



## **Scope of Works**

### **Rolling Stock Engineering and Specialist Services**

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## 1 List of Abbreviations

AEO	Means a person or entity to which the ASA has issued an ASA Authorisation.
CCO	Component Change Out generally undertaken as part of Level 3 Maintenance.
Enhancement	Means an increase or improvement in quality, value, or extent of the operation of a system to affect the overall operability of the Rolling Stock
Engineer	Qualified person with appropriate level of competency and experience to be able to complete work under the level of supervision supplied
ERM	Means Sydney Trains Enterprise Risk Management
ESI	Engineering & System Integrity
FMD	Fleet Maintenance Division
Fit for Function	<p>Upon completion of Works, Sydney Trains' shall confirm the requirements of the Final Production Baseline documents, Technical Specification and the Standards referenced therein and certified as "Fit for Purpose" by the Sydney Trains' representative</p> <p>Physical, functional, and performance characteristics or specifications that uniquely identify a component or device and determine its interchangeability in a system.</p>
Hold Point	Means a mandatory verification point as specified in Technical Specification 5.3.1, beyond which work cannot proceed without approval by the Principal's Representative or Principal nominated Verifier. The work cannot proceed until the Principal's Representative or Principal nominated Verifier is able to verify the quality of the completed work and releases the hold by means of an inspection request approval.
ITP	<p>Inspection and Test Plan(s)</p> <p>A plan produced by the Supplier as a single document that records all inspection and testing requirements relevant to a specific process.</p>
Modification	Means a configuration change, normally a design change made to Equipment
OEM	Original Equipment Manufacturer
Rolling Stock	Means locomotives, carriages, wagons, or other vehicles used on a railway
RFQ	Request for Quotation
SCARD	<p>Safety Change Assessment and Reporting Determination (SCARD)</p> <p>SCARD is a Safety Change Management requirement to be carried out on any planned change that affects the safe operation of the railways. The SCARD determines whether the change represents a minor, important or significant</p>

	safety risk to the organisation
Specialist Services	In the context of this SOW document, specialist services are defined as those services identified under suppliers capabilities.
Trial	<p>A Trial is defined as a work program executing the end-to-end process of determining if a proposed engineering solution and/or procedure will function as intended in in-service running. Typically, a trial will entail the configuration of trains is to be altered and/or test equipment is to be fitted and the train runs in passenger service on Sydney Trains' track, either on a Special Train Notice (STN) or a scheduled run for a specified period to validate the engineering solution.</p> <p>A trial provides for changing train configuration and hence forms part of the Sydney Trains Configuration Management responsibilities as detailed in SOW 2.4</p> <p>Upon completion of a Trial, the original configuration must be reinstated unless a permanent configuration change authorisation such as an Engineering Modification is issued.</p>
Upgrade	Means to improve system performance in a particular area by adding or replacing components.
Train	2 or more units of rolling stock coupled together, at least 1 of which is a locomotive or other self-propelled unit or a unit of rolling stock that is a locomotive or other self-propelled unit. A single unit of passenger rolling stock is called a car. A set is made up of 2 or more cars. Trains may be composed of one or more sets.
WHS	Means Workplace Health & Safety

# 1 Introduction

## 1.1 Purpose

The purpose of this Scope of Works document is to provide the high level requirements for a range of Engineering and Specialist Services relating to Sydney Trains Rolling Stock.

## 1.2 Introduction to Sydney Trains

Sydney Trains operates one of the geographically largest metropolitan rail systems in the world. An average of one million rail journeys are made each day on the Sydney Trains network in NSW on week days. The fleet consists of around 2,200 electric and diesel carriages, travelling on approx. 1,600km of track with approx. 1,550km of overhead wiring and stopping at 176 stations.

Sydney Trains is responsible for managing assets valued in excess of \$19 billion, including rolling stock, stations, rail & electrical infrastructure. Sydney Trains staff are responsible for providing regular passenger rail services, ticketing, passenger information, maintenance services, communications and control systems, ICT and technology services as well as performing a range of corporate governance and management activities.

The Fleet Maintenance Division (FMD) within Sydney Trains is responsible for delivery of safe, reliable and commercially competitive fleet maintenance services for Sydney Trains and NSW Trains in consultation with the Engineering and System Integrity (ESI) Division. Engineering & System Integrity (ESI) Division and FMD are responsible for providing engineering services. ESI and FMD operate in an environment where they are required to provide quality engineering services that are technically appropriate, provide best value for money and meet the time requirements agreed with the Asset Owner / Program Manager.

The Engineering and System Integrity (ESI) Division within Sydney Trains is currently the only approving authority for engineering related to the configuration and maintenance of rolling stock on the Sydney Trains Network.

ESI and FMD have identified a number of Engineering and Specialist Services that may be required on an on-call basis to meet the future needs of the business. It is proposed to establish a prequalification scheme for the supply of these services. The service requirement, including categories and capabilities are shown below and are further detailed in Section 2.

The current requirements shall be classified in the following categories and capabilities.

