Urban Regulatory Framework

Puntland

Ministry of Public Works and Transport

First Draft: 30/12/2013

UNITED NATIONS
Joint Programme on Local Governance and Decentralised Service Delivery

UN HABITAT
FOR A BETTER URBAN FUTURE

FOREWORD

PREFACE

ACRONYMS

URF	Urban Regulatory Framework
MoPW&T	Ministry of Public Works and Transport
BOD	Biochemical Oxygen Demand
FAR	Floor Area Ratio
BC	Building coverage
BVP	Built Volume per Plot Area
CEB	Compressed Earth Block
COD	Chemical Oxygen Demand
cm	Centimetres (measuring unit for length)
dB	Decibel (measuring unit for sound)
Ecosan	Ecological Sanitation
EIA	Environmental Impact Assessment
FAR	Floor Area Ratio
Ha	Hectares (measuring unit for area)
km	Kilometers(measuring unit for length)
m	Meters(measuring unit for length)
m^2	Square metres(measuring unit for area)
Max.	Maximum
Min.	Minimum
mm	Millimetres (measuring unit for length)
MPa	Mega Pascal (measuring unit for strength)
N/mm^2	Newton per square millimetres (measuring unit for strength)
p/ha	People per hectare (measuring unit for population density)
PLC	Plot Coverage
PPP	Public-Private Partnership
SSB	Stabilized Soil Block
ViP	Ventilated improved Pit latrine

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INTRODUCTION

This document called “Urban Regulatory Framework for Puntland” shall be referred to as “The URF”.

The URF provides the principles for the sustainable development and management of all land. It is binding for public and private land within urban areas, for estate development to be developed in new areas, and for any investment project, public institutional, tourist, public spaces, urban renewal and any servicing projects.

The URF shall be considered as one of the most important tools for the preparation and implementation of spatial plans. The standards and guidelines provided by the URF should be regarded as reference for the government authorities concerned, and for planners and professionals in the urban development, particularly in the following tasks:

- Preparation of development programmes and plans
- Improvement of living standards in all settlements
- Sustainable management and development of all land
- Development of settlements in terms of housing, social facilities, and technical infrastructure, according to the needs of the people
- Provision of a standardized level of context-appropriate basic facilities and services to people throughout the country
- Reduction of the unjustifiable differences in standards of housing, community facilities and other basic elements of human settlements within the country.
- Estimation and reservation of the long-term land requirements necessary for the provision of facilities and services according to the guidelines.

It is important to state that the URF may be applied with a degree of flexibility in a way that the community at large will benefit most from any development. It is applicable in four aspects:

- **Forward Planning** - used as a basis for allocating valuable land resources and location guidelines for various types of land uses and facilities.
- **Development Management** - providing guidance on the scale, intensity and site requirements of developments, including the administrative procedures.
- **Plan Implementation** - providing the principles for various uses and adequacy of facilities to serve an urban area, and overlooking all aspects for their sustainable integration.

- **Raising Quality of Life** - providing guidelines which are environmentally and socially sound, to guide environmental planning and conservation of our natural landscape, habitats, cultural heritage and townscape, while supporting local economic development.

Certain effects of the formulation of the URF may be not fully predictable and their adjustment shall therefore be possible if necessary, as the purpose of this URF is to support the management of development and growth to be efficient and well-coordinated. .

The URF are to be understood as a flexible guideline in the preparation of spatial plans, especially within the context of new development. The URF in principle reflect the socioeconomic goals and policies in the country, the socio-cultural heritage of the people, and the environment of the country. The URF allows for socio-economic development and for application to various local conditions.

While the standards set in the URF are applicable to the new development areas, for areas of renovation and in the existing built-up areas, the area requirements can be reduced considerably according to the availability of land, by increasing the intensity of the built-up areas.

The set of proposed standards covers many subjects, and it is obviously not practicable to achieve all standards simultaneously. Therefore, it will be required to prioritize specific needs in different areas according to the local needs and conditions.

PLANNING OBJECTIVES

The vision tied to planning and decision-making is to achieve social, economic and environmental sustainability of local development and growth by pursuing an integrated development management. For every project, the goals, principles, cornerstones and added values shall be defined at the beginning. This includes objectives and achievable benefits.

A project is most successful; if every aspect of community development, from energy, water, environmental quality, to natural habitat, green infrastructure, urban form, mobility, education and social equity is addressed. For communities to be socially, environmentally and economically sustainable, they shall be seen as integral to larger systems, both natural and constructed. This URF assists in addressing each of the planning aspects.

Social services and facilities shall meet the present and future needs of the population, while citizens shall have the opportunity to actively participate in planning in their Local Council area, and to contribute to the transparent decision-making.

Service delivery shall be maximally efficient and follow a set of minimum standards, so that the highest number of population benefits from public infrastructure provided by the public and private service sector, efficient land use settlement layouts, as well as legal access to land, housing, and building permits. The following principles of planning shall always be applied across Puntland:

- To ensure sufficient allocation of land for prospective urban developments, thus helping to achieve sustainable urban growth and protection of urban life sources, such as agricultural production areas, water basins, and environmentally sensitive areas
- To support the local economy by encouraging the utilization of available land for economic activities, which can help to reduce poverty, improve standards of living and social equality, and provide a basis for the provision and equal distribution of basic urban services
- To encourage social diversity and improve the quality of urban life by attaching importance to the relationship between residential land uses and other urban land uses, as well as by observing expected needs and identifying the number and volume of public service units with due regard to conditions pertaining to employment and income as well as environment and location
- To encourage diversity in building typologies and promote the environmental and functional integration of existing and new developments in urban areas and to protect historically significant urban fabric and buildings whenever and wherever possible
- To protect environmentally sensitive areas from urban expansion, industrial development and other pollution sources by identifying mitigation measures to protect natural environments that can be used for recreational purposes
- To integrate the natural environment into spatial plans and designs and to apply to green building principles.
- To ensure accessibility and improved mobility within urban areas, whether by foot or by other means of transport such as bicycles or vehicles, and to provide an efficient road network for public transport planning and linking all residential districts and neighbourhoods in the city
- To provide and extend utilities services and transport connections among districts and from urban to rural areas in order to sustain reciprocal relations among different levels of urban areas and between urban and rural areas.
- To plan for compact development for cost effective investment in infrastructure, efficient public transport and movement.

A KEY FOR USING URBAN REGULATORY FRAMEWORK

Introduction	The introduction outlines the purpose and objectives of Urban Regulatory Framework (URF) for Puntland.
Volume 1 **Framework for Spatial Planning and Plan Making**	**Volume 1** provides information on settlements spatial planning, type and contents of spatial planning system, and a framework for plan making procedures at the district level. It should guide authority of concern to decide on type and contents of a spatial plan to promote inclusive and sustainable development of urban and rural areas.
Volume 2 **Land Use Planning Standards and Guidelines**	**Volume 2** provides guiding principles and standards for planning of different land uses including all public service facilities, recreation, commercial and industrial uses. It should be used during the master planning to guide the development of urban master plans.
Volume 3 **Building Development Standards and Guidelines**	**Volume 3** provides guiding for building development including building alignments, floor area ratio, building coverage, building layouts, settlements upgrading, and detailed plot development parameters for residential, mixed use, commercial, industrial, public intuitions as well as procedures for building permitting and other development management. It should be used during the layout (detailed) planning to guide implementation of urban developments.
Volume 4 **Urban Roads and Transport Standards and Guidelines**	**Volume 4** provides standards and guidelines for urban road planning, urban road uses including footway, parking standards, and guidelines for traffic circulation and management. It has to be used during the master plan and layout (detailed) planning stages.
Volume 5 **Technical Infrastructure Standards and Guidelines**	**Volume 5** includes guidelines and standards for technical infrastructure planning and development. It provides detailed guideline for water resources management, waste management, and electricity supply including renewable energy, gas and telecommunication services and storm water control and management. It has to be used during the master plan and layout (detailed) planning stages.
Volume 6 **Construction Standards and Guidelines**	**Volume 6** provides general design requirements for buildings, construction material, techniques and components as well as safety requirements for construction sites. It provides minimum guidance for designing and managing a construction of a building. It should be a reference for private and public sector developments.
Annex	Annex of the URF includes notations and graphic standards for spatial plans, and form sheets for different stages of construction works including building permit and authorization. It also includes a detailed guide to the content of master plans, and finally a list of references for developing this document.

Volume 1

Framework for Spatial Planning & Plan Making

1 FRAMEWORK FOR SPATIAL PLANNING AND PLAN MAKING

Volume 1 provides information on settlements spatial planning, type and contents of spatial planning system, and a framework for plan making procedures at the district level. It guides authorities of concern to decide on type and contents of a spatial plan to promote inclusive and sustainable development of urban and of rural settlement areas.

1.1 URBAN SETTLEMENTS

1.1.1 STATUTORY DISTRICT HIERARCHY

The existing hierarchy of districts in Puntland is divided by regions and the regions are sub-divided into districts graded A, B, and C[1.] The established three-tier hierarchical pattern of districts includes the capital city of Puntland and the regional capitals at grade A, while other urban centres are graded as B and C. Although the criteria to define the hierarchy of a district are unknown but the common practise is that the level of production and the extent of self-sufficiency per district are primarily used to define the hierarchy. The size of the territory and population density is also taken as minor element into the decision.

Villages fall under the district centres, which can be at any grade depending on the district administration.

Table 1. 1. Statutory District Hierarchy

Grade	Puntland Regions				Disputed Regions		
	Nugaal	Karkaar	Mudug	Bari	Sool	Sanaag	Cayn
A (Region-al Capital)	Garowe		Galkacyo	Bosaso	Lasanod	Cerigabo	
B	Eyl	Qardho	Galdogob	Caluula		Badhan	Buuhoodle
	Burtinle	Bander bayla					
C	Dangorayo	Iskushuban	Jariiban	Qabdala	Hudun	Dhahar	Caynabo
	Awrculus			ufayn	Taleh		
				Baargaal			

Source : Article 4, Law no.16 , 27/09/2013, Presidential Office, Puntland State of Somalia

[1] Article 4, Law no.16 , 27/09/2000,Land Permission Law, Official Gazette,, Puntland State of Somalia

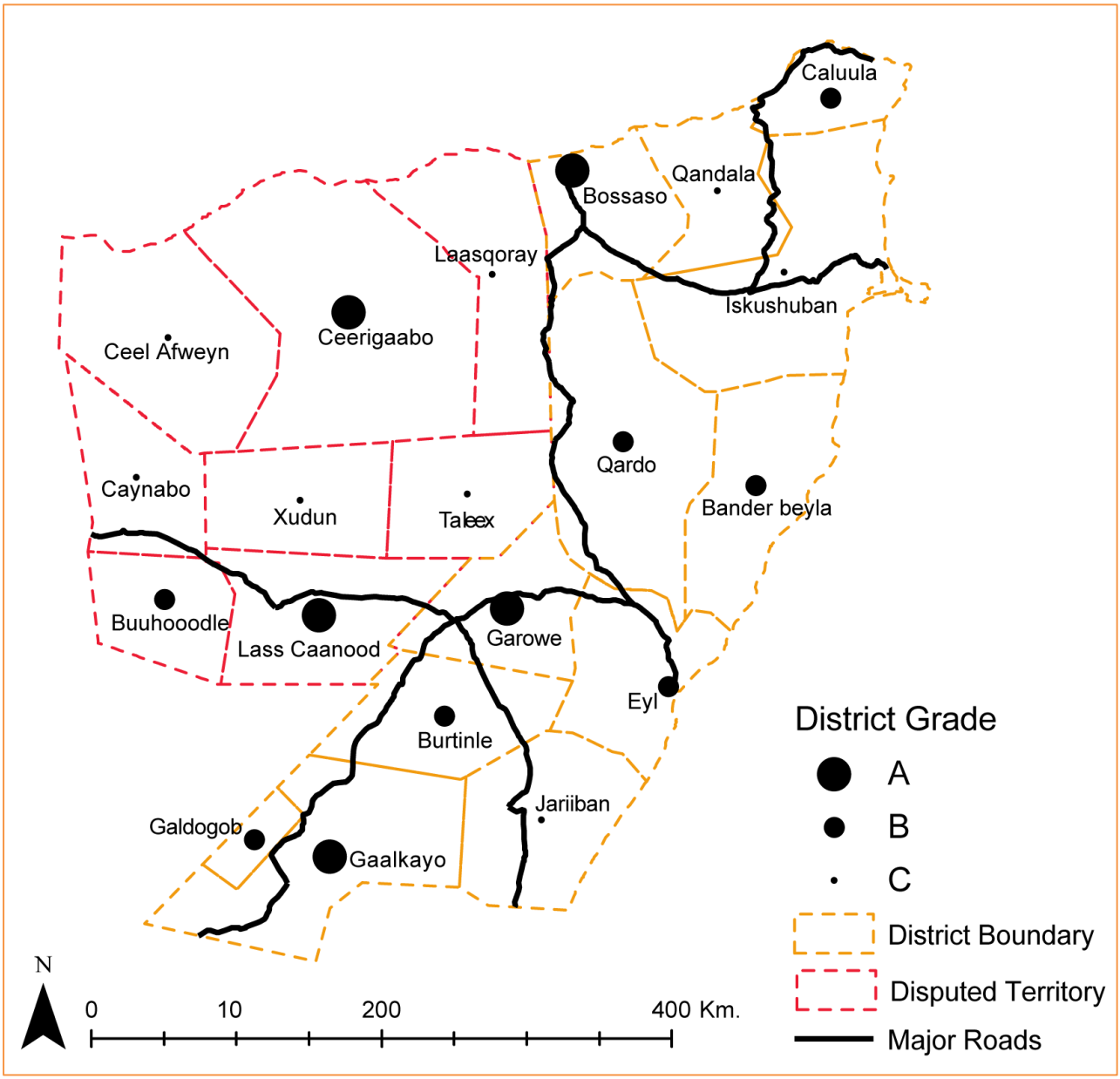


Figure 2. 1 Statutory District Hierarchy

1.2 SPATIAL PLANNING HIERARCHY

Planning hierarchy refers to the decision-making and implementation processes of development policies. A plan at a lower level in the hierarchy should be required and ordered to follow and fulfil the policies and mission drawn on by a plan at a higher level. For example, national development policies detail development objectives, strategies, actions, and finally concrete projects and outcomes sequentially from a plan at the national level to one at the regional level and then down to the level of district layout plans. This hierarchical order will ensure the compliance of each type of plan with high level decisions and their implementation process.

It is vital to emphasize that a plan-making process does not need to be and cannot follow the abovementioned hierarchical order of the planning system. Rather the plan making process has to be responsive and flexible, which after all is the essence of development in Puntland, with all its natural and environmental, social and cultural, economic and infrastructural, and spatial and institutional issues influencing most development processes overtime. The plan-making process therefore shall be a two-ways interaction –bottom up and top down for each type of plan.

1.2.1 NATIONAL SPATIAL PLAN (1/250,000 – 1/500,000)

A National Spatial Plan (NSP) determines spatial aspects of the country's social and economic development. It is prepared at a scale of 1/250,000 to 1/500,000, depending on the size of the Puntland national territory. The plan consists of background studies, reports, plans, maps, and other informative material, and shall be regularly reviewed every 15 years.

The purpose of The National Spatial Plan is to;

- Provide a framework for the coordination and implementation of sectoral programmes and development projects
- Establish a system of urban and rural settlements that will be in conformity with the location of resources, promote more balanced economic growth throughout the country, and permit the provision of infrastructure and other facilities on an economic basis
- Promote the hierarchical development of urban centres in Puntland, thus providing more alternatives for the absorption of internally displaced persons/returnees and other migrant populations and avoiding the problems arising from excessive concentration in certain large urban areas such as Bosasso and Garowe.

- Strengthen the functional links among human settlements with respect to the movement of people, commodity flows, the delivery of services, and general socio-economic activities
- Provide guidelines for the provision of services and infrastructure in relation to the distribution of productive activities and population
- Link the national economic and sector policy strategies with the location of settlements in order to optimize the use of resources and their balanced spatial deployment throughout Puntland
- Promote the hierarchical development of urban centres in Puntland, thus providing alternatives for the absorption of returnees and other migrant population
- Provide a national environmental framework and urban development policy.

1.2.2 REGIONAL SPATIAL PLAN (1/50,000 – 1/100,000)

A Regional Spatial Plan (RSP) deals with spatial aspects and the potential for social and economic development of a region. It should be prepared at a scale of 1/50,000 to 1/100,000, depending on the size of the region.

The RSP have to be in conformity with National Spatial Plans and be able to give direction and guidance to District Spatial Development Plans. A regional plan consists of policies, plans, background studies, reports, and maps and shall be reviewed every 10 years.

The purpose of A Regional Spatial Plan is to;

- Formulate a macro land use plan, being an elaboration of the National Spatial Plan, as an overall guideline for the location of development and distribution of the population and activities in the region
- Identify urban and rural centres and provide guidelines and priorities for public investments and regional transportation and communications facilities in order to facilitate inter settlement functional links, particularly rural-urban linkages
- Provide for the development of facilities and services within service or growth centres in accordance with feasible standards
- Provide a framework for environmental protection
- Identify urban and rural service/growth centres and determine investment programmes and the most suitable locations for future development.

1.2.3 DISTRICT SPATIAL DEVELOPMENT PLAN (1/25,000)

A District Spatial Development Plan is a strategic development plan that guides the spatial development of the urban and rural areas within a district. The District Spatial Development

Plan will be a spatial representation of the Distinct Development Framework, which is a concise 5 years development framework derived from regional and national sector priorities, district profile, and community consultations and priorities. A District Spatial Development Plan contains planning aims, objectives, and principles, as well as development proposals, plans maps, background studies, reports, and other information, with the purpose of securing orderly, coordinated, efficient, and environmentally sound urban-rural development and proper use of land in the district.

A District Spatial Development Plan determines macro-level development strategies relating to land use planning, basic service delivery, population growth and estimation, gross densities for the district 's urban areas, and the tentative location of major urban functions. The plan is developed in conformity with strategies of the National and Regional Spatial Plans and be able to give direction and guidance to the Urban Master Plans.

The Local Council shall be responsible for the preparation, approval and implementation of District Spatial Development Plan and its regular review every 5 years within its area of jurisdiction. Its scale shall be no less detailed than 1/25,000, depending on the size of the area of concern.

The purpose of a District Spatial Development Plan is to;

- Create and maintain a balance between the urban and rural environments of the district in order to ensure the provision of adequate and suitable social services and facilities to meet present and future needs and minimize or prevent the social costs associated with uncontrolled growth
- Create and maintain an urban system which promotes an efficient and prosperous urban economy with minimum cost in the provision and maintenance of infrastructure, travelling time and effort, and all other urban activities
- Assist in promoting the efficient management of urban growth by creating and maintaining the various elements of the urban structure, particularly institutional building
- Ensure service delivery to the entire district territory and optimization of its natural resources
- Give indications and guidance on macro-level land use planning, transportation, population growth, urban densities, and basic service delivery for the rural areas.

1.2.4 URBAN MASTER PLAN (1/2,000 – 1/5,000)

An Urban Master Plan is a key local government function which includes long-range land use development strategies and policies, growth management principles, capital budgeting

and regulatory or implementation strategies for urban areas in the district. Urban Master Plan is prepared for urban centre of districts at grade A, B, C, and other main villages when necessary. It generally involves the appropriate types and forms of urban land uses, as well as road, technical infrastructure, and open space planning directed at the efficient utilization of land in order to provide benefits to the broader population, the economy, and the environment.

A master plan states goals, policies, guidelines, and standards for socio-economic and environmental planning and development. It is based on analysis and the application of foresight, to guide, direct, or constrain subsequent actions, in order to achieve the set goals.

A Urban Master Plan shall be regularly reviewed every 5 years and its scale shall be no less detailed than 1/5,000.

1.2.5 LAYOUT (DETAILED) PLAN (1/500 – 1/1,000)

A Layout Plan is a detailed land use plan (and associated development brief where desirable) of part of an urban area or a particular major land use zone as designated in the urban master plan, in which significant physical development is planned or has begun or is likely to take place, or there is need for development, redevelopment, renewal, or upgrading.

Layout (Detailed) Plans are as-built plans for the urban environment and set standards for building layouts, road design, building setbacks, connections of buildings to access roads, floor space ratio and building coverage for a specific plot, plot size, net and gross density for a particular zone or area, detailed design for car parking lots, landscaping, the drainage and location or network of technical infrastructure including sewage and water treatment plants, the sewage network, the water and electricity distribution network and electric substations, lighting, and telephone and all other services.

Layout (Detailed) Plans are generally prepared at a scale of 1/1,000, depending on the size of area of concern. The detailed implementation plans are prepared at a scale of 1/500 and shall be regularly reviewed every 5 years.

1.2.6 SPECIAL PLANS

Special Plans can be prepared for specific areas with a particular and characteristic environment or with natural resources, or for a special subject or sector such as transportation, recreation, or tourism. The followings are examples of special plans:

- Integrated Watershed Basin Development Plan
- Integrated Coastal Zones Management and Development Plan

- Integrated Rural Development Plan
- Tourism Development Plan
- Road Network Plan

1.3 A FRAMEWORK FOR PLAN MAKING PROCEDURES AT DISTRICT LEVEL

Urban master planning is a key local governance function, since local governments and the municipalities have a better understanding of the critical problems, opportunities and priorities at their area of jurisdiction. Local municipality/government at a district level and the Ministry of Public Works and Transport at central level are key authorities in Puntland for land and urban sector policy formulation, legal and regulatory framework. The current legislation system lacks clarity on roles and responsibility of local and central level authorities for master plan formulation, approval and implementation process. Below framework therefore presents a step by step approach with proposed roles and responsibilities of local and central government institutions in undertaking spatial planning process for the district. Three tier of spatial planning hierarchy, which is a district spatial development plan and district development framework as strategic document to guide developments in the district, an urban master plan as a land use development plan to guide/designate land use development in the district urban area, and a layout (detailed) plan for implementing the urban master plans shall be prepared in a district.

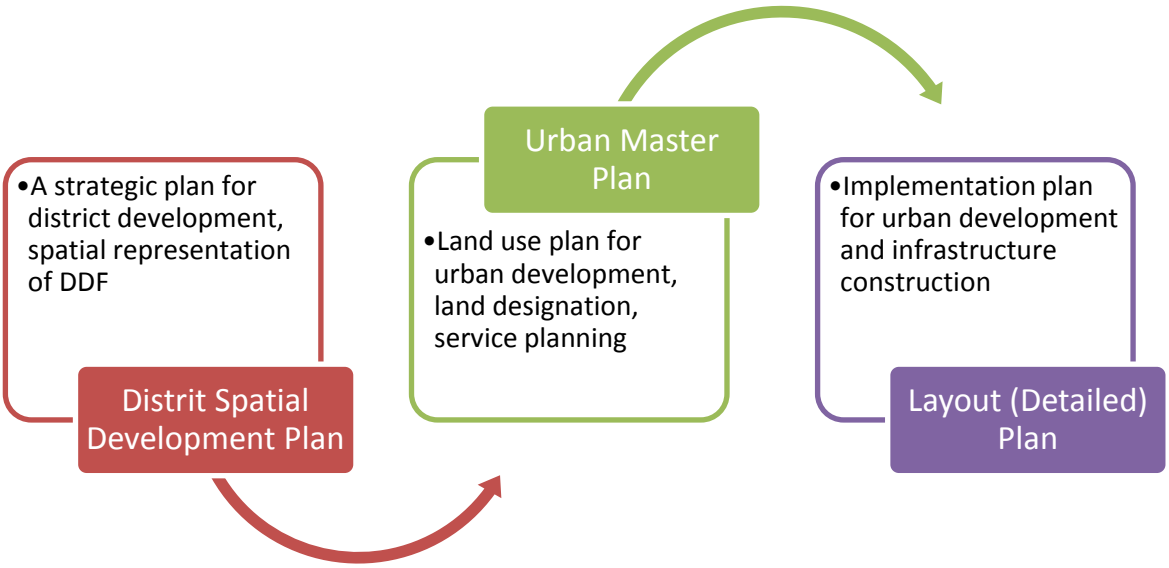


Figure 1. 2 Spatial Planning Process at District Level

The preparation of a planning document shall follow the below principle procedure of Planning Initiation, Plan Elaboration, and Approval and Adoption. A planning document shall be developed in accordance with the public interest.

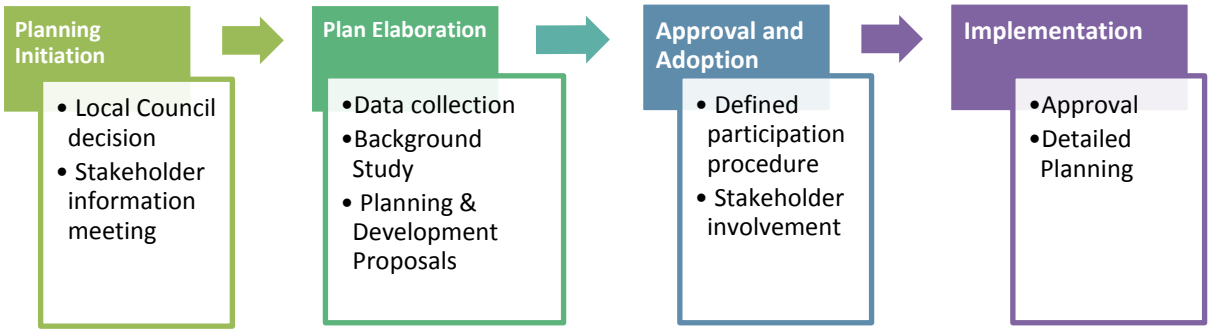


Figure 1.3 A Plan Making Process at District Level

Local government shall identify an urban master plan boundary, which will be subject to approval of the Ministry of Public Works and Transport (MoPW&T). The master plan boundary will be used to limit urban development and prevent urban sprawls. The definition and approval process of master plan boundary shall follow as below.

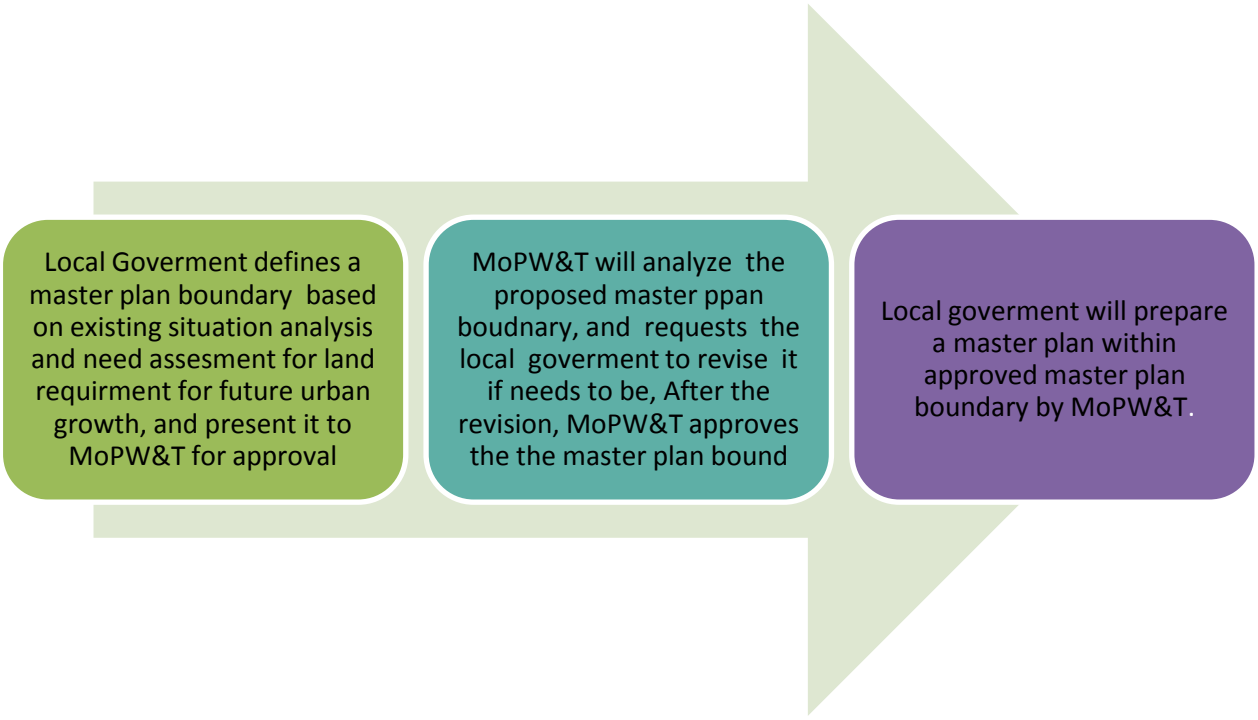


Figure 1. 4 A Process for identifying and approving a Master Plan Boundary

A spatial planning process at the district level shall follow the below principles:

Step 1: Planning Initiation

- The preparation of a spatial plan including district spatial development plan, urban master plan and layout (detailed) plan shall be initiated by the local government when the need for planning or for the review of an existing plan has been identified, or when a plan has elapsed.
- The preparation of a planning document may be initiated by the Local Council, or may be requested to the Local Council by a public, communal or private entity.
- There shall be an information meeting for stakeholders and citizen representatives to explain the goal of planning.

Step 2: Plan Elaboration

Plan elaboration shall be a full responsibility of Local Government. However, MoPW&T shall define and approve a master plan boundary which the Local Government will be allowed to prepare a master plan within. MoPW&T shall also provide technical support if requested and financial support to the local government/council to undertake the plan elaboration.

A broad inclusive and participatory planning approach shall be ensured throughout a planning and implementation process. All documents related to a plan or specific project shall be made available for viewing at the Local Council office. Local council shall be required and fully responsible for conducting the community consultations, stakeholder meeting with relevant government agencies and private sector, peer to peer group meetings as part of the Background Study to clarify and confirm planning constrains, priorities and strategies. The scope of planning for urban settlements at grade B, C, or rural village centres may differ from that for major cities and district at grade A.

Plan Elaboration process shall be as follows.

- Data collection. A set of spatial, socio-economic data is needed for the plan preparation. This includes, but not limited to;
  - A detailed land use map for urban areas,
  - Land coverage/use maps for rural areas,
  - A detailed household survey and needs assessment,
  - Community consultation that includes community and peer group consultations on needs, expectations and development opportunities,
  - Geological and topographic maps/data sets
  - Building and property inventory maps/data sets

- Perimeter survey (cadastral survey)

- Background Study: A comprehensive analysis of existing situation shall be undertaken and be presented as a “District Profile” for the preparation of District Spatial Development Plan, and as an “Urban Profile” for the preparation of Urban Master Plans and Layout (detailed) Plans.
- Planning and Development Proposal: This shall be based on the results of the Background Study and any impact and feasibility studies for alternative development options. It should include major development directions, development proposal, implementation strategies, monitoring and evaluations. Planning and Development Proposal shall be prepared as a draft document:

Step 3: Approval and adoption

- The draft planning and development document shall be circulated among all government departments at Local and Regional government level for comments within 15 days.
- After incorporating the relevant and examined comments, the draft document shall be circulated among all other stakeholders and publicly displayed at the Local Council office for 30 days. Anybody may submit comments during displaying period of 30 days.
- After incorporating the relevant and examined comments, the draft planning document shall be presented and discussed in public stakeholder meetings at the Local Council level and finalized by incorporating all relevant comments.
- The planning document shall be submitted to the Local Council for approval within 15 days, with the participation of the Technical Committee presenting the document to the local councillors.
- The approved planning document shall be submitted to MoPW&T for their information and use.

Step 4: Eligibility to prepare a plan

- Any physical development plan shall be prepared by a qualified and registered physical planner
- Local council through its technical departments may form a planning team or a technical committee to prepare the plans.
- Local Council may request technical support from the MoPW&T or agencies, or from a registered and approved private planning consultancy.

Step 5: Implementation

- Local Council shall be fully responsible for implementation, and MoPW&T shall have an advisory role in the implementation of developments in conformity with the plan, especially in cases of major investment which requires strong cross-sectoral coordination. MoPW&T shall have also responsibility to oversee the urban development within master plan boundary.
- After the approval of a planning document by the Local Council, any decision about development projects in the area shall be guided by the planning document at all levels of governance.
- Before the development on an area exceeding 5 ha, there shall be a feasibility and site analysis. The feasibility and site analysis shall evaluate the site resources and characteristics, identify and review any current planning and regulatory controls, quantify the areas of the site suitable for the envisioned development, and establish the project goals in terms of program components, design priorities, opportunities and constraints, site features, realistic considerations for the site, more intense site investigation after the establishment of an initial range of proposed development, or other client-driven criteria.
- The feasibility and site analysis shall be accompanied by preliminary meetings with local officials and/or community members.
- There shall be an Environmental Impact Assessment for development in areas of environmental, historical, cultural significance, as well as for the development projects of potentially polluted commercial or industrial uses.

Step 6: Revision and modification

- There shall be the possibility for modification of major elements of an approved planning document, when those appear necessary on occasions and for purposes in the public interest.
- Such revision of a planning document may be requested to the Local Council by a public, communal or private entity.
- When, after thorough assessment, the existence of such necessity has been identified by the Local Council, the approval and adoption process as described in Step 3 shall be followed to amend the respective elements.
- If the amendments concern less than one tenth of the total area of the plan, revision period for public to appeal may be reduced to 14 days in total, with 2 periods of one week for the public to comment, instead of 30 days required during the preparation of a new plan.

- The Local Council shall be responsible for initiating and managing the revision process of approved plans.
- During the revision of a planning document, any newly decided development shall be in line with the revised draft once it has principally been decided by the Local Council.
- A revision of a planning document shall not be undertaken more than once in 2 years for the same area of concerned.

Step 7: Validity and regular review

- Approved planning documents shall regularly be updated through an interim review after 2 years and complete review after 5 years.

Volume 2

Land Use Planning Standards & Guidelines

2 LAND USE PLANNING STANDARDS AND GUIDELINES

Volume 2 provides guidance and standards for planning land requirements for different uses including all public service facilities, recreation, commercial and industrial uses. It should be used during the master planning to guide the development of urban master plans.

2.1 LAND USE CATEGORIES AND DEFINITIONS

Below categories shall be used in physical planning documents. The standardized colour code is included in the annex.

Table 2.1 Land use categories and definitions

Main Land Use Categories	Urban Master Plan	Detailed Plan	Description
Residential	high density	high density	> 30 -50 dwellings/ha
	medium density	medium density	15-30 dwelling /ha
	low density	low density	10 - 15 dwelling /ha
Mixed Use	Mixed Use		housing and commercial activities, which do not substantially disturb the housing.
Commercial	Commerce & Business	Animal market	
		Petrol station	including car repair and services
		Storage, wholesale	including supermarket, market
		Retail sales, service	including private office, bank, hotel, restaurant, café, building material (selling only, no production)
		Other commercial	
Institutional	Public Administration	Public administration	national, regional, district, sub-district administration, local councils offices
		Prison	
		Police	
		Fire station	
		Other public administration	court, election commission
	Education	Basic education	kindergarten, Quranic school, primary and intermediate primary (4-14 years)
		Secondary	secondary, technical, vocational, etc. (15-18 years)
		Higher education	higher education, university (> 18 years), research, teachers training school
	Health	Primary health care	Health Post, Day care, MCH, pharmacy
		Clinic	Specialized clinic, Polyclinic
		Hospital	general, specialized hospital
		Other health care	veterinary station, laboratory
	Culture & Religion	Mosque	
		Other religious	if any
		Fairground	
		Cemetery	
		Other culture	library, cinema, theatre, assembly hall, auditorium, congress hall, museum, monument, cultural centre, open air theatre

Land use categories and definitions, contd.

Main Land Use Categories	Urban Master Plan	Detailed Plan	Description
Special Area	Special Area		government reserved area, military reserved area, etc.
Agriculture	Agriculture	Agriculture	agricultural use including dwellings, maintenance and storage buildings, and other such uses necessary for the support of the principle use.
	Urban Agriculture	Urban Agriculture	Vacant urban land may temporarily be used for agriculture with permission from the land owner and the Local Council.
Recreation	Sport and Recreation	Sport	Sports areas including Stadium, play field, sport hall, gymnasium, animal race, etc.
		Recreation	Recreation Centre, garden, neighbourhoods and district parks, major urban centre parks, picnic and camping space
		Other	public squares
Tourism	Tourism		
Industry	Industry	Light Industry	including small workshops, small scale building material production
		Heavy Industry	mining, quarry, petrol-chemical, gas-oil extraction
		Other Industry	slaughterhouse
	Warehouse, large-scale storage		
Utility (Technical Infrastructure)	Power Plant	Power plant	
	Electric Transmission Substation	Electric transmission substation	
	Water Treatment	Water treatment	
	Sewage Treatment	Sewage treatment	
	Solid Waste Collection	Solid waste collection	
	Solid Waste Disposal	Solid waste disposal	dumpsite and collection sites
	Communication	Communication	radio, TV, telephone, etc. tower
	Other Utility	Other utility	

Land use categories and definitions, contd.

Main Land Use Categories	Urban Master Plan	Detailed Plan	Description
Protected Area	Natural and Cultural Protected Area	Water basins	river, dry river basins, floodplains
		Agriculture, pasture	
		Forest / green belt	incl. natural open spaces, Nature sanctuaries
		Waterfront	
		Waterbody	sea, water reservoir
		Natural resource	wetland, marshland, mining areas
		Cultural heritage	e.g. archaeological sites
		Monument	
		Other protected area	steep slopes and hilltops
Transport	Airport area	Airport area	
	Harbour/marina	Harbour/marina	
	Bus terminal	Bus terminal	including taxi and minibuses
	Freight terminal	Freight terminal	
	Public parking	Public parking	
	Other Transport	Other transport	
Road	International road	International road	
	National road	National road	
	regional road	Regional road	
	Urban road	Urban road	Trunk, Primary, Secondary and Access Roads
	Rural road	Rural road	
	others/unspecified	Access road	
		Pedestrian path	

2.2 SETTLEMENT COMPONENTS

For the sake of planning, the urban areas in Puntland are classified into three categories: neighbourhood, district, and major urban centre. These refer to the level of public services that needs to be accommodated and are also linked to the number of inhabitants that are expected to be served by the proposed public services. Statutory district (an official territory that includes urban core and rural villages in Puntland) hierarchy is based on the grading system as explained earlier, while the concept of neighbourhood, district and major urban centre system is more for planning purposes only. For example, in the planning context a district urban centre in Puntland can contain several neighbourhoods and do not need to be officially delineated, and strictly includes only urban areas, not rural villages. Therefore the concept of the district here should not be confused with the statutory district.

2.2.1 NEIGHBORHOOD

The neighbourhood level in urban areas shall have a population of 5,000 or less corresponding to one primary school unit. However, a variation in the size of the neighbourhood between 5,000 and 15,000 inhabitants can also be acceptable, but additional utilities such as secondary schools, parks, administrative and health services, and bigger market centres may be needed for such neighbourhoods.

2.2.2 DISTRICT

In principle, three neighbourhoods (three primary school units), each with a maximum of 5,000 inhabitants, will make a district centre with a total population of 15,000, but depending on the local circumstances, a district may be smaller or larger (more than 5,000, up to 60,000). This population size is supported by a higher level of daily services, e.g. secondary schools, vocational schools, trade and business centres, health, cultural and administrative utilities, sports centres, and recreational areas. The district can also offer job opportunities, such as those available in light industry estates.

2.2.3 MAJOR URBAN CENTRE

A major urban centre shall have a population of 45,000 or more and be the most sophisticated service centre, accommodating the best and most diversified service facilities. In the Puntland context, ideally a major urban centre should be the capital city of the country, a regional capital, or a city at the grade A. A major urban centre should not only be considered the top service centre within given administrative boundaries, but should also be

equipped with advanced urban functions; and infrastructure for international trade and business, recreation and sports, and tourism; and cultural, health, and educational facilities for the broader urban areas around them.

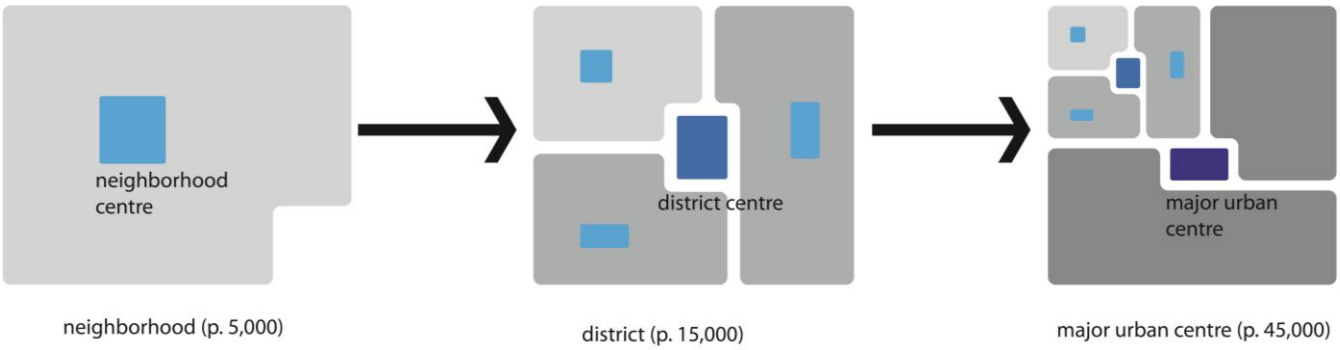


Figure 2.5 Settlements components

2.3 RESIDENTIAL USE

Among the prerequisites for developing any settlement on a sound foundation, an adequate number of decent houses for the population have to be ensured. In order to achieve this, clear housing standards must be defined, relating to the provision and distribution of houses. Housing demands must also be taken into account, based on expected population growth, family size, overcrowding, and the state of the existing residential units.

The residential units' criteria indicate allocation of one residential unit per household, and the size of the residential unit will vary according to household size, which in Puntland averages 6 persons. Under the assumption that an average living area for one person is 15–20 m², it is possible to estimate the overall ceiled area of a residential unit at between 75 and 120 m².

Table 2. 2 Gross Residential Densities in Residential Areas

Settlement type	Gross density (dwelling /ha)	Gross density (person/ha)
Rural settlements (villages)	<10	<60
Urban areas		
Low density	10–15	60–90
Medium density	15–30	90–180
High density	30–50	180–300

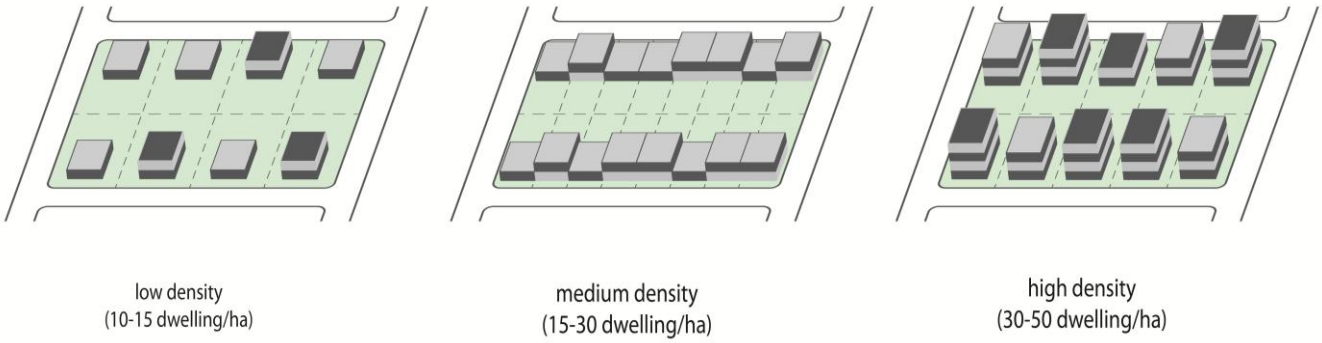


Figure 2.6 Illustration for gross residential density

2.4 PUBLIC AND INSTITUTIONAL FACILITIES

2.4.1 EDUCATION

The educational system in Puntland can be divided into non-formal and formal. Quranic schools form the main component of non-formal education. They function as early child development centres for children normally in the 3 – 7 age brackets. The formal educational system of Puntland comprises eight years of primary education (four years of primary and four years of intermediate primary) and four years of secondary education. University education normally takes four years to complete. Thus, it is a 2 + 8 (4 + 4) + 4 system.

2.4.1.1 Kindergarten and Quranic School

Kindergarten is new and becoming a part of Puntland's formal education structure. This education system is considered to be for children from 4-6 years old. Parallel to formal education, the Quran is also commonly taught for the same age group in Puntland.

A typical kindergarten should be located between 300 and 500 m walking distance, with 15 to 25 children in each classroom and 15 to 25 m² space available per child. A typical kindergarten should also have three to six classrooms and should be combined with primary school premises or attached to neighbourhood parks wherever possible. In addition, the kindergartens should be designed in a way that Quranic education can also be provided.

