

TECHNICAL EVALUATION MATRIX				
Project Name:	Real time GPS Tracker			
Project Description:	GPS Trackers to be installed on-board locomotives			
Agency/Firm:	Transnet Freight Rail			
Annexure	C			
Evaluation Criteria Description	Evidence required	Scoring Guideline	Maximum Score / Weighting	Score
SyS-REQ001: The system shall record and display geographic coordinates latitude and longitude in decimal degrees format, refer to table 1 below (BBH 7777 version 2).	Product Technical Documentation	0 = No GPS coordinate functionality provided (0%). 1 = Coordinates are provided but not in decimal format (0.4%). 2 = Decimal format is used but outputs are inconsistent or unclear (0.7%). 3 = Coordinates are correctly provided in decimal degrees with documentation (1.1%). 4 = Fully compliant implementation with validated decimal-degree outputs and technical specification proof. (1.4%)	1.4%	
SyS-REQ002: The GPS system must measure the GPS speed of the locomotive in real-time as per table 1 below (BBH 7777 version 2).	Product Technical Documentation	0 = No real-time GPS speed measurement provided (0%). 1 = Speed is shown but not in real time (0.4%). 2 = Real-time speed is attempted but accuracy or refresh behaviour is unclear (0.7%). 3 = GPS speed is measured in real time with supporting documentation (1.1%). 4 = Fully compliant implementation with validated real-time speed outputs and technical specification proof (1.4%).	1.4%	
SyS-REQ003: The system shall record timestamp of the location data as per table 1 below (BBH 7777 version 2). - GPS date time: The time at which the location was sent (UTC+2). - Received time: The time at which the sent location was received in the server. This is important to determine latency of transmission. - Format: the timestamp shall be recorded in a standard format such as ISO 8601 (e.g., YYYY-MM-DD HH:MM: SS) (year-month-day hour: seconds).	Product Technical Documentation	0 = No location timestamp recording provided (0%). 1 = Timestamps are recorded but required time fields or format are incomplete (0.4%). 2 = Required timestamp fields are partly recorded but format or latency traceability is unclear (0.7%). 3 = GPS date time, received time, and standard format are documented (1.1%). 4 = Fully compliant implementation with validated timestamp capture with latency traceability and technical specification proof (1.4%).	1.4%	
SyS-REQ004: The GPS system shall have the capability to monitor the quality of positional data in real-time.	Product Technical Documentation	0 = No real-time positional-data quality monitoring provided (0%). 1 = Quality indicators are mentioned but not monitored in real time (0.132%). 2 = Real-time quality monitoring is partial or not clearly evidenced (0.264%). 3 = Positional-data quality is monitored in real time with documentation (0.396%). 4 = Fully compliant implementation with validated real-time quality monitoring with technical proof (0.528%).	0.528%	
SyS-REQ005: The GPS system shall record and store positional data quality metrics along with positional data to support post-analysis.	Product Technical Documentation	0 = No storage of positional-data quality metrics provided (0%). 1 = Quality metrics are captured but not stored with position data (0.132%). 2 = Metrics are stored inconsistently or without clear post-analysis support (0.264%). 3 = Quality metrics are stored with positional records and documented (0.396%). 4 = Fully compliant implementation with validated quality-metric history supporting post-analysis with technical proof (0.528%).	0.528%	
SyS-REQ006: The GPS module's transmit interval shall be remotely configurable, with a default setting of 5 minutes. - The successful bidder must establish a formal process for reviewing and requesting API changes. - All change requests must be submitted by TFR via a ticketing system to ensure proper documentation, evaluation, and approval.	Product Technical Documentation	0 = No remote transmit-interval configuration and API change control provided (0%). 1 = Interval configuration is manual or change control is missing (0.4%). 2 = Remote configuration or ticketed change process is only partly defined (0.7%). 3 = Default 5-minute interval and formal API change process are documented (1.1%). 4 = Fully compliant implementation with validated remote configuration with auditable ticket workflow and technical proof (1.4%).	1.4%	
SyS-REQ007: The transmit interval shall be configurable within a range of 1 minute to 15 minutes. - The transmission interval shall apply to stationary and moving locomotives.	Product Technical Documentation	0 = No 1-to-15-minute transmit interval configuration provided (0%). 1 = Transmit interval is configurable but outside the required range (0.4%). 2 = Required range is partly supported or operating-state coverage is unclear (0.7%). 3 = 1-to-15-minute intervals are supported for stationary and moving locomotives (1.1%). 4 = Fully compliant implementation with validated configurable interval range across operating states with technical proof (1.4%).	1.4%	

SyS-REQ008: The GPS tracking system shall provide real-time location information indicating the group of locomotives coupled together, referred to as a consist, at any given time during operation. - A consist is defined as a configuration of one or more locomotives coupled together to operate as a single unit. - A consist includes all locomotives in the arrangement regardless of their physical position (front, middle, or rear of the train).	Product Technical Documentation	0 = No coupled-locomotive group location reporting provided (0%). 1 = Group location is displayed without reliable coupling context (0.4%). 2 = Coupled-group reporting is partial or inconsistently updated (0.7%). 3 = Real-time group location for coupled locomotives is documented (1.1%). 4 = Fully compliant implementation with validated coupled-group tracking with technical proof (1.4%).	1.4%	
SyS-REQ009: The cloud storage shall maintain a historical log of all location data for each locomotive, including all positional data points, for a minimum of 12 months. - The OEM shall remove any sensitive information that violate POPIA rules, including but not limited to: • Personal data of locomotive operators or system users (e.g., names, employee IDs). • Login credentials and other user authentication data.	Product Technical Documentation	0 = No 12-month historical location-log retention and POPIA controls provided (0%). 1 = History is retained for less than 12 months or POPIA controls are absent (0.4%). 2 = 12-month retention or sensitive-data removal is only partly addressed (0.7%). 3 = 12-month historical logs and POPIA-sensitive data removal are documented (1.1%). 4 = Fully compliant implementation with validated compliant retention and privacy controls with technical proof (1.4%).	1.4%	
