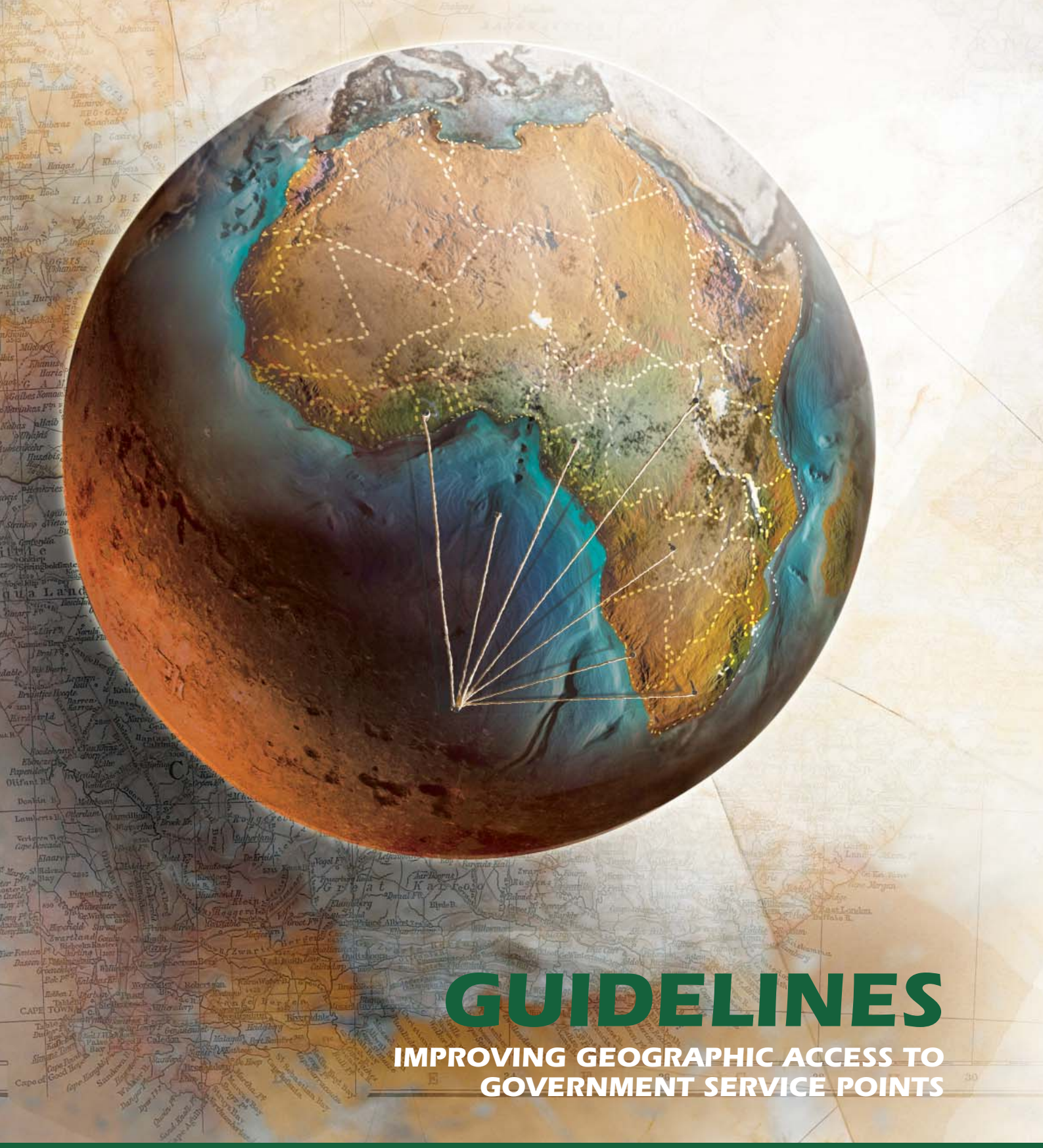

GUIDELINES

IMPROVING GEOGRAPHIC ACCESS TO GOVERNMENT SERVICE POINTS

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the dpsa

Department:
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ABOUT THIS PUBLICATION

People in South Africa often face great inconvenience and travel long distances to obtain the services and information they need from government. They also often have to visit more than one service point to access related government services.

Improving service delivery, especially services that improve the lives of poor and marginalised people, remains a government priority. Citizens also have high service delivery expectations and continue to demand better access to services.

Various policies, including the Constitution and the Public Service Regulations, place an obligation on departments to improve access to services, to develop standards for their services, and to remove barriers that decrease access.

This Guideline was development in response to departments that have expressed the need for a practical, step-by-step guide that is easy to read and will assist them in analysing the geographic location of their service points with a view to improving access to their services.

It was developed in consultation with senior managers and practitioners of several departments that provide services directly to the public. Several of these departments have previously conducted accessibility studies and are regularly reviewing their service delivery footprint. The document also draws on international practice.

While the guideline may be useful for professional planners and Geographic Information System (GIS) experts, it is primarily aimed at officials who need assistance and who have not yet acquired such levels of expertise.

The spatial realities of South Africa and service delivery needs of people change continuously over time and they impact on the need for government services and where they should be provided. This calls for regular accessibility studies and more responsive and innovative ways of providing services. This Guideline is therefore designed as a living document and will be reviewed and enriched through ongoing collaboration and consultation with departments.

CONTENTS

ABBREVIATIONS

GIS	Geographic Information System
GPS	Global Positioning System
IDP	Integrated Development Plan
SASDI	South African Spatial Data Infrastructure
SASSA	South African Social Security Agency
SDIP	Service Delivery Improvement Programme

COMMON TERMS

Accessibility study:	A study that assesses the ease with which people can reach the nearest social and economic service points using existing roads and modes of transport.
Cartesian coordinate system:	
Catchment area analysis:	
Catchment profile:	
Geo-coding:	
In-migration:	Movement of into in a region or community, especially as part of a large-scale and continuing movement of population.
Metadata:	
Network connectivity:	
Ortho-images:	
Out-migration:	Movement away from a person's region or community to settle in another are or community, especially as part of a large-scale and continuing movement of population
Quantitative data:	Data that can be quantified and verified. Quantitative data defines wherease qualitative data describes
Population thresholds:	
Spatial data:	Spatial data is any data with a direct or indirect reference to a specific location or geographical area, such as natural or constructed features. Spatial data is usually stored as co-ordinates and topology, and is data that can be mapped. Spatial data is often accessed or analysed through Geographic Information Systems
Spatial information:	
Spatial modeling:	
Standard deviation:	
Trade area analysis:	
Unconstrained catchment area analysis:	
Unique identifier:	

INTRODUCTION

The Guideline is aimed at practitioners who require guidance in developing their geographic access norms, conducting accessibility studies, and setting targets to improve access to their service points.

It also highlights key government policies and regulations to consider in looking at the geographic location of your service points.

The emphasis in this Guideline is predominantly on geographic access. It does not contain everything you need to know about access to services. Departments need to consider many other factors when improving access to their services. Although such aspects fall outside the scope of this document, reference is made to them.

The step-by-step guide sets out a generic process that can assist departments in developing their access norms; collecting spatial information, conducting accessibility studies and setting targets for improving access; and finally developing an implementation plan.

Developing geographic access norms

Departments need access norms to assist them to plan for providing services and to determine whether geographic access to their service points are adequate at present. If they do not yet have such norms, they need to develop them.

This first entails identifying the key services of the department, their target populations, and the various types of service points used. Departments then need to determine maximum distances for beneficiaries to travel to service points in different types of areas and determine population thresholds for such facilities.

Developing geographic norms is only the starting point for meeting the service delivery needs of people. The quality and affordability of services are important, and the needs of people with physical and other vulnerabilities must be considered. Access norms therefore should be integrated with service standards, internal capacity norms, and facility standards. All the key factors that determine where service points should be located must be identified.

Collecting spatial information

Spatial data is required about the demography of the population, geographical boundaries, and available transport networks. Geographic co-ordinates are required for service points of departments. Such data could already exist in the department; otherwise it needs to be collected or obtained directly from the data custodians such as other departments, private sector vendors and science research councils.

Conducting a geographic accessibility study

Accessibility studies can assist departments in a number of ways. They can help to indicate:

- Well-served, poorly-served and over-served areas.
- Well-located facilities that are optimally used; poorly located or underused facilities, and over-burdened facilities.
- Where there is a need to increase the number of facilities, or reduce, downscale or relocate existing facilities to more optimal locations.
- The optimum geographic location of service points to meet the service demand of the population.

There are various methods and software packages that departments could use to conduct accessibility studies. Some methods are simple and easy to use while others involve more complex techniques.

This Guideline sets out the more comprehensive approach while highlighting some of the quicker methods, such as the overlaying of service point data on Google Earth maps using software that can be loaded onto a personal computer. The disadvantage of the quicker methods is that they are not as comprehensive and do not take into consideration factors such as actual distances that people travel to reach service points.

Developing a plan of action

The findings of the accessibility study should be used to set targets for reducing the distances that people travel to access services. This needs an implementation plan to indicate the various measures that the department will take to improve access to its services.

Look at what is affordable for fixed centres and what can be done by mobile or other means to extend access affordably. Consult with provincial and local authorities on their spatial development frameworks in identifying physical sites that will be suitable for your facilities.

Several departments have adopted multi-channel strategies that combine the use of traditional service points with mobile services, establish partnerships with governmental and non-governmental stakeholders and through participation in the one-stop Thusong Service Centres. Departments are also making greater use of Information and Communications Technology to increase access to information and services. By adopting such approaches, departments can increase the reach and take up of their services in all types of geographical areas.

B POLICY AND REGULATORY CONTEXT

Introduction

Various government policies obligate your department to improve access to its services. They set specific requirements and provide guidance on how departments must develop and implement geographic access and other service standards. They also provide the context in which departments must develop strategies to remove barriers to access.

It is important to consider these policies when studying the provision of your services and in determining where facilities should be located geographically.

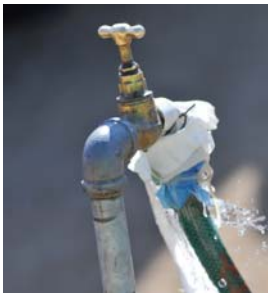
An overview of some of the key policies is provided hereafter.

Constitution

The Bill of Rights in the Constitution places an obligation on departments to improve access to services. It also states that the state must take legislative and other measures to provide access to a range of services, for instance, housing, health care, food, water and social security, within its available resources to achieve progressive realisation of these rights.

The Constitution also provides for the setting of norms and standards to ensure equal access to public services. In terms of Section 146 (subsection 2 (b)) of the Constitution, national legislation prevails in the aim of uniformity for effective service delivery.

Provincial authorities are responsible for translating national norms and standards into provincially specific forms in law and for playing a monitoring and co-ordinating role.



Public Service Regulations

Part 111.C.1 of the Public Service Regulations state that an Executive Authority shall establish and sustain a service delivery improvement programme for a department by:

- Specifying the main services to be provided to the different types of actual and potential customers, as identified by the department;
- Containing consultation arrangements with the department's actual and potential customers;
- Specifying the mechanisms or strategies to be used progressively to remove the barriers so that access to services is increased – taking into account customers' means of access to the services and the barriers to increased access;
- Indicating standards for the main services to be provided;
- Containing arrangements on how information about the department's services are to be provided; and
- Stipulating a system or mechanisms for complaints.

Municipal Systems Act

The Municipal Systems Act requires that each Municipality must have an Integrated Development Plan (IDP). This must include a spatial development framework that describes the existing and future spatial patterns that provide for integrated, efficient and sustainable settlements. This framework sets out, among other things, new development areas, major movement routes, areas targeted for redressing past imbalances and spatial reconstruction, and where infrastructure development should take place.

Provincial growth and development strategies

Although the preparation of Provincial Growth and Development Strategies and spatial development frameworks by provinces is not a legislative requirement, they incorporate issues and proposals of national, provincial, metropolitan and municipal strategic significance. They also serve as a crucial tool to:

- Guide and co-ordinate development in a province by indicating what type of investments should be prioritised in different localities.
- Indicate where new development should be located, taking into account the ability to provide communities with services such as water, schools and clinics.

White paper on improving service delivery (Batho Pele)

Section 4.2 of the Batho Pele White Paper provides the context for departments to develop and publish service standards for their services.

The White Paper states that national and provincial departments must publish standards on the level and quality of services they will provide, including the introduction of new services to those who have

previously been denied access to them. With certain services, such as health or education, national departments, in consultation with provincial departments, may set standards which will serve as national baseline standards.

Individual provinces may then set their own standards, provided these meet or exceed the national baseline. Provincial departments may also set additional standards for aspects of service not covered by national norms.

Similarly, departments may set intra-departmental service standards which will serve as minimum norms for their institutions and components. These internal institutions and components may also set additional service standards for aspects not covered by intra-departmental norms.

Fulfilling regulatiory requirements – what your department needs to do

Government policies oblige departments to improve access to their services and to address past imbalances that still exist. Departments must develop service delivery standards, including geographic access norms, and they must apply these norms and standards to set targets for progressively improving geographic and other forms of access to their services.

Consult beneficiaries on their service delivery needs and expectations and identify geographic and other barriers to access your services.

Your department must define its key services and identify its beneficiaries and stakeholders. Consult beneficiaries on their service delivery needs and expectations and identify geographic and other barriers to access your services. This will assist you in setting access norms for your services and in developing strategies to remove barriers to access. The implementation of such strategies must be affordable, achievable and sustainable. It is therefore important to determine the implications of your access norms for all the stakeholders concerned and to ensure that they are affordable.

Engage municipalities and provincial authorities on the content of their spatial development plans and frameworks with a view to identifying physical sites for service points and co-ordinating planning and investment in new facilities. Such consultation and co-ordination is based on the principle identified in the White Paper on Spatial Planning and Land Use Management that a co-ordinated and visible government presence would turnaround the fortunes of previously neglected communities.

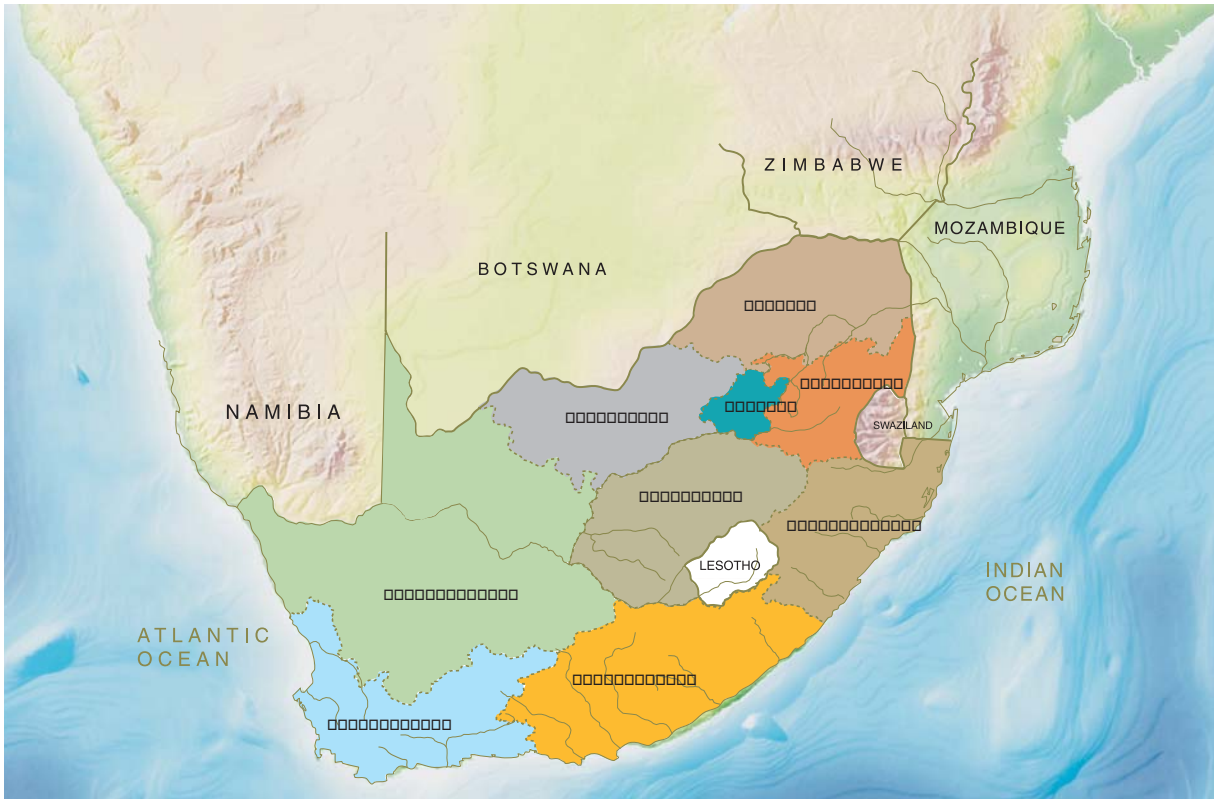
Note that municipalities need information about the policies, programmes and expenditure plans of sector departments where these have cost implications for them. For example, municipalities are required to provide services like water and sanitation for the effective functioning of facilities such as schools, hospitals and clinics, and they must be consulted.

UNDERSTANDING GEOGRAPHIC ACCESS TO SERVICE POINTS

INTRODUCTION

South Africa is a medium-sized country, with a total land area of slightly more than 1.2-million square kilometres, making it roughly the same size as Angola and Mali. Its long coastline stretches more than 2 500km. It measures about 1 600km from north to south, and roughly the same from east to west.