<b>Categories and Capabilities</b>
<p>Rolling Stock Systems Trials and Asset Works</p> <ul style="list-style-type: none"> <li>• Design, Supply, Install, Commission (Trials)</li> <li>• Fleet Roll Out and Support</li> <li>• Redesign, Modification, Supply</li> <li>• Asset Works / Refurbishment / Overhaul</li> </ul>
<p>Rolling Stock System Design</p> <ul style="list-style-type: none"> <li>• Engineering Concept Design</li> <li>• Engineering to Final Design</li> <li>• Investigations</li> <li>• Design Assessment and Recommendations</li> </ul>
<p>Rolling Stock Engineering Reports – Asset Support Services</p> <ul style="list-style-type: none"> <li>• Scope of Works Development / Cost Estimates</li> <li>• Reporting for Repair / Overhaul / Replacement / Modification / Upgrade</li> <li>• Condition Assessment Reports and Asset Management Plans</li> <li>• Inspection and Testing Regime</li> </ul>
<p>Rolling Stock Simulation Analysis</p> <ul style="list-style-type: none"> <li>• Structural Integrity Assurance and Analysis</li> <li>• Linear and Non Linear Status Analysis and Steady State and Transient Heat Transfer Analysis</li> <li>• Fatigue Life Estimation</li> <li>• Buckling Analysis</li> <li>• Transient Dynamic Behaviour Analysis</li> <li>• Spectral and Harmonic Response Analysis</li> </ul>
<p>Rolling Stock Scientific Services</p> <ul style="list-style-type: none"> <li>• Material Study, Scientific Testing and Metallurgical Assessments</li> <li>• Chemical Analysis</li> <li>• Non Destructive Testing and Inspections</li> <li>• Quality Control and Weld Inspections</li> <li>• Corrosion Inspection</li> </ul>
<p>Rolling Stock System Assurance</p> <ul style="list-style-type: none"> <li>• RAMS (Reliability, Availability, Maintainability, Serviceability) Analysis</li> <li>• Risk Analysis</li> <li>• Maintenance Optimisation</li> <li>• Deterioration Modelling</li> <li>• Assurance Inspections</li> </ul>

## 2 Scope of Works and Services

### 2.1 Overview

The following sections provide further details of typical activities to be undertaken by the Supplier for the respective categories. The current list of requirements may be amended from time to time in the future.

#### 2.1.1 Sydney Trains Fleet Details

The services shall be applicable to the following fleets and the sub-systems.

**Table 1 - Fleets Applicable to the Prequalification Scheme**

Fleet Type	No. Cars	Into Service
Sydney Trains Metropolitan		
Suburban (S)	192	1972-1980
Suburban (K)	160	1981-1985
Suburban (C)	56	1986
Tangara (T)	446	1988-1995
NSW Trains Intercity (electric)		
Intercity (V)	204	1970-1989
OSCar (H)	221	2006-2012
NSW Trains Regional (diesel)		
Xplorer	23	1993
Endeavour	28	1994-1996
Hunter	14	2006-2007
NSW Trains Interstate (diesel)		
XPT Power Car	19	1982-1993
XPT Trailer Car	60	1982-1993

**Table 2 – Fleet Subsystems**

Supplier submitting a response for System Design, Trials and Asset Works will be required to identify what fleet subsystems they have capability in.

Ref	Fleet Subsystems
1	Body
2	Bogie
3	Intercar Connectors
4	Door Systems

5	Braking Systems
6	Pneumatics (Other Than Braking)
7	Auxiliary Equipment
8	Climate Control
9	Traction Systems
10	Auxiliary Power Supply
11	Main Power Supply
12	Lighting
13	Indicators, Control & Monitoring Systems
14	Communications
15	Water Systems
16	Catering Equipment
17	Diesel Engine Systems (Main Engine)

An Index of subsystems has been provided as an attachment to the Scheme to help in identifying the system capabilities shown above.

## 2.2 Mode of Operation

The Prequalification Scheme will operate according to the Schemed Conditions. Suppliers will be required to execute a Standing Offer Deed prior to admission to the scheme for the various categories of services they are capable of providing. Suppliers for the various Categories and Capabilities may be requested to provide offers against individual work packages issued as RFQs. Sydney Trains may enter into contracts with the suppliers for the work package by issuing Purchase Orders based on the pre agreed terms and conditions and quotations provided.

## 2.3 Mandatory Requirements for the delivery of Works and Services

As a minimum, the supplier shall:

- i. Carry out Works and Services in accordance with ASA (Asset Standards Authority) Standards, Sydney Trains Specifications/Standards, current Australian Standards (AS) and other procedures as approved by Sydney Trains. The selection of appropriate standards for the Work Package will be the professional responsibility of the supplier.
- ii. Provide all personnel, equipment, and materials necessary to complete the Work Package. Unless otherwise specifically agreed with Sydney Trains, the supplier shall not presume or expect Sydney Trains to provide any personnel, equipment or materials.
- iii. Provide all deliverables agreed to be produced and delivered by the supplier. Each Work Package will be in the Supplier's standard documentation with the



level of detail commensurate with industry standards and to meet the requirements defined in accordance with Sydney Trains Specification RS00\_0000\_02ST, Preparation of Engineering Documents - Style.

