Geographic accessibility study of social facility and government service points for the metropolitan cities of Johannesburg and eThekwini 2011/12

PART B

BACKGROUND, METHODOLOGY, APPROACH AND STAKEHOLDER INTERACTION

the dpsa
Department:
Public Service and Administration
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1 PART B – BACKGROUND, METHODOLOGY, APPROACH AND STAKEHOLDER INTERACTION

TABLES

FIGURES

1 PART B – BACKGROUND, METHODOLOGY, APPROACH AND STAKEHOLDER INTERACTION

1.1 INTRODUCTION

1.1.1 The Government Programme of Action (Outcome 12) provided for the conducting of a geographic accessibility study in two metropolitan municipalities in 2011/12. The Department of Public Service and Administration appointed the Council for Scientific and Industrial Research (CSIR) to conduct the study which began in September 2011.

1.1.2 The metropolitan cities of Johannesburg and eThekwini were selected for the study as they would provide different scenarios in relation to access, geography and population density.

1.1.3 This section – **Part B** – forms one of the four parts of the study report.

1.1.4 The **Executive Summary** of the report covers the strategic intent and key findings.

1.1.5 **Part A** of the report covers:

- Strategic intent;
- The project scope and the facility types analysed;
- Limitations;
- Location factors;
- Key findings and challenges;
- Geographic access standards agreed upon;
- Integrated need maps.

1.1.6 **Part B** (this section) covers:

- Project deliverables;
- The general approach and study methodology;
- Population data used;
- Reporting zones;
- Map interpretation;
- Stakeholder interaction undertaken.

1.1.7 **Part C**, Sections 1-10, covers:

- The analysis reports and findings for each facility type for each of the two cities.

1.2 PROJECT DELIVERABLES

1.2.1 Geographic access norms (e.g. maximum acceptable travel time or distance to access a facility) for the selected government service points were formulated or, in the case where such norms already existed, they were revised if so required.

1.2.2 An audit of current levels of access to all service points of the Departments, i.e. the average travel distance of residents to their nearest service point in each city within the specified access (distance) parameters.

1.2.3 A comparison, in tabular form, of the distances that people currently travel to each facility type for each city.

1.2.4 Proposals (i.e. maps) for a spatially integrated three to five year social facility investment plan (for each of the two metropolitan areas) to meet the backlog based on the following:

- The developed and accepted access norms;
- Facility size ranges and hierarchy of provision;
- Infrastructure sharing opportunities;
- Inter-governmental co-operation.
- Recommendations with respect to optimum locations and/or affordable solutions to improve access to each of the different services for either a stand-alone or an integrated provision approach.

1.2.4.1 A cost schedule of capital and/or land implications for certain of the proposed interventions.

1.3 BASIC APPROACH AND METHODOLOGY

1.3.1 The basic methodology for this project was the application of the service access planning methodology. This uses accessibility analysis tools in a GIS environment to undertake a facility audit and accessibility analysis of the designated facilities following a basic five-step approach (Figure 1).

