TRAFFIC COMMUNICATION & MANAGEMENT SOLUTION

USING

Automatic Number Plate Recognition
1. INTRODUCTION

There is some confusion within the local South African market place regarding the use of Automatic Number Plate Recognition to facilitate a true working database that will allow information collation, patterns of traffic movement, enforcement and general policing of criminal elements. Recent proposals by various consulting engineers on behalf of Government Departments have overlooked key aspects of providing an end to end solution that can interface into all databases including eNATIS to ensure a total means of monitoring traffic movements and those parties who are intent on defrauding or avoiding identification on our roads.

ANPR is unique in its ability to impact positively in an intelligence led and proactive basis on every key area of police business, including levels 1-3 criminality and counter terrorism. The ACPO/Police Standards Unit pilot projects (Laser 1 & 2) have evidenced the ability of ANPR to produce significant increases in overall arrest rates and Offences Brought To Justice compared to conventional policing methods, through the use of dedicated ANPR intercept teams. ANPR can also contribute to crime reduction and public reassurance.

2. TERMINOLOGY

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3. PURPOSE

This strategy lays down a route map to develop ANPR. It is intended that individual Police Forces & Metro Forces will use this strategy as a starting point for developing or updating their own local ANPR strategies. It also involves a wider vision in which a joined up, national and inter–agency approach can open up vastly increased opportunities to use ANPR. This includes its use to provide strategic and tactical intelligence at all levels, to target criminals and crime hotspots and to put a new investigative tool into the hands of all investigators.

In developing this strategy, the police service will need to work closely with a range of partners. Locally this includes Police Authorities, Municipal Authorities, the Department of Public Prosecution and the Courts. Provincially it includes the Provincial Government Offices. Nationally it includes Home Affairs, Department of Transport, SANRAL, eNATIS etc.
Long term success will only be achieved if ANPR moves from its current status in many forces as an add-on project to becoming a **mainstream policing tool**, integrated into police force strategies, tactics, systems, processes, training and baseline funding. In doing so, the focus needs to move from consideration of the technological issues around ANPR, important as these will continue to be, to recognising that it the **business processes** to properly gather and fully exploit **Vehicle Intelligence** that will bring the best returns.

This Vehicle Intelligence will ensure that the Criminal is denied the Use of the Roads.

4. **AIM**

To provide an end to end solution for the capture of a licence plate and its correct reference to database information from whichever source it might be gleaned.

5. **OBJECTIVES**

Bids are herewith invited from competent service providers to assist in the provision of hardware, the development of specialised computer software, setting up of electronic and wireless connectivity as well as the provision of detailed expert advice with suitable local and global reference sites and the support for the development, operation and maintenance of a single “Traffic Communication and Management Solution” involving ANPR, as a pilot project for a period of twelve (12) months.

6. **SCOPE**

In order to assist with the management of all vehicles using South African roads it is the Scope of this project to provide a simple, easy to use, interactive database that will enable any permitted organisation with suitable wireless, hand-held, “off the shelf” pocket computers, vehicle or static mounted interfaces access from any reasonable communication point on a national basis to any specified database through one common web site platform that will coordinate all relevant databases on line. Such links will allow for access to, amongst others, real time information on:

- Drivers and driving licence details, such as the name, ID Number, address and other contact details of the holder, the date of issue, expiry date, issuing authority, etc.
- Vehicle details, such as the make, model, colour, engine and VIN Numbers of the vehicle, stolen vehicles, date of registration, licencing and roadworthiness testing information, etc.
- Owners of vehicles, such as the name, ID number, address and other contact details of the owner.

The hardware and software must be able to capture number plates at speeds from 0 – 250km or more in all South African weather conditions on a twenty four (24) hour a day, seven (7) day a week, three hundred and sixty five day (365) year time frame with a greater than 99.5% reliability. It is envisaged that temperatures may range from minus twenty (-20) degrees to plus sixty (+60) degrees with humidity of up to ninety five percent (95%).

Number Plate information will be transmitted from a range of sites on a national basis through relevant servers into the central database that will interface to all other databases and provide a collective html web based interface for all permissible organisations.

The database will be capable of handling more than sixty million licence plates and provide an array of functionalities. The database must be proven over a number of years with supporting documentation from the relevant clients.