2.4.1.2 Primary School

Standards for the primary schools (primary and intermediate primary) are based on providing education to the whole 7 to 14 age bracket. On average, one primary school (located within a walking distance of 500 m) is envisaged for a population size of 1,000 to 5,000 persons. One typical primary school consists of 6 (but in case of need, up to 36) classrooms, each with an average of 35 to 45 pupils, serving a total of at least 210 – 270 pupils in a co-educational system.

2.4.1.3 Secondary and Vocational School

Standards for secondary schools or vocational schools are based on providing for pupils aged 15 to 18. One typical secondary school or vocational school consists of 3 – 6 classes of 35 – 45 students each. A total of 210 – 270 students are considered to be the minimum economical size for such a school. Under certain circumstances, in the Puntland context, school size may range between 6 to 24 classrooms, serving a general population of between 5,000 and 15,000 people. Specialized institutions and private schools follow the same

standards according to the level of education they offer. For colleges and higher education institutions, special standards are applied.

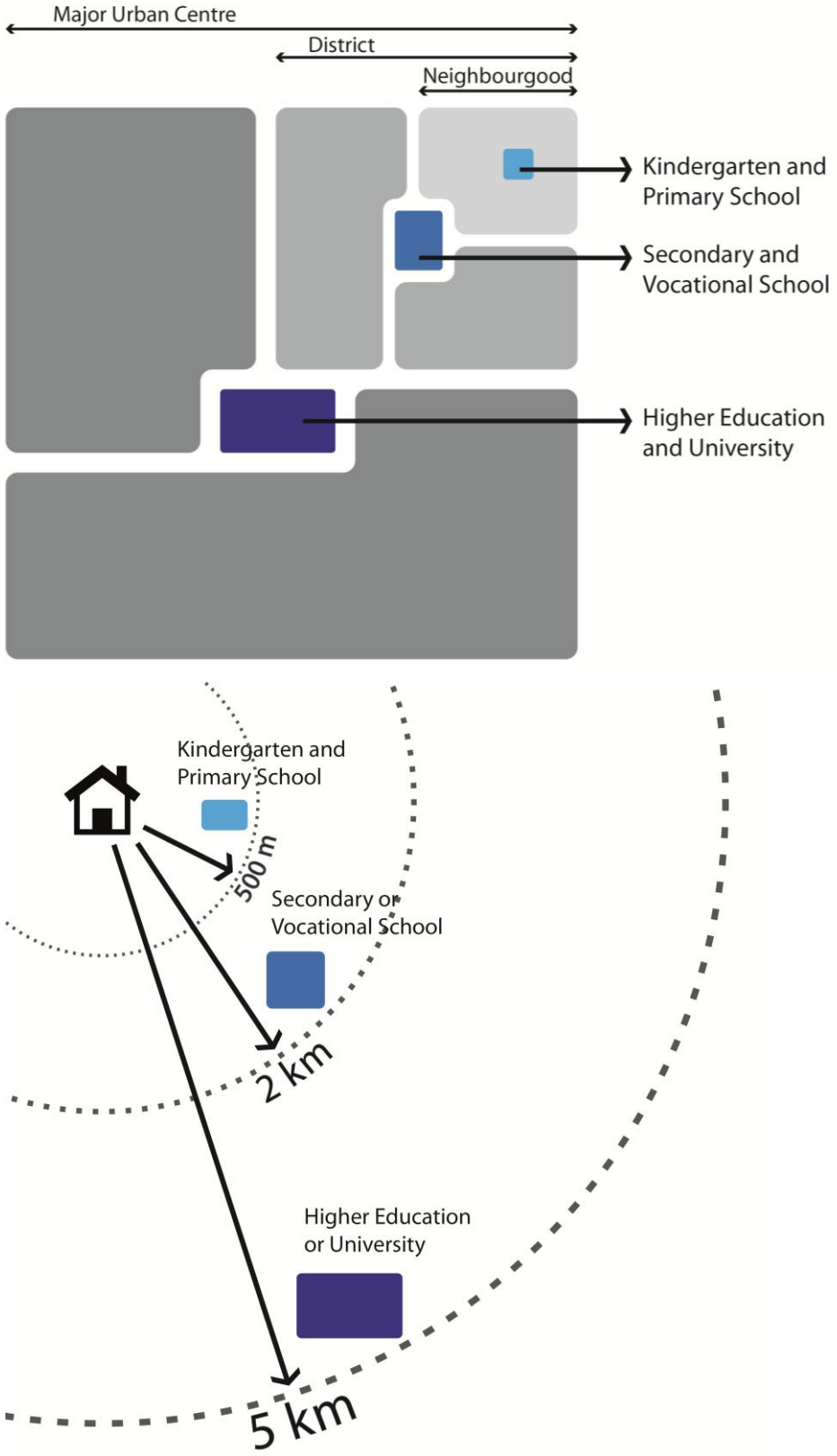


Figure 2.7 Coverage area of education facilities

Table 2.3 Standards for Education Facilities

	Location	Catchment population	Computation of requirements in classrooms	Minimum site requirements (ha)	Notes
Kindergarten and Quran school	Neighbourhood centre	5,000 persons	15–25 pupils per classroom min. 15 m² per pupil	3 classrooms = 0.07 6 classrooms = 0.11	Within a radius of 300–500 m May be affiliated with primary school
Primary (primary and intermediate primary) school	Neighbourhood centre	5,000 persons	35–45 pupils per classroom min. 15 m² per pupil	6 classrooms = 0.3 12 classrooms = 0.6 24 classrooms = 1.3 36 classrooms = 1.9	Within a radius of 500 m Including playground + parking
Secondary school	District centre	5,000–15,000 persons	35–45 pupils per classroom min. 20 m² per pupil	12 classrooms = 0.8 18 classrooms = 1.3 24 classrooms = 1.7	Within a radius of 2 km Including playfields + administration + halls + parking spaces
Vocational high school	District centre	>15,000 persons	35–45 pupils per classroom min. 20 m² per pupil	12 classrooms = 0.8 18 classrooms = 1.3 24 classrooms = 1.7	Within a radius of 10 km Including playfields + administration + halls + parking spaces
Higher education institute or university	Major urban centre	>45,000 persons			

2.4.2 HEALTH

2.4.2.1 Health Post

A health post is the lowest tier of service provider in Puntland and serves a population ranging between 1,000 and 5,000 residents. Health posts are located in specially identified large villages in the rural areas and in neighbourhood centres of urban areas.

2.4.2.2 Maternal and Child Health Care Centre

A maternal and child health care centres (MCH) is the intermediate tier of service provider and is to serve a population ranging from 5,000 to 15,000 residents. MCHs should be located in appropriate large villages in the rural areas as well as in the neighbourhood and districts centres.

2.4.2.3 General Hospital

A general hospital serves a minimum population of 15,000. General hospitals are located in the district centres and major urban centres. Hospitals should be in possession of 6 or 8 beds per 1,000 people.

2.4.2.4 Specialized Hospital

A specialized hospital serves a population of at least 90,000 persons. Specialized hospitals are located in the major urban centres only and each should be in possession of at least 100 beds.

Table 2.4 The Standards for Health Facilities

	Location	Catchment population	Minimum site requirements (ha)	Notes
Health post	Neighbourhood centres	5,000 persons	0.18	One health post in each primary school unit
Maternal and child health care centre (MCH)	Neighbourhood centres District centres	5,000–15,000 persons	In neighbourhood: 0.4 In district: 0.9	At least 15 beds
General hospital	District centres Major urban centres	>15,000 persons	In district: 0.8 In major urban centre: 2.2	6–8 beds per 1,000 persons At least 100 beds 80–130 m² per bed Including administrations + service area + parking spaces
Specialized hospital (specialized health facility)	Major urban centres	>90,000 persons	2.2	Including administrations + service area + parking spaces At least 100 beds 80–130 m² per bed
Pharmacy	Neighbourhood centres	5,000 persons	0.008	One pharmacy in each primary school unit
Veterinary clinic	District centres Major urban centres		0.2	May be affiliated with general hospital
Quarantine station	International ports and airports, border posts			

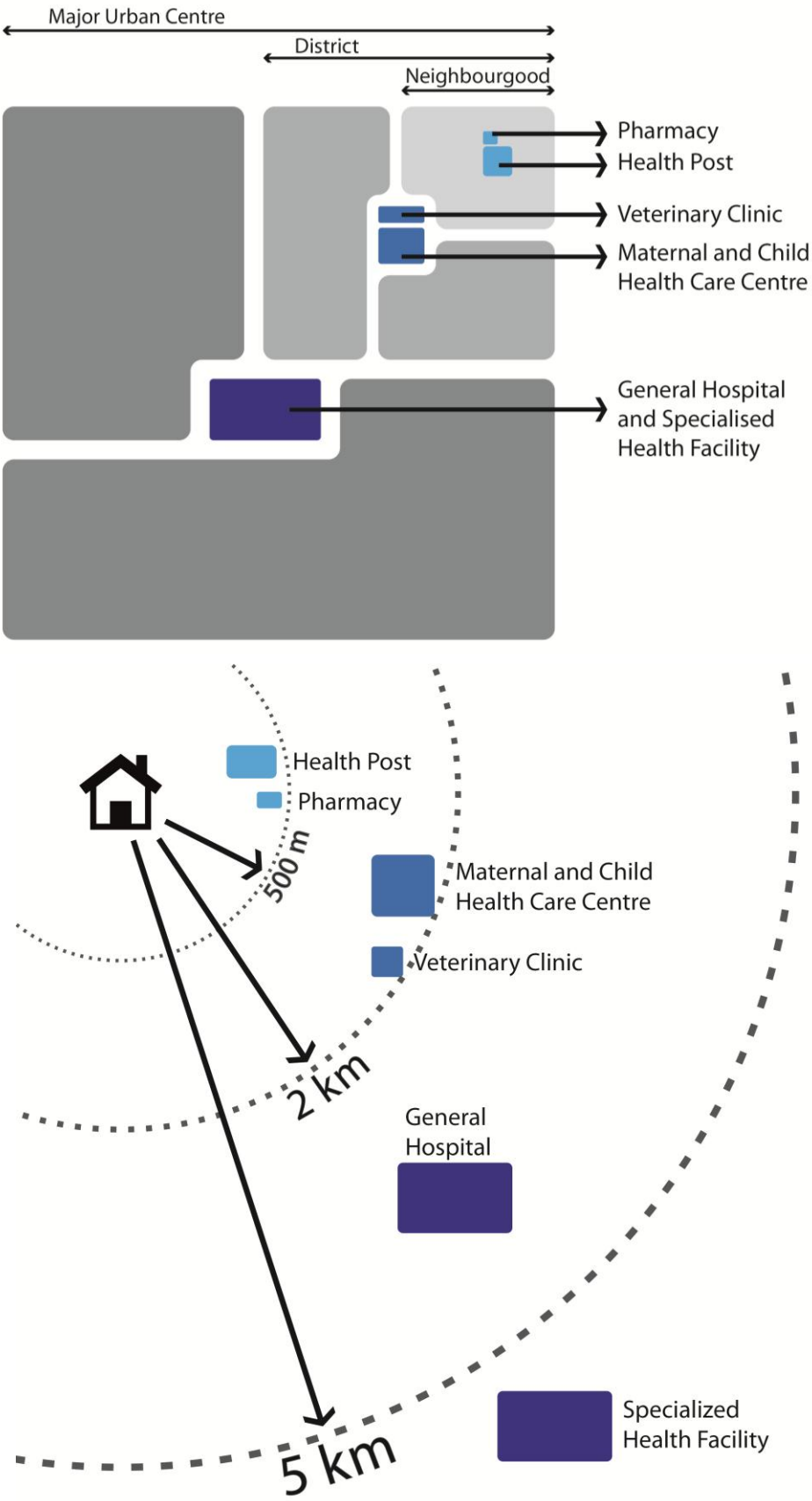


Figure 2.8 Coverage area of health facilities

2.4.3 SOCIAL AND RELIGIOUS FACILITIES

2.4.3.1 Religious Facilities

Mosques

The number of mosques is determined by the estimated number of worshippers per population of a neighbourhood or a district. A number of prayers is estimated to correspond to around 12 percent of the population. The total area is estimated at 1.5 m² for each worshipper.

Cemetery

A cemetery area can be calculated on the basis of 4 m² per grave. Urban sites, rocky areas, and areas with high ground water should be avoided when determining the locations for establishing cemeteries. Cemeteries should be established outside the urban areas.

2.4.3.2 Social Facilities

Social facilities include homes for the orphans, aged, disabled, deaf, blind, and mentally or developmentally challenged. They also include cultural centres, which might accommodate a youth centre, social hall, community centre, or public library. Museums should also be established in areas with archaeological, historical, and natural significance. The minimum site requirements for social and religious facilities are summarized in the table below.

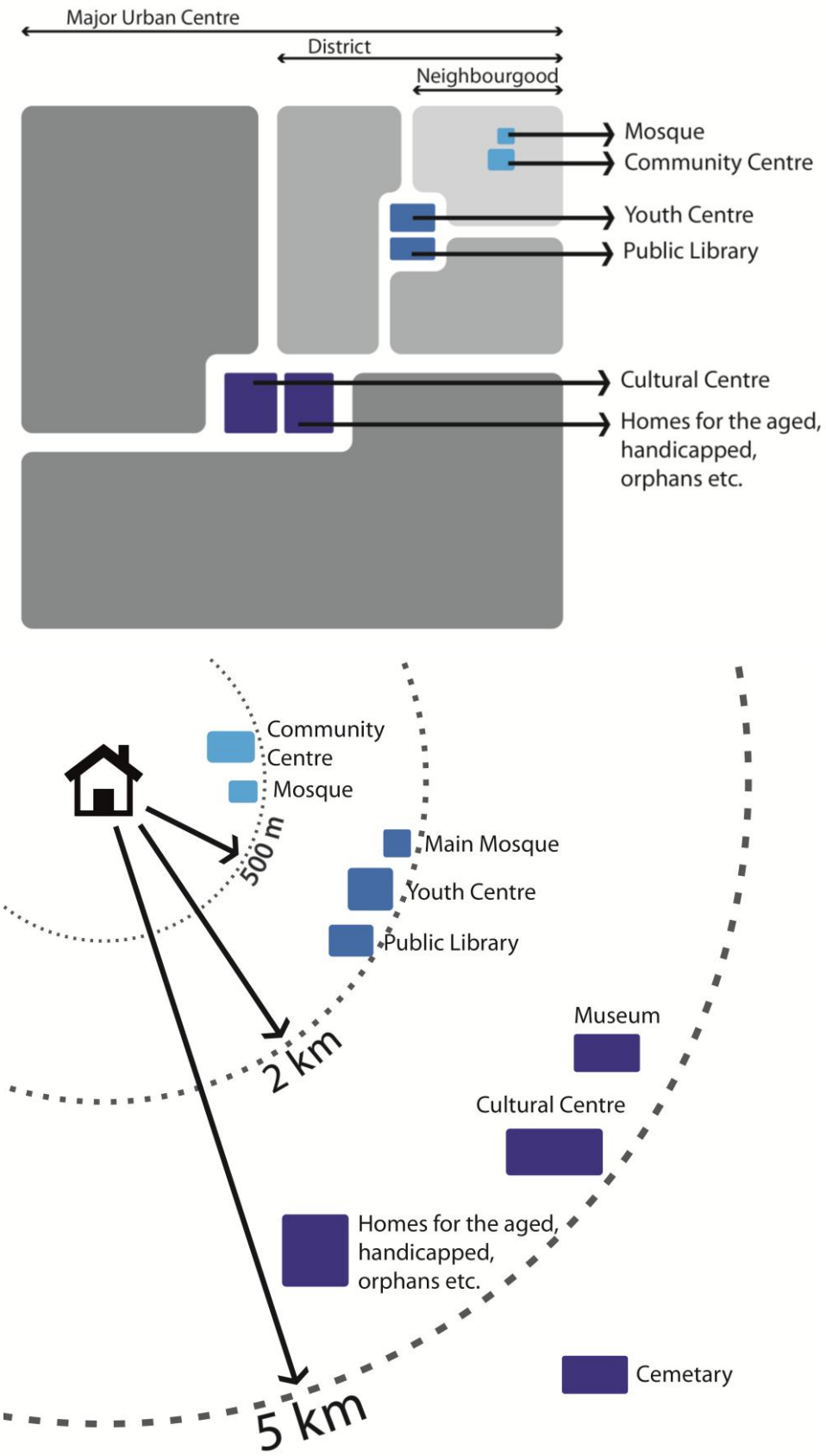


Figure 2.9 Coverage area of social and religious facilities

Table 2.5 Standards for Social and Religious Facilities

	Location	Catchment population	Minimum site requirements (ha)	Notes
Mosque	Neighbourhood centres District centres	5,000 persons	In neighbourhood centre: 0.2 In district centre: 0.5	1.5 m² per worshipper (Large mosques: 1.00 ha)
Cemetery	All settlements			4 m² per grave Outside of residential area
Homes for orphans and for the aged, disabled, deaf, blind, mentally or developmentally challenged, etc.	District centre Major urban centres	>=45,000 persons	0.8	Area requirement depends on the needs
Youth centre	District centres Major urban centres	>=15,000 persons	0.5	May be affiliated with secondary/vocational schools, cultural centres, sports centres
Social hall, community centre, cultural centre, etc.	Neighbourhood centres District centres Major urban centres	>=5,000 persons	In neighbourhood centre: 0.1 In district centre: 0.3 In major urban centre: 0.9	0.2 m² per person
Public library	District centres Major urban centres	>=15,000 persons	0.5	Including parking spaces
Museums	Archaeological sites Major urban centres Areas with natural beauty			

2.4.4 PUBLIC ADMINISTRATION

Public administrative facilities include the municipality office, which can also be used as a district administration office, as this is a common practice in Puntland. Other administration facilities are central government regional offices, police stations and courts. Administrative and civic centres are often handsomely and spaciously planned to express civic dignity and pride. These facilities can be affiliated with the central business districts located in district centres and major urban centres. A minimum area requirement for each type of facility varies depending on the number of employees per facility. In principal, 70 – 80 m² per employee, including the parking space, is adopted.

There should be at least one police station for every 5,000 inhabitants and one court for a minimum population of 15,000.

Table 2.6 Standards for Administrative Facilities

	Location	Catchment population	Minimum site requirements (ha)	Notes
Municipality	District centres Major urban centres		0.35	70–80 m² per employee including parking space
District administration centre	District centres		0.2	70–80 m² per employee including parking space
Central government regional office	District centres Major urban centres		0.35	70–80 m² per employee including parking space
Police station	Neighbourhood centres District centres Major urban centres	5,000 persons	In neighbourhood centre: 0.1 In district centre: 0.3 Headquarters in major urban cities: 0.8 ha	Including parking space
Court	District centres Major urban centres	>15,000 persons	In district centre: 0.3 Regional courts in major urban cities: 0.8 ha	

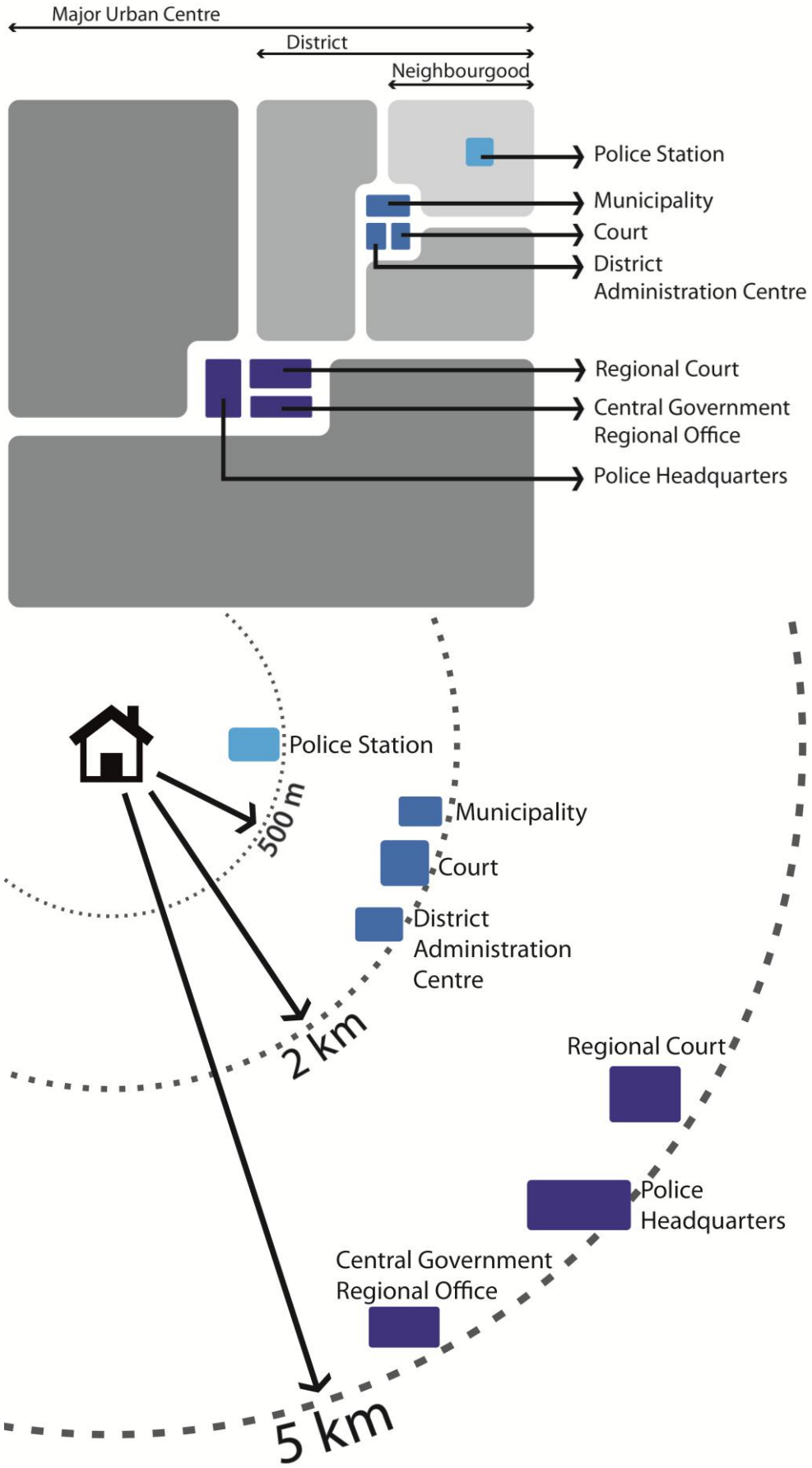


Figure 2.10 Coverage area of public administration and institution facilities

2.4.5 OTHER PUBLIC FACILITIES

Other urban public facilities include post offices, fire brigades and prisons. The area requirements for these functions are summarized in the table below.

Table 2.7 Standards for other public facilities

	Location	Catchment population	Minimum site requirements (ha)	Notes
Post office	Neighbourhood centres District centres Major urban centres	>5,000 persons	In neighbourhood centre: 0.05 In district centre: 0.1 Headquarters in major urban cities: 0.4	
Fire brigade	District centres	15,000 persons	0.5	Central locations
Filling station and car workshop	In selected neighbourhoods at 30 or 25 km intervals between major urban centres	>=5,000 persons	In residential areas: 0.1–0.2 In non-residential areas: >0.3	On main roads
Slaughterhouse	Industrial area	>=15,000 persons	3.0	Areas with intensive animal breeding
Prison	Major urban centre	> 45,000		

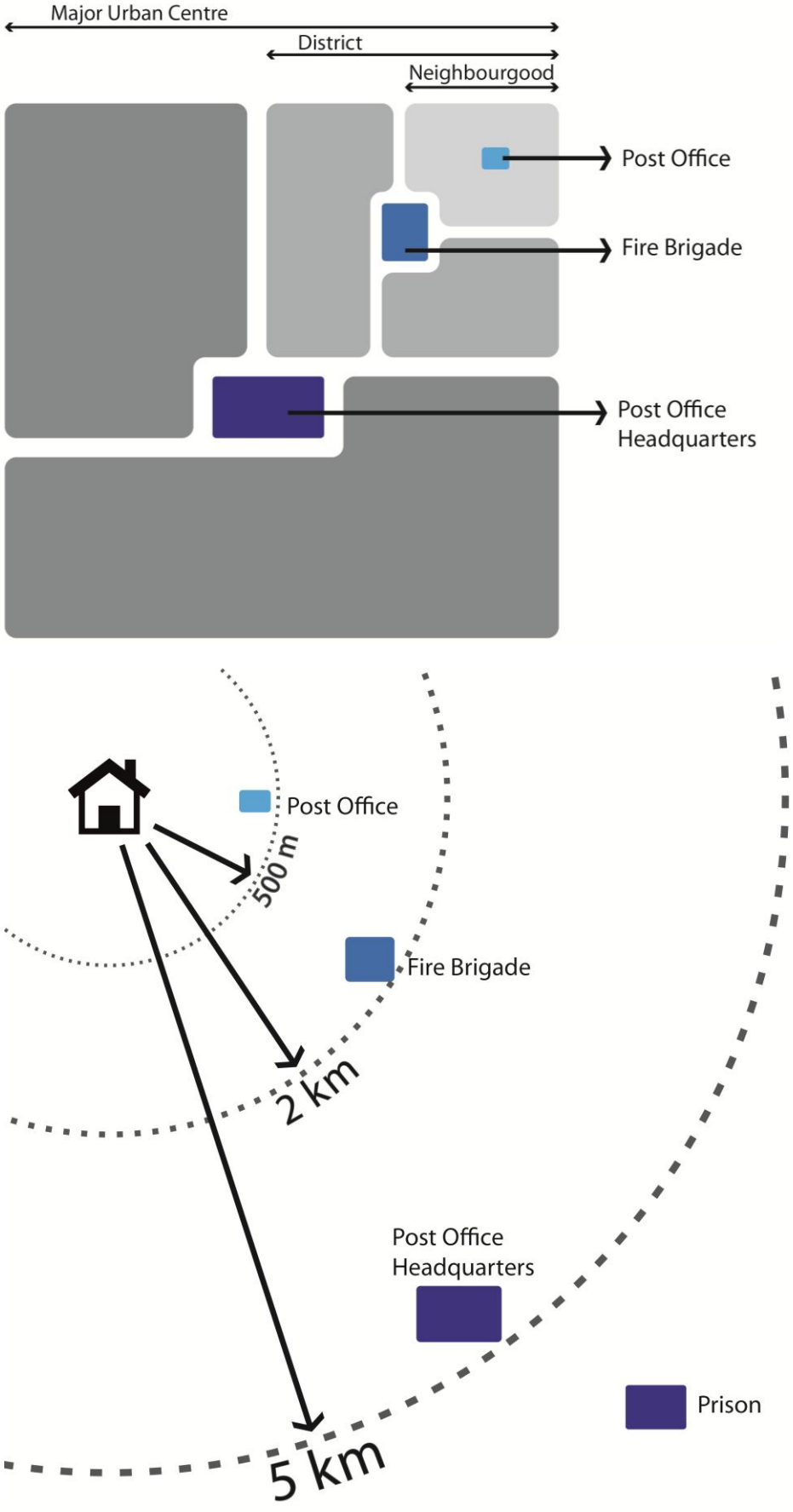


Figure 2.11 Coverage area of other public institutions

2.5 COMMERCIAL AREAS

Commercial areas host local retail shops and markets, specialized shops, catering services and hotels, storing facilities for goods and fuel (including cold storage), and the central business district (CBD). The area requirements for the commercial facilities depend on the level of trade and the type and intensity of economic activities. They also depend on the vision set by local government to develop the city.

The commercial area covered with shops and markets is estimated to be 1.0 – 1.5 m² per person. There should be at least one market area with around 0.5 hectare for every 5,000 people.

Central retail areas or specialized market areas can be designated in the district centres. For example, an area for livestock markets or mixed use shopping malls can be provided for a settlement with population of 15,000 and more.

The space requirements of the central business district (CBD) must be calculated according to employment offered therein. Generally, 70 – 80 m² per employee is required. This includes parking space, access roads, pedestrian walkways, and open space in the CBD areas. The CBD should be developed around the main roads in the major urban centres.

The table below summarizes the area requirements for different types of commercial activities.

Table 2.8 Area requirement for trade, business, and tourist accommodation facilities

	Location	Catchment population	Minimum site requirements (ha)	Notes
Market area and shops	Neighbourhood centres	5,000	0.5	Minimum 1.0–1.5 m² per person Including parking space
Central retail shops, workshops, and offices	District centres	>=15,000	1.2	Minimum 0.8 m² per person On main roads Including parking space
Central business district (CBD)	Major urban centres	>=45,000	1.4 (200 employees)	70–80 m² per employee including parking space
Hotel	District centres Major urban centres	>=15,000 persons	In district centre: 0.3 In major urban centre: 0.8	Including parking space

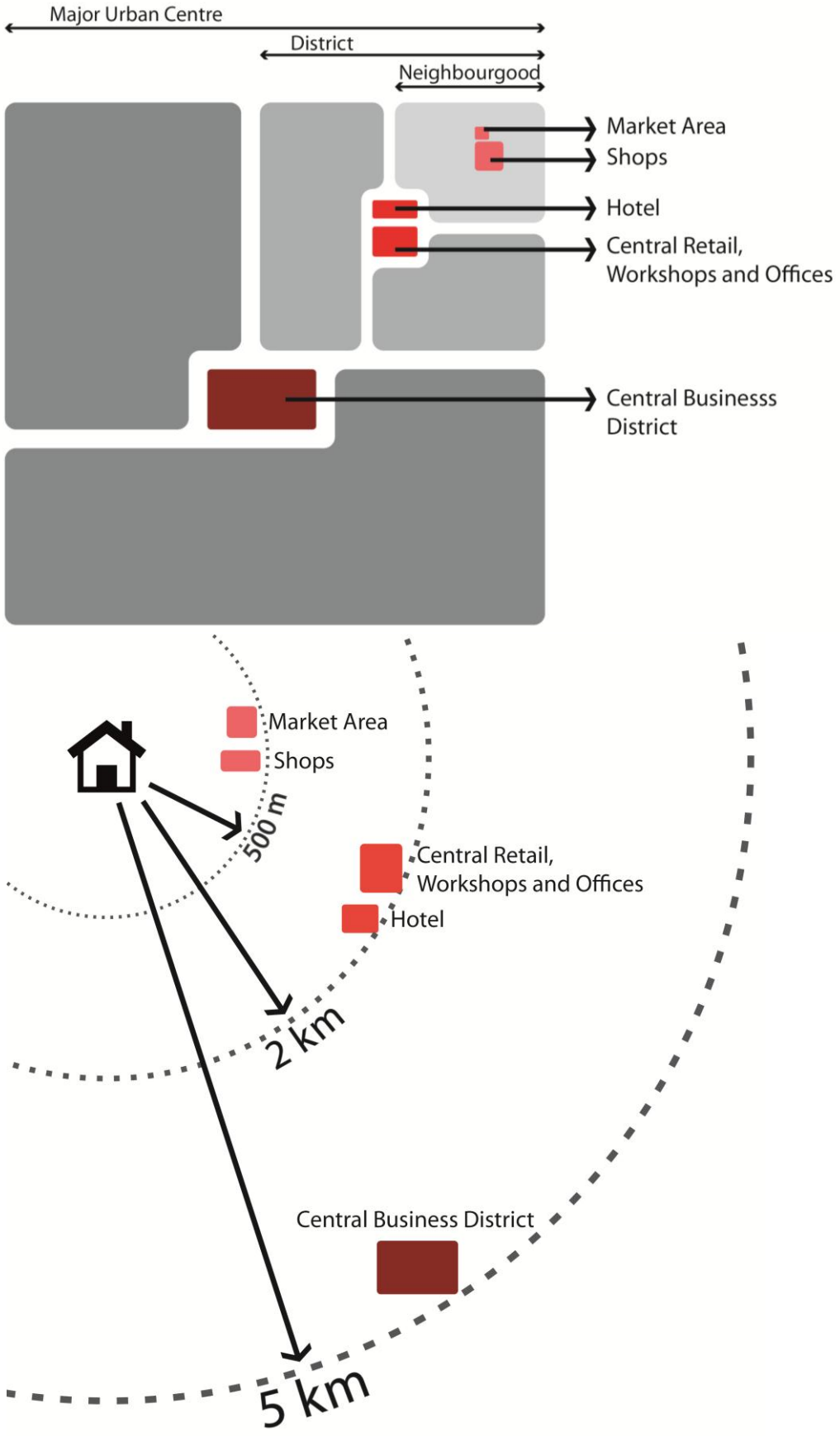


Figure 2.12 Coverage area of commercial facilities

2.6 INDUSTRY AREAS

Industry is classified into light, general, heavy, and 'special uses' depending on the scale of the activity, the noise and effluents caused, and the odour, appearance, and nature of the materials produced. Industrial development should only be permitted in areas zoned for such purposes.

The area requirements for industrial facilities should be calculated on the basis of the anticipated number of industrial employees and the type of industrial activity. In general, a density between 25 – 30 m² per employee within industrial areas can be adopted in general and light industrial sites. While in heavy industrial sites a minimum of 50 m² per employee should be adopted. The locational requirements common to all industrial and business land use types are:

- Flat land or large flat terraces (slope less than 5 percent)
- Good accessibility to port facilities, inland container depots or airport
- Good access to major traffic routes, preferably direct access to major trunk roads wherever possible to avoid causing nuisance to other noise sensitive uses
- Convenient access to business centres in urban areas
- Adequate provision of piped water, sewage disposal and waste storage/treatment facilities, electricity supply and telephone services
- Sited to avoid adverse environmental effects (e.g. noise, odour, dust etc.) on residential and other sensitive land uses, or with design requirements for the provision of appropriate installations to mitigate such effects
- Sited to avoid despoliation of the rural landscape, natural conservation sites, water catchment areas, dry river basins and environmentally sensitive areas, and the site concerned should be properly designed and landscaped so as to minimise adverse impacts

Table 2.9 Standards for Industrial Areas

Type	Minimum Site Requirements (ha)	Notes
Light Industry	0.1 per plot	25 – 30 m² per employee minimum plot frontage width is 20 m
General Industry	0.1 per plot	25 – 30 m² per employee minimum plot frontage width is 20 m
Heavy Industry	vary as per functional needs	min. 50 m² per employee
Warehouse	vary as per functional needs	70 m² per employee

2.6.1 HEALTH PROTECTION ZONE

A health protection zone against pollution of all sorts from industrial undertakings is very important for master planning purposes.

The following industrial undertakings shall, in accordance with their capacity and type of production, have the following health protection zones:

- The chemical industry
- Metallurgical, machine tool, and metal working industries
- Ore minerals and non-metallic mineral mines
- The building industry
- The textile industry and light industry
- Processing of animal products
- Food processing industries
- Heat and power stations and boiler installations
- Sanitary engineering installations and municipal undertakings
- Sewage treatment installations
- Sewage pumping stations
- Agricultural undertakings and agricultural premises

A buffer zone from 100 m up to 1,500 m should be sustained around the industrial installations, depending on the type of industry, capacity, and production method.

2.7 RECREATIONAL AREAS

The function and attractiveness of a city is very much dependent on its outdoor spaces. The pattern of squares, parks, streets, and natural and sports areas has highly important social implications, as these are meeting places for residents and make up the ‘living room’ of the city. The natural features within and surrounding a city include habitat for animals and plants, which have positive effects on the microclimate. Plants are not only ornamental but also improve air quality and serve as windbreakers. Green areas should be used to filter storm and sewage water, improving the water balance and decreasing pollution. The pattern of open, natural, and recreational spaces within and surrounding the city is often referred to as the ‘green structure’. A well-planned green structure of paths and nodes adds ecological value to the city and provides accessibility to recreation and a nature experience.

The following aspects should be in focus when planning and developing public space:

- Accessibility
- Closeness
- Universal design
- Quality
- Quantity
- Diversity

The guidelines below focus on five main recreational public space categories:

i. Neighbourhood Park (including playgrounds),
ii. District Park,
iii. Major City Park,
iv. Sports Areas,
v. Other Open Spaces (small and main squares).

There are other public space categories with no specific standards applied, such as amusement parks, botanical gardens, and zoos, and these are relevant for presentation in a plan.

2.7.1 NEIGHBOURHOOD PARK (INCLUDING PLAYGROUNDS)

Throughout urban neighbourhoods with residential and mixed use there should be small neighbourhood parks providing a good access to the most basic public space functions, such as play and contact with green. These parks should be located within residential areas and accessible to children without them needing to cross any large roads. Neighbourhood parks should have play equipment and make small-scale sports possible, e.g. with basketball hoops or small football pitches. Places to sit are essential, preferably under shade trees. The neighbourhood parks should provide these functions but be simple and easy to maintain. It is preferred to link neighbourhood parks with primary schools and kindergartens, or even secondary schools, wherever possible.

2.7.2 DISTRICT PARK

District parks are the public space 'backbone' of the city. Apart from the most basic functions, these parks may also allow activities that require a larger area (such as fields), for gatherings or spontaneous sports activities, and larger planted areas, both formal and more nature-like or organic. Their size can vary a lot, but the common factor (except for the functions described) is their incorporation into the urban pattern. District parks should ideally be located near or connected to major paths or nodes to be well utilized. Both district and neighbourhood parks must be available for the above-mentioned entertainment and environmental improvement purposes as far as local circumstances permit and if water is available to construct and maintain them in districts and residential neighbourhoods.

2.7.3 MAJOR CITY PARK

A major city park has the same functions as a district park, but their size is significantly larger. Major city parks can be landmarks. They should offer a large spectrum of activities and features and could also contain considerable groves and fields. These parks play a major role in the green structure, connecting different parts of the city and serving as large ecological 'paths' and 'islands'. Major city parks should be planned in a capital city such as Hargeisa, but also in cities with a population of 45,000 or more; they can be also planned in a district at the grade A level or in larger regional capital cities.

2.7.4 SPORT AREAS

Sports activities should be incorporated into the different categories of parks, but there is also a need for places catering exclusively for a variety of sports. These areas should provide facilities for sports at a more advanced level and, in some cases, arenas for an

audience. The size could vary depending on the specific sport and its significance. Sport fields and sport pitches should have an even distribution throughout residential areas. The distribution of arenas and stadiums is a strategic decision for each city or settlement to make rather than being dependent on certain standards. It is preferable to distribute the sports facilities among educational and social facilities. Importantly, sports areas have to be linked with major urban centre parks, district parks and other public spaces.

Table 2.10 Sports and Play Facilities

Type	Pitch size (m)
Junior football pitch	45x90
Senior football pitch	100-110x 64-75
Netball pitch	15.25 x30.5
Basketball pitch	15 x28
Volleyball pitch	9x18
Tennis court	11x24
Children's playground	No specified size

2.7.5 PUBLIC OPEN SPACE (SQUARE)

The main squares should be the natural nodal points in each part of the city. In these spaces, bigger events can also take place. Attaching public and cultural buildings or small-scale commercial activities strengthens the character and utility of such places.

Table 2.11 Standards for Recreation Areas

	Location	Catchment population	Minimum site requirements (ha)	Notes
Neighbourhood parks (including playgrounds)	Neighbourhood centres	5,000	0.15	Minimum 3 m² per person May be affiliated with kindergartens and primary schools Accessibility: 5 minutes walk or 500 m radius
District parks	District centres	15,000	2.25	Minimum 1.5 m² per person May be affiliated with primary and secondary schools Accessibility: 10–20 minute walk or 1,000 m radius
Major urban centre parks	Major urban centres	>=45,000	>=10	Accessible via pedestrian network: 20 minute walk or public transport
Sports areas	Neighbourhood centres District centres Major urban centres	>=5,000	Variable size, depending on activity	Can be combined with parks
Picnic and camping spaces				Areas associated with the sea or natural beauty

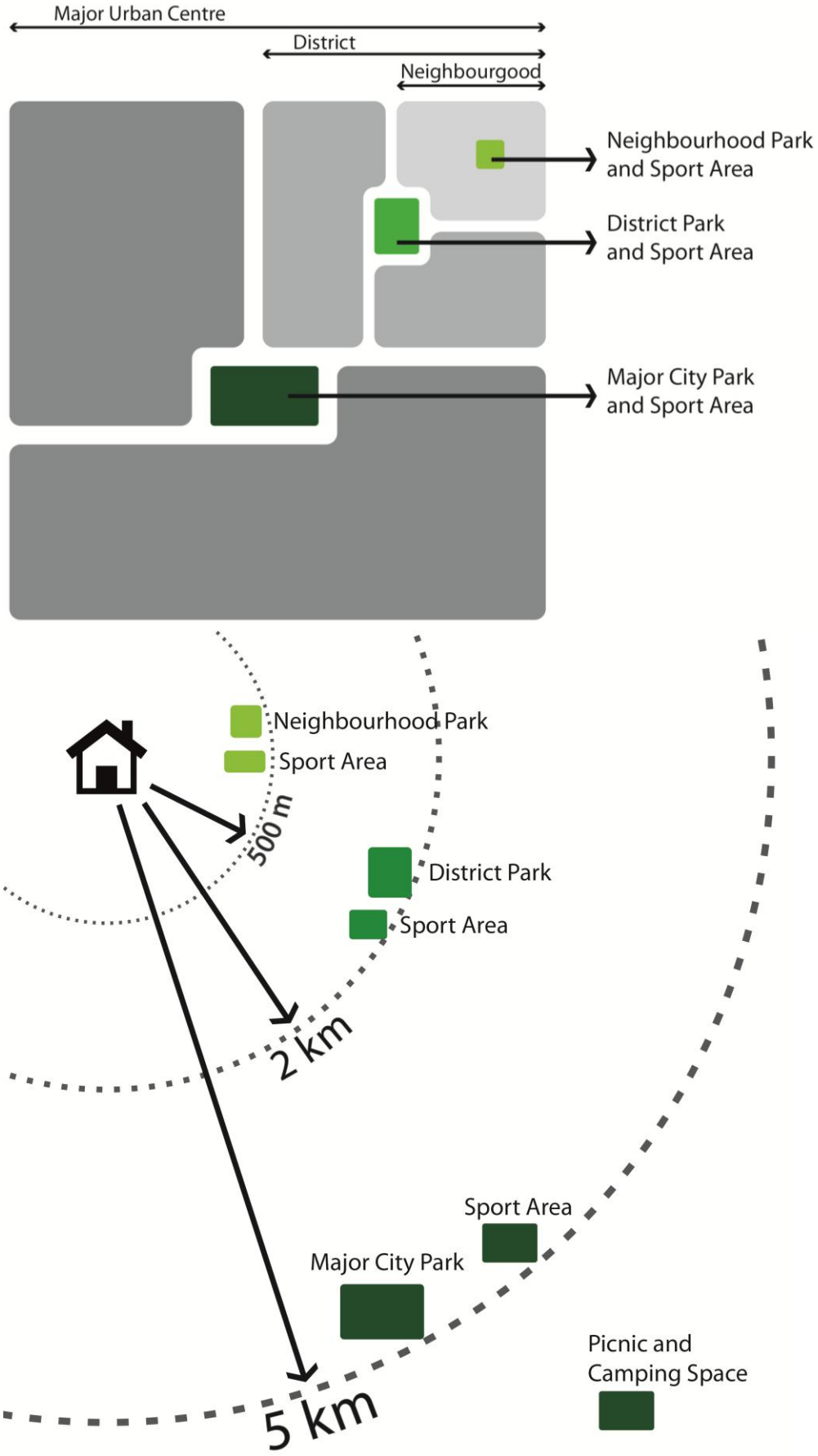


Figure 2.13 Coverage of Recreational Facilities/Parks and Sport facilities

Volume 3

Building Development Standards & Guidelines

3 BUILDING DEVELOPMENT STANDARDS AND GUIDELINES

Volume 3 provides standards for building alignments, floor area ratio, building coverage, building layouts, settlements upgrading, and detailed plot development parameters for residential, mixed use, commercial, industrial, public intuitions as well as procedures for building permits. It should be guidance for layout (detailed) planning to achieve sustainable development of urban areas.

3.1 DEFINITIONS

The following parameters shall be used to regulate the type and extents of development which may be permitted on a plot and in a zone.

W is width of plot.

L is length of plot.

Plot boundary is the external definition of a plot in plan.

Plot area (PA) is the total area of a plot within its plot boundaries (PA = W * L).