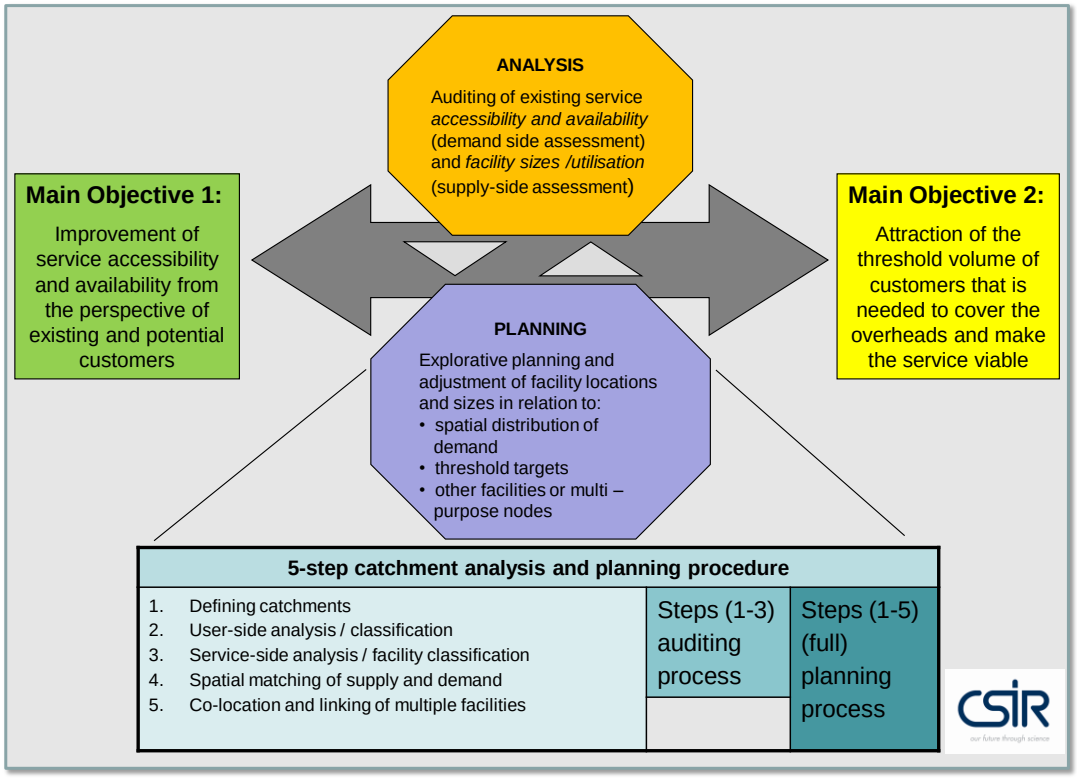


Figure 1: Basic 5-step catchment analysis and planning procedure

1.3.2 The basic approach was adapted for this study to include two additional steps: namely, the development and verification of the norms and standards before the analysis commenced; and a final costing step to enhance the decision-support process.

1.3.3 The general approach to the analysis of each facility will be similar; however, the outputs required and the scale and spatial sphere of influence of each facility type will dictate the analysis processes used and the level of detail required for each facility type.

1.3.4 The following step-wise process (Table 1) was followed for most facility types analysed in undertaking the accessibility auditing and planning of new facilities. Some facilities types did not require such a comprehensive accessibility analysis process and, in these cases, alternative GIS spatial analysis (as appropriate to the scale of the facility) was undertaken. Deviations from the general approach will be indicated in the sector reports. (A more detailed explanation of each of the Steps is contained in Annexure B.1.)

Table 1: Steps in the facility accessibility analysis process

STEP 1:	Verification of access norms and thresholds for a specific facility type. (Also, reviewed and revised if necessary based on outcome of Step 2)
STEP 2:	Travel distance and catchment area analysis (based on the above standards). Calculation of total demand per current service point.
STEP 3:	Spatial classification of under-, over- or poorly-served demand (users), backlog quantification and mapping of unserved demand.
STEP 4:	Facility analysis. Review and classification of facilities with respect to utilization rates.
STEP 5:	Planning for new facilities, closures, relocation and right-sizing of facilities – optimization or rationalisation as required.
STEP 6:	Development of an integrated plan for public investment.
STEP 7:	Costing of implementation plan.

1.3.5 The study team followed an integrated approach to planning new facilities that is in line with government policy and strategy and which also promotes city building. Groupings of facilities that are required (backlog) and which can be appropriately clustered or can share a precinct/ building were identified. To enable the team to integrate the results, the study made use of the same general analysis process for all facilities and used the same set of analysis zones (hexagons of 20 hectares in size) so that the results could be easily overlaid and integrated for each city. Figure 2 illustrates this.