SyS-REQ010: The locomotive equipment shall be able to store 7 days of the latest measurements in device memory, in the case of a catastrophic failure of the device and/ or the locomotive to which it is installed (derailment).	Product Technical Documentation	0 = No 7-day onboard device-memory storage provided (0%). 1 = Device memory exists but does not retain 7 days (0.4%). 2 = 7-day retention is claimed but recovery behaviour is unclear (0.7%). 3 = Latest 7 days of measurements are retained in device memory with documentation (1.1%). 4 = Fully compliant implementation with validated 7-day onboard storage under failure conditions with technical proof (1.4%).	1.4%	
SyS-REQ011: The system shall maintain a unique identifier (i.e., locomotive number) for each locomotive to enable accurate tracking of its location and operational status within the railway network. - The format of this unique identifier shall be defined and assigned by TFR.	Product Technical Documentation	0 = No unique locomotive identifier maintenance provided (0%). 1 = Identifier is present but not unique or centrally defined (0.4%). 2 = Unique identifier approach is partial or registry alignment is unclear (0.7%). 3 = Unique locomotive number tracking is documented (1.1%). 4 = Fully compliant implementation with validated unique identifier management with technical proof (1.4%).	1.4%	
SyS-REQ012: The locomotive number shall be a six-digit identifier based on the unique number assigned to each locomotive.	Product Technical Documentation	0 = No six-digit locomotive-number format provided (0%). 1 = Locomotive number is used but not six digits (0.4%). 2 = Six-digit format is partly applied or inconsistently validated (0.7%). 3 = Six-digit locomotive identifier format is documented (1.1%). 4 = Fully compliant implementation with validated six-digit identifier handling with technical proof (1.4%).	1.4%	
SyS-REQ013: The first three digits represent the class (e.g., 21E), and the last three digits (e.g., 034) represent the specific locomotive number. For example: - If a locomotive is assigned the number 21E034, it shall be expressed as 021034. - If a locomotive is assigned the number 43D055, it shall be expressed as 043055.	Product Technical Documentation	0 = No class-and-number locomotive identifier structure provided (0%). 1 = Identifier does not separate class and locomotive number (0.4%). 2 = Class and specific-number structure is partial or ambiguous (0.7%). 3 = First-three-class and last-three-number structure is documented (1.1%). 4 = Fully compliant implementation with validated identifier parsing and display with technical proof (1.4%).	1.4%	
SyS-REQ014: The system shall validate locomotive numbers against a central registry to prevent duplication leading to two locomotives reporting with the same number.	Product Technical Documentation	0 = No central-registry locomotive-number validation provided (0%). 1 = Duplicate prevention is not linked to a registry (0.132%). 2 = Registry validation is partial or duplicate handling is unclear (0.264%). 3 = Locomotive numbers are validated against a central registry (0.396%). 4 = Fully compliant implementation with validated duplicate-prevention workflow with technical proof (0.528%).	0.528%	
SyS-REQ015: The system shall be implemented as a Software as a Service (SaaS) subscription model.	Product Technical Documentation	0 = No SaaS subscription implementation model provided (0%). 1 = Solution is not offered as SaaS (0.4%). 2 = SaaS model is mentioned but commercial or operational details are incomplete (0.7%). 3 = SaaS subscription model is clearly documented (1.1%). 4 = Fully compliant implementation with fully compliant SaaS operating model with contractual and technical proof (1.4%).	1.4%	

SyS-REQ016: The successful bidder shall supply, install and manage the GPS tracking equipment in locomotives.	Product Technical Documentation	0 = No supply, installation, and management of GPS tracking equipment provided (0%). 1 = Bidder excludes supply, installation, or management responsibility (0.4%). 2 = Responsibilities are partly covered or unclear (0.7%). 3 = Supply, installation, and management responsibilities are documented (1.1%). 4 = Fully compliant implementation with complete managed equipment lifecycle with implementation proof (1.4%).	1.4%	
SyS-REQ017: The successful bidder shall provide, maintain, host and manage cloud infrastructure responsible for collection and storage of location data.	Product Technical Documentation	0 = No managed cloud infrastructure for data collection and storage provided (0%). 1 = Cloud hosting or management responsibility is absent (0.132%). 2 = Cloud collection or storage management is only partly defined (0.264%). 3 = Managed cloud infrastructure is documented (0.396%). 4 = Fully compliant implementation with validated hosted and managed cloud architecture with technical proof (0.528%).	0.528%	
SyS-REQ018: The sharing of the GPS data with other customers other than TFR shall require prior approval from TFR.	Product Technical Documentation	0 = No TFR approval for sharing GPS data with other customers provided (0%). 1 = Third-party data sharing controls are absent (0.4%). 2 = Approval control is mentioned but workflow is unclear (0.7%). 3 = Prior TFR approval for other-customer data sharing is documented (1.1%). 4 = Fully compliant implementation with auditable data-sharing approval controls with governance proof (1.4%).	1.4%	
SyS-REQ019: The system shall provide a secure, standards-based Application Programming Interface (API) to enable Transnet Freight Rail (TFR) to access location and related operational data.	API & Data Interoperability Specification	0 = No secure standards-based API access to GPS data provided (0%). 1 = API access is not provided (0.4%). 2 = API exists but standards, security, or access scope is incomplete (0.7%). 3 = Secure standards-based API access is documented (1.1%). 4 = Fully compliant implementation with validated secure API capability with technical proof (1.4%).	1.4%	
SyS-REQ020: The API shall support encrypted communication using industry-accepted transport security protocols.	API & Data Interoperability Specification	0 = No encrypted API communication provided (0%). 1 = API transport encryption is absent (0.4%). 2 = Encryption is mentioned but protocol suitability is unclear (0.7%). 3 = Industry-accepted encrypted transport is documented (1.1%). 4 = Fully compliant implementation with validated encrypted API communication with security proof (1.4%).	1.4%	