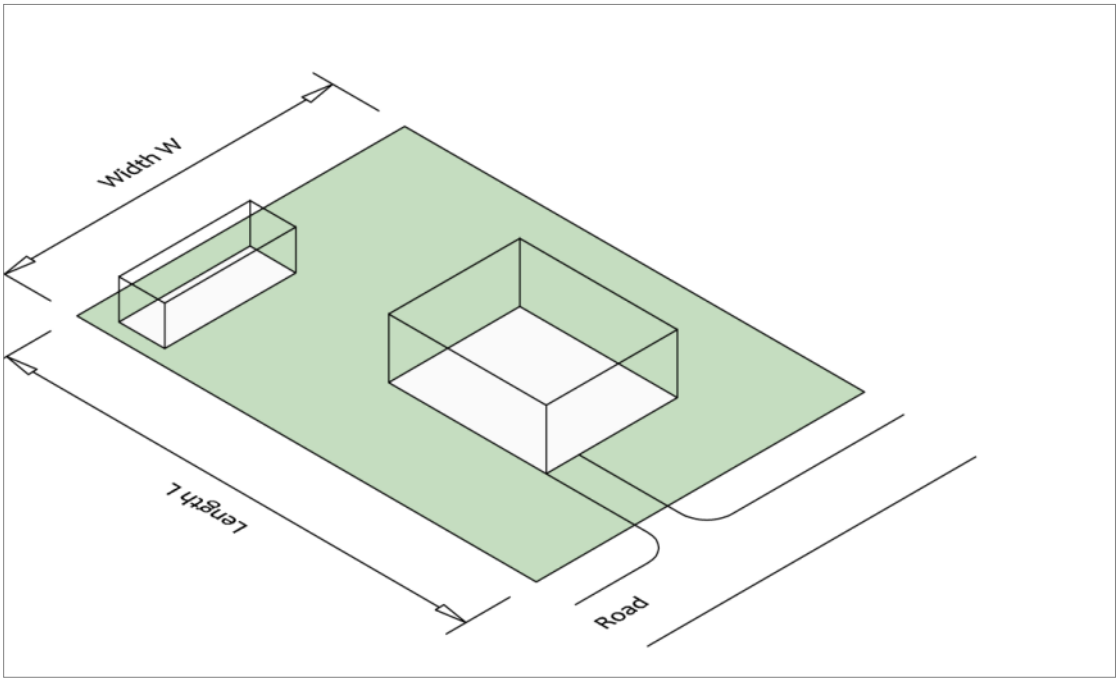


Figure 3.1 A plot extent

The following parameters shall be used to regulate the type and extents of development which may be permitted on a plot and in a zone.

Building Coverage (BC) *is the* total coverage of a building on a plot.

Building Coverage Ratio **(BCR)** is the total maximum percentage of the total plot area, which shall be permitted to be covered by main and ancillary buildings on the plot, not including driveways, landscaping (e.g. summer hut), and underground structures (e.g. septic tank).

*(BCR=(BC / PA) * 100*

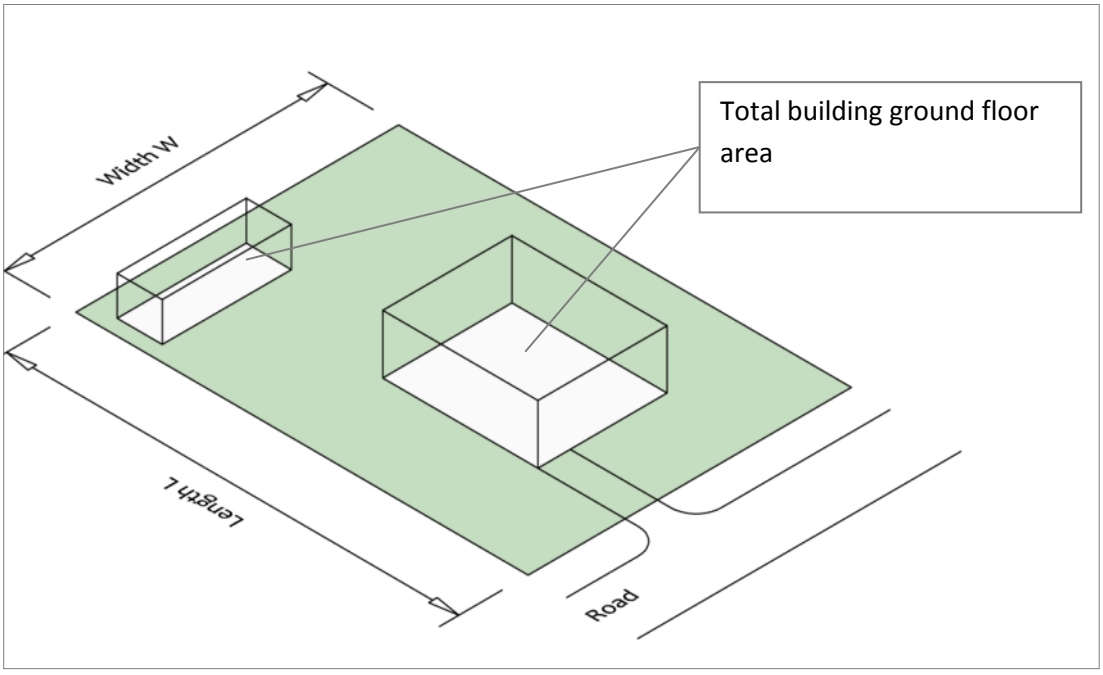


Figure 3.2. Building coverage

Floor Area Ratio (FAR) is the maximum percentage of allowable total gross floor area comprising all levels of all main and ancillary buildings permitted on a plot, of the plot area.

*FAR = Total floor area of a building / Plot Area * 100)*

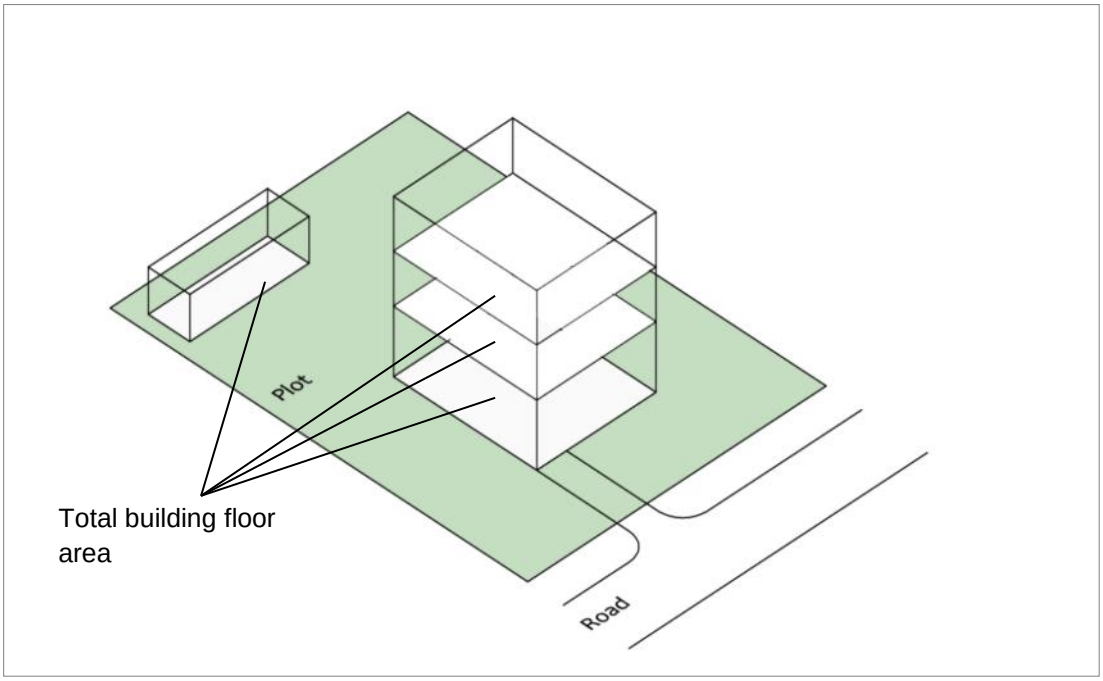


Figure 3.3 Floor Area Ration (FAR)

Number of floors Number of floors is the number of floors a building may have, not considering floors underground, with one floor not being lower than 2.85 m (brut) and not being higher than 4.10 m (brut), and not including antennas, rooftops smaller than 25% of the floor area, lift overruns and similar.

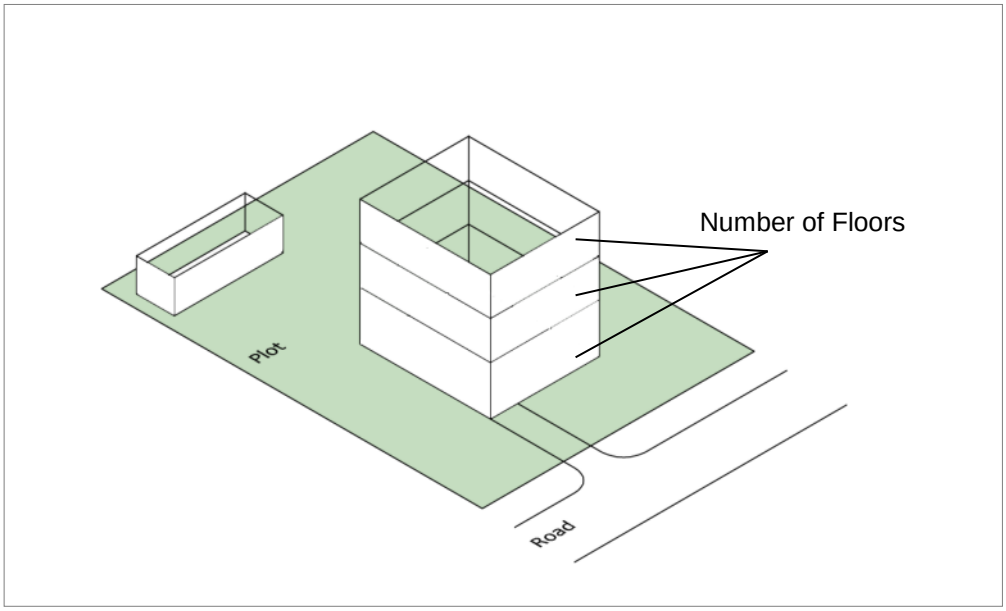


Figure 3.4 Number of floor

Building setback is the minimum distance between the building and the plot boundary.

Front Setback is the minimum allowable distance between the building and the plot boundary facing the main access.

Side Setback is the minimum allowable distance between the building and the plot boundary facing the neighbouring plot to the side.

Rear Setback is the minimum allowable distance between the building and the plot boundary at the rear of the plot.

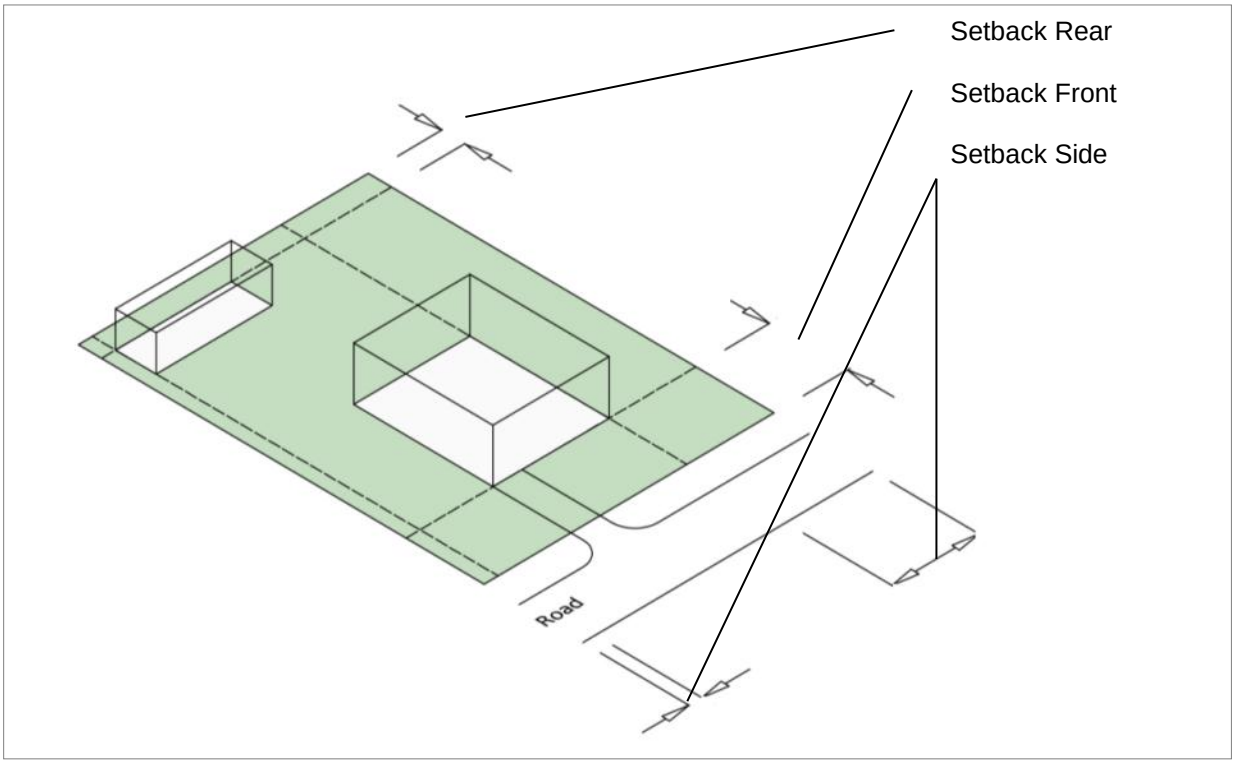


Figure 3.5 Building Setback

Minimum distance, is a distance between detached buildings on one plot in order to regulate construction of more than one building on the same plot, and the distance between the buildings in particular.

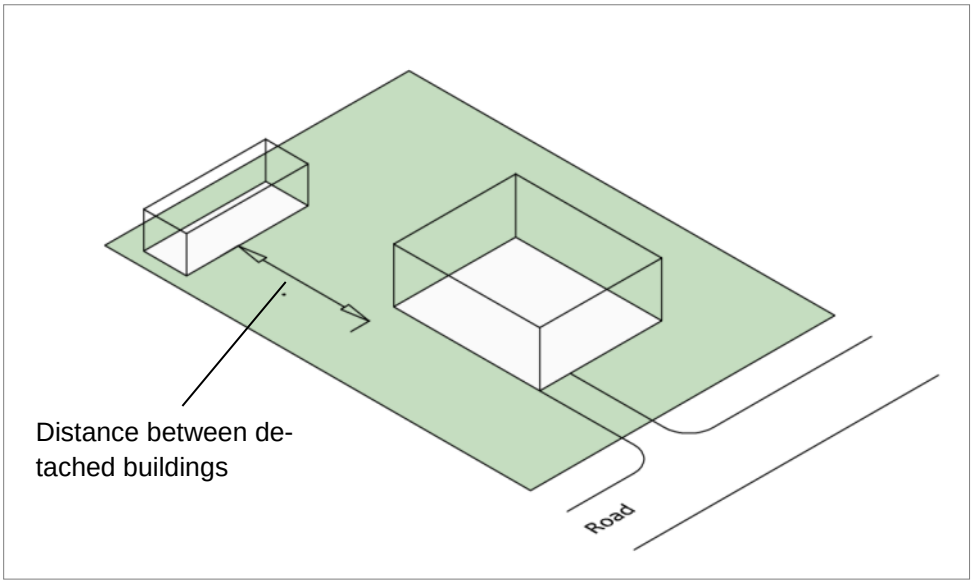


Figure 3.6 Minimum distance

Built Volume per Plot Area (BVP) Built Volume per Plot Area (BVP) is the maximum three dimensional space filled by a building. It is calculated as Volume of building divided by plot area

BVP=Total Building volume / PA.

This parameter shall be used to regulate maximum development in industrial zones.

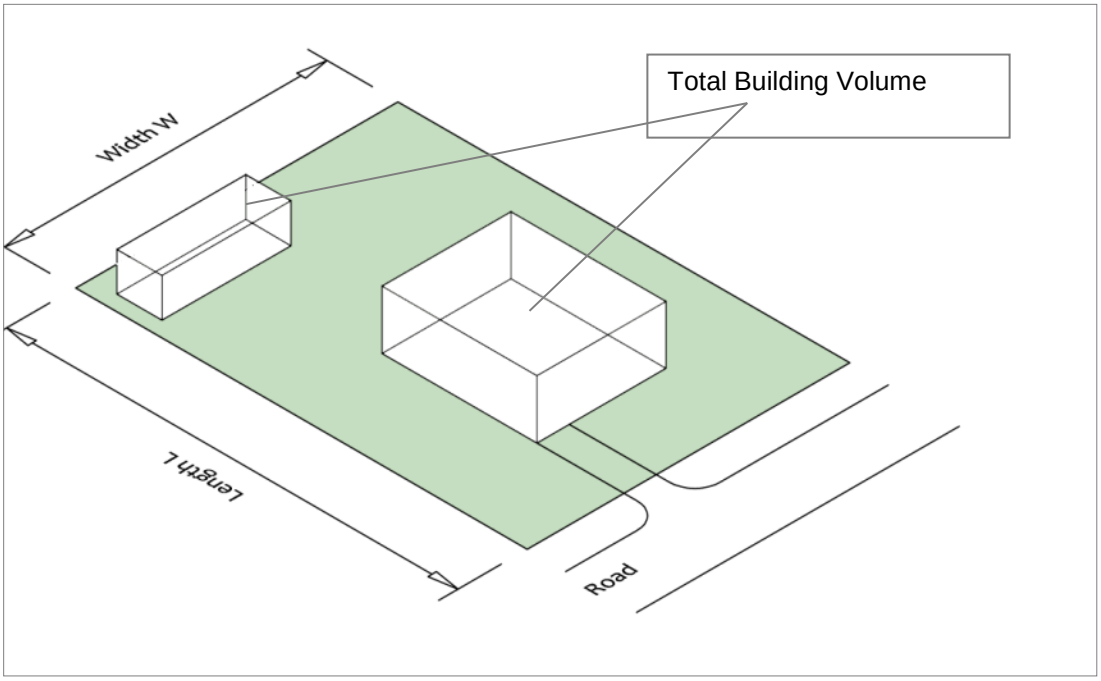


Figure 3.7 Built Volume per Plot Area

Detached buildings are freely standing buildings surrounded by non-built space.

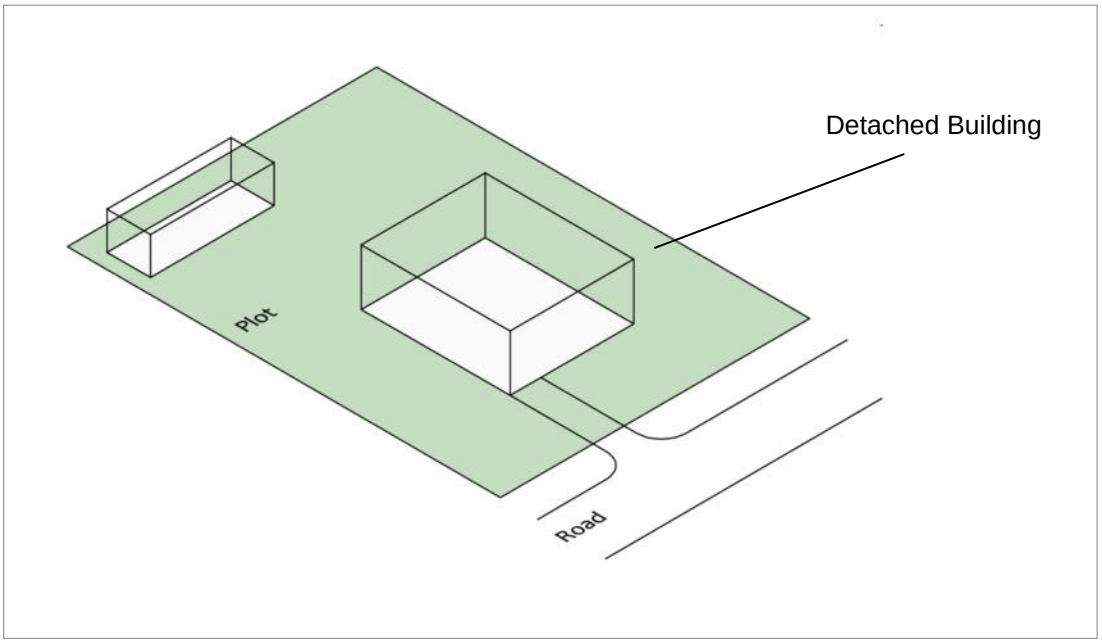


Figure 3.8 Detached building

Semi-detached buildings are connected to another building to one of its sides where they do not have a side setback.

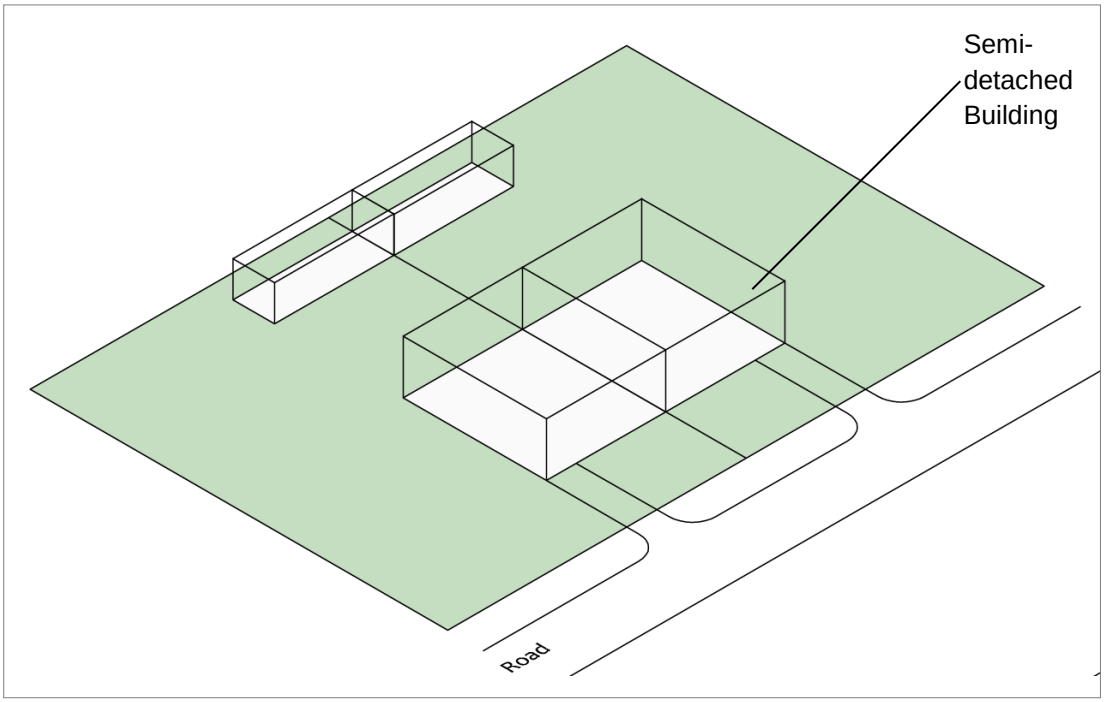


Figure 3.9 Semi-detached building

Attached buildings have no side setbacks.

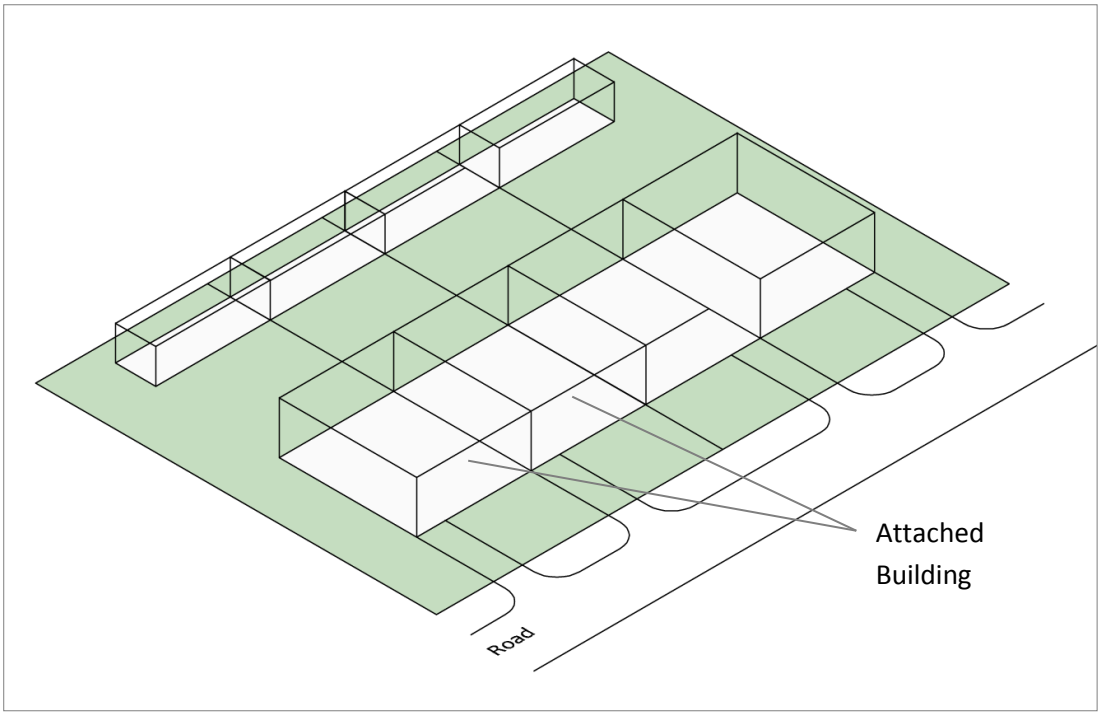


Figure 3.10 Attached building

Ancillary buildings are incidental to the main building and their use shall be in support of the use of the main building.

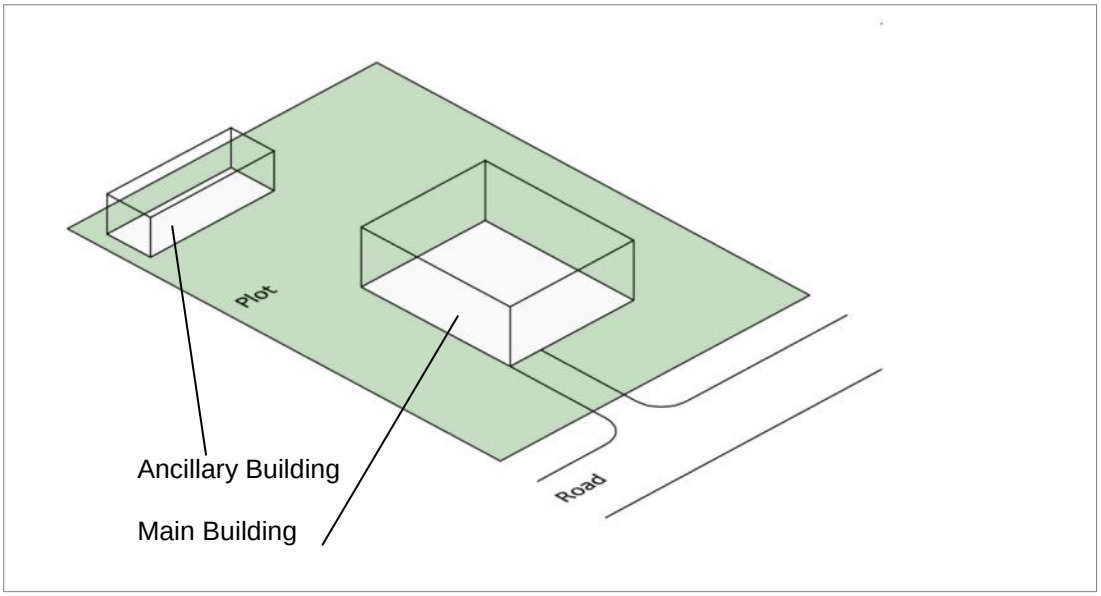


Figure 3.11 Ancillary buildings

3.2 PLOT DEVELOPMENT REQUIREMENTS

Table 3.1 Plot development requirements

Terms	Requirements
Plot area	▪ A plot area shall depend on the location of the plot, and the zoning sub-category. For most zones it shall be specified by the Layout Plan. ▪ There shall be maximum plot areas for urban residential plots be adhered to in Layout Planning, as specified by the development parameters. ▪ Plot areas for high rise development shall depend on planning principles related to lighting, aeration, distances and density and specifications by the detailed layout plan.
Plot layout and requirements	▪ Plots shall be created to use land and infrastructure in the most efficient way. The shorter plot width shall face the road. ▪ Newly planned plots shall be rectangular in shape where possible. ▪ Ideally, the depth of the plot shall be about twice the frontage width. ▪ A plot shall be directly accessible by a vehicular and pedestrian
Service and sanitation infrastructure	▪ All plots shall have potable piped water accessible on the plot, or in the house. ▪ Where it is not possible to provide potable piped water to all plots, communal stand pipes shall be accessible at least within 500 m. There shall be minimum 1 kiosk per 250 people in urban areas, or 1 borehole or kiosk per 250 people in rural areas. ▪ A plot shall be levelled in a way that storm-water runoff is controlled. ▪ Surface water run-off from buildings and hard surfaces shall be collected by a drainage system and conducted to the main drainage alongside the road. ▪ Infiltration into the ground shall be encouraged. ▪ The drainage must be to the approval of the Local Council. ▪ Where a driveway crosses a storm-water a culvert shall be constructed. ▪ All plots shall have an on-site toilet in accordance with the Section 3 in this Code. In high density areas, pit latrines shall not be acceptable for new development and composting toilets/ Ecosan/ bio-digestion systems shall be encouraged when no central sewerage system exist. ▪ Waste water shall be directed to a public sewer where it exists, or to a septic tank where this is permissible, or to an alternative on-site treatment system as discussed in section 3 of this Code. ▪ Any refuse while kept on the plot shall be stored in proper containers for collection, to the approval of the Local Council. ▪ Biodegradables shall be separated from non-biodegradable waste and composted. ▪ Hazardous wastes shall be specially treated in accordance with section 3 of this Code. ▪ Where there is no refuse collection organized through the Local Council, non-recyclable refuse shall be deposited in sites approved by the Local Council. ▪ There shall be one disposal point for about every 100 households. ▪ Electricity shall be supplied by the service provider, or alternatively generated by a photovoltaic system other renewable source of energy, or by a generator.
Plot boundaries	▪ Plots may be, but do not have to be enclosed by hedges, wire fences and walls with the following restrictions: ▪ Fences or walls shall not exceed 2 m in height. ▪ Walls shall be maintained in an optically clean and structurally safe condition. ▪ Broken glass shall not be permitted for the use in walls or fencing. ▪ Along road boundaries, fences or plain walls shall be set back 0.5 m inside the plot. ▪ Wire fences shall be of plain wire mesh. Barbed wire or angled top sections of barbed wire shall not be permitted. ▪ Grass fences shall not be permitted in urban high and medium density areas because of fire hazard. ▪ Retail commercial uses and service uses shall face the road without any enclosure.
Planning	▪ In urban areas, the economic and orderly use of land shall be encouraged for efficient and attractive plot layouts and good quality buildings. ▪ Neighbouring uses shall be compatible with each other. ▪ Planning for neighbourhood centres, district centres and major urban centres shall take into account connectivity of uses and modes of transport, including convenience for pedestrians. ▪ Existing mature trees shall be retained wherever possible. ▪ At least 30% of a developed area shall have a permeable ground surface area. This shall be combined with the use of vegetation in neighbourhoods, and “green roofs” (roofs covered with vegetation) or light coloured reflective roofs and building surfaces.
Neighbourhood Safety	▪ Long cul-de-sacs of more than 100 m shall be avoided. ▪ Street lights shall be provided along primary, secondary and trunk roads from local transport nodes to the neighbourhoods, especially from minibus stops, and bus stops. ▪ Developers shall be encouraged to install security lighting on their plot boundary and street lighting. ▪ Invisible corners and space shall be avoided in plot boundary design along roads.

3.3 RESIDENTIAL DEVELOPMENT

A variety of layouts and densities for residential areas may be specified depending on location, and shall be classified as by density and height.

Table 3. 2 Definitions of terms

Terms	Definitions
Low rise	A ground floor only, or ground floor plus one (G+1), i.e. up to two floors in total
Mid-rise	Higher than two floors (G+2).
High-rise	Higher than four floors.(G+4)
A Detached House	A standalone building. A detached house can be a single- family dwelling or house a multiple number of families
A semi-detached house	Twin houses sharing at least one wall, or one building touching a second building with one wall.
Cluster housing	Based on a subdivision technique in which detached dwelling units are grouped relatively close together and usually relating to each other in orientation. It leaves open spaces as common areas and provides shared facilities. It results in higher densities especially appropriate for urban housing typologies.
A town house	A house within a row of similar houses that are joined together on each side (except on the two ends of the row) on one or more floors. Town houses are usually forming medium to high density neighbourhoods
Apartment buildings	Contain several housing units/flats/apartments on more than 2 floors.

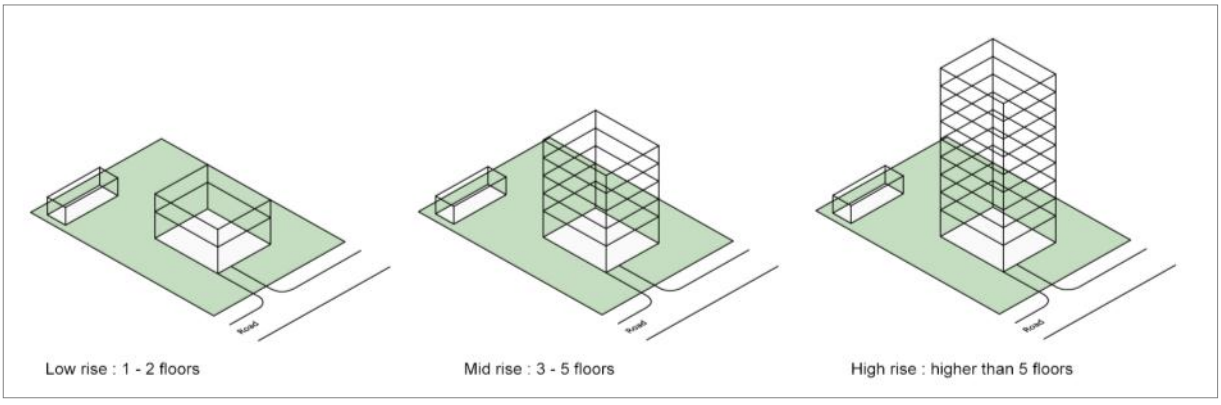


Figure 3.12 Density

Table 3.3 Residential plot development parameters

		Low rise			Mid and High rise		
		High Density	Medium Density	Low Density	High Density	Medium Density	Low Density
Building Coverage (max)		0.70	0.50	0.30	0.50	0.40	0.30
Floor Area Ratio (max)		1.20	0.90	0.60	2.00	1.50	1.20
Number of Floors		1-2			3-8		
Plot Area (max)		350 m^2	700 m^2	1000 m^2			
Building Setbacks	Front (min)	3m	4 m	5m	5m	5m	5m
	Side (min)	1.2 m, but 1.5 in coastal zone	½ height but min 1.5m	½ height but min 1.5m	¼ height	¼ height	½ height
	Rear (min)	2 m	½ height but min 2.5m	½ height but min 2.5m	½ height	½ height	½ height
Distance between detached buildings on one plot (min)		½ height but min 2m	½ height	½ height	½ height	½ height	1 height
Requirement	▪ A building with 4 floors and above should be equipped with elevator and constant electricity supply, sufficient water pressure and supply, flush toilets, and on site water treatment/or sewage connection ▪ Small structures for domesticated animals shall be permitted, provided they are well screened from the road, do not create a nuisance and are strictly for domestic use only. ▪ Private swimming pools shall be positioned within the building lines, and be fenced for safety reasons. The drainage system must be to the approval of the Local Council. ▪ A residential building or plot may be used for non-hazardous business subject to regular inspection. ▪ The approximate land requirement for public space including roads shall be estimated 18 - 25 % of the total land area. ▪ The noise limit at day time shall be 55 dB, at night time 45 dB. The location of residential buildings shall be arranged so as to reduce the noise to a prescribed limit. ▪ The minimum area for any internal courtyard shall be 10 m2, with a width not being smaller than 2.5 m. ▪ The primary building material shall achieve the necessary strength and durability at minimum cost. ▪ Simple and small floor plans, which may be extended in the future, shall be used to reduce construction costs. ▪ The use of renewable energy and resources shall be promoted.						

All requirements have to be fulfilled simultaneously. This results in permissible volumes depending on plot area, building height and setbacks. The higher the building, the smaller is the BCR. Designs will not always reach the maximum BCR and FAR.

3.4 MIXED USE DEVELOPMENT

Mixed use areas shall comprise housing, and commercial activities, which do not substantially disturb the housing. Permitted use shall be residential buildings, commercial and office buildings, restaurants, public residential buildings including hotels, business enterprises (e.g. repair shops, small workshops of up to 2,000m^2 area, recycling centres of up to 1,500 m^2 area, retail, administrative uses, cultural, social and recreational uses, gardening and tree nurseries, petrol stations, religious uses, health related uses).

Table 3. 4 Mixed use plot development parameters

MIXED USE		General Mixed Use Area	Major urban centre	District centre	Neighbourhood centre/rural market centre
Building Coverage Ratio (max)		0.6	0.6	0.6	0.5
Floor Area Ratio (max)		1.5	2.5	2	1.2
Number of Floors		1-4	1-8	1-4	1-4
Building Setbacks	Front (min)	5 m	5 m	5 m	5 m
	Side (min)	½ height but min 1.5m	½ height but min 1.5m	½ height but min 1.5m	½ height but min 1.5m
	Rear (min)	-	-	-	-
Distance between detached buildings on one plot (min)		½ height but min 1.5m	½ height but min 3m	½ height but min 3m	½ height but min 2m
General Requirement		▪ A building with 4 floors and above should be equipped with elevator and constant electricity supply, sufficient water pressure and supply, flush toilets, and on site water treatment/or sewage connection ▪ Neighbourhood centres, district centres and major urban centres shall be zoned for mixed use. ▪ The approximate land requirement for public space including roads shall be over 25 % of the total land area. ▪ The noise limit at day time shall be 60 dB, and at night time 50 dB. The location of residential buildings shall be arranged so as to reduce the noise to a prescribed limit.			

3.5 COMMERCIAL DEVELOPMENT

Permitted uses are office buildings, retail, department stores, shopping malls of maximum 15,000m^2 ground floor area, sales including wholesale of maximum 15,000m^2 ground floor area, restaurants, food courts and accommodation, entertainment, not substantially disturbing business enterprises and services, including business accommodation, hotels, motels, repair shops, workshops, crafts, tailoring workshops, carpenters, tinsmiths, machine shops, recycling centres, religious, cultural, social and health related uses, fitness centres, petrol stations, multi-floor car parking, storage units and small warehouses, including staff accommodation. In sub-centres, additionally permitted are all business enterprises and unlimited size of shopping centres if the limitation of disturbance for the surrounding areas is proven.

Table 3. 5 Commercial plot development parameters

Commercial Plots		Proposed Standards
Building Coverage Ratio (max)		0.6
Floor Area Ratio (max)		2
Number of Floors		1-8
Building Setbacks	Front (min)	5 m
	Side (min)	½ height
	Rear (min)	½ height
Distance between detached buildings on one plot (min)		½ height but min 2m
General Requirements	▪ Commercial areas shall be predominantly for the accommodation of trading and other establishments of economy, and may contain uses of the service industry. ▪ When septic tank is located in the front, building seatback front is at least 5 m; when septic tank is located in the back, the building setback side must be 3 m and more. ▪ Plots with an area of 500 m2 and above shall be landscaped. ▪ Ground-floor retail in urban cores and neighbourhood centres may be adjacent to the street without building setback in newly developed areas and wherever possible. ▪ A plot shall be accessible by car and truck. ▪ A building with 4 floors and above should be equipped with elevator and constant electricity supply, sufficient water pressure and supply, flush toilets, and on site water treatment/or sewage connection ▪ The approximate land requirement for public space including roads shall be estimated 20 % of the total land area at minimum. ▪ The noise limit at day time shall be 65 dB, at night time 55 dB.	

3.6 INDUSTRIAL DEVELOPMENT

Permitted uses are general manufacturing, processing, assembling, handling, and storing of products and materials. Industrial use shall comprise all commercial activities, business enterprises and all establishments of economy, manufacturing, processing, breweries, warehouses, storage spaces, petrol stations but not including shopping centres and retail.

Table 3.6 Industrial plot development parameters

INDUSTRIAL		Heavy Industry	Light Industry
Building Coverage Ratio (max		0.5	0.5
Built Volume per Plot Area (max)		6	6
Building Setbacks	Front (min)	20m	10 m
	Side (min)	1 height	1 height
	Rear (min)	1 height	1 height
Distance between detached buildings on one plot (min)		1 height	1 height
General Requirements	▪ There shall an Environmental Impact Assessment (EIA) be required for all heavy industry plots before such use may be permitted. ▪ Every industrial plot shall have direct vehicular access and frontage on to an industrial service road, and a separate pedestrian access (gate) shall be provided. ▪ Waste water and hazardous waste water shall be treated to the approval of the Local Council, in accordance with the section 3 of this Code. ▪ Any entrance gate shall be set back sufficiently inside the site to allow the largest vehicle entering the premises to park completely off the road while waiting for the gate to be opened. ▪ Industrial plots shall be enclosed by means of boundary walls or fences for security and screening purposes, 2 m in height. Any necessary walls along the front road boundary should be of decorative brickwork to form an attractive frontage or else be set back 0.5 m inside the plot and screened by a hedge or other landscaping. Any wire fence along the front boundary must also be set back 0.5 m and be screened by landscaping. No angled barbed wire shall overhang on to land outside the plot boundary. ▪ The front of any industrial plot shall be landscaped. Any plans of felling mature trees shall be included in the building permit application documents. ▪ The approximate land requirement for public space including roads shall be 30 % of the total land area. ▪ The noise limit at day time shall be 75 dB, and at night time 70 dB. ▪ A buffer zone between 100 m and 1,500 m around industrial uses, depending on the type of industry, capacity, and production method serving as a protection zone for public health, shall be sustained	

3.7 PUBLIC ADMINISTRATION AND SERVICES USES

Permitted uses in public administration and services are administrative, civic service, police, army, post, judiciary, fire stations, religion, cultural, social, educational, health, and recreation facilities.

Table 3.7 Public administration and services plot development parameters

PUBLIC ADMINISTRATION AND SERVICES		Public administration	Health	Education	All other
Building Coverage Ratio (max)		0.5	0.3	0.3	0.5
Floor Area Ratio (max)		1.50	1.20	1.20	1.50
Building Setbacks	Front (min)	5 m	5 m	5 m	5 m
	Side (min)	1 height	1height	1 height	1 height
	Rear (min)	5 m	5 m	1 height	5 m
Distance between detached buildings on one plot (min)		1 height	2 height	1 height	1 height
General requirement	▪ The needs of the disabled, particularly those with a mobility problem shall be taken into account by the design and the main services of public and institutional buildings shall be accessible by handicapped people. This has implications for the design of buildings in terms of accessibility of main areas and sanitary facilities of a building in terms of design of doors, hallways, stairs and changes in level. ▪ Plots with an area of 500 m2 or larger shall be landscaped. ▪ Water supply shall be ensured to the approval of the Local Council. ▪ A plot shall be levelled in a way that storm-water runoff is controlled. ▪ Surface water run-off from buildings and hard surfaces shall be collected and conduct to the main drainage alongside the road. ▪ Infiltration into the ground shall be encouraged and drainage shall be provided. ▪ In high density areas, pit latrines shall not be acceptable and composting toilets/ Ecosan/ bio-digestion systems must be encouraged when there is no sewage system. ▪ Waste water and hazardous waste water shall be treated and direct discharge shall be avoided. ▪ Any refuse shall be stored in proper containers for collection, ▪ Bio-degradable shall be separated from non-biodegradable waste and composted. Hazardous waste requires special treatment. ▪ Electricity shall be supplied by the service provider, or through use of a photovoltaic system, other renewable source of energy, or by a private generator.				

3.8 SETTLEMENT UPGRADING

- The affordability of a project and its potential cost-effective replication shall be ensured.
- Urban upgrading standards shall be kept at minimum, and may deviate from standards for new development, while adhering to public health and safety requirements.
- No large destruction and replacement of existing housing units shall be pursued.
- Only highly health-hazardous areas can be justified to be cleared from residential development and shall not be re-developed.
- Areas which need environmental protection can be justified to be cleared from polluting industrial operations, and protected from newly built structures.
- At the same time or before upgrading (but never secondary to upgrading) sufficient new housing options and plots accessible to citizens of all income categories shall be provided, or their provision be supported.
- Any construction technique for private houses shall be permitted when following the minimal planning and architectural standards.
- In a situation where the majority of residents are tenants and houses are illegally built on government or public land, the project may reclaim the government / public land and compensate the absentee owners. The infrastructure shall then be upgraded, and a non-profit Housing Trust created. Tenants shall pay rents which are used for the improvement and maintenance of the neighbourhood.

3.8.1 MINIMUM SETTLEMENT UPGRADING STANDARDS

- Depending on hierarchy, location and number of citizens served, access roads might not need pavement.
- For urban renewal projects, roads may have special designs non-conform to conventional road designs in new developments and standard carriage way widths may be reduced. The minimum width depends on the general speed of traffic, on the type of traffic which has to pass at minimum, and which type of vehicles shall pass each other at the same time.
- Water supply shall be through communal access points.
- The use of renewable energies and reusable resources shall be encouraged.
- Wastewater collection and treatment shall be controlled and located near the point of generation. This may include communal latrines, small-scale piped water networks with septic or other form of treatment.
- In high density urban settings composting toilets shall be required to protect ground water. If no compost toilets are applied, minimum distances between wells and pit latrines shall be adhered to, and their topographically right placement shall be insured.