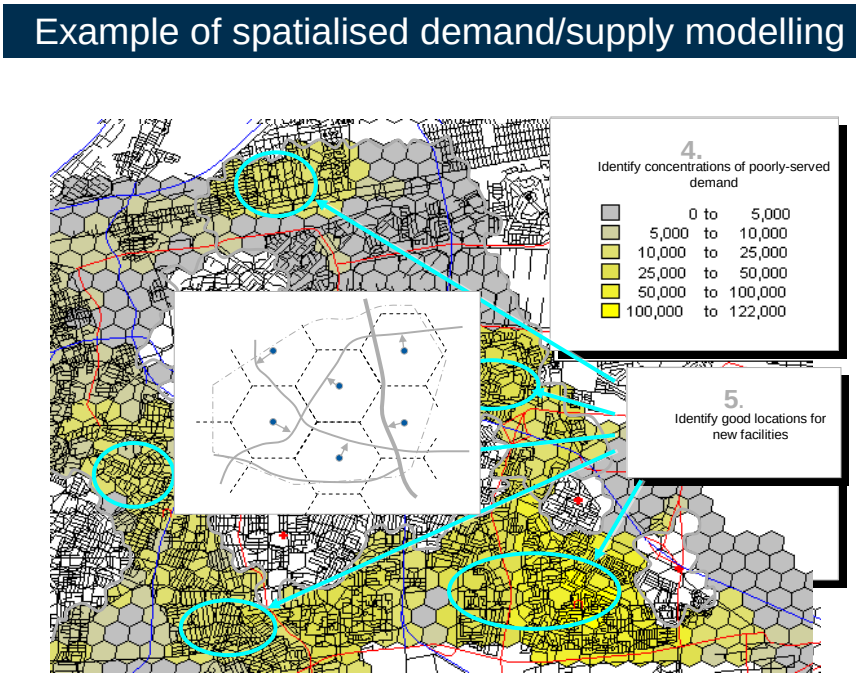


Figure 2: Example of spatialised demand/ supply modelling and the use of analysis zones

1.3.6 The study assumed that users of services will make a rational choice with respect to selecting to use the facility closest to where they are located, in this case their place of residence. Although this is not true in all cases, the analysis is at such a level that it enables the outputs to be used to achieve an equitable and balanced supply of facilities and services within a specified planning region.

1.3.7 It was also assumed that the current investment in facilities is fixed and that existing facilities will not be relocated unless a specific request was made in this regard. New facilities were clustered (sometimes with existing facilities) where possible. Relocation of facilities was only considered at the express request of the Client; for example, if facilities are leased and will expire in the medium term (up to five years) or the current buildings cannot be retained.

1.3.8 Relevant policy documents were consulted in terms of the following points**:**

- Desirable travel distances between residents and services;
- Clustering, co-location and sharing of facilities and services between Departments to achieve integration;
- Potential for outsourcing or public private partnerships;
- Delivery of service through technology innovation such as smart phones and Internet;
- Maximum and minimum facility size to achieve operational efficiency;
- Facility hierarchy and distribution network.

1.4 FACILITIES INCLUDED IN THE ACCESSIBILITY ANALYSIS

1.4.1 The following facilities were included in the study:

- Department of Health: Hospitals, Community Health Centres, Clinics, Mobile Services.
- Department of Basic Education: Primary (including Grade R) and Secondary Schools.
- Department of Social Development: Social Grant Pay Points and SASSA Offices, Children's Homes (also known as orphanages) and Homes for the Aged.
- Department of Home Affairs: All fully-fledged offices incorporating small, medium and large offices.
- Department of Safety and Security: Fully-fledged Police Stations, Satellite Stations, Contact Points.
- Department of Justice and Constitutional Development: High Courts and Magistrate's Courts (incorporating Regional and District Court types).
- Department of Labour: Labour Offices and Mobile Offices.
- Government Communication and Information System: Thusong Service Centres.
- Metropolitan Municipality of Johannesburg – Parks, Libraries, Fire Stations, Community Halls.

- Metropolitan Municipality of eThekwini – Parks, Libraries, Fire Stations, Sizakala Centres, Sportsfields.

1.5 GENERIC DATA

1.5.1 Road network data was provided by the CSIR. This is important attribute data that relates to the distance of road network links and the average time (i.e. speed) it will take a vehicle to traverse a specific section on the road network.

1.5.2 Facility data was provided by the relevant municipality and departments. The attribute data included the name of the facility and the relevant capacity for the specific type of facility.

1.5.3 Population for each City: global totals for each metropolitan area were acquired from StatSA and based on the annual mid-year estimates. The data was disaggregated to the analysis units (hexagons) by the CSIR using dasymetric mapping principles.

