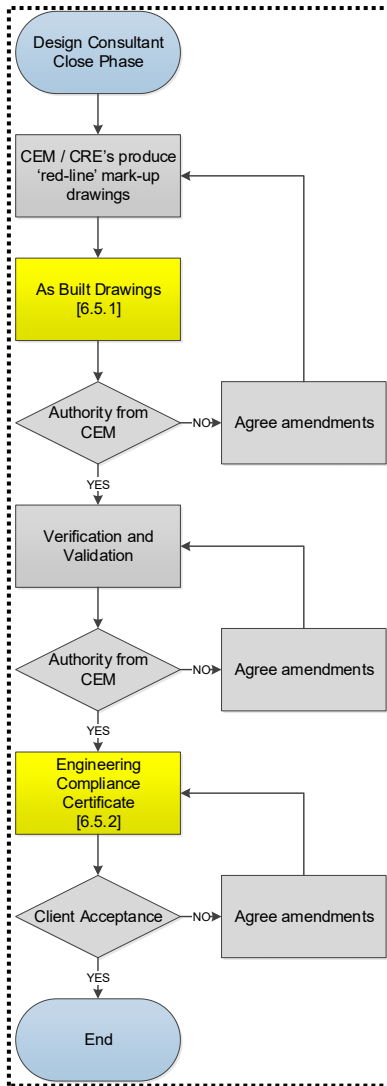


Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 5 of 7	

Delivery Phase continued



Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 6 of 7	

Close Phase


Issue no:	2	Date:	30/01/2020	Parent document:	ENG01 Engineering Assurance Handbook		
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design	Workspace file:	N/A	Page 7 of 7	

Meeting Title	Lead Party	Attendees	Frequency	Desired Output
Start-up Meeting	DM	PM, CEM, CRE's, PCM, QS	GRIP stage	Project team aligned on key milestones
Design Progress Meeting	DM	PM, CEM, CRE's, Planner, QS	Weekly	Review of design status
VR Project Progress Meeting	PM	CEM, DM, Planner, QS	Fortnightly	Review of project status
Client Progress Meeting	Client	PM, CEM, DM, PCM, CM	Fortnightly	Review of project status with client
Contract Reviews	PD	PM, CEM, DM, PCM, CM	Monthly	Review of project status with General Manager
Collaboration & Feedback Review	DM	HoD, PD/PM from Consultant	Quarterly	Feedback survey score and action plan for improvement
Construction/Buildability Workshop	CEM	DM, CRE's, PE's,	GRIP stage	Align construction strategy and design delivery strategy
Risk Review / Workshop	CEM	DM, CRE's, PE's	GRIP stage	Key design and construction risks identified
Value Engineering Workshop	CEM	DM, CRE's, PE's	GRIP stage	Identify and evaluate opportunities for efficiencies
Design out Waste Workshop	CEM	DM, CRE's, PE's	GRIP stage	Identify opportunities to reduce waste on the project
CSM HAZID Workshops	DPE	CEM, DM, CRE's, PE's	As required	Project Hazard Record
Design Development Reviews	CRE	CRE, PE by discipline	Fortnightly	Resolution of single discipline design issues before IDC
Interdisciplinary Design Checks (IDC)	CEM	CRE's, DM,	As required	IDC Certificate and record of comments
Interdisciplinary Design Reviews (IDR)	DPE	PE's, CEM	As required	IDR Certificate and record of comments
Lessons Learnt Workshop	DM	DPE, CEM, CRE's, PE's	Project Close	Record of best practice and lessons learnt

Issue no:	1	Date:	30/01/2020	Parent document:	ENG01M002			
Approved for IMS:	IMS Coordinator	Document owner:	Professional Head of Civil Engineering and Multidisciplinary Design		Workspace file:	N/A	Page 1 of 1	