Edinburgh Tram Project

Design Management Plan

Issue & Revision Schedule

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1. Purpose

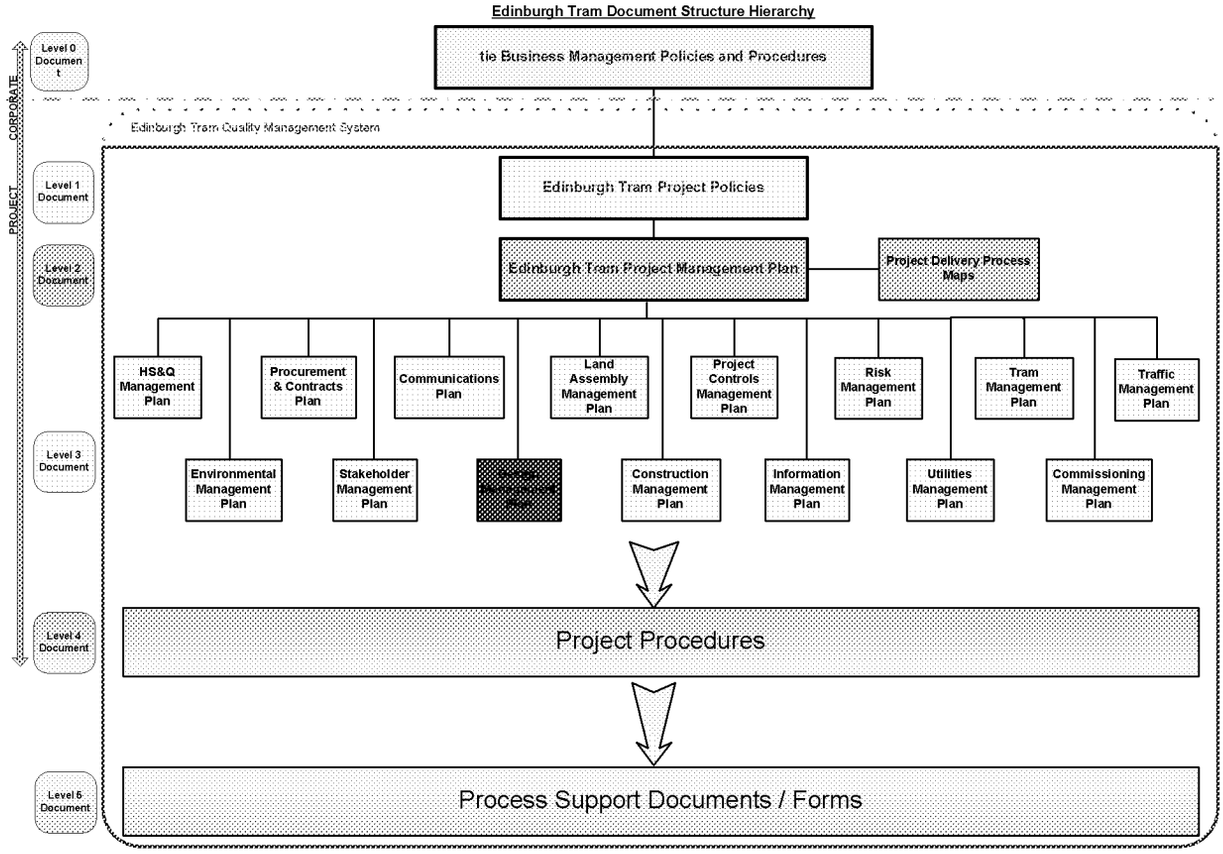
1.1 Plan Objectives

- To provide the overall strategy for the detailed design of ETN.

This plan will be reviewed regularly to ensure effectiveness.

1.2 Documentation Structure

The following chart highlights where the Design Management Plan sits in relation to the overarching Edinburgh Tram Project Management Plan and the various other work stream plans developed specifically for the Edinburgh Tram Project. The Design Management Plan is viewed as a Level 3 Document within the Hierarchy, whereby any associated procedures and support documents will be referenced within it.