Figure 1: The nine provinces of South Africa

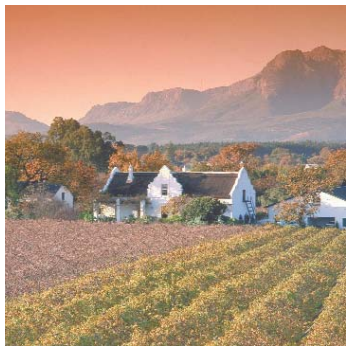


The nine provinces vary considerably in size. Figure 1 provides a Google Earth image showing the nine provinces of South Africa. The smallest is tiny, crowded Gauteng, a highly urbanised region; and the largest is the vast, arid, empty Northern Cape, which takes up almost a third of South Africa's total land area. The country is also rich in social diversity with more than 47-million people (mid -2007 estimates of Stats SA) of diverse origins, cultures, languages and beliefs. Most of the people are concentrated in the eastern half.

Slightly more than 50% of South Africa's population lives in urban areas. The most rural province in South Africa is Limpopo. Gauteng, with both Johannesburg and Pretoria within its boundaries, is almost entirely urban. Other areas of high urban concentration are around Cape Town in the Western Cape, Durban in KwaZulu-Natal, Port Elizabeth and East London in the Eastern Cape and, in the interior, Bloemfontein in the Free State.

The mid-2007 population estimates for the nine provinces are:

- Eastern Cape – 6.9-million (14.4%)
- Free State – 2.9-million (6.2%)
- Gauteng – 9.6-million (20.2%)
- KwaZulu-Natal – 10-million (20.9%)
- Limpopo – 5.4-million (11.3%)
- Mpumalanga – 3.5-million (7.4%)
- Northern Cape – 1.1-million (2.3%)
- North West – 3.4-million (7.1%)
- Western Cape – 4.8-million (10.1%)



CHANGING SPATIAL REALITIES IN SA

In implementing this guideline, it is important to take into account the changing spatial realities and the socioeconomic environment in the country. These changes will continue to affect the demand for services, and need to be considered when making decisions about what and where to invest in government infrastructure and services.

Research conducted in 2009 by the Human Sciences Research Council (HSRC) shows that the distribution of the population and human settlements in the country is rapidly changing. The main driver for migration is increasing unemployment, which is hitting the poor hardest and rural areas in particular.

Migration trends include the movement of people from rural areas, former homeland areas and farmlands to urban areas. People are moving to the peri-urban fringe and informal settlements around small towns, secondary cities, coastal urban centres and the metropolitan cities, especially Johannesburg and Cape Town.

Migrating households choose the best combination of access, affordability, earning and social environment they can find. Most of the urban migration stream is moving into shack settlements, which is placing a heavy new strain on infrastructure and service delivery as well as subsidy housing development.

Urban informal settlements are turbulent and crowded. Conditions tend to be bad but there is generally better access to work and earning potential. Many may not get jobs and may have to live on social grants. Government delivery will need to be ahead and alert and establish service centres in the right places.

Those people who are left behind in rural shack areas include a high percentage of women-headed and damaged households that have lost key family members because of sickness or out-migration. Conditions in rural shack areas tend to be badly run-down and these areas often provide very little access to work.

In the future, climate change could also drive in-migration and cross-border migration. It is envisaged that cross-border migration flow could go up by an unknown amount increasing competition for jobs, housing and access to services.

What this means is that the demand for services will continue to change and government will need to take this into consideration when making decisions about what and where to invest in infrastructure and services.

Departments need to ensure that they have access to up-to-date information on migratory trends and human settlement patterns as well as demographic statistics for South Africa.

Challenges that departments will have to deal with include:

- Providing more services within the peri-urban and informal settlements within urban centres.
- Providing services to the most vulnerable especially in the rural areas.

- Optimally locating service points closer to the people, especially in areas where human settlement patterns and demographics are changing.
- Developing road infrastructure and transport services to improve access to services and encourage economic development.

WHAT DO WE MEAN BY IMPROVING GEOGRAPHIC ACCESS?

Service points are offices, mobile service units and other physical points where citizens come into contact with government to get information, communicate with government and transact services. It is assumed in this Guideline that people will access the service points closest to where they live.

Geographical access is defined as how close government service points are to where people live and work, using existing road networks and modes of transport, for instance by foot, bus, taxi or motor car.

People need to access different government services where they live. Hence the distance between the service points of various departments should also be considered in determining access, for instance, Home Affairs offices and service points of the Departments of Social Development and Labour.

In selecting which service points to use, people are often also guided by their perceptions of the quality of services provided by different service points and the capacity of such service points to provide services. Departments should therefore not look at geographic access in isolation but also consider the following:

- The range and quality of services provided at service points. Departments should ensure that service points have adequate capacity to provide quality services.
- The ease and convenience of using services. Departments should particularly aim to ensure that people with disabilities are able to access services and amenities.
- Accessibility is closely linked to affordability. Even when service infrastructure is in place, services will remain beyond the reach of many people if they are not able to afford to travel to them and use them.

Access can be improved by using complementary access channels. Departments can reduce the need for people to travel to their facilities by adopting multi-channel strategies that combine the use of traditional service points such as offices and mobile services and more innovative mechanisms.

STEP-BY-BY GUIDE

INTRODUCTION

Departments need to know where the beneficiaries of their services live, what their needs are and how government can address shortfalls.
They are also required to do the following:

- Develop geographic access norms for their service points.
- Set targets for reducing distances that people travel to access such facilities.
- Develop plans for achieving these targets.

This Guideline sets out a process that can assist departments in achieving these. Departments should adapt the process according to their particular needs and circumstances.

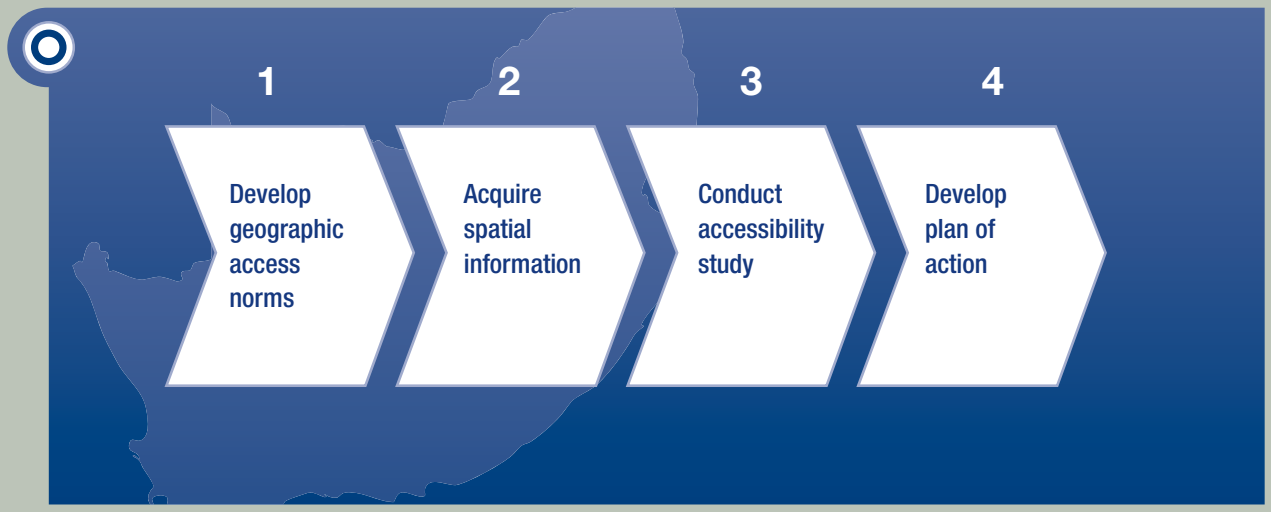
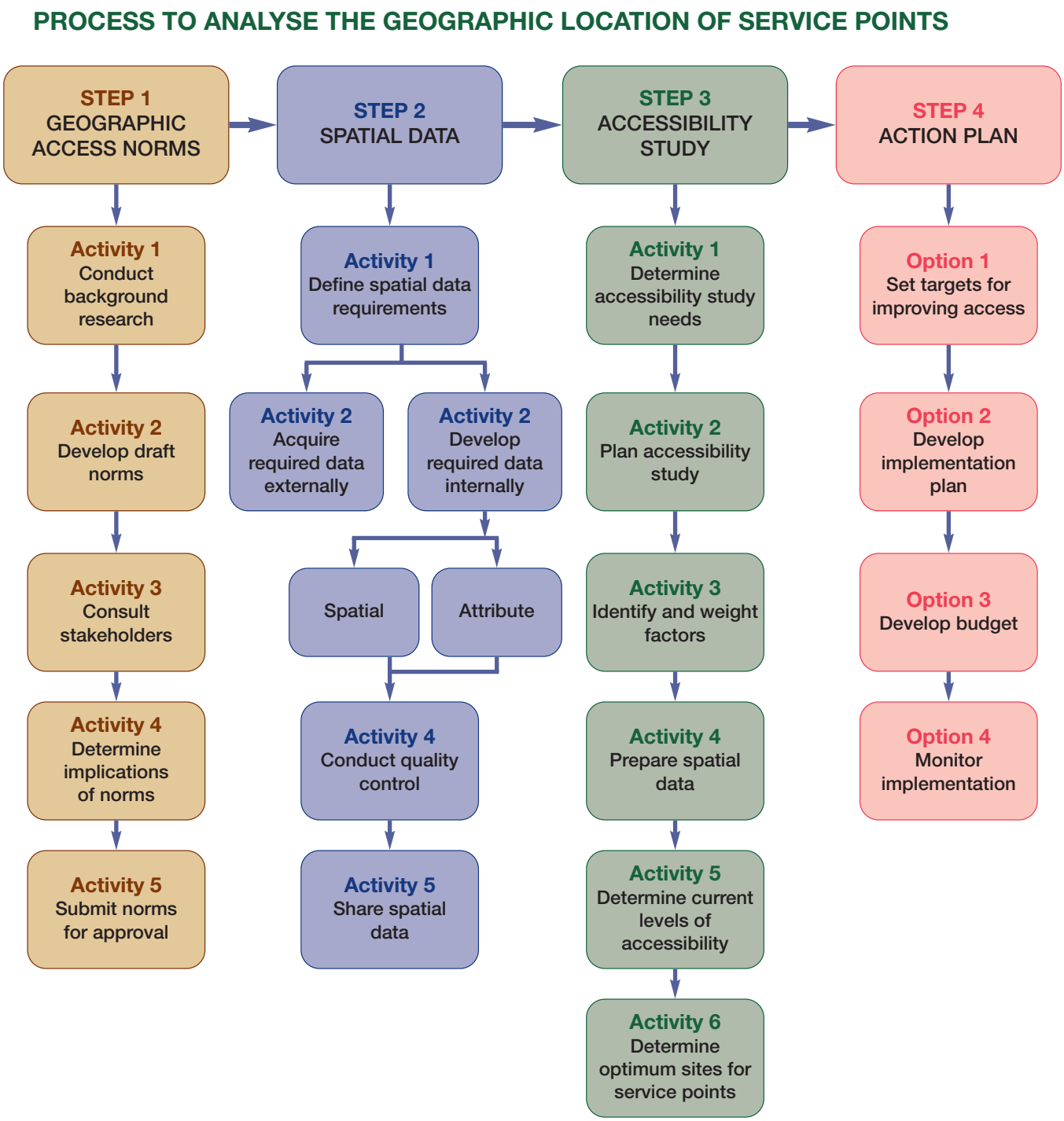


Figure 2: The four key steps to analyse the location of service points

Figure 3: Overview of the process to analyse the location of service points



Geographic access norms generally include the following:

- Maximum distances for beneficiaries to travel to service points using various modes of transport, for instance, the maximum distance for learners to walk to a primary school.
- Population thresholds for service points for them to be able to provide quality services to the target population, for instance, the maximum and minimum number of learners per classroom for different sizes and types of schools.

As the geographic landscape of South Africa and density of the population vary extensively from area to area, access norms should be differentiated for different types of areas. They should also be differentiated for various types of service points.

Note that developing geographic access norms are only the starting point for meeting the service delivery demand of the population. Departments should combine their geographic access norms with other norms and standards for service points, such as service delivery standards and internal capacity norms and facility standards.

There are five key activities in developing geographic access norms (see Figure 4).

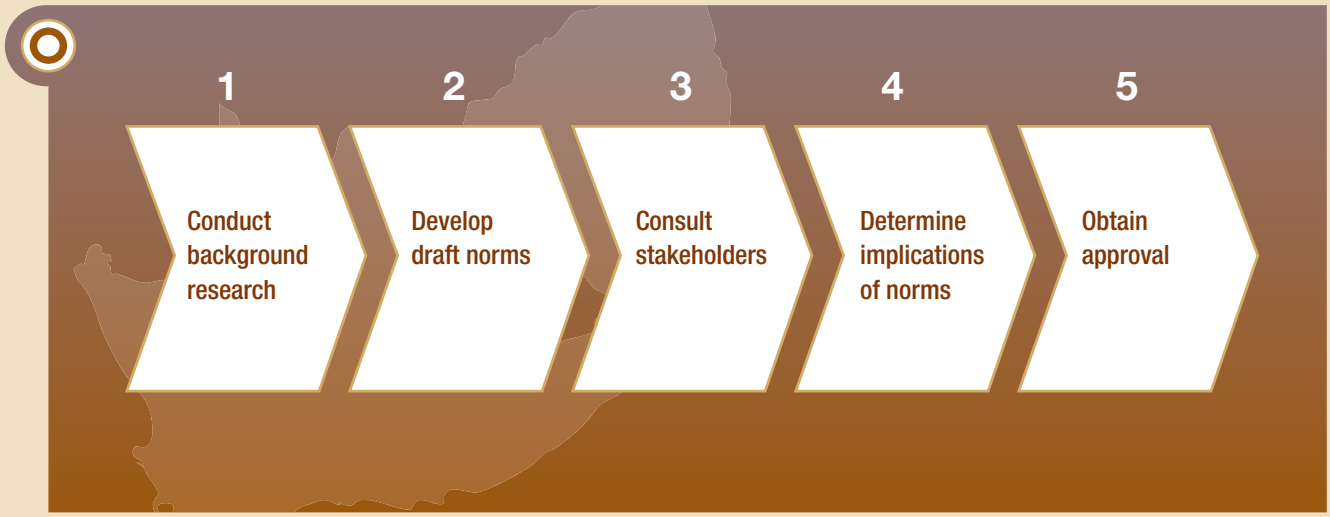


Figure 4: The five key activities in developing geographic access norms

ACTIVITY ONE: CONDUCT BACKGROUND RESEARCH

Study the service delivery model of your department to identify its key services and stakeholders, its target population and hierarchy of service points. Also identify possible interrelationships and reporting arrangements between the various types of service points and how they are typically configured in relation to one another. Such a hierarchy could include the following:

- Regional and district offices
- Various types of permanent, fully established service points that provide different services and levels of service
- Temporary or satellite service points that provide selected services at certain times and on specific days only
- Mobile service units
- Shared facilities
- Thusong Service Centres (one-stop centres providing information and services to communities)
- Agency services in which other parties such as post offices or banks provide certain services on behalf of your department.

Then conduct background research to determine if your department already has geographic access norms or if they still need to be developed for your service points. Also determine if geographic accessibility studies have been done as they can provide baseline information on current levels of access to your services.

Review South African and international access standards and guidelines that provide examples that could assist you, such as the following:

- Redbook – Guidelines for Human Settlement Planning and Design, which is freely available online at the website of the Council for Scientific and Industrial Research (CSIR).
  Go to: **http://www.csir.co.za/Built_environment/RedBook/**

- Summary standards and Guidelines for the Planning of eThekwini Social Activities and Public Open Space. They were developed by the CSIR for the eThekwini municipality and cover a range of national, provincial and municipal services.

- Guidelines for the Formulation of Spatial Development Frameworks issued by the Department of Rural Development and Land Reform.

Consider the geographic access norms of departments that provide complimentary services as these could assist you in developing access norms for your department. Keep in mind that departments regularly review their access norms and that they change over time.

The Department of Social Development has also defined and documented access norms for South African Social Security Agency (SASSA) pay points (see Table 1).

Table 1: Example of geographic access norms for social grant pay points

Factors considered	Social grant pay points	Service/mobile offices
Travel time/distance	60 min / 5km	40km
Modes of transport, e.g. taxi, bus	Walk, taxi, bus	Walk, taxi, bus
Facility capacity	1 250 people per payment session (day). 30 seconds to pay a beneficiary. Beneficiaries are not allowed to queue more than two hours.	One SASSA employee for every 800 beneficiaries in catchment area. Gazetted space norms.
Access to other infrastructure (e.g. banks, post offices, taxi ranks)	Where beneficiaries are within 5km from banks, post offices, Thusong centres, these facilities must be used.	
Services offered	Payment of grants helpdesk and enquiries.	Applications and enquiries Customer care reviews
Other factors that influence decisions on the location of services – Spatial optimisation results		
Information and communication technology, business processes, open (daily, hours), delegated decision-making – 08h00 – 15h00		
Staffing Norm – One SASSA employee for every 800 beneficiaries in catchment area.		

Identify factors that may influence decisions on where service points of your department should be located. You can even allocate weights to them to assist in conducting the accessibility studies and in identifying optimal locations for service points. Conduct research within your department and consult stakeholders to identify such factors. Examples of such location factors are:

Socio-environmental factors: There are many socio-environmental factors that you could consider. For example, levels of unemployment may determine the need for labour facilities. Levels of crime may also be used to weight the demand for police stations in different areas.

Daily movement of people: Defining the geographic access of government service points is often influenced by factors such as the daily movement of people, in particular the in- and out-migration of people around towns and cities at various times of day and night.

Proximity to complementary services: Some departments have interfaces between them that need to be considered and their service points should be located in close proximity. For example, police stations are often located in close proximity to court facilities.