SyS-REQ021: The API shall provide capabilities to retrieve both real-time (current) and historical location data.	API & Data Interoperability Specification	0 = No real-time and historical API retrieval provided (0%). 1 = API does not retrieve location data (0.4%). 2 = API retrieves only current or only historical data (0.7%). 3 = API supports both real-time and historical retrieval (1.1%). 4 = Fully compliant implementation with validated dual retrieval capability with API proof (1.4%).	1.4%	
SyS-REQ022: The solution shall support efficient query mechanisms to enable filtering, time-based searches, and structured data retrieval as required by TFR systems.	API & Data Interoperability Specification	0 = No efficient API query filtering and time-based search provided (0%). 1 = API has no filtering or time-based query capability (0.4%). 2 = Query mechanisms are limited or inefficient (0.7%). 3 = Filtering, time search, and structured retrieval are documented (1.1%). 4 = Fully compliant implementation with validated efficient query performance with API proof (1.4%).	1.4%	
SyS-REQ023: The API shall support structured, machine-readable data formats commonly adopted in enterprise environments (e.g., JSON, XML, or equivalent). Bidders may propose the most appropriate data format, provided interoperability with TFR enterprise systems is ensured.	API & Data Interoperability Specification	0 = No machine-readable API data formats provided (0%). 1 = API output is not machine-readable (0.4%). 2 = JSON, XML, or equivalent format support is partial (0.7%). 3 = Machine-readable data formats are documented (1.1%). 4 = Fully compliant implementation with validated structured format support with API proof (1.4%).	1.4%	

SyS-REQ024: Comprehensive API documentation shall be provided, including: • Endpoint definitions or interface specifications • Authentication and authorization requirements • Sample requests and responses • Error handling descriptions and response codes • Usage guidelines and integration examples • Documentation shall be sufficient to enable independent integration by TFR technical teams.	API & Data Interoperability Specification	0 = No comprehensive API documentation provided (0%). 1 = API documentation is not provided (0.4%). 2 = Documentation omits key endpoint, authentication, or error details (0.7%). 3 = Comprehensive API documentation is provided (1.1%). 4 = Fully compliant implementation with complete developer-ready API documentation with proof (1.4%).	1.4%	
SyS-REQ025: The bidder shall provide high-level and detailed architecture documentation illustrating the end-to-end data flow from onboard GPS devices through communication networks to backend infrastructure and API interfaces. The architecture documentation shall clearly identify: - Data acquisition components - Communication mechanisms - Storage infrastructure - API exposure layer - Security controls	API & Data Interoperability Specification	0 = No end-to-end data-flow architecture documentation provided (0%). 1 = Architecture documentation is absent (0.4%). 2 = Data-flow documentation is high level or incomplete (0.7%). 3 = High-level and detailed data-flow architecture is documented (1.1%). 4 = Fully compliant implementation with validated end-to-end architecture proof from device to backend (1.4%).	1.4%	
SyS-REQ026: The system shall implement logging and audit mechanisms to record all API access attempts, transactions, configuration changes, and administrative actions.	API & Data Interoperability Specification	0 = No API logging and audit mechanisms provided (0%). 1 = API audit logging is absent (0.132%). 2 = Logging exists but lacks transactions, configuration, or admin traceability (0.264%). 3 = API access, transaction, configuration, and admin logs are documented (0.396%). 4 = Fully compliant implementation with validated audit logging with traceability proof (0.528%).	0.528%	
SyS-REQ027: Audit logs shall support traceability, security monitoring, and compliance with TFR governance requirements.	API & Data Interoperability Specification	0 = No audit-log traceability and security monitoring provided (0%). 1 = Audit logs do not support traceability (0.132%). 2 = Traceability or monitoring support is incomplete (0.264%). 3 = Audit logs support governance traceability and security monitoring (0.396%). 4 = Fully compliant implementation with validated compliance-ready audit logging with proof (0.528%).	0.528%	
SyS-REQ028: The system shall implement robust access control mechanisms to manage and enforce permissions for accessing data and performing API operations.	API & Data Interoperability Specification	0 = No API access-control enforcement provided (0%). 1 = Access control is absent (0.132%). 2 = Permissions exist but enforcement is unclear (0.264%). 3 = Robust API permissions and access controls are documented (0.396%). 4 = Fully compliant implementation with validated permission enforcement with security proof (0.528%).	0.528%	
SyS-REQ029: The solution shall support role-based access control (RBAC) or equivalent authorization models, enabling the definition of user roles and associated permissions (e.g., read, write, modify, delete). Permissions shall govern access to data sets and API functionality in accordance with TFR security policies.	API & Data Interoperability Specification	0 = No role-based access control provided (0%). 1 = Role-based access is absent (0.132%). 2 = Roles are defined but permissions are incomplete or unclear (0.264%). 3 = RBAC or equivalent authorization model is documented (0.396%). 4 = Fully compliant implementation with validated role and permission model with security proof (0.528%).	0.528%	
SyS-REQ030: The system shall provide secure authentication and authorization mechanisms for API consumers using industry-recognised standards (e.g., token-based authentication, certificate-based authentication, or equivalent).	API & Data Interoperability Specification	0 = No secure API authentication and authorization provided (0%). 1 = Secure authentication is absent (0.132%). 2 = Authentication exists but recognized standards are unclear (0.264%). 3 = Standards-based authentication and authorization are documented (0.396%). 4 = Fully compliant implementation with validated secure auth implementation with proof (0.528%).	0.528%	