A variety of law enforcement and other reports will be generated upon request. These reports which will be able to be viewed and transferred electronically or printed to high quality hard format will include, number plate capture totals at varying intervals, alert details from varying published databases, pursuit tracks, searched
plates, non roadworthy vehicles identified, uninsured vehicles identified, and other requested report layouts from time to time, etc.

The system will further provide for a comprehensive real-time and interactive Geographical Information System (GIS), which should enable, amongst others: viewing of locations of the various ANPR cameras and servers, live feeds from cameras, mobile units, remote site deployed specialist units, on screen report generation, etc.

Awaiting the introduction of the Administrative of Road Traffic Offences (AARTO) Act, No 48 of 1998, it is envisaged that driver and vehicle offences will be monitored and controlled in terms of the National Road Traffic Act, No 93 of 1996 and specifically those offences provided for under Schedule 3 of the Criminal Procedure Act, No 51 of 1977, as amended by Act 56 of 1979. These offences, for which section 341 notices can be issued, are:

- Driving a vehicle at a speed exceeding a prescribed limit;
- Driving a vehicle which does not bear prescribed lights;
- Leaving or stopping a vehicle at a place where it may not be left or stopped, or leaving a vehicle in a condition in which it may not be left;
- Driving a vehicle at a place and a time where it may not be driven;
- Driving a vehicle which is defective or any part whereof is not properly adjusted, or causing any undue noise by means of a motor vehicle;
- Owing or driving a vehicle for which no valid licence is held; and
- Driving a motor vehicle without holding a licence to drive it.

The above provisions will cover most of the traffic offences that are required to be controlled for the purpose of this project.

The main advantage of using this section of the Criminal Procedures Act is that, although drivers will be stopped, notices may be posted afterwards and not required to be printed and handed to the driver at the roadside. This will eliminate the need for providing traffic officials with portable printers under certain circumstances. However, the project will be developed with the main view to be operated in terms of the AARTO Act. Only if AARTO is not ready by the time of implementation will the Criminal Procedures Act route be followed.

7. PROJECT REQUIREMENTS & DELIVERABLES

7.1 INTRODUCTION

Specific requirements for the various elements of this project include the following:

7.1.1 The provision of a range of cameras that will allow the capture automatically of a South African number plate from 0 - 250km per hour in all South African weather conditions on a 24/7 basis with a greater than 95% reliability;
7.1.2 The provision of capturing software that can be loaded onto static or mobile hardware solutions that will translate and communicate the licence plate and related details to the central database in a live or regularly updated mode;
7.1.3 The provision of communication software that can be loaded onto static or mobile hardware solutions that will provide an immediate notification of key exceptions such as outstanding warrants, non roadworthy, uninsured, no licence, etc.;
7.1.4 The provision of communication software and local database that can be loaded onto static or mobile hardware solutions that will allow regular and incident specific data transfer to ensure prompt notification after an event;
7.1.5 The provision of an adequate size, fast, multi-functional and multi-user capable server that will allow for connection to and transfer of data and information from and to all static or mobile ANPR points. This server will also be linked to a number of other databases which may number more than one hundred (100) including eNATIS for the extraction and dissemination of information such as previous number plate captures in other locations and the other hotlists that this number plate is referenced against and the reason for this reference on an html web based global platform;
7.1.6 The provision of a fast, reliable, efficient, effective, cost-effective, electronic connection service between the various static and mobile interfaces around the country and the central Server;
A schematic representation capturing the envisaged system is provided below. A more detailed representation is available under request.

Each of the above issues is discussed in more detail below:

7.2 **ANPR CAMERA**

Due to the variations in wide range of applications plus range of existing cameras, plus the range of speeds of vehicles and the often changing lighting conditions owing to day time weather changes, sunshine and night time conditions when faced with car headlights, the solution must be able to link into both old, exiting and new cameras. The range of existing CCTV cameras must be utilised by the LPR software. Where additional cameras are installed, these could be IP cameras or pulsed infra red monochrome cameras to handle the variations of lighting conditions. In addition the camera might have a secondary overview camera in the same complete housing so that there are two images captured at the same time and recorded onto the same storage and database device. In this way evidence can be confirmed that the monochrome plate capture conforms to the colour image showing colour and make of vehicle and its positioning on the road in regard to other factors.