People with special needs: Consider the needs of special needs groups of people that must be catered for. They include people with HIV/ Aids, people living with disabilities, aged people and children. Many people, especially people in poor communities, cannot afford to use public transport and travel on foot.

Affordability to government and beneficiaries: Access norms must be affordable and sustainable for government. They are generally implemented incrementally over the medium to long term as there are infrastructure and budgeting implications for departments.

The geographic access norms must also be affordable for people who need to travel to the service points of your department.

Availability of suitable land, infrastructure and basic services: The availability of suitable land as well as physical infrastructure and basic services could influence decisions on where government facilities should be located. This may include the availability of roads and sufficient office space, shelter, water, sanitation and electricity.

ACTIVITY 2: DEVELOP DRAFT GEOGRAPHIC ACCESS NORMS

Develop geographic access norms for your department using a template that combines different sets of information. Table 2 is an example of such a template. The template is generic and you should adapt it to meet your needs, for instance, by adding or subtracting columns.

Table 2: Template for defining geographic access norms for service points

1. Name of department (e.g. Health):

2. Type of service point (e.g. small primary health care clinic):

3. Type of geographical area (e.g. urban/ rural):

4. Services offered	5. Target population	6. Maximum travel distance	7. Mode of transport	8. Population threshold	9. Service standards	10. Internal capacity norms	11. Facility standards
For example: Preventative and primary health care	For example: Generally cater for lower-income areas where people do not have health insurance or medical aid membership	For example: 3km	For example: Predominantly on foot or local public transport	For example: Population threshold such as catchment area of 5 000 – 20 000 people	For example: Service provided at least eight hours a day and four days a week Maximum queuing time of 60 minutes	For example: Staff allocation Number of beds Number of vehicles	For example: Size of facility Physical accessibility standards in relation to persons living with disabilities
12. Location factors considered	For example: Disease profile of the area Suitability and availability of land Soil type Each clinic is linked to a Community Health Care Centre where the services are provided on a referral basis						

Follow a consultative approach to filling in the template. Consult internally in your department and then consult with external stakeholders. This could be done through focus group meetings or workshops.

Fill in separate templates for the different types of service points and for different kinds of geographical areas identified by your department, for example, urban, rural and sparsely populated areas.

Completing the template

Follow the steps set out to fill in the template. Examples have been included in the template to guide you.

1. **Name of department:**
   The first step in filling in the template is to enter the name of your department at the top.

2. **Type of service points:**
   Enter the type of service point for which the geographic access norm is being developed. Some departments have categorised their various types of service points further and have developed access norms for each type of service point. For example, the Department of Health has defined Mobile Clinics, Neighbourhood Clinics, Community Health Care Centres and various levels of hospitals.

3. **Type of geographical area:**
   The topology of the geographic landscape and density of the population vary extensively from area to area, hence access norms should be differentiated for different types of geographical areas, for example, urban, rural and sparsely populated areas. Fill in separate copies of the template with differentiated norms for each of these different types of geographical areas.

4. **Services provided:**
   List the key services/functions that are performed at the different types of service points. You should identify these services during your preliminary background research.

5. **Target population:**
   Your department must be clear about the target populations of its various services and it should know their demographics or other defining characteristics in relation to the larger or total population.

   The target population refers to the group of people that needs to be reached through the services of your department. It could include individuals, households, communities, organizations or all the people of the country. For example, a target population of a service could be all the households in a particular local community living at or below the poverty level.

   Use the template to indicate the various services of your department and list their target populations.

6. **Maximum travel distance:**

In the past, accessibility has mostly been considered in relation to travel times. However, this measurement assumes that most people have private vehicles or can afford to use public transport. Many people still have to travel long distances on foot to service points. Distance should therefore be used to determine the geographic accessibility of service points and not travel time.

There are various ways to determine maximum travel distance norms for different types of service points and areas:

- Conduct workshops and meetings in your department to estimate travel time/distance norms that you think are reasonable.

- Consult beneficiaries or conduct surveys to gain an understanding of how far they are currently traveling and what they believe would be a reasonable distance.

7. **Mode of transport:**

Define the preferred or most prevalent mode of transport used by the target population in traveling to service points in various areas. There are four main modes of transport: pedestrian, bus, taxi and motorcar transport. Metro rail services are provided in some metropolitan areas. Information on the preferred mode of transport can be obtained from beneficiaries through independent, structured surveys or informally through consultation with beneficiaries at service points.

8. **Population threshold of service point:**

The population threshold of service points refers to the minimum and/or maximum number of beneficiaries that can be served at a service point in a given time period, for example, per day, per month or per year.

Consider the impact of other available access channels through which information and services can be provided to beneficiaries, for example, through information and communication technologies such as web portals, fax and telephone. The availability of such access channels could lessen the need for people to travel to service points, which could reduce the demand for such service points.

9. Service standards

Service standards refer to minimum measures or levels at which service points have to operate; these measures generally have time, cost, quality, equity or quantity dimensions. For example, the processing of an application may take 45 minutes if adequate staff and processes are in place.

The national Department of Social Development has developed National Norms and Standards for Social Assistance Service Delivery. These are comprehensive and serve as a useful guideline for other departments.

10. Internal capacity norms:

The capacity of service points depends on various factors, for instance, adequate staffing, productivity, facilities and infrastructure available at service points as well as the efficiency of processes.

If your department has not yet defined internal capacity norms for its service points it could use work measurement techniques to determine these. For instance, the Western Cape Department of Health has developed a workload calculator that takes into account workload and population parameters to develop staffing models for their health care service points. These models include the required number and skills mix of staff as well as their optimal use at different sizes and types of service points.

11. Facility standards:

Good design has a key role to play in improving the quality of services provided. List a uniform set of facility standards, for instance, physical accessibility standards and space specifications that apply to facilities across the country. Such facility standards should inform the construction of new service points and the refurbishment and reconfiguration of existing ones.

12. Location factors:

List the factors that must be considered in deciding on where service points should be located. Examples of such factors are highlighted earlier in this chapter of the Guideline.

ACTIVITY 3: CONSULT BENEFICIARIES AND OTHER STAKEHOLDERS

Once you have approval from your department, you should consult beneficiaries and stakeholders for input on your draft access norms. This will assist in determining their suitability and acceptability. Use this input to refine your norms.

You could conduct such consultation through interviews, meetings or workshops. Your department could also publish the draft access norms in the Government Gazette for comment.

Internal departmental consultation:

Obtain input on the draft geographic access norms from colleagues in your department, especially from those who are directly involved in providing services to beneficiaries at service points as well as officials involved in policy formulation and planning. This could be done through focus group meetings and circulars.

Citizen consultation and participation:

The Public Service Regulations require that your department must consult with citizens in the development of your service delivery norms. Consider conducting a household survey or an informal survey at service points to obtain input from beneficiaries on the suitability of your draft access norms.

Other government departments and stakeholders:

Conduct meetings or workshops to present the draft access norms to other departments and relevant stakeholders for input.

Note that municipalities and provinces are responsible for developing spatial development frameworks to co-ordinate planning at local and regional levels, and you should consult therefore with them in developing your department's access norms. The Department of Public Works as well as the Department of Roads and Transport are also key stakeholders as they are responsible for the provision of infrastructure.

Align the draft geographic access norms of your department with those of complementary services provided by other departments, where possible. Such alignment facilitates the clustering of facilities of various departments closer to communities and closer to one another.

ACTIVITY 4: DETERMINE THE IMPLICATIONS OF YOUR ACCESS NORMS

Once you have developed the draft access norms you should test them by means of an accessibility study. Such a study will assist you in developing accessibility statistics and maps that will assist you in determining the following:

- The percentages of people who would fall within and outside of the draft access norms in different areas.
- The possible need for additional strategies, additional service points or other measures to improve levels of service provision and access.
- Possible resource and cost implications of implementing the draft access norms and whether they are affordable and sustainable for your department.

Then determine whether the draft access norms should be adjusted upwards or downwards.

ACTIVITY 5: SUBMIT GEOGRAPHIC ACCESS NORMS FOR APPROVAL

All service delivery norms of your department should be approved by your Minister or Executing Authority. Thereafter they should be published in your Service Charter.

STEP ONE – KEY CONSIDERATIONS

You should not develop and apply your access norms without considering local needs and context and any applicable policies. Nor should they be applied irrespective of proper planning processes and consultation. Consult with local authorities and other government stakeholders on where service points should be located and to identify suitable land.

Consider the following:

- Geographic access norms are necessary to determine the optimal number and location of service points and to ensure maximum coverage of beneficiaries.
- Geographic access norms are indicative only due to the increasing mobility levels of people in some communities and their choice to use facilities in other areas.
- Develop differentiated access norms for the various types of service points and for different types of geographical areas.
- Consult key stakeholders in developing your access norms, especially your beneficiaries, the provincial departments of planning and local government as well as municipalities.
- Align your geographic access norms with those of comparative departments to ensure greater synergy in the delivery of services across government.
- Conduct accessibility studies to assist you in adjusting your geographic access norms.
- Consider the cost and other resource implications for implementing the access norms, for instance, the cost of establishing additional service points.

STEP TWO: COLLECTING SPATIAL INFORMATION

Introduction – What is Spatial Information?

Spatial information includes any information that can be geographically referenced to a location on the surface of the earth. It provides information on place and space. Such information is also known as geo-information, geographic information or geospatial information.

Many departments have geographically referenced the location of their services and have detailed information on facilities, staff, equipment and the beneficiaries that use their service points. Figure 4 illustrates the spatial location of secondary schools in OR Tambo District Municipality.

Figure 5: Location of secondary schools in OR Tambo District Municipality

Departments can use their spatial information to do the following:

- ❏ Develop strategies and mechanisms for improving geographic access to their services.
- ❏ Plan the creation of new service delivery infrastructure.
- ❏ Monitor service delivery at service points and also in relation to other service points, taking the spatial distribution into account.
- ❏ Plan and manage the deployment and utilization of their staff at service points and other offices.
- ❏ Manage the use and maintenance of facilities and infrastructure.

Several departments have access to detailed demographic information on the distribution of the population, which they use to determine whether they are providing adequate services to them. They also maintain aggregate information to determine the outcome of service provision in various administrative areas, for example, the Department of Education has information on the pass rates of learners within different regions of the country.

Often departments also have other referential layers of information, including administrative boundaries and road networks that they use in the production of maps.

The importance of good quality spatial data

Accurate spatial information is essential for conducting accessibility studies. In particular, a complete picture of available government service points and road networks as well as demographic information is needed. Accurate information on the capacity of service points to provide quality services that meet the needs of the population is also needed.

The South African Spatial Data Infrastructure (SASDI) provides for policies and standards for spatial information which are applicable to all public sector organisations. Ideally your department should have policies on the capture and maintenance of spatial information, the use of data standards and the management of data, which are aligned to SASDI. Your department also needs mechanisms to capture and maintain its spatial information. This can be done using a variety of different methods that are described in this section..

Furthermore, national standards of Standards SA and international ISO standards on geographic information, especially ISO 19111 on spatial referencing, ISO 19114 on quality evaluation procedures and ISO 19115 on metadata provide guidance on the collection of the spatial information and its metadata.

Collecting spatial data

Various spatial datasets are needed to analyse the location of your service points. There are various activities to follow to determine your data requirements, to acquire the data, and to ensure that the quality of the data meets the required quality standards.

You will also need a Geographic Information System (GIS) to store and use your spatial datasets. GIS uses computer technology to integrate, manipulate, analyse and display a wide range of information in a spatial format.

Figure 5 shows the five key activities to follow to acquire the spatial data sets that you need.

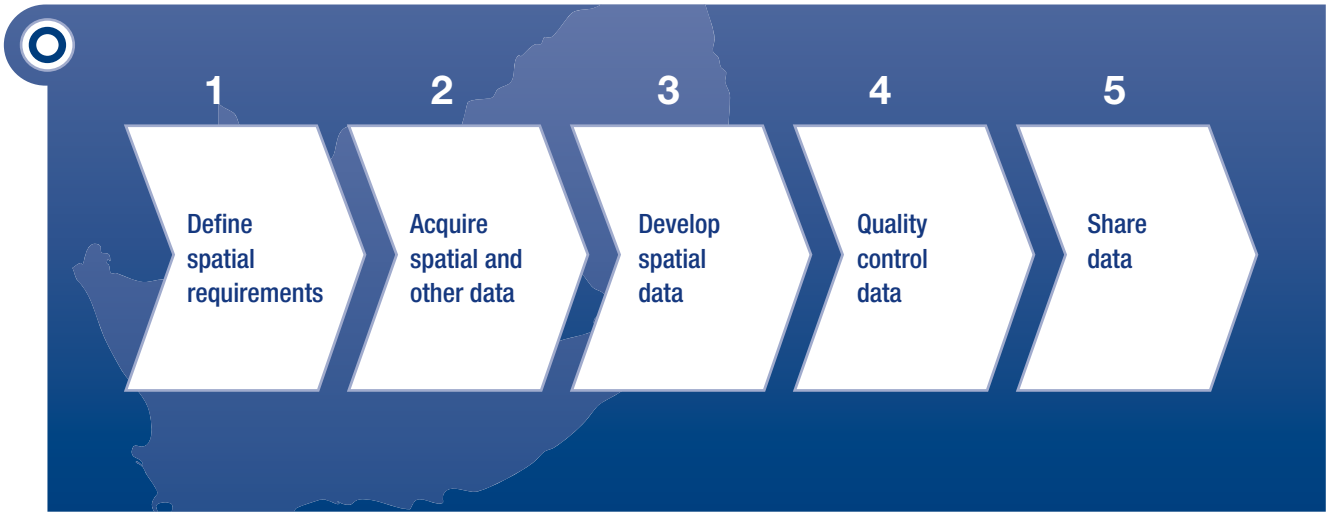


Figure 5: The five key steps in acquiring spatial information

ACTIVITY 1: DEFINE SPATIAL DATA REQUIREMENTS

Consider the following when identifying the spatial data needed for the accessibility study:

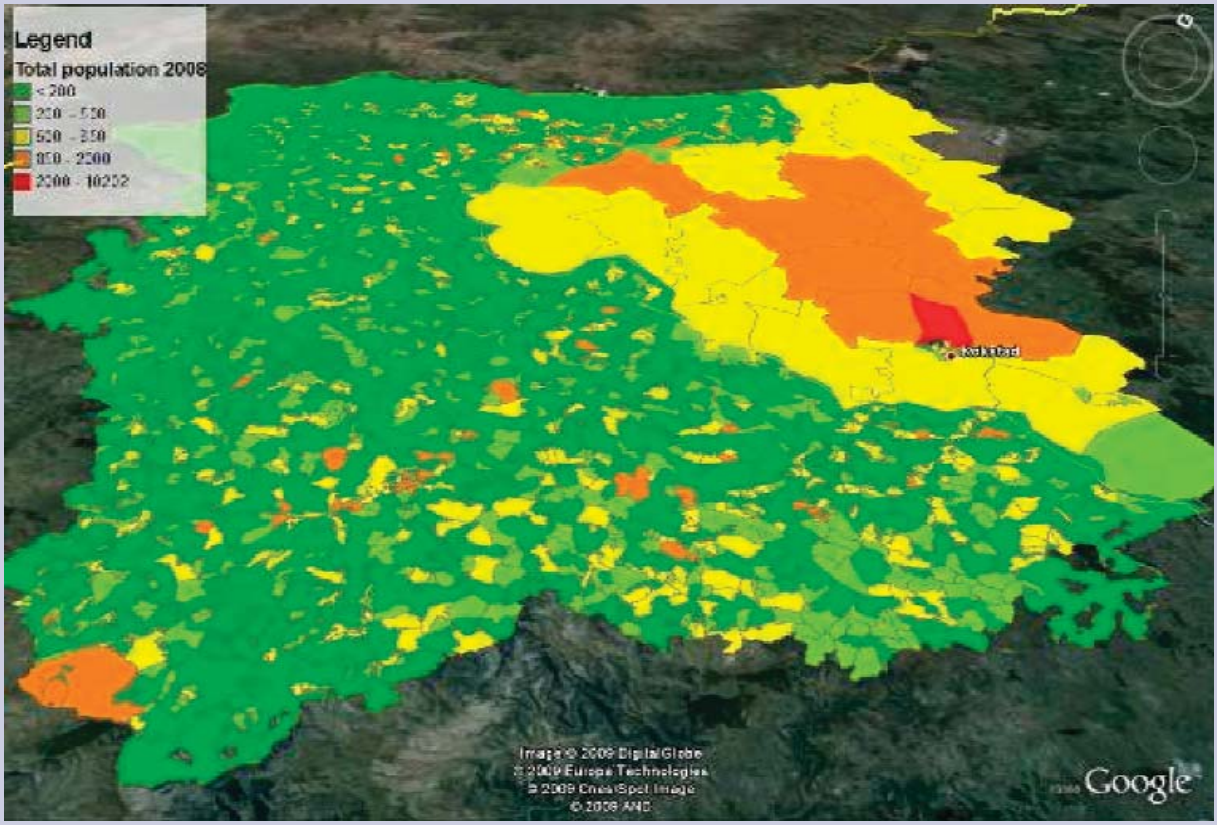
- The policy mandates, service delivery model and department planning should provide guidance on what spatial and attribute information should be collected in relation to its services, service points and beneficiaries.
- The objective, scope and deliverables of your study, as will assist in identifying specific data requirements, including the level of detail required.
- The data standards which are applicable to the capture and maintenance of spatial information in your department.

Generally you will need information on the beneficiaries of your services as well as information on available road networks that beneficiaries use to travel from where they live to the service points of your department. You will also need information on other factors needed to determine the required number and location of service points, for instance, socio-economic data.

