EG CONSTRUCTION

Fleet Management System

System Specification Document

Version 1.3 – FINAL DRAFT
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Prepared for Final Approval by:

CEO

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1. Executive Summary

This document specifies the requirements for a Fleet Maintenance Management System for EG Construction. The system will integrate with the existing Vehicle Tax Management module to provide a comprehensive fleet management solution.

✓ Specification Complete

All requirements have been gathered from the Senior DPF. This document is ready for CEO approval.

Business Objectives

- Track scheduled maintenance based on configurable intervals (hours or kilometers)
- Implement condition-based monitoring with photo documentation
- Maintain complete service history for all machines across multiple sites
- Provide visibility into machine performance and component wear patterns
- Enable DPF teams to log work with Senior DPF approval for quality control
- Generate alerts via SMS, Email, and WhatsApp
- Scale seamlessly as the fleet grows or changes

Key Features Confirmed

- Photo attachments on inspections (especially for Repair/Replace items)
- Approval workflow – all entries require Senior DPF approval
- Job cards for repairs, tyre changes, and tyre repairs
- WhatsApp notifications (in addition to SMS and Email)
- Oil analysis tracking with results logging
- Parts usage recording (for future inventory capability)

2. System Overview & Design Principles

2.1 Scope

The Fleet Maintenance Management System covers four primary functions:

Function	Description
Preventive Maintenance	Scheduled services based on configurable hours/km intervals per machine type
Condition-Based Monitoring	Monthly/quarterly inspections with photo documentation and oil analysis tracking
Job Cards & Repairs	Track all repair work, tyre changes, and ad-hoc maintenance with approval workflow
Service History & Analytics	Complete records enabling pattern analysis, cost tracking, and decision-making

2.2 Design Principles

Principle	Implementation
Configurable	Service intervals, notification thresholds, and inspection frequencies are settings – not hardcoded
Scalable	Add/remove machines, sites, and users anytime. No limit on fleet size
Accountable	All entries require Senior DPF approval before being finalized, ensuring accuracy
Template-Based	Machine Types serve as templates. New machines inherit defaults automatically
Future-Ready	Architecture supports GPS/telematics integration, parts inventory, and mobile apps

2.3 Fleet Categories

Category	Machine Types	Tracking Method

Yellow Machines	Excavators, Graders, Rollers, Dozers, Loaders, TLBs, Fioris, Concrete Pumps	Operating Hours
Road Vehicles	Tippers, Water Bowsers	Kilometers

3. User Roles & Permissions

3.1 DPF Team Structure

The current DPF team structure at EG Construction:

Level	Staff	System Role
Senior DPF	Foreman (1 person)	Senior DPF
Junior DPF	Admire, Lewis (2 people)	Site DPF
Junior-Junior DPF	2 additional staff	Site DPF

3.2 System Roles & Permissions

Role	Permissions	Typical Users
Administrator	Full system access: manage users, configure machine types and intervals, manage all settings, view all data, generate reports	CEO, System Admin
Senior DPF	Approve/reject all entries from Site DPFs, view all sites and work, create own entries (auto-approved), view analytics, add new machines, update hours/km	Foreman
Site DPF	Submit services, inspections, and job cards for approval, view own submissions and history, update machine hours/km, attach photos	Junior DPFs
Data Entry	Update machine hours/km readings only	Dedicated staff
View Only	Read-only access to dashboards and reports	Management

4. Core Features

4.1 Dashboard

The main dashboard provides an at-a-glance overview of fleet status:

- Service Status Summary: Machines OK, due soon, and overdue
- Pending Approvals: Entries awaiting Senior DPF review (highlighted for Senior DPF)
- Upcoming Services: Machines approaching next service interval
- Overdue Services: Machines past their service due date
- Recent Activity: Latest approved entries
- Watch List Items: Components flagged during inspections
- Oil Analysis Due: Machines requiring scheduled oil analysis

4.2 Machine Management

Each machine has a profile containing:

- Basic Info: Name/identifier, machine type, category
- Current Readings: Hours or kilometers, last updated date
- Current Location: Which site the machine is currently assigned to
- Service Status: Next service due, units until due
- Service History: All approved past services
- Inspection History: All condition-based monitoring records with photos
- Job Card History: All repairs, tyre changes, and ad-hoc work
- Component History: Track of replacements for pattern analysis
- Oil Analysis History: Results and schedule