2. Overview

2.1 Detailed Design by SDS

The effectiveness of detailed design of ETN is critical to its success. It:

- enables delivery of the utility diversions;
- provides the foundation for robust Infraco bid prices;
- delivers a wide range of statutory and non-statutory approvals;
- achieves system safety to the requirements of safety legislation via the ICP; and
- provides a design which complies with the requirements of the Parliamentary Acts and within the constraints set out by Promoter.

Detailed design takes the preliminary design forward to achieve a series of deliverables which are tailored to obtain consents and approvals and to feed into the Infraco bid its associated construction process.

SDS procedures provide the means by which packages of design submitted for review by **tie** and ETN stakeholders are inherently assured as being fit for purpose and complying with requirements, consents and approvals. SDS' document "Project Management Plan – Detailed Design Phase" mandates how this is achieved.

2.2 Design by Infraco

Design by Infraco includes the scope of design not covered by SDS, which, taken together with SDS design, provides a complete detailed design for the entire Tram system. Design by Infraco also includes all necessary system integration activity, including integration of the tram vehicle into the system. Infraco is the principal party in respect of design with the SDS and Tramco contracts for design and build novated to them. In the notes below where the term 'SDS/Infraco/Tramco' is used it is intended to refer to a process managed by Infraco in respect of these novated arrangements.

2.3 Design by Tramco

Design by Tramco includes the design of the tram vehicle and any necessary activity to ensure that the vehicle can be integrated into the tram system as defined by Infraco.

2.4 Design Review Process

There are five elements of the Design Review Process: which are shown below. These are variously relevant to Detailed Design by SDS, Design by Infraco and Design by Tramco. Designs processed from any of these sources will each be associated with one of three categories:

A. Designs for review through an appropriate forum the outcome of which is a Record of Review (RoR) containing either advisory or mandatory elements.
B. Designs for CEC Planning approval ('Prior Approval' in lieu of a full council Planning Committee meeting)
C. Design for Technical Approval – mandatory technical approvals by the appropriate body e.g. bridge structural integrity.

1. Submission of Designs to a programme backed up by a variety of consultation forums for stakeholders as the design proceeds. (Cat A)

2. **Technical Approvals** of the designs provide formal technical approvals for the various design elements by the relevant competent authority. Often these will be sought from CEC in respect of their statutory authority role. However, others will also be needed from bodies such as the Scottish Environmental Protection Agency and Scottish Natural Heritage and Transdev; achievement of these will be confirmed in the Design Verification Statements (see below). **(Cat C**)