1.5.4 The demand for a Department's services were derived from the total population as provided by StatsSA and disaggregated as explained above.

1.5.5 Hexagons (20 ha in size) were produced for each metropolitan area as well as for a buffer area of 10 km around the metros. The reason for using the hexagons as analysis units is that it allows the analysis output to be produced on a more detailed level than working with, for instance, sub-places. A finer-grained analysis gives more accurate distance measures, especially in high density areas.

1.6 POPULATION DATA MANIPULATION AND STATUS

1.6.1 The demand for a Department's services was derived from the total population provided by StatsSA mid-year estimates for the two metropolitan areas for 2011 and was for:

- Johannesburg - 3 685 073; and,
- eThekwini - 3 667 106.

1.6.2 The mid-year estimates from StatsSA, however, did not have a demographic profile and breakdown per age category, income, marital status, and employment status. A demographer, Dr Kok, undertook a projection based on growth patterns since 1996 to derive the changes for these variables for the two metropolitan areas. The geographical detail of this exercise was done on a sub-place level. The CSIR used aerial imagery to determine new growth areas in the Cities. New growth areas were profiled based on the characteristics of neighbouring areas and neighbourhood patterns and the correlation of this with specific socio-economic profiles. Thus, the 2001 population profiles were projected onto the new data and care was taken to match the profile of new growth areas to established areas of a similar character.

1.6.3 This data acted as the basic demand data set for all services. For those facilities that required the data to have specific age and income breakdown, the necessary attributes to enable population and demand profiling for specific services were established once the Departments had clarified the demand profile for each specific service.

1.6.4 In addition to this population, additional demand from a 10 km buffer zone surrounding the Johannesburg and eThekwini municipalities was considered. For this buffer area, the demand per hexagon was reduced by a distance decay factor of 1% per 1 km. Where services are in reach, this additional demand (or specified fraction thereof) was considered as part of the demand for services within the metropolitan boundaries. The reason for this was that the high population densities on the fringes of the Cities mean that there is a strong probability that there is demand on City services from across its boundary. In developing the coverage statistics and implementation plans this buffer population was not considered further.

1.6.5 The Census 2011 data just released shows that the final population total for eThekwini was 3 442 361 and for Johannesburg 4 434 827.

1.6.6 Thus, in eThekwini the population is lower than used in this study but the impact is minimal (242 712 less) and amounts to a 6% lower demand overall. By the time the planned facilities are developed this will not lead to any expected service redundancy.

1.6.7 In the case of Johannesburg, where the estimate was 20% less than the Census count, this will lead to a greater demand for services and some of the proposed facilities may be under greater pressure than anticipated. In undertaking the analysis and planning in Johannesburg, a key issue was to ensure a good distribution of facilities and coverage to all parts of the City. The new facilities proposed are therefore well located with good access for citizens and thus remain relevant although some adjustment in capacity may be required. It is also noted that, should the various Departments increase the effectiveness of service delivery, it may be possible to serve more people without capital projects or staff increases. It is also possible that a more detailed work study of the throughput of certain office types can realise larger thresholds populations than currently specified for certain office sizes. That is, improvements in work environment, technology and efficiency could result in the current staff being able to deal with more cases than presently. The actual demand at each of the new proposed sites can be adjusted based on revealed usage figures in future and could be between 5 to 25% more.

1.6.8 It is not prudent to either re-do or ignore the results of the study since the same areas that are shown to have a backlog will be evident. What is most important is that as each of the proposed projects reaches the detailed planning stage and close to the time of implementation, a basic population count should be undertaken in the service catchment area in order to adjust the facility size.

1.6.9 Given the backlog based on the mid-year estimates there remains a substantial investment that has yet to be made to address the initial backlog. It is thus proposed that the services at each of the facilities proposed be provided as efficiently as possible and that where possible technological solutions such as internet based services be used to expand the capacity.

1.6.10 Once the small area layer becomes available from StatsSA it would be prudent to check if the population change is a general trend across Johannesburg or if it is confined to specific areas. Should the latter be the case, it will be simple to indicate which facilities would need additional capacity. The facilities types for which it may not be easy to make capacity adjustments are those relating to education and health services. In these instances, the detail sector reports have already indicated that studies are required before expansion is undertaken or, in the case of health, that other policy options be considered in order to reduce the demand for services.