### General Requirements

1. Execute safety responsibilities, authorities and accountabilities consistent with Sydney Trains Safety Management System requirements which are defined in SMS document number SMS-02-RG-3058. All Sydney Trains staff and suppliers are required to comply with the System Requirements, Safety Responsibilities, Authorities and Accountabilities, within the Safety Management System.
2. Typical minimum safety requirements to enter a Sydney Trains Rolling Stock Maintenance Facility are as follows;
  - Rolling Stock Maintainer Qualification (or equivalent Rail Industry Worker Qualification)
  - Local Maintenance Facility Site Induction
3. The Supplier personnel shall comply with the Sydney Trains Safety Specification.
4. The supplier is required to provide evidence of systems to ensure that personnel have:
  - a. The necessary capacity, including communication, technical and risk management skills, and knowledge to perform the required work;
  - b. An adequate sense of responsibility to be entrusted with the required work; and
  - c. The physical and mental fitness to do the required work.
  - d. The system of competency planning and management shall as a minimum, consist of the following elements:
    - Identification and achievement of qualifications
    - Training and experience in performing a task
    - Training and experience working within a work management system
    - Assessment of suitability of the person to achieve the task and consistently perform the task
    - Supervision and control of the function and the person performing it.
    - Periodic review of the task and its requisite competency

## 2.4 Category 1 - Rolling Stock System Trials and Asset Works

In this category, the Works and Services will constitute a Work Package to provide System Trials and Asset Works. The following constitute typical engineering services which would be called for in providing System Trials and Asset Works including the indicative deliverables:

Applicable Fleet Sub-Systems	Capabilities and Typical Activities	Indicative Deliverables
<ol style="list-style-type: none"> <li>1. Body</li> <li>2. Bogie</li> <li>3. Intercar Connectors</li> <li>4. Door Systems</li> <li>5. Braking Systems</li> <li>6. Pneumatics (Other Than Braking)</li> <li>7. Auxiliary Equipment</li> <li>8. Climate Control</li> <li>9. Traction Systems</li> <li>10. Auxiliary Power Supply</li> <li>11. Main Power Supply</li> <li>12. Lighting</li> <li>13. Indicators, Control &amp; Monitoring Systems</li> <li>14. Communications</li> <li>15. Water Systems</li> <li>16. Catering Equipment</li> <li>17. Diesel Engine Systems (Main Engine)</li> </ol>	<p>Capabilities / Activities</p> <ul style="list-style-type: none"> <li>• Trials incl. Design, Supply, Install, Commission</li> <li>• Fleet Roll-out and Support</li> <li>• Redesign, Modification and Supply</li> <li>• Asset Works, Refurbishment, Overhaul</li> </ul> <p>Including</p> <ul style="list-style-type: none"> <li>• Repairs (General / Collision / Structural)</li> <li>• Equipment Modifications</li> <li>• Trialling, solution development and recommendations</li> </ul>	<ul style="list-style-type: none"> <li>• Project / Program Management</li> <li>• Trial Completion Reports</li> <li>• Selection Criteria for Successful Trial</li> <li>• Delivery of Scope of Works</li> <li>• Project Status Reports</li> <li>• Est. Implementation Complexity</li> <li>• Presentations</li> <li>• Detailed Implementation Costing</li> <li>• ERM Risk Assessment</li> <li>• SCARD</li> <li>• Design calculations</li> <li>• Preparation of Scope of In Service Trial, proposed Fitment including the following but not limited to,               <ol style="list-style-type: none"> <li>a. Program of Works</li> <li>b. Engineering Drawings</li> <li>c. FMECAs produced for the design and maintenance requirements</li> <li>d. OH&amp;S and Human Factors</li> <li>e. Integrated Logistics Support (ILS) and</li> <li>f. Reliability, Availability, Maintainability and Safety/Supportability elements (RAMS)</li> </ol> </li> </ul>