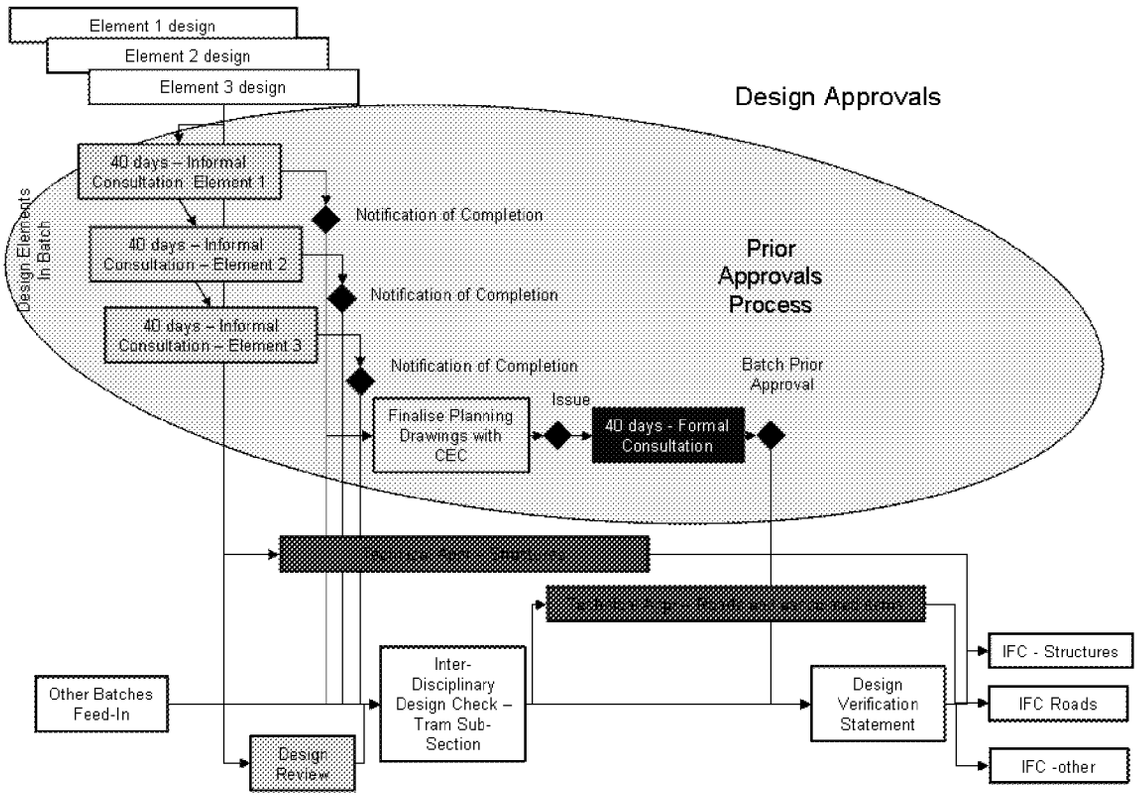
3. A CEC planning approvals process termed 'Prior Approvals' in lieu of a full council Planning Committee application for public facing matters which require such approvals (as defined in the relevant Acts). (Cat B)

4. A Design Review process which is designed to submit selected Design Review Packages to review so as to produce a Record of Review for each selected design package based on stakeholder comments related to the fit of the design with Employer's Requirements and any particular stakeholder interest. It is primarily concerned with addressing the design as an effective integration of design elements to create an operational tram system. (Cat A)

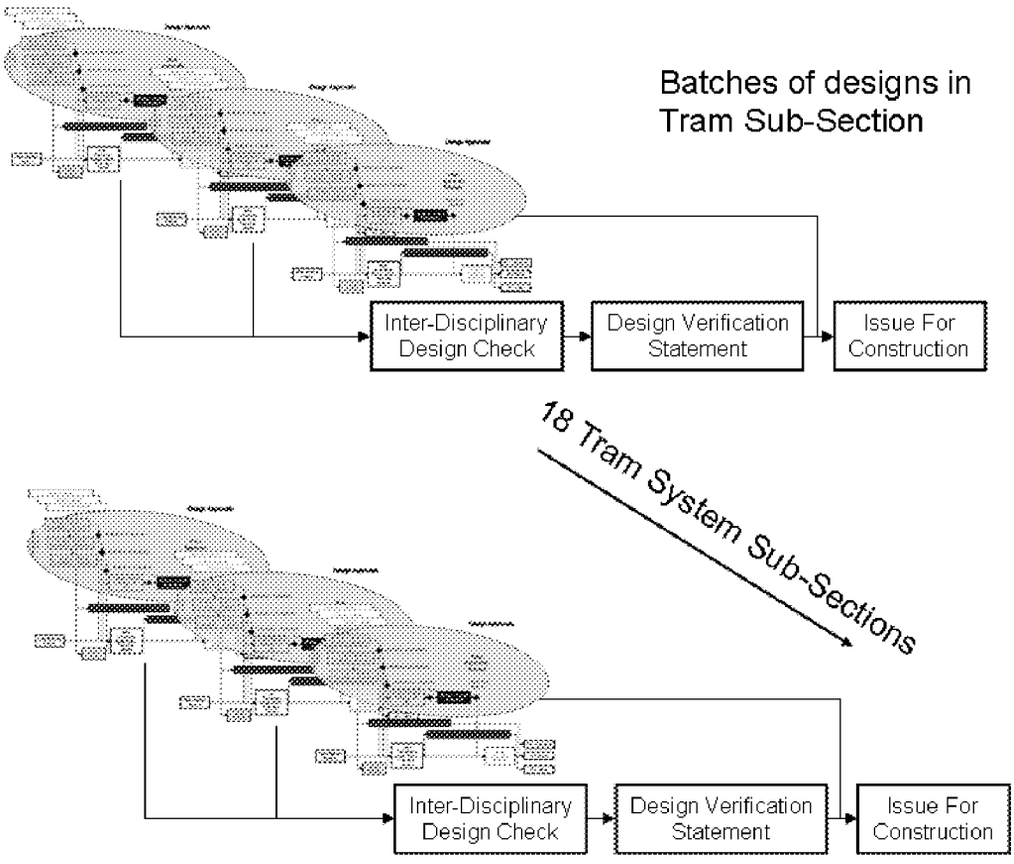
5. A formal Design Verification Statement confirming the final status of each design package which will be informed by all the above. (Cat A)