SyS-REQ031: The bidder shall describe the proposed authentication model and demonstrate alignment with enterprise security best practices.	API & Data Interoperability Specification	0 = No proposed authentication model description provided (0%). 1 = Authentication model is not described (0.132%). 2 = Model is described but enterprise alignment is weak (0.264%). 3 = Authentication model aligns with enterprise security practices (0.396%). 4 = Fully compliant implementation with validated enterprise-grade authentication model with proof (0.528%).	0.528%	

SyS-REQ032: -The GPS tracking module may be powered either through connection to the locomotive electrical supply or through an internal battery solution, or a hybrid combination thereof, at the discretion of the bidder. -The proposed power architecture shall ensure continuous and reliable operation of the module for the full duration of the contract period. -The bidder shall clearly describe the proposed power strategy and demonstrate its suitability for the locomotive operating environment.	Product Technical Documentation System Architecture Documentation	0 = No GPS module power-supply architecture provided (0%). 1 = Power approach is not specified (0.132%). 2 = Wired, battery, or hybrid option is partly described (0.264%). 3 = Power option is clearly documented (0.396%). 4 = Fully compliant implementation with validated power architecture with operating proof (0.528%).	0.528%	
SyS-REQ033: Where the solution interfaces with locomotive electrical systems, it shall be compatible with both diesel and electric locomotive supply conditions and shall be designed to tolerate typical railway voltage variations and transients in accordance with recognised railway environmental and power standards (e.g., EN 50155 or equivalent).	Product Technical Documentation System Architecture Documentation	0 = No diesel and electric locomotive supply compatibility provided (0%). 1 = Locomotive electrical compatibility is not addressed (0.132%). 2 = Compatibility is claimed for only some supply conditions (0.264%). 3 = Diesel and electric supply compatibility is documented (0.396%). 4 = Fully compliant implementation with validated electrical compatibility with technical proof (0.528%).	0.528%	
SyS-REQ034: The bidder shall specify the supported voltage ranges and protective mechanisms implemented.	Product Technical Documentation System Architecture Documentation	0 = No supported voltage ranges and protection mechanisms provided (0%). 1 = Voltage ranges or protections are not specified (0.132%). 2 = Voltage support is partial or protection details are unclear (0.264%). 3 = Supported ranges and protective mechanisms are documented (0.396%). 4 = Fully compliant implementation with validated voltage and protection design with technical proof (0.528%).	0.528%	
SyS-REQ035: Where a battery-powered solution is proposed, the module shall: - Sustain data transmission at the specified reporting intervals - Operate reliably under the environmental conditions applicable to TFR operations - Minimise battery replacement frequency - Provide clear battery health monitoring and reporting capability - The bidder shall specify: •Expected battery life at the proposed transmission interval •Replacement cycle •Access methodology for battery replacement •Any operational impact during battery servicing	Product Technical Documentation	0 = No battery-powered solution performance and servicing provided (0%). 1 = Battery life or servicing details are absent (0.4%). 2 = Battery performance is partly described but replacement or monitoring is unclear (0.7%). 3 = Battery life, replacement cycle, access method, and health reporting are documented (1.1%). 4 = Fully compliant implementation with validated battery operation and maintenance proof (1.4%).	1.4%	
SyS-REQ036: The bidder shall demonstrate that the selected power solution (wired, battery, or hybrid): -Supports uninterrupted data collection and transmission -Does not introduce operational safety risks -Does not adversely affect locomotive systems -Is maintainable within TFR operational constraints	Product Technical Documentation	0 = No uninterrupted, safe, maintainable power solution provided (0%). 1 = Power solution creates unresolved operational or safety risks (0.4%). 2 = Continuity, safety, or maintainability is only partly shown (0.7%). 3 = Power solution supports uninterrupted safe operation and maintainability (1.1%). 4 = Fully compliant implementation with validated safe power solution with technical proof (1.4%).	1.4%	
SyS-REQ037: The solution shall provide a reliable and resilient communication capability to transmit locomotive data to the designated backend systems at the specified reporting intervals.	Product Technical Documentation System Architecture Documentation	0 = No communication architecture and performance monitoring provided (0%). 1 = Communication capability is not described (0.4%). 2 = Communication technology is described but performance measures are incomplete (0.7%). 3 = Reliable communication architecture and measurable performance are documented (1.1%). 4 = Fully compliant implementation with validated resilient communication performance with technical proof (1.4%).	1.4%	
SyS-REQ038: The bidder may propose any suitable communication technology or combination thereof, provided that measurable service performance (e.g., latency, packet loss, connection stability, and coverage) is demonstrated and made available to TFR for monitoring.	Product Technical Documentation System Architecture Documentation	0 = No communication technology or performance monitoring provided (0%). 1 = Communication technology is proposed but no measurable performance indicators are defined (0.4%). 2 = Some performance metrics are described but are incomplete or not measurable (0.7%). 3 = Communication technology and measurable service performance (latency, packet loss, stability, coverage) are documented (1.1%). 4 = Fully compliant implementation with validated communication performance metrics and monitoring (1.4%).	1.4%	
SyS-REQ039: For Class 44D locomotives operating in the Mineral, Mining and Chrome (MMC) Business Unit and intended for cross-border operations, the communication solution shall support continuous tracking data availability both within the Republic of South Africa and across cross-border railway corridors outside the borders of South Africa.	Product Technical Documentation System Architecture Documentation	0 = No cross-border tracking capability provided (0%). 1 = Tracking is limited to within South Africa only (0.4%). 2 = Cross-border capability is mentioned but continuous availability is not demonstrated (0.7%). 3 = Continuous tracking across South Africa and cross-border corridors is documented (1.1%). 4 = Fully compliant implementation with validated continuous cross-border tracking availability with operational (1.4%). proof.	1.4%	