In most instances the total population is used to define the target population. Total population is defined as the total number of individuals of all age, gender and race groups living in a particular area. However, depending on the responsibilities of the department, the types of service points and their beneficiaries, the target population may be defined by other factors, for instance unemployed people. You could also consider future population projections to define the target population, based on factors such as population growth, mortality and in- and out-migration.

The most current statistics on the target population for your accessibility study should be obtained at the smallest area level possible. Ideally, this should be at an enumeration area level, which is the smallest area for which information is collected during a census conducted by Statistics South Africa. You will also require comprehensive and accurate information on national, main, secondary and tertiary roads to do the accessibility studies. Information on barriers that could impede travel to service points, such as impassable rivers and mountains will also be required.

Figure 6: Demographic estimates at an enumeration area level for Alfred Nzo District Municipality illustrated in Google Earth



ACTIVITY 2: ACQUIRE SPATIAL AND OTHER DATA FROM EXTERNAL SOURCES

The acquiring of spatial data refers specifically to the target population and road network. However, other referential data may also be needed, including administrative boundaries and other socio-economic layers (e.g. poverty, unemployment, crime, daytime population, and education and health statistics).

The first call to find available spatial information should be the Spatial Metadata Discovery facility of the SA Spatial Data Infrastructure – **URL: //nsif.dla.org.za/metadata_tool/smd.**

When custodial departments or organisations cannot provide access to the most current data at the required spatial level, the spatial information may need to be to acquired from private-sector vendors or you may need to collect it yourself.

Statistics on the total population should be obtained from Statistics South Africa as long as the information can be provided at the smallest spatial level possible and it is current. However, if you require the information in a particular format you could procure it from the private sector. You should use the most current datasets that are available.

Road data sets are available from National Geo-spatial Information of the Department of Rural Development and Land Reform or from four main sources within the private sector. namely: MapIT, Business Connexion, Knowledge Factory and AfriGIS. An evaluation of these road datasets should be done before making a final decision on selecting one for your accessibility study.

ACTIVITY 3: COLLECT REQUIRED DATA INTERNALLY

There are various ways of collecting spatial information, including spatial information surveys, mapping workshops and geo-coding.

Generally, spatial information surveys provide the most accurate information but they are very time-consuming and expensive. Geo-coding, on the other hand, can be done quickly and cheaply although the accuracy, especially for service points in rural areas, tends to be quite poor. Mapping workshops on average provide the best accuracy within a reasonable time frame and cost.

Spatial information survey:

A spatial information survey involves teams of fieldworkers visiting every government service point to define the geographic co-ordinates using a Global Navigation Satellite System receiver, such as Global Positioning System (GPS). During the survey an audit on the infrastructure, equipment, beneficiaries and personnel at the service point may also be collected.

You will need a comprehensive list of all service points to conduct a special information survey. Ideally these service points should have a unique number or identifier that is provided by the department. Although this method provides the most accurate information, it is also the most expensive. The steps normally followed in implementing a spatial information survey are:

- ❏ Obtain complete list of government service points.
- ❏ Recruit fieldwork teams with access to GPS.
- ❏ Develop questionnaire for the collection of information on infrastructure, equipment, beneficiaries and personnel at the service point.
- ❏ Work with departmental staff to identify location of service points.
- ❏ Undertake spatial information survey, capturing geographic location of service points and associated attributes.

Mapping workshops:

Workshops can be organised with managers responsible for regions or districts within your department to define the location of its service points on maps or ortho-images. You will need a comprehensive list of all the service points of your department. These should include the physical addresses, place name and contact details.

Using a combination of Geographic Information System and visualisation software (e.g. Google Earth), the managers can assist you to plot the existing geographic location of the service points. You can also use this method to maintain and update your spatial information. The steps that are normally followed in implementing a mapping workshop are:

- ❏ Obtain complete list of government service points.
- ❏ Integrate available spatial information into your GIS or Google Earth (e.g. administrative boundaries, geographic place names, other reference points). If using Google Earth, be aware of the limitations in terms of accuracy and date of the imagery.
- ❏ Organise and hold workshops in departmental regions.
- ❏ Invite regional managers to attend the workshops with a full list of the service points that they are responsible for.
- ❏ Request them to fill in a short questionnaire for each service point that provides a unique identifier and relevant attributes (e.g. number of staff).
- ❏ Regional managers need to sign an attendance register and data capture register (i.e. registers that information is complete and accurate). They must also hand over the list and completed questionnaires for each service point.
- ❏ GIS operators need to facilitate the workshop to locate the exact position of all service points in map or ortho-image with input from regional managers. This is done by sequentially to identify administrative and geographic places where service points are located, and then using the regional manager's local knowledge of where service points are situated along roads and in towns. The unique identifier of the service point is also captured in the GIS or Google Earth.

- ❏ Capture information from questionnaires into a database or spreadsheet.
- ❏ Import the information on the location of service points from Google Earth into a GIS, if necessary, and link the attributes from the database to them, using the unique identifiers of service points.

Geo-coding:

You can use geo-coding to allocate geographic co-ordinates to service points in your database. Geo-coding is one of the easiest and most cost-effective methods to use, but it generally does not provide service points with the most accurate geographic co-ordinates, especially those in rural areas.

Begin by matching variables that are common to both your service point database and a spatial layer of information that includes geographic coordinates. A variable could, for instance, include place names such as Pretoria, Sandton and Bele Bela.

Where such matches are found, transfer the geographic co-ordinates for those points from the spatial layer of the information to your database of service points. You will then be able to map the location of the service points on a GIS.

The steps to follow in geo-coding your service point addresses include the following:

Obtain a complete list of your service points in electronic format, including:

- ❏ The physical addresses of the service points, for example, street number, street name, and street type as follows: 22 Smith Road.
- ❏ The geographic places where the service points are located, for example, suburb, town, village and city.

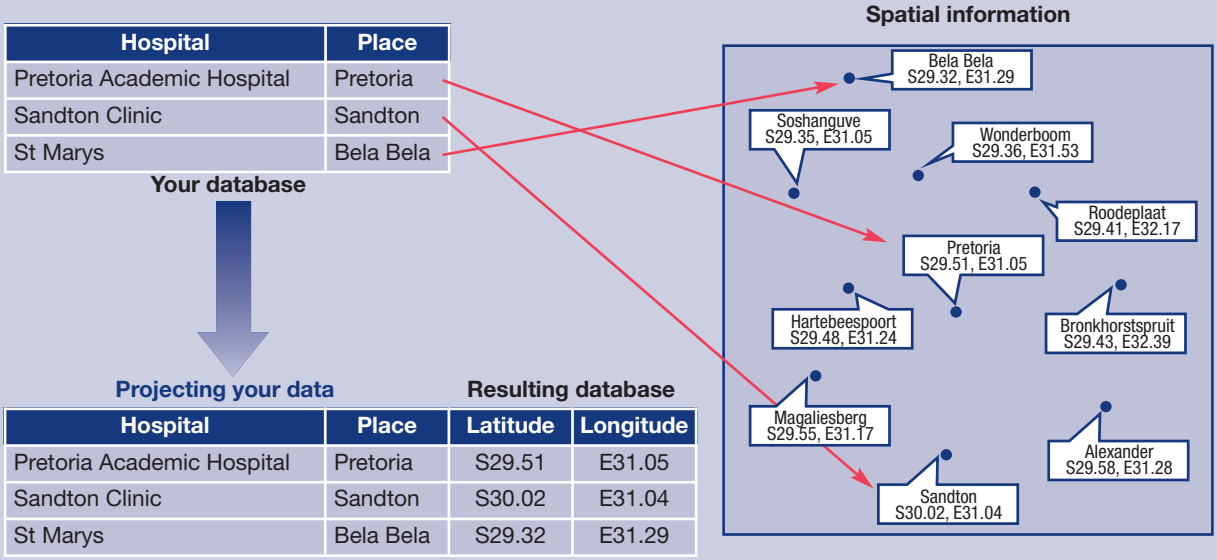
Acquire the spatial information that will be used to do the geo-coding, for instance:

- ❏ National address directory or street address database which contains geographic coordinates.
- ❏ Geographic places of Statistics South Africa.

Use GIS or specialist geo-coding software to geo-code the database of service points, clearly indicating the level to which they have been geo-coded, for example street, suburb, town, village or city level. Use Google Earth to check the geographic position of the service points and adjust these positions if necessary.

The geo-coding process is illustrated in Figure 7. (overleaf)

Figure 7: Illustration depicting the geo-coding process



Hospital	Place
Pretoria Academic Hospital	Pretoria
Sandton Clinic	Sandton
St Marys	Bela Bela

Hospital	Place	Latitude	Longitude
Pretoria Academic Hospital	Pretoria	S29.51	E31.05
Sandton Clinic	Sandton	S30.02	E31.04
St Marys	Bela Bela	S29.32	E31.29

The geographic co-ordinates of the service points of departments are generally provided in a geographic co-ordinate system, for example, latitude/longitude. However, geographic co-ordinates are not as easy to calculate as with projected (Cartesian) co-ordinates, which are required for doing accessibility studies.

You should therefore transform your service point datasets from a geographic to a projected co-ordinate system.

A commonly used projection is the Transverse Mercator or Lo projection, giving you co-ordinates in the South African Coordinate System.

ACTIVITY 4: QUALITY CONTROL THE DATA

You should quality control all your spatial data sets before undertaking ther accessibility study. The aim is ultimately to identify spatial features and attributes that are incorrect so that they can be corrected where possible. The quality control also provides an understanding of the level of accuracy associated with datasets that will be used in the accessibility studies. When errors in the data cannot be corrected, the quality control exercise will indicate the levels of inaccuracy that may be associated with the results of the accessibility study.

The quality control exercise should follow standardised approaches that are internationally accepted and it needs to include aspects such as completeness, validity, logical consistency, physical consistency, referential integrity and positional accuracy.

For a detailed description of the methods that you can use to do quality control refer to Annexure 1 of this Guideline.

Table 3 provides a template in which you can capture the results of the quality control exercise. The percentage column indicates how accurate (high percentages) or inaccurate (low percentages) particular factors associated with the datasets are. The factors with low percentages should be focused on in improving the quality of the data. Where errors in the data cannot be corrected, the inaccuracte percentages should be noted.

Figure 7: Illustration depicting the geo-coding process

QUALITY CONTROL FACTORS	PERCENTAGE
COMPLETENESS	
Target Population	
What percentage of the study area is covered by spatial information on the target population at the local level?	
What percentage of the spatial features have the required variable on the target population?	
Government services	
What percentage of the government services are in the spatial information compared to departmental lists?	
What percentage of the government services are in the correct geographical location?	
What percentage of the government services have a unique ID?	
What percentage of the spatial features have information on the capacity of government services?	
Road network	
What is the percentage accuracy of the road dataset?	
VALIDITY	
Target Population	
What percentage of the variables associated with the information on the target population is of the right type?	
What percentage of the spatial features in the target population dataset are correctly classified?	
What percentage of the variables have information associated with the spatial features that are in the right range of values?	
What percentage of the spatial features are duplicates?	
Government services	
What percentage of the variables associated with the information on the government servicesis of the right type?	
What percentage of the spatial features in the government services dataset are correctly classified?	
What percentage of the variables have information associated with the government services points that are in the right range of values?	
What percentage of the government service points are duplicates?	
Road network	
What percentage of the variables associated with the information on the road network is of the right range?	
What is the percentage of the spatial features in the road database are correctly classified??	
What percentage of the variables have information associated with the government services points that are in the right range of values?	
What percentage of the road segments are duplicates?	
LOGICAL AND PHYSICAL CONSISTENCY	
What percentage of the spatial features in the target population and their associated attributes are logically and physically consistent?	
What percentage of the government service points and their associated attributes are logically and physically consistent?	
What percentage of the road segments and their associated attributes are logically and physically consistent?	
REFERENTIAL INTEGRITY	
What is the percentage of the spatial features in the target population dataset have unique ID?	
What percentage of the government service points have unique ID?	
What percentage of the road segments have unique ID?	
POSITIONAL ACCURACY	
What percentage of spatial features in the target population dataset are in the correct geographic location?	
What percentage of the government service points are in the correct geographic location?	
What percentage of the road segments are in the correct geographic location?	

ACTIVITY 5: SHARE THE SPATIAL DATA WITH OTHER DEPARTMENTS

Once you have completed the exercise to control the quality of your spatial datasets and have made the required improvements you should archive a standardized dataset. By standardize we mean that all the data quality issues identified in the quality control exercise have been addressed. Simultaneously you must register your spatial dataset with SASDI by recording the metadata on the Spatial Metadata Discovery facility.

Your department should establish an agreement or protocol according to which the spatial datasets will be made available to other departments and users. These will need to be in compliance with the policies of the SASDI. The protocol should:

- ❑ Stipulate how the datasets can be accessed by different users.
- ❑ Specify the conditions under which the datasets may be used.
- ❑ Indicate that your department is the custodian of the datasets.
- ❑ Confirm the quality of the data sets.
- ❑ Be signed off by your department

Ideally spatial datasets should be archived within the custodial departments and disseminated by them. However, your department might not have the institutional capacity to develop, archive or disseminate spatial information. In such an instance your department could make use of the National Geo-spatial Information component within the Department of Rural Development and Land Reform, Statistics South Africa and the Municipal Demarcation Board.

STEP TWO – KEY CONSIDERATIONS

Take note of the following:

- ❑ Spatial studies are dependent on reliable data. Ensure that the spatial and attribute data of your department is as complete, acurate and up to date as possible to provide reliable results.
- ❑ If your department does not have the required spatial datasets it may need to be acquired from other departments or private sector vendors who maintain such data. In particular you will need spatial data on road networks as well as demographic information.
- ❑ Spatial information on the service points of departments should be readily available to other departments. Your department should develop a protocol to enable the sharing of its spatial information.

STEP THREE – CONDUCTING AN ACCESSIBILITY STUDY

What are Accessibility Studies?

Accessibility studies assess the ease with which people can reach the nearest social (for example, school or clinic) or economic (for example retail outlets) service points using existing roads and modes of transport (pedestrian, bus, taxi and motorcar) (Goodall, 1987; Deichmann, 1997).

Various approaches can be used to conduct an accessibility study. Some methods are fairly quick and easy to follow while others are much more comprehensive and require the use of sophisticated software and lots of experience.

Simpler methods to determine the best location for service points include, first, a visualisation approach and, second, using GIS software. Both these methods make use of Google Earth to view the results, which is readily available and easy to use. Annexure 2 of this Guideline provides a detailed description of how to apply these methods.

Accessibility modeling is a more complex method; however, it much more comprehensive and accurate information, which can assist you in developing access improvement initiatives, for instance, an infrastructure development plan.

This Guideline sets out the more comprehensive approach as well as highlighting some methods that are quicker and easier to use.

You should adopt an approach that meets the specific requirements of your department. Consider the needs of your department in defining the objectives and scope of your study. Also consider what deliverables you need to produce.

HOW TO CONDUCT AN ACCESSIBILITY STUDY

There are six main activities in conducting an accessibility study (see Figure 8)

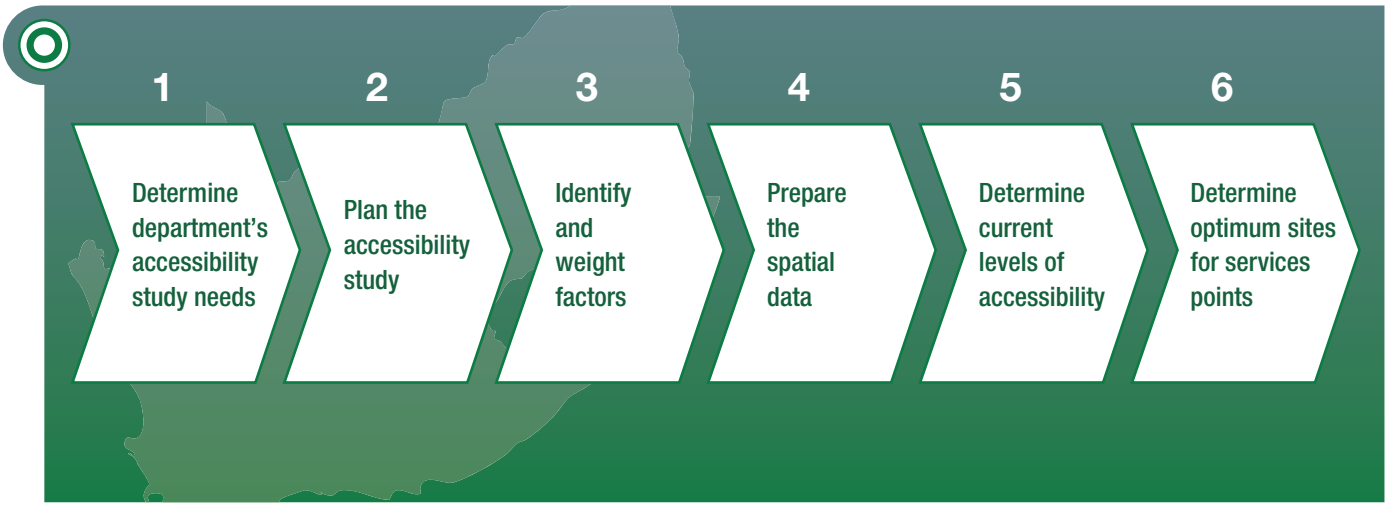


Figure 8: The six key activities in conducting an accessibility study

ACTIVITY 1 – DETERMINE DEPARTMENT'S ACCESSIBILITY STUDY NEEDS

Steps to determine your department's accessibility study needs are:

a) Conduct a document study.
b) Consult internal and external stakeholders, such as service beneficiaries.
c) Undertake a preliminary analysis.

After an initial accessibility study has been completed, updates should be done regularly and should consider the following:

- Changes in the distribution, composition and concentration of the population; changes in their socioeconomic and other characteristics, for example, migration; and changes in human settlement patterns. Such changes impact on the demand for government services in different areas.