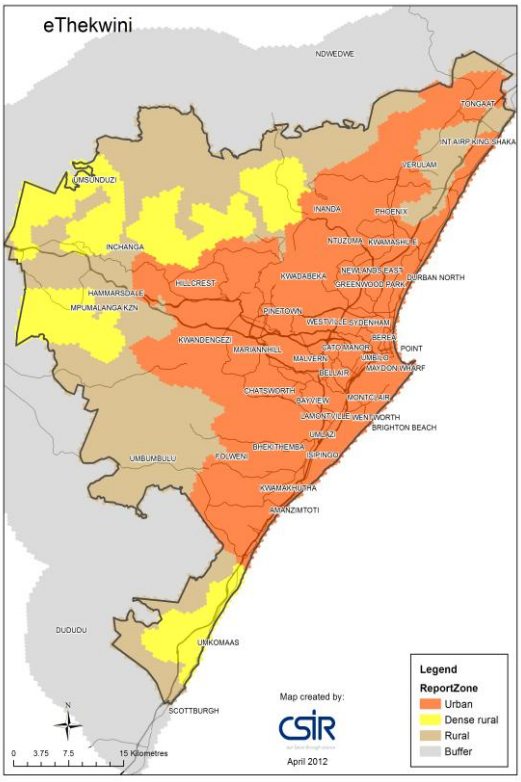
1.7 REPORTING ZONES

1.7.1 For reporting purposes, each municipality has been divided into zones according to the differing population densities in the municipal area.

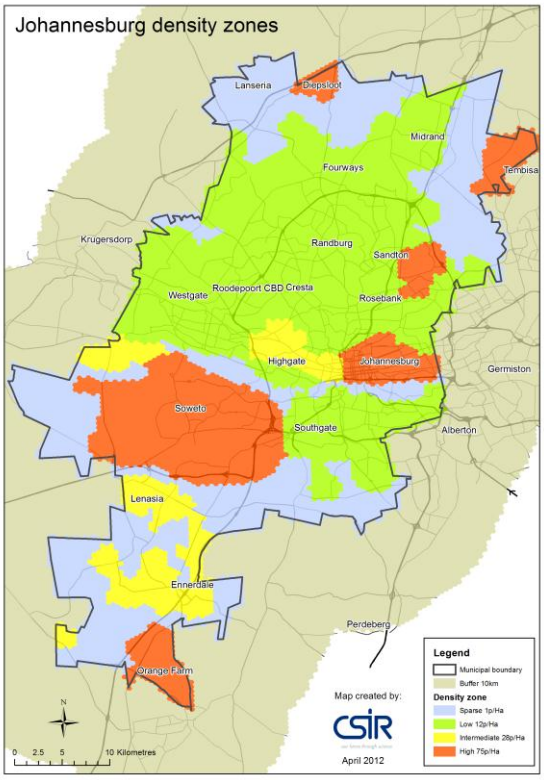
1.7.2 The zone types, illustrated by the figures alongside, are as follows:

eThekwini:

- Urban – more than 6 persons per hectare and contiguous to the CDB core.
- Dense Rural – more than 6 persons per hectare but disjoint from the major urban area.
- Rural – peripheral and large intervening areas where the population density is less than 6 persons per hectare.



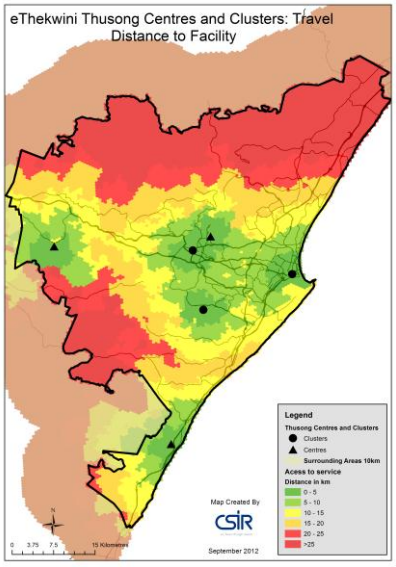
Johannesburg:



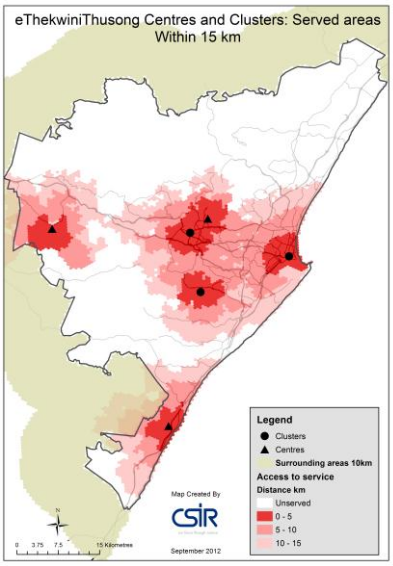
- High density – more than 75 persons per hectare. This is mostly the areas in the City where there are high concentrations of high rise flats, such as the inner city of Johannesburg, and high density residential areas, such as Diepsloot and Soweto, where the average household size is higher than in the rest of the city.
- Intermediate density – areas with an average of 28 persons per ha. These are areas with fewer flats and more residential houses, but still a relatively high average number of persons per household and smaller plots per house.
- Low density – areas with an average of 12 persons per ha. These are mostly the traditional suburbs with free standing houses and large plots.
- Sparse areas – these areas are mostly the green fields/ undeveloped areas, for instances areas where no housing is allowed due to mining activities.

1.8 INTERPRETING THE MAPS IN THE REPORT

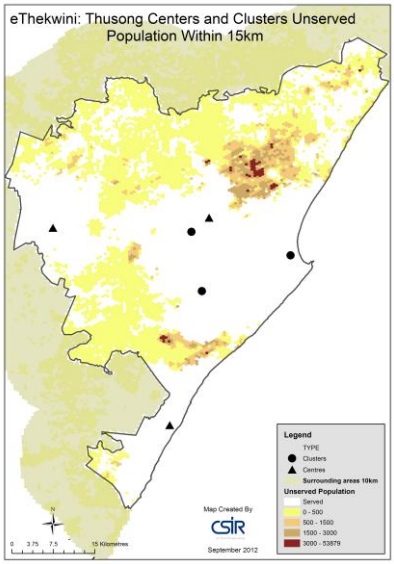
1.8.1 **Travel distance maps (unconstrained):** These are maps that indicate travel distance to the closest facility. The dark green colour represents locations that are closest to a facility while red represents locations that are the furthest from facilities.



1.8.2 **Catchment area analysis maps:** All catchment area analysis maps are indicated by a red colour scheme (from dark to light shades). The dark shade indicates areas that are close to a facility, while the lightest shade is for those that are the furthest from that facility. The unshaded areas represent unserviced areas of demand. This results either from the settlements being too far from a facility (beyond the standard access travel distance) or because all the capacity of the facilities has technically been already allocated for use by people living nearer to the facility. In areas were the served areas around a facility are very small – compared to catchment areas of other facilities of the same type – the facility is deemed to be too small to serve the local demand. The facility could be a full scale facility situated in a very dense area of demand or the facility could simply have limited capacity, i.e. a mobile clinic.

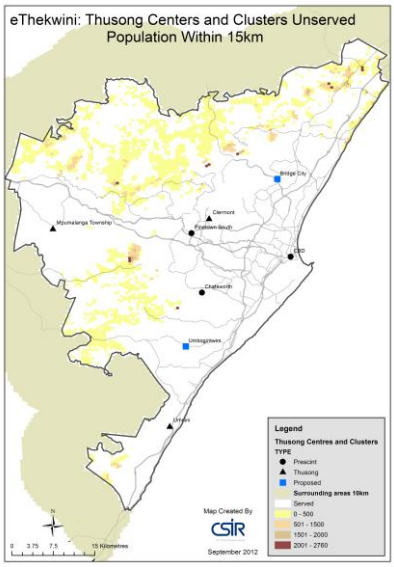


1.8.3 **Unserved demand maps:** These maps indicate the location and density of population (demand) that is outside the served facility catchments. These are mainly depicted in yellow or brown shades. The darker the shade, the greater the unserved demand in that location. The extent and concentration of the demand will provide an indication of whether there is sufficient localised demand to consider adding additional fixed facilities or if the demand is too thinly spread to cost-effectively address the need.