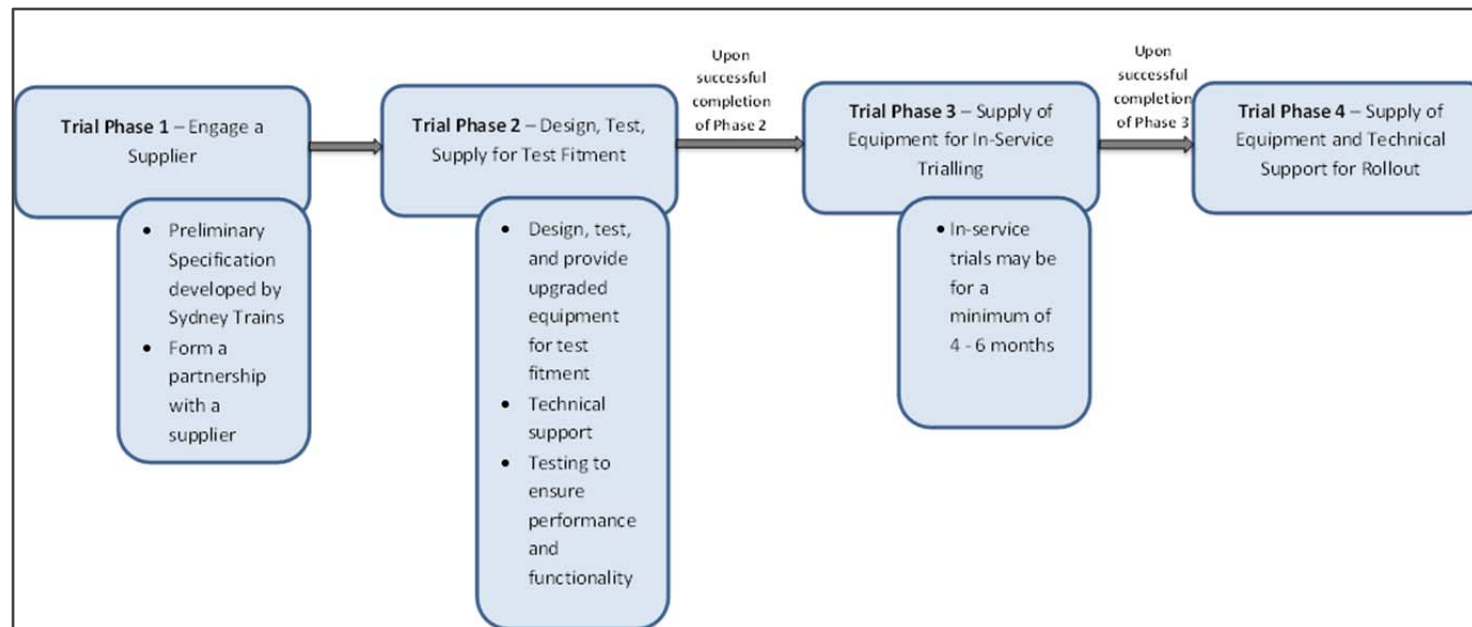
### 2.4.1 System Trials

Trials typically include engineering assessment, trial, investigation and design solutions for Sydney Trains to support the on-going, maintenance and reliability activities on a car and its sub-system components as identified in Table 2.

Trials are defined as the specialist engineering services to undertake Work Packages to provide an end-to-end program of concept/feasibility study through to the implementation and rollout of the proposed solution which may be executed in a phased manner. Figure 1 illustrates the typical phased trial activity and the proposed tasks it entails.

It is envisaged that multiple designs or proposals may be trialled from one or more suppliers. It is expected that after a successful trial a decision would be made as to which design or proposal would be carried forward into fleet roll out. Typically, this would involve only one supplier for the roll out.

**Figure 1 Typical Trial Process**



#### **2.4.1.1 Trial Phase 1: Supplier Engagement & Preliminary Assessment**

In Phase 1, the primary objective is to establish the requirements of the concept solution to address the current issue or upgrade/modification/enhancement to a rolling stock system or sub-system as has been assessed, recorded and documented by the Engineering Team in Sydney Trains. Sydney Trains' intends to engage a supplier to develop the Trial Concept and Trial Planning to the extent of advisory, approvals and consultancy function. It is anticipated that this stage would include, but not be limited to the following sub-tasks/deliverables,

- i. Initial Assessment
- ii. Reports and Recommendations
- iii. Technical Risk Assessment
- iv. Proposals

This would include, but not be limited by, the aspect of design responsibility that was established by Sydney Trains, where visibility of any design issues that will require rectification will be identified as the Trial progresses.

#### **2.4.1.2 Trial Phase 2: Design, Test, Supply of Test Fitment**

The Supplier will design, test, and recommend upgraded equipment/proposed solution for the test fitment of the subject rolling stock system or sub-system.

Typically, a test fitment of the upgraded components/system/subsystem will be carried out at a nominated Sydney Trains' maintenance facility and the execution of the Test Fitment shall be subject to the Works entailed in the Purchase Order and the subsequent Scope documents. Technical support must be provided by the supplier to assist in the installation process. Testing will be carried out to ensure performance and functionality requirements are met. As a minimum, the Supplier is expected to undertake the following tasks,

- i. Risk Assessment
- ii. Drawings & Fitment Methodology including Sydney Trains' approval
- iii. Test Fitment installation Recommendations, Assumptions & Conclusions
- iv. Inspection & Test Plans including necessary Hold Points, Review Points and Stop Points
- v. Test Fitment Performance Measurement
- vi. Final Reports

All changes to rolling stock (incl. all associated drawings and modification documents) are to be reviewed and approved by ESI prior to trial.

#### **2.4.1.3 Trial Phase 3: Supply of Equipment for In-House Trialling**

Following the successful trial fitment of the subject component/system/sub-system, in-service trials will commence. Typically, in-service trials may be for a minimum of 4 - 6 months and the equipment on trial will be tested on its ability to collectively operate with the rest of the system.

It is expected that the Supplier shall provide all equipment and support for the trial. This must include any support equipment needed for recording and monitoring, for the duration of the trial period. The key performance characteristics for each new component will be

monitored during the trial to determine if they perform as expected during service conditions.

It is anticipated that the Supplier will provide the necessary documentation for the depot/maintenance centre work flow, installation and maintenance procedures so that the depots can deliver the completed works. Based on the provisions of the final scope, it may be determined that the trial installation works shall be carried out by Sydney Trains' personnel or the Supplier. If the former option is exercised the Supplier will certify that the work performed by Sydney Trains is fit for purpose. Sydney Trains will determine the success or failure of each piece of equipment in the trial based on a comprehensive Inspection & Test plan agreed prior to the commencement of the Trial. Trial components will require Sydney Trains approval prior to fleet rollout out for the test fitment.