- New developments that are taking place or are being proposed, for instance, housing developments and projects of other departments or institutions. The Integrated Development Plans (IDP) and Spatial Development Frameworks of local and provincial governments are good sources for this information.

A Conduct a document study

A review of departmental policies, prescripts and service standards will assist in identifying key information about your services. Study departmental strategic plans and documents such as the Service Delivery Improvement Programme (SDIP) and Service Charter, which should provide valuable following information about the following:

- Key services.
- Beneficiaries and stakeholders.
- Service delivery norms and standards.
- Service delivery model.
- Types of service points.
- Administrative or demarcation boundaries, for instance, police precincts or magisterial districts.
- Key factors and planning criteria used to determine the need for service points.
- List of existing and planned service points.
- Previous spatial research conducted by your department.

B Consult internal and external stakeholders

Conduct a survey at service points for feedback from **beneficiaries** on how accessible service points are, and what constraints people experience in accessing them. This survey could be random or targeted. Use a short evaluation form to see what problems people are experiencing.

You can also use **focus groups** to identify accessibility challenges as well as possible opportunities for dealing with them. These can include internal and external stakeholders.

The **regional and local offices** of your department that are closer to the service delivery interface should also be able to provide useful information about the access needs of your beneficiaries and stakeholders. For example, staff may indicate that queues are long and that they are unable to manage the number of applications that they are receiving.

C Undertake a preliminary analysis

Collect statistics to identify possible service points or areas that are below standard, for example, statistics on the average number of beneficiaries or applications being handled by service points in a given timeframe.

Determine whether there are too few service points in relation to the size of the beneficiary population in an area.

By overlaying the data on the present location of service points with the distribution of the population in Google Earth one is able to see where possible gaps exist.

ACTIVITY 2 – PLAN THE ACCESSIBILITY STUDY

After you have clarified your accessibility study needs, you should develop Terms of Reference for it.

Pay careful attention to the way in which you define the scope, objectives and outputs of the accessibility study, as these will guide you in determining the approach and methods you should follow. They will also determine what spatial information you will require.

The Terms of Reference should include the following:

- Define the objectives, scope and outputs or deliverables of the accessibility study.
- Indicate the approach and methods that will be used.
- Identify the services and types of service points that will be included.
- Define the geographical boundaries (study area) to be included.
- Define the population to be included (target population).
- Provide the geographic access norms and other criteria will be considered in the study.
- Identify the spatial information you will need.
- Determine timeframes, budget and resource requirements.

ACTIVITY 3 – IDENTIFY AND WEIGHT THE FACTORS THAT NEED TO BE CONSIDERED IN THE STUDY

In addition to the geographic access norms of your department, there may be other factors or criteria to consider in determining where service points should be located. These could include the extent of in- and out-migration, levels of socio-development, and the availability of suitable land and basic services.

Weight the selected factors by allocating percentages to them, to reflect their level of importance. Consider the extent to which the factors should be taken into account. This will assist in identifying the geographic areas that should be prioritised for attention.

The factors can be weighted in various ways. For instance:

- A nominal weight could be used to increase or decrease the importance of a factor. Areas affected by out-migration could, for instance, be weighted by a percentage value of -10 while areas with significant in-migration may be weighted by a percentage value of +50. A nominal weight could also be used when insufficient quantitative data on the factor is available.

- The standard deviation of a factor that can be quantified can be used to define weights. For example, the frequency of the total number of crimes can be statistically analysed and areas that fall in the different standard deviations used to weight the target population. Areas falling into the positive third standard deviation (representing areas with total crimes much higher than the average) can be weighted up by a certain percentage.

ACTIVITY 4 – PREPARE THE SPATIAL DATA FOR THE ACCESSIBILITY STUDY

Prepare the spatial data that will be used in the accessibility study. This includes road, service point and demographic data on the target population.

In particular, you should focus on the following six steps:

a) Define the study area.
b) Create a buffer area around the study area.
c) Assess the quality of the spatial information.
d) Incorporate the spatial information into the accessibility modeling software.
e) Improve the network connectivity using Feedlinks and Delaunay networks.
f) Assign speed limits to road network.

A Define the study area

Decide on the study area and administrative level that the accessibility study will be done at.

Ideally it should be done at a provincial level. This will provide a holistic view of where government services should be located most optimally. Provinces have distinct differences in their geography, socio-economic and cultural character.

However, accessibility studies may also be done at the district and local municipality level to take into consideration the distinct socio-economic characteristics and service needs of communities (for example, Metropolitan areas).

B Create a buffer area around the study area

Create a buffer of at least 60km around your study area, keeping in mind that people often move across administrative boundaries to access service points that are closest to them. Figure 9 provides an example of a buffer area that has been created around OR Tambo District Municipality.

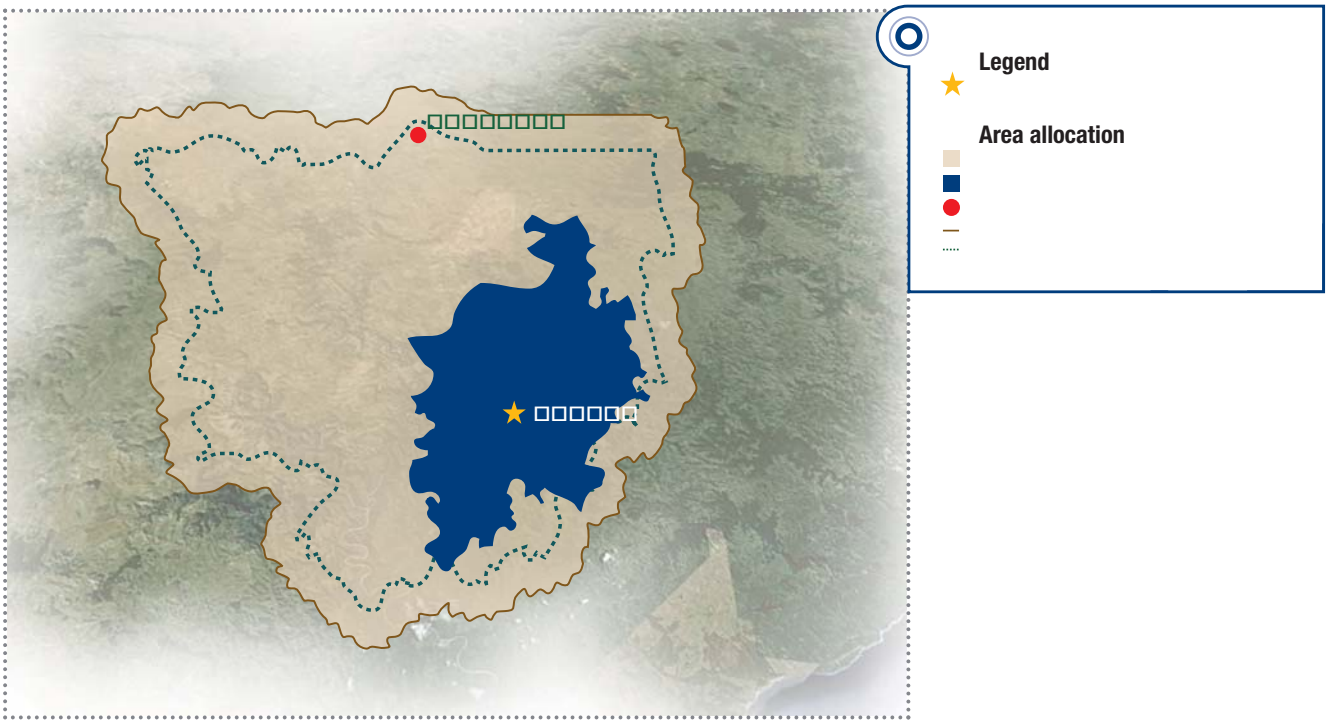


Figure 9: Example of a buffer area

Always try to use the most current spatial information on the target population, service points and road network. Also ensure that the spatial information is at the smallest spatial level possible. For instance, information on the target population should be at a census enumeration area[1] level.

Extract the spatial information for the study area from the full dataset and store it as a separate file. Only the spatial information within the study area should be extracted – with the 60km buffer area clipped out from the full dataset.

C Assess the quality of the spatial information

Quality control assessments include standardising the datasets; checking for duplicate geographic co-ordinates; ensuring that spatial features have a unique identifier; ensuring that the datasets are in a local co-ordinate system, and checking to see that the datasets are as complete as possible. All the necessary quality control assessments are discussed in Section 7.2.5.

1 A census enumeration area is the smallest area demarcated in a census so that an enumerator can deliver and collect census questionnaires within a short time period. In South Africa, a census enumeration area normally contains between 200-250 households.

D Incorporate the spatial information into the accessibility modelling software

A key activity in the data preparation phase is importing the datasets from your GIS into the accessibility modelling software that will be used in the study,

It is strongly recommended that you use Flowmap software. Flowmap is a software package developed by the Faculty of Geosciences of the University of Utrecht in the Netherlands. This software has the widest range of accessibility models that can simultaneously take into consideration the greatest number of factors when looking at optimising the location of service points. It is also able to generate accessibility statistics.

The cost of Flowmap is significantly lower than other commercial packages. It has the added advantage of also having a freeware version for students. However, GIS practitioners will need advanced training to use Flowmap.

Several commercial GIS software packages have spatial modeling capabilities. Generally, these packages do not consider the combined effects of capacity limits, distances traveled along a road network, the extent of the target population and available infrastructure in determining where service points should be located.

These are not discussed in detail in this Guideline. However, some of these GIS software packages include:

- The ESRI ArcInfo software has a Location-Allocation Model that can be used to do accessibility modeling.
- The ARCGeographic Information System software has an add-on package called Spatial Analyst that allows suitability modeling or distance analysis to be done.

E Improving the network connectivity using Feedlinks and Delauney networks

Conduct a connectivity analyses in Flowmap to see if any road segments are not connected properly to the road network. If such segments exist, you need to connect them to the road network.

Road network data sets are often incomplete. Smaller roads and paths used by communities to access other communities, service points or major roads are sometimes not included. It is therefore necessary to create links between these communities, service points and the main road network.

These linkages are established by creating Feedlinks and Delaunay networks. Feedlinks are straight lines generated by the Flowmap software that are used to connect all service points and communities to the main road network using the shortest distance.

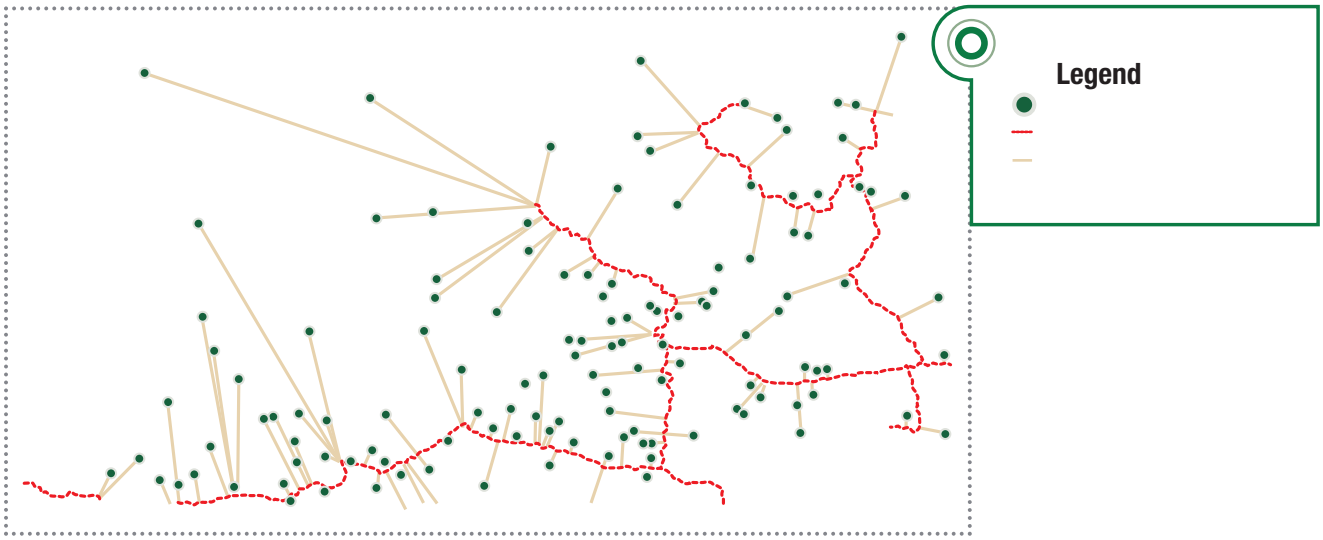


Figure 10: Feedlinks joining communities and service points to the road network

Use Delaunay networks or triangulation to create a set of triangles that connect nearby communities and service points to one another. The triangles are generated by the Flowmap software and the triangle edges show the shortest distance between communities and/or service points.

Figure 11 provides an illustration of a Delaunay network linking communities and service points to one another.

Remove all triangle edges that cross the road network as the Feedlinks provide a better link between communities or service points and the road network.

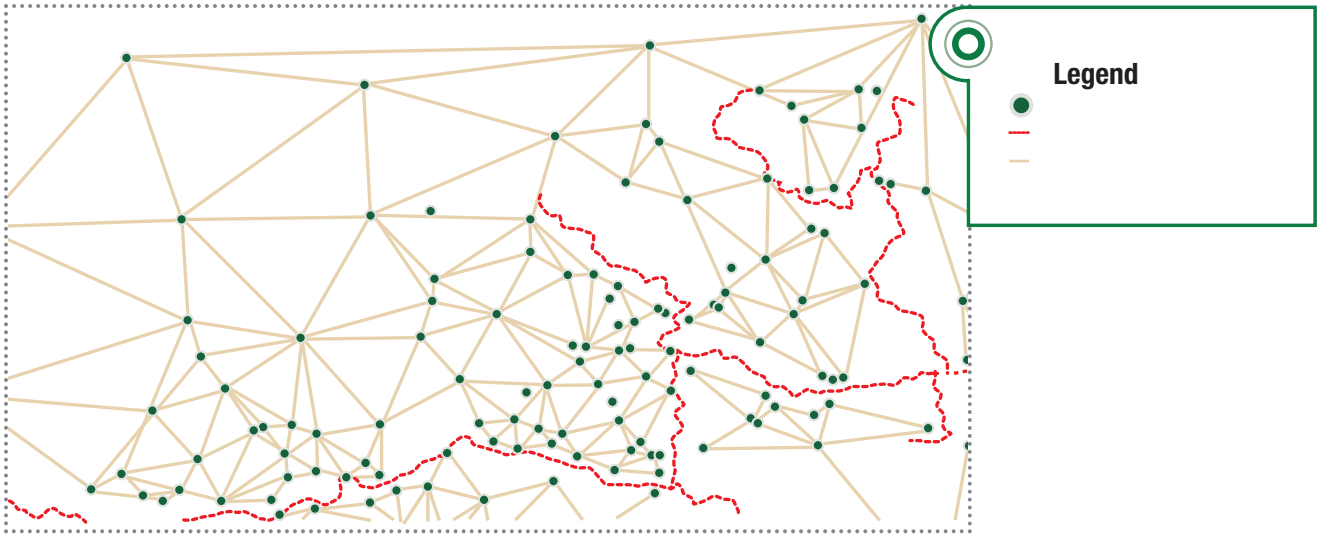


Figure 11: Delaunay network linking communities and service points to one another

After you have created the Feedlinks and Delauney networks, you need to identify links between communities, service points and the road network that need to be deleted because of barriers that make them inaccessible. Barriers include, for instance, mountains, conservation areas and large rivers.

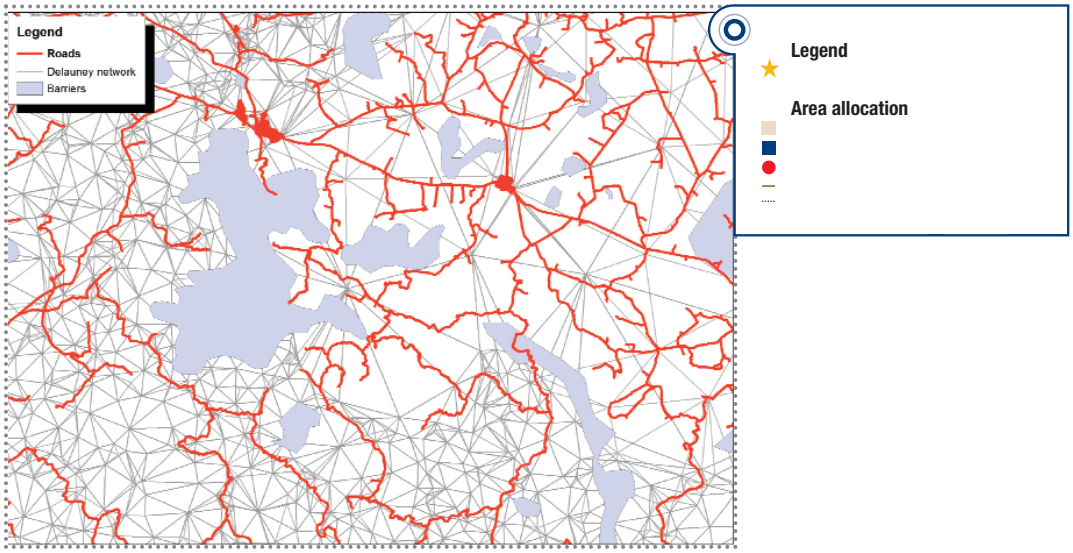


Figure 12: Network links removed where barriers exist

Figure 12 provides an example of network links that have been removed where barriers exist.

F Assign speed limits to road network

You then need to determine the speed that people travel along different types of roads using different modes of transport (by foot, by bus or by car/taxi) must then be added to the road network. Table 4 provides an example of the speeds that can be used for different road types and network links considering the different modes of transport.