These elements are described below and are related as shown in the following diagram.

Relationship of Design Review Process elements



At the Tram Sub-Section level these elements are related as shown below.



The actual dates will be defined from time to time according to the details on the project master programme revisions.

The management arrangements and accountabilities are defined in 3.1

2.4.2. Redesign

It is possible that rework of some design elements which have already been submitted and reviewed or approved many be required from time to time. This may occur, for example, because a Value Engineering opportunity is identified, **tie** issues a Change Order, or SDS/Infraco/Tramco issue a Change Request. Whatever the source of initiation of the change of design, the new design must, by default, re-enter at the Inter-Disciplinary Design Review (IDR) stage (not shown in the diagrams above) and thence go through the IDC and other processes. It is for SDS/Infraco/Tramco to make the case for each item on its merits where it is proposed not to follow this full process route.

2.4.3. Submission of Designs

SDS/Infraco/Tramco will submit packages of design to **tie** to an agreed programme. Before this happens SDS/Infraco/Tramco will have been an integral part of a number of interfacing activities, whose purpose it is to inform detailed design such that it is most likely to be as expected at first submission. These interfacing activities include:

- Regular Critical Issues Meeting, attended by tie, CEC, TEL, Transdev, SDS/Infraco/Tramco; its purpose being to discuss and resolve arising issues whose resolution is critical to progressing detailed design and which have not been resolved by other meetings, processes or means;

- Tram Design Working Group, attended by tie, CEC, TEL, Transdev, SDS/Infraco/Tramco, Historic Scotland and Edinburgh World heritage Trust; its purpose being to discuss and resolve pre-application planning issues likely to be of particular interest to Historic Scotland and the Edinburgh World Heritage Trust;

- Roads Design Working Group, attended by tie, CEC, TEL, Transdev, SDS/Infraco/Tramco; its purpose being to discuss and resolve detailed roads design issues where requirements conflicts exist;

- Requests for Information – submitted by SDS/Infraco/Tramco to tie for answers to issues affecting the progression of detailed design; and

- Changes – submitted by tie to SDS/Infraco/Tramco where ETN needs change, or by SDS/Infraco/Tramco where decisions reached through the above meetings or processes have caused a change to their contracted requirement.

2.4.2. Technical Approvals

The need for Technical Approvals will be driven by a combination of requirements defined by engineering standards, CEC requirement and general law. These will be generally incorporated into internal SDS/Infraco/Tramco design processes or CEC approvals processes and will not be reviewed separately by **tie**, although issues arising will be reflected in the Design Verification Statements.

2.4.3. Prior Approvals

Some elements of design review require formal approvals from CEC Planning called 'Prior Approvals'. This is related to the CEC Planning Approvals process and has the elements of:

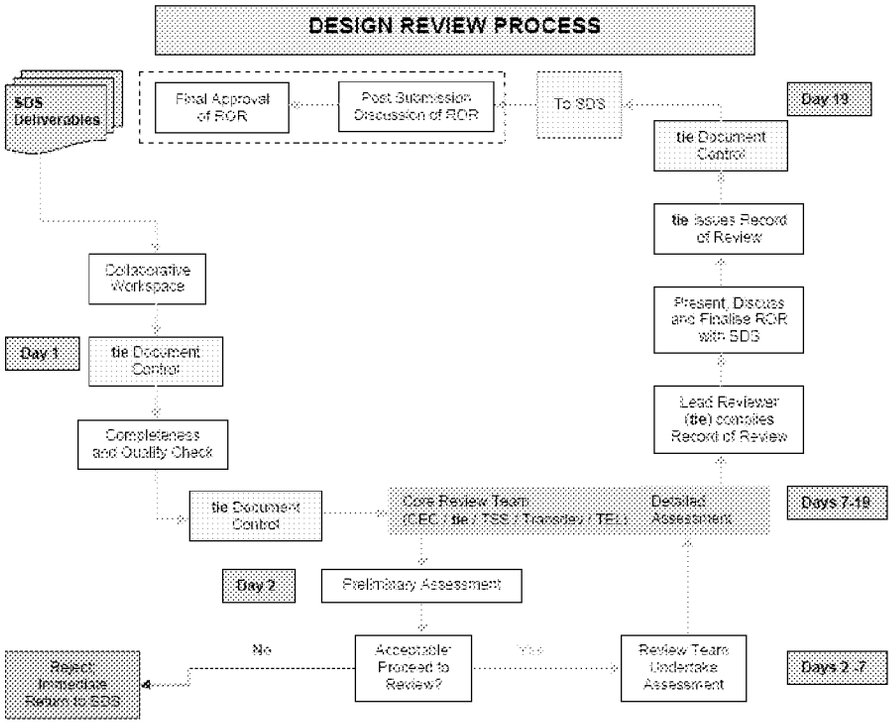
Informal Consultation: a period of consultation of 8 weeks duration with CEC Case Officers to allow a good understanding of design content and basis.

Prior Approvals: an administrative process of 8 weeks duration carried out with the delegated authority of the CEC Planning Committee which provides formal planning consent to designs which require it. This element of the process causes designs to be made public following Informal Consultation. A protocol exists to deal with exceptions to this process which requires a full application to the Planning Committee.

2.4.4 Design Review

The purpose of the Design Review process is to take selected packages of submitted design and review them so as to produce a Record of Review for each selected design package based on stakeholder comments related to the fit of the design with Employer's Requirements and any particular stakeholder interest. It is primarily concerned with addressing the design as an effective integration of design elements to create an operational tram system. In the event of a clash between offered design and Employer's Requirements the review will include the taking of a decision as to the required outcome.

tie's ETN Engineering Group will determine which packages are selected for submission to the Design Review process. The selection will take account of risk, sensitivity and stakeholder interest. Issues which emerge from the Record of Review will be addressed by SDS/Infraco/Tramco and also transferred into other similarly applicable designs.



Day 1

1. **Delivery of documentation by** SDS/Infraco/Tramco to **tie**
   Documentation will be uploaded onto a PB online collaborative workspace, which will generate an email notification to the **tie** Document Controller, who will download the document onto the **tie** intranet system and issue to **tie**'s ETN Engineering Group.

2. **Completeness and quality check**
   tie's ETN Engineering Group will check the package against the list provided to ensure that all documentation is accounted for, and to ensure that version control has been exercised within the package.

Day 2

3. **Initial assessment by tie's ETN Engineering Group**
   - Assessment of package fitness for review i.e. is there a written submission detailing how the package meets requirements and specifications.
   - Identification of key issues for review scrutiny

4. **Documentation placed on deposit for scrutiny by reviewers.**
   Electronic copy of documentation will be issued by **tie**'s ETN Engineering Group to the lead reviewer from each stakeholder **(tie/CEC/TEL/Transdev/TSS)** for further delegation dependant on the content and/or discipline and a hard copy will be placed on deposit in a data-store in Meeting Room 1.

Days 2-7

5. **Review by relevant stakeholder staff.**
   The Review Team will consider the documents placed on deposit in preparation for a 'round table' review session to be attended by representatives of all stakeholders.