SyS-REQ040: The successful bidder shall be responsible for ensuring that tracking data for applicable Class 44D locomotives operating in the MMC BU remains available irrespective of the communication environment, network operator, or country in which the locomotive is operating.	Product Technical Documentation System Architecture Documentation	0 = No assurance of tracking data availability across environments or operators (0%). 1 = Responsibility for data availability is not accepted (0.4%). 2 = Availability is partially addressed but not independent of operator or geography (0.7%). 3 = Tracking data availability across environments, operators, and countries is documented (1.1%). 4 = Fully compliant implementation with validated resilient data availability across all operating conditions with (1.4%). proof.	1.4%	
SyS-REQ041: The bidder shall be responsible for providing and maintaining all communication arrangements, technologies, services, and associated infrastructure necessary to support reliable cross-border tracking capability for the duration of the contract.	Product Technical Documentation System Architecture Documentation	0 = No responsibility for communication arrangements or infrastructure provided (0%). 1 = Communication responsibility is unclear or partially assigned (0.4%). 2 = Some arrangements are described but lack completeness or lifecycle coverage (0.7%). 3 = Full responsibility for communication technologies, services, and infrastructure is documented (1.1%). 4 = Fully compliant implementation with validated end-to-end communication responsibility and sustained support with proof (1.4%).	1.4%	
SyS-REQ042: Where communication is temporarily unavailable, the onboard tracking solution shall continue recording tracking data and automatically transmit stored data once communication is restored.	Product Technical Documentation System Architecture Documentation	0 = No offline data recording or delayed transmission capability provided (0%). 1 = Data loss occurs when communication is unavailable (0.4%). 2 = Data storage is provided but automatic retransmission is unclear or incomplete (0.7%). 3 = Data is stored during outages and automatically transmitted upon restoration (1.1%). 4 = Fully compliant implementation with validated store-and-forward capability with no data loss and performance proof (1.4%).	1.4%	
SyS-REQ043: The successful bidder shall be fully responsible for ensuring that all communication equipment, spectrum usage, and transmission technologies used in the solution are legally approved for operation within the Republic of South Africa and, where applicable, in cross-border operating territories.	Product Technical Documentation System Architecture Documentation	0 = No legal or regulatory compliance for communication technologies provided (0%). 1 = Regulatory compliance responsibility is not addressed (0.4%). 2 = Compliance is partially addressed but lacks completeness across regions (0.7%). 3 = Legal approval for equipment, spectrum, and technologies is documented for all applicable regions (1.1%). 4 = Fully compliant implementation with validated legal approval across all operating territories with certification proof (1.4%).	1.4%	
SyS-REQ044: The bidder shall obtain and maintain all required regulatory certifications, approvals, licences, and authorisations (including, where applicable, ICASA type approval, spectrum licensing, and approvals from applicable telecommunications and regulatory authorities within the SADC region) for the full duration of the contract. Non-compliance shall remain the sole responsibility of the supplier.	South African Regulatory Compliance	0 = No regulatory certifications or licences provided (0%). 1 = Responsibility for certifications and licences is not accepted (0.4%). 2 = Certifications are mentioned but incomplete or not maintained for contract duration (0.7%). 3 = Required certifications, licences, and approvals (including ICASA and SADC) are documented (1.1%). 4 = Fully compliant implementation with validated certification lifecycle management and compliance proof (1.4%).	1.4%	
SyS-REQ045: The system must ensure the accuracy of the speed data with an error margin of no more than 5 km/h.	Product Technical Documentation System Architecture Documentation	0 = No speed accuracy requirement provided (0%). 1 = Speed accuracy is not addressed (0.4%). 2 = Accuracy is claimed but exceeds or does not prove the 5 km/h tolerance (0.7%). 3 = Speed accuracy within 5 km/h is documented (1.1%). 4 = Fully compliant implementation with validated speed accuracy within tolerance supported by test evidence (1.4%).	1.4%	
SyS-REQ046: It is desirable that time shall not exceed 1000ms for real-time data requests.	Product Technical Documentation System Architecture Documentation	0 = No real-time response capability provided (0%). 1 = Response time requirement is not addressed (0.4%). 2 = Response time is mentioned but exceeds or does not demonstrate 1000 ms (0.7%). 3 = Real-time response within 1000 ms is documented (1.1%). 4 = Fully compliant implementation with validated sub-1000 ms response performance with test proof (1.4%).	1.4%	
SyS-REQ047: It is desirable that the tracking system shall provide a positioning accuracy of 5 meters or better under standard operating conditions.	Product Technical Documentation System Architecture Documentation	0 = No evidence of GPS positioning accuracy capability provided (0%). 1 = GPS capability is mentioned but no accuracy specification or supporting evidence is provided (0.4%). 2 = GPS accuracy specification is provided but does not demonstrate compliance with ≤5 metre accuracy or lacks validation evidence (0.7%). 3 = Documented GPS accuracy of ≤5 metres provided with supporting technical specifications/test evidence (1.1%). 4 = Proven positioning accuracy of ≤5 metres through validated test results, operational evidence, and documented performance under relevant operating conditions (1.4%).	1.4%	

SyS-REQ048: The successful bidder shall be fully responsible for the maintenance and upkeep and monitoring of the tracking device for the period of the contract.	Maintenance and support plan, monitoring procedures, escalation process, preventative maintenance schedule, and evidence of service management capability	0 = No maintenance, upkeep or monitoring responsibility commitment provided (0%). 1 = Maintenance responsibility is mentioned but scope, ownership and support approach are not defined (0.132%). 2 = Maintenance and monitoring responsibilities are partially defined but service processes or support commitments are incomplete (0.264%). 3 = Documented maintenance, upkeep and monitoring responsibilities provided with defined support processes and technical documentation (0.396%). 4 = Fully compliant implementation with validated maintenance processes, monitoring capability, escalation procedures and contract support evidence provided (0.528%).	0.528%	