4.3 Adding New Machines

When the company acquires new equipment:

1. Select the Machine Type (e.g., Excavator, Tipper)
2. Enter the machine identifier (e.g., "Excavator 05")
3. Enter current hours/km reading
4. Assign to a site (optional)
5. System automatically applies service intervals from the Machine Type

4.4 Hours/Kilometers Tracking

Feature	Description
Manual Entry	Select machine, enter reading, system validates (cannot be less than previous)
Bulk Update	Update multiple machines at once (useful for weekly updates)
Reading History	Full log with timestamps and who entered them
Stale Data Alerts	Notification if reading not updated in configurable days

4.5 Photo Attachments

Photos can be attached to:

- Inspection items – especially those marked Repair or Replace
- Job cards – to document work done or issues found
- Service entries – to document condition before/after service

Photos are stored with the record and viewable in history. This provides visual evidence for decision-making and accountability.

5. Machine Type Configuration

Machine Types are templates that define default service intervals and tracking methods.

5.1 How Machine Types Work

Concept	Description
Template	Each type defines: tracking unit (hours/km), minor/major intervals, applicable checklist items
Inheritance	New machines inherit settings from their Machine Type automatically
Override	Individual machines can have custom intervals if needed
New Types	Administrators can create new Machine Types anytime

5.2 Default Machine Types

See Appendix B for the complete configuration based on EG Construction's current fleet.

Machine Type	Tracking	Minor Service	Major Service
Excavator	Hours	250 hrs	1,000 hrs
Grader	Hours	250 hrs	1,000 hrs
Dozer (Cat)	Hours	500 hrs	2,000 hrs
Tipper	Kilometers	5,000 km	20,000 km
Water Bowser	Kilometers	5,000 km	20,000 km

(See Appendix B for complete list of all 11 machine types)

6. Service & Maintenance Tracking

6.1 Service Calculation

The system automatically calculates next service due based on:

- Current hours/km reading
- Hours/km at last service
- Service interval for that Machine Type

6.2 Logging a Service

When a DPF performs a service, they submit the following (requires Senior DPF approval):

Field	Description	Required?
Machine	Select from list	Yes
Service Type	Minor or Major	Yes
Service Date	When performed	Yes
Hours/KM at Service	Machine reading	Yes
Site/Location	Where machine was	Yes
Submitted By	Auto-filled from login	Yes (auto)
Parts Used	Parts/components with quantities	Optional
Parts Cost	Total cost	Optional
Photos	Attach photos of work done	Optional
Notes	Additional observations	Optional

7. Job Cards & Repair Tracking

In addition to scheduled services, the system tracks all ad-hoc repair work through Job Cards.

7.1 What Job Cards Track

- Repairs – any unscheduled repair work
- Tyre changes – replacement of tyres
- Tyre repairs – puncture repairs, etc.
- Any other ad-hoc maintenance work

7.2 Job Card Fields

Field	Description	Required?
Machine	Which machine was worked on	Yes
Job Type	Repair / Tyre Change / Tyre Repair / Other	Yes
Date	When work was done	Yes
Hours/KM	Machine reading at time of work	Yes
Site	Where machine was located	Yes
Description of Work	What was done (detailed)	Yes
Components Involved	What parts were affected/replaced	Yes
Parts Used	Parts consumed with quantities	Optional
Parts Cost	Cost of parts	Optional
Photos	Before/after or issue documentation	Recommended
Submitted By	Auto-filled from login	Yes (auto)

> ℹ️ **All Job Cards Require Approval**
> Like service entries, all job cards submitted by Site DPFs must be approved by the Senior DPF before being finalized in the system.