Walk speeds can be standardised at 4.5 km/hr for all the different types of roads and network links. Considering the normal speed limits associated with the different types of roads, the speeds can be reduced by a factor of between 10%-20% for car/taxi speeds and 30%-40% for bus speeds. This is to take into consideration variations in speed because of changes in the road gradient, road curvature and to cater for possible stops along the way.

Table 4: Speeds used in the accessibility modeling for different types of roads and modes of transport

Type of road	Km/h			
	Normal speed limit	Walk Speed (WALKSPEED)	Bus Speed (70% of normal) (BUS SPEED)	Car/Taxi Speed (90% of normal) (CAR SPEED)
National	120	4.5	80	100
Main	100	4.5	70	90
Secondary	80	4.5	50	70
Tertiary	60	4.5	40	50
Feedlinks	4.5	4.5	20	25
Delaunay	4.5	4.5	20	25

Do an analysis of airline and road network distances using the Crow Flight Conversion Factor to see to what extent the travel speed should be reduced to take into consideration the slope of the land, contours and obstacles.

ACTIVITY 5 – DETERMINE CURRENT LEVELS OF ACCESSIBILITY OF SERVICE POINTS

Once you have prepared the spatial data for your study, you can go ahead with the analysis to determine the current levels of accessibility of service points.

You will be able to develop accessibility statistics and maps to support your analysis and to identify areas and service points that fall above or below the access norms of your department.

Develop accessibility statistics using unconstrained catchment area analysis

An unconstrained catchment area analysis means that no travel distance/time constraints or capacity parameters for service points are taken into consideration in developing accessibility statistics. This will assist you to develop catchment profiles, including a range of accessibility statistics for the study areas you have selected. You can store the statistics in an Excel spreadsheet.

Catchment profiles include following:

- The number of people each service point has to deal with in its unique catchment area.
- The average distance or time that people in the catchment area travel to the closest service point.
- The worst case travel distance or time for people to travel to service points.
- The travel distances or times for different percentages, for instance 95% or 99%, of the target population travel to reach different types of service points.

You can conduct the unconstrained regular catchment area analysis using Flowmap software to generate the accessibility statistics for the service points in the geographic focus area, as follows:

- Develop distance tables.
- Then use Flowmap to run a catchment profile that will generate accessibility statistics for all existing service points in the study area.
- Copy the accessibility statistics and store them in an Excel spreadsheet.

Distances tables show the distance between every geographic location (for example, location of a community) to every other geographic location (for example, location of a service point) along the road network, taking the mode of transport and speed limits into consideration. Table 5 provides an example of a distance table. For example, the distance between the community (e.g. Origin code = 10) and another community (e.g. Destination code = 100) is 79 137m or 79.1 km.

Table 5: An example of a distance table

Origin	Destination	Distance (metres)	Distance (km)	Origin	Destination	Distance (metres)	Distance (km)
1	1	0.0					
1	10	102453.60	102.45	1	101	18716.79	18.72
1	100	27813.22	27.81	1	1010	31231.76	31.23
1	1000	33146.74	33.15	1	1011	18640.09	18.64
1	1001	29585.54	29.59	1	1012	28125.40	28.13
1	1002	29117.91	29.12	1	1013	27172.39	27.17
1	1003	27959.56	27.96	1	1014	27117.56	27.12
1	1004	25564.46	25.56	1	1015	25017.18	25.02
1	1005	29101.14	29.10	1	1016	23701.14	23.70
1	1006	33859.10	33.86	1	1017	21316.79	21.32
1	1007	31814.37	31.81	1	1018	24389.74	24.39
1	1008	27576.48	27.58	1	1019	30332.03	30.33
1	1009	27762.14	27.76	1	102	34811.44	34.81

Table 6 provides examples of accessibility statistics. The statistics were determined in 2009 covering a range of services provided in selected districts of South Africa.

Table 6: Example of accessibility statistics for various departments in selected districts of South Africa

Accessibility Statistics	Home Affairs Offices	Primary Schools	Secondary Schools	Social grant pay points
Demand	4863758	1873168	1281435	9012817
Number of facilities	143	7992	2225	4417
Averarge demand	34012.3	250.8	626.7	240.5
Mode of transport	Bus	Walk	Walk	Bus
Worst case travel time	252.0			95.0
Worst case travel distance		32.6	57.8	
Average travel time	31.3			7.4
Average travel distance		2.1	5.0	
% of beneficiaries within 60 min	52.6%			98.5%
% of beneficiaries within 3km		79.3%	42.1%	
95% of beneficiaries within (min)	64.2%			19.2%
95% of beneficiaries within distance		5.4%	12.1%	
99% of beneficiaries within (min)	76.0%			29.7%
99% of beneficiaries within distance		9.4%	17.5%	

By examining the accessibility statistics, it is possible the compare the average demand and average travel distance or time that people travel to service points with the access norms of a department. In this way it is possible to identify districts where access to service points may have to be improved.

For example, the Department of Home Affairs has set a norm of 30 minutes travel time by bus for its service points. Table 6 indicates that the average travel time for some of its districts is just above this at 31 min. However, the worst case travel time of 252 min or 4 hrs 50 min indicates that there are areas within the districts that are extremely inaccessible.

Figure 13 shows that the average travel time by bus to service points of the Department of Home Affairs in the district municipalities of Kgalagadi and Central Karoo are a lot higher than the departmental norm of 30 minutes. The graph also shows that Ugu, Bushbuckridge, Maruleng and Chris Hani district municipalities have much better travel times than the departmental norm.

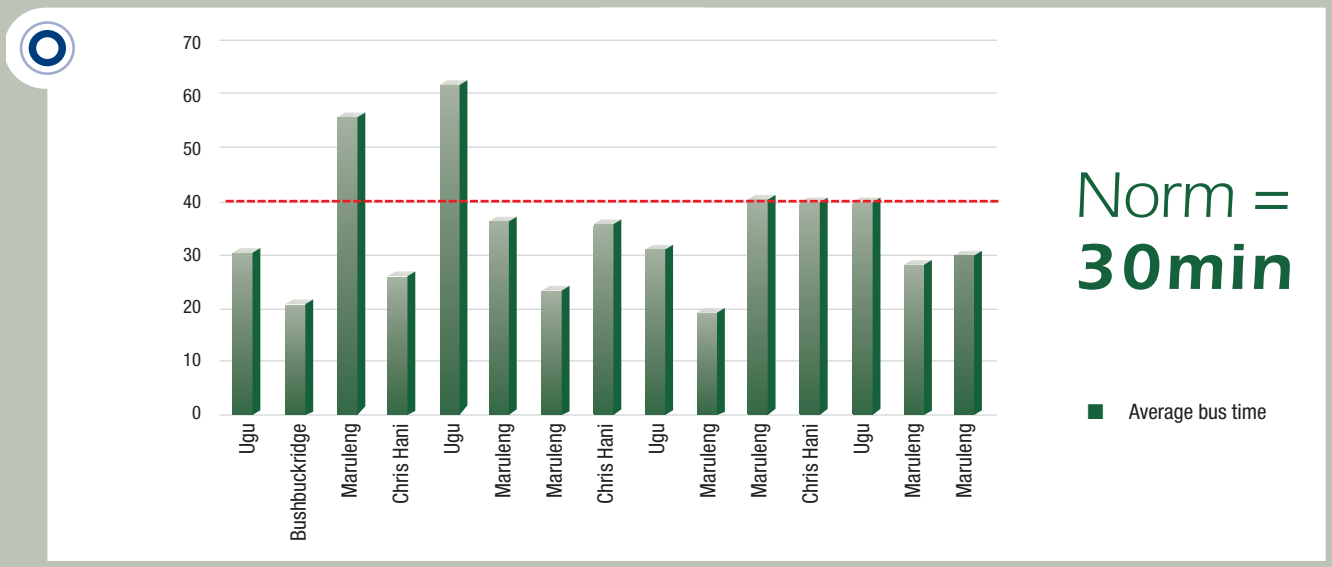


Figure 13: Average travel time to service points of the Department of Home Affairs in selected districts of South Africa

You can use the accessibility maps and statistics generated in the unconstrained catchment area analysis to create accessibility maps. The maps show how accessible service points are to communities.

To develop accessibility maps you need to do the following:

- Export the accessibility statistics generated in FlowMap into your GIS.
- Then use the GIS mapping generation to develop the accessibility maps.
- You can also overlay other layers of spatial information, for example road network data, on your maps to produce detailed accessibility maps.

An example of an accessibility map of magistrate courts in Umzinyathi District Municipality that was developed in 2009 is provided in Figure 14. The colours on the map show the travel time or distance from magistrate courts to communities in Umzinyathi District.

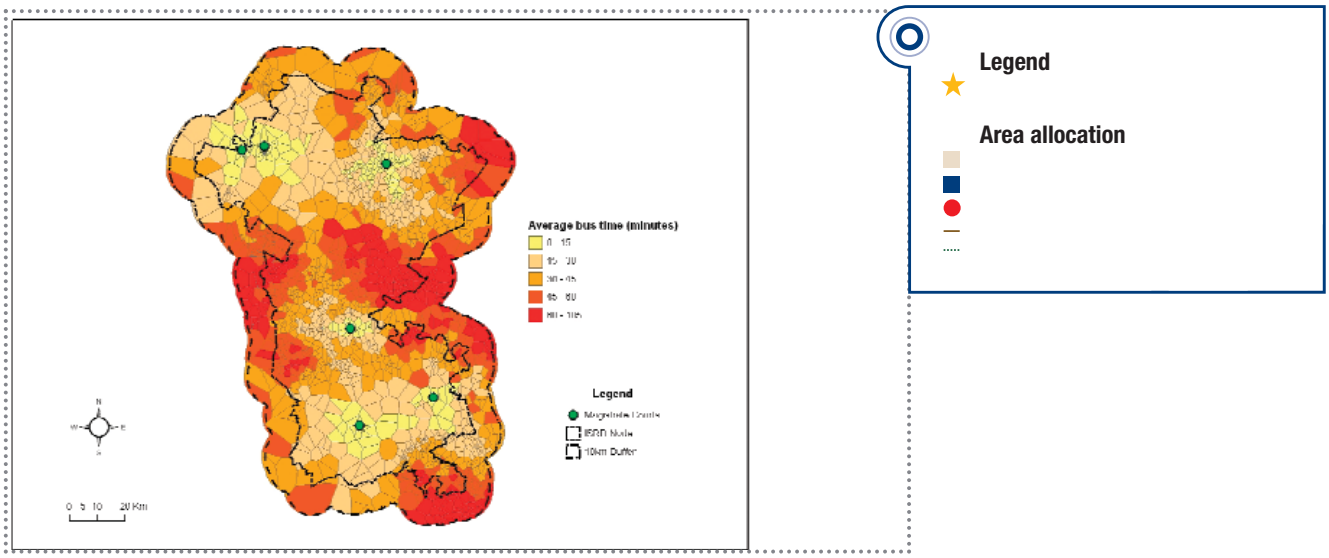


Figure 14: Example of an accessibility map of magistrate courts in Umzinyathi District Municipality

Deep red highlights the enumeration areas where the travel time by bus to the nearest magistrate court is 60 to 105 minutes. The lighter colours show areas where travel times are much shorter. The enumeration areas that are small and coloured deep red could be identified as priority areas for attention as they have are the most inaccessible and have the larger concentrations of people.

ACTIVITY 5 – DETERMINE THE OPTIMAL PROVISION AND LOCATION OF SERVICE POINTS

Once you have conducted the accessibility analysis to identify areas where geographic access to service points is inadequate, you should conduct further analyses to identify sites where service points should optimally be located or where you need to implement other access improvement initiatives.

Available methods

Various methods can be used to determine optimum sites for service points. They vary in complexity and accuracy. The simpler methods are quicker and do not require high levels of expertise. The more complex methods take time and require a good deal of technical expertise; however, they are much more comprehensive and provide more accurate results. Unfortunately, many departments are under time constraints and lack the expertise to follow the more sophisticated methods, in particular the use of accessibility modeling.

Accessibility modeling is a more complex method; however, it much more comprehensive and accurate information, which can assist you in developing access improvement initiatives, for instance, an infrastructure development plan.

Overview of accessibility modeling

The purpose of accessibility modeling is to determine the optimal number and location of sites for service points considering a range of factors. They include the following:

- Extent of the target population within reach of service points.
- Access norms of your department including travel time/distance and capacity limits of service points.
- Extent of the road network that includes travel speeds for different types of roads and travel constraints, for example, road curvature.
- Availability of existing infrastructure that can be used as service points.
- Other factors that your department may wish to consider.

A brief overview of accessibility modeling is provided in this section. A more detailed overview of how to do accessibility modeling is provided in Annexure 5 of this Guideline.

For accessibility modeling you will use the accessibility statistics and spatial maps produced during your accessibility analysis.

Generally three models are used for accessibility modeling: the expansion model, the reduction model and the relocation model.

Expansion model: Increase the number of service points, by identifying optimal locations where accessibility statistics indicate that service points are needed.

Reduction model: to reduce the number of existing service points when:

- Accessibility statistics indicate that the department has more service points at present than its access norms require.

- Service points that have the least effect on the accessibility of government service points have been identified.

Relocation model: to optimise the location of existing service points. You will use the relocation model:

- If your accessibility analysis shows that existing service points of your department are not located optimally.

- After running the expansion and relocation models to fine tune the location of service points.

Table 7 is an example of how accessibility statistics can be used to compare the optimal number of required service points with the existing number of service points. This comparison will identify the extent to which an expansion or reduction of service points is needed. For instance, in Umzimkhulu the number of service points needs to increase from 20 to 70 (+270%) while in Maluti a Phofung service points could be reduced from 58 to 34 (-41%).

Table 7: Example of accessibility statistics to identify areas where expansion or reduction of existing service points is required

ISRD Node	Total No. of existing service points	Total No of optimal sites	Percentage reduction (-ve) or Expansion (+ve)
Alfred_Nzo	127	51	149.02
BushBuck Ridge	97	116	-16.38
Central Karoo	5	7	-28.57
Chris Hani	170	146	16.44
Kgalagadi	26	38	-31.58
Maluti I Phofung	34	58	-41.38
Maruleng	20	23	-13.04
OR Tambo	652	172	279.07
Sekhukhune	217	326	-33.44
Ugu	156	141	10.64
Ukhalamba	58	56	3.57
Umkhanyakude	164	134	22.39
Umzimkhulu	74	20	270.00
Umzinyathi	120	138	-13.04
Zululand	272	203	33.99

The map in Figure 15 shows the results of accessibility modeling that was done for the Department of Labour in OR Tambo District Municipality in 2009. The map shows where labour centres and mobile facilities, also known as visiting points, should optimally be located considering the access norms of the department.

The pink areas in the map show the catchment areas of proposed service points. However, large areas of the district municipality are coloured in grey. These are areas outside of the catchment areas of the proposed service points where the access norms do not justify the establishment of service points. The department would have to consider alternative mechanisms for providing access to people in such areas. Alternatively, it could review its access norms, for instance, to provide greater coverage of its services.

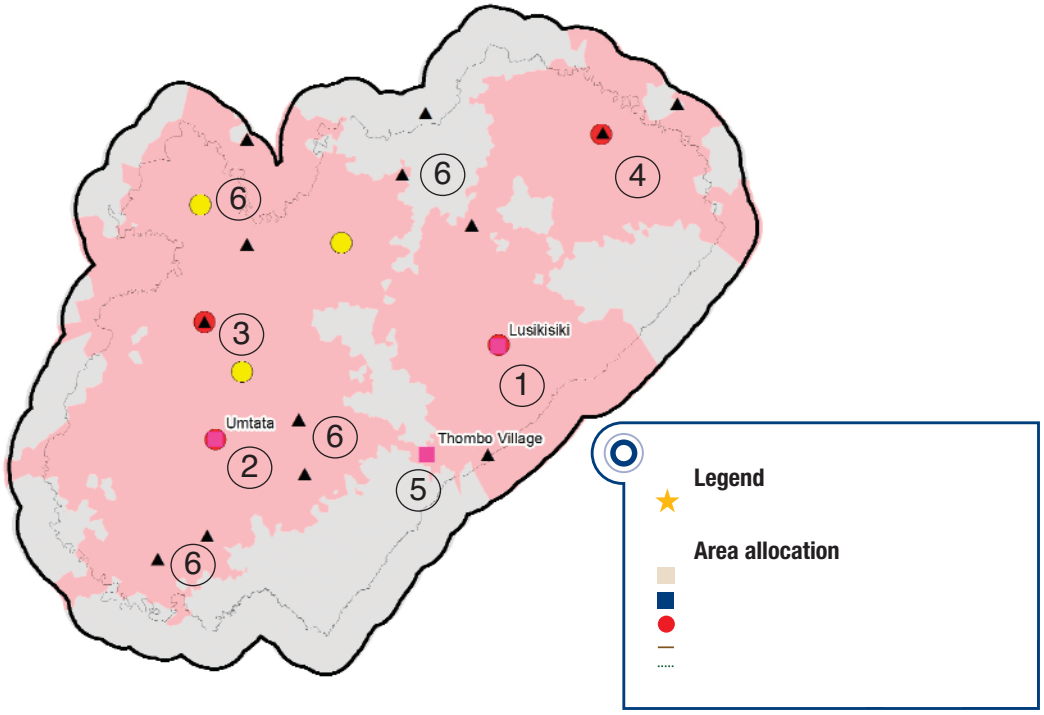


Figure 14: Example of an accessibility map of magistrate courts in Umzinyathi District Municipality

By overlaying existing service points on maps of the proposed sites it is possible to see which of the existing service points are located at optimal sites. These existing service points should be retained by the department. For example, Lusikisiki and Umtata were identified as optimal sites for labour centres and in both instances (see points 1 and 2 in Figure 17).