SyS-REQ049: The successful bidder must conduct regular maintenance checks and technical support shall be available to quickly address any issues that arise.	Maintenance and support plan, monitoring procedures, escalation process, preventative maintenance schedule, and evidence of service management capability	0 = No maintenance checks/support capability provided (0%). 1 = Support capability mentioned without defined process (0.132%). 2 = Maintenance/support process partially defined (0.264%). 3 = Documented maintenance schedule and technical support process provided (0.396%). 4 = Validated maintenance programme, support SLA and escalation process provided (0.528%).	0.528%	
SyS-REQ050: The successful bidder must provide details about the maintenance plan and strategy that shall be followed.	Product Technical Documentation	0 = No maintenance plan provided (0%). 1 = General maintenance approach provided without detail (0.132%). 2 = Maintenance strategy partially documented (0.264%). 3 = Complete maintenance plan with preventive/corrective activities provided (0.396%). 4 = Fully detailed lifecycle maintenance strategy with proven implementation approach (0.528%).	0.528%	
SyS-REQ051: The system shall support over-the-air (OTA) updates for firmware and software enhancements.	Operational Support & Maintenance Model	0 = No OTA update capability provided (0%). 1 = OTA capability mentioned only (0.4%). 2 = OTA process exists but security or rollback controls unclear (0.7%). 3 = Documented OTA update process with security controls (1.1%). 4 = Validated OTA deployment, rollback and audit capability demonstrated (1.4%).	1.4%	
SyS-REQ052: Bidders are required to provide Mean Time Before Failure (MTBF) values for the GPS tracking equipment. Bidders with higher MTBF values shall be preferred.	Operational Support & Maintenance Model	0 = No MTBF information provided (0%). 1 = MTBF stated without supporting basis (0.4%). 2 = MTBF provided with limited supporting reliability data (0.7%). 3 = MTBF values documented with manufacturer evidence (1.1%). 4 = Validated MTBF performance data and reliability history provided (1.4%).	1.4%	
SyS-REQ053: Mean Time to Repair (MTTR) a faulty module shall be done within 24 – 48 hours.	MTTR commitments, support response times, escalation procedures, and evidence of service reliability performance.	0 = No MTTR commitment provided (0%). 1 = Repair commitment mentioned without timeframe (0.4%). 2 = MTTR target provided but process/evidence incomplete (0.7%). 3 = 24–48 hour MTTR commitment with SLA and repair process documented (1.1%). 4 = Validated MTTR performance, SLA compliance and escalation records provided (1.4%).	1.4%	
SyS-REQ054: Contractors shall provide data, which proves these figures.	Operational Support & Maintenance Model	0 = No reliability evidence provided (0%). 1 = Reliability claims provided without evidence (0.4%). 2 = Limited reliability data provided (0.7%). 3 = Reliability reports and supporting calculations provided (1.1%). 4 = Independent/operational reliability evidence validated (1.4%).	1.4%	
SyS-REQ055: There shall be penalties imposed when there is low reliability as to be defined in the SLA.	Operational Support & Maintenance Model	0 = No reliability SLA provisions provided (0%). 1 = Reliability obligations mentioned only (0.4%). 2 = SLA provisions partially defined (0.7%). 3 = Reliability targets and penalties documented in SLA (1.1%). 4 = Proven SLA governance with reliability performance reporting (1.4%).	1.4%	

SyS-REQ056: TFR and the successful bidder shall jointly establish the required availability percentage for operational and accurate GPS data over a defined period.	Operational Support & Maintenance Model	0 = No availability target process provided (0%). 1 = Availability target mentioned only (0.4%). 2 = Target-setting process partially defined (0.7%). 3 = Joint availability measurement process documented (1.1%). 4 = Agreed availability KPI process with monitoring and reporting evidence (1.4%).	1.4%	
SyS-REQ057: The successful bidder shall be responsible for continuous monitoring of the GPS system's availability.	Operational Support & Maintenance Model	0 = No availability monitoring provided (0%). 1 = Monitoring capability mentioned only (0.4%). 2 = Monitoring exists but reporting is unclear (0.7%). 3 = Continuous availability monitoring with reports provided (1.1%). 4 = Real-time monitoring, alerts and historical availability reporting validated (1.4%).	1.4%	
SyS-REQ058: The successful bidder shall also be responsible for requesting locomotives from TFR operations if maintenance or repair work is needed on the GPS system devices installed in locomotives.	Operational Support & Maintenance Model	0 = No maintenance access process provided (0%). 1 = Request process mentioned only (0.4%). 2 = Process partially documented (0.7%). 3 = Defined maintenance request, approval and coordination process (1.1%). 4 = Proven operational process with tracking and audit trail (1.4%).	1.4%	
SyS-REQ059: There shall be penalties imposed when there is low availability as to be defined in the SLA.	Service Level Agreement (SLA) Commitments	0 = No availability SLA provisions provided (0%). 1 = Availability obligations mentioned only (0.4%). 2 = Availability penalties partially defined (0.7%). 3 = Availability targets and penalties documented (1.1%). 4 = SLA governance supported by availability reports and enforcement process (1.4%).	1.4%	
SyS-REQ060: The cloud infrastructure shall incorporate auto-scaling groups to dynamically adjust resources in response to increased load.	Cloud architecture documentation, auto-scaling configuration, scalability design and performance validation evidence.	0 = No auto-scaling capability provided (0%). 1 = Scaling capability mentioned only (0.4%). 2 = Manual/limited scaling capability provided (0.7%). 3 = Automated cloud scaling documented (1.1%). 4 = Validated auto-scaling under load with monitoring evidence (1.4%).	1.4%	