As a minimum, it is expected that the following tasks/activities will be undertaken by the Supplier to realise the outcomes of this phase,

- i. Supply, kitting, delivery to Sydney Trains' locations (as nominated & informed to the Supplier)
- ii. Installation of the Trial equipment
- iii. Provide adequate installation, inspection and maintenance procedures as confirmed with Sydney Trains' representative
- iv. FMECA Analysis & the associated Preventative & Corrective actions
- v. On-site technical support during the trial installation work as will be confirmed with the Supplier
- vi. Performance Management & Reports
- vii. Final Analysis, Reports & Recommendations

#### **2.4.1.4 Trial Phase 4: Supply of Equipment & Technical Support for Rollout**

Following successful in-service trialling of the upgraded/modified/enhancement components, full rollout across the associated fleet will commence and will, where possible, be co-ordinated with other works programmes.

The rollout program of works shall be planned and detailed as per the outcome of the trial and the extent of the rollout to be decided at the completion of Phase 3. However, as an indicative requirement, it is expected that the Supplier will provide the components in the designated form for the nominated train sets at a rate sufficient depending on rollout rate requirements.

The Supplier will provide the necessary documentation for the depot work flow and installation procedures so that the depots can deliver the completed works. A certification framework shall be agreed upon by the Supplier & Sydney Trains' to certify the installation work performed is fit for purpose. Any configuration changes must follow the Sydney Trains' Configuration Management process.

The indicative requirements shall include, as a minimum,

- i. Supplier Fleet Rollout plan, framework and methodology
- ii. Inspection & Testing Plan
- iii. Technical Support structure & rollout plan
- iv. Supply, logistics and inventory management of the components

- v. Additional CCO scope that may need to be undertaken shall be treated as a variation
- vi. Amendment of all required existing drawings and maintenance documents to reflect the change.
- vii. Approval of final drawings and associated engineering documents by ESI.

## **2.4.2 Asset Works**

### **2.4.2.1 Rolling Stock Works**

Sydney Trains has identified the need to undertake minor asset works on its fleet in the event of collision, damage incurred in the normal course of operations due to events such as storm flooding, fire, catastrophic failure, or corrosion.

The works may include on call investigative and reporting services of the damaged Cars/equipment, equipment repair, equipment overhaul, installation, fit-out, in situ and ex-situ works as necessary for Cars to be certified fit for service. The condition assessment and reporting may be conducted as a separate activity under Category 3 – Asset Support Services, depending on Sydney Trains business requirements.

### **2.4.2.2 Completion of Asset Works**

The works may include;

- Completion of all agreed repairs
- Completion of all agreed repairs and, test ready for commission and delivery
- Development of final ITP
- Delivery of all documentation
- Liaison with Sydney Trains including depot planning and management, logistics, engineering, project management and others as required

## **2.4.3 Work Program Methodology**

The Program/Project Management activities to be undertaken shall be to the extent of delivering the requisitioned services within agreed timeframes.

The Program/Project Manager will need to be proficient in Railway engineering, operations, engineering design, co-ordination and management.

The Program/Project Manager will also be required to be familiar with relevant Australian Standards, NSW State Government procurement policies and relevant NSW State legislation. In particular, the Program Manager will be expected to have a sound working knowledge and understanding of the National Rail Safety Law and the current Work Health and Safety legislation.

For each package of works, the Program/Project Manager will be expected to attend an initial briefing with the relevant Sydney Trains managers, who will provide a scope of works required to be implemented. The Program/Project Manager will then be required to act as a single point of contact on behalf of Supplier and is expected to co-ordinate various meetings and activities required to deliver agreed services and ensure that deliverables are delivered on time and meeting quality standards.

The Program/Project manager will be required to prepare and supply periodic reports on the progress of the works, as stipulated by Sydney Trains for the specific packages including minimum monthly project status review meetings.

At the completion of each project, the Program/Project Manager will be required to supply to Sydney Trains a comprehensive close-out report and all necessary documentation.

#### **2.4.3.1 Delivery / Hand back**

Delivery Phase deliverables may include;

- Completed ITP documentation pack for the repair and rectification approved by Sydney Trains
- Weekly status report
- Delivery of the repaired Cars with all repairs and rectification completed as per the agreed Scope of Work, and with all agreed out-of-course work completed
- At time of delivery of the sets to Sydney Trains, all completed quality/engineering related documentation, including:
  - hand marked-up drawings as agreed,
  - Completed and approved ITP documentation and all support documents as a single bound pack and in a transportable electronic format.
  - Final Commissioning verification run on track, if required

## 2.5 Category 2 - Rolling Stock System Design

In this category, the Services will constitute a Work Package to provide System Design Services. The following constitute typical engineering services which would be called for in providing System Design Works including the indicative deliverables:

Applicable Fleet Sub-Systems	Capabilities and Typical Activities	Indicative Deliverables
<ol style="list-style-type: none"> <li>1. Body</li> <li>2. Bogie</li> <li>3. Intercar Connectors</li> <li>4. Door Systems</li> <li>5. Braking Systems</li> <li>6. Pneumatics (Other Than Braking)</li> <li>7. Auxiliary Equipment</li> <li>8. Climate Control</li> <li>9. Traction Systems</li> <li>10. Auxiliary Power Supply</li> <li>11. Main Power Supply</li> <li>12. Lighting</li> <li>13. Indicators, Control &amp; Monitoring Systems</li> <li>14. Communications</li> <li>15. Water Systems</li> <li>16. Catering Equipment</li> <li>17. Diesel Engine Systems (Main Engine)</li> </ol>	<p>Capabilities / Activities</p> <ul style="list-style-type: none"> <li>• Engineering Concept Design</li> <li>• Engineering to Final Design</li> <li>• Investigations</li> <li>• Design Assessment and Recommendations</li> </ul> <p>Including</p> <ul style="list-style-type: none"> <li>• Engineering Services / Reports</li> <li>• Design for fleet modifications and upgrades</li> </ul>	<ul style="list-style-type: none"> <li>• System Definition Review (SDR)</li> <li>• Preliminary Design Review (PDR)</li> <li>• System Design Review (SDR)</li> <li>• Critical Design Review (CDR)</li> <li>• ERM Risk Assessment</li> <li>• SCARD</li> <li>• Design calculations</li> </ul>



## 2.5.1 Design Requirements

The Supplier may be expected to undertake the following activities to support the delivery of services.

- Investigation and assessment reports of services;
- Organisation and co-ordination of meetings, workshops, and other requirements, minutes of all meetings are to be prepared by the Supplier. All formal Review Activities will be coordinated through Sydney Trains' Representative(s);
- Required design activities including confirmation of deployment of competent resources;
- Internal reviews as well as Sydney Trains high level reviews, as required;
- Preparation and submission of relevant statutory reports including preparation and submission of contingency plans, safety management plans, environmental management plans, test reports (including for hazardous materials) and audits;
- Provide, as required, assistance to the Sydney Trains' Representatives with the preparation of the Business case & Project plans to the extent of technical analysis, reports, risk analysis and as may be specified in the Purchase Order

### 2.5.1.1 Co-ordination Requirements

The Supplier shall ensure co-ordination between all documents. Adequate time shall be programmed and allowed for co-ordination, and appropriate staff allocated for the co-ordination function.

Co-ordination should include but not necessarily be limited to the following:

- Co-ordination of external specialist advice and incorporation into the documents, including from Sydney Trains' Representative and Sub-Consultants nominated by Sydney Trains' Representative;
- Co-ordination between drawings, scheduled and specified information, as applicable;
- Co-ordination within each discipline's documents, as applicable;
- Co-ordination between various discipline's documents, as applicable.

### 2.5.1.2 Work Package Review

Reviews and Hold Points

The Supplier shall submit specific deliverables for Sydney Trains' high level review at the specified date.

For individual Work Packages, the appropriate 'Hold Points' for Approvals by Sydney Trains Representative shall be agreed upon. Typically, the following can be considered as indicative 'Hold Points'

- Review 1 – Preliminary Assessment including validation of assumptions(SDR)
- Review 2 – Analysis & Modelling Outputs & Calculations (PDR)
- Review 3 – Approval & Review of final data and assessment reports(CDR)
- Review 4 – FMECA as applicable for the proposed recommendations
- Review 5 – Final Assessment Report

These Hold Points are expected to help in effective, efficient and timely management of delivery. The

Supplier is required to obtain the consent from Sydney Trains' representative prior to progressing to the next stage.

### **2.5.1.3 Documentation Requirements**

In addition, the Supplier shall provide experienced personnel as required, throughout the duration of the Contract for the preparation, updating and delivering of the documentation at each stage of the Service.

Drawings and documents shall be specific to the Work Package and incorporate all relevant data. The Supplier will provide evidence of quality assurance documentation for the Services provided as applicable and agreed upon at the time of a Purchase Order.

### **2.5.1.4 Program of Services**

In accordance with the provisions of the Purchase Order and the delivery of Services agreed upon, the Supplier is expected to provide a preliminary program of works/services addressing the Work Package activities as detailed in the respective Scope of Works and indicating the Suppliers' proposal of the best time frame in which service delivery can be achieved without affecting the overall Sydney Trains' broader project delivery.

As a minimum, this shall be set out in the form of a bar chart clearly identifying the critical path, if applicable. The bar chart shall be created using MS Project, P6 or equivalent software giving a minimum of "level 3" detail i.e. all major activities required to complete the Supplier's Activities including Milestones, priority of each item and the relevance of each item for the critical path.

## 2.6 Category 3 - Rolling Stock Asset Support Services

In this category, the Services will constitute a Work Package to provide Asset Support Services. The following constitute typical engineering services which would be called for in providing Asset Support Services including the indicative deliverables.