Upon the hard copy in the data-store (Meeting Room 1) reviewers should consider and mark-up as necessary with any comments; coloured pens are allocated to each stakeholder (**tie – green/CEC – orange/TEL – purple/Transdev – blue/TSS – red**) and should be used to identify comments relevant to that stakeholder. Comments should be signed and dated and can be taken forward for consideration and potential inclusion on a Record of Review at the formal review session. If no comments are applicable on any item of documentation, this should be clearly marked "no comment". Reviewers should note that the hard copy must not be removed from the review areas (including Meeting Room 1 and the Review Tables only).

During this time, preliminary meetings with SDS/Infraco/Tramco technical staff can take place to develop understanding of the design and design issues and improve process efficiency.

Days 7 – 19

6. **Core Review Team Detailed Assessment (Every Thursday 1000-1600)**
   Following the period of review, **tie**'s ETN Engineering Group will arrange for stakeholders (**tie/CEC/TEL/Transdev/TSS**) to gather for a formal review session to generate a Record of Review (ROR) for issue to SDS/Infraco/Tramco. This meeting will take place on a weekly basis on Thursday, which will be a day specifically set aside by all relevant parties, and should be attended by representatives of SDS (relevant to the discipline/element to be reviewed) who will present their design and subsequently respond to any queries and comments as annotated on the drawings. During the session the lead reviewer (currently one of David Crawley/Tony Glazebrook/Gavin Murray) will annotate comments to illustrate where comments have been closed out or discussed, or identified as an issue. The ROR will be compiled by the lead reviewer and sub-divided to illustrate which comments belong to which stakeholder; it will be supplied early to SDS and then discussed at the following Thursday session with SDS/Infraco/Tramco before finalisation and issue. The ROR if necessary can be discussed further to resolve any issues before it is agreed between all parties.

   Note: the core review team membership will consist of at least one member from each of the stakeholders (**tie/CEC/TEL/Transdev/TSS**). It is the responsibility of each stakeholder to ensure representation.

2.4.5. Review of Documents Submitted Outwith the Design Package Review Process

SDS/Infraco/Tramco will, during the Detailed Design phase, continue to submit to **tie** a range of documents for information and review outwith the Design Package Review process which is detailed elsewhere within this Design Management Plan.

tie's Document Control will log receipt of such documents from SDS, uploading an electronic copy to the relevant section of the extranet, with a hard copy also being filed.

tie's Document Control also will log the documents in a Review Tracker and then agree with tie's Engineering team the most appropriate circulation for review of the submitted documents. Dependent upon the content of the documents, distribution for review will include any or all of: **tie** (including TSS), CEC, TEL, and Transdev.

tie's Document Control then will circulate the documents, in electronic format, with an additional hard copy where deemed appropriate, to the nominated recipients requesting that a review be undertaken of the documents and for any comments to be returned to tie's Engineering Group by means of a completed Record of Review (ROR).

tie's ETN Engineering Group will manage and monitor this process and, through liaison with tie's Document Control, will ensure that distribution has been completed and that all

nominated recipients are aware of the appropriate dates for their ROR return to tie's Engineering Group.

tie's ETN Engineering Group finally will collate all responses and issue a consolidated ROR to SDS within the contractual 20 working day period from receipt from SDS.

2.4.6. Design Verification Statement

Packages of design will be submitted to **tie** by SDS/Infraco/Tramco with an associated Design Verification Statement which will detail how the design complies with statutory, stated and best-practice requirements.

When packages of design have been submitted for review, the review will comprise examination of how each package demonstrates:

- How it meets the Employers Requirements (latest version will be available for perusal in Meeting Room 1)
- How it meets stakeholder requirements
- How it meets the Approvals and Consents requirements (including CEC and other 3rd Parties)
- How it closes issues raised in previous Records of Review
- How it complies with engineering standards – or how it handles non-compliances (SDS to specify following initial review period)
- How it meets the Verification and Validation requirements
- How it mitigates hazards from the Hazard Log
- How it meets the Detailed Design Case for Safety
- How it meets the CDM requirements
- How it is "Fit for Purpose"
- How it meets the CEC Street's Design manual
- How it meets the CEC Tram Design Manual
- How it meets requirements, comments or ROR issues raised at PD, TDWG or RDWG and by CEC at PD1
- How it meets with run-time requirements
- How it meets with RAMS definitions

Where sub-sections of design are submitted for review, whilst a DVS may not be available, a written statement of conformance with maximum possible inclusion of the main points above should be provided.