7.3 **NUMBER PLATE READING DEVICES (NRD)**

It is required that the successful Bidder will investigate, in detail, the availability of all suitable ANPR NRDs. The NRDs shall be applied to the images obtained from each of the ANPR cameras such that number plate images are captured, processed and information delivered to a local or centralised ANPR database server (ADBS) for subsequent processing. The successful Bidder shall install the NRDs in sufficient 19” rack mounted cabinets or
road side enclosures to be provided by the Bidder. These shall be located in positions to be agreed with the appointed Engineer. The successful Bidder shall ensure compatibility and integrate these devices with the ADBS in order to provide a real time total system solution.

7.3.1 Number Plate Reading Devices

Number Plate devices shall be loop or beam triggered or self-triggering. The external method of triggering shall allow an accuracy level to be determined plus allow vehicles without plates to be identified and an alarm generated. NRDs shall monitor ANPR camera images on a continual basis to seek targets. Performance shall be maintained during continuous traffic flow and where more than one number plate is in the field of view of each ANPR camera.

7.3.2 Speed of Processing of NRDs

Central to the performance of the overall system is the speed of delivery of information to the user. The operating speed of the NRDs shall not compromise the specified end-to-end performance of the complete system. The successful Bidder shall pay particular attention to any impact the number of ANPR cameras applied to the NRDs has to ensure the process of triggering or volume of traffic passing ANPR cameras does not place the performance of the system outside the specifications. The successful Bidder shall assume the speed of vehicles passing through each outstation shall not exceed 250kmph.

7.3.3 Performance of Number Plate Reading Devices

7.3.3.1 The successful Bidder is required to supply number plate reading devices capable of providing a performance given below for each traffic lane in any 24 hour period.

   i) Percentage of vehicles captured by the LPR system (i.e. capture rate of 99.9999%), allowed to miss 1 vehicle per 1 000 000.
   ii) Percentage of readable plates captured by the NRDs and delivered to the ADBS 99.5% (i.e. plate capture rate of 99.5%).
   iii) and of these, Percentage of readable plates correctly read 95% (i.e. successful read rate of 95%). (The definition of a readable number plate is provided below).

7.3.3.2 For the avoidance of doubt, the successful Bidder shall assume that the NRDs shall deliver to an ADBS and correctly read (99.5% of 95%) of all readable plates. All vehicles will be captured, with or without plates.

7.3.3.3 The successful Bidder shall verify the performance of the NRDs in specific NRD Performance Tests. The NRD Performance Tests shall be completed in advance of the Tests on Completion.

7.3.3.4 The evaluation of NRD performance shall be based on time windows, the duration of which shall be agreed with the Engineer but in any event shall enable a representative and adequate traffic flow (typically 10 000 vehicles) to be monitored, so that an accurate assessment of NRD performance can be taken.

7.3.3.5 The successful Bidder shall provide proposals for NRD performance evaluation, a high level NRD Performance Test Plan and indicative programme in his Tender Return.

7.3.3.6 The presentation of skewed number plate (i.e. not horizontal in the field of view) to the NRDs shall not affect the performance of the NRDs.

7.3.3.7 The NRD must have the ability to be deployed by the side of the road and be able to read at an angle of 45 degrees into the third lane.
7.3.3.8 Vehicle number plates obscured by adverse weather conditions shall be deemed unreadable. A vehicle number plate partially obscured by a cyclist or pedestrian will not be regarded as a readable number plate.

7.3.3.9 A readable number plate is defined as a South African legal plate presented for 0.5 seconds, or more than 0.5 seconds in the field of view and of a size required by the NRD. The successful Bidder shall ensure that the image provided is of a size required by the NRD.

7.3.3.10 The NRD shall achieve the required performance at traffic lanes where the traffic is at peak flow and presenting a continuous stream of traffic, number plates visible for a short period of time and for traffic which is stationary. The performance of accurate reading shall not be affected by the presentation of more than one number plate in the field of view. The performance at night shall remain consistent with the daytime performance levels.

7.3.3.11 All NRD equipment provided by the successful Bidder shall be located in a 19″ rack mounted cabinets or road side enclosures supplied and installed by the successful Bidder.

7.3.3.12 The successful Bidder shall make accessible to the Engineer the proposed 19″ rack mounted cabinets or road side enclosures for the purposes of inspection, prior to installation. The layout and build quality of the cabinet shall be to the approval of the Engineer and shall not be installed on site unless so approved by the Engineer. Such approval shall not be unreasonably withheld by the Engineer.