Capabilities and Typical Activities	Indicative Deliverables
<p>Capabilities</p> <ul style="list-style-type: none"> <li>• Scope of Works Development and Cost Estimates</li> <li>• Reporting for Repair, Overhaul, Replacement, Modification and Upgrade</li> <li>• Condition Assessment Reports and Management Plans</li> <li>• Inspection and Testing Regime</li> </ul> <p>Including</p> <ul style="list-style-type: none"> <li>• Engineering Services / Reports</li> </ul>	<ul style="list-style-type: none"> <li>• ITP Documentation</li> <li>• Proposed Scope of Works</li> <li>• Itemised Costs</li> <li>• Proposed Methodology</li> <li>• Process Models &amp; Documentation</li> <li>• Risk &amp; Issues Report</li> <li>• Resource Plans</li> </ul>

### **2.6.1 Engineering Assessment - Reporting**

The engineering assessment phase will normally include:

- Car/component teardown and inspection with Sydney Trains,
- Determine final scope for repair and rectification, material/labour requirements, cost, and schedule/duration
- Confirmation of proposed documentation for Delivery Phase
- Draft Inspection and Test Plan (ITP)
- Proposed quality related deliverables and delivery documentation
- Proposed project management requirements
- Liaison with Sydney Trains including depot planning and management, logistics, engineering, project management and others as required.

### **2.6.2 Scope of Works Requirements**

The key Engineering Assessment deliverable is a comprehensive engineering / teardown / inspection report. The report as a minimum will include:

- Proposed scope of works for the repairs, including options
- Proposed strategy for the supply/delivery of materials, including meeting minutes and tracked actions
- Itemised costing
- Proposed methodology, timing, duration and schedule for the repairs - (schedule to include suggested milestones and hold points, i.e. for the supply of key equipment, inspections and significant deliverables);
- The proposed quality deliverables (such as ITP documentation and associated approval criteria), and engineering approvals for the on-Car repair work
- Agreed process for structural repairs, including hold points, inspections, documentation and approvals.

### **2.6.3 Standards, Codes and Statutory Requirements**

The Supplier, as part of their Work Package, shall be responsible for selecting and making use of appropriate standards, codes and other statutory requirements. Sydney Trains will rely on the professionalism of the Supplier to make the appropriate judgements in this area.

## 2.7 Category 4 - Simulation Analysis

In this category, the Services will constitute a Work Package to provide Simulation Analysis Services. The following constitute typical engineering services which would be called for in providing Simulation Analysis Services including the indicative deliverables.

Capabilities and Typical Activities	Indicative Deliverables
<p>Capabilities</p> <ul style="list-style-type: none"> <li>• Structural analysis               <ul style="list-style-type: none"> <li>○ Integrity assurance</li> <li>○ Event behaviour simulations</li> </ul> </li> <li>• Linear and non-linear               <ul style="list-style-type: none"> <li>○ Status analysis</li> <li>○ Steady-state and transient heat transfer analysis</li> </ul> </li> <li>• Fatigue life estimation (stress-life, strain-life, fracture mechanics, etc.)</li> <li>• Buckling analysis (linear and non-linear)</li> <li>• Transient dynamic behaviour analysis (impact and crash)</li> <li>• Spectral and harmonic response analysis (model)</li> </ul> <p>Including</p> <ul style="list-style-type: none"> <li>• Engineering Services / Reports</li> </ul>	<ul style="list-style-type: none"> <li>• Methodology</li> <li>• 3D CAD models and engineering drawings</li> <li>• Metallurgical assessment Reports</li> <li>• FMECA Study &amp; Reports</li> <li>• Risk Assessment</li> <li>• Cost Model Population</li> <li>• Analysis of Options &amp; Risks</li> </ul>

## 2.8 Category 5 - Scientific Services

In this category, the Services will constitute a Work Package to provide Scientific Services. The following constitute typical engineering services which would be called for in providing Scientific Services including the indicative deliverables.

Capabilities and Typical Activities	Indicative Deliverables
<p>Capabilities</p> <ul style="list-style-type: none"> <li>• Material Study, Scientific Testing and Metallurgical Assessments</li> <li>• Chemical Analysis</li> <li>• Corrosion Inspection</li> <li>• NDT &amp; Inspection (Incl. advanced)</li> <li>• Quality Control &amp; Weld Inspections</li> <li>• Corrosion Inspection</li> </ul> <p>Including</p> <ul style="list-style-type: none"> <li>• Engineering Services / Reports</li> </ul>	<ul style="list-style-type: none"> <li>• Methodology</li> <li>• 3D CAD models and engineering drawings</li> <li>• Metallurgical assessment Reports</li> <li>• FMECA Study &amp; Reports</li> <li>• Risk Assessment</li> <li>• Cost Model Population</li> <li>• Analysis of Options &amp; Risks</li> </ul>

Material Study Analysis may include Microscopy, Surface analysis, Magnetic Particle Testing, Chromatography, Mass spectrometry, NMR (Nuclear Magnetic Resonance spectroscopy analysis), Thermal analysis, and Spectroscopy techniques including FTIR (Fourier transform infrared spectroscopy) analysis or Raman analysis.

## 2.9 Category 6 - System Assurance Services

In this category, the Services will constitute a Work Package to provide System Assurance Services. The following constitute typical engineering services which would be called for in providing System Assurance Services including the indicative deliverables.