1.8.4 If the travel distance coverage is good but the results indicate a localised discrepancy which may be attributed to a specific lack of capacity of facilities, then an inspection of the analysis results of the number of people living within the selected distance from a facility is required to either increase or decrease capacities of specific facilities to best meet the demand within a cut off travel distance

1.8.5 **Optimisation/ intervention maps**: The optimisation maps show proposed locations (blue squares in this case) that provide the best access for the population concentrations that are shown on the unserved demand maps. They generally also show the impact of these facilities by reflecting those areas (yellow to brown shades) that will remain unserved after the development of the proposed facilities. The optimised/ good locations are mainly based on the Flowmap analysis, in which parameters are set to achieve the best coverage of the population in terms of service provision. It is important to note that the proposed locations are not the best sites to ensure 100% coverage, but are the best locations within the set number identified by the sector/ department, or to ensure a specified target coverage. In this case, 90% was the most commonly set population target. It is also possible to plan to meet the best coverage of land area rather than the highest number of people served.



1.8.6 The intervention maps can be the same as the optimisation maps but in some cases the final locations have been shifted to allow for co-location with other facilities or to take into consideration other factors such as known growth or city development strategy or other policies. They are also based on an inspection of the graphic and tabular results of the analysis of the areas with unserved demand. The sites/ locations that are selected are tested by re-running a catchment area analysis to evaluate the coverage in terms of the competition from the new and proposed sites to ensure that the final plan is viable and that it spreads service coverage sufficiently, as well as spreading the load over all the facilities as best as possible.

1.9 FORMAL ENGAGEMENTS WITH MUNICIPALITIES & SECTOR DEPARTMENTS

1.9.1 Formal stakeholder engagements were held with officials from the sector departments and municipalities on the following dates:

- Project inception meeting with DPSA – 17 October 2011.
- Project inception and overview meeting with City of Johannesburg – 18 October 2011.
- Project overview meeting with DPSA – 8 November 2011.
- Stakeholder meetings with National Departments – 7 November to 1 December 2011.
- Feedback meetings in Johannesburg – 6 March 2012.
- Feedback meetings in eThekwini – 7 March 2012.
- Feedback meetings in Pietermaritzburg for KwaZulu-Natal – 8 March 2012.

- Access norms and standards discussions with Departments of Justice, Labour and Basic Education, the SAPS and City of Johannesburg – 19 April 2012; GCIS – 20 April 2012.
- Progress and analysis process meeting with DPSA – 26 July 2012.
- Integration workshop with City of Johannesburg in Stellenbosch – 22 August 2012.
- Feedback meetings in Johannesburg – 27 September 2012.
- Feedback meetings in KwaZulu-Natal – 16 October 2012.

1.9.2 Other meetings were held between the sector representatives and the project team throughout the term of the study. More information on these can be found in the sector reports contained in Section C.

ANNEXURE B.1: MORE DETAILS ON THE FACILITY PLANNING PROCESS

STEP 1: Verification of access norms and thresholds

Any facility accessibility audit analysis requires that there are basic provision and access norms suitable for each facility type that will be analysed. To minimise unnecessary analysis and re-work, a brief review of the suitability of the access norms and thresholds within the different contexts and a comparison of facilities with similar requirements was undertaken at the start of the project. This was done in consultation with the relevant departments through stakeholder meetings or in one-on-one discussions. A review of relevant departmental policies and documents was undertaken where required. In critical instances the verification process was supported using basic first round analysis.

STEP 2: Catchment area analysis

The first step was to define current catchments or the areas of influence of existing facilities using basic catchment area analysis procedures. This process allocates all users to the closest facilities via a specified network. Where the facilities have size constraints the process allocates users to the closest facility with spare capacity, but within the distance constraint. Choices regarding the transport mode, the maximum acceptable travel distance and facility constraints, if applicable, were established for each facility. Where Departments have not yet established facility access norms and thresholds this process will be undertaken as a consultative process with the relevant departmental representatives (See Step 1). If constraints are applied, then realistic values for the constraints were established, based on current or future service provision standards or minimum acceptable values for users as determined by the stakeholders.