7.3.4 Number plates Other than South African

The NRD shall have the capability to read other Southern African number plates.

7.3.5 Configuration (Set-Up) of Number Plate Reading Device

The NRDs shall have a user interface for the purposes of configuration, set-up and 'fine tuning' of the local system. Any switching devices required to integrate NRDs, input video signals, NRD output
signals, shared keyboard, shared mouse, shared configuration monitor and the like shall be controlled electronically (and not mechanically). The NRDs shall be capable of reading number plates from CD, DVD & SVHS tapes recorded (in real-time mode) from any CCTV system including the ANPR cameras. It is accepted that the performance of the NRDs using input from recorded media may fall outside the Specifications.

7.3.6 Processing Speed of NRDs as Part of Whole System

The processing capacity of the NRDs shall be such that the end-to-end system response time (that is, the time between a vehicle passing an outstation ANPR camera, and associated notification data being presented on an ANPR User Interface PC or remote users who shall receive notifications by PC, E-Mail, pager or SMS shall not exceed 3 seconds (3 000 MS) in total. The stated end-to-end system performance time shall exclude elapsed time between either a pager notification call being initiated by the ADBS and the receipt of the pager notification by the pager or via SMS.

7.3.7 Number Plate Reading Devices - Output

The NRDs shall generate as a minimum, the following information for each captured vehicle index:

7.3.7.1 date and time (accurate to nearest second) that the vehicle passes an Outstation ANPR camera (i.e. the time the VRM is captured).
7.3.7.2 camera identifier (to be agreed with the Engineer).
7.3.7.3 captured index (up to 12 alpha-numeric characters).
7.3.7.4 confidence level of captured index as generated by NRD.
7.3.7.5 Colour image of vehicle.

7.3.8 Colour Image

The NRDs shall be capable of generating (as a minimum) an colour image of the vehicle. The colour image shall be the camera image from which the NRD has derived the captured vehicle or an overview camera. The resolution of the image shall be such that when viewed on screen or printed it shall:

7.3.8.1 be of sufficient width in pixels to maintain the aspect ratio of the original image.
7.3.8.2 be such that the index plate shall be identifiable when displayed on a 640 pixel x 480 pixel screen with the index plate occupying no more than 60 pixels in height.
7.3.8.3 be such that the index plates shall be identifiable when printed onto an A4 page using a 600 dpi laser printer with the index plate occupying no more than 2 cm in height.
7.3.8.4 If the colour images are stored using compression techniques the method of compression shall be of an industry of recognised methods. The successful Bidder shall not use a proprietary compression method.
The colour images shall be used by Users at each in-station (control room type environment in office) to verify the accuracy of the captured and read vehicle index on delivery to the ANPR User Interface PC of the notification. The image shall be as specified but the Engineer shall ensure that the clarity of image on screen and printout is such as to allow for verification.

7.3.9 Other Images (Digitisation)

If appropriate the successful Bidder shall submit detailed proposals in his Tender Return for the collection and presentation of other digitised images (e.g. front of vehicle view etc) or sequences of images that can be extracted from the out-station ANPR camera and stored on the ADBS such that they are retrievable from – and will be presented with - any ANPR search or notification data. The successful Bidder shall submit full cost details in his Tender Return for the provision of such imaging for both at the time of contract award or at some later date. The successful Bidder shall note that such images shall be required to be obtained, and stored for all captured indexes and shall be required to be stored in accordance with the identified data retention period.

7.5 MOBILE ANPR

It is required that the successful Bidder will investigate, in detail, the availability of Mobile ANPR solutions. Mobile ANPR will require a turnkey solution utilising ANPR cameras linked to NRD with full communication options.

7.5.1 ANPR Cameras

Each mobile application will utilise either CCTV or IP or ANPR cameras or Intelligent ANPR cameras according to the specifications above. The cameras must be rugged, environmental sound and IP67.
compliant. Multiple cameras should be provided for to allow for the capture of the number plate and simultaneously an overview allowing for full identification; colour, make and actions in surrounding scenario for plate capture.

7.5.2 Touch Screen Monitor

The system is controlled and operated by the officer via a touch screen, located in the front of the vehicle and connected to the NRD, which itself is normally located in the boot.