8. Condition-Based Monitoring (Predictive Maintenance)

8.1 Inspection Frequency

Frequency	Description
Monthly	Standard inspection items checked during site visits
Quarterly	Detailed inspections including oil analysis

8.2 Inspection Rating Scale

Rating	Description	Photo Required?
Good	Component in acceptable condition	No
Service	Needs routine servicing	Optional
Repair	Damaged, needs repair work	Yes – Recommended
Replace	Failed/worn, needs replacement	Yes – Required

8.3 Oil Analysis Tracking

For machines over 6,000 hours or 50,000 km, the system tracks oil analysis:

- Schedule: Quarterly / Twice yearly / Annually (based on utilization)
- Reminders: System sends notification when analysis is due
- Results: When analysis is done, results are logged in the system
- History: Full history of oil analysis results for each machine

Oil analysis results inform decision-making about machine health and maintenance needs.

8.4 Watch List

Components rated "Service" can be added to the Watch List for monitoring before the next inspection. The system sends reminders as the review date approaches.

9. Approval Workflow

All entries from Site DPFs require approval from the Senior DPF before being finalized. This ensures accuracy and accountability.

9.1 Why Approval is Required

- Ensures accurate data entry – prevents errors or rushed submissions
- Quality control – Senior DPF can verify work was done correctly
- Accountability – clear record of who did what and who approved it
- Prevents shortcuts – under pressure, staff might cut corners without oversight

9.2 What Requires Approval

- Service entries (minor and major services)
- Job cards (repairs, tyre changes, tyre repairs)
- Inspections (monthly and quarterly)

9.3 Approval Process

6. Site DPF submits entry (service, job card, or inspection)
7. Entry is saved with status "Pending Approval"
8. Senior DPF receives notification of pending entry
9. Senior DPF reviews entry details and photos
10. Senior DPF can: Approve (entry is finalized) or Reject with comments (entry returned for correction)
11. If rejected, Site DPF corrects and resubmits

9.4 Senior DPF Entries

Entries created directly by the Senior DPF are auto-approved (no approval needed for their own work).

9.5 Pending Approvals View

The Senior DPF dashboard prominently displays all pending approvals with:

- Entry type (Service / Job Card / Inspection)

- Machine and site
- Submitted by (which Site DPF)
- Date submitted
- Quick link to review and approve/reject

10. Notifications & Alerts

The system sends notifications via three channels:

- SMS – for urgent alerts
- Email – for detailed information
- WhatsApp – preferred for regular notifications (more convenient, frequently checked)

10.1 Notification Types

Notification	Trigger	Recipients
Service Due Soon	Machine approaching service interval	Site DPF, Senior DPF
Service Overdue	Machine past service interval	Site DPF, Senior DPF
Pending Approval	New entry submitted for approval	Senior DPF
Entry Approved	Senior DPF approved submission	Site DPF (submitter)
Entry Rejected	Senior DPF rejected submission	Site DPF (submitter)
Inspection Due	Monthly/quarterly inspection reminder	Senior DPF
Oil Analysis Due	Machine due for oil analysis	Senior DPF
Watch List Reminder	Flagged item approaching review date	Site DPF, Senior DPF
Critical Item Alert	Component marked Replace	Senior DPF
Stale Reading Alert	Hours/km not updated in X days	Data Entry, Senior DPF

11. Reporting & Analytics

11.1 Standard Reports

Report	Description
Fleet Status	All machines with service status (OK / Due Soon / Overdue)
Service History	All services by machine, type, or date range
Job Card History	All repairs and ad-hoc work
Inspection Summary	Recent inspections with ratings breakdown
Component Lifespan	Average lifespan by component type and machine
Site Performance	Maintenance frequency and wear by site
DPF Activity	Work logged by each DPF (approved vs. rejected)
Parts Usage	Parts consumed by machine, type, or time period
Cost Analysis	Maintenance costs by machine, site, or category
Oil Analysis Report	Oil analysis schedule and results history

11.2 Analytics Insights

- Machines with higher-than-average maintenance frequency
- Components failing faster than expected
- Sites with higher wear rates (e.g., chrome mining vs. flat surface)
- Cost trends over time
- Oil analysis patterns indicating potential issues

12. Integration with Tax Management Module

The Fleet Maintenance System integrates with the existing Vehicle Tax Management module.

12.1 Shared Components

- Vehicle/Machine Master List – single source of truth
- User Authentication – single login
- Notification System – shared SMS/Email/WhatsApp infrastructure
- Site/Location Data – shared reference data

12.2 User Experience

After logging in, users see navigation to:

- Tax Management – licensing and ZINARA renewals
- Maintenance – services, inspections, job cards
- Fleet Overview – combined dashboard

13. Data Migration

To get the system operational, existing service history needs to be entered strategically.