Capabilities and Typical Activities	Indicative Deliverables
<p>Capability</p> <ul style="list-style-type: none"> <li>• RAMS Analysis and Modelling</li> <li>• Risk Analysis</li> <li>• Maintenance optimisation</li> <li>• Deterioration modelling,</li> <li>• Assurance Inspections</li> </ul> <p>Including</p> <ul style="list-style-type: none"> <li>• Engineering Services / Reports</li> </ul>	<ul style="list-style-type: none"> <li>• Methodology</li> <li>• 3D CAD models and engineering drawings</li> <li>• Metallurgical assessment Reports</li> <li>• FMECA Study &amp; Reports</li> <li>• Risk Assessment</li> <li>• Cost Model Population</li> <li>• Analysis of Options &amp; Risks</li> </ul>

The above may include - Safety and quality of Rail Engineering, assessment and issuing of analyses and documents, consulting services for systems security architecture, consequence tree analysis, failure modes effects and criticality analysis (FMECA), fault tree analysis (FTA), hazard log, HAZOP (Hazard Operability Study), interface hazard analysis (Zonal Analysis), preliminary hazard analysis (PHA), safety evidence in compliance with DIN EN 50126, DIN EN 50128, and DIN EN 50129 norms, subsystem hazard analysis, secure information transmission processes such as the DIN EN 50159 norm

## 3 General Requirements

### 3.1 Codes and Requirements

It is anticipated that the Supplier will make themselves aware of all the latest Codes, Specifications and Standards. Sydney Trains safety and engineering documents may be accessed from following internet sites:

<http://engineering.railcorp.nsw.gov.au/>

[www.railsafe.org.au/](http://www.railsafe.org.au/)

<http://www.asa.transport.nsw.gov.au/>

The Supplier will be familiar with all relevant Rolling Stock standards, codes, requirements. In case of any problem, the Supplier will liaise with Sydney Trains' Representative and seek early advice regarding the currency and detailed application of standards, codes and requirements, and design parameters for the specific Work Package. Knowledge of the overall principles of the relevant codes is assumed of all Suppliers as a precursor to registration.

#### 3.1.1 Conformity with Acts, Regulations, Ordinances and Standards

Except where the Request for Quote (RFQ) requires a higher standard, the work shall be carried out in accordance with the provisions of all relevant Acts, regulations, codes, rules and specifications/standards. These shall include, but not limited to, the current editions/revisions of:

- AS relevant to all aspects of the Project
- AS 1428 (current edition) - all relevant parts;
- Disability Standards for Accessible Public Transport Guidelines;
- Health Regulations;
- Work Cover;
- Rail Safe Network Rules & Procedures;
- AS 4292 railway safety management;
- Standard Guidelines for Fire and Life Safety for Rolling Stock
- Engineering Standards published by the Assets Standards Authority (ASA)
- Other Sydney Trains Codes & Standards available on Sydney Trains' internet sites
- Rail Safety Act

### 3.2 Quality Assurance

Supplier shall comply with ASA and Sydney Trains standards, processes and procedures.



### 3.3 Safety Requirements

It is expected that the Supplier shall ensure adherence to the following Sydney Trains' Safety Requirements when working on Sydney Trains' depots, sites and maintenance centres.

#### 3.3.1 Rail Safety National Law (NSW)

The Supplier shall provide evidence of compliance with the Rail Safety National Law 2002 and Australian Standard AS4292 series for Railway Safety Management. All services carried out under the Contract shall comply with the Rail Safety National Law (NSW) (As at 1 July 2015, Act 82a of 2012) and Australian Standard AS4292 series for Railway Safety Management.

The Supplier shall ensure compliance with the following requirements:

- The mandatory requirements of the National Rail Safety Accreditation Package and the guidelines contained in the National Rail Safety Accreditation Package and particularly the guidelines relating to Safety Management Systems.
- Supplier to work in accordance with the Sydney Trains SMS
- Authorised Rail Industry Worker (Rail Industry Safety Induction (RISI) and/or with Category 3 Medical)
- Necessary qualifications
- Any additional training will be provided by Sydney Trains

#### 3.3.2 Project Specific Safety Requirements

Supplier's Corporate WHS management system will have been accredited by Sydney Trains', by another NSW government organisation or by an external third party accreditation body.

Supplier shall carry out works and deliver Cars to the Sydney Trains' site in accordance with the provisions of the following documents,

- General Safety Specification For Suppliers



Safety-Specifications  
-for-Contractors-Sydl

- General Safety Specification For Suppliers



Safety-Specifications  
-for-Service-Provider:

Prior to commencement of Works on Sydney Trains' sites/maintenance centres/depots, the Supplier shall provide evidence of its WHS system complies with the following, as a minimum,

- Process for hazard identification and risk assessment including:
  - Monitors and controls of PPE;
  - Plant and equipment; and

- Hazardous substances and dangerous goods
- Process for managing the competence, licensing and certification of its employees and subcontractors
- Process for managing the training and induction requirements of its subcontractors and staff
- Process for reporting and investigation of incidents

### **3.3.3 Workplace Health & Safety Plan**

The Supplier must, and must ensure that its Personnel, comply with the all relevant and applicable requirements of the WHS Law and Regulations in carrying out the Works.

Supplier shall ensure all its processes and procedures to execute Works in compliance with

- NSW Code of Practice: How to Manage Work Health and Safety Risks and
- Work Health and Safety Act 2011 (NSW) and the Work Health and Safety Regulation 2011 (NSW)