The output of this task was the production of maps showing current service areas which have been categorised into travel distance/ time bands. This will be based on distance only in all cases and on distance and capacity constraints where applicable. If required, a totally unconstrained distance map was produced to establish the maximum distance to each facility. The latter implies a map which shows how far every part of the study area is from a specific facility type, irrespective of the size of the facility. For each facility or service type, individual catchment was also be mapped to show which areas are allocated to which facility.

STEP 3: Analysis of under-, over- or poorly-served demand and backlog quantification

Based on the results of the previous steps, those areas that are well served, i.e. within reach and having sufficient supply, were mapped as were the un-served/ backlog areas (areas not meeting the set norms). The concentrations of un-served demand for each facility type were then determined and then mapped using proximity counting or density maps. The total backlog in facilities was then calculated. The potential over-supply of facilities also became evident and was then flagged for further on-the-ground investigation by the relevant department.

STEP 4: Facility analysis

This step involved the classification of the facilities with respect to their potential utilisation rates using the outcomes of the Step 2 analysis. This analysis concerned either the constrained catchment analysis process or an unconstrained analysis which allocated all demand to the closest facility within a specified distance or area of jurisdiction. In the latter case, the maximum demand within a specified catchment or distance range of an existing facility was calculated to promote the 'right-sizing' of facilities. This prepared the basic data required in Step 5 which investigated the rationalisation (closure) of facilities or the expansion of facilities which are well located but too small. Expansionary activities can reduce the need for building new facilities.

STEP 5: Planning for new facilities and right-sizing of facilities

Once the supply situation was clarified using catchment area analysis, the un-served demand was analysed to determine where capacity (new facilities or expansion) should be located. To plan for increased capacity and/or new facilities, a proximity count of un-served demand (as established in Step 3) was used to establish the key areas of shortage and a rough estimate of facility needs.

The proximity counting process allowed for the identification of concentrations of un-served demand, thereby assisting in the identification of those locations where there is a sufficient concentration of un-served demand to support either expansion or totally new facilities of a specified size. Suitable general locations for new or enlarged facilities of each type were then mapped, based on the unsatisfied demand. This is the most cost-effective and flexible approach to follow if spatial area plans have been established and 'development nodes' identified, and where coverage is more critical than efficiency. Alternatively, a more quantitative approach which used an optimization analysis was followed. This determined the number of locations to satisfy un-served demand based on selected criteria such as minimum distance or minimum capacity size or for a fixed number of facilities.

Two options were available with respect to the optimization: either optimization to achieve a set percentage of coverage, or optimization for a set number of facilities. For the later, each department/ sector specified a set number of facilities that it can afford and then the model found the best general locations in accordance with the specified number of facilities. This is more suitable in a constrained budget environment. The results were then used to select suitable locations for new facilities to address the unallocated or surplus demand. Decisions required from an operational perspective were whether the most optimal site should be selected from a purely population density perspective (in which case a new facility may be located within an already served area), or if the new facility should seek to extend coverage and be located in an un-served area and thus potentially serve fewer people.

Where sufficient demand for a new facility cannot be achieved within the poorly served areas, other options were suggested and tested if required. These included questions of whether:

- Certain facilities can be increased in size or operational capacity (see above);
- Longer access distances should be accepted;
- Facilities can be relocated;
- Services could be provided on an agency basis by another party; or,
- Mobile/ periodic services points can be identified to provide services where there is insufficient demand to warrant permanent service points.

STEP 6: Costing of facility optimisation plans

This step involved the basic costing of two facility provision scenarios per facility. The Departments indicated their preferred option for incorporation into an integrated facility investment plan.

STEP 7: Development of an integrated plan for public investment

A key element in the identification of locations for new facilities is to examine access to public transport routes and nodes and the existence of established facility clusters or single key facilities. These aspects were used in the final task which was to draw up an integrated spatial plan of facilities that can ideally be clustered to promote investment into identified multi-facility nodes.