- Swales and terraces, and improved footpath networks for storm-water management and treatment of storm-water prior to discharge shall be promoted.
- Erosion control measures shall be undertaken for existing areas and during construction activities.
- The coordination of synergistic aspects of the solid waste and recyclables economy shall be promoted.
- Drainage improvements shall always be done in a holistic approach, and drainages must never end uncontrolled despite possible borderlines of a project area.

3.8.2 URBAN RENEWAL AREAS

The objective of urban renewal is to trigger urban regeneration through the addition of amenities, and the improvement of buildings and livelihood in previously deteriorating urban areas.

- An area characterized by functional weaknesses and structural problems, legal uncertainties, and / or economic underutilization of land may be designated as a renewal area.
- For an urban renewal area, a layout plan shall be developed showing functional development, and rezoning if applicable. The URF may be applied differently to urban renewal areas.
- The demolition of existing built structures and relocation of residents shall be kept to a minimum.
- Relocation of residents shall only be permitted connected to the purpose of necessary infrastructure development in the public interest, or connected to the evacuation from hazard-prone areas.
- In case of unavoidable relocation, alternative land and accommodation for the residents to be relocated must be availed in advance.

3.8.3 FUNCTIONAL DEVELOPMENT AND REZONING

- Rezoning shall be possible as part of renewal strategies and may be a necessary measure when land is unused or underused.
- When applying for rezoning, a developer must demonstrate that the newly proposed zoning is suitable for the area and for the community.
- Spatial relationships with the surrounding areas and uses shall be supported that would serve the development.
- The mix of land uses shall be promoted to provide variable socio-economic options for the area.

- Exemptions or special usages may under examination be allowed.
- Existing built structures and uses shall be formalized when in line with the planning objectives for the area.
- The neighbouring communities shall be consulted early on at planning stage.
- The revitalization of blight areas may include:
    - Plot consolidation to bring small tracts into a larger plot
    - On-site improvements such as amenities and services
    - Contribution of land to public facilities and services

3.8.4 PRESERVATION OF VALUABLE TOWNSCAPES AND FEATURES

- Historically valuable buildings and historic, cultural, geological, or archaeological features, trees, green areas, and spaces, shall be preserved and restored in close collaboration with the Local Council and any government agency in charge of cultural heritage.
- The Local Council may list buildings, areas and features to be historically or environmentally valuable, or recommend to be listed to the government agency in charge of cultural heritage.
- Listed buildings shall be preserved and restored.
- Individuals may initiate the listing of building.

3.9 BUILDING PERMIT

Development shall be categorized according to construction volume and complexity for administrative purposes as follows:

Table 3.8 Building categories and definitions

Building Categories	Definitions
A	Residential, commercial and mixed use buildings with one floor only, and with floor area not exceeding 60 m^2, and with rooms the roof span of which does not exceed a length of 4.50 m.
B	Residential buildings with one floor only and a floor area exceeding 60 m^2; and commercial and mixed use buildings with one floor only and a floor area not exceeding 100 m^2
C	Residential buildings with more than one floor but not exceeding 4 floors, and not exceeding a total floor area of 600 m^2
D	Commercial and mixed use buildings with more than one floor or more but exceeding a floor area of 100 m^2, but in any case not exceeding 4 floors and not exceeding a total floor area of 600 m^2; and any building accessible to the public.
E	Buildings and constructions of a high complexity, all buildings exceeding 4 floors or exceeding a total floor area of 600 m^2; all industrial buildings; and other constructions which represent a particular risk for persons and their properties and goods
F	Bridges and other traffic artefacts, and towers
R	Refurbishment and/or interior alteration within existing main structure
S	Refurbishment of existing building with structural alteration
T	Temporary structure
X	Extension (vertical/horizontal)
Building permit requirement	• An owner or lessee of land shall not undertake any development without first obtaining a building permit from the Local Council, when such is required. This concerns new development, extensions, structural alterations, and demolitions to a building on any category of land, public utilities, and sewer and waste water treatment facilities. • An application for building permit shall be submitted at the Local Council office. • An application for building permit shall be certified by a registered architect or registered structural engineer, except for officially approved plans offered by the Local Council, for buildings of Category A, or for development exempted from the requirement for building permit.

3.9.1 DEVELOPMENT EXEMPTED FROM THE REQUIREMENT FOR BUILDING PERMIT

The following developments shall be exempted from the requirement for building permit:

- Wall plastering;
- Interior non-structural changes;
- Buildings built in traditional technology (Aqal) not exceeding 1 floor and which are not located in urban master plan area;
- Earth constructions using no stabilizer, not exceeding 1 floor and not exceeding 60m2 Total Floor Area, and which are not located in a urban master plan area
- Building extensions which result in a building with ground floor only and an area of up to 60m2;
- Constructions by National Security.

3.9.2 BUILDING PERMITS APPLICATIONS DECIDED BY THE GENERAL WORKS SUB-COMMITTEE OF THE LOCAL COUNCIL IN DISTRICTS A AND B

The following applications for building permit shall be decided by the General Works Sub-Committee without the necessary involvement of the complete Local Council for expediting the building permit approval process. This easement applies to works in Districts Grade A and B.

- Brick walls and wire fences except within central urban cores;
- Minor horizontal extensions and alterations;
- Buildings of Category A which are not located in urban master plan area;
- Advertisements;
- Sewer connections from public sewers to buildings.

The General Works Sub-Committee shall report to the Local Council about any expedited building permit approvals.

3.9.3 PRELIMINARY REQUEST

For sites outside of an approved Urban Master Plan or Layout(detailed) Plan, or for complex development intentions, a preliminary request is advisable before preparing a complete Building Permit application, but not obligatory.

- A preliminary request shall comprise:
    - Project brief describing the intended project

- A Site plan (Scale 1:200)

- The preliminary request shall be submitted to the Local Council in 3 sets.
- The General Works Sub-Committee of the Local Council prepares a technical appraisal report within 15 days of submission of the complete documents.
- The result of the report provides an orientation for the applicant; it is the applicant's decision of whether or not to proceed with a building permit application in accordance with the recommendations.
- There shall be no fee for the preliminary request.

3.9.4 CONTENT FOR APPLICATION OF BUILDING PERMIT

Table 3.9 Content of application of building permit

1. A copy of Preliminary Request and its report **2. Prove of land ownership / lease / utilization permit** **3. Application fee payment receipt**	
4. Three plan sets of the planned development, certified as required and comprising:	▪ Location plan showing location of development (Scale 1: 500 or 1:1,000) ▪ Site plan showing the layout of development on the plot, utilities, road access, and parking (Scale 1:200) ▪ Landscaping plan for development of categories D and E and for any public or institutional buildings (Scale 1:200) ▪ All floor plans (Scale 1:100) ▪ Roofing plan (Scale 1:100) ▪ Foundation plan (Scale 1:100) ▪ Elevations of each side of the building (Scale 1:100) ▪ At least two cross-sections through the building showing structure and composition of the building (Scale 1:100), or as specified for the particular case by the Local Council ▪ Infrastructure conduit and sanitation plans at scale 1:100 except for Category A ▪ Fire safety plan for Categories D and E, and for any public administration and services building
▪ **The Local Council or the Ministry of Public Works and Transportation and its agencies may develop standard models in accordance with The URF and be made available to the public. The applicant, when using an approved standard model, shall only be required to submit a location plan and site plan.**	

3.9.5 PROCEDURES FOR BUILDING PERMIT APPLICATION

The application process period shall be no longer than 60 days starting with the confirmed completeness of application documents.

Table 3.10 Steps of a building permit application procedure

Steps	Definitions
1	Applicant submits 3 plan sets, completed application form and Land utilization permit / Prove of registered land ownership to Local Authority; Engineer from Local Authority Department of Public Works checks completeness of documents with the help of a Check List, and indicates the missing or additionally required documents, or confirms the completeness of the application; verifies indicated classification of proposed development in application form and stamps viewed plans
2	Engineer from Local Authority Department of Public Works determines application fee based on a publicly advertised calculation guideline within 5 days, and issues invoice to applicant
3	Applicant pays application fee into the publicly advertised bank account of the Local Authority and keeps payment receipt to submit with the application
4	Applicant submits remaining documents and bank payment receipt to the Local Authority
5	Local Authority Engineer issues Acknowledgement of reception to the applicant, indicating the date of complete submission and the name and signature of receiving officer
6	The application process period of max 60 days shall start with confirmed completeness of application documents
7	General Works Sub-Committee of Local Council informs owners of neighbouring plot of the planned development using Neighbour objections record, except for applications for Categories A and B.
8	Neighbours have the right to appeal to the Local Council for any reason. However, the building permit can only be refused when the application does not conform to this URF and the Assessment criteria list.
9	General Works Sub-Committee of Local Council sends invitations for a technical assessment meeting inviting the Technical Committee, the Social Affairs Sub-Committee, infrastructure providers and other relevant stakeholders, together with a copy of the site plan for each development to be discussed.
10	General Works Sub-Committee of the Local Council prepares a technical

	appraisal report based on the URF and on the Assessment criteria list; issues recommendation for approval or rejection.
11	For applications which do not fall under the projects which may be expedited, the Secretariat of Local Council adds the building permit application to the agenda of the next scheduled Local Council meeting and sends invitations. The date and agenda of the next scheduled Local Council meeting shall be published on the notice board of the Local Council, and optionally in other public places and/or in the local newspaper. During the scheduled Local Council meeting, a decision on the building permit application shall be taken. In rare cases the decision may be postponed until the next meeting
12	The Local Council issues written notice of decision to the applicant, including the approval conditions if any, together with inspection cards and one approved set of plans; or communicates deferment including reasons for the deferment until next meeting; or communicated refusal of building permit application and the reasons for the negative decision.
13	For approved developments, the Building Inspectorate receives one set of approved plans and a copy of the written notice stating the approval; the Archive receives the third copy of the written notice and plan set.
14	When building permit has been granted, the applicant shall commence development within 3 years.

3.9.6 RIGHT TO ASSUME GRANTED BUILDING PERMIT

If no response by the Local Council regarding approval, adjournment or rejection of an application for building permit has been given within 60 days of its approved complete submission, the permit shall be considered as granted.

3.9.7 VALIDITY OF BUILDING PERMIT

- When a building permit has been granted, the construction work shall commence within 3 years of granting, and complete construction within 6 years of granting.
- In case construction is not commenced within 3 years of granting of building permit, the building permit elapses.
- In case construction is commenced but not completed after 5 years have elapsed, the Local Council shall send a notification of the expiry date of the building permit.

- In case construction is commenced but not completed within 6 years, the owner of the incomplete building shall pay yearly penalty fees until its completion, to be regulated and publicly advertised in a by-law by the Local Council.

3.9.8 BUILDING PERMIT APPLICATION ASSESSMENT

- The Local Council, the Technical Committee, and the responsible Sub-Committees shall follow prescribed assessment criteria when deciding about the granting of a building permit.
- The results of the assessment shall be recorded in the files regarding every criterion. The Assessment criteria list is provided in the Annex.

3.9.9 TECHNICAL ELABORATION AFTER GRANT OF BUILDING PERMIT

- After grant of building permit, as-built construction drawings shall be elaborated for buildings except for Categories A and B, to be certified by a registered architect / engineer at a general scale of 1:50, with further elaborated details at scales 1:20, 1:10 and 1:5 if needs to be.
- The grant of a building permit authorizes construction only under the precondition of the detailed elaboration of construction drawings, except for buildings of Categories A and B.
- The existence of such drawings may be verified by public inspection after reception of the first inspection card, and at any time thereafter.
- If construction works are carried out without the existence of detailed as-built plans, the inspector serves a **Construction Stop Notice**, except for Categories A and B.

3.9.10 INSPECTION OF AUTHORIZED CONSTRUCTION

3.9.10.1 Public Inspection

- The Local Council shall inspect any construction to ensure the protection of the developer from construction faults, and to ensure public and environmental health and safety.
- Inspections by the Local Council during construction shall be based on the URF standards.
- An officer responsible for public inspection may decide to inspect the building at any time.
- The owner of a building or other built element under construction shall accept public inspection by the responsible Local Council at any time when he/she, a representative, or construction workers are on site.

- The owner of a building or other built element under construction is not required to wait for public inspection and may continuously carry out construction.
- When the officer responsible for public inspection discovers a problem on site, he/she shall serve a **Stop Notice** requiring a pause of the construction works, which shall be complied with immediately.
- The officer responsible for public inspection who has served such notice shall report to the Local Council about the serving of such notice immediately.
- The Local Council shall take a decision about the notice and approve to continue being effective, or deem unnecessary the stop of construction works within 2 weeks of the serving of the notice, if the purpose for the notice hast not been resolved by then.
- During each Local Council meeting, the presentation of completion reports given by the Building Inspector shall be an additional point of the agenda for monitoring purposes.

Table 3.11 The procedures for public inspection

Steps	Definitions
1	When building permit is granted by the Local Council, the applicant receives inspection cards, which are to be submitted as notices to the Local Council during construction as follows: i) When starting construction, ii) When foundation is finished, iii) When roof construction (excluding roof cover) is finished, iv) When development is ready for occupation **("Notice of Completion").**
2	The Public Inspectorate produces an inspection report filed at the Local Council for every inspection undertaken. The report is to be presented at Local Council meetings if requested. When construction mistakes or safety concerns relative to this Code occur, the developer is informed immediately by the officer and receives a copy of the inspection report together with the order to eradicate the shortcoming immediately.
3	The developer shall hand to the Public Inspector, or sends "Notice of Completion" when he deems development ready for occupation. The developer pays the publicly announced fees for the preparation of the "Certificate of Occupation" into the publicly communicated Bank Account of the Local Council (through notice board and newspapers) and keeps receipt.
4	After the Local Council has received the "Notice of completion", a Public Inspection Team comprised of 2 persons at minimum shall inspect the development within 8 working days of reception of the card. In case no inspection takes place or its adjournment is not announced to the applicant within 8 working days, the occupation permit is regarded as being granted.

5	For each final inspection visit, the Officer responsible for Inspection has to bring a "**Notice of Completion**" – card, and a "**Certificate of Occupation**"-form.
6	The Public Inspection Team shall issue the "**Certificate of Occupation**" on the spot, and hand it over to developer on presentation of the Bank receipt. The inspection team shall file the **Certificate of Occupation** at the Local Council office for later collection in case the payment receipt was not presented during final inspection.
7	In case of unsatisfactory inspection results, the inspection team shall issue a form sheet stating the requirements necessary for an eventual approval of occupancy permit, with clear reasoning based on this Code, and together with a 2nd"Notice of Completion"-card (a copy of which the officer responsible for inspection has to always carry) on the spot
8	A copy of the final inspection report stating the result is given to the Local Council
9	If no "**Certificate of Occupation**" was granted at final inspection, the developer shall undertake the required improvements and modifications within 60 days. When finished, he/she shall send a second "**Notice of Completion**" to the Local Council, followed by steps 4 to 6.

3.9.10.2 Quality Control as Responsibility of Developer

- An architectural or structural engineer shall be engaged by the developer for quality control, who shall be responsible for the continuous supervision of construction, for the safety on site, for accurate plan implementation, and for the accurate use of construction materials according to the standards of the profession. This shall not be necessary for developments of Category A.
- The engineer shall continuously inspect and produce a continuous inspection diary.
- The inspection diary shall always be available for viewing on request by the Public Inspectorate, by the Local Council and the Technical Committee and responsible Sub-Committees.

3.9.11 UNAUTHORIZED CONSTRUCTION

- Any person who carries out construction, which is not exempted from the need for building permit, without a permit, before permit has been issued, or in contravention of approved plans, shall be liable to enforcement action by the Local Council.
- Unauthorized construction shall be subject to a stop notice, which when served requires the immediate stop of construction activities. If the stop notice is not complied with, the offender may be prosecuted.

- Construction is considered unauthorized if it is not exempted from development permission, and:
    - if the developer does not have a building permit with a date prior to when construction started,
    - if the development is not in conformity with the approved plans, or when a building permit has lapsed.
- After stop notice has been served and approved, the Local Council shall require the developer to submit a complete building permit application within 30 days.
- The application fee for this building permit application shall be 10-fold the published normal cost as a penalty.

3.9.12 HAZARD NOTICE TO ABATE PUBLIC HEALTH HAZARDS

- A Local Council officer may serve a **"Public Health Hazard Notice"** to the responsible person or entity causing a public health hazards, requiring corrections to the situation to abate it, and prevent reoccurrence of said nuisance.
- Considered as public health hazards caused by the private are the following:
    - standing water
    - waste water runoff into the public realm or to the neighbouring plot
    - contamination of potable water sources and supply
    - uncontrolled waste dumping
    - dirty latrines affecting the public realm.
- The officer who has served such notice shall report to the Local Council about the serving of such notice immediately.
- The person / entity who were served such notice for causing contamination of potable water sources and/or supply shall correct the cause of the hazard immediately without the approval of the Local Council of the existence of such hazard.
- The Local Council shall take a decision about the notice and approve the existence of a hazard, or deem ineffective within 7 days of the serving of the notice.
- If following to the on-site issuance of the Public Health Hazard Notice, there was no communication of the Local Council in regard to the validity of such notice, the person / entity may assume its irrelevance, except when the identified cause was contamination of potable water source and/or supply.
- There shall be penalties for non-compliance with the "Public Health Hazard Notice" within 14 days of approval of the hazard by the Local Council, and in accordance with penalties published.

3.9.13 INVOLUNTARY RELOCATION

- When redeveloping an area, an assessment shall be made whether relocation can be avoided, or minimized.
- Priority shall be given to the integration of all residents settling in the area into the new development scheme as far as this is possible in sight of the zoning of the redevelopment area.
- Any relocation, and only if unavoidable and in public interest, shall be done in consonant with fixed procedures.
- The project management team responsible for the relocation will request suitable and appropriate land in the area proposed for relocation, demarcates the chosen relocation site, and prepares Layout Plans.
- When direct economic and social impacts are caused by taking of land resulting in involuntary relocation or loss of shelter, loss of assets or access to assets, loss of income sources or means of livelihood whether or not the affected persons must move to another location or the restriction of access to legally designated parks and protected areas result in adverse impacts on the livelihoods of the displaced persons, the following guidelines shall be required:
    - Where relocation cannot be avoided, displaced persons shall be meaningfully consulted throughout the entire project cycle individually and collectively, with a right to appeal, and receive the opportunity to participate in the project activities, and share the project benefits.
    - The property or use rights of owners and users shall be registered.
    - Compensation for any loss of private property, such as built structures, crops and trees, and for the type of any use rights, shall be determined at the time of relocation and paid before relocation commences.
    - Compensation shall be according to the market value of the land and the property, or the interest therein of the claimant at the valuation date. The assessment of compensation is by an independent valuer appointed by the Local Council or the General Works Sub-Committee.
    - The relocated persons shall be assisted in restoring their livelihoods and standards of living.

3.9.13.1 Grievance

- Objections to relocation, compensation, or other related grievances, may be made to the implementing agency, to the Traditional Leaders and Elders, and/or to the Local Council for determination of validity of claims.

- Grievance shall be administered as far as possible directly at community level with the participation of the Traditional Leaders and Elders. If conflict resolution fails at project level, the aggrieved party may refer the matter to the formal court system.

Volume 4

Urban Roads and Transport

Standards & Guidelines

4 URBAN ROADS AND TRANSPORT STANDARDS AND GUIDELINES

Volume 4 provides standards and guidelines for urban road planning, urban road uses including footway, parking standards, and guidelines for traffic circulation and management. It has to be used during the master plan and layout (detailed) planning stages.

Transport and Traffic Management strategies shall provide and maintain a safe, efficient and reliable transport system in an environmentally acceptable manner for the development of settlement areas, and to provide access to work, goods, and services with the least expenditure of energy, time, and emissions. The main targets of transport and traffic management shall be:

- Improved integration of transport and land use planning;
- Improved public transport services and facilities;
- Facilitation and increase of pedestrian and cycling movement
- Environmental protection measures in relation to transport infrastructure and activities.

Generally, the damage to the environment through the introduction of transport facilities such as roads, railways, bus depots and terminals, and petrol stations shall be kept to a minimum through Environmental Impact Assessments at planning stage.

The total width of a road shall be derived from its type and additional uses following its course. Possible uses are:

- Carriageway
- Footway
- Cycle track
- Drainage
- On-street parking
- Row of trees
- Hard shoulder
- Verge, with or without planting reserve and marginal strip
- Central reserve and traffic island
- Service road.
- Two- three wheel vehicle drive

The cross-section with essential uses shall be determined by the responsible planner/ civil engineer. Not all uses need to be included in each road cross-section. Civil engineers and

urban planners may propose to the Local Council to waive the standard width recommendations in cases of urban renewal where there is insufficient space, and for low cost housing neighbourhoods. The standard width recommendations include a safety and manoeuver space. The minimum width of carriageways on the general speed of traffic; roads where high speed is allowed require bigger width.

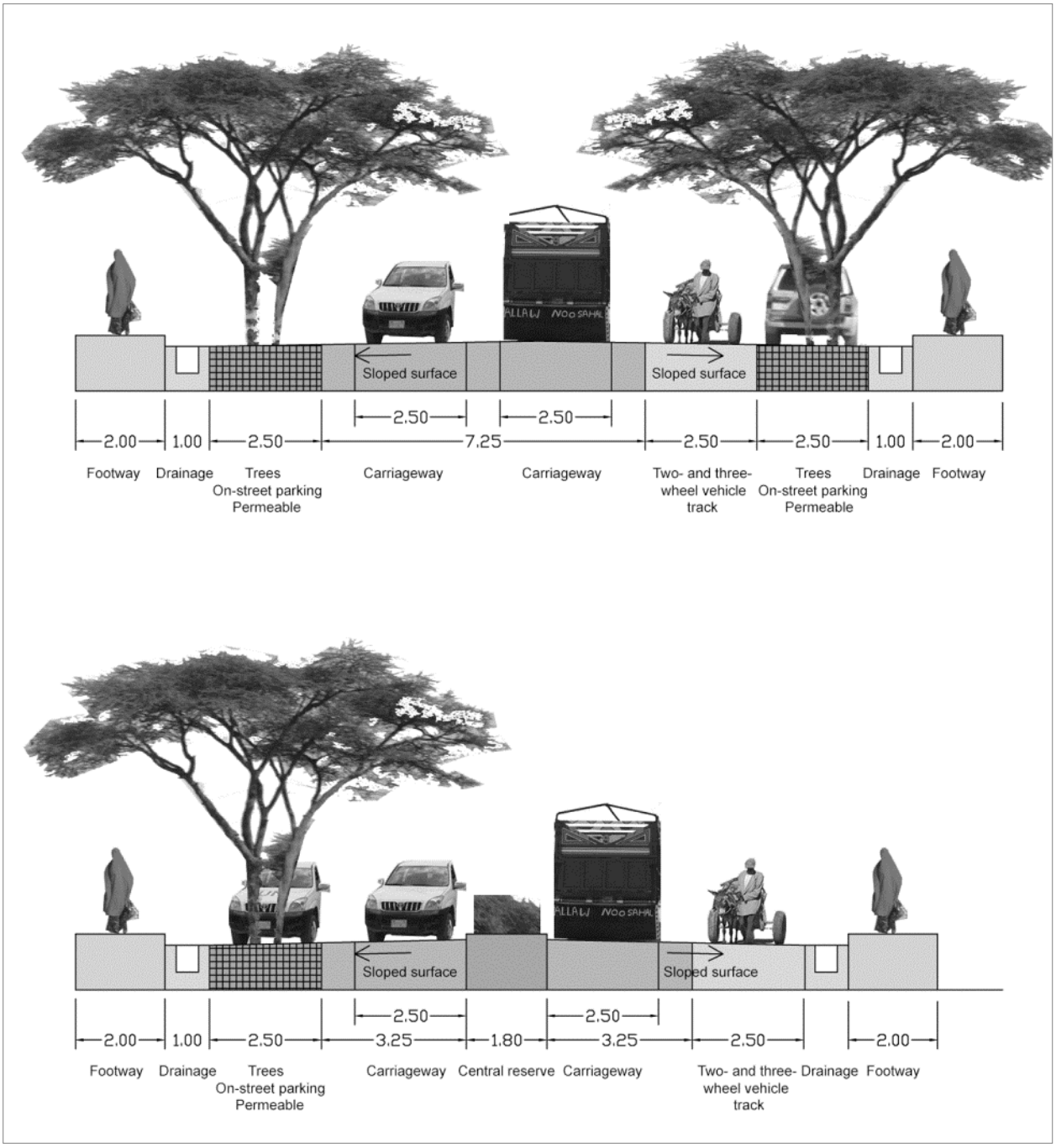


Figure 4.1 Samples of road sections with uses following the course of the road

4.1 URBAN ROADS AND HIERARCHY

Urban roads serve transportation demands within cities and towns. The necessary urban road network for managing the movement of pedestrians and vehicles, along with parking spaces, will take up approximately 25 percent of the urban area.

Streets and roads, particularly in an urban area, are multi-modal transportation corridors and serve more functions than just of mobility and access. Streets are public places: places to gather, socialize, window shop, people watch, etc. An urban road classification system for urban and downtown streets is necessary to better integrate the road and its design into the urban fabric. The system should take into account the variety of functions and the users of the road.

The road network plays a part in providing access to property and in travel mobility. Access is a fixed requirement, necessary at both ends of any trip. Mobility along the path of such a trip is defined in terms of 'level of service'. It can incorporate a wide range of indicators: road condition, travel speed, degree of congestion, and so forth. The urban road network can be classified as follows.

4.1.1 TRUNK ROAD

The trunk road is at the top of the road hierarchy in Puntland and is part of the formation of the primary road network of an urban area. It is an inter-regional road connecting major towns to each other and to international road networks. It carries a high traffic volume and provides for long trips at a relatively high speed. Only the primary roads are connected to the trunk roads.

4.1.2 PRIMARY ROAD

A primary road provides major access to the main economic and social centres in Puntland's urban areas. It connects district centres, residential neighbourhoods, and localities of urban areas with trunk roads. The primary road accommodates a trip of medium to lower speed levels. This road category can be also further divided into two subcategories: with median and without median. Only primary roads provide access to trunk roads, as sustaining the road hierarchy is essential for road safety and efficient traffic flow.

4.1.3 SECONDARY ROAD

A secondary road allows for short trips at a low speed. It provides a connection from primary roads to residential neighbourhoods and a distribution of traffic flow among various areas of

the city. The secondary road provides direct access between a primary road and an access road. It also provides access to major institutional, economic, and social activity centres from the primary roads. The identification of the secondary road should be based on density and type of public and commercial activities, as well as any other points of interest that are located along the road.

For example, a road classified as a secondary road ideally should have markets, bus terminals, and major administrative/institutional/economic buildings located alongside, and should provide a connection from those activity centres to primary roads or to trunk roads.

4.1.4 ACCESS ROAD

An access road provides access to adjacent plots and properties with driveways and cul-de-sacs. The access road functions as a service road within residential communities, directing local traffic to the secondary roads.

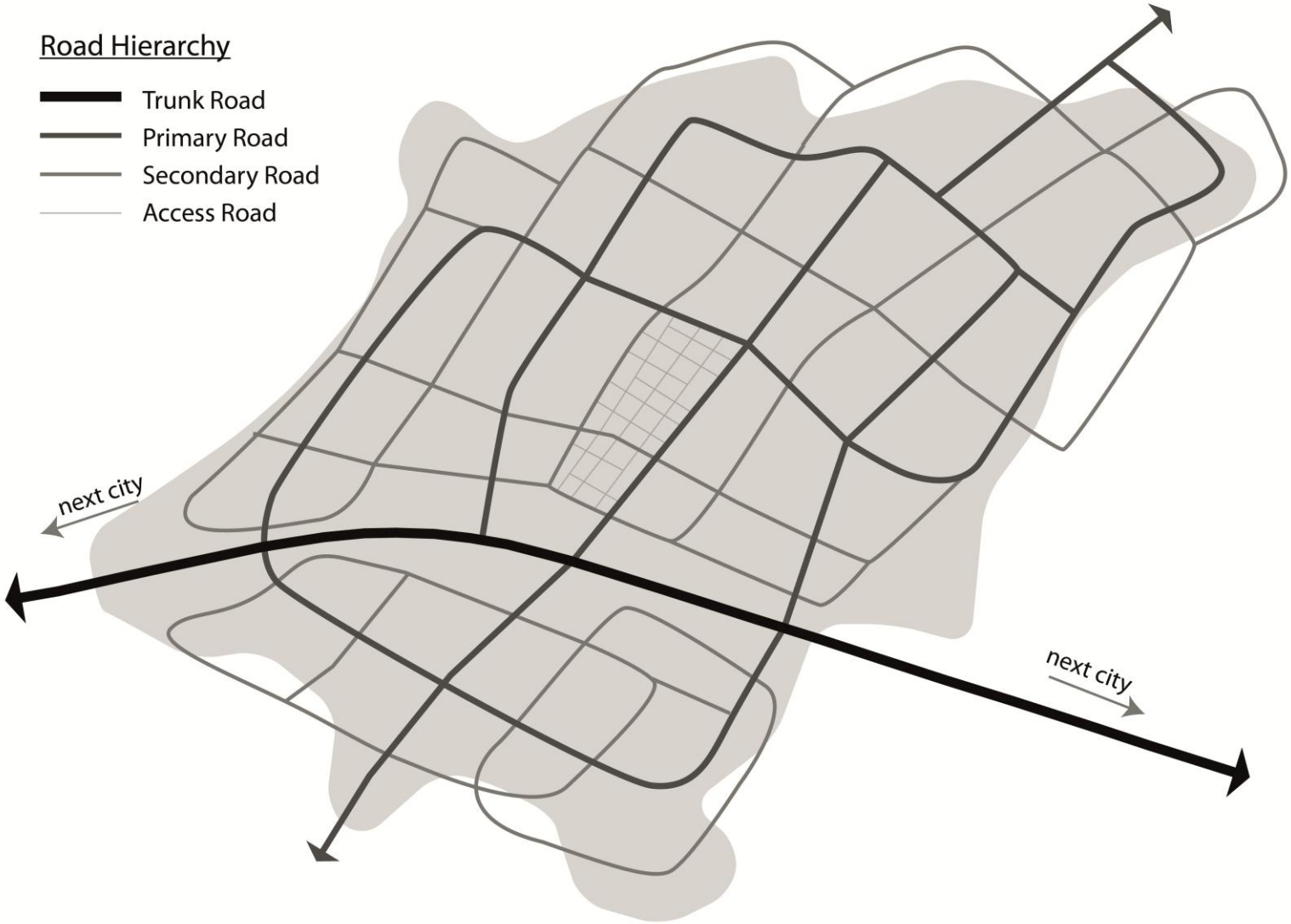


Figure 4.2 An example of a functionally classified urban road hierarchy

Table 4.1. Standards for Urban Road Classification

Road characteristics	Road categories			
	Trunk Road (intercity and regional road, connecting cities and regions)	Primary Road (within cities, connecting major activity centres)	Secondary Road (within the city, connecting residential neighbourhoods)	Access Road (within the city, connecting premises to road network)
Access control	Partial	Partial	None	None
Adjacent land use	High density, residential, office, retail, mixed use	High to medium density, residential, civic space, office, retail, mixed use, commercial	Medium to low density, residential, mixed use, civic space or stop sign	Low density, residential
Intersection type	Grade separated or at grade with improved signalization	at grade with improved signalization	at grade with improved signalization	Stop sign or no control
Pedestrian traffic	Separated/limited	Yes	Yes	Yes
Median	Where possible	Where possible	No	No
Emergency lanes	Where possible	No	No	No
On street parking	Designated area only	Yes	Yes	Yes
Lane width (m)	3.25–4.0	3.25–4.0	2.5–3.25	2.5 (min.)
Number of through lanes	2–4	2–4	2	1–2
Road width (m)	**30-40**	**20-30**	**10-20**	**8-12**
Design speed (km/h)	80–100	80–100	40–50	30–50
Operating speed (km/h)	60–70	40–50	30–40	Less than 30
Pavement	Paved	Paved	Paved	Paved/unpaved
Gradient	4 -8 %	4-8 %	5-10 %	5-10 %

Table 4.2. Passage Space for Urban Roads

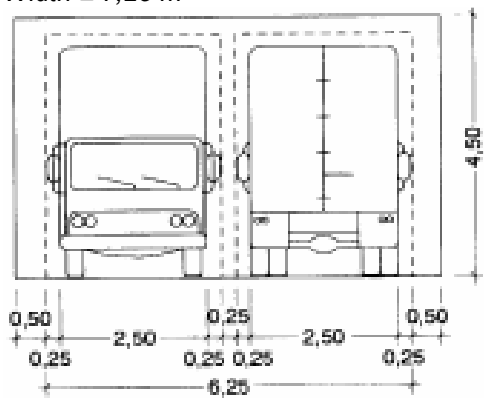
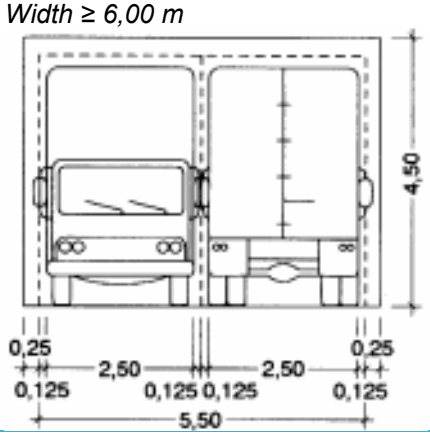
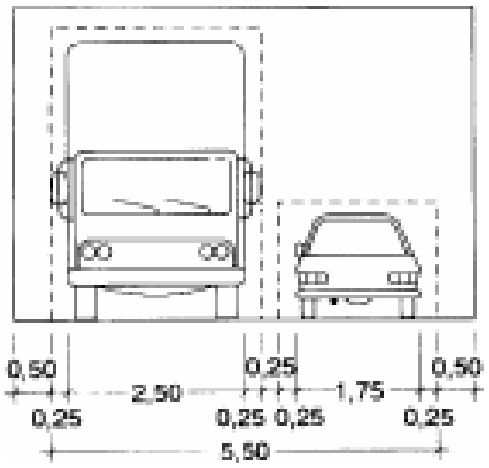
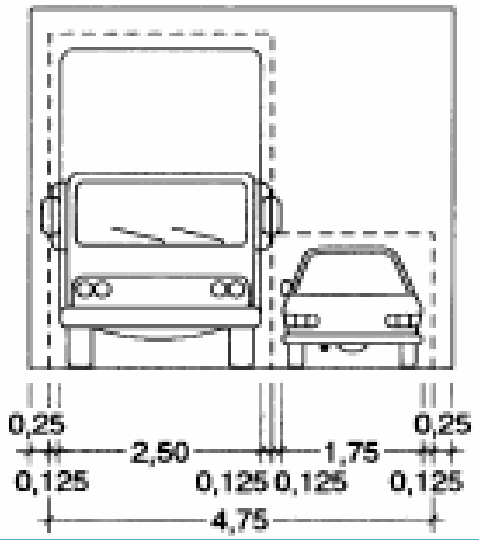
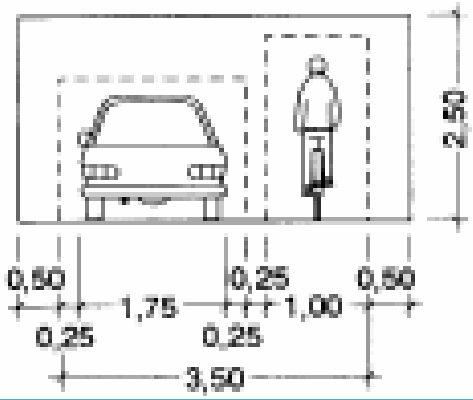
Trunk roads and primary roads	Secondary and access roads
1 drive lane for all vehicles including trucks and buses	
Width ≥ 4,00 m	*Width ≥ 3,25 m*
1 drive lane for vehicles not including trucks and buses	
Width ≥ 3,25 m	*Width ≥ 2,50 m*
2 drive lanes for all vehicles including trucks and buses passing each other	
Width ≥ 7,25 m 	*Width ≥ 6,00 m* 
2 drive lanes for all vehicles including trucks and buses but trucks passing motor vehicle	
Width ≥ 6,50 m 	*Width ≥ 5,25 m* 
2 drive lanes for all motor vehicles (cars and jeeps) passing each other	
Width ≥ 5,75 m	*Width ≥ 4,50 m*
2 drive lanes for motor vehicles (cars and jeeps) and bicycle	
	
	Width ≥ 4,50 m

Figure 4.3 Cross-section examples for Urban Roads

4.2 FOOTWAYS

- The absolute minimum width of a footway shall be 1.0 m.
- A commonly designed footway shall be at least 2m wherever possible.
- Road designs of all hierarchy levels other than Access Roads shall include footways on either side.
- Vehicular bridges shall include footways on both sides.

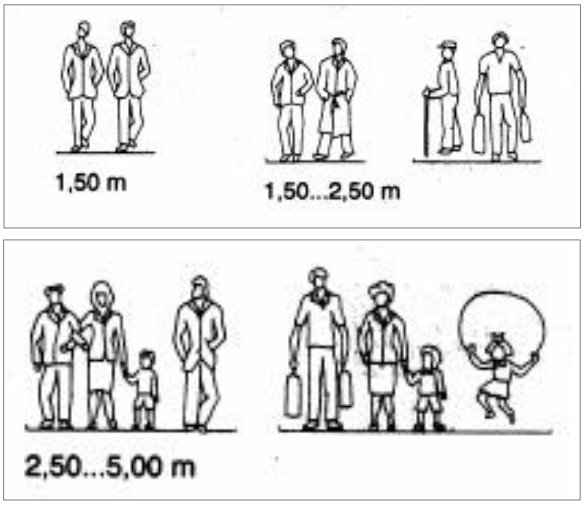


Figure 4.4 Passage space for pedestrian

Table 4.3. Recommended widths of footway

Function	Min. Width
Along shopping streets	2 m
In industrial zones	3.5 m
On bridges outside urban areas	1.5 m
On bridges in urban areas	1.2 m
Along trunk roads and primary roads	2 m
Along secondary roads	1.5 m
Access paths in high density areas	1 m

4.3 CAR PARKS

- Parking must be provided in residential, mixed use, commercial, industrial areas, public administration and services, as well as in social, sports, religious and recreation areas.
- A driveway between parking stalls shall be at minimum 5 m wide when parking is for cars, jeeps and pick-ups only; 6 m when parking for minibuses shall be included; and 20 m when parking is for busses and trucks.
- All new primary, secondary and access roads shall be designed for on-street parking.
- The required width for on street parking shall be 2.5 m for parallel parking, 5.5 m for perpendicular parking, or 5 m if designed cross wise at an angle of 45 degree.
- Rows of trees may be combined with on-street parking.

Table 4.4. Minimum parking bay dimension

Vehicle	Type of parking	Length of parking bay	Width of parking bay
Cars, jeeps, pick ups	Parallel	6.5m	2.4 m
	Perpendicular	5 m	2.5 m
		Width of drive lane to access parking bay strip: 7.7 m	
	Angle 60 ^{o}	1 row 5.5 m 2 rows 10 m	2.5 m
	Angle 45 ^{o}	5 m	2.5 m
		Width of drive lane to access parking bay strip: 4 m	
Minibuses	Parallel	6.5 m	3 m
	Perpendicular	6 m	3 m
		Width of drive lane to access parking bay strip: 8.5 m	
	Angle 60^{o}	6.5 m	3 m
	Angle 45 ^{o}	6 m	3 m
		Width of drive lane to access parking bay strip: 6 m	
Buses and trucks	Parallel	22 m	3.5 m
	Perpendicular	Single truck: 12m Truck w. trailer: 22 m	4 m
		Width of drive lane to access parking bay strip: 20 m	
	Angle 30^{o}	Truck w. trailer: 13 m	3.5 m
		Width of drive lane to access parking bay strip: 5 m	
	Angle 45 ^{o}	Truck w. trailer: 15 m	4 m
		Width of drive lane to access parking bay strip: 7.5 m	

Table 4.5. Standards for Parking Requirements

Type of Development		One car parking space for every:
Residential	Multi-storey apartment buildings (high rise density)	2 dwelling units
	Dormitories	20 beds
	Medium and low density	One dwelling unit
Offices and administration	Offices and public administration	3 employees + 2 guest parking, or 50m^2 floor space
	Offices and administration with significant visitors stream (e.g. doctor's office, advisory service)	25m^2 floor space, (min3 parking spaces regardless of office space)
Retail shops		50m^2 sales floor space, except for retail shops in a building of category A; 1 taxi stand per 80 m^2 sale space
Catering and accommodation	Restaurants, cafés, clubs	12 seats + 1 parking per 10 staff
	Hotels, motels, hostels and other publicly accessible accommodation	5 beds plus 1 parking per 3 managerial staff; 1 taxi space per 80 m^2 floor space; any other attached use must be equipped with additional parking
Communal and cultural use	Community centres, mosques, concert halls, theatres, cinemas, presentation rooms	12 seats, or 15 m^2 public floor space
	Sports facilities and playing fields	10- 20 seats or spectator capacity
Education	Primary and secondary schools	20 pupils and 1 parking per 5 teachers
	Nurseries and day care centres	20 children and 1 parking per 5 care takers
	Universities, technical colleges	30 students and 1 parking per 3 lecturers and staff. Truck access and 2 truck/bus parking
	Dormitories	20 beds
Mosques		10-12 worshippers
Cemeteries		20 parking per 5,000m^2 plot size
Industry		4 employees and 1 truck parking per 100m^2 floor space
Warehouse		4 employees and 1 truck parking per 400m^2 floor space
Workshops and commercial use	Car repair shops	2 parking per repair stand; truck access and parking for truck repair shops
	Other workshops and commercial uses	6-10 employees; further truck access and parking depending on use specification
Petrol stations		3 customer parking in rural petrol stations / 5 customer parking in urban areas, plus 1 parking per 3 staff members, 2 truck parking
Health	MCH / Hospital	15 beds plus 1 parking per 3 staff members, 1 taxi space per 50 beds
	Private doctors and surgeries	4 parking space per consulting room plus 1 parking per 3 staff members
Transport nodes	Bus terminals, etc., but airports are subject to special planning	15 m^2 floor space, plus 1 taxi stand per 80 m^2 floor space

4.4 OTHER FUNCTIONS AND REQUIREMENTS

Table 4.6. Other functions and requirement

Functions	Requirement
Two- and three-wheel vehicle tracks	▪ Two- and three-wheel vehicle tracks (for the use by donkey cart, wheelbarrow, motorcycle and bicycle) shall be included along trunk roads and primary roads. ▪ The minimum width of a two- and three-wheel vehicle track shall be 2.5 m. ▪ Two- and three-wheel vehicle tracks may be combined with footways with a total minimum width of 3 m.
Bus bays	▪ Bus bays shall be provided on trunk roads, primary roads and 2-directional secondary roads to enable buses to stop for boarding/alighting passengers without obstructing other traffic. ▪ A width of ≥ 3.25 m shall be provided over a length of ≥ 40 m along the carriageway. ▪ Bus bays shall be located approximately 500 m to maximum 800 m apart in urban areas. ▪ Outside of urban areas the spacing between bus bays shall be in accordance with the concentration of population.
Central reserve (median) and traffic island	▪ The widths of central reserves on urban roads may vary and shall be influenced by street furniture requirements and planting. It should be used for street lighting posts, and other utility posts when necessary, as well as landscaping ▪ The minimum width for central reserves with barrier fences for Trunk Roads and Primary Roads shall be 2.00 m. ▪ The minimum width for central reserves for Secondary Roads shall be 1.00 m.
Corners and Junctions	▪ Traffic signalled intersections shall be used for low and medium traffic flow where there is limited space available. ▪ Roundabouts shall be used for low /medium traffic flow where there is sufficient space available. ▪ Priority intersections may be designed as cross roads or T-junctions, and shall be equipped with give way / stop signs. ▪ Staggered junctions shall be preferred to cross roads wherever possible for increased safety. Junctions must be designed with 90 degree angles to the nearest traffic stream. ▪ Y junctions shall be avoided in new development to avoid obscured sight lines. ▪ Junctions on the inner side of curves shall be avoided. ▪ Roads shall intersect with other roads of the similar hierarchy class, or one hierarchy level above or below. ▪ Corner radii and visibility splays have to be respected when designing a road. Splays at junctions shall be half the width of the adjoining road

Other functions and requirements, contd.