SyS-REQ061: The system shall undergo load testing to verify its capability to support multiple concurrent locomotive device connections and manage data from more than 2,000 locomotives. - The successful bidder shall specify the testing tools and methods to be employed, indicating whether testing will be automated, manual, or a combination of both. - The successful bidder shall provide a detailed test procedure. - Device management processes shall be implemented to clearly indicate the status of devices as active or non-active.	Load testing methodology, test results, performance reports and capacity validation evidence.	0 = No load testing evidence provided (0%). 1 = Load testing approach mentioned only (0.4%). 2 = Test approach provided without results (0.7%). 3 = Load testing results demonstrate required fleet capacity (1.1%). 4 = Validated performance testing with scalability evidence (1.4%).	1.4%	
SyS-REQ062: Installation Configuration (Optional Architecture): The installation configuration of the GPS tracking system shall be at the discretion of the bidder, provided that the proposed mounting location and method: - Is technically suitable for reliable system operation - Does not compromise locomotive safety, performance, or maintainability - Complies with applicable railway installation standards and Transnet safety requirements - The bidder shall be fully responsible for determining and justifying the appropriate installation location within the locomotive. 8.1.1.5 Where a 19" rack is available, it may be utilised if deemed appropriate by the bidder. Alternative mounting locations may be proposed where operationally or technically justified.	Installation design documentation, mounting configuration, installation procedures and technical approval evidence.	0 = No installation configuration provided (0%). 1 = Installation approach described only (0.4%). 2 = Configuration partially documented (0.7%). 3 = Installation design and mounting justification provided (1.1%). 4 = Validated installation design with drawings and technical approval (1.4%).	1.4%	

SyS-REQ063: Antenna Installation & Responsibility: The bidder shall be responsible for determining the appropriate antenna configuration and installation location to ensure optimal signal reception and transmission. The bidder may: - Utilise an existing TFR GPS antenna, subject to confirmed spare slot availability on the bulkhead/roof, or - Install a dedicated antenna solution, which shall be high-voltage (HV) approved and suitable for railway environments - All antenna installations shall: •Be mechanically robust •Be designed to withstand environmental and operational conditions, including exposure to overhead track equipment (OHTE) •Not interfere with existing locomotive systems •Comply with applicable safety and electrical clearance requirements The bidder assumes full responsibility for antenna integration, certification, and long-term integrity of the installation.	Product Technical Documentation System Architecture Documentation	0 = No antenna selection and installation responsibility evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.132%). 2 = Partial capability or documentation provided (0.264%). 3 = Documented compliance with supporting technical evidence provided (0.396%). 4 = Fully compliant implementation validated through test results, certification or operational proof (0.528%).	0.528%	
SyS-REQ064: The GPS Electronic equipment used on rolling stock system modules shall meet EN 50155 standard requirements to ensure it is suitable for railway applications.	Product Technical Documentation System Architecture Documentation	0 = No en 50155 railway equipment compliance evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.132%). 2 = Partial capability or documentation provided (0.264%). 3 = Documented compliance with supporting technical evidence provided (0.396%). 4 = Fully compliant implementation validated through test results, certification or operational proof (0.528%).	0.528%	
SyS-REQ065: The system must be able to function without failure across a wide range of temperatures encountered in railway environments (-40°C to +85°C).	Product Technical Documentation	0 = No temperature operating range capability evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.132%). 2 = Partial capability or documentation provided (0.264%). 3 = Documented compliance with supporting technical evidence provided (0.396%). 4 = Fully compliant implementation validated through test results, certification or operational proof (0.528%).	0.528%	
SyS-REQ066: The GPS system equipment shall be designed and tested to resist mechanical stress due to vibrations and shocks experienced during locomotive operation.	Product Technical Documentation	0 = No vibration and shock resistance evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.132%). 2 = Partial capability or documentation provided (0.264%). 3 = Documented compliance with supporting technical evidence provided (0.396%). 4 = Fully compliant implementation validated through test results, certification or operational proof (0.528%).	0.528%	
SyS-REQ067: The GPS system equipment shall be able to operate reliably in high humidity conditions and resist moisture ingress.	Product Technical Documentation	0 = No humidity and moisture resistance evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ068: All electronic components should be coated to protect against dust, moisture, and other environmental factors that could compromise reliability.	Product Technical Documentation	0 = No protective coating for environmental protection evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ069: Input surges are extremely higher on older type locomotives (e.g., 10E locomotives) and the GPS equipment must be immunised against higher surges than would normally be expected. In this respect, the requirements that are stipulated in EN50155 must be used as a minimum.	Product Technical Documentation	0 = No input surge protection evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	