2.5 Key Responsibilities

Director, Engineering Approvals and Assurance is responsible for ensuring that this procedure is effective, chairing the Critical Issues Meetings and the Engineering Meetings, ensuring that this procedure is complied with and also is responsible for the overall management of the design review process from receipt of deliverables to issue of an agreed Record of Review.

SDS/Infraco/Tramco is responsible for detailed design and for management of the external approvals process to ensure successful approval of the design, first time. Infraco is the principal party in respect of design with the SDS and Tramco contracts for design and build novated to them. Where the term 'SDS/Infraco/Tramco' is used it is intended to refer to a process managed by Infraco in respect of these novated arrangements.

The **tie** Planner is responsible for ensuring that this process is inserted into the programme for each package of detailed design and for monitoring progress of such, notifying any variances to the Director, Engineering Approvals and Assurance.

CEC is responsible for ensuring their compliance with timescales within this plan and for attendance at necessary meetings required during the process.

2.6 Definitions

CEC: City of Edinburgh Council. Promoter of the Edinburgh Tram Network (ETN).

SDS: Systems Design Services contract. This contract is being delivered by Parsons Brinckerhoff who has a number of sub-consultancies, principally Halcrow and Corderoy.

Infraco: The Infraco preferred bidder after Financial Close

Tramco: The Tramco Preferred Bidder after Financial Close

TSS: Technical Services and Support Contract. This contract is being delivered by Scott Wilson, together with a number of sub-consultancies.

ICP: Independent Competent Person. As defined in the ROGs regulations; a person independent of the project appointed by **tie** to verify that the overall tram system is safe for construction, operation and maintenance.

3. Key Activities

3.1 Overview

The “RACI” Chart below details key tasks and their associated functional roles:

	Key Tasks	Functional Roles					
		Director, Engineering Approvals and Assurance	SDS/Infraco/Tramco	TSS	CEC. TEL, Transdev	tie HSQE Manager	tie Planner
Processes to inform detailed design	Set up meetings	A	R	CI	CI	CI	
	Attend meetings and ensure appropriate people in attendance	A	R	C	C	C	
	Prepare minutes of meetings	A	R	CI	CI	CI	
	Process RFIs and changes	A	R	CI	CI	C	
Detailed design	Raise issues for resolution	A	R	CI	CI	CI	
	Incorporate all requirements	A	R	CI	CI	CI	
	Verify design adequacy and quality	CI	AR	CI	CI	CI	
	Prepare package delivery schedule	CI	AR	CI	CI	CI	I
	Prepare package verification detail	C	AR	C	C	C	
Procedure Audit	Set up audit plan to cover this Design Management procedure	A	C	C	C	R	
	Conduct audit and report results	A	CI	CI	CI	R	
Design Review	Manage process	AR	CI	C	CI	CI	
	Monitor programme	AR	CI	CI	CI		CI
	Compile management reports	A R	CI	CI	CI	CI	

RACI is an acronym for:

R = **Responsible** – owns the delivery of the Activity
A = to whom “R” is **Accountable** – must sign-off (approve) the output of the Activities
C = to be **Consulted** – has information or capability to contribute to the activity
I = to be **Informed** – must be notified of results

3.2 Reporting

The Director, Engineering Approvals and Assurance will report 4 weekly to the Project Director. The report will include details of progress with individual SDS design deliverables as well as progress with design package submission and their associated design review.

4. Monitoring, Reviewing and Auditing

The Director, Engineering Approvals and Assurance shall regularly monitor the effectiveness of this procedure and shall formally review it at least once every three months.

The HQSE Manager shall audit compliance with this procedure to a schedule commensurate with the perceived risk.