Function	Requirement
Roads reserve	▪ There may be space reserved for a future road in accordance with an Urban Master Plan or District Spatial Development Plan, while its development is delayed. ▪ Space may be reserved for the future widening of a road. ▪ Road reserves may temporarily be used for impermanent structures and other uses, but only on approval by the Local Council.
Utility strips	▪ A utility strip is a space reserved for service reticulation following the course of a road and including the footway, if any. ▪ Any electricity line (underground or above ground) shall be located in the outer space of utility strip and with a distance of 6 m from the edge of the road. ▪ Any electricity line, if above ground, shall have a minimum height of 6 m. ▪ Any Telecommunication lines shall have a distance of 5m distance from edge of the road. ▪ Water mains shall be located in the middle space with a distance of 3 m from the edge of the road. ▪ Storm-water drainage channels shall be located at a distance of 50 cm from the edge of the road. ▪ Storm-water drainage channels may be constructed from rectangular or trapezoid masonry or concrete channels, and shall be dimensioned dependent of hydraulic engineering calculation including discharge capacity and slope. ▪ Strom water drainage channels shall be designed in a way that storm water velocity does not exceed 3.5 m/s. ▪ The minimum horizontal separation between utilities shall be 50 cm. ▪ Crossings of any underground cables/pipes shall be at right angles. ▪ Where the minimum separation distance cannot be provided, concrete blocks shall be wedged between the services. ▪ Service allocation plans shall be part of any new road planning. Designs shall incorporate provisions for road crossings. ▪ All service providers shall be consulted by the road engineer in the design stage, and in pre-construction stakeholder meetings. ▪ Estate development must have a maximum distance of 30 m from the centre of a road.

Other functions and requirements, contd.

Function	Requirement
Advertisements in the public realm	Advertisement means any word, letter, model, sign, placard, board, billboard, notice, poster, device or representation, whether illuminated or not, employed wholly or in part for the purposes of advertisement, announcement or direction, and excluding any such thing employed wholly as a traffic sign or a railway signal. Included are composite sign posts and structures used for the display of advertisements. **Location** ▪ No advertisement shall be erected in such a manner obstructing free and clear vision, or where its shape, colour, or position may interfere with, or obstruct the view of, or be confused with any road traffic sign or device, railway signal, signal for the control or safety or navigation by air, or any other traffic and traffic security device. ▪ Advertisements shall not obstruct or interfere with an official traffic sign or device, or with the driver's view of approaching, merging or intersecting traffic. ▪ Advertisements shall not obstruct visibility at a bend, junction or other hazard, interfere with road-users' view of traffic signs, or distract road-users' attention at hazardous sites. ▪ Blinking advertisements which may appear like a traffic safety sign or municipal vehicle warning from the distance shall be prohibited. ▪ Illuminated advertisements or video screens shall not be permitted unless it can be clearly shown that road users will not be distracted, and that the sign will be well maintained. Video screens on roads shall only show very simply to understand messages which do not require much attention and shall have low intensity of illumination. ▪ Advertisements shall not be permitted where they will reduce the pleasantness and attractiveness of an area. ▪ The minimum distance of signs from the edge of road and from junctions shall be 5 m.
Bridges	▪ The width of a vehicular bridge shall follow the road dimension. ▪ Designs for vehicular bridges shall have provisions for services (water, electricity, and telecommunication) and shall contain footways on both sides of the carriageway.

Other functions and requirements, contd.

<table>
<tr><th>Function</th><th>Requirement</th></tr>
<tr><td>Floodlighting</td><td>▪ Lighting on buildings, at entrance gates and within plots shall only shine into that plot and not into neighbouring plots or public roads.
▪ The illumination of a structure or building for visual effect and prominence shall only be permitted where the building is of particular importance and merit.</td></tr>
<tr><td>Street Vendors</td><td>▪ Street vendors should be accommodated where there is demand for their goods and services—near major intersections, public transport stops, parks, and so on
▪ Supporting infrastructure, such as cooperatively managed water taps, electricity points, trash bins, and public toilets, should be provided
▪ Vending areas should be positioned so as to ensure the continuity of cycle tracks and footpaths</td></tr>
<tr><td>Street Lighting</td><td>▪ Street lights shall have an absolute minimum distance of 1.2 m from the edge of a carriageway; the commonly applied distance shall be 2 m.
▪ Street lights shall be mandatory for trunk roads, primary roads and secondary roads.
▪ Additional lighting should be provided at conflict points
▪ The placement of street lighting should be coordinated with other street elements so that trees or advertisement hoardings do not impede proper illumination
▪ The spacing between two light poles should be approximately three times the height of the fixture, as indicated in the table below
▪ Poles should be no higher than 12 m, especially in residential areas, they should be significantly lower than 12 m to reduce undesirable illumination of private properties.

<table>
<tr><th>Street type</th><th>Pole Height (m)</th><th>Spacing (m)</th></tr>
<tr><td>Footpath, Access roads</td><td>4.5-6</td><td>12-16</td></tr>
<tr><td>Primary and Secondary roads</td><td>8-10</td><td>25-27</td></tr>
<tr><td>Trunk roads</td><td>10-12</td><td>30-33</td></tr>
</table>
</td></tr>
</table>

4.5 TRAFFIC CIRCULATION AND ACCESS

- When traffic circulation and access to a neighbourhood are being planned, it shall be determined whether through traffic should be encouraged or discouraged.
- In residential areas, the number of access points to the arterials/collectors shall be limited. The design of internal streets shall be short, narrow, curvilinear, and tortuous.
- In areas prone to congestion due to traffic load, multiple access points shall provide for good integration in the urban network.

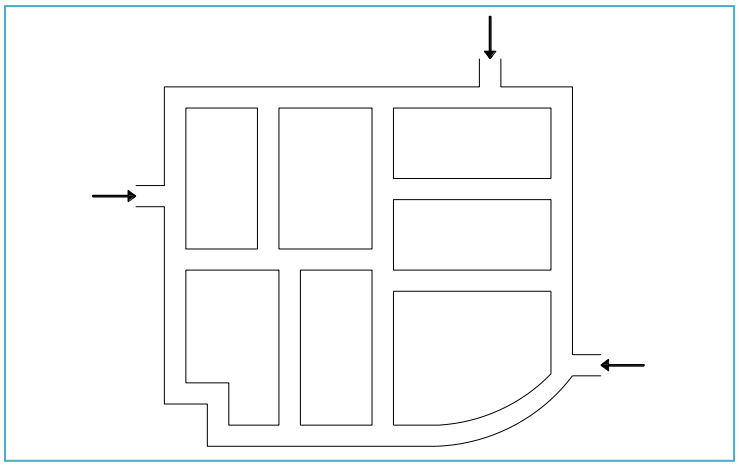


Figure 4.5 Multiple access points to neighbourhood

Grid pattern

A grid pattern shall be considered best suited for use in high-density areas and in commercial areas with widely distributed traffic flows. It is especially suited for generally flat areas, or otherwise requires extensive grading to obtain buildable plots. Variations from a typical grid (e.g. secondary loop roads) shall be encouraged for differentiation and to discourage through traffic if this is not desired.

Curvilinear pattern

Curvilinear patterns discourage direct through traffic, optimize land use, and minimize cut and fill grading operations in a diverse topography. Plots can be grouped into smaller groupings through the use of cul-de-sacs, loop courts, T-type turnarounds and short streets. The curvilinear pattern can cause confusion when attempting to traverse the area. Extensive curvilinear patterns shall be avoided for the design of commercial and industrial areas.

4.6 PEDESTRIAN SAFETY

- Pedestrian safety shall always be a concern where vehicular traffic and pedestrian movement are combined. In residential and mixed use areas there shall be an added emphasis on the safety for children.
- Parking areas, landing areas at bus stops, possibilities for crossings of wide streets at intersections and local neighbourhoods shall be planned. Where roads cross with pedestrian walkways, inter-visibility between pedestrians and emerging vehicles shall be ensured through planning measures.
- All streets in residential areas shall be designed for slow speed below 40km/hour only.
- Road designs of all hierarchy levels other than Access Roads, including on vehicular bridges, shall include footways on either side.

4.7 PUBLIC TRANSPORT

Urban areas with populations 45,000 and over are considered to be in need of a public transportation system in the form of at least a single-modal bus, supplemented by minibus and taxi operations.

- An adequate network of arterial roads shall be established to enable efficient access of and within urban locations through public transport.
- Urban design shall be supportive to walking, cycling and public transport.
- The distance between bus and / or minibus stops shall be 500 m– 800 m.

Table 4.7. Standards for Bus Terminal Area Requirements

Type	Site areas per bus	Location
Urban transport terminal	100 m² per bus	
Intercity transport	150 m² per bus	Near town centre where transfer to local transport is convenient
Long distance coaches	150 m² plus additional area for affiliated and related facilities	

Bus and Minibus Transport

Every bus route shall have two terminal points. They fall into three basic categories:

- Service terminal point which is a simple turning only facility that gives access to a stacking area for the operation of 1 or 2 routes
- Bus terminal which includes bus turning, stacking and passenger waiting facilities and accommodates the operation of a number of bus routes

- Public transport interchanges for buses, minibuses and taxis.

All bus termini and public transport interchanges shall be located off-street if possible. In some circumstances a service terminal point may be temporarily located on-street but it shall never obstruct vehicular and pedestrian circulation.

4.8 PETROL STATIONS

Petrol (filling) stations should be located on trunk, primary, and secondary roads. This should be set out after careful studies of local conditions pertaining to the following:

- Type of use of the adjoining buildings
- Size and shape of the site
- Traffic volume and adjoining streets
- Link with the main traffic flow
- Distance from the nearest junctions
- Distance to the nearest filling stations and related accessories

Table 4.8. Standards for petrol (filling) stations

Type	Location	Catchment	Min. Site requirement (ha)	notes
Petrol Station and Car Workshops	in selected neighbourhoods at 25 or 30 km intervals between major urban centres	>=5,000	in residential areas: 0.1 – 0.2 in non-residential areas: >=0.3	on main roads

- Petrol stations shall be easy to turn into, easily visible, recognizable from a distance, and located near the road.
- Access to petrol stations shall be 2-ways, or preferably a separate entry and exit should be provided and clearly marked, each at least 7.3m wide and separated by at least 20m of landscaped area. A system of one way working should be operated.
- Fuel tankers shall have enough space to turn and avoid blocking any traffic flow within or outside of the petrol station

Volume 5

Technical Infrastructure Standards & Guidelines

5 TECHNICAL INFRASTRUCTURE STANDARDS AND GUIDELINES

Volume 5 provides guidelines and standards for technical infrastructure planning and development. It provides detailed guideline for water resources, waste management, and electricity supply including renewable energy, gas and telecommunication services and storm water control and management. It has to be used during the master planning and layout (detailed) planning stages.

Utility services are components of basic technical infrastructure and the planning for their provision should be integrated into the overall planning of new development areas. Therefore various government departments and utility companies should be coordinated.

There shall be adequate coordination during planning and implementation, and physical separation between utilities. The actual width of the dedicated reserves will be depended on the total widths of the types of utilities to be accommodated. Early consultation with the relevant utility companies and concerned departments at the planning stage are necessary.

Table 5.1 Land requirement for Technical Infrastructure

	Facility	Min. site requirements (ha)	Catchment population	Notes
Technical infrastructure	Water tank	0.06	>5000	One water tank with capacity of 200 m^3
	Landfill site	0.12	>5,000	A sanitary landfill site should be designated at an appropriate location outside of the residential area
	Garbage collection point	40 m^2	>500	1 garbage collection point with a minimum of 40 m^2 per 500 inhabitants

5.1 WATER SOURCES AND SUPPLY

Access to clean water is a right of every citizen. Unfortunately, big portion of population do not have access safe drinking water. The availability of good quality water for everyone should be ensured. This is not just for drinking, but also for sanitation, agriculture, and industrial use. Urban water supply in Puntland usually comes from groundwater tapped by boreholes, or water is pumped from rivers and lakes into elevated storage tanks, or tankers, or carts for direct delivery to consumers.

Natural water sources should be protected from urban and industrial developments and other sources of pollution. Further policy requirement for each type of fresh water sources is proved at below table

When selecting a water source, the following shall be considered:

- Springs shall be of sufficient capacity and adequate quality.
- If the use of springs is not possible, the exploration of groundwater resources shall be considered as second best option.
- If ground water is not available, surface water like rivers, streams or lakes shall be considered.
- If none of the above sources is available locally, a long distance water supply is the only alternative; rain water harvesting is to be considered as a complementary water supply for households and small communities.

Table 5.2 Water sources and requirements

Water Sources	Requirements
Spring	▪ A spring shall be properly tapped and protected from pollution with a constructed structure for the collection point, and with a protective cover for the catchment area to prevent the contamination of water. ▪ Water from springs may be collected at the site or, in gravity flow schemes, piped to storage tanks which can then supply tap stands in communities several kilometres from the source. The supply is not secured because delivery is changing when exploited. ▪ A spring used as a potable water source shall not be a stream which has gone underground and is re-emerging. ▪ The source of a spring and the collecting area shall not be polluted by surface runoff. ▪ There shall be no latrines within 30 m upstream of a spring. ▪ A spring which is planned to be connected to a piped water system shall be on higher elevation than the area to be supplied. ▪ The spring tank shall not be built on swampy ground, in a flood prone zone or zone prone to erosion and it shall be designed in a way that the flow from the protected spring does not cause erosion or damage. An area around a spring tank shall be fenced. ▪ A temporary diversion of the spring water is required during construction of the collection chamber.
Ground Water	▪ Before ground water is being extracted, the extend and nature of aquifers shall be examined by collecting hydro geological information and mapping the aquifers, springs, water table, piezometric levels, yield of ground water extraction sources and their water quality. ▪ The maximum extraction shall be fixed so that it does not exceed the natural recharge. ▪ In the watershed of an aquifer, impervious land coverage shall be minimized to less than 20 % to reduce storm-water runoff, downstream flooding, and water contamination, and to maintain groundwater recharge. ▪ Water sources and the catchment area for water supply including the confining bed of aquifer and the water bodies of lakes shall be protected from pollution. ▪ A borehole shall have a minimum distance of100 m from sources of potential pollution such as latrines, septic tanks, refuse dumps, cattle kraals, dip tanks and cemeteries. ▪ The following land uses shall not be permitted within 100 m of an aquifer: businesses that use hazardous chemicals, solid waste disposal including such facilities, seepage lagoons, hazardous waste storage, storage, pipelines that transmit oil/gasoline/or hazardous materials, and pit latrines **Wells** ▪ Hand-dug wells may be used to extract groundwater in rural areas for water supply at communal and household level. ▪ Hand-dug wells shall be restricted to soft ground (clay, sand and gravel). Depending on

	ground stability and the ground water table, they may exceed a depth of 50 m. ▪ The minimum diameter of a hand-dug well shall be 1,20m. ▪ Hand-dug wells shall be lined with brick or stone masonry, locally cast concrete, or pre-cast concrete rings for protection from collapse. ▪ Below the water table the lining shall be porous, allowing water to penetrate and be stored for use. ▪ Above ground, a raised concrete cover shall be used to stop polluted surface water from entering. ▪ Drainage channels and soakways shall be used to prevent puddles of wastewater. ▪ Tube wells shall be sunk by experts with specialist tools. ▪ Tube wells shall only be built where the ground is soft. ▪ There shall be a well pit for access to the well ensuring that the aquifer would not be contaminated from the surface. ▪ Eroding of the aquifer material has to be prevented. ▪ Traditional unlined, uncovered or shallow hand-dug wells shall be improved by making them deeper or wider, lining them and adding a sealed cover with a pump **Boreholes** ▪ A hydro-geological survey shall be conducted to locate water. ▪ Engine-driven augers and rock drills shall be used to sink a borehole where the water table is very low, or where the ground is particularly hard. ▪ A borehole shall have a minimum distance of 100 m from sources of pollution, such as latrines, septic tanks, refuse dumps, cattle kraals, dip tanks and cemeteries. ▪ Extracted borehole water shall not contain surface active agents, pesticides and polychlorinated biphenyls, mineral oil, poly-nuclear aromatic hydrocarbons, and radioactive materials. ▪ Sand and gravel in uniform grain size shall be used as filter material between borehole and filter pipe. ▪ Drilling boreholes shall not be permitted in medium and high density residential and mixed use areas.
Surface water	▪ Surface water collected from lakes and rivers shall be treated before use for human consumption. ▪ Intakes shall be above the level of a sewerage outlet or outlet of industrial waste waters into a lake/river. ▪ The bottom of intakes from rivers shall be at least 1m above ground to prevent boulders or stones from entering. ▪ The design of the intake shall be resistant to floods ▪ Surface waters shall at least be disinfected, and usually filtered to ensure microbial safety. Contamination from human waste, livestock and other hazards shall be minimized at the source
Desalination	▪ Membrane and distillation desalination processes are very efficient at removing higher

	molecular weight organic chemicals and virtually all inorganic chemicals. ▪ Distillation and reverse osmosis may be employed as single-stage treatments or combined with only a low level of residual disinfectant ▪ During post-treatment, the water must be stabilized or demineralised prior to distribution to reduce its corrosive nature. Stabilization is commonly achieved by adding chemical constituents (calcium and magnesium carbonate) along with pH adjustment or through blending with small volumes of mineral-rich waters.

5.1.1 POTABLE WATER QUALITY STANDARDS

- When water is for human consumption, physical, chemical, bacteriological and virological standards shall be maintained.
- Potable water has to be clear from pathogenic organisms and shall not contain any harmful substances.
- Potable water shall be clear, colourless, and odourless.
- The content of dissolved materials shall be low.
- The content of iron, manganese, organic materials, and nitrogenous substances shall be low.
- Potable water shall not be corrosive.
- The insurance of quality and quantity of potable water shall be privileged before any other interests.
- For all water collection systems, potable water protection areas shall be established.
- The water quality of water in the distribution network, and on entry into the distribution system shall be regularly monitored by the responsible water labs. Surveillance should cover sources and activities in the catchment, transmission infrastructure, whether piped or unpiped, treatment plants, storage reservoirs and distribution systems.
- Surveillance of drinking-water requires a systematic programme of data collection, analysis, sanitary inspection and institutional and community aspects.
- As long as no national guideline exists, the WHO Guidelines for Drinking Water Quality shall be applied.

5.1.1.1 Water Safety Plan

- A Water Safety Plan shall ensure drinking-water supply including the prevention or minimization of contamination of source waters, the reduction or removal of contamination through treatment processes and the prevention of contamination during storage, distribution and handling of drinking-water, equally for large piped drinking-water supplies, small decentral supplies and household systems.
- A Water safety Plan shall plan the supply water that meets water quality targets; identify potential sources of contamination and how they can be controlled; validate control measures employed to control hazards; implement a system for operational monitoring of the control measures within the water system; act correctively to ensure that safe water is consistently supplied; undertake drinking water quality verification.

5.1.1.2 Control Measures Of Piped Distribution Systems

- Water entering the distribution system shall be microbial safe, and ideally should also be biologically stable.
- The distribution system shall provide a secure barrier to contamination.
    - Maintaining a disinfectant residual throughout the distribution system can provide some protection against recontamination and limit microbial growth problems.
    - Chlorination has proved s successful in controlling Naegleria fowleri in water and sediments in long pipelines.
    - Residual disinfectant will provide partial protection against microbial contamination
- Where a disinfectant residual is used within a distribution system, measures to minimize DBP production should be taken into consideration.
- Water distribution systems should be fully enclosed, and storage reservoirs and tanks should be securely roofed with external drainage to prevent contamination.
- Control of short-circuiting and prevention of stagnation in both storage and distribution contribute to prevention of microbial growth.
- The use of backflow prevention devices, maintaining positive pressure throughout the system and implementation of efficient maintenance procedures may maintain the quality of water within the distribution system
- Security measures shall be put in place to prevent unauthorized access to or interference with the drinking-water system infrastructure.

MONITORING

In piped distribution systems, operational monitoring parameters may include the following:

- Chlorine residual monitoring
- Oxidation–reduction potential (or redox potential) measurement
- Heterotrophic bacteria present in a supply Pressure measurement and turbidity

5.1.1.3 Vended Water

- Vendors transporting and delivering water to users in tanker trucks should be required to add chlorine to provide a free residual concentration of at least 0.5 mg/l at the point of delivery to users.
- Tankers should also be used solely for water or, if this is not possible, should be thoroughly cleaned prior to use.

- All components of systems associated with supplying and delivering vended water need to be designed and operated in a manner that protects water quality.
- Water storage containers, pipework and fittings should not include defects such as structural faults that allow leakage and permit the entry of contaminants.
- Cleanliness of storage containers, standpipes, taps and hoses needs to be maintained.
- Materials used in all components, including pipework, containers and hoses, need to be suitable for use in contact with drinking water and should not result in contamination of the water with hazardous chemicals or with substances that could adversely affect its taste.
- Hoses used to transfer water at kiosks or used on carts and tanker trucks should be protected from contamination (e.g. by preventing contact of the ends with the ground) and drained when not in use.
- The area around standpipes should include drainage or be constructed in a manner to prevent pooling of water.
- All components of water vending, including sources, methods of abstraction and transport, should be incorporated into a Water Safety Plan.
- Where vendors are registered or have a contract with a water utility, their operation should be regularly checked by the utility, and should also be subject to independent surveillance.

5.1.2 STORM-WATER AND EROSION CONTROL

5.1.2.1 Storm water

A storm-water management shall be part of any proposed neighbourhood development and/or subdivision.

A storm-water management plan shall contain information on road gradation, dimensions of channels, sedimentation ponds and constructed wetlands, energy dissipaters on steep slopes, discharge of effluent to natural wetlands, and erosion control measures.

Storm water management principles

- Sediment and pollutants shall be captured and treated before storm water enters the environment.
- Where there is no drainage system and to reduce storm-water loads on conventional drainage systems, the storm water runoff shall be minimized through promotion of on-site storm-water handling, and the support to storm water infiltration into the ground.
- Infiltration shall be increased by one or more of the following measures:
- Allowing water to run in sheet flow through vegetation.

- Using infiltration basins and ponds on larger sites
- Minimising impermeable surfaces wherever possible. Permeable surfaces are grass, gravelled areas or various types of paving.
- Installing permeable material below ground depending on the soil conditions.
- Storm-water runoff shall discharge into one of the following:
- An adequate soakaway or other adequate infiltration system, such as filter drains, filter strips;
- Swales, basins and ponds (on larger sites); or where that is not reasonably practicable
- A watercourse; or infiltration capacity is limited by shallow and/or sensitive groundwater and impermeable soil
- A conventional sewer.
- Infiltration measures shall be combined with rain water collection where possible.
- Sediment shall be captured before entering into wetlands.
- Pollutants shall be captured before entering the environment

Domestic storm-water removal

For domestic storm-water management, the ground shall be sloped away from house, and drainage shall lead into channels along the public road or into gardens with a soil capable of infiltration

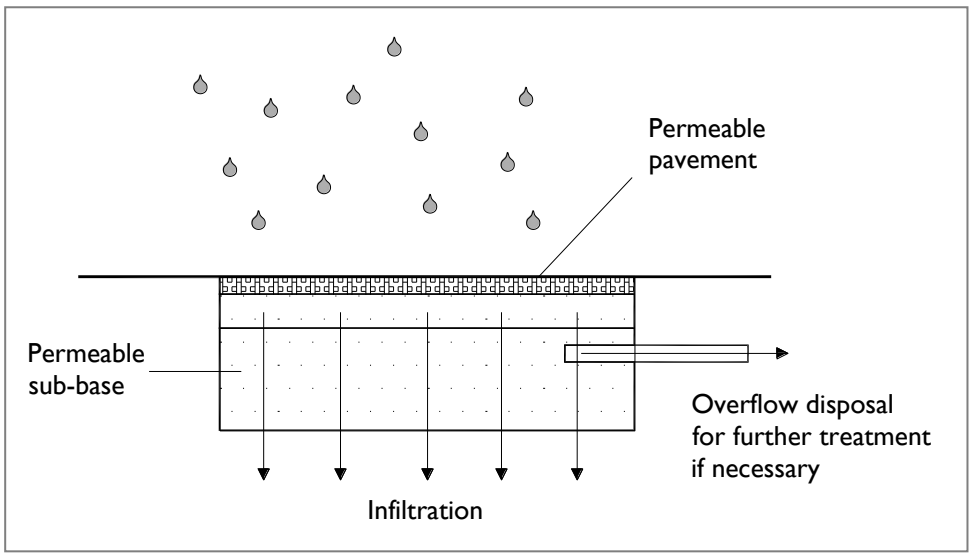


Figure 5.1 Permeable pavement (cross-section)

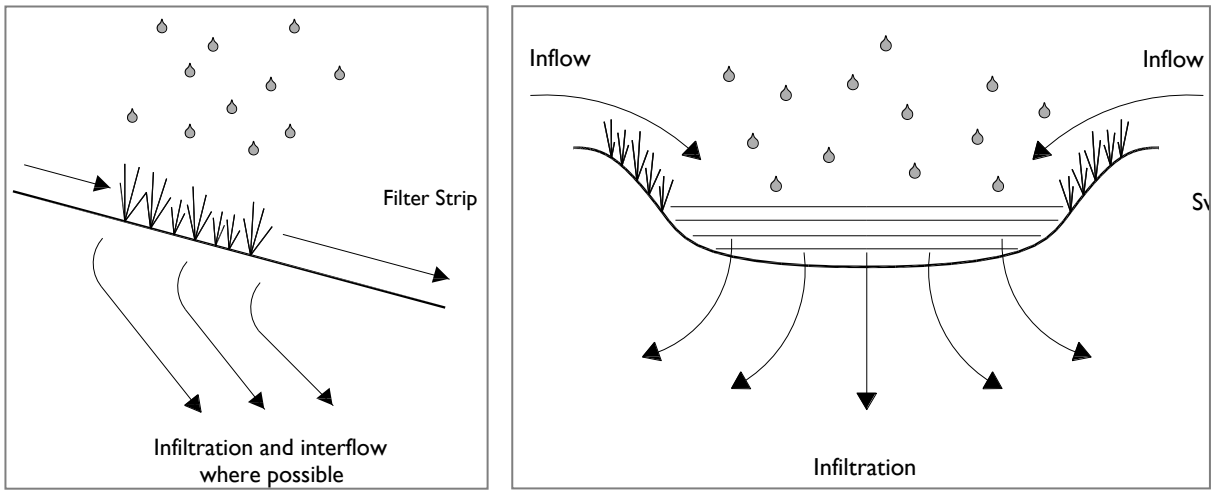


Figure 5.2 Filter strip and swale (cross-sections)

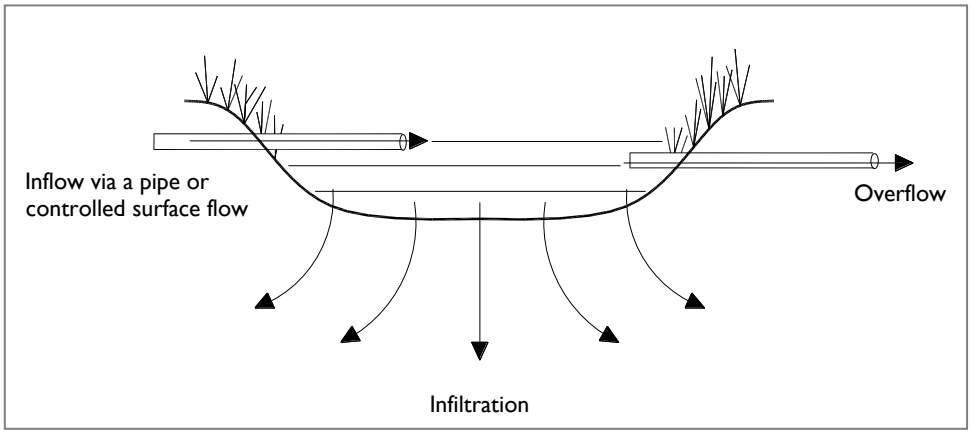


Figure 5.3 Infiltration basin (cross-section)

5.1.2.2 Erosion control

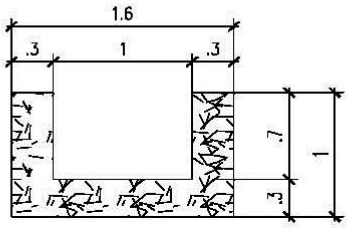
Erosion alters the natural surface runoff patterns of water by denuding large areas of vegetation, loosening the soil, changing land slopes, and accelerating site runoff, often through structural conveyance systems such as storm drains, and open channels. This can cause harmful impacts.

- Erosion from a site caused by land-disturbing operations shall be prevented or at least reduced by controlling energy, velocity, and volume of runoff through site management including soil stabilization and structural measures.
- The impact on slopes steeper than 15% and on highly erodible soils shall be avoided.
- Natural vegetation and other areas that filter runoff and reduce erosion shall be preserved.
- The amount of impervious area shall always be kept at a minimum.
- During construction projects, the area to be disturbed shall be limited.
- To avoid area-wide clearing, it shall be considered to stage a construction project into construction phases.
- During construction projects, retaining walls shall be considered to reduce the development footprint.
- The planned sequences of construction shall include erosion control measures, maintenance, upkeep and inspection of the measures in the plan.

5.1.2.3 Storm Water Drainage

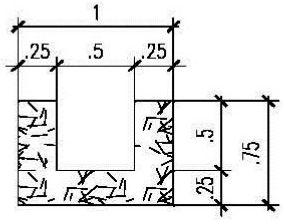
For urban areas with flooding problems, an underground piped network combined with a small number of open ditches is recommended. In areas of low rainfall, roads and open areas should be designed to allow easy surface runoff. Underground networks for storm drainage should be designed separately from the sewage networks wherever financial resources allow, so that the problems of low flows, clogging, etc. will be mitigated.

kst = 60 Masonry Channel



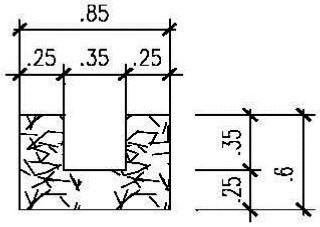
J [%]	B [m]	H [m]	Rhy	V [m/s]	Q [m3/s]
0.50	1.00	0.70	0.29	1.87	**1.31**
0.75	1.00	0.70	0.29	2.29	**1.60**
1.00	1.00	0.70	0.29	2.64	**1.85**
1.25	1.00	0.70	0.29	2.95	**2.07**
1.50	1.00	0.70	0.29	3.23	**2.26**

kst = 60 Masonry Channel



J [%]	B [m]	H [m]	Rhy	V [m/s]	Q [m3/s]
0.50	0.50	0.50	0.17	1.28	**0.32**
0.75	0.50	0.50	0.17	1.57	**0.39**
1.00	0.50	0.50	0.17	1.82	**0.45**
1.25	0.50	0.50	0.17	2.03	**0.51**
1.50	0.50	0.50	0.17	2.23	**0.56**
2.00	0.50	0.50	0.17	2.57	**0.64**
2.50	0.50	0.50	0.17	2.87	**0.72**
3.00	0.50	0.50	0.17	3.15	**0.79**
3.50	0.50	0.50	0.17	3.40	**0.85**

kst = 60 Masonry Channel



J [%]	B [m]	H [m]	Rhy	V [m/s]	Q [m3/s]
0.50	0.35	0.35	0.12	1.01	**0.12**
0.75	0.35	0.35	0.12	1.24	**0.15**
1.00	0.35	0.35	0.12	1.43	**0.18**
1.25	0.35	0.35	0.12	1.60	**0.20**
1.50	0.35	0.35	0.12	1.75	**0.21**
2.00	0.35	0.35	0.12	2.03	**0.25**
2.50	0.35	0.35	0.12	2.27	**0.28**
3.00	0.35	0.35	0.12	2.48	**0.30**
3.50	0.35	0.35	0.12	2.68	**0.33**
4.00	0.35	0.35	0.12	2.87	**0.35**
5.00	0.35	0.35	0.12	3.20	**0.39**

Velocity in Masonry Channels should not be higher than 3,5 m/s!

Legend:

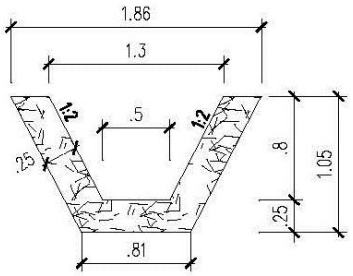
J = Gradient [%], B = Breath [m], H = Height [m]
kst = Strickler Coefficient [m $^{(1/3)}$ /s]
Rhy = Hydraulic Area [m2] = A / l $_u$
lu = Hydraulic Wet Parimeter [m]; A = Area Channel Section [m2]
V = Average Velocity [m/s]
Q = Discharge (Quantity) [m3/s]

Formulas:

*Gaukler-Manning-Strickler-Formula: V = kst * Rhy $^{2/3}$ * J $^{1/2}$*
Continuity Condition: V = Q / A

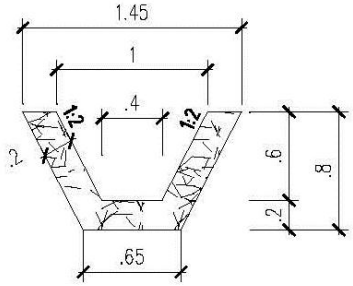
Figure 5.4 Common sample dimensions for rectangular storm-water drainage channels.

kst = 60 Masonry Channel



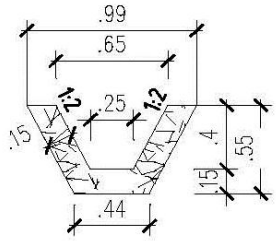
J [%]	B_{up}	B_{down}	H [m]	Rhy	V [m/s]	Q [m3/s]
0.50	1.30	0.50	0.80	0.31	1.96	**1.41**
0.75	1.30	0.50	0.80	0.31	2.08	**1.50**
1.00	1.30	0.50	0.80	0.31	2.78	**2.00**
1.25	1.30	0.50	0.80	0.31	3.10	**2.23**
1.50	1.30	0.50	0.80	0.31	3.40	**2.45**

kst = 60 Masonry Channel



J [%]	B_{up}	B_{down}	H [m]	Rhy	V [m/s]	Q [m3/s]
0.50	1.00	0.40	0.60	0.24	1.64	**0.69**
0.75	1.00	0.40	0.60	0.24	1.74	**0.73**
1.00	1.00	0.40	0.60	0.24	2.32	**0.98**
1.25	1.00	0.40	0.60	0.24	2.60	**1.09**
1.50	1.00	0.40	0.60	0.24	2.85	**1.20**
2.00	1.00	0.40	0.60	0.24	3.29	**1.38**

kst = 60 Masonry Channel



J [%]	B_{up}	B_{down}	H [m]	Rhy	V [m/s]	Q [m3/s]
0.50	0.65	0.25	0.40	0.16	1.24	**0.22**
0.75	0.65	0.25	0.40	0.16	1.31	**0.24**
1.00	0.65	0.25	0.40	0.16	1.75	**0.31**
1.25	0.65	0.25	0.40	0.16	1.95	**0.35**
1.50	0.65	0.25	0.40	0.16	2.14	**0.39**
2.00	0.65	0.25	0.40	0.16	2.47	**0.45**
2.50	0.65	0.25	0.40	0.16	2.76	**0.50**
3.00	0.65	0.25	0.40	0.16	3.03	**0.55**
3.50	0.65	0.25	0.40	0.16	3.27	**0.59**
4.00	0.65	0.25	0.40	0.16	3.50	**0.63**

Velocity in Masonry Channels should not be higher than 3,5 m/s!

Legend:

J = Gradient [%], B = Breath [m], H = Height [m]
kst = Strickler Coefficient [$m^{(1/3)}$/s]
Rhy = Hydraulic Area [m2] = A / l_u
lu = Hydraulic Wet Parimeter [m]; A = Area Channel Section [m2]
V = Average Velocity [m/s]
Q = Discharge (Quantity) [m3/s]

Formulas:

Gaukler-Manning-Strickler-Formula: $V = kst * Rhy^{2/3} * J^{1/2}$
Continuity Condition: V = Q / A

Common sample dimensions for rectangular storm-water drainage channels, contd.

5.2 WASTE AND TREATMENT

- When establishing wastewater systems, it shall be ensured that ground and surface water pollution (e.g. from nutrients and pathogens) is prevented.
- Waste water shall be treated to level not to exceed assimilative capacity of environment.
- The quality of effluent shall be audited before returning to the environment.
- Waste water conduction through gravity shall always be preferred.
- Sewer treatment facilities shall be located at the lowest point of a settlement and ideally of the watershed.
- Energy generation shall be promoted as a secondary benefit of treatment.
- The design of a sewer which will be tied into an existing system shall take into account information on the downstream system.
- The minimum distance required of any sewer line to potable water exit points shall be 15 m.
- Water mains and sewers shall be separated horizontally.
- Sewers shall always be located below water mains.
- Percolation tests shall be performed in the area of disposal fields to determine the soil absorbance rate for the effluent.
- Soil absorption systems and stabilizing ponds shall not be located in flood prone areas.

5.2.1 WASTE WATER CONDUCTION

Table 5.3 Waste water conduction

Waste water conduction	Requirements
Sewer systems	▪ Sewers can be designed as separate, partially combined or combined, carrying only wastewater, some storm-water in addition to wastewater, or the full wastewater and storm-water flows. ▪ The owner or occupier of any premises, or the owner of a private sewer, is entitled to connect to any available public sewer to discharge domestic waste water and storm-water on application to the service provider.
Manholes	▪ A manhole shall be provided at connections of sewer lines, especially between main sewer line and secondary sewer line. ▪ Manholes shall be placed at every junction of two lines, change in diameter of lines, change in alignment of lines, change in slope, at a regular frequency depending on the diameter even for straight lines.
Junction and inspection chambers	▪ Junction chambers shall normally be provided at every connection to the sewer. ▪ Inspection chambers shall be provided at changes in direction and at intervals of no more than 30 m for simplified sewers and 100 m for public collector sewers. ▪ At changes of sewer diameter the sewers shall be aligned to invert in junction and inspection chambers.
Sewer lines	▪ For public collector sewers, provision for storm-water flows shall be made at design stage. ▪ The sewer shall be designed so that at a peak flow any deposited material is washed away to achieve self-cleaning velocity. The diameter is calculated from the discharge, self-cleaning velocity, pipe material, and slope. ▪ Sewer lines shall be made from brick, concrete, stoneware, vitrified clay, iron, steel, ductile iron, plastic, polyethylene, glass fibre reinforces plastic, or other material as approved by the Local Council. ▪ There shall be no sewers below the groundwater table. ▪ Water mains and sewers shall be separated horizontally. ▪ Sewers shall be located below water mains. ▪ The minimum distance between any sewer line and drinking water at exit point shall be 15 m. ▪ Cover of a sewer line is required, as soon as it is necessary to provide protection against imposed loads, particularly vehicle loads, and to allow an adequate fall on house connections. The cover can be reduced when laying sewer lines away from heavily trafficked areas.

Table 5.4 Minimum cover for concrete pipes laid in lanes and roads

Heaviest Vehicle	Minimum Cover
Motorcycle	25 cm
Light car or van	35 cm
Cars, donkey carts, small trucks	40 cm
Occasional trucks	50 cm

5.2.2 SEWER SYSTEM

Table 5.5 Sewer system and requirement

Sewer system	Requirements
Conventional gravity sewer system	Conventional gravity sewers are large networks of underground pipes that convey black- water, grey-water and storm-water from individual households to a centralized treatment facility using gravity, and pumps where necessary. Conventional gravity sewers do not require onsite primary treatment or storage of the wastewater. Conventional gravity sewers require a centralized treatment facility that is able to receive the wastewater. ▪ Conventional gravity sewers shall not be used in areas with high groundwater table, or in flood prone conditions. ▪ When a downhill grade cannot be maintained, a pump station must be installed. ▪ Primary sewers shall be laid beneath
Simplified Sewerage system	Simplified neighbourhood systems are laid in-block instead of in-road in privately used land instead of public space, which can significantly reduce the length of sewer and costs. The diameter of pipes is much smaller than for conventional systems. ▪ Simplified sewerage shall always be considered for population densities higher than 150 p/ha. ▪ Simplified sewerage shall only be considered where a reliable water supply is available on or near each plot and where total water use is at least 60 litres / person / day. ▪ Simplified sewer systems shall be designed as separate system for waste water only, but with some allowance for the entry of storm flows. ▪ Settlement tanks shall be considered to precede sewers when water use is lower than 30 litres / person / day. ▪ Draining water from yards and roofs to the sewer shall be discouraged. ▪ Plots shall have a simple gully trap to attenuate flows to the sewer and catch grit before it enters the sewer.

	▪ Simplified sewerage shall be designed with the objective of minimizing cover (often <40 cm) by locating sewers away from heavy traffic and close to existing sanitary facilities. ▪ A small individual household grease trap shall be installed to intercept the kitchen wastewater before it is discharged into the sewer. ▪ The minimum sewer diameter shall be 10 cm; the assumed minimum flow shall be 1.5 litres / second. ▪ The minimum permissible sewer gradient may be flatter when construction quality is high.
Grinder pump pressure sewer system	Grinder pumps collect wastewater from the home and grind it into slurry. The slurry is conveyed to a larger sewer main or directly to a wastewater treatment plant. The system requires power because it is usually based on pumping. ▪ The system shall employ small diameter pipe ▪ Lines shall be laid in narrow shallow trenches that can follow natural grade and do not cause destruction of natural or built features. ▪ The service and main collection lines shall be designed to ensure enough velocity to scour lines and prevent excessive build-up or clogging.

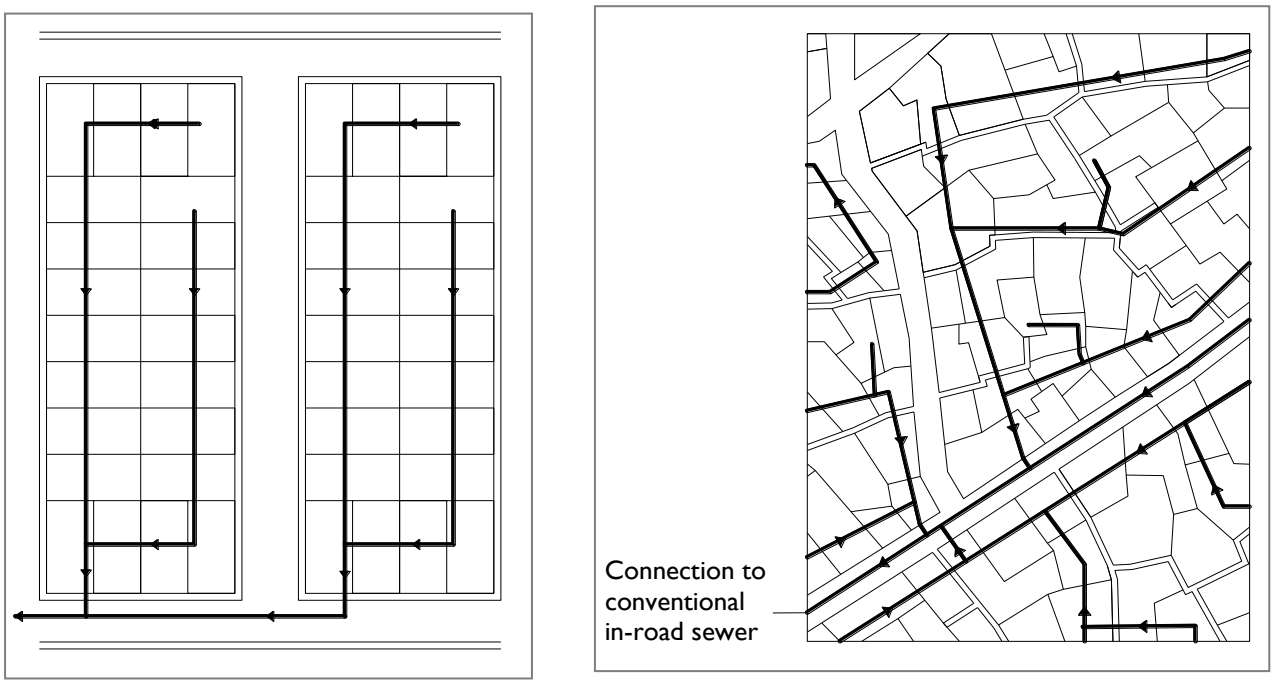


Figure 5.5 Simplified sewerage system in a regularly laid-out neighbourhood and in an irregularly grown neighbourhood.

5.2.3 WASTE WATER TREATMENT

- Waste water is a carrier of many disease producing organisms (pathogens) and shall therefore be treated to remove the risks of transmitting diseases.
- When a private sewage disposal system malfunctions, the system shall be corrected within 15 days or as otherwise specified by the Local Council.
- Waste water shall be treated in different stages:
    - Primary (septic tanks, settlement tanks, and stabilization ponds),
    - Secondary (reed beds, percolating filters, package plants, and waste stabilization ponds),
    - Tertiary (percolating filters, waste stabilization ponds, leach fields and soakways).
- Primary treatment of waste water sewage shall always be provided prior to any further treatment process and/or to soil effluent dispersal.