7.5.3 Software

At the core of the system handling the NRD process lies the recognition engine. Application software, allows the user, armed with the plate read, to interrogate local and national databases for detection and identification of stolen and wanted vehicles. Hot List types which can be accessed and exploited by the system include, but are not limited to:

7.5.3.1 PNC Extract - an extract of all vehicles of interest from the Police National Computer.
7.5.3.2 MIDAS database provided by the insurance industry for uninsured vehicles.
7.5.3.3 Local Hot Lists - Hot Lists of up to 50,000 entries can be created, edited and imported.
7.5.3.4 Bulk-loaded Hot Lists - Hot Lists over than 50,000 entries can also be imported.
7.5.3.5 eNATIS White List for unregistered motor vehicles.

7.5.4 Connectivity

Connected to a remote Hot List database (e.g. the Police National Computer), the NRD system can perform live checks for each plate against the remote database. This connection can use an arbitrary bearer, e.g. a GSM/GPRS/WIFI modem. If a GSM/GPRS modem is fitted, the system can be used to send SMS pager messages for each Hot List hit: it can also provide over-the-air updates to the Hot List databases.

7.5.5 Hardware

The hardware platform must be a small, compact, mobile, powerful, ruggedised PC designed to be permanently installed and operated in vehicles, with relevant certificates of conformance. Using NRD software, the platform is capable of simultaneously processing number plates from up to sixteen (16) ANPR inputs and sixteen (16) overview cameras.

7.6 HANDHELD ANPR

It is required that the successful Bidder will investigate, in detail, the availability of Handheld ANPR solutions. Handheld ANPR will require the utilisation of “off the shelf”, generally commercially available, wireless, handheld, re-chargeable battery
operation and robust pocket computers, that will be suitable for the efficient and effective operations for ANPR usage for this project. Amongst others, such pocket computers, must be able to:

7.6.1 be ultra portable - the system must be carried at all times with no effort.
7.6.2 provide immediate ANPR functionality - you do not need to wait.
7.6.3 immediately check vehicle registrations against the “on board” database.
7.6.4 hold a database in excess of 10 Million number plates.
7.6.5 immediately alert the operator if a match is found against the database.
7.6.6 store photographic images associated with the number plate.
7.6.7 send information “in and out” using Bluetooth / wireless / GSM / 3G etc.
7.6.8 allow for the manual input of Registration Numbers.
7.6.9 allow several hours of use without the battery being recharged or changed.
7.6.10 be highly robust using proven hardware.
7.6.11 utilise GPRS/3G/Edge Connectivity.

7.7 STANDALONE ANPR

It is required that the successful Bidder will investigate, in detail, the availability of a rugged ANPR processing unit with full wireless GSM/GPRS and wireless LAN communications. The system must be a fully self contained ANPR system capable of processing two (2) lanes of traffic with overview imagery per system. The unit must feature integrated ‘on board’ camera power supplies and frame grabbers for ease of use and transportation. It must be encased in an ultra high impact copolymer, and the platform must be extremely strong and durable, designed to withstand and operate in extreme environmental conditions. The platform must be able to be deployed and set up in a matter of minutes using the built in monitor and GUI, ideal for rapid ‘incident reaction’ deployments. The platform must be designed to run ANPR NRD software and additional softwares that must allow communication and networking between units to create a ‘ring of steel’ capability.

The unit may be used in covert, mobile and static ANPR applications. Whether ground buried, or strapped to a lamppost the unit must be powered by batteries or mains power. A requirement must be for the unit to hibernate during periods of inactivity as a result significantly reducing power consumption. Passing vehicles must be able to trigger the system to wake up, recognise and record number plates and send passing vehicle VRM details by sms ‘hotlist’ messaging and MPEG videos by email. Multiple battery packs must enable the platform to be left unattended for days at a time. Neoprene O-rings and ABS latches and all external connectors must seal perfectly, enabling the system to be ground buried for extended periods for operations where the risk of compromise is high. The casing must offer total protection for the internal PC - watertight, airtight, dustproof, chemical resistant and corrosion proof. The casing must be NATO codified and tested to MIL C-4150J (Military Standard), IP-67 (Ingress Protection) and ATA (Air Transportation Association).