13.1 Migration Approach

Based on Senior DPF guidance, the approach is:

12. Enter last service for each machine (to establish baseline)
13. System calculates next service due from this baseline
14. New work going forward is entered as it happens
15. Historical records beyond last service are not migrated (start fresh)

13.2 Data Needed for Migration

For each machine, the following is needed:

- Current hours/km reading
- Date of last service
- Hours/km at last service
- Type of last service (minor or major)

14. Sites & Locations

The following sites have been confirmed for initial setup:

#	Site Name	Location
1	Magaya Mazowe	Mazowe
2	Magaya Chegutu	Chegutu
3	Spirtzkop Bruvoc	Harare
4	Chakari Bruvock	Chakari
5	Mapanzure Chrome	Zvishavane
6	Chivhu	Chivhu

Additional sites can be added anytime as new projects start.

15. Next Steps

#	Action	Owner
1	Final review of this specification	CEO
2	Scope approval and sign-off	CEO
3	Gather last service data for each machine	Senior DPF
4	Begin technical design and development	Anesu
5	System deployment and user training	Anesu + Senior DPF

Appendix A: Complete Inspection Checklist

Rating: Good | Service | Repair | Replace

Photos required for items rated Repair or Replace.

1. Engine (9 items)

- Coolant leaks and pipes
- Fuel leaks and pipes
- Oil leaks and pipes
- Belts, tensioner, pulley
- Induction pipes & exhaust
- Oil bath condition
- Engine mounting
- Clean radiator using gun
- Wash engine & performance check

2. Transmission (6 items)

- Wash transmission
- Leaks & level (gearbox)
- Clutch & converter check
- Drive train bolts & linkages
- UJ condition & propshaft
- Performance check

3. Final Drives & Hubs (2 items)

- Leaks & level
- Components wear (oil analysis) – Quarterly

4. Suspension (8 items)

- Spring
- Kingpin
- Bushes

- U-bolts torque
- Ball joints
- Droid/V-stay mounting
- All shocks
- Chassis

5. Steering (3 items)

- Leaks
- Response
- Alignment

6. Brakes (4 items)

- Check
- Adjust
- Tyre condition
- Studs

7. Undercarriage – Tracked Machines Only (5 items)

- Sprocket
- Idlers
- Chain
- Grouser
- Rollers

8. Batteries (3 items)

- Charge
- Condition
- Mounting bracket

9. Pneumatics (6 items)

- Drain tanks

- Mountings
- Tank condition
- Air leaks
- Pipe condition
- Compressor condition

10. Hydraulics (3 items)

- Tank mounting
- Leaks
- Pump efficiency

11. General / Other (14 items)

- Fuel tank cleaning
- Fuel tank mounting
- Cab mountings
- Bucket condition – Excavators, Loaders
- Loading box condition – Tippers
- Pins and bushes
- Fire extinguisher
- Mirrors
- Body work
- Lights and electrics
- Wear plates
- Mouldboard – Graders
- Ripper frame – Dozers
- Aircon

Appendix B: Default Machine Type Configuration

Yellow Machines – Hours Tracked

Machine Type	Minor Service	Major Service	Current Machines
Excavator	250 hrs	1,000 hrs	01, 02, 03, 04
Grader	250 hrs	1,000 hrs	G1, G2
Roller	250 hrs	1,000 hrs	R1, R2, R3
Dozer (Standard)	250 hrs	1,000 hrs	D1
Dozer (Cat)	500 hrs	2,000 hrs	D2
Loader	250 hrs	1,000 hrs	L1, L2, L3, L4
TLB	250 hrs	1,000 hrs	TLB1
Fiori	250 hrs	1,000 hrs	F1
Concrete Pump	250 hrs	1,000 hrs	CP1

Road Vehicles – Kilometers Tracked

Machine Type	Minor Service	Major Service	Current Machines
Tipper	5,000 km	20,000 km	T1–T11
Water Bowser	5,000 km	20,000 km	WB1, WB2

— End of Document —