Two additional service centres are proposed (see points 3 and 4 in Figure 17) at locations where visiting points already exist. In such instances, the department could consider upgrading the visiting points to labour centres.

A labour centre located at Thombo Village (point 5 in Figure 17) and at least 10 visiting points (point 6 in Figure 17) are not optimally located. Therefore, the department could consider relocating them to more optimal locations, while some of them could possibly be closed.

IDENTIFYING AREAS FOR PRIORITY ATTENTION

By weighting the various criteria included in your accessibility studies it will be possible to identify particular geographical areas that require urgent attention. You may, however, need to conduct more in-depth analysis to develop detailed profiles of such areas, such as socio-demographic profiles, using additional sources of information to identify suitable interventions to improve access in such areas. Keep in mind local conditions and the access needs of citizens.

STEP THREE – KEY CONSIDERATIONS

Your department should institutionalise a process to review its service delivery footprint, considering the following:

- ❑ The continuous changes taking place in the demographic profile of the country as well as changes in human settlement trends. Such changes impact on the demand for your services.
- ❑ The need for a strong citizen-centric approach to service delivery means consulting the public and other relevant stakeholders regularly about their service delivery needs.

Your department should also periodically undertake the following:

- ❑ Review your geographic access norms, keeping in mind the changing access needs of people and the capacity of your service points to provide them with quality services.
- ❑ Monitor improvements in access by conducting further accessibility studies and by undertaking citizen satisfaction surveys.

STEP 4 – DEVELOP A PLAN OF ACTION

Introduction

The accessibility study findings will provide information on the following:

- Geographical areas which are currently well-served, poorly-served and over-served in relation to the provision of service points.
- Potentially under-used and over-used facilities.
- The number of service points that are required to provide optimum levels of service and access to beneficiaries.
- Potential optimum sites for new facilities.
- Areas that should be given priority.

Use these findings to assist you in developing a plan of action and a budget.

ACTIVITY 1 – SET TARGETS FOR IMPROVING GEOGRAPHIC ACCESS TO YOUR SERVICE POINTS

Analyse the accessibility statistics and spatial maps produced during your accessibility study to:

- Determine the gap between actual distances currently travelled by beneficiaries to their closest service points and the access norms of your department.
- Set targets for progressively reducing such travel distances.

For instance, the actual average travel difference from where people live to their closest service points in the study area could be 20 km while the access norm of your department for that type of area might be 15 km. Your department needs to determine how to bridge the 5 km gap and to set a timeframe for doing this; for instance by setting up additional service points in optimal locations over a certain time period.

ACTIVITY 2 – DEVELOP AN IMPLEMENTATION PLAN

First, define the approach of your department in developing an implementation plan. You could, for instance, distinguish between strategic responses such as the review of the access strategies and policies of your department, the development of a blueprint for setting up service points over the medium term, and shorter term crisis interventions targeted at areas that require urgent attention.

Then identify the key steps to include in your plan, for instance, the following:

a) Reviewing the service delivery model of your department.
b) Improving the capacity of service points.
c) Develop an infrastructure plan of your department.

A Review the service delivery model of your department

Your department may need to review its current typology of service points to improve the coverage of its services. It is possible to broaden access to your services in all geographical areas, even in remote rural areas, of by adopting a wider range of access channels.

Consider making greater use of Thusong Service Centres, mobile service units, service delivery kiosks, and partnerships with stakeholders such as the South African Post Office, other departments as well as non-governmental and faith-based organisations. Establish linkages to other programmes such as the Community Development Workers programme.

Clustering and multiple uses of facilities could potentially provide considerable benefits to beneficiaries as well as cost savings and efficiencies to government.

In some instances it may be necessary to provide assistance to beneficiaries to access the services of your department, for instance, the Department of Basic Education has implemented a hostelling and transport assistance scheme.

B Improve the capacity of service points

Improve the capacity of your service points by implementing the capacity norms of your department for service points, for instance, by improving infrastructure, staffing capacity as well as the efficiency of processes to improve turnaround times of transactions. By improving such capacity your department can provide better quality services and increase the use of your service points, thereby improving access to its services.

C Develop an infrastructure plan for your department

Develop an infrastructure plan or review the current plan of your department to give effect to the findings of your accessibility study.

Infrastructure can be broadly defined as “structures, services or facilities that are needed to enable the functioning and development of a country, including roads and transport facilities, houses, electricity, water, sewerage, telecommunication and government service points”.

Infrastructure plans identify as far as possible the infrastructure needs of your department, the costs to construct them, the phasing of the development, funding sources and the agencies or individuals that are responsible for their delivery

The key steps to follow in developing an infrastructure plan are:

a) Identify objectives of the infrastructure plan
b) Determine the outline of the plan
c) Consultation
d) Develop draft infrastructure plan
e) Review and finalise infrastructure plan

A – Identify objectives of the infrastructure plan

Define the purpose, intended audience and objectives of the infrastructure plan.

You need to draft a Terms of Reference for this.

B – Determine the outline of the plan

An overview of the suggested content of such a plan is provided in Annexure 3

C – Consultation

Decisions about where to locate service points should be made in consultation with local authorities and provinces affected by those decisions.

Consult other departments or stakeholders that have similar service delivery models on possibly sharing facilities.

Your department should engage with local authorities during the development of their Spatial Development Frameworks so that they can include your proposals. See the Guidelines for the Development of Spatial Development Frameworks issued by the Department of Rural Development and Land Reform.

D – Develop draft infrastructure plan

- Define the approach that will be followed in implementing the plan
- Source all available information on departmental service delivery model, existing infrastructure, services offered by facilities, target beneficiaries, norms and standards, results of accessibility studies, asset management system, financial budget and expenditure projections and monitoring and evaluation plan.
- Analyse available information.
- Use qualitative techniques to fill gaps in information
- Write up infrastructure plan as a living document, including financial budget and expenditure projections.

E – Review and finalise infrastructure plan

- Present infrastructure plan to department for consideration
- Contract external infrastructure planning expert to review the plan

Use inputs received to edit infrastructure plan and produce final version.

ACTIVITY 3 – DEVELOP A BUDGET

Calculate the cost implications of your plan and determine whether the plan is affordable and sustainable and provides for economies of scale.

Evaluate the Medium Term Expenditure Framework (MTEF) to determine the availability of funding. Typically the budgets of departments are constrained in the short term and discretionary funding is limited to new infrastructure. Hence the implementation of access norms is a medium term exercise and it should be done incrementally.

It is likely that you will have to prioritise which facilities will be allocated funding ahead of others.

ACTIVITY 4 – MONITOR IMPLEMENTATION

Track the implementation of your plan. Ensure that new facilities are actually established at optimal sites and monitor the use of service points by beneficiaries.

STEP FOUR – KEY CONSIDERATIONS

The results of your accessibility study should assist you in developing a comprehensive plan of action for improving access to the services of your department. Consider the following:

- Set targets for reducing travel distances for service points over the medium term. Ensure that your plans are feasible and affordable.
- Broaden the coverage of your services by adopting a multi-channel access strategy, for instance, by combining the use of traditional service points with more innovative access mechanisms and partnerships.
- Consult other departments and local authorities in selecting physical sites for facilities. Align the access initiatives of your department with those of other departments to bring about greater synergy in service provision across the country.

CONCLUSION

The spatial realities of South Africa and service delivery needs of people change continuously over time and they impact on the need for government services and where they should be provided. This calls for regular accessibility studies and more responsive and innovative ways of providing services.

This Guideline provides departments with a generic process and practical methods that can assist them to develop geographic access norms for their service points, to set targets for improving geographic access to their services and to develop an action plan to achieve them. Departments should adapt the process to meet their specific requirements.

Reference is made in the Guideline to key government policies that departments must consult as they provide the context and set specific requirements in relation to the manner in which departments must develop their geographic access norms, set targets to improve access to their services and conduct their planning.

Keep in mind that access to services is a very broad concept and that it is multi-dimensional. While the focus of this Guideline is on geographic access to government service points there are many other important aspects in relation to access that departments must consider, for instance, the capacity of service points to provide quality services. Hence departments should not look at geographic access in isolation.

Finally, this Guideline is a living document that will be reviewed and enriched over time.

CHECKLIST

This checklist is a working tool. It provides a step-by-step check of the work and deliverables for the different steps and activities to analyse the geographic location of service points with the view to improving their services. It also provides a space for comments and notes for your use.

STEP ONE	DEVELOPING GEOGRAPHIC NORMS		
	Description	Major deliverables	Comments
Activity 1: Conduct background research	1.1 Review the following: • Constitution, national and departmental policies and departmental strategic plans • Service delivery model of department • Departmental interventions or programmes including Service Delivery Improvement Programme (SDIP) • Access norms of other departments. • International access norms and standards for government services.	1.1 Service delivery mandate of department identified. 1.2 Example of comparative access norms identified.	
Activity 2: Develop draft access norms	2.1 Use access norms template and list: a. Type of service point b. Type of geographical area c. Services that department provides to beneficiaries at the service point d. Target population e Main mode of transport that beneficiaries use to reach service point 2.2 Indicate a reasonable, average distance that beneficiaries could expect to travel to reach this type of service point 2.3 Define the population parameters of the service point 2.4 Indicate required facility standards for this type of service point 2.5 Specify the service standards of the service point 2.6 List the various location factors that must be considered in determining the sites for service points	2.1 Draft access norms developed	
Activity 3: Consult beneficiaries and stakeholders	3.1 Organize workshops with relevant stakeholders to obtain comment on access norms 3.2 Align the distance norms with those of complimentary services of other departments where possible 3.3 Conduct a beneficiary survey on access norms to get input 3.4 Publish access norms in Government Gazette to get broader stakeholder input	3.1 Beneficiary and stakeholder input on access norms obtained.	
Activity 4: Determine implications of your access norms	4.1 Test your access norms through an accessibility study 4.2 Use results of accessibility study to assist in determining resource and other implications of implementing the norms 4.3 Adjust the norms if necessary	4.1 Access norms tested and adjusted if necessary 4.2 Resource and other possible implications of norms determined	
Activity 5: Submit access norms for approval	5.1 Finalize draft access norms after taking stakeholder input into consideration 5.2 Submit draft access norms to the Executive Authority for approval 5.3 Publish access norms in Service Delivery Charter of department 5.4 Integrate access norms with other criteria used for locating service points of department.	5.1 Access norms approved 5.2 Access norms published in Service Delivery Charter of department.	

STEP TWO	COLLECTING SPATIAL INFORMATION		
	Description	**Major deliverables**	**Comments**
Activity 1: Define the spatial data requirements of your department	1.1 Consult policy and the strategic plans of department for guidance on what spatial and attribute information should be collected on the target population and service points 1.2 Consult policies, strategic plans and national and ISO standards on the standards that should be followed in the capture and maintenance of the spatial and attribute data in a Geographic Information System (GIS) 1.3 Consider the scope and objective of your accessibility studies	1.1 Need for spatial and attribute information defined. 1.2 Standards for the capture and maintenance of spatial and attribute data determined.	
Activity 2: Acquire spatial data from external sources	2.1 Consult the Spatial Data Discovery facility to determine available spatial information 2.2 Acquire spatial data from external sources: a. Target population – obtain most current data at the smallest area level possible b. Government service points c. Road network – accurate information on national, main, secondary and tertiary roads d. Other relevant spatial information, such as barriers – rivers, mountains, administrative boundaries	2.1 Spatial information on target population, government service points and/or road network acquired from external sources.	
Activity 3: Collect spatial data yourself	3.1 Obtain clearance from Committee on Spatial Information to collect spatial data. 3.2 Collect spatial data on government service points using one of the following methods: a. Spatial information survey b. Mapping workshops c. Geo-locating	3.1 Spatial data on target population, government service points and/or road network collected	
Activity 4: Control the quality of data	4.1 Conduct quality control assessment and define level of accuracy using quality control table. 4.2 Make corrections to spatial features and attribute where possible. 4.3 Provide spatial datasets in a local coordinate system 4.4 Provide metadata with spatial datasets. 4.5 Provide datasets in a suitable Geographic Information System (GIS) format	4.1 Produce quality control assessment report 4.2 Provide corrected spatial datasets in a local coordinate system, with metadata and in a suitable Geographic Information System (GIS) format	
Activity 5: Share data with other departments	5.1 Archive a standard dataset for dissemination to users. 5.2 Develop a protocol on how users can access spatial dataset and under what conditions, including sign off by custodial department on quality 5.3 Develop and provide metadata for dataset 5.4 Register metadata records with Spatial Metadata Discovery facility. 5.5 If required, transfer dataset to government department or agency that will disseminate the dataset	5.1 Archived standard dataset 5.2 Protocol on accessing and using spatial dataset 5.3 Metadata records registered on Spatial Metadata Discovery (SMD)	

STEP THREE	CONDUCTING ACCESSIBILITY STUDIES		
	Description	Major deliverables	Comments
Activity 1: Plan the accessibility study	1.1 Develop Terms of Reference for your study. Determine: • Objectives, scope and output • Approach and methods • Services and types of service points • Geographical boundaries • Target population and defining characteristics • Geographic access norms and other criteria • Spatial information • Time frames, budget, resources	1.1 Terms of Reference for accessibility study developed	
Activity 2: Identify and weight other criteria/factors that need to be considered	2.1 Identify relevant criteria 2.2 Determine and apply appropriate method to apply weighting: • Nominal weight technique • Standard deviation of quantifiable factors	2.1 Factors/criteria weighted by percentage value	
Activity 3: Prepare the spatial data for the accessibility study	3.1 Define the study area or administrative level at which the accessibility study will be done 3.2 Create a buffer around study area. 3.3 Assess the quality of spatial data 3.4 Incorporate spatial data into accessibility modeling software 3.5 Improve network connectivity using Feedlinks and Delauney networks 1.7 conservation areas, large rivers) 1.8 Assign speed limits	3.1 Spatial data prepared and incorporated into accessibility modeling software.	
Activity 4: Determine current levels of accessibility of service points	4.1 Develop accessibility statistics using unconstrained regular catchment area analysis 4.2 Develop accessibility maps depicting current levels of accessibility in the study area	4.1 Accessibility statistics and maps developed.	
Activity 3: Conduct analysis to determine optimum sites for service points	3.1 Use accessibility statistics to select appropriate method: • Visualisation approach • Spatial analysis using a GIS: o Buffers o Trade area analysis • Accessibility modeling 3.2 Develop and print spatial maps	3.1 Spatial maps depicting optimum sites for service points developed	

STEP FOUR	DEVELOP AN ACTION PLAN		
	Description	Major deliverables	Comments
Activity 1: Set targets for improving access			
Activity 2: Develop an implementation plan	2.1 Review the service delivery model of your department 3.2 Improve the capacity of service points 3.3 Develop or review the infrastructure plan of your department a. Identify objectives of the infrastructure plan. Define purpose, intended audience and objectives of infrastructure plan b. Determine outline of the plan c. Consult other department or stakeholders that have similar service delivery proposals on possibly sharing facilities. d. Develop draft infrastructure plan. d.1 Define the approach that will be followed in the implementing the plan. d.2 Source all available information on departmental service delivery model, existing infrastructure, services offered by facilities, target beneficiaries, norms and standards, results of accessibility studies, asset management system, financial budget and expenditure projections and monitoring and evaluation plan. d.3 Analyse available information. d.4 Use qualitative techniques to fill gaps in information d.5 Write up infrastructure plan as a living document, including financial budget and expenditure projections e. Review and finalise infrastructure plan e.1 Present infrastructure plan for department for consideration e.2 Contract external infrastructure planning expert to review the plan e.3 Use inputs received to edit infrastructure plan and produce final version.	a. Terms of Reference b. Plan outline c. Agreement with relevant stakeholders d. Draft infrastructure plan e. Final infrastructure plan	
Activity 3: Develop a budget			
Activity 4: Monitor implementation			

ANNEXURE 1
QUALITY CONTROL METHODS

You should quality control all your spatial data sets before undertaking an accessibility study. The quality control exercise should follow standardised approaches that are internationally accepted and it needs to include aspects such as completeness, validity, logical consistency, physical consistency, referential integrity and positional accuracy.

A detailed description of the methods that can be used is provided in this Annexure.

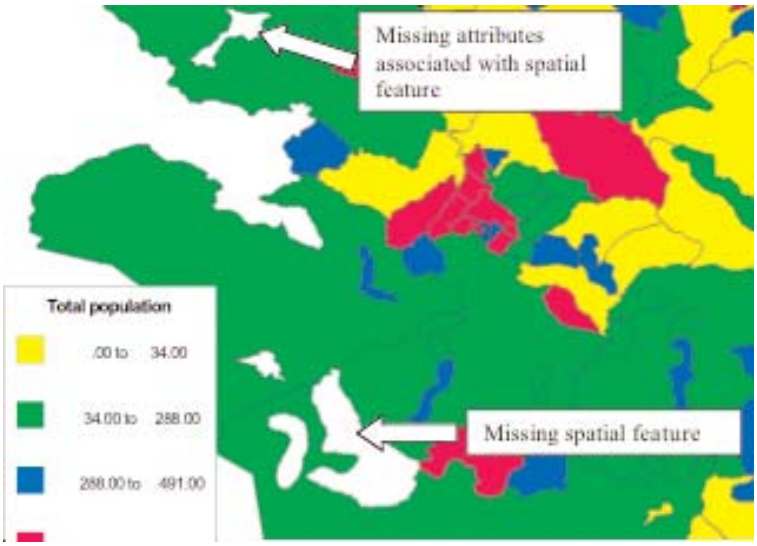
A COMPLETENESS OF DATA

The completeness of a data set means that all the spatial features and their associated attributes that are required for the study area are included. A spatial feature is an area, line or point on a map that has its own set of geographic coordinates. Attributes are records in a database that are linked to the spatial feature (e.g. number of classrooms at a primary school).