7.8 OTHER APPLICATIONS

It is required that the successful Bidder will investigate, in detail, the practical application of the ANPR systems above to provide additional solutions for the following areas:

- Weigh Bridges both fixed and mobile
- Height and length restrictions
- Misuse of one way thoroughfares
Free flow and boomed toll roads
Yellow lane or off lane driving
Journey Time Averaging
Congestion Charges
Parking Guidance and Management
Access Control

7.8 DATA STORAGE

It is required that the successful Bidder will investigate, in detail, the availability of suitable database and interactive solutions that will allow the interface between disparate ANPR systems and a range of existing and planned databases.

Data must be stored on each of the ADBS for retrospective (post incident) analysis by Users. The system shall initially comprise a No. of outstation (ANPR capture point) ANPR camera traffic lanes. For each captured vehicle index generated by the NRDs the following information, as a minimum, must be stored on the ADBS as part of the ADBS Vehicle record:

7.8.1 Date and time (accurate to the nearest second) that vehicle passes outstation camera, i.e. the time at which the vehicle index is captured.
7.8.2 Camera identifier (to be agreed with the Engineer).
7.8.3 Captured vehicle index (up to 12 alpha-numeric characters).
7.8.4 Confidence level of captured vehicle index.
7.8.5 Colour image of vehicle.
7.8.6 The period for which an ADBS vehicle record is stored in the database shall be a minimum of 3 years irrespective of whether a match against any database is made.
7.8.7 It is envisaged that the volume of data generated by the NRDs shall be significant. In his Tender Return the successful Bidder must provide full details of the proposals for data management and backup.

7.9 SUMMARY

7.9.1 The provision of all computer hardware must be subject to the Tests on Completion. All equipment must be specified by the successful Bidder on the basis that it shall:

7.9.1.1 enable the successful Bidder to meet the stated end-to-end system performance time;
7.9.1.2 be robust and resilient and enable the successful Bidder to meet the stated system availability;
7.9.1.3 not be over specified, at the unnecessary expense.

7.9.2 Each ANPR User Interface PC shall have speakers capable of delivering a minimum volume sound (controlled through software). The ANPR User Interface PCs shall have a DVD R-W Drive installed and enabled. The successful Bidder must note that the minimum specification of monitors to be supplied with the ANPR User Interface PCs shall be 17” (800 x 600 resolution, 256 colour) 0.28 dpi with a refresh rate of 75 – 85 MHz at optimal use. The successful Bidder must provide details of the Operating Systems running on the ANPR User Interface PCs and the - ADBS. Any specified Operating System software shall be industry standard and non-proprietary. The successful Bidder must specify in his Tender Return suitable hardware for use as the ADBS. The specification and functionality of the ADBS shall be agreed by the Engineer whereupon it shall be procured by the successful Bidder. Such agreement shall not be unreasonably withheld by the Engineer.

7.9.3 The Specification of each ADBS shall be commensurate with the requirements of the following:

7.9.3.1 traffic flow analysis at each location.
7.9.3.2 anticipated increase in traffic flow.
7.9.3.3 data retention period.

7.9.4 The successful Bidder shall demonstrate the scalability and expandability of the ADBS in his Tender Return. The successful Bidder shall ensure the ADBS is capable of meeting the immediate
requirements of this Contract but can also be economically upgraded. The successful Bidder shall be responsible for the installation and configuration of all hardware and shall be responsible for connecting all hardware to the network infrastructure provided by RTMC. The ANPR User Interface PCs and the ADBS shall not run any software other than that necessary to provide the full functionality of the System as detailed in the Statement of Requirements. The successful Bidder shall specify all hardware and Operating Systems to be procured under the terms of the Contract in his Tender Return.

7.9.5 Printing

7.9.5.1 The successful Bidder shall provide functionality and facilities to enable hard copy output of all notifications and system reports. The successful Bidder shall assume that all hard-copy output of system reports and notifications contains reference to South African legislation relating to Data Protection. The precise wording shall be agreed with the Engineer.

7.9.5.2 The successful Bidder shall specify a suitable printer for this purpose, paying particular attention to the output resolution required to preserve the quality of the colour image and any other digitised imaging in hard copy format. The specification of the printers shall be agreed with the Engineer and upon agreement shall be supplied and installed by the Contractor. Such agreement shall not be unreasonably withheld by the Engineer.

7.9.5.3 The method by which the printers shall be connected to the ANPR User Interface PCs shall be specified by the successful Bidder and shall be optimised to minimise printing time.