5.2.3.1 Primary Treatment

Table 5.6 Waste water treatment (primary)

Waste water treatment	
Primary treatment	**Septic tank systems** ▪ A septic tank shall either be followed by a soak away, leach field or other secondary treatment for the discharge of effluent, or shall be connected to a sewer. ▪ Septic tanks shall be made from precast concrete, cast in place concrete, fiber-glass or fiber reinforced plastic, or polyethylene. ▪ Septic tanks shall be water tight without any seal coating. ▪ Water tightness must be ensured during varying operating conditions. ▪ The tank shall be tested for water-tightness at factory and after installation. ▪ The following preconditions shall to be fulfilled when using a septic tank: - There must be a water connection on site. - Minimum plot size where installed shall be 300 m2. - Vehicular access shall be ensured for sludge emptying. - The terrain shall not be sloped more than 5 %. - The terrain shall not be rocky, unless installed above ground. ▪ The adequate depth of the tank shall be determined in dependence of site conditions, depth of sewer line, and use of pumps. Generally, a septic tank shall not be placed any deeper than necessary. ▪ Septic tanks shall not be permitted in potential flooding areas, in areas with regular high rainfall and in areas with high groundwater level < 2 m. ▪ Septic tanks shall not be used on ridges and hilltops. ▪ The minimum distance from a septic tank and effluent absorption area to water lines shall be 15 m. ▪ The minimum distance of septic tank and effluent absorption area to fresh water bodies, water access points, boreholes, wells, or springs shall be 30 m. ▪ Septic tanks shall not be used in high density areas for individual residential plots. ▪ In residential and mixed use areas with more than 30 DU/ha which are not connected to a public sewer, large multi-chamber septic tanks shall be shared for housing clusters or rows of houses. ▪ There shall be no more than one septic tank on a residential or mixed use plot. ▪ There shall be no more than two septic tanks on a commercial, industrial or public / institutional use plot. ▪ For large scale developments and public buildings, a permeability test for the soil on the site shall be made. ▪ The drainage field of a septic tank shall not be covered with an impervious surface, such as a driveway or parking area. ▪ The vent termination and manholes of tanks shall be at least 60 cm above the design flood elevation in a flood hazard area.

	▪ Where traditional septic tank systems cannot be used for on-site sewage treatment, trickle filters, or compost toilets shall be used. ▪ A septic tank that is connected to a leach field or a soakaway can later be connected to a solids-free sewer when one is installed.
	General requirements for designing, installing and maintaining a septic tank ▪ A septic tank shall be purchased with certification and dimensions according to engineered calculation, or can also be self-constructed, if it is planned by a certified engineer and its construction supervised by such. ▪ Cast-in-place concrete tanks must be designed by a structural engineer. ▪ Structural integrity is required to withstand corrosives, pressures, and possible movement of fittings due to pumping or maintenance. ▪ The septic tank riser and all septic tank covers shall be sound and secure. ▪ Concrete septic tanks shall not be placed in the vicinity of trees. ▪ The tank shall be designed with sufficient volume to provide a 48-hour retention time. ▪ Special design considerations are required for significant rock outcrop or shallow depth to rock, shallow depth to groundwater, and access to the tank by a pump truck, any water needed for cleaning the tank or effluent filter, structural stability especially for hilly sites in locations of seismic activity or periodic problems with slope stability or subsidence. ▪ The length to width ratio 3:1 is recommended. ▪ Septic tanks shall not be smaller than 2,700 litres. ▪ The outlet should be at least 23cm below the roof of the tank to allow scum storage and ventilation. ▪ An effluent filter (screen) shall be installed on the descending leg of the outlet. This screen shall be accessible for cleaning. ▪ A vent shall be installed to allow pressure balancing between gases on both sides. Dislodging is required annually even if it is not full.
	Precast concrete septic tanks ▪ Concrete used for precast septic tanks shall be sulphate resistant, with a maximum aggregate size of 20 mm, a low water-cement ratio of about 0.35, and a minimum compressive strength of 4,000 Psi (27,560 kPa) in 28 days. ▪ The minimum width of the tank walls and bottoms shall be 80mm, and of the top slab 90 mm. ▪ Lids shall be designed with tongue-and-groove, and be sealed. ▪ The minimum concrete cover over reinforcing bars shall be 25 mm. ▪ Tanks shall not be moved from the manufacturing site to the jobsite before it has not cured for 7 days.
	Anaerobic Baffled Reactor ▪ The anaerobic baffled reactor is an improved variation of a septic tank with a series

	of baffles over which the incoming wastewater is forced to flow. This technology is appropriate at household level, for cluster housing or a small neighbourhood. The BOD is reduced up to 90% and is far superior to that of a conventional septic tank. ▪ Dislodging shall be done every 2 to 3 years. ▪ Hydraulic retention time shall be 48 - 72 hours. ▪ Up-flow velocity of the wastewater shall be less than 0.6m/h. ▪ It shall have 2 to 3 up-flow chambers.

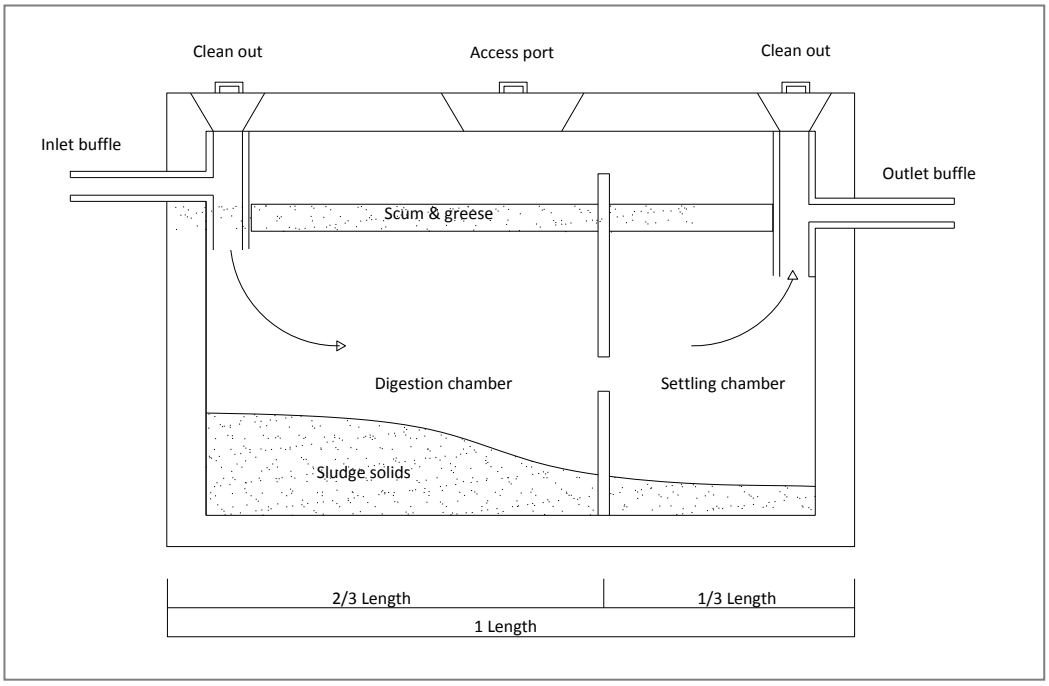


Figure 5.6 A septic tank

5.2.3.2 Secondary Treatment

Table 5.7 Waste water treatment (secondary)

Waste water treatment	
Secondary treatment	**Percolating filters** **(also called trickling filters, biological filters, bio filters, clinker beds, rotating arm systems, bacteria beds and filter beds)** ▪ They may be used for treatment of small individual residential or rural sewage, municipal sewage (large centralized systems), or industrial wastewater. ▪ The site shall be accessible for sludge removal. **Reed beds**(also called constructed wetlands) ▪ There are horizontal and vertical flow reed beds, or they may be used in combination. ▪ Reed beds may best be used in neighbourhoods or large projects. ▪ Reed beds are good treatment option for communities that have primary treatment. ▪ The technology shall not be used on slopes > 5 %, on rocky ground, and at high water tables < 2 m. ▪ Pre-treatment is required, e.g. through septic tank systems at individual plot level before the effluent is transported to the reed bed. ▪ The site shall be accessible for sludge removal.

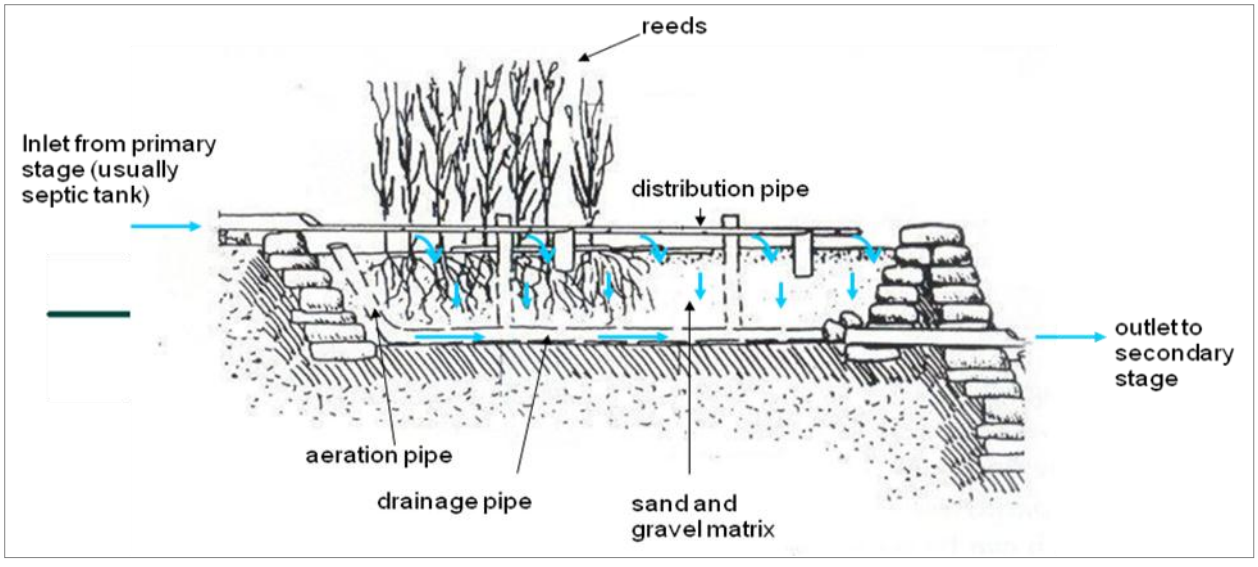


Figure 5.7 Vertical flow constructed wetland (cross-section)

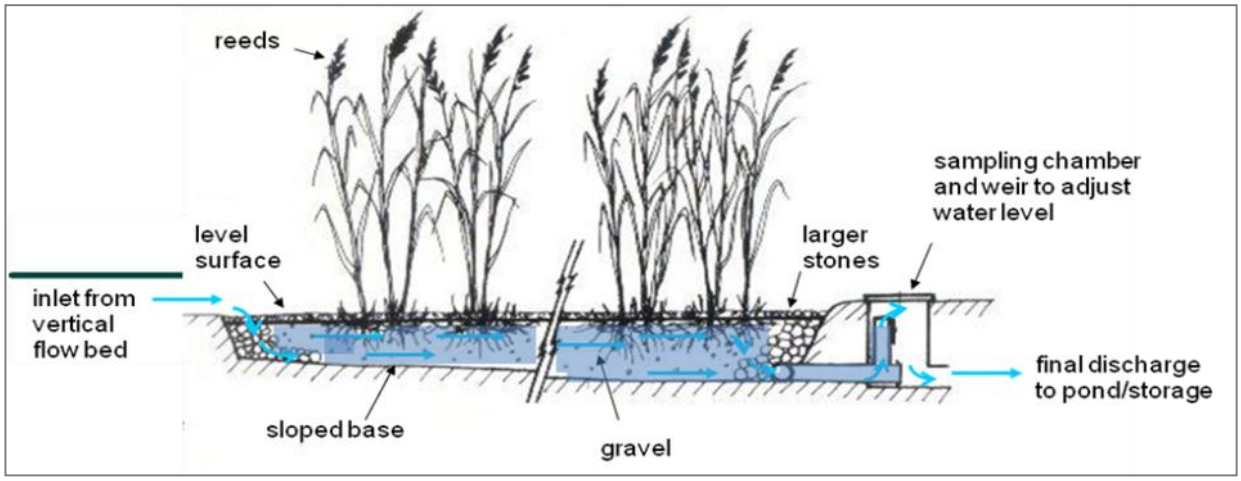


Figure 5.8 Horizontal flow constructed wetland (cross-section)

Waste water treatment (secondary), contd.

Waste water treatment	
Secondary treatment	**Package plants** ▪ Package plants may be used for the treatment of industrial waste water. The final effluent with a medium quality can be released into the environment such as receiving streams, rivers, etc. ▪ Continuous power supply shall be ensured when deciding for this system. It is recommended that electricity is generated by the developer. **Sedimentation ponds** (also called thickening ponds) ▪ Sedimentation ponds are appropriate where there is inexpensive, available space that is far from homes and businesses. ▪ Sedimentation ponds shall be located on the edge of a settlement. ▪ They shall be coupled with an onsite drying or co-composting to generate a hygienic product. ▪ They shall not be applied in terrain sloped more than 5 %, at a high water table < 2 m, in flood prone zones and/or on rocky ground. ▪ The site shall be accessible for sludge removal by a front-end loader. **Stabilisation ponds** (also called oxidation ponds or lagoons) ▪ Stabilization ponds are suitable for neighbourhood and especially for rural communities that have large, open unused lands, away from homes and public spaces. Stabilization ponds can be used for all treatment stages. ▪ Stabilization ponds shall not be used in high density housing areas with more than 150 p/ha, and in inner-urban areas. ▪ They shall not be applied in terrain sloped more than 5 %, at a high water table < 2 m, in flood prone zones, and/or on rocky ground. ▪ The site shall be accessible for sludge removal.

Waste water treatment (secondary), contd.

Waste water treatment	
Secondary treatment	**Intermittent Sand Filters** (also called slow sand filters) ▪ Intermittent sand filters are simple, low cost solutions which require minimal operating energy. In some cases, they can operate purely on gravity. ▪ Intermittent sand filters shall be planned inbig areas with suitable sandy filter media only. ▪ They shall especially be considered on sites that have shallow soil cover, inadequate permeability, high groundwater, and limited land area. **Anaerobic filter** ▪ This technology is appropriate at household level, for cluster housing or a small neighbourhood. ▪ It shall only be used if water use is high and supply of wastewater is constant. ▪ It shall not be used on rocky ground. **Biogas digesters** ▪ This technology shall be applied especially when off-grid solutions become necessary, and especially for public buildings with many users, such as schools, prisons, dormitories, etc. ▪ For appliance with private houses, one digester can connect to one or a number of households and can be designed accordingly. ▪ Biogas digesters shall not be used in potential flooding areas, areas with regular high rainfall and areas with high groundwater level < 2 m, except when built above ground. ▪ They shall only be used when there is regular water supply on site. Rain water shall be used as far as possible in digestion. ▪ For fixed dome digesters, the minimum plot size is 300 m^2 except when one system is shared in a housing cluster. For smaller plots, small plastic-drum-based biogas digesters shall be encouraged. ▪ Access for dislodging by a vehicle shall be possible. ▪ The terrain may be sloped but special attention shall be given to the prevention of landslides.

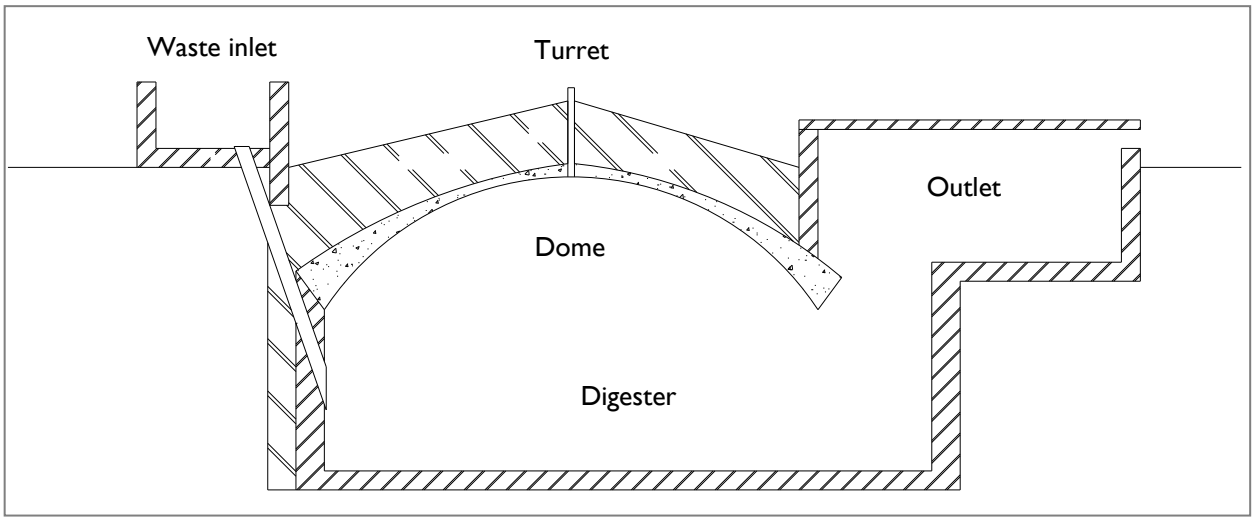


Figure 5.9 Biogas digester (cross-section)

5.2.3.3 Tertiary Treatment

Table 5.8 Waste water treatment (tertiary),

<table>
<tr><th colspan="2">Waste water treatment</th></tr>
<tr><td>Tertiary treatment</td><td>
Leach fields & soakways

Leach fields and soakways shall be used in combination with septic tank, reed bed or percolating filter.
They shall not be placed in areas with regular high rainfall.
They shall be more than 2 m above water table.
Soil absorption sites shall not be located on land with a slope greater than 20 %.
Soil absorption sites shall not be covered or paved in the area where the effluent is discharged.
The land over a leach field shall be restricted for large vehicles.
Surface water shall be diverted away from any soil absorption site on the plot or the neighbouring plots.
A waste disposal bed of sand and gravel mounded on the surface shall be constructed in areas where the ground is insufficiently absorptive.
A soil layer of at least 1 m shall be between the bottom of the soil absorption site and the ground water or bedrock.
For sites where the layer of soil is less than 1m over high ground water, filling shall be permitted when the soil is sandy, but shall not be permitted when the soil is mainly clay and silt.
The following distances for leach fields and soakways shall be kept:

<table>
<tr><th>Element</th><th>Required distance of soil absorption system (m)</th></tr>
<tr><td>Residential building</td><td>5</td></tr>
<tr><td>Public building</td><td>7.50</td></tr>
<tr><td>Underground cistern, well</td><td>30</td></tr>
<tr><td>Water main</td><td>15</td></tr>
<tr><td>Lake, reservoir, stream, watercourse</td><td>30</td></tr>
<tr><td>Spring</td><td>30</td></tr>
<tr><td>Roadway ditch</td><td>3</td></tr>
<tr><td>Swimming pool</td><td>4.50</td></tr>
<tr><td>Plot boundary</td><td>1.50</td></tr>
</table>
</td></tr>
</table>

5.2.3.4 Decentralized waste water collection and treatment

- If public waste water sewer is not available, new developments shall include own waste water collection and treatment facilities, either individually on each plot, or by clustering several plots.

- Treatment systems using biogas digestion shall be considered especially for schools, dormitories, hospitals, prisons, and for public lavatories which serve major marketplaces and/or public buildings and transit locations.
- Where septic tank systems and biogas digesters are not possible for on-site sewage treatment, compost toilets shall be used.
- Where public sewers become available, the use of private sewage disposal system shall be phased out within a period determined by the Local Council, and the building shall be connected to the public sewer.

5.2.3.5 Domestic grey water

Untreated domestic grey water contains soap, pathogens, organic matters and nutrients (food rests, cooking oil etc) which, when untreated cause clogging of soil, prevent infiltration of water into the ground and the resulting standing water causes health and sanitary problems. Therefore,

- Untreated grey water shall not be discharged in the public realm.
- Untreated grey water shall not be discharged into pit latrines.
- Domestic treatment needs shall sufficiently remove settle able solids, fats, oil and grease.
- For plots where there is no septic tank system and no sewer connection, a small reed bed system with controlled disposal of grey water in a defined filtering area shall be installed wherever possible.
- Domestic treated effluent shall be discharged on permeable surfaces of the plot, into existing drainage channels or into an infiltration trench/ soak away.
- The re-use of treated grey water shall be promoted.
- Treated effluent may be utilized for non-human consumption including livestock, gardening, and aquaculture. It can be discharged onto gardens on the plot; ideally the discharge area is elevated so that the effluent may easily be conducted using gravity.

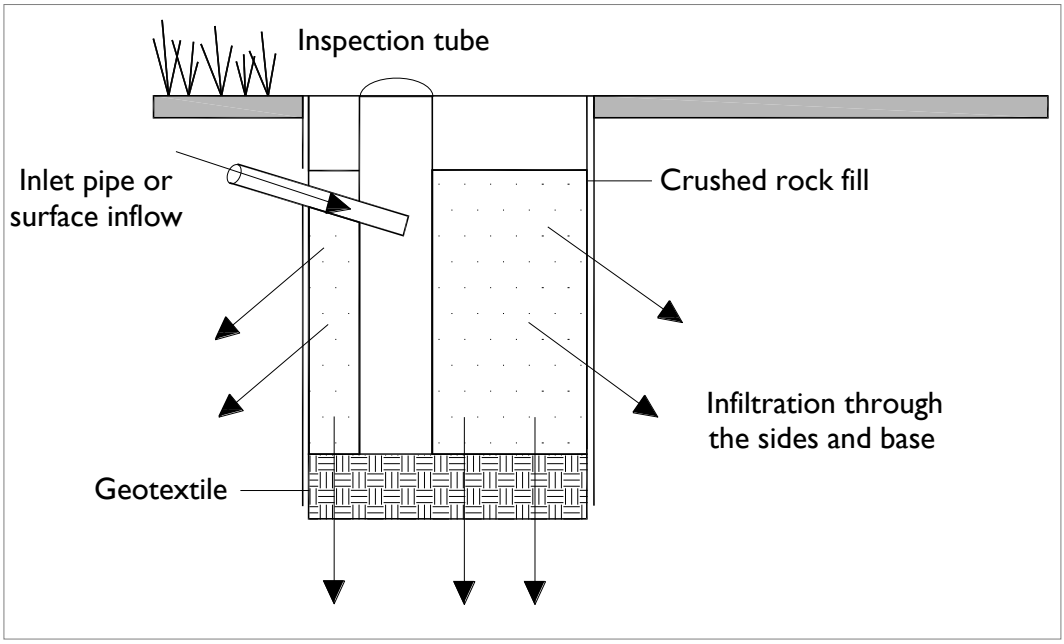


Figure 5.10 Traditional soakaway (cross-section)

5.2.3.6 Effluents

- The most appropriate wastewater treatment shall be that which will produce an effluent meeting the recommended microbial guidelines at a low cost and with minimal operational and maintenance requirements.
- A treatment plant shall achieve at least 90% reduction of BOD5 (The biochemical oxygen demand of wastewater during decomposition occurring over a 5-day period.) to less than 20mg/l and of suspended solids to less than 30mg/l.
- For fine silty and clayey soils, the concern about nutrient and pathogen removal may be lowered because of increased natural soil treatment capabilities increase, as long as hydraulic loading rates are maintained.
- When using untreated waste water for irrigation, crop restrictions shall be an accompanying measure to protect the consumer.
- The Local Council Local shall keep residents fully informed about where wastewater is used for irrigation.
- The most optimal sludge disposal with the lowest maintenance requirements is with reed beds, ponds, and composting toilets.

5.2.3.7 Industrial effluents

- Industrial waste water shall not be discharged into the environment without treatment.

- The industry and type of water produced shall be assessed on a site-by-site-basis according to the requirements of the responsible authority.
- There shall be no physical connection or cross-connection between any potable water supply and effluent discharge.

BEST PRACTICE ALTERNATIVE FOR DOMESTIC GREY WATER TREATMENT

Grey water is passed through a simple defined treatment area ("box") on the plot. The grey water may be led to this outlet through pipes or moved manually (e.g. with buckets) where no drainage system exists. The treatment box should be placed in such way to utilize any available slope. The treatment area may be above or below ground, but must be free draining and not susceptible to storm-water flooding. Treatment is achieved through a filtering system using gravel, sand and water loving plants (sedges, papyrus, reeds, Vetiver grass etc) planted between the inlet pipes.

$1m^2$ of treatment surface area is required for every 100 liters of greywater. Wastewater originating from showers, sinks, laundry, kitchen, wash water and urine (from urine separating toilet) may be passed through this system. When grey water from kitchen uses (cooking, dish-washing) is involved, a grease trap with a primary filter (sieve) and funnel must be used. Organic material captured by the primary filter may be composted.

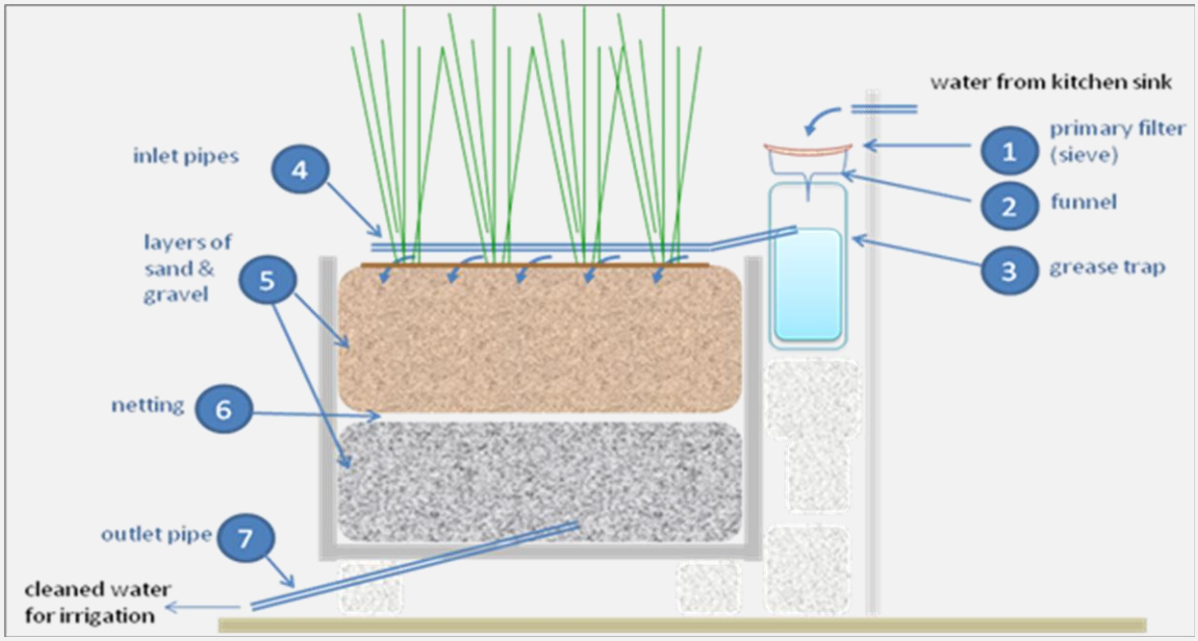


Table 5.9 Tolerance limits for industrial effluents

Characteristic	*Tolerance limits*
Total suspended solids, mg/l, max	30
Particle size of total suspended solids, mg/l	Shall pass 850 micron
Total dissolved solids, mg/l, max	500
Total residual chloride, mg/l, max	1
pH	6,5 – 9,0
Temperature (in any section of the stream within 15 m downstream from the effluent outlet), ˚C, mg/l, max	40˚C
Biochemical oxygen demand for 5 days at 20˚C, mg/l, max	60
Chemical oxygen demand after 1 hour's quiescent settlement, mg/l, max	20
Oils and grease and other liquids immiscible with water, mg/l, max	2,5
Edible oils, mg/l, max	10
Colour, TCU, max	25,0
Turbidity, NTU, max	25,0
Effluent volume/day m^3, max	5,0
Dilution ratio, effluent: receiving water body, max	8,0
Radioactive materials **Alpha emitters, u c/ml, max** **Beta emitters, u c/ml, max**	 10^{-7} 10^{-6}
Insecticides	Nil
Pesticides **Organochlorides, mg/l, max** **Organophosphates, mg/l, max**	 0,10 0,20
Carbonates, mg/l, max	0,15
Nitrogen derivatives, mg/l, max	0,05
Ammoniacal nitrogen, mg/l, max	10
Sulphates (as SO_4^{2-}), mg/l, max	800
Nitrates, mg/l, max	50
Nitrites, mg/l, max	1,0
Phenolic compounds and cresols, mg/l, max	1
Cyanides (as CN) and all compounds from which hydrocyanic acid is liberated on acidification, mg/l, max	0,05
Sulphides (as S) and all compounds from which hydrogen sulphide is liberated on acidification, mg/l, max	2,0
Flourides (as F), mg/l, max	2,0
Arsenic (as As), mg/l, max	0,05
Cadmium (as Cd), mg/l, max	0,01
Hexavalent chromium (as Cr), mg/l, max	0,05
Total Chromium, mg/l, max	0,05
Bromides, mg/l, max	8,0
Copper (as Cu), mg/l, max	2,0
Lead (as Pb), mg/l, max	0,05
Mercury (as Hg), mg/l, max	Nil
Nickel (as Ni), mg/l, max	0,01
Selenium as (Se), mg/l, max	Nil
Zinc (as Zn), mg/l, max	5
Phosphates, mg/l, max	0,15
Inorganic compounds	0,01

5.2.3.8 Toilets

Table 5.10 Toilet types and requirement

Toilet types	Requirements
Compost toilets	▪ Any Ecological Sanitation (Ecosan) certified system shall be permitted if suitable for the local conditions, depending on space, building height, and assurance of use or disposal of waste product. ▪ Compost toilets can be designed in various configurations and constructed above or below ground. ▪ Compost toilets shall always be used when no drainage system or sewerage connection is available, and one of the following conditions applies: - new construction of high density residential, usually low cost, areas, especially when each plot shall have an individual toilet. - in areas with high water table < 2 m and in flood prone areas. - in areas with limited water supply. - in areas near the lake and with high predominance of mosquitoes.
Dehydration vaults	▪ Dehydration vaults may be used to collect, store and dry (dehydrate) faeces. They can be applied under almost any condition, independent of water supply, soil type, ground water table, and availability of space, apart from space being required when constructing. ▪ There shall be two alternating vaults, allowing the faeces to dehydrate in one vault while the other vault fills. ▪ When one vault is full, it shall be sealed. ▪ The dry material from the other vault shall be removed and then put back into service. ▪ The urine shall be separated from the faeces. In the absence of moisture, organisms cannot grow, smells are minimized and pathogens destroyed. ▪ The vaults shall be watertight to prevent external moisture from entering. ▪ Chambers shall be constructed of sealed block or formed concrete, to ensure that rainwater, surface run-off, grey-water and urine are prevented from entering the vaults. ▪ For design purposes for one person 100 litres of storage space shall be assumed for every 6 months. Each vault shall be sized for the accumulation of six months of faeces to allow for a six month drying time in the out-of-service vault. ▪ A vent is required to help keep the vaults dry and control flies and odours. ▪
Pit latrines	▪ Pit latrines shall only be used on permeable soils, except when provisions are made for pumping the pit when full, and reusing. ▪ Pit latrines can best be built in silty ground. ▪ Where the ground is sandy or gravelly, special attention shall be given to soil stability

	measures and the superstructure, to avoid collapse. ▪ There shall be a minimum distance of 30m between a pit and a water source. ▪ There shall be a minimum distance of 15 m of a pit from drinking water pipes. ▪ Conventional pit latrines shall be located at a minimum distance of 6 m from any house, and minimum 3 m from any plot boundary to minimize fly and odour nuisances. ▪ In high density areas exceeding 180 p/ha, pit latrines shall be discouraged when toilets are used at each plot. If pit latrines are used in high density areas, regular emptying services shall be ensured and vehicular access to the pit latrine on the plot shall be possible. ▪ Pit latrines shall not be applied in flood prone areas and areas with high ground water table < 2 m. ▪ A pit shall be at least 2 m deep but shall be completely above the water table.
Ventilated Improved Pit Latrines	▪ Ventilated Improved Pit latrines (ViP's) shall be favoured to conventional pit latrines ▪ ViP's shall be located at a minimum distance of 4 m from any house, and minimum 2 m from any plot boundary. ▪ The chimney shall be higher than the roof.

The technology requires the four main parts:

1- A reactor (storage chamber)

2- A leachate collection system

3-An access door to remove the mature product.

4- A ventilation unit to provide oxygen

and allow gases (CO_2, water vapour) to escape

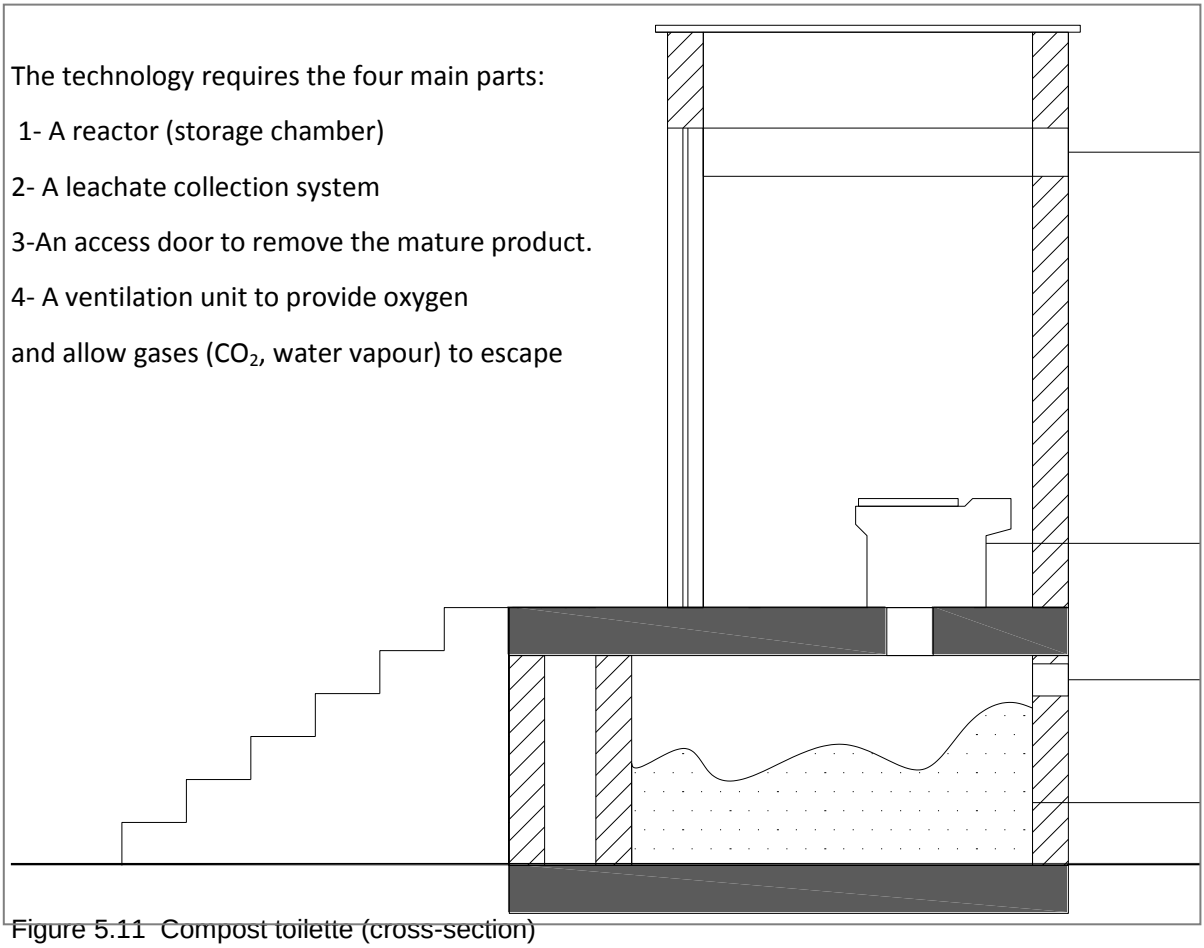


Figure 5.11 Compost toilette (cross-section)

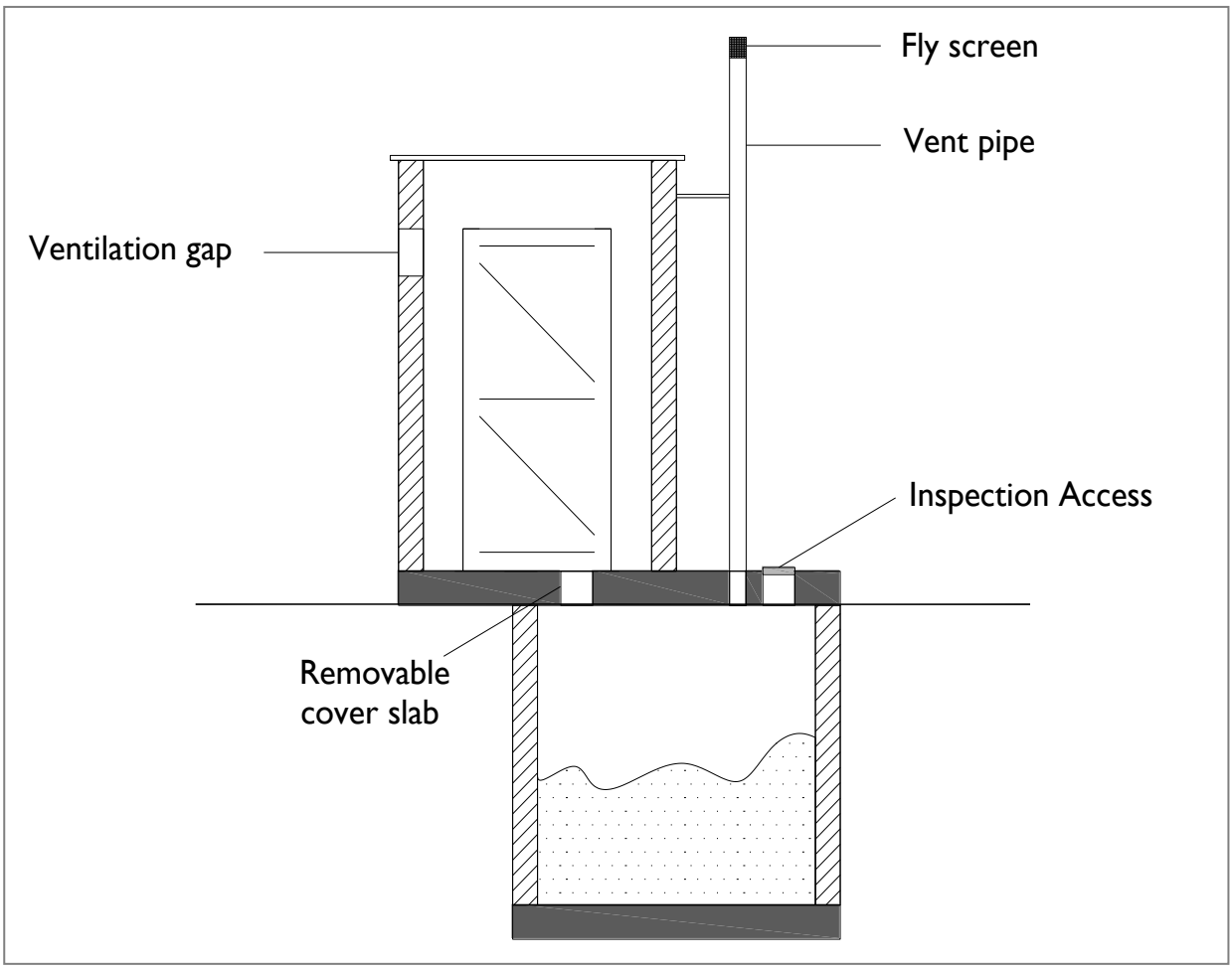
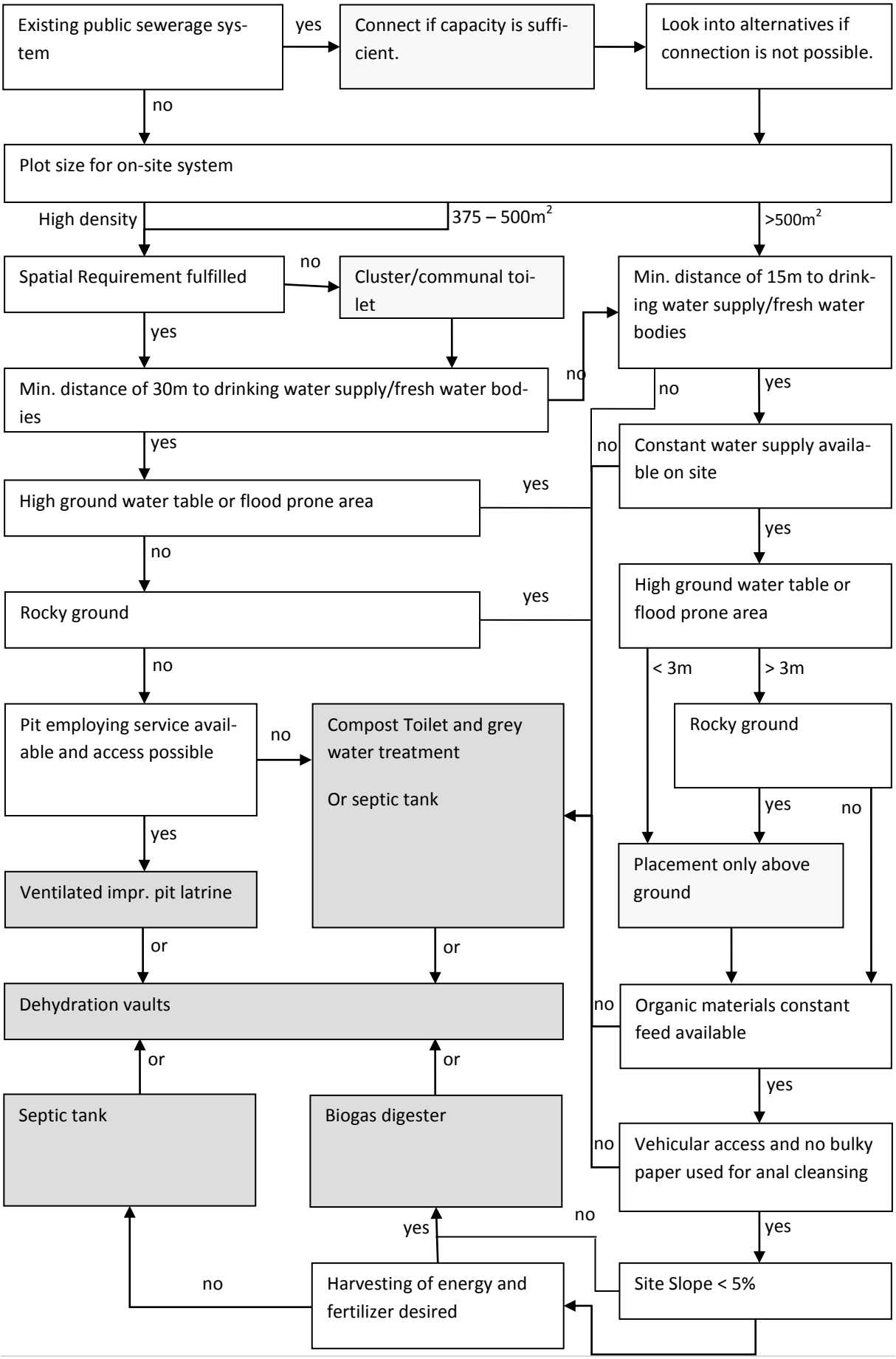


Figure 5.12 Ventilated improved pit latrine

Diagram: Decision making tool for the application of domestic toilets and waste water treatment



5.2.4 SOLID WASTE MANAGEMENT

- The following waste management hierarchy, ordered from the most to the least desirable, shall be applied in planning: avoid, minimize, recycle and re-use, treat and process, and dispose.
- Any person who generates waste shall minimize it by conserving raw materials and energy, reducing toxic emissions and wastes, reclaiming and recycling it and incorporating environmental concerns in the design, process and disposal of a product.