SyS-REQ070: The materials and design of the system should minimise the risk of fire and smoke, ensuring safety and reliability in railway applications.	Product Technical Documentation	0 = No fire and smoke risk minimisation evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ071: The GPS system equipment shall not produce noise levels that may interfere with other nearby devices as per EN50121-3-2.	Product Technical Documentation	0 = No emc/noise interference compliance evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ072: The GPS modules shall be rated IP67 or higher for environmental protection.	Product Technical Documentation	0 = No IP67 environmental protection rating evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ073: A security architecture document detailing the data encryption methodologies used (e.g., TLS 1.2 or higher) must be provided.	Product Technical Documentation	0 = No security architecture and encryption methodology evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ074: Data in transit such as location data, user credentials, configuration files, logs, and any other confidential information must be encrypted.	Product Technical Documentation	0 = No encryption of data in transit evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ075: To comply with South African data protection regulations and ensure the security of sensitive location data, all GPS data from locomotives must be processed/ hosted locally before any potential transfer to international servers.	Product Technical Documentation	0 = No popia/data protection compliance evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ076: The service provider shall provide a SOC II type 2 report or ISO-27001 compliance report or an attestation that a pen test has been conducted and findings remediated.	Product Technical Documentation	0 = No security assurance certification evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ077: The GPS system equipment installed on the locomotives must be hardened to ensure they are robust and resistant to physical damage.	Product Technical Documentation	0 = No physical equipment hardening evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	

SyS-REQ078: The GPS system equipment must have security mechanisms to protect the device from theft, unauthorized access, and vandalism	Product Technical Documentation	0 = No anti-theft and unauthorised access protection evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ079: The GPS must be able to fall back to alternative wireless communication methods in case of primary network failure.	Product Technical Documentation	0 = No fallback wireless communication evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.132%). 2 = Partial capability or documentation provided (0.264%). 3 = Documented compliance with supporting technical evidence provided (0.396%). 4 = Fully compliant implementation validated through test results, certification or operational proof (0.528%).	0.528%	
SyS-REQ080: The GPS must have backup power supplies in case of primary power source failure.	Product Technical Documentation	0 = No backup power supply evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ081: The system must have backup servers in the case of primary server failure.	Product Technical Documentation	0 = No backup server capability evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.132%). 2 = Partial capability or documentation provided (0.264%). 3 = Documented compliance with supporting technical evidence provided (0.396%). 4 = Fully compliant implementation validated through test results, certification or operational proof (0.528%).	0.528%	
SyS-REQ082: Operational Dashboard Capability - The solution shall provide configurable, web-based dashboards enabling authorised TFR users to visualise locomotive location, status, and historical movement data in near real-time. Dashboards shall support: - Fleet-level overview (map-based and tabular views) - Individual locomotive drill-down - Time-based filtering (date, shift, corridor, depot) - Export of data in structured formats for further analysis - The system shall allow user-defined views and filters appropriate to railway operational control environments.	Product Technical Documentation	0 = No operational dashboard capability evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.132%). 2 = Partial capability or documentation provided (0.264%). 3 = Documented compliance with supporting technical evidence provided (0.396%). 4 = Fully compliant implementation validated through test results, certification or operational proof (0.528%).	0.528%	
SyS-REQ083: Railway-Specific Analytics - The solution shall provide analytics suitable for railway operations, including but not limited to: - Route and corridor utilisation analysis - Dwell time and idle time analysis - Movement history and replay functionality - Communication performance reporting - Device health and uptime monitoring - The system shall enable TFR to generate reports that support operational performance monitoring, asset utilisation assessment, and service reliability analysis.	Product Technical Documentation	0 = No railway-specific analytics evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ084: Scalability & Performance - The dashboard and analytics platform shall be scalable to support the full fleet size and concurrent user access without degradation in performance. The bidder shall specify: - Data refresh intervals - System response times - Historical data retention limits	Product Technical Documentation	0 = No dashboard scalability and performance evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	
SyS-REQ085: The successful contractor(s) shall be responsible for drafting an Acceptance Test Procedure (ATP) and submitting this to Transnet Freight Rail for Approval.	Product Technical Documentation	0 = No acceptance test procedure (atp) evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.132%). 2 = Partial capability or documentation provided (0.264%). 3 = Documented compliance with supporting technical evidence provided (0.396%). 4 = Fully compliant implementation validated through test results, certification or operational proof (0.528%).	0.528%	

SyS-REQ086: The tests shall be executed according to the ATP to test the functionality of the complete system using a holistic approach.	Product Technical Documentation	0 = No atp execution and system testing evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.132%). 2 = Partial capability or documentation provided (0.264%). 3 = Documented compliance with supporting technical evidence provided (0.396%). 4 = Fully compliant implementation validated through test results, certification or operational proof (0.528%).	0.528%	
SyS-REQ087: The test cases shall have traceability to both the System Requirement Specification (SRS) and the User Requirement Specification (URS).	Product Technical Documentation	0 = No test case traceability evidence provided (0%). 1 = Requirement is mentioned but evidence is insufficient (0.4%). 2 = Partial capability or documentation provided (0.7%). 3 = Documented compliance with supporting technical evidence provided (1.1%). 4 = Fully compliant implementation validated through test results, certification or operational proof (1.4%).	1.4%	