7.9.6 Disk Copy

The ANPR application software shall manage the receipt of captured VRMs from the NRDs and store these on the ADBS as appropriate. The ANPR application software shall manage the real time matching of the captured VRMs against the Road Traffic Management Corporation Database or whatever database is specified by the Engineer (NaTIS, PNC, NIA databases) in real time or an Extract of this database and other (local) Hotlist databases and the receipt and notification of interest data held by those databases in the event of a match occurring.
7.10.5 The ANPR application software running on the ANPR User Interface PC shall also permit users to manually enter VRM data (either single/multiple VRMs through keyboard entry or via an auxiliary input file) into the ADBS and for such manual entries to be matched against the National and other local databases as though they are automatic NRD generated (captured) VRMs.

7.11 USER ACCESS TO THE ADBS

7.11.1 Access to the ANPR application software on the ADBS shall be controlled by means of biometric access.

7.11.2 The ANPR application software shall facilitate as a minimum 100 unique system users, of which at least 10 shall be able to access the ANPR application software concurrently (i.e. single user concurrent access at each ANPR User Interface PC).

7.11.3 Users of the System can be allocated Manager status in which case they will be able to allocate privileges and rights to other users and reconfigure the functionality of the system.

7.11.4 Users with Manager status shall have the ability to:
   7.11.4.1 Set up additional users on the system.
   7.11.4.2 Remove users.
   7.11.4.3 Modify user rights.

7.11.5 Users of the ANPR application software who have Manager Status shall have the ability to control specific access rights, functionality and privileges assigned to specific user IDs.

7.11.6 On booting the ANPR User Interface PCs, access to the ANPR application software shall be automatic and users shall be presented with a logon screen requesting the following information:
   7.11.6.1 User Login.

7.11.7 Users shall only be permitted to access the ANPR application software on entering the correct biometric data.

7.11.8 On successful login to the ANPR application software, the user shall have access to functionality and screen menus commensurate with their User ID’s access rights.

7.11.9 Where access rights to a specific function are denied the function shall not be displayed on any tool bar or screen menu.

7.11.10 For periods of keyboard inactivity a screen saver shall come into operation. The screen saver shall be immediately deactivated and the screen shall revert to its current system operational status when either, one or both, of the following occurs:
   7.11.10.1 User presses any key.
   7.11.10.2 Notification is sent to a User.

7.11.11 The ANPR application software shall permit users to logout or change user. During the transition period between changing from one User ID to another, the ANPR application software shall continue to send notifications to the ANPR User Interface PCs.

7.12 SYSTEM REPORTING

The successful Bidder must provide both performance monitoring and system reporting utilities that shall enable the system performance to be monitored. This will allow facilitation of a proactive maintenance response and sophisticated searching of historical captured VRMs. The ANPR application software shall provide system diagnostic utilities to advise users of the current status of the various components of the System. The successful Bidder must provide search utilities that shall enable intelligent use of the data stored on the System. The ANPR application software must facilitate the requirements in respect of data searching, reporting and diagnostics that shall be available to all users.
7.12.1 **Operation Reports**

7.12.1.1 The data search facilities shall be available to all users.

7.12.1.2 Reports must have an option to display results either in tabular or graphical format (if appropriate).

7.12.1.3 Reports shall provide a facility to print to hard copy or save to disc.

7.12.1.4 Hard copy output of each report shall make reference to the South African Data Protection Act in the footer. The format of this reference shall be agreed with the Engineer.

The ANPR application software shall enable Operations reports to be generated on the following:

7.12.1.5 Number of vehicle indexes being captured by the ADBS.

7.12.1.6 Specific vehicles (conventional wild card character substitution shall be enabled).

7.12.1.7 Specific database match types (National database and/or Hotlists etc).

7.12.1.8 Reports to also include the total number of matches over the reporting period.

7.12.1.9 Performance of NRDs as a percentage based on confidence levels.

Users shall be able to enter any one, or more, of the following search criteria to reduce the data set being reported on, and hence search times:

7.12.1.10 Start/end time and date (mandatory).

7.12.1.11 All or specific cameras

7.12.1.12 National Database matches (include/exclude in search).

7.12.1.13 National Database Download (Extract) file matches (include/exclude in search).

7.12.1.14 Hotlist(s) matches (include/exclude in search).

7.12.1.15 NRD confidence levels (minimum and maximum shall be specified).

The search criteria shall be subject to the identified data retention periods. Where appropriate all captured VRMs satisfying the search criteria shall be displayed. Users shall then be able to select individual captured VRMs satisfying the search criteria and the following data shall then be displayed, subject to access right restrictions:

7.12.1.16 Captured index

7.12.1.17 Camera identifier

7.12.1.18 Date and time (accurate to the nearest second)

7.12.1.19 VRM captured.

7.12.1.20 Colour image of vehicle

7.12.1.21 Confidence level

7.12.1.22 Database match information as appropriate.

7.12.2 **System Configuration Report**

7.12.2.1 User shall have a facility to display the current operational status and configured status of the System.

7.12.2.2 The information presented to the user shall include:
Fault status on ANPR camera inputs, NRDs and server.

7.13 SYSTEM MANAGEMENT UTILITIES

7.13.1 System Backup

7.13.1.1 The ADBS must run a daily backup system that shall perform a complete backup of the entire ADBS.

7.13.1.2 The successful Bidder must ensure the backup system shall enable the complete restoration of the System (in the event of data loss for whatever reasons) including all software and data up to the time of the last system backup.

7.13.1.3 All third party software and hardware necessary to perform the backup of the System must be specified by the successful Bidder and, subject to the agreement of the Engineer, shall be supplied by the successful Bidder. Such agreement shall not be unreasonably withheld.

7.13.1.4 The successful Bidder must give due consideration to the size of the data to be backed up, the impact of the backup process on the live operation of the System.

7.13.1.5 The successful Bidder must be responsible for the installation and configuration of each backup system.

7.13.1.6 The Backup process must operate on a monthly cyclic basis.

7.13.1.7 It must be the responsibility of the client to ensure that suitable backup media is inserted into the backup device prior to the daily / weekly backup routine commencing.

7.13.1.8 The backup routine must be wholly automatic after the backup media is installed, and there shall be no further manual intervention.

7.13.1.9 The backup routines must commence at a time to be agreed with the Engineer (at a time that coincides with the period of least System activity).

7.13.1.10 The backup routine must be such that a successful system backup can be taken without prejudicing overall system performance, i.e. The successful Bidder must ensure that the end-to-end system performance time is not compromised when the backup routine is in operation.

7.13.2 Archive Data

The successful Bidder must present proposals in his Tender Return on how the proposed backup software and hardware can be adapted to provide a facility to achieve the following:

7.13.2.1 Automatic weeding of data from the system that is older than a specific age.

7.13.2.2 Enable selective archiving of data to the proposed backup media.

7.13.3 System Diagnostics

The successful Bidder must develop system diagnostics that shall automatically inform each ANPR User Interface PC as to the operational status of the following system components:

7.13.3.1 NRDs
7.13.3.2 ADBS

The system diagnostics shall run continuously and in the event of a component failure shall immediately advise users of the failure by notification to the appropriate ANPR User Interface and by pager.

The System Configuration Report detailed elsewhere in the Statement of Requirements shall be updated in real time and automatically reflect any changes in the operational status of any system components.
All system diagnostic messages shall provide precise date and time information.

8. EXPERTISE REQUIRED

8.1 This project requires that service providers must have a sound knowledge and adequate experience in all respects related to industrial and electronic, computerised data systems, electronic engineering design, development, commissioning, operations and maintenance of such systems, including software design and development thereof, data processing and report formulation and generation.

Experience in electronic, computerised systems, including system analysis, system specification, conceptual data modelling, database design, system development and implementation, as well as the preparation of computer software programmes and user manuals; training of users, operation and maintenance of computerised road traffic information systems, as well as road traffic management and information systems is a prerequisite.

Industrial engineering experience, including business process re-engineering, operations management, quantitative techniques and solution methodologies, performance management, human and system performance measurement related to road transport and traffic, in terms of relevant legislation and procedures, is a further strong recommendation.

8.2 Personnel requirements, details of which must be submitted in the required Bidding Documentation, are as follows:

8.2.1 Level 1 Personnel: This level of personnel must have at least a B degree in industrial systems design or similar qualification and at least seven (7) relevant practical experience. At least two (2) persons must have a B degree in industrial electronic engineering as well as the required relevant experience and at least one must be a systems design and development engineer. (Approximately 3 persons required).

8.2.2 Level 2 Personnel: This level of personnel must have at least a B degree in industrial electronic systems, or similar qualification and at least three (3) years relevant practical experience – (Approximately 3 persons required).