Target population:

To do a completeness check, the boundary of the study area can be overlaid on the spatial information of the target population. Thematic maps of variables in the target population data can be produced to see if there are gaps in the spatial information or attributes associated with the spatial features. Figure 1 shows a thematic map of total population and where there are missing spatial features and attributes associated with the spatial features.

Figure 1: Thematic map of total population showing incomplete data



You need to ensure that:

- The spatial features, for instance enumeration areas, which contain information on the target population, cover the entire study area.
- All the spatial features must have the required attributes associated with them, for instance, the number of beneficiaries in the target population.
- The most recent estimates of these variables should be used and they should be provided at the smallest spatial level possible.

Service points:

To check the completeness of service points you should do the following:

- Compare the spatial datasets for the service points with lists of service points in your department. Service points that have not been included in the spatial data set must be added.
- Check whether all the spatial features have been captured. A simple way of doing this is to randomly select a random sample of 10% of service points to check whether they have been captured in the spatial layers of information.
- See whether the spatial features have all the required attributes associated with them. Key attributes that are needed include the unique identifiers, names, and capacity of the service points to address the needs of beneficiaries.

Road dataset:

The completeness of the road dataset can be checked by overlaying the road dataset on recent topographical maps, ortho-images, satellite imagery or in Google Earth. By selecting 100 random points in the study area, checks can be done to see if the roads closest to these 100 random points on the base maps, ortho-images, satellite imagery or in Google Earth are in the road dataset. The road dataset should have information on the type of road, speed limit and curvature factor associated with each road segment.

B VALIDITY OF DATA

You need to determine whether the attributes in the databases are accurate so that errors can be corrected. This is done by checking whether:

- The attributes are of the right type (i.e. text/string, categorical or numeric). For example, the unique identifier should be a text variable (e.g. Clinic153) while the capacity of the service point should be a numeric variable (e.g. 348).
- The spatial features have been classified correctly and whether they have the right range of values. Classification refers to the type of service point, for example, a primary or secondary school. An example of the right range of values is when a school has 5 000 classrooms – this value is out of range of the numbers of classrooms normally associated with schools.
- Duplicate spatial features (e.g. service points with exactly the same co-ordinates) exist. If duplicates are found in the spatial information, incorrect spatial features need to be deleted or their spatial location corrected. If spatial features of the same type share the same geographic location (and have duplicated geographic coordinates) these features need to be combined into one and their attributes aggregated.

The classification of spatial features, range of values and extent of duplicates can be checked using the Filter option in Mocrosoft Excel. With the Filter option it is possible to select incorrectly classified service point types, and records where values associated with service points are found to be out of range, so that they can be corrected.

Target population:

By viewing the attribute tables associated with the spatial features in a GIS, and creating thematic maps of variables of the target population dataset, it is possible to check whether the attributes are of the right type, the classification of spatial features and whether there are duplicates.

Service points:

The easiest way to check the validity of attributes associated with government service points is to view the table in Microsoft Excel or in a desktop Geographic Information System (GIS) to see if the variables are correctly defined.

Road data set:

When it comes to the road dataset this is best done in a full GIS so that the variable types, classification of spatial features, attributes and duplicates can be checked at the same time. A full GIS allows duplicate segments of roads to be quickly detected and to be cleaned. The connectivity of road segments to one another can also be checked within a full GIS. A connectivity analysis also needs to be done within the accessibility modelling software used to check that all the road segments are connecting to one another. Notes should also be made during the validity check on the extent of errors detected and fixed to provide an understanding of the accuracy of the dataset.

C LOGICAL AND PHYSICAL CONSISTENCY

Logical and physical consistency looks at whether spatial features are consistent when it comes to topology, their extent, spatial relationship with other features, and geographic location.

You need to:

- Check the location of spatial features and their related attributes to see whether they consistently and logically make sense. This can be done by:
  - Producing thematic maps using variables associated with spatial features, including the categorical and numeric fields.
  - Randomly selecting between 20 and 30 points that can be identified in the study area to check consistencies in the target population, government service point and road datasets.
  - Queries of the spatial and attribute databases can also be done to see if the variable values associated with spatial features are correct.

D REFERENTIAL INTEGRITY

You need to check how well attribute tables are able to link to spatial features and other tables. By using a relational join (joining two tables together by matching values in fields that are common to both tables) or geo-coding functions in GIS, you can easily determine the extent that attribute tables are able to link to spatial features.

The spatial and attribute tables must have unique identifiers or primary and foreign keys to enable them to link effectively. It is important to have a unique identifier to distinguish spatial features from one another that may have the same geographic co-ordinates and to enable the set of attributes associated with spatial features to be linked to them.

Consider the following:

- The target population dataset should have the unique enumeration area number if you are using census enumeration area data.
- Service points should have a unique number that allows information from various divisions in the department (e.g. finances, human resources, operations, beneficiaries, results) to be linked to the spatial features. A good example of this is the Education Management Information System (EMIS) number of the Department of Education.

E POSITIONAL ACCURACY

You need to check how well spatial features are located geographically. By overlaying the study area and various secondary layers of information (e.g. administrative boundaries, roads and streets, rivers) on the target population, their positional accuracy can be determined. A random sample of about 10% of:

- Spatial features from the target population dataset can be extracted and overlaid on a base map or ortho-image to further check the positional accuracy. The positional accuracy of government service points and road segments can also be checked in this way.
- Service points and road segments will determine the positional accuracy of spatial features in these datasets. Ideally, positional inaccuracies of government service points and road segments should be systematically corrected. These corrections can all be done using GIS software.

F OTHER QUALITY CONTROL CHECKS

- It is also important to ensure that all spatial datasets used in the accessibility studies are provided in a cartesian coordinate system in metres because their geographic co-ordinates are provided in angular units (degree, minutes, seconds) and, therefore, they are easier to work with when doing accessibility modelling.
- The datasets should be provided with metadata, which enables users to get a more thorough understanding of the datasets.
- The datasets should also be provided in a suitable GIS format (e.g. GML or Shape file format) that can be easily incorporated into the accessibility study.

ANNEXURE 2 IDENTIFYING OPTIMUM LOCATION OF SERVICE POINTS – SIMPLER METHODS OF CONDUCTING ASSESSIBILITY STUDIES

Introduction

Various methods can be used to determine optimum sites for service points. They vary in complexity and accuracy. The simpler methods are quicker and do not require high levels of expertise. The more complex methods take time and require a good deal of technical expertise; however they are much more comprehensive and provide more accurate results.

Simpler methods that you can use to determine the best location for service points include, first, a visualisation approach and, secondly, the use of Geographic Information System (GIS) software. Both these methods make use of Google Earth to view the results, which is readily available and easy to use.

This Annexure provides a detailed description of how these methods can be applied.

Visualisation approach using google earth

The visualisation approach allows you to view your service points in Google Earth. The advantage of using Google Earth is that you can use satellite imagery. From the satellite imagery you can see the distribution and concentration of human settlements and other developments, which is also an indication of the distribution of the population. The existing road infrastructure can also be seen from the satellite imagery contained in Google Earth.

Knowing where existing service points, the population and roads are will allow you to identify potential sites for new service points. Although this basic approach is easy to use it is very limited as it does not consider factors such as the actual distances or times that people travel using existing modes of transport to access service points, or the capacity constraints that service points may have in delivering services to people within the area.

To use the visualisation approach you will have to do the following:

Download Google Earth from the web page:

- Go to Google Earth on their web page at **http://earth.google.com/intl/en/download-earth.html.**
- Click on the “Agree” and “Download” button and a window will open to ask you whether you want to “Save” or “Run”.
- If you click on “Save”, the Google Earth software will be saved to your computer before you do the installation. If you click on “Run”, the Google Earth software will be immediately installed on your computer.

Capture your existing service point data in Google Earth

- Export your service point data from the existing software on your GIS (e.g. ArcMap, MapInfo) and import it into a Google Earth KML or KMZ file format. Most GIS software has the ability to export their data to Google Earth file formats.
- Export the other layers of information (e.g. administrative boundaries, population statistics) and overlay on the satellite imagery and service point data in Google Earth. If the service data is not in a spatial format, it can be captured directly into Google Earth by using the “Add Placemark” tool, as follows:
- Obtain a list of the service points with their names and the geographic places where they are located. If the service points are located in a major urban area you can also get their street addresses.
- Enter the name of the geographic place (e.g. “Cofimvaba, South Africa”) into the “Fly To” window and click on the “Begin Search” button. This will “fly” you into the geographic place.
- With the aid of local knowledge on the location of service points you can identify its geographic location and add a Place mark where it is situated.
- If you have the street address of a service point (e.g. “22 Smith St, Durban”) you can enter this information into the “Fly To” window and Google Earth will take you to the exact location where the service point is located. A Place Mark can then be put on the building where the service point is situated.

View data in Google Earth to identify potential sites for service points

Once you have imported the various data sets in Google Earth you can view them. You could also facilitate a workshop with departmental officials (e.g. district managers) to identify possible sites for the location of new service points.

In locating new service points it is necessary to consider provincial development plans and IDPs of local municipalities. It is also necessary to consult with government departments at a national and provincial level to see whether existing departmental infrastructure can be used to locate the new service point or whether an integrated service centre can be established.

The white arrow in Figure 1 points to where a new service point could be located considering where existing service points are located, where there are large concentrated of people and where roads exist.

Analysis with the aid of a geographic information system

A more advanced approach than the visualisation approach is to use the spatial analyses functions that are available within a GIS. This includes the use of buffers and trade areas or areas of influence/jurisdiction. These methods can be used to identify areas that are presently being covered by existing service points and areas where there is no coverage and high concentration of people.

In using such methods you should always consider proposed developments in provincial development plans and IDPs of local municipalities in locating potential sites for new service points. Furthermore, consult other departments about the possible sharing of existing infrastructure or the establishment of an integrated service centre.

Use of buffers around existing service points

Buffers of a particular radius (e.g. 3km) can be generated in GIS software around existing service points. The areas covered by the buffers indicate the approximate reach of these facilitate. Figure 2 shows a 3km buffers (circles) around primary schools in the Bushbuckridge municipality. Those areas that are not covered by the buffers would be considered to be out of reach of schools in this area.

By examining these out-of-reach areas in Google Earth, it is possible to see the extent of the population and road infrastructure so that a decision can be made about possibly locating a new service point. The New Service Point marker in Figure 2 shows the possible location of a new primary school considering the extent of the underlying population and access to roads. The advantage of this approach is that it is can be done quite quickly; the disadvantage is that it does not consider variations in the terrain or road network, and where people live, that would influence beneficiaries accessing service points.

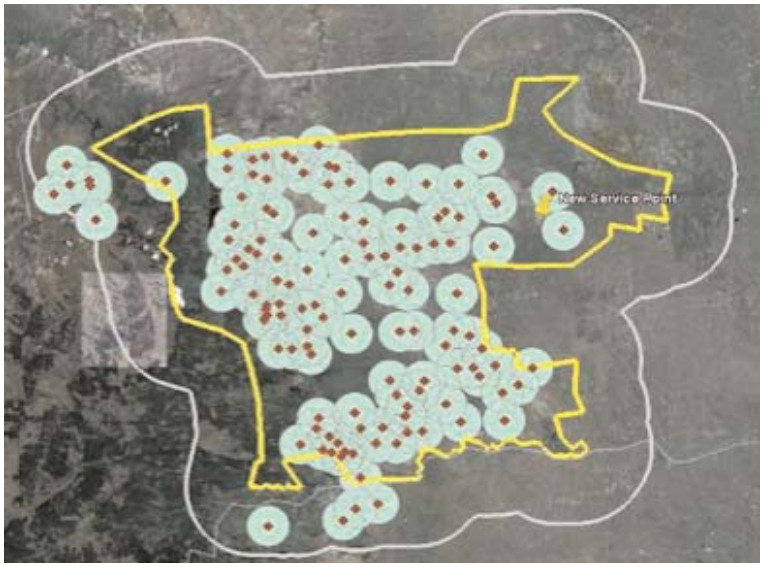
To use the buffers you will have to do the following:

- Get access to the existing service point data from the relevant department and import it into GIS software. Use the GIS software to create buffers of a particular radius. The radius used should be obtained from the access norms of the department (e.g. 3km travel distance to schools) or defined in consultation with department officials.

- Export service points and buffers into a Google Earth KML or KMZ file format.

- Overlay service point and buffers data in Google Earth. Use a consultative approach to view areas that are not covered by the buffers (i.e. out-of-reach areas) to see if there are large concentrations of people in these areas. Also look where existing road networks are situated so that new service points can be located in the most accessible location. Figure 2 shows where a new service point could be located using this approach.

Figure 2: Google Earth map showing buffers around service points and the possible location of a new service point



Trade area analysis

Trade area analysis identifies areas of influence or jurisdiction of service points. For example, a clinic might have an area of influence which covers patients from a surrounding area. Furthermore, magistrate courts cover magisterial districts and police stations cover police precincts.

You can determine the trade areas of service points by analysing various sets of information. For example, a database of applications for services provided at service points can be used to determine the areas where beneficiaries of those services live. Another approach would be to use a learner enrolment register at schools to identify where learners live. Departments could also interview beneficiaries accessing service points to identify where they live.

Information about where beneficiaries live can be geo-located in a GIS. You can digitise the outer perimeter of trade areas in a GIS.

An advantage of the trade analysis method is that it provides a more definitive understanding of areas that are being served by existing service points, and therefore areas that are not being served can be identified more accurately.

A disadvantage of this method is that the collection of information on where beneficiaries live and the defining of the trade areas could take some time. It is better to use this approach when the analysis is being done for a relatively small area with a limited number of service points, for instance, at local municipal level.

You can undertake a trade area analysis as follows:

- Obtain access to an applications database or register for service points. If these databases or registers are unavailable you can survey beneficiaries attending service points randomly over a period of time to identify where they live. You should then capture the information in a spreadsheet or database.

- Geo-code the address information of beneficiaries live using the geo-coding functionality found in existing GIS software. Use the Statistics South Africa's main and sub-place GIS spatial layers of information to do the geo-coding.

- Once all the records have been geo-coded, manually create boundaries around the outer perimeter of each service point indicating the areas where beneficiaries using those service points reside. Some GIS software can create these out perimeter boundaries automatically.

- Export the data layers containing the location of the service points and their 'trade areas' into a Google Earth KML or KMZ file format.

- Overlay the service point and trade area layers of data in Google Earth.

- Study the areas that fall outside of the trade areas to determine whether large concentrations of people live there. Consider the location of existing road networks and identify areas where new service points are required.

Figure 3 illustrates where a new service point could potentially be located outside of the trade areas of existing service points.

Figure 3: Google Earth map illustrating the use of trade area analysis to identify the possible location of a new service point

ANNEXURE 3
FORMAT OF AN INFRASTRUCTURE PLAN

This Annexure provides a suggested format for an infrastructure plan. However, you should determine whether your department already has a prescribed format that you need to comply with.

Introduction

The introduction to your infrastructure plan should provide a clear description of the purpose of the plan and justification for the infrastructure. The justification should be made considering policies and the strategic plans of your department.

The plan should include the following key components:

1. **Service delivery model**

   Clearly describe the following:

   - The various types of service points of your department.
   - The norms and standards for these different types of service points including their geographic access norms.
   - Any suggested changes in the types and number of service points to be provided.
   - Detailed information on the current and the approved number of new service points. This may include summary statistics on the physical specifications of the infrastructure (e.g. size, construction material), design and utilisation capacity (e.g. over-capacity), condition, value and expenditure.
   - Maps are useful to show the distribution of service points.

2. **Demand or need determination**

   The reasons for the proposed new infrastructure should be provided, based on changes in the demand or need for services.

   Information such as growth in the population, in-migration, ratios of staff to beneficiaries, and increases in transaction volumes could all be used to show changes in changes in service demand.

3. Accessibility study

Accessibility studies are used to quantify the extent of service demand and the supply of government service points required to meet this demand. This section should cover the following:

- The results of accessibility studies undertaken.
- Information on the geographic accessibility of existing services points.
- Areas of poor accessibility could be highlighted through the use of accessibility maps.
- The optimal number and location of new service points.
- Service points that should be given priority in rolling out the infrastructure plan.
- Service points that should be considered for closure or relocation.

4. Asset management

This section should present the plans, standards, and specifications and costs for managing existing and new infrastructure. It should also describe the standards to be used in the infrastructure design, service provision and staffing.

5. Financial summary

The financial summary provides information on historical and future expenditure on the maintenance and construction of infrastructure. It also indicates from where the funds will be sourced.

6. Plan improvement and monitoring

This section describes how the implementation of the infrastructure plan will be monitored and evaluated. A logic model can be used to define the output and outcome indicators that will be used to do the monitoring and evaluation. Such monitoring and evaluation could assist in identifying possible needs to adjust the infrastructure plan.

7. Supporting documentation

A financial budget and an executive summary should be added to the document when the main content of the plan has been completed. Furthermore, any references or supporting documents should be included in a References and Appendices section in the Plan.

KEY CONSIDERATIONS

Key points to consider in developing an infrastructure plan for your department include the following:

- ❑ Policy and regulatory requirements.
- ❑ The service delivery model of your department.
- ❑ Service delivery norms and standards for your services.
- ❑ Extent of current and projected service demand.
- ❑ Your departmental infrastructure norms and standards.
- ❑ Existing infrastructure of your department.
- ❑ Operational requirements to use the new infrastructure including business processes, finances, human resources, and information and communication technologies.
- ❑ Finances required for establishing the new infrastructure.
- ❑ Justification for the funding requirement.
- ❑ Timelines for establishing the new infrastructure.
- ❑ Monitoring and evaluation of plan implementation.

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