Table 5.11 Solid waste handling and requirements

Solid Waste handling	Requirements
Waste generation and storage	▪ Waste, other than composting material, shall be properly stored. ▪ Each business entity or office shall have waste bins for solid waste, to be collected by the Local Council. ▪ Solid waste generated in manufacturing and industrial processes shall be analysed before disposal to determine quality, nature and quantity of chemicals contained. ▪ No person shall engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment and licence. ▪ No person shall own or operate any institution that generates bio-medical waste without a valid Environmental Impact Assessment and licence. ▪ Every person who generates toxic or hazardous waste shall treat or cause to be treated hazardous waste using an incinerator or any other appropriate technology approved by the Local Council. ▪ Any person who generates bio-medical waste shall treat or cause it to be treated, or shall segregate it, and securely package it in biohazard containers, and label the containers.
Segregation and re-use	▪ Solid waste shall at the point of discard be divided into biodegradable, recyclables (plastics, metals, glasses), other non-biodegradable, and hazardous wastes. ▪ Waste collection points, separation and recycling commerce shall be co-located. ▪ A segregation area shall be located away from direct runoff zone of river or stream, allow vehicle access, and shall be covered and fenced to keep out rain and animals. ▪ Organic waste materials shall be composted, briquetted, or digested in a biogas reactor.
Transportation	▪ A person granted a licence to transport waste shall ensure that the collection and transportation of waste does not cause scattering, escaping and/or flowing out of the transportation means. ▪ Waste transportation routes shall follow an agreement with the Local Council.
Incineration	▪ On-site incineration is recommended in remote facilities where removal is not economically feasible, or in areas where waste collection would result in open

	dumping or disposal in a river course. ▪ An incinerator shall be located where: - it is not neighbouring occupied or planned buildings, or in touristic areas, - there is no chance of flooding, - no flammable roofs or inflammable materials are stored within 30 meters, - prevailing winds blow smoke away from buildings, - security risk is minimized. ▪ An incineration site shall have running water, a solid floor, lighting if 24hrs operation, fly ash containerization and storage before disposal.
Recycling	▪ The reduction of waste before reaching the landfill shall be encouraged. ▪ The recycling of as many waste materials as possible shall be supported, e.g. with the help of setting up collection depots. ▪ Recovered materials shall include dust and cinder, vegetables and putrescible, paper, metal and steel cans, rag and textile, glass, and plastic. ▪ Local Councils shall support the private sorting waste before disposal. ▪ The use of recycled materials shall be encouraged. ▪ Public institutions, e.g. schools shall be encouraged to participate in recycling activities.
Re-use	▪ The reuse of as many waste materials as possible shall be supported. ▪ Waste products shall be re-used depending on existing industries. Different types of plastic can be made re-usable as flakes, crumbs, granules, or pellets, which can be sold to the industry. ▪ Metal and glass shall be sold to the industry. ▪ Paper shall be re-used in paper production. ▪ Organic waste shall be used in biogas digestion, in briquettes or for compost manure.
Composting	▪ Domestic organic waste shall be separated and composted to use as fertilizer in agriculture.
Briquetting	▪ The organic content in a landfill site shall be reduced to reduce landfill gas released into the atmosphere by either composting or briquetting of organic waste. ▪ The use of alternative cooking fuel like pellets or briquettes, and efficient cooking stoves shall be promoted.
Disposition	▪ Deposition or disposal of solid waste shall not cause a hazard to human health or environment and not cause public nuisance. ▪ No solid waste shall be incinerated, burned, or otherwise disposed in any place except at a designated waste disposal site. This does not apply to inert waste used as fill material, mine trailings, vegetative material from land clearing, and vegetative agricultural waste. ▪ No person shall dispose any pesticide, toxic substance or any other hazardous

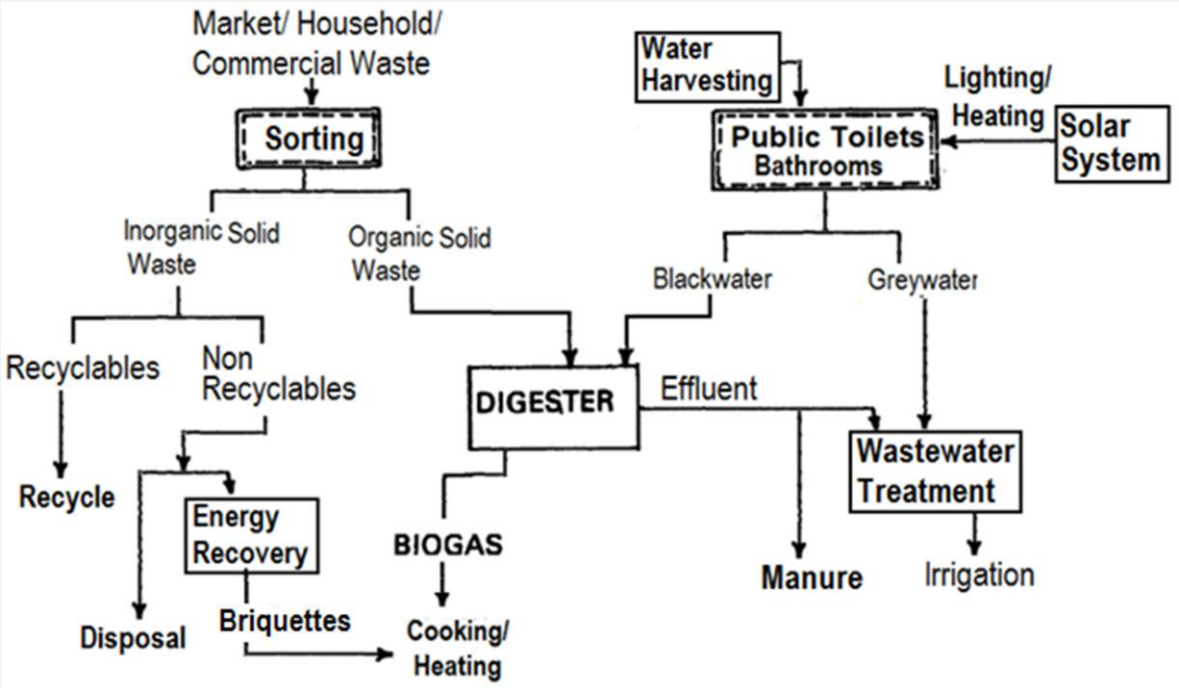
	waste in other than at a designated site or plant approved by the Local Council. ▪ Pesticides shall under no circumstances be dumped or disposed into any sewerage system.
Disposal sites	▪ Big municipal landfills shall be lined to avoid organic pollutants from liquid waste. ▪ The bottom of the lowest liner shall be more than 1.5m above historic high level of ground water. For landfills where no liner is required, the lowest level of waste shall be at least 3m above the historic high level of ground water. ▪ Technical piping systems shall be installed to collect gas and leachate and process it by burning or biological/chemical treatment. ▪ The landfill shall be designed so as to collect and treat the run-off of surface waters and other liquids resulting from a storm from the active area of the landfill. ▪ A non-commercial landfill for the disposal of maximum 20 tons / day of municipal and non-hazardous solid waste is exempt from the liner, leachate collection system, and ground water monitoring requirements. ▪ A non-commercial landfill shall only be approved if there is no evidence of existing ground water contamination, if there is no practicable waste management alternative, and if it is located in an area which receives less than 1,000 mm of annual precipitation. ▪ A non-commercial landfill for industrial solid waste shall not be established within 305 m of a park, monument, recreation area, wilderness or wilderness study area, wild and scenic river area, ecologically and scientifically significant area, farmland area, or in “prime”, “unique”, or of “government wide importance” area. ▪ A non-commercial landfill for industrial solid waste shall not be established within 400m of dwellings and residential areas, and public and institutional buildings if not otherwise allowed by zoning, and of historically valuable structures or properties. ▪ A non-commercial landfill for industrial solid waste shall not be located within 3 km of any airport runway end used by turbojet aircraft, or within 1,500 m of any airport runway end used by piston type aircraft. ▪ No new industrial landfill or extension shall be located in a subsistence area, dam failure, flood area, flood plain, wetland, above an underground mine, above a fault, above a salt bed, and near other geologic features which could compromise structural integrity. ▪ No new industrial landfill or extension shall be located in a seismic zone. ▪ No new industrial landfill or extension shall be located on public land used for a public water system, or in a location that could cause water contamination, including the water of a lake, reservoir, or pond. ▪ Partnerships with the private sector shall be explored by Local Councils to receive support e.g. in maintenance and repair of equipment, landfill site operation, waste collection and disposal in remote areas, and recycling.

BEST PRACTICE: SOLID WASTE

Managing waste and sanitation decentral in Public Private Partnerships, will help Local Authorities to cope with the challenge of service provision. Proposed is the following easily replicable scheme:

Public pay toilets and showers is located next to a produce market. The facility includes a biogas digester. The site may be used for additional communal uses, such as child care.

- Organic waste from the market, from households, and from the pay toilets is digested in a biogas reactor.
- Biogas produced from the system used as a source of energy for cooking (restaurant business at same location) and/or heating (water for public showers). The use of biogas for cooking and heating substitutes the use firewood and charcoal as sources of fuel, thereby contributing to reduced deforestation, soil erosion, air pollution, indoor air pollution and global warming.
- Effluent produced can be used as organic fertiliser improving soil fertility and structure, and the reduction of the amount of chemical fertilisers imported.
- Grey water from showers treated separate through small reed bed; effluent used for irrigation.
- Facility should have solar hot water heating if biogas is not used for heating.
- Simple solar photovoltaic for lighting (without need of inverter)
- Rain water harvesting for the use in showers and for flushing, which, however needs support from piped water as backup in dry season.
- Covered waste segregation site, where non-biodegradable materials are separated for recycling.
- Waste collection from households, or incentive to bring waste to the site through payment of money or token for the use for public facilities, or meals.
- Use of sustainable construction material through the use of compressed earth blocks, or controlled burnt bricks using for example coffee husk or tobacco stems for fuel, depending on location and local availability.



5.3 ELECTRICITY SUPPLY

Electricity can usually be supplied through a national or decentral grid, or generated through a generator or a solar photovoltaic System.

Electricity supply facilities include power generating stations, electric substations, overhead lines and underground cables.

- Power generating stations require special investigations on each project.
- The area requirement for an electric substation varies from 3,000-10,000 m2 depending on type and voltage level.
- Conductors and adjacent buildings/structures shall be physically separated.
- Safety clearance shall take into account the magnitude of swing of conductors caused by wind deflection.
- Vertical ground clearance shall be 6 m at minimum.
- High voltage lines (>= 110 KV) must not be passed over buildings or buildings constructed in the path of such lines.
- Underground wiring shall be preferred over overhead wiring.
- The working corridors shown in below table shall be adhered to for above ground transmission lines.

Table 5.12 Standards for Electrical Transmission line Regression

Voltage Level (kilo volt-kV)	Width of the preferred working corridor (m)
11	7
30	10
66	10
110	15
230	36
400	50

5.3.1 ELECTRICITY INSTALLATION

- Electrical wiring in a building must always be done by a qualified electrician.
- The national wiring regulations shall be followed.
- A domestic wiring circuit shall be protected by a fuse (5A, 10A, 20A or 30A).
- Domestic electrical wiring shall be done with cables consisting of 3 wires, which have standard colours. Red or brown shall be the colour code for Live (+); Black shall be the colour code for Neutral (-); Green or yellow-green shall be the colour code for Earth.

- Permanently installed electrical equipment shall be permanently connected to grounding conductors.

5.3.2 RENEWABLE ENERGY

- The harvesting of renewable energy shall be supported where possible, especially for off-grid energy generation.
- Biogas may be harvested for cooking fuel, or for transformation into electricity.
- Solar may be used for heating water, or for photovoltaic systems generating electricity. Photovoltaic systems can be used for water pumping systems.
- Wind power may be used mechanically, e.g. for water –pumping, or for generating electricity.
- Hydro power can be used with hydroelectric dams, through the capturing of the kinetic energy in rivers or streams without the use of dams, through pumped-storage hydroelectricity, or through tidal stream power generation and wave power generation.

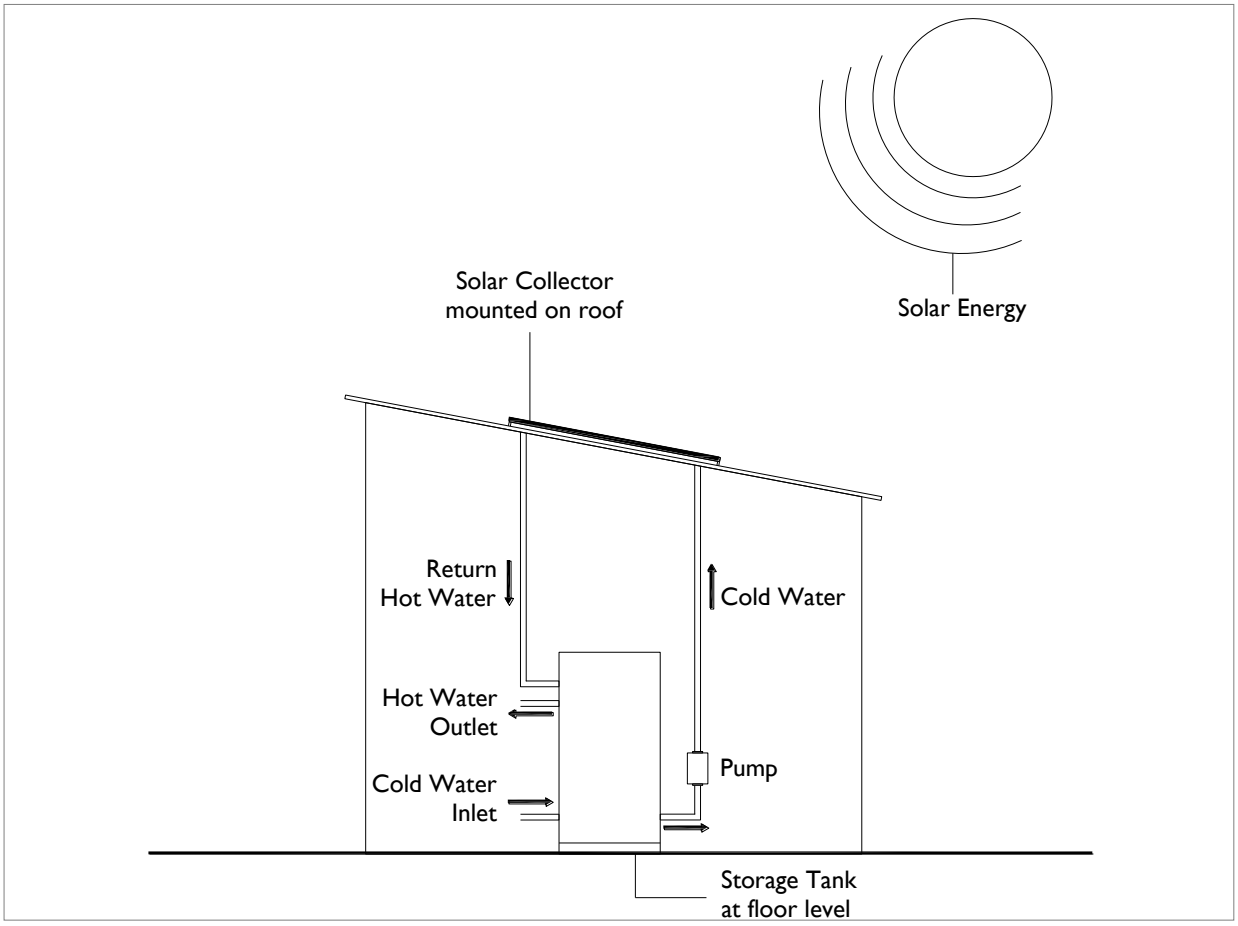


Figure 5.13 Solar water heating system

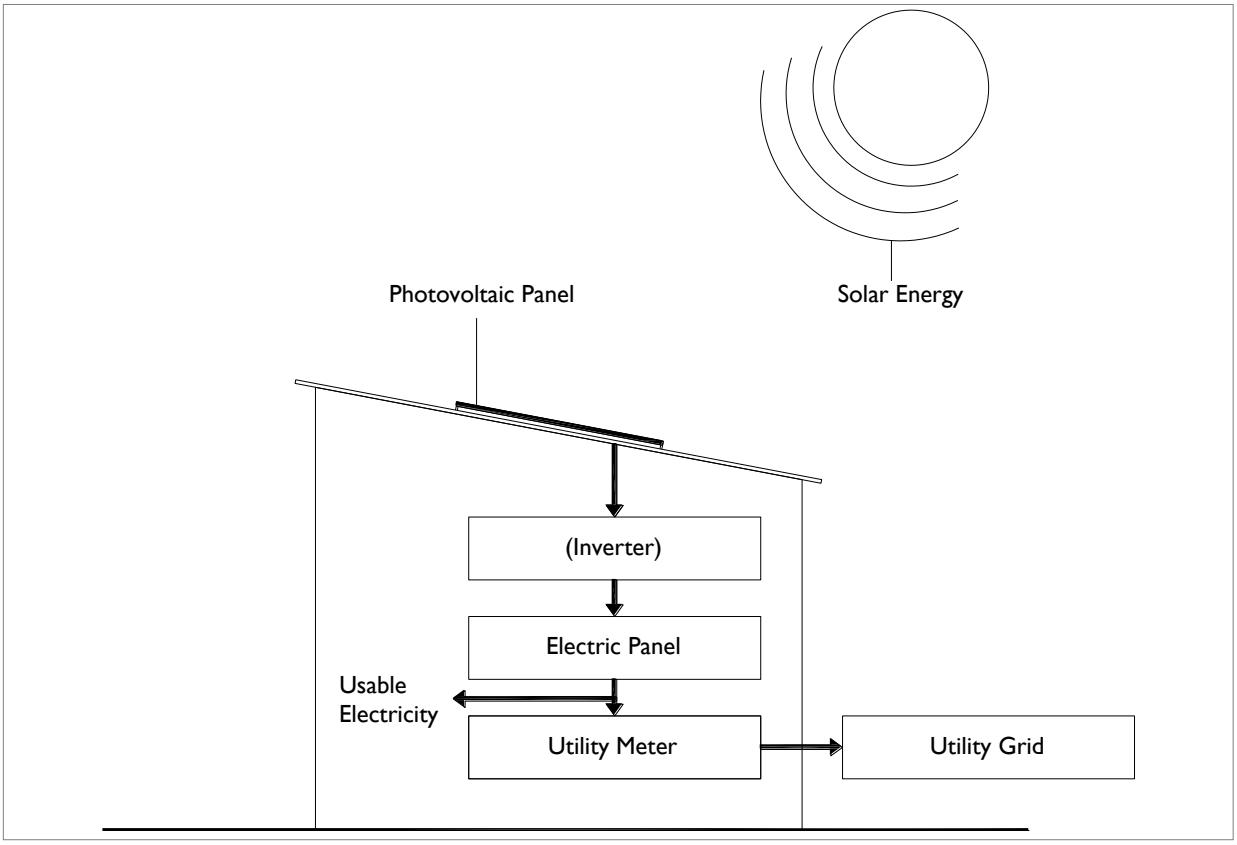


Figure 5.14 Photovoltaic system

The inverter is part of the system, or in some cases not necessary depending on the type of appliances.

5.4 GAS SUPPLY

Currently there is no gas supply network in Puntland. Gas supply has been provided for home use or industrial use through gas cylinders.

Gas storage or a bulk liquefied petroleum gas (LPG) storage installation should be planned to provide an alternative energy supply for district and major urban centres.

- Major gas holder stations or gas storage tanks and LPG storage tanks require the installation of protection zones.
- The location and size of a gas storage tank or LPG/air mix installation shall be determined dependent on the number of consumers and the required capacity of such facility.

5.5 TELECOMMUNICATION SERVICES

Telecommunication services include telephone networks and Internet, satellite, and radio telecommunications systems. A telephone network, which comprises the subscriber premise apparatus, subscriber lines, telephone exchanges and junction circuits, is usually a basis for all telecommunication services. No direct standard can be derived for land reservation, as the size of sites varies according to a number of factors, such as the number of lines and type of switching equipment.

- For local exchanges in urban areas with 20,000 – 60,000 lines, a site area between 1,000 m^2 and 1,500 m^2 is required.
- For local exchanges in urban areas with up to 120,000 lines, or combined local/tandem exchanges or telephone exchange complexes (operator centre, office, computer room, and exchange), a site area ranging from 1,500 m^2 to 2,000 m^2 is required.

Volume 6

Construction Standards & Guidelines

6 CONSTRUCTION STANDARDS AND GUIDELINES

Volume 6 provides general design requirements for building construction, construction material, techniques and components as well as safety requirements for construction sites. This volume provides minimum guidance for designing and managing a construction of a building. It should be useful for private and public sector developments

6.1 GENERAL DESIGN REQUIREMENTS FOR BUILDINGS

6.1.1 HABITABLE AND SANITARY ROOMS AND KITCHEN

Table 6.1 Minimum building design standards for a habitable and sanitary rooms and a kitchen

Function	Requirements
Habitable room	▪ Every room which is not a storage room must be habitable in terms of height, ventilation, and intrusion of daylight. ▪ The Floor area of a habitable room shall be min 7 m2, with no cross dimension smaller than 2.1 m, and for up to 2 persons sleeping. For any additional person accommodated the floor area shall be increased by a minimum of 3.5 m2. ▪ The minimum inner height of a habitable room shall be 2.5 m. ▪ In predominantly hot regions, the minimum inner height of a habitable room shall be 3 m where there are no measures of powered mechanical ventilation. ▪ Measures of natural ventilation shall always be preferred to powered mechanical ventilation. ▪ The distance across an open space opposite a window of a habitable room shall be 2.4m at minimum.
Sanitary room (bathroom)	▪ The minimum floor area of a sanitary room (bathroom) shall be 1.2 m2 with no cross dimension smaller than 90 cm. ▪ The minimum inner height of a kitchen or sanitary room shall be 2.3 m. ▪ Interior toilets and bathrooms without wall openings into the external air shall only be permitted in exceptions and if equipped with ventilation-, aeration- and lighting provisions.
Kitchen	▪ The minimum floor area of a kitchen shall be 4 m2 with no cross dimension smaller than 90 cm. ▪ The minimum inner height of a kitchen or sanitary room shall be 2.3 m.
For all functions	▪ Every room which is not a storage room shall have at least one wall opening directly into the external air in addition to the entrance. ▪ When the window space (open or opening) is < 1/20th of the floor space, an air

	space between exterior walls and roof of 10cm should be provided, or at least two air vents per room shall be provided in the upper third of the exterior walls. ▪ The net height of a standard door opening shall be 2.1 m.

6.1.2 STRUCTURAL STABILITY AND LIFE SPAN

- The construction of a building shall be stable, and shall not threaten the stability of any other neighbouring building and development site. The geological and ground water conditions of the development site shall therefore be taken into account when planning new construction or alterations and extensions.
- Two walls meeting at corners shall interlock, or masonry shall interlock with columns wherever possible.
- Foundations and roofing shall receive special attention in their design to extend the life span of a house and to reduce maintenance costs.

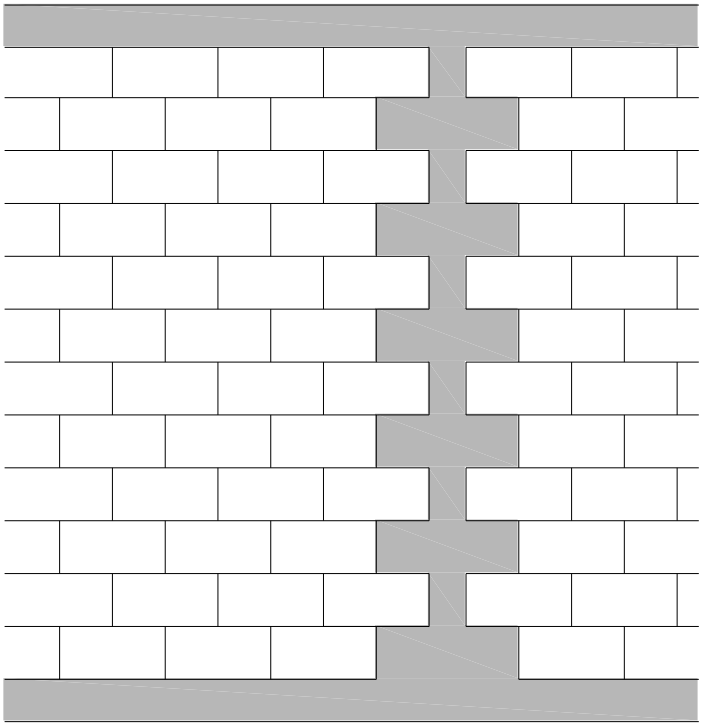


Figure 6.1 Confined masonry principle for seismic stability

6.1.2.1 Earth quake prone zones

- The floor plan design and built shapes shall be simple, rectangular and rather symmetrical.
- Adjoining structures shall be separated by a gap of ≥ 25mm.
- The length thickness and height thickness ratio of a wall shall be limited to reduce the tendency of a wall to overturn.
- There shall be reinforcement through bands or ring beams in horizontal and in vertical direction.
- Large stair cases shall be separated from the rest of the building, and interconnections of stairs with adjacent floors shall be by sliding joints.
- The use of seismic bands shall be considered at plinth level (except if founded on rock or hard soil), at door-window lintel level, in all cases properly tied or bonded walls.

6.1.2.2 Wall opening

- Wall openings shall not be wider than 120 cm each.
- Wall openings shall be kept away from corners, with a minimum distance of 45cm between the opening and the inside corner of the exterior wall.
- The sum of widths of openings divided by wall length between the inside corners shall be smaller than 50 cm for constructions of one floor, and smaller than 42 cm constructions of two floors.
- The width between two consecutive openings shall be wider than 55 cm.
- The vertical distance between two openings above each other must be higher than 60cm.

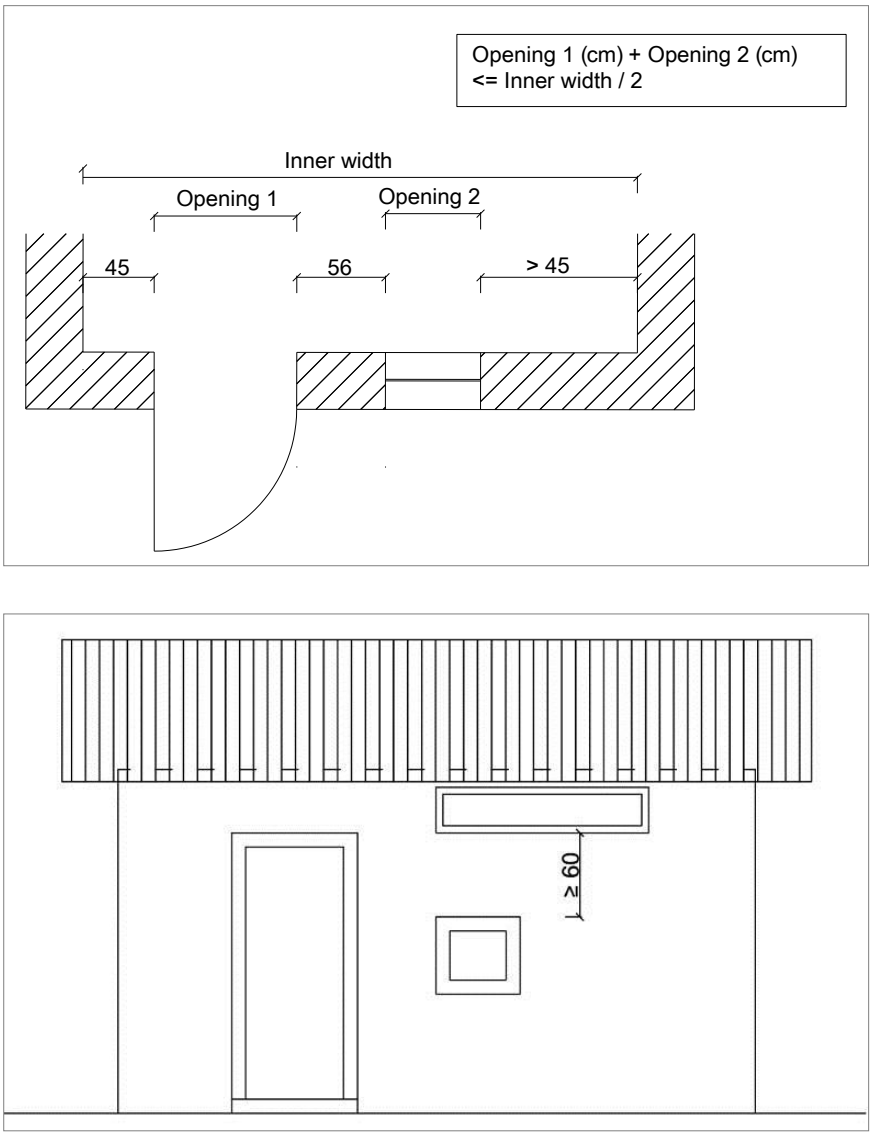


Figure 6.2 Wall opening principles

6.1.3 SOUND TRANSMISSION CONTROL MEASURES FOR BUILDINGS

- The maximum acceptable noise levels shall be inside;
  - Offices : 50-60 dB
  - Dwellings : 45-55 dB
  - Schools : 45-50 dB
  - Hospitals: 40-50 dB.
- Protective measures against sound transmission shall be taken for semi-detached or attached houses and multi-storeys including apartment blocks higher than two stories, and for buildings accessible to the public which also contain dwelling units.
- Protective measures shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent dwelling units or between dwelling units and adjacent public areas such as halls, corridors, stairs or service areas.
- The dividing walls of two housing units in semi-detached houses and attached houses shall be double and disconnected with a dividing air space or insulation of minimum 1 cm.
- To oppose air-borne sound, penetrations or openings in construction assemblies for piping, electrical devices, heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated against sound transmission.
- Floor/ceiling assemblies between different dwelling units, or between a dwelling unit and a public area within the same buildings shall have impact insulation against sound transmission.

6.1.4 RECOMMENDATIONS FOR GREEN BUILDING DESIGN

- The use of local materials shall be preferred where possible.
- The use of materials that use the least energy for production and transport shall be preferred.
- The use of materials which the extraction or harvesting of which degrades natural habitat shall be avoided.
- The building design shall be according to the thermal and solar profile of the location to reduce energy usage.
- The orientation of the house shall be in response to sun, wind and climate (shading, natural ventilation, cooling by thermal mass, natural lighting).
- Windows shall be placed and dimensioned to limit solar heat gain in the hot season and heat loss in cold season. Plants shall be used for shading of a building if required.
- Rain water shall be harvested and used in irrigation, toilets, and showers or for washing, to reduce the used amount of treated water where possible.

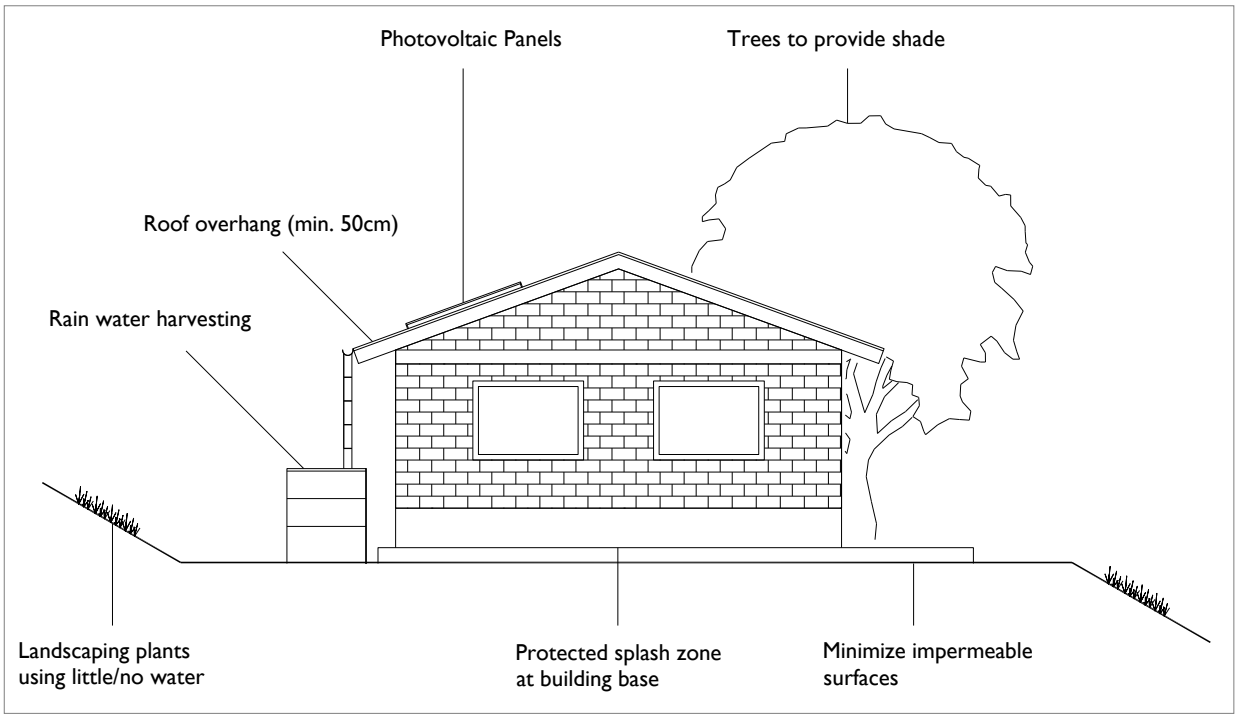


Figure 6.3 Green building principles

6.1.5 RECOMMENDATIONS FOR DESIGN OF A BUILDING IN HOT CLIMATE

Table 6.2 Recommendations for design of a building in hot climate

Function	Recommendation
Shading	▪ In hot humid areas, shading shall be maximised. The following recommendations for shading shall be followed as far as possible. ▪ Shading may be by trees in front of windows, and for shaded courtyards ▪ Shading may be through wide roof overhangs incorporated into the design of the building ▪ Shading devices may be installed in dependence of the building's orientation, e.g. vertically or horizontally, and fixed or moving.
Thermal mass	▪ In the highland areas with highest diurnal temperature variations, a high thermal mass shall be applied in constructive parts near the ground (i.e. ground floor external walls, and floors). ▪ The highest thermal mass can be achieved by the use of soil blocks, rammed earth and natural stone. ▪ The thermal conductivity of concrete depends on its composition and curing technique. Concretes with stones are more thermally conductive than concretes with ash, perlite, fibres, and other insulating aggregates. ▪ The thermal mass shall be low in the northern maritime coastal strip.
Natural ventilation	▪ The following recommendations for high natural ventilation shall particularly be followed in the tropical humid zones. ▪ Good cross ventilation shall be insured through open floor plans with regularly distributed inlet openings and outlet openings. ▪ Inlet openings shall be located on the wind-ward side at a height below 2 m, and outlet windows shall be located on the opposite side. ▪ The total net area of side ventilation wall openings shall be minimum 1.2 m2. ▪ Ideally, vents shall be oriented NE-SW or E-W, with a thin building depth. ▪ The core of the building shall be naturally ventilated and blocked from solar. ▪ Ceilings shall possibly be high with a minimum net height of 2.65 m, and optimum net height of about 3.50 m, or shall possibly be refrained from to support an unblocked airflow. ▪ In a multi-storey structure every floor needs its own air vents. ▪ Roof space shall be ventilated by large roof vents. ▪ Especially in the highland areas with high diurnal temperature variations, building design shall allow for vertical airflow caused by differences of temperature between inside and outside air. ▪ Staircases can use open design and be positioned under out vents to accelerate vertical air flow.

	▪ In the tropical humid climate of the coastline, buildings shall have a distance of minimum 3 m. ▪ Good cross ventilation shall be in combination with lightweight walls (e.g. bedrooms on upper floor) and heavy weight floors. ▪ In terraced housing with big building depths, air wells combined with an open roof area may be used for improved ventilation. ▪ In hot dry areas, dust barriers shall be provided at openings
Other measures	▪ For the roof, light-coloured, reflective surfaces shall be used for lower absorbance of heat. ▪ For multi-storey buildings, highly reflective light coloured materials shall be used for the surfaces of walls. ▪ For multi-storey buildings, bulk insulation shall be used in solar exposed areas, such as East- and West walls, if possible.

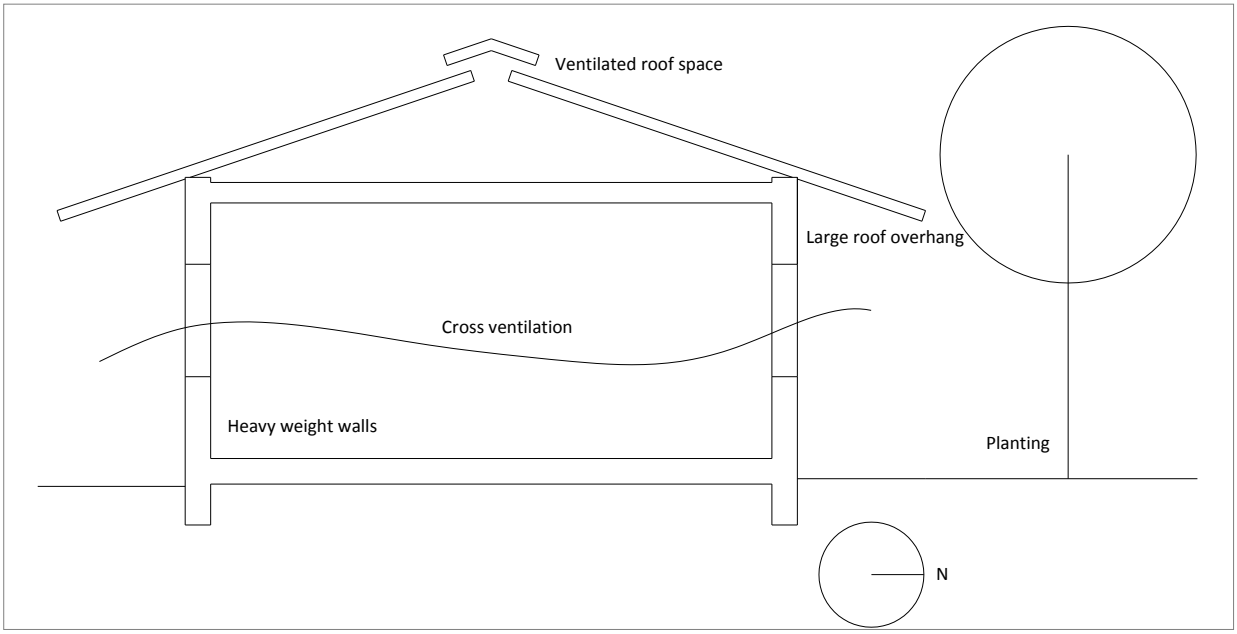


Figure 6.4 Hot climate building principles

6.1.6 ADDITIONAL DESIGN REQUIREMENTS FOR PUBLIC BUILDINGS AND WORK PLACES

Table 6.3 Design requirements for public building and work places

Function	Design requirements
Staircase	Publicly accessible, exterior and interior staircases shall meet requirements of a maximum angle of gradient and a minimum space for a foot step for security reasons and comfort. The formula shall also guide staircase design in the private domain but there, adoption is a non-obligatory guideline. ▪ All steps of one staircase shall have similar dimensions. ▪ The gradient angle shall be maximum 45 degrees. ▪ The principle formula for gradient angle shall be: 2 vertical rise (height of step) plus 1 tread (depth of tread) equals 61–64 cm. ▪ The optimal design for the gradient angle is (only stated for guidance): 1 tread (depth of step) minus1 vertical rise (height of step) equals 12cm. - A common vertical rise is 15-18 cm. - A common tread is 27-30 cm. ▪ If the staircase has more than 10 steps, the staircase space shall either be limited by a wall or by secure banisters of 90 cm height above the front edge of the step. ▪ If a stair case has up to 5 steps, it shall have one hand rail at minimum with a height of ≥ 85 cm. ▪ The width of one course of a stair case in the public realm shall be ≥ 100 cm, and in the private realm it is recommended ≥ 85 cm. ▪ If 2 or 3 persons are expected to pass each other on a staircase simultaneously, its course shall have a minimum width of 110 cm respectively 165 cm.
Ramp design	▪ Public buildings and government administration buildings and public spaces shall be made accessible to handicapped people by ramps if applicable. ▪ Ramps shall have a gradient between 1: 12 and 1: 20. ▪ Ramps shall have a minimum width of 1.2 m. ▪ Level landings shall be at least 1.2 m long and clear of any door swings. ▪ Where door swings open onto the landing of a ramp, the landing shall be at least 2 m long. ▪ Any ramp with a change of level greater than 20 cm shall have a railing across the full width of its lower end. ▪ Ramps longer than 3 m shall be provided with unobstructed handrails at a height of 85 -90 cm on both sides. ▪ Where total rise is greater than 2m,an alternative access method shall be foreseen.

Table 6.4 Sample ramp design parameters

Gradient	Horizontal run	Maximum rise
1:12	10 m	50 cm
1: 15	5 m	33 cm
1: 20	2 m	16.5 cm

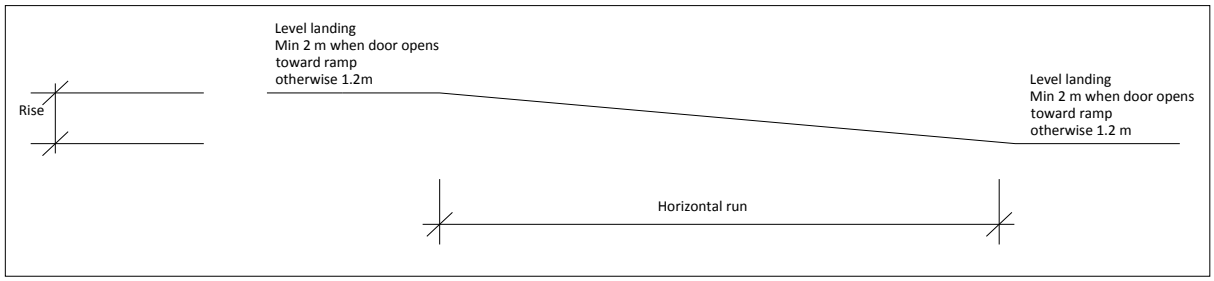


Figure 6.5 Ramp parameters

Table 6.5 Design requirements for public building and work places

Function	Design requirements
Elevators	▪ Every building containing more than 5 floors shall be provided with an elevator according to technical norms, and with one minimum net opening of 1.2 m.
Fall protection	In case of level changes, hand rails shall be installed as follows: ▪ For a level change of up to 3.50 m, the height of the hand rail shall be ≥ 90 cm. ▪ For a level change of above 3.50 m, the required height of the hand rail shall be ≥ 100 cm. ▪ For a level change in the public realm of 50 cm or more, but no more than 100 cm, the location of the level change shall be demarcated by a yellow line. ▪ For a level change of 80 cm or more, handrails must be designed with vertical balusters, which shall not be spaced more than 10 cm apart.

Table 6.6 Design requirements for public building and work places

Function	Design requirements
Fire protection measures	▪ Neighbourhood layouts shall be designed in a way that the access to all buildings and public spaces is possible. ▪ Precautions shall be taken against causes of fire, and against possibilities of fire transmission between buildings. ▪ Water points and fire hydrants shall be well accessible with a radius of 250 m. ▪ The water rate for fire fighting shall be secured at25 m3/hour with minimum availability for 2 hours. ▪ Alternatively, fire fighting engines shall be equipped with water tank. ▪ Kitchens shall preferably be placed outside of the main building to avoid dangers caused by fire, which may be caused by earthquakes or other. ▪ Buildings shall be designed that access and equipment for detecting, fighting, controlling and extinguishing fire are provided and that the spread of fire within the building, and to any other building would be minimized in case of fire. ▪ Buildings above 2 stories require rising pipes for fire fighting purposes, or a filled water tank on the roof, in either case with access armature at every floor level **Fire alarm.** Every public, commercial and industrial building with a floor area of more than 1,000 m2 shall have ▪ Fire alarms to be reached within 50m; ▪ A defined and well-marked fire assembly point; ▪ Fire fighting equipment as specified by the fire department of the local government **Exits and stairs** ▪ Public, commercial and industrial buildings shall have at least 2 doors leading to the exterior and opening outward. ▪ Every point in a public building shall have a maximum distance of 30m from an exit or staircase. ▪ At least one floor shall be accessible to persons with wheel chairs through ramps, elevators and by avoiding level changes in the building. ▪ Every multi-storey residential building with a length of more than 50m shall have exits or emergency exits and stairs or emergency stairs to be reached within 25m **Additional measures** ▪ For public buildings in earth quake prone zones, seismic bands or dowels shall be used at corners and T-junctions at window sill level, and vertical steel reinforcing bars at jambs of doors and large windows or other openings larger than 60cm x 60 cm.

Design requirements for public building and work places, contd.

Function	Design requirements
Accessibility for persons with disability	▪ The main uses and sanitary facilities in public buildings shall be accessible to people with disabilities. ▪ Changes in level shall be accessed through ramp or an elevator. ▪ Any doors for use by persons with disability shall have a net opening of not less than 1.2 m, and door handles at a height of 85 cm. ▪ Wheel chair spaces shall be provided in an auditorium for public functions with at least one space for wheel chairs for every 400 seats.
	The following minimum requirements shall be adhered to for any building, where people are employed and/or which are publicly accessible and/or which house and accommodate many people. This applies to office and administrative buildings, commercial and industrial buildings dormitories, hospitals, schools and nurseries among others. The minimum quantities apply also in cases where fewer users are expected. Sanitary facilities shall be provided separate for permanent users (e.g. staff) and public users. ▪ For public users and clients (e.g. residents, patients, students, pupils and similarly) the following minimum number of toilets shall be provided: - 1 toilet per every 15 female users and 1 toilet and 1 urinal per 20 male users. At least one toilet shall be suitable for use by people with disabilities. - 1 sink per 20 female users and 1 sink per 20 male users. At least one sink shall be suitable for use by people with disabilities. ▪ For staff (e.g. nurses, teachers) the following minimum number of toilets shall be provided: - 1 toilet per 20 female users and 1 toilet and 1 urinal per 30 male users. At least one sink shall be suitable for use by people with disabilities. - 1 sink per 30 female users and 1 sink per 30 male users. At least one sink shall be suitable for use by people with disabilities.

6.2 CONSTRUCTION MATERIALS, TECHNIQUES AND COMPONENTS

6.2.1 MASONRY WALLS

Table 6.7 Masonry wall construction

Construction Techniques	Requirements
Wall protection	▪ A wall shall be constructed to adequately resist the penetration of rain, shall not permit the passage of moisture from the ground to the building, and shall be suitable for the intended use of the building. ▪ The base of a wall shall to be protected from humidity and water. ▪ The roof overhang shall be wide enough to protect the walls from rainfall at different angles. ▪ Exposed parts of internal walls to kitchen, bathrooms and toilet rooms shall have smooth water resistant or water-repellent surfaces.
Lateral support for masonry walls	▪ Masonry walls shall be laterally supported in horizontal or vertical direction at maximum intervals. ▪ The maximum ration of wall length, thickness, or of wall height, thickness for bearing walls and exterior non-bearing walls shall be 18, and for interior walls 36. ▪ Bearing walls from masonry shall not be higher than 4 stories and must be properly reinforced.
Masonry principles	▪ A masonry wall may be built with a single course, as a composite wall, dry stacked wall, or masonry bonded hollow wall. ▪ Masonry units shall be staggered uniformly, with an overlap between a quarter and a half lengths of the masonry unit. ▪ Before laying masonry units in mortar, they shall be soaked in water. ▪ Units shall be laid horizontally, one course at a time. ▪ The horizontal (bed) and vertical joints should not exceed a thickness of 15mm for burnt bricks, stabilized soil blocks and concrete masonry units, and a thickness of20mmwhen using dressed stones. ▪ Variation of joint thickness shall not exceed 4 mm. ▪ Joints shall be filled completely. ▪ No more than a height of 1 meter shall be built per day. ▪ A wall shall be properly cured every day for at least 3 days. In hot and dry climate, a wall shall be watered 3 to 4 times a day. ▪ A dry stacked wall shall be coated with surface bonding mortar on both sides.

Masonry wall construction, contd.

Construction Techniques	Requirements
Masonry units	A masonry unit is a brick, tile, stone, or concrete block. ▪ A masonry unit shall be made from soil, concrete, or a mix of soil and stabilizer. It may be hollow or solid. ▪ A masonry unit from soil is composed of air-dried or burned soil, shale, fired clay or mixtures thereof. Air-dried clay blocks may be compressed or uncompressed. ▪ A masonry unit is considered hollow when its net cross-sectional area in any plane parallel to the load-bearing surface is less than 75 % of its gross cross-sectional area measured in the same plane. - It is considered solid when its net cross-sectional area in every plane parallel to the load-bearing surface of 75 % or more of its gross cross-sectional area measured in the same plane.
Soil blocks	▪ Non-stabilized soil blocks shall be sun-dried before placed in walls. ▪ Stabilized soil blocks shall be properly cured before placed in walls. ▪ Organic top soil shall not be used in stabilized air dried soil blocks. ▪ Non-stabilized, air-dried soil blocks shall achieve a compressive strength of 0.7 N/mm2 (MPa). ▪ Stabilized, air-dried soil blocks (also called SSB or CEB) shall achieve a compressive strength of 2,5 N/mm2 (MPa).“Hydraform” blocks are a specific brand of usually stabilized air dried soil blocks. ▪ An air-dried sample soil block shall not gain more than 15 % in weight when placed into a water bath for 24 hours. ▪ Complete external rendering with lime or cement stabilized plaster (min. 2 %) is recommended for walls made of non-stabilized air dried soil blocks. ▪ A ring beam is recommended in construction using air-dried soil blocks. ▪ Soil blocks shall not be used for isolated piers or columns in a load-bearing capacity, including walls with a length less than 60 cm. ▪ In earthquake prone zones, wood shall be used for strengthening and supporting earth block masonry. ▪ The height of a building built from soil blocks without confinement shall not exceed 1 storey. ▪ Structural reinforcement shall be used in construction of buildings higher than 1 floor under the supervision of a certified engineer.

Masonry wall construction, contd.

Construction Techniques	Requirements
Burnt bricks	▪ Uncontrolled produced burnt bricks shall be avoided whenever possible. ▪ Institutional, public service buildings, government/administration, and industrial buildings, as well as walls for public and industrial plots, shall not be built from unlicensed burnt bricks. ▪ Minimum wall width is 35 cm for external walls, 21.5 cm for internal load bearing walls and 10 cm for internal non-bearing walls. ▪ Burned soil bricks (made from clayey soil) shall achieve a compressive strength of 3 N/mm2 (MPa) for the lowest quality of load bearing bricks, and 104 N/mm2 (MPa) for the highest quality of load bearing bricks.
Stone masonry	▪ Stone masonry buildings shall completely be avoided in seismic zones
Concrete masonry	▪ Concrete building blocks may be used if purchased from a certified factory or distributor. ▪ Its common measurements L x W x H shall be L with 40 cm, W with 10cm, 20cm, or 30cm, and H with 20 cm. ▪ Concrete blocks suitable for use below ground level shall be sealed or coated with a waterproofing material and be surrounded by a layer of coarse sand and gravel for drainage on the side of the wall facing the exterior. ▪ Concrete block, when used in tandem with concrete columns and tie beams and reinforced with rebar, may be used inload-bearing walls for buildings exceeding 1 storey (Concrete Block Structure (CBS)). ▪ Concrete blocks for general use in masonry walls not exceeding 1 storey, or for masonry infill within concrete frames (CBS) shall have a minimum compressive strength of 4 MPa. ▪ Concrete blocks suitable for general use in pure masonry walls exceeding 1 storey but not exceeding 2 storeys shall have a minimum compressive strength of 7 MPa. ▪ In zones where there are high wind loads and seismic forces and while not using CBS construction for 2 storey construction, steel reinforcing shall be inserted to increase tensile strength. The reinforced cores shall be filled with grout to secure the reinforcing in proper relationship to the structure, and to bond the block and reinforcing. ▪ Load bearing walls shall be at least 20 cm wide. ▪ A masonry unit from concrete is made of cement and suitable aggregates. When manufacturing concrete blocks: ▪ The concrete mix cement, sand shall be 1: 5 to 1: 8 depending on the quality of aggregate. ▪ Crushed sand (with a higher quantity of 5 mm particles) shall be preferred to

	quarry sand, which shall be preferred to river sand. ▪ Aggregates shall be well graded (i.e. have a well distributed variety of grain sizes). ▪ Aggregates are recommended to be angular (through crushing). ▪ The mixture of fine aggregates : coarse aggregates (5 to 10 mm) shall be 40-60 % ▪ A ratio of 1: 5 shall be applied when using river sand. ▪ Quarry sand shall be washed wherever possible. ▪ River sand shall be washed and sieved to remove silts and organic debris. ▪ The dry mix shall be mixed until having a uniform colour by shifting the pile of the mix at least 3 times, before water is added. ▪ The blocks shall be cured in shade for at least 24 hours, and immersed in water for at least seven days. ▪ 50 kg of cement shall be used for not more than 40 blocks. ▪ Blocks shall not be transported before 18 days of curing after production. ▪ Blocks shall be wet for 7 days after production (once in the morning and once in the evening). ▪ After production, blocks shall be covered with plastic, tarpaulins or other shading for 18 days.

Masonry wall construction, contd.

<table>
<tr><th>Construction Techniques</th><th>Requirements</th></tr>
<tr><td>Mortars and plasters</td><td>

The cement mortar to bind hollow cement blocks shall be a mix from cement, water and a fine aggregate. It shall provide an even bed to the hollow cement block and prevent their inequalities from bearing upon one another.
The aggregate shall be free from adherent coatings and organic matter, and impurities such as iron pyrites, alkalis, salt, coal, and mica.
The aggregate shall not contain appreciable amount of clay.
The aggregate shall not contain shale or other materials which will affect hardening and attack reinforcement.
The aggregate shall contain particles of various sizes in suitable proportions.
Only clean water free from silt, salts or any organic matter shall be used.
All mortars using cement or lime shall be used within 30 minutes after adding water.
Walls should have external rendering particularly when the wall material is not water-resistant.
For rendering earth walls, soil based plasters, thin lime based plasters or lime based rendering (white wash) are suitable.
Cement plaster and any kind of synthetic material e.g. polymer paints shall not be used on earth construction.
Mortar mixes shall be used as recommended below

<table>
<tr><th>Mortar/ plaster composition</th><th>Mix by Volume</th></tr>
<tr><td>Cement : Sand</td><td>1: 4 (public buildings)
1:6 (private masonry buildings)</td></tr>
<tr><td>Cement : Soil</td><td>1:10</td></tr>
<tr><td>Cement : Lime: Sand</td><td>1:1:6 (public buildings)
1: 2: 9 (private masonry buildings)</td></tr>
<tr><td>Cement : Lime: Soil</td><td>1:1:20</td></tr>
<tr><td>Lime : Sand</td><td>1:8</td></tr>
<tr><td>Lime : Soil</td><td>1:10</td></tr>
<tr><td>Mud (for use with mud blocks only)</td><td>-</td></tr>
</table>
</td></tr>
</table>

6.2.2 NON – MASONRY CONSTRUCTION

Table 6.8 Table Non – masonry construction

Construction Techniques	Requirements
Wattle-and-daub construction	▪ Wattle-and-daub construction is for its safety highly recommended in earth quake prone conditions. All structural parts shall be well tied together. Ideally, diagonal bracing is applied. ▪ External walls built in structural timber shall be braced and lined externally with termite and weatherproof panelling or with any other termite and weather proof sheeting material.
Rammed earth	▪ Rammed earth buildings shall not be more than 1 floor high. ▪ Exterior walls shall be a minimum of 30 cm in thickness, interior bearing walls shall be a minimum of 20 cm in thickness. ▪ Walls of non-stabilized rammed earth shall be protected by external rendering with lime or cement stabilized plaster (minimum 2 %). ▪ Rammed earth walls may take up to 2 years to cure.
Light earth vaults	▪ Light earth vaults can be a modern and durable interpretation of Aqal – shapes
Reinforced concrete frame combined with any type of masonry	▪ Reinforced concrete buildings must be engineered. ▪ Columns shall be stronger than beams; foundations shall be stronger than columns. ▪ Ground floors shall not be more flexible than the upper floors, and therefore not be taller or open for design purposes. ▪ There shall be vertical continuity in the load transfer from floor, to beams, to columns, to walls, to foundation, to the ground. Any discontinuity or irregularity in the path of load transfer may lead to collapse of the building in an earthquake. ▪ Masses of floors shall be rather equal, and in no case exceed the double mass of an adjacent floor. ▪ Vertical offsets in floors shall be avoided. ▪ The masonry infill shall conform to above mentioned regulations for bricks/blocks. ▪ The spacing between masonry units and columns shall be consistent. ▪ Reinforcing steel shall be clean and free from rust. ▪ Reinforcing steel shall be stored in a sheltered place

6.2.3 CONCRETE

Table 6.9 Construction material

Construction Material	Requirements
Concrete	There are mixes for common construction parts which shall be followed if not specified differently by a certified engineer: ▪ Cement: Sand: Aggregate for structural applications with reinforcement such as beams, columns, and floor slabs. ▪ 1: 2: 4 Cement: Sand: Aggregate for structural applications with reinforcement such as beams, columns, and floor slabs. ▪ For beams, columns and floor slabs, a minimum of 200 kg cement shall be used per m3 with a water-cement ratio of 0.6. ▪ For foundations a minimum of 275 kg cement shall be used per m3 with a water-cement ratio of 0.65. ▪ The strength of concrete shall be 20 N/mm2. ▪ Concrete must be used within 30 minutes of mixing, and therefore the quantities mixed shall not exceed the amount which can be used within 30 min. **Cement quality assurance measures** ▪ Cement shall be stored well protected from moisture and rain. ▪ Cement shall be stored above ground using platforms. ▪ Cement shall not be stacked to a height exceeding 10bags. ▪ Cement shall be stored in such a way that the first to arrive in storage is the first to be used in construction.

6.2.4 WALL CONSTRUCTION COMPONENTS

Table 6.10 Construction components

Construction techniques	Requirements
Lintels	▪ Wall openings wider than 20 cm require lintels above. ▪ Lintels may consist of wood, steel, concrete or bamboo with mortar filling. ▪ Alternatively, arches may be built in masonry walls. ▪ Lintels shall extend 1.5 block length past opening on either side in masonry walls.
Bond beam	▪ A bearing wall shall be topped with a continuous bond beam. ▪ A bond beam may be made from concrete with steel reinforcement. For buildings with a height of 1 – 2 floors, wood or concrete beams with bamboo reinforcement may be used.
Anchorage	▪ Roof and floor structures shall be suitably anchored to bond beams or walls below the bond beam with adequate metal fasteners.

6.2.5 CONSTRUCTION COMPONENTS OTHER THAN WALLS

Table 6.11 Construction components other than walls

Construction Components	Requirements
Foundations	▪ All wall constructions consisting from blocks, and all structural columns shall have a foundation with a depth of minimum 30cm underground, or deep enough to be placed on sub-soil, or as specified by a structural engineer. Foundations may be designed as continuous/monolithic or as piers. ▪ Hard boulder ground / massive igneous or metamorphic rock may replace the use of a constructed foundation. ▪ A foundation shall never be built with a base that is not level and stable. When building a continuous foundation on sloped ground, the base must be stepped. ▪ When the site is being levelled, where possible, soil shall be dug out, instead of holes being filled up. If digging is impossible, the soil in-fills shall be well compacted. ▪ The top of foundation shall have same level throughout the building. ▪ When a foundation accommodates drainage, the trench for the foundation shall have a small slope. The layer of gravel which is part of the drainage system shall then be levelled before building the base of the foundation. ▪ All top soil shall be removed in the area of a planned building. ▪ If excavation leaves a cut/abrupt edge in the land, the slope shall be stabilized by a retaining wall or by stabilizing plants, depending on slope and height to prevent erosion. ▪ Perimeter insulation between the top of the foundation and the base of the wall shall be applied if possible. ▪ When using placed rocks for a foundation, large rocks should be placed flat to not tilt when settling, and voids should be minimized through the use of smaller stones.

Construction components, contd.

Construction Components	Requirements
Floors	▪ A floor shall have a compact, smoothened and impervious surface. ▪ A floor shall have an elevation of about 15 cm above surrounding ground level. ▪ Floor beds may be built from a layer of compacted soil with or without stabilizer with a minimum height of 20 cm, a layer of stones with a flat surface pointing up, bricks, or blocks, a floor slab with a minimum height of 5 cm consisting of a mix of cement-gravel, cement-sand, cement-soil or lime-sand, or any other suitable methods approved by the Local Council. ▪ There should be a thin layer of cement creed or soil based creed on top of a floor slab, spread on the floor while wet.
Drainage	▪ Drainage shall be applied to ensure that walls will not be in constant contact with water. ▪ 2. The drainage may be part of the bearing walls (rubble trench foundation), or the ground may be sloped away from the building towards a trench drain
Roofs	▪ Roofs shall be weather proof, resist wind loads, and support their own weight and the weight of one person on the roof. ▪ Covering, rafters, purlins and any members forming the roof structure shall sustain a minimum load of10 N / mm2. ▪ Roof structures shall be tied against uplifting wind forces. Ties shall be fixated extending into the wall height at a minimum of 40cm. ▪ For roofing material, burned and unburned clay tiles, cement roofing tiles and sheets, galvanized iron sheets, thatch, or any certified roofing material if submitted with proper documentation and reference shall be permitted. ▪ Corrugated iron sheets shall be preferred to loose roofing units such as tiles, or heavy roofing especially in earth quake prone zones. ▪ Heavy roofs shall be avoided. When heavy roofs are used, they shall be properly connected to the walls. ▪ A cement mix shall be applied on the ridge line of thatched roofs to ensure water run-off away from the joint. ▪ Thatch shall not be used in commercial, industrial, and high density

residential areas.

- Below are ranges of slopes shall be applied depending on the roofing material, if not specified differently by the manufacturer:

Coverings	**Slope**
Thatch	45 - 60˚
Tiles /shingles	15 - 40˚
Roofing sheets /lap jointed	12 - 15˚
Roofing sheets /single length	3 - 7˚
Soil mix	6˚
Concrete slab	1˚

6.3 SAFETY ON CONSTRUCTION SITES

Table 6.12 Safety elements on the construction site

Element	Requirements
Protective clothing	▪ Any person on a construction site shall wear a helmet. ▪ Any worker on a construction site shall wear protective clothing such as overall, strong shoes, helmet, breathing masks, hand gloves and goggles depending on the type of work carried out. ▪ Any person shall wear hand gloves and dust masks while working with cement.
Protective site measures	▪ There shall be measures taken to protect open trenches from collapsing, especially in sandy soils. ▪ A construction site shall be fenced.
Inspection of site and equipment	▪ Before any pouring of concrete begins, the foreman responsible for site operations shall always inspect the formwork on stability. ▪ Electrically powered tools (e.g. drills) shall be regularly inspected to ensure the safety of their cables. ▪ The repair of any powered tool and the relocation of electrical cables shall be handled by an electrician.
Scaffolds and ladders	▪ Scaffolding shall be used in construction of walls higher than 1 floor. ▪ While constructing a roof, scaffolding under the roof shall be used. ▪ When moving on top of a roof, boards shall be used to walk on. ▪ A scaffold shall be strong and stable to support the weight of materials and people working on it. ▪ A scaffold shall be built using a safety factor of 4:1. ▪ When made from wooden poles or timber, the minimum width or diameter shall be 7.5 cm. ▪ Wood used for scaffolding shall be inspected to be free from splits or knots ▪ The spacing of vertical poles shall not exceed 2.4 m ▪ Scaffolding joints shall be strengthened by tying them with ropes rather than nails ▪ The scaffold must daily be inspected before use. ▪ The scaffold shall never be overloaded. ▪ Ladders shall be rigid and in good condition. ▪ A ladder should be pitched of 4:1 to prevent sliding.

	▪ A ladder accessing a scaffolding must be connected to the ledger, and protrude by 90 cm above the working platform at minimum
Storage and fire safety measures	▪ Combustible materials such as petrol and paints must be stored separately from materials such as timber ▪ Bricks and blocks should not be piled up to heights exceeding 1meter ▪ There shall be fire extinguishers placed next to storage facilities. ▪ A carbon dioxide fire extinguisher or buckets filled with sand shall be placed near fuel storages or storages accommodating other combustible material. ▪ A drum/barrel filled with water shall always be located next to stored timber.
Cleanliness, hygiene, first aid and rest place	▪ There shall be at least one clean toilet for males, and one clean toilet for female on site ▪ There shall be hand washing facilities on site ▪ There shall be a clean facility where food may be prepared ▪ There shall be provided clean potable water on site ▪ There shall be a safe rest area, protected from rain and sun ▪ There shall be a designated smoking place on site ▪ There shall be a complete first aid kit including medicine and other items such as bandages and disinfectants ▪ There shall be at least one person regularly on site who is trained in first aid.

ANNEX

7 ANNEX

7.1 Standards for Notations and Graphics

District Spatial Plan - DSP (1/25,000)			Urban Master Plan (1/2,000 – 1/5,000)			Layout (Detailed) Plan (1/500 – 1/1,000)		
Land Use Class	Code	Colour Code (RGB)	Land Use Class	Code	Colour Code (RGB)	Land Use Class	Code	Description
Residential Area	R	(150,90,20)	High density	R1	(255,220,140)	High density	R1	> 30 -50 dwellings/ha
			Medium density	R2	(200,150,20)	Medium density	R2	15-30 dwelling /ha
			Low density	R3	(150,90,20)	Low density	R3	10 - 15 dwelling /ha
Public Facilities	F	(80,190,250)	Education	F1	(150,220,255)	Primary School	F1/1	kindergarten, Quranic school, primary and intermediate primary (4-14 years)
						Secondary School	F1/2	secondary, technical, vocational (15-18 years)
						Higher Education	F1/3	higher education institute, university, research centre, teachers training school (> 18 years)
			Health	F2	(80,190,250)	Health Post	F2/1	health post, daycare, pharmacy
						MCH	F2/2	MCH, specialized clinic, polyclinic
						Hospital	F2/3	general, specialized hospital
						Other Health Facility	F2/4	veterinary station, quarantine station, laboratory
			Social & Religious Facilities	F3	(0,120,190)	Mosque	F3/1	
						Cemetary	F3/2	
						Social Facility	F3/3	homes for aged, phsically handicapped, deaf and blind, mentally retarded, orphans; youth centre, social hall, community centre
						Cultural Facility	F3/4	cultural centre, public library
						Museum	F3/5	
			Administration	F4	(120,200,220)	Public Administration	F4/1	municipality, district administration centre, central government regional office
						Police Station	F4/2	
						Court	F4/3	
			Other Public Facilities	F5	(90,140,210)	Post Office	F5/1	
						Fire Brigade	F5/2	
						Prison	F5/3	
						Slaughterhouse	F5/4	

Commercial Area	C	(240,30,50)	Commerce	C1	(240,30,50)	Market Area	C1/1	
						Retail & Office	C1/2	including shops, workshops, restaurants, café, banks, private offices, etc.
			Tourism	C2	(245,90,40)	Hotel	C2	
Recreational Area	S	(100,200,100)	Sport & Recreation	S1	(100,200,100)	Park	S1/1	neighbourhood parks, district parks, major city parks, picnic and camping space
						Sport Area	S1/2	stadium, play field, sport hall, gymnasium, animal race, etc.
Protected Area	N	(40,120,70)	Natural and Cultural Protected Area	N1	(40,120,70)	Water Basin	N1/1	water catchment area, dry river basins, etc.
						Natural Resource	N1/2	e.g. mine area
						Cultural Heritage	N1/3	historical & archaeological sites
						Environmentally Sensitive Area	N1/4	e.g. wetland
			Coast	N2	(230,180,120)	Coast	N2	beaches, seafronts
Special Area	X	(140,140,100)	Special Area	X	(140,140,100)	Special Area	X	government reserved area, military reserved area, etc.
Industrial Area	I	(130,90,170)	Industry	I1	(130,90,170)	Light Industry	I1/1	
						General Industry	I1/2	
						Heavy Industry	I1/3	
			Warehouse	I2	(180,160,220)	Warehouse	I2	including large scale storages
Utility	U	(110,110,110)	Utility	U	(110,110,110)	Power Plant	U1	
						Water Tank	U2	water treatment, water tank, reservoir
						Sewage Treatment	U3	
						Electric Substation	U4	
						Solid Waste Collection & Disposal	U5	dumpsite, collection site, landfill site
						Gas Tank	U6	
						Telecommunication	U7	radio, TV, telephone towers
Roads	T	line	Trunk Road	T1	line	Trunk Road	T1	
			Primary Road	T2		Primary Road	T2	
			Secondary Road	T3		Secondary Road	T3	
			Access Road	T4		Access Road	T4	
						Pedestrian Road	T5	
Transport	T	(180,180,180)	Airport	T6	(180,180,180)	Airport	T6	
			Harbour/Marina	T7		Harbour/Marina	T7	
			Bus Terminal	T8		Bus Terminal	T8	including taxi and minibuses
			Freight Terminal	T9		Freight Terminal	T9	
			Public Parking	T10		Public Parking	T10	

7.2. Content of a District Spatial Development Plan and Urban Master Plan

1. Background Study

Chapter I – General
- 1. Geographical Description
- 1.1 Location and Size
- 1.2 Topography, Geology, and Hydrology
- 1.4 Climate

Chapter 2 - Administrative Structure and Local Politics
- 2.1 Ethnic Groups
- 2.2 Languages
- 2.3 Religion
- 2.4 Culture/Beliefs

Chapter 3 - Demography and Settlement
- 3.1 Population Trends
- 3.2 Migration Patterns
- 3.3 Settlement Patterns

Chapter 4– Land Use
- 4.2 Land Use and Land Use Conflicts
- 4.3 Land Tenure and Land Tenure conflicts
- 4.4 Urban and Settlement Morphology

Chapter 5 – Natural Resources
- 5.1 Green areas
- 5.2 Forest reserves and wildlife
- 5.3 Aquatic and marine resources
- 5.4 Environmentally-critical areas

Chapter 6 – Planning Subjects
- 6.1 Poverty levels
- 6.2 Local economic development
- 6.3 Agriculture, Livestock, and Fishery
- 6.4 Forestry
- 6.5 Mining
- 6.6 Commerce/ Industry
- 6.7 Tourism
- 6.8 Off-farm Employment
- 6.9 Other Locally Specific Subjects

Chapter 7 – Environment and Sanitation
- 7.1 Water
- 7.2 Sanitation
- 7.2 Solid Waste Management
- 7.3 Disaster and Risk Management and Mitigation

Chapter 8 – Social Welfare
- 8.1 Health
- 8.2 Education
- 8.3 Social Welfare and Community Development
- 8.4 HIV/AIDS
- 8.5 Nutrition

Chapter 9 – Traffic and Transport
- 9.1 Transport types and state of transport infrastructure

Chapter 10 – Planning Conclusions and Development Strategies.
- 10.1 Summary of issues and implications for planning
- 10.2 Results from the needs assessment and consultations

10.2 Opportunities, constraints and needs analysis
10. 3 Conclusions on planning priorities

2. Development Proposal

Chapter I – District / Urban Development Framework
1.1 Planning aims and objectives
1.2 Guiding principles and strategies
Chapter 2 – Development Proposals
2.1 Housing
2.2 Economic Development and Employment
2.3 Public institutions and Social services and facilities
2.4 Transportation and road network
2.5 Sanitation and utilities
2.6 Urban renewal (if applicable)
2.7 Environmental protective measures and enhancement
Chapter 3 – Plan Implementation Strategy
3.1 Phasing and programming
3.2 Development management and institutional responsibilities
3.3 Implementation strategies
3.4 Public Investment and Financing strategies
3.5 Monitoring strategies

7.3. Content of a Layout (detailed) Plan

- A Layout Plan shall contain the following specifications as applicable, but is not limited to:
- Plot subdivision;
- Areas and structures to be conserved;
- Areas for public and common uses, recreation, play areas, and green spaces;
- Flood prone zones and other risks;
- Road network, traffic circulation, and parking;
- Utility spaces and type of utilities;
- Space for garbage disposal and collection points;
- Spaces for underground works, excavations, retaining walls, or banks of earth, and for mining;
- Type and extent of built structures;
- Maximum number of housing units allowed per building;
- Built structures meant for specific groups of people and uses;
- Detailed use of specific plots, and plots which have to be kept unbuilt;
- Design requirements or range, if desired (e.g. roofing angle, number of floors, materials, colours).

7.4. Templates for building permit and applications

Puntland State of Somalia

Application for Building Permit

To be delivered to Local Council where the plot proposed for development is located

A. Project Identification

Approval of reception by Local Council	Received by (Name/ Signature)	Code given by Local Council:
Box to be filled in by Planning authority	Date received:	Development category *(circle)* A – B – C – D – E – F – R – S – T – X

( ) Documents are complete
( ) The following required document(s) is (are) missing:
- ( ) Proof of land ownership / lease / utilization permit
- ( ) Application fee payment receipt
- ( ) Location plan 1:500 / 1:1,000
- ( ) Site plan 1:200
- ( ) Landscaping plan 1:200, if applicable
- ( ) All floor plan(s) Scale 1:100
- ( ) Roofing plan 1:100
- ( ) All elevation(s) Scale 1:100
- ( ) Foundation plan 1:100
- ( ) All elevations 1:100
- ( ) Cross sections of all principally different elevations 1:100
- ( ) Infrastructure conduit and sanitation plans 1:100
- ( ) For public buildings: plan of parking area 1:500
- ( ) Additional documentation of technical equipment or materials, if applicable
- ( ) Environmental Impact Assessment, if applicable
- ( ) Submitted plans are certified as required

Type of application

- ( ) Preliminary request----------ignore section E
- ( ) New construction
- ( ) Complete demolition
- ( ) Public advertisement
- ( ) Subdivision ----------respond to sections A to D7, E4
- ( ) Change of use ----------respond to sections A to D4
- ( ) Mining (surface or underground)---------- -respond to sections A to C, D11, E4

A.1	Local Council		
A.2	Plot identification	Plot no.: Deed plan no. (if any):	
B. Personal information of representing plot owner / lessee			
B.1	Name		
B.2	ID		
B.3	Place of birth		
B. 4	Year of birth		
B. 5	Other plot owners / lessees	Name	ID
		(1) …… (2) …… (3) ……	
C. General plot information			
C. 1	Zoning of plot	( ) Mixed Use ( ) Residential ( ) Commercial ( ) Industry ( ) Public & Institutional ( ) Tourism	( ) Recreation ( ) Special Area ( ) Utility ( ) Transport ( ) Road ( ) No zoning
C. 2	Existing development on plot	( ) Plot undeveloped ( ) Plot developed (*describe existing development*):	
D. General project information			
D. 1	Intended development	( ) Mixed Use ( ) Residential ( ) Commercial ( ) Industry ( ) Public & Institutional ( ) Tourism ( ) Recreation	( ) Special Area ( ) Utility ( ) Transport ( ) Road ( ) Other (specify)……
D. 2	Detailed description of intended use		
	D. 2.1 Change of zoning applied for	( ) Yes ( ) No	
D. 3	Detailed Layout Plan for the area where the plot is located	( ) Existing ( ) Not existing	
D. 4	Subdivision of plot planned	( ) Yes ( ) No	
	D. 4.1 Number of plots planned		
	D. 4.2 Purpose of subdivision		
D. 5	If residential or mixed use, number of housing units planned		
D. 6	If commercial or mixed use, number of office units planned		
D. 7	Floor area including secondary uses	Total…….. (m2)	
	D. 7.1 Main building	…….. (m2)	
	D. 7.2 Secondary buildings		

		(kitchens, staff quarters, carports etc.)	…..…….…….. (m2)
D. 8	Building height (main building)		
D .9	Building height (secondary building)		
D. 10	Mining intended (surface or underground)		( ) Yes ( ) No
	D.10. 1	Types of minerals to be extracted	
	D.10. 2	Excavations planned	( ) Yes (Specify depth): …….. ( ) No
E. Specific project information			
E.1	**Construction method**		
	E.1.1.	Walls	
	E 1.2.	Roofing material	
	E 1.3.	Roofing material colour	
	E 1.3.	Foundation	
E. 2	Construction Costs		……SOS
E. 3	Planned building and plot equipment		
	E 3.1.	Rain water harvesting	( ) Yes If yes, size of tank/rain barrel: ( ) No
	E 3.2	Toilet and black water	( ) Sewer connection ( ) Septic tank ( ) VIP ( ) Biogas digester ( ) Composting toilet ( ) Sewage treatment plant ( ) Traditional pit latrine ( ) Other (specify):
	E 3.3.	Grey water	( ) Domestic filtering system ( ) Septic tank ( ) Other (specify):
	E 3.4.	Storm water drainage on plot	( ) Yes If yes, describe: ( ) No
E. 4	Existing infrastructure and utilities		
	E 4.1.	Access	( ) Road ( ) Public footpath ( ) No public access
	E. 4.2	Electricity	( ) Yes, on plot ( ) Yes, in the neighbourhood Distance of closest power line from plot: ……meters ( ) No
	E. 4.3	Potable water	( ) Yes, on plot ( ) Yes, in the neighbourhood Distance of closest protected water source from plot: ……meters ( ) No
	E. 4.4	Waste water treatment	( ) Public sewer connection Distance of closest sewer line from plot: ……meters
	E .4.5	Waste disposal and collection	( ) Collected at plot Waste is collected by: …….. ( ) Collected from neighbourhood collection point ( ) No
			For commercial, industrial or health facility: State the type of refuse from your planned facility and explain disposal.
	E. 4.6	Strom water drainages along plot	( ) Yes ( ) No

I/We hereby apply for permission to carry out the development described in this application and on the attached drawings.

Date, Signature:……

If signed by an agent:	Name of agent: Professional registration: Address: Phone number:

The applicant has the right to inquire about the status of his/her application any time after the application process has started.

Puntland State of Somalia

Application for Building Permit

ASSESSMENT CRITERIA LIST

For Local Council

Name of applicant……..……

Building permit application no. …….

1 Architect/Engineer's professional registration is confirmed or not necessary *(for development categories A+B and for models)* ( ) Confirmed ( ) Not necessary ( ) Not confirmed
If necessary and not confirmed, application is incomplete and not submitted to Local Council
Remarks……

2 The planned development is clearly presented and the design, its dimensions, etc. is well understood
( ) Yes ( ) No
Remarks……

3 The proposed use is in line with zoning ( ); Change of zoning required ( ) If change of zoning is required – it is acceptable ( ) Yes ( ) No
If no, refusal of development is suggested

4 EIA is required according to Environment Policy and subsequent legislation ( ) Yes ( ) No

5 *If EIA is required*, the EIA approves the development ( ) Yes ( ) No
If no, refusal of development is suggested
Remarks……

6 *If no EIA is required, t*he foreseeable impact on the natural environment has been thoroughly assessed and is acceptable ( ) Yes ( ) No
If no, refusal of development is suggested
Remarks……

7 Detrimental noise, air, water or ground pollution is to be expected by the proposed development
( ) Yes ( ) No; If yes, mitigation measures are included in the proposal ( ) Yes ( ) No
If no, refusal of development is suggested
Remarks……

8 The proposed development complies with the existing physical plans (District Spatial Plan / Urban Masterplan / Layout Plan)
( ) Yes ( ) No ( ) No plans existing
Remarks……

9 *For buildings C-E,* there were objections from neighbours ( ) There were no objections ( )
If there were objections, they are reasonable ( ) or negligible ( )
Remarks……

10 All engineering calculations, if any, specifications and drawings are clear and well calculated
( ) Yes ( ) No ( ) Not necessary ( ) Necessary but not submitted
Remarks……

11 The planned building is in line with maximum permittable extent of development ( ) Yes ( ) No
Remarks……

12 The proposed architectural style and layout suit the surroundings ( ) Yes ( ) No
If no, the proposed architectural style is, however, acceptable in its context ( ) Yes ( ) No
If no, refusal of development is suggested
Remarks……

13 The Planned materials can be approved ( ) Yes ( ) No
Remarks……

14 The proposed construction technology is suitable for the planned building height and volume of development ( ) Yes ( ) No
Remarks……

15 *(For sub-divisions)* Access, circulation and infrastructure are well planned ( ) Yes ( ) No
Remarks……
(For single plot development) Access, parking, circulation and infrastructure is sufficient in regard to the planned development ( ) Yes ( ) No
Remarks……

16 Toilet type and black water treatment are acceptable for planned type of development, use, location, density and ground water table ( ) Yes ( ) No
If no, consultations and improvement of documents required
Remarks……

17 Grey water treatment/evacuation is acceptable for planned type of development, use, location, density and ground water table ( ) Yes ( ) No
If no, consultations and improvement of documents required
Remarks……

18 Storm water drainage conditions on plot are acceptable for planned type of development, use, location, density and ground water table ( ) Yes ( ) No

If no, consultations and improvement of documents required

Remarks……

19 Waste disposal / removal are ensured ( ) Yes ( ) No
If no, consultations and improvement of documents required
Remarks……

20 Potable water is accessible within an acceptable distance ( ) Yes ( ) No; Distance is……..m
If no, consultations and improvement of documents required
Remarks……

21 Electricity is easily accessible and public connection possible ( ) Electricity is not essential for the proposed use ( ) Developer plans use of solar energy ( )
Remarks……

22 *(For public, public residential, gastronomy, commercial and industrial buildings)* Safety, public health and occupation standards are respected ( ) Yes ( ) No
If no, consultations and improvement of documents required

Remarks……

23 The additional traffic caused by the proposed development is acceptable without additional traffic management measures ( ) Yes ( ) No
If no, consultations and improvement of documents required
Remarks……

24 The proposed development does not cause any harm to the public interest ( ) Yes ( ) No

Remarks……

25 The applicant is likely able to finance the proposed development ( ) Yes ( ) No

Remarks……

26 In order for the proposed development to be approved, the technical sub-committee proposes the following conditions to be fulfilled by the applicant, if applicable:

Any other remark:

Local Council:	Officer (Name and signature):	Date:

Puntland State of Somalia

Application for Building Permit
ACKNOWLEDGEMENT OF RECEPTION OF APPLICATION

Name of applicant……..……

Building permit application no. …….

( ) The building application is complete.
( ) The following *required* document(s) is (are) missing and have to be handed in to <u>start</u> the building permit application process:

( ) Building permit application form
( ) Proof of land ownership / lease / utilization permit
( ) Application fee payment receipt……..……
( ) Location plan 1:500 / 1:1,000
( ) Site plan 1:200
( ) Landscaping plan 1:200, if applicable
( ) Floor plan(s) 1:100 for levels no. ……
( ) Elevation(s) 1:100 for elevation E-W-N-S
( ) Roofing plan 1:100
( ) Foundation plan 1:100
( ) 2 cross sections of all principally different elevations 1:100. Cross section through……
( ) Wall sections of all principally different elevations 1:20. Cross section through…….
( ) *For public buildings*: plan of parking area Scale 1:500
( ) Infrastructure conduit and sanitation plans
( ) Fire safety plan (for categories D and E)
( ) Additional documentation of technical equipment or materials: ……
( ) Environmental Impact Assessment ( ) Not required
( ) Approval by registered architect / structural engineer

Local Council:	Officer (Name and signature):	Date:

Puntland State of Somalia

Application for Building Permit

NEIGHBOR OBJECTIONS RECORD

For Building Categories C-E

Name of applicant……

Building application no. ……

Intended development (as in application form)

( ) Mixed Use
( ) Residential
( ) Commercial
( ) Industry
( ) Public & Institutional
( ) Tourism
( ) Recreation
( ) Special Area
( ) Utility
( ) Transport
( ) Road
( ) Other (specify)……..

Detailed use description (as in application form)……
The plot intended for development has ……..(state number) neighboring plots.

Plot neighbors and objection record

	NAME OF HEAD OF HOUSEHOLD	SIDE OF PLOT *(circle)*	OBJECTION *(tick)*
1		EAST-WEST-SOUTH-NORTH	
2		EAST-WEST-SOUTH-NORTH	
3		EAST-WEST-SOUTH-NORTH	
4		EAST-WEST-SOUTH-NORTH	
		ANY OTHER SPECIFY:	

REASON FOR OBJECTION(S)

1

2

3

4

REMARK BY ELDER (NAME:……) ABOUT OBJECTION(S)

1

2

3

4

REMARK BY OFFICER ABOUT OBJECTION(S)

1

2

3

4

Local Council:	Officer (Name and signature):	Date:

Puntland State of Somalia

Application for Building Permit

APPLICATION FEE PAYMENT RECEIPT

The reception of the following fees for building permit application is hereby officially acknowledged:

Name of applicant……

Building application no. ……..……

Building Category (circle)	A	B	C	D	E	F	R	S	T	X
Development factor (SOS/m^2)	1	20	30	40	50					See A-E
Lump sum (SOS)						xxx	xxx	xxx	xxx	

Floor area planned (m^2)…….

Total floor area (m^2) x Development factor (SOS/m^2)

……..m^2 x ……..…...SOS/m^2

Total amount (SOS)……

Local Council:	Officer (Name and signature):	Date:

Puntland State of Somalia

CONSTRUCTION STOP NOTICE

The construction activities have to be stopped immediately until this Stop Notice is being amended.

If the Stop Notice is not complied with, the offender may be prosecuted.

Plot ID:……
Name of developer (if known):……..……
Building application no. (if any):……..……..……..

The reason for the serving of this Stop Notice is:

( ) Construction without building permit with a date prior to start of construction of a building not exempted from building permit requirement.

The herewith stopped construction is not (checklist):

( ) Wall plastering only;

( ) Interior non-structural changes only;

( ) A 1-floor traditional style building outside of a zoned neighborhood centre, district centre or major urban center;

( ) A 1-floor building in unstabilized earth construction technology no larger than 60m^2 outside of a zoned neighborhood centre, district centre or major urban center;

( ) Building extension resulting in a 1-floor building no larger than 60m^2;

( ) Activities by the National Security organs.

( ) Construction is not conforming to approved plans by Building Permit.

( ) Construction, except for categories A and B, has been commenced without any prior existence of certified as-built drawings.

( ) Building permit has lapsed.

The Stop Notice requires approval by the District Council by……..

In case of approval of continued validity of the Stop Notice, the developer will be requested to submit a Building Permit application, at a 10-fold application fee.

In case no communication has been made by the Local Council by above date, the Stop Notice can be considered invalid starting from above date.

Local Council:	Inspection officer (Name and signature):	Date:

Puntland State of Somalia

Permitted Building - Inspection Card No. 1

NOTICE OF
START OF CONSTRUCTION

The start of construction is hereby announced to the Local Council.

Name of developer……
Building application no. ……..……...……

Construction has started on
……..,
With the following
activity:……...

Signature of developer:	Confirmed by architect / engineer (if applicable): (Name and signature):	Date:
Local Council:	Notice received by officer (Name and signature):	Date:

Puntland State of Somalia

Permitted Building - Inspection Card No. 2

NOTICE OF
COMPLETING THE FOUNDATION

The completion of foundation is hereby announced to the Local Council.

Name of developer……
Building application no. ……..……

The foundation works were completed on……...…...
The foundation has the following characteristics:……..…
…….……..
.
The foundation has been built conform to the building permit application plans.

Signature of developer:	Confirmed by architect / engineer (if applicable): (Name and signature):	Date:
Local Council:	Notice received by officer (Name and signature):	Date:

Puntland State of Somalia

Permitted Building - Inspection Card No. 3

NOTICE OF
COMPLETING THE ROOF STRUCTURE

The completion of roof structure is hereby announced to the Local Council.

Name of developer……

Building application no. ……..……..……

The roof construction works without roofing were completed on……
The roof structure has the following characteristics: ……..
……
The roof structure has been built conform to the building permit application plans.

Signature of developer:	Confirmed by architect / engineer (if applicable): (Name and signature):	Date:
Local Council:	Notice received by officer (Name and signature):	Date:

Puntland State of Somalia

Permitted Building - Inspection Card No. 4

NOTICE OF COMPLETION

The completion of the building is hereby announced to the Local Council.

Name of developer……
Building application no. ……

The construction works were completed on……
The building is deemed ready for occupation.
The building has been built conform to the building permit application plans.

Signature of developer:	Confirmed by architect / engineer (if applicable): (Name and signature):	Date:
Local Council:	Notice received by officer (Name and signature):	Date:

Puntland State of Somalia

Permitted Building
CERTIFICATE OF OCCUPATION

The final inspection has been carried out on ……and the results are hereby documented.

Name of developer……
Building application no. ……..……

( ) The building has been built conform to the building permit application plans.
( ) The following parts of the building have not been built conform to the building permit application plans.
( ) The final inspection concludes that the building may be occupied.
( ) The final inspection concludes, that the building may not be occupied, until the following issues have not been rectified within 60 days from today :

- ……..….
- ……..……
- ……..……
- ……..……
- ……..……
- ……..

( ) After timely rectification, the "Notice of Completion" shall be re-submitted by (date):……...

Local Council:	Inspection officer (Name and signature):	Date:

Puntland State of Somalia

PUBLIC HEALTH HAZARD NOTICE

The below person / entity is being served a Hazard Notice for causing public health hazards as specified below. The person / entity is required to correct the situation to abate it, and prevent reoccurrence of said nuisance.

Name of person / entity causing public health hazard……

Address or plot no. where public health hazard is being identified:……

The public health hazard which was identified consists in:

( ) Causing standing water affecting the public realm

( ) Causing waste water runoff into the public realm or to neighbouring plot(s)

( ) Causing contamination of potable water sources and supply

( ) Uncontrolled / unauthorized waste dumping

( ) Dirty latrine(s) affecting the public realm

Description of details:……

The Hazard Notice requires approval by the District Council within 7 days, i.e. by ……
If the purpose for this notice is the causing of contamination of potable water and supply, it must be resolved immediately without waiting for the District Council's approval or other communication.

In case of approval of continued validity of the Hazard Notice by the District Council, the causing person / entity is requested to resolve the cause of having been served this notice.
In case no communication has been made by the Local Council by ……., the Hazard Notice can be considered invalid starting from above date.
In case of approved existence of a Public Health Hazard by the District Council by above date, and non-rectification within 14 calendar days of approval of the hazard by the Local Council, the causing person / entity is requested to pay a penalty fee for non-compliance in accordance with the penalty system published.

Local Council:	Inspection officer (Name and signature):	Date:

8.5. References

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