INFRASTRUCTURE GUIDELINES:

NATURE AREAS AND NATURAL OPEN SPACES OF NELSON MANDELA BAY
Introduction

The primary purpose of these guidelines is to direct the development of infrastructure within the nature reserves and undeveloped public open spaces of the Nelson Mandela Bay Municipality in order to maintain the visual, aesthetic, cultural and biodiversity features and values of these areas. The ultimate objective being to maintain the current quality and diversity of these sites, yet simultaneously improve the utilisation thereof, for the benefit of present and future generations.

The detailed objectives of these guidelines are:

- To specify principles and appropriate approaches to the planning of infrastructure in these areas;
- To specify design criteria for appropriate infrastructure that promote structures that are sympathetic to the surrounding environment;
- To identify and recommend best-practise “green” technology and construction methods; and
- To specify standardised templates for all signage within these areas.

The guidelines have been written with a cradle to grave approach in mind, which has shaped the structure of the document, which begins at the infancy of the planning and design stage of infrastructure and continues through to maintenance elements. However, the guidelines should be read as a collective whole, rather than as separate sections. This division into the various headings and sub-headings is effected as a means to easy referencing:

1. Architectural design;
2. Alterations and additions to existing buildings;
3. Landscaping;
4. Infrastructure;
5. Contractor’s regulations and quality control
6. Maintenance guidelines;
7. Green practices; and
8. Signage.

The primary purpose of establishing infrastructure in nature reserves and open spaces is three-fold:

- To facilitate awareness and education regarding the value (biological, economic, recreational, spiritual, and aesthetic) of the natural and cultural environment within which the area is located;
- To increase revenue generated from these areas in order to facilitate their appropriate long-term management of the area; and
• To provide tertiary social services to the citizens of, and visitors to, the areas (e.g. recreation, sporting, cultural etc.).

However, the document has not been drafted to provide a framework for the overall management of the Nelson Mandela Bay Municipality’s nature areas for biodiversity conservation and eco-tourism purposes, but rather to guide the planning and development of appropriate infrastructure in nature reserve and open spaces in a focussed and clearly specified manner. Consequently, this document should be viewed as the first of a suite of tools that aim to facilitate the sustainable management and use of the Nelson Mandela Bay Municipality’s nature reserves and green open spaces. Additional tools will therefore need to be developed in the future to address issues such as visitor and infrastructure carrying capacity, revenue streams, and the facilitation of park use and custodianship.

Infrastructure Planning and Design Philosophy
Creating guidelines for a nature reserve deals with the question of order or disorder at the most basic and essential level. Despite the seemingly vast and wild nature of the natural environment, it never gives the impression of chaos. This order in nature is immeasurable because of the variety of shapes, forms, patterns and movements that exist within it.

By creating “place” and “space” through the design and construction of buildings and infrastructure, humans attempt to generate an understandable order within the vastness of nature. In this manner, the order that will apply to the creation of buildings in nature reserves will be an order of geometry and simplicity.

Through structure, repetition and alignment, as well as the use of self-similar elements and methods of construction, an order and sense of regularity is created within a series of building. From this follows the necessity to restrict the scale, height, materials and finishes used on these buildings and structures in order to create a specific character that is visually pleasing, coherent and recognizable.
1. Architectural design guidelines

1.1. The Site

Site analysis
- A detailed analysis of the site must be done indicating relation to other buildings, orientation, existing vegetation, contours, slopes, access, views etc.;

- The site analysis must be submitted with sketch plans and working drawings to relevant authorities.

![Align buildings with contours](image)

General practices
- Where possible, build on a part of the site that has previously been affected or disturbed;

- Orientate buildings in reference to the natural environment and reference to the sun (refer to solar manipulation);

- Place buildings to follow contour lines (land formation);

- Design retaining walls, storm water and other elements to minimize possible soil erosion around the building;

- Use vegetation to improve climatic extremes.
**Building / development platform**

- The building platform entails the placement of building - how the building “sits” on site;

- A two dimensional platform will contain the maximum space that a new building or buildings will take up;

- Where possible, buildings must be placed on the parts of land which are in the worst condition (needs repair);

- All new designs must preferably make use of stone walls, if it is not possible, use at least a stone plinth;

- Historical precedents must guide the design of new buildings: main buildings must be solid, decks and attachments can be treated differently.

**Building envelope - scale**

- After calculating the space of the new buildings and the impact on the environment, the building platform must be developed to a three dimensional space that must include the positioning of the buildings in relation to the contours, the retaining walls or any other measures needed to minimize the impact of storm water;

- The building envelope must also indicate what measures have been taken to reduce the scale of the building in the landscape by drawing sections through the site (e.g. stepping of building down contours);

- A height restriction of 4.5m taken from the highest point of the exterior wall of the proposed building on the site to the top of a parapet or highest point of a flat roof or 4.5m to the middle point of a pitched roof.
Building form

- Break building up in smaller parts to minimize visual impact;
- Maximum width of a block to be 7.6m, in special cases buildings like conference centres may be wider, but preference must be given to longer narrow buildings above rectangular buildings;
- Try to avoid square or round spaces and bulky buildings;
- Organic forms are not excluded, but circular buildings must be avoided;
- When a building is broken up into blocks, the blocks must be roofed individually, with lower roofs over connecting structures;
- All forms must be directly attached to the ground – no stilts permitted with the exception of external decks and viewing structures (e.g. bird sanctuaries), where environment requires it (waterholes, forest areas, marshlands, pedestrian walkways etc.).

1.2. Architecture

General

- Design proposals must show an understanding and sensitivity towards the natural environment;
- Use combinations of natural and environmental friendly materials like timber, natural stone and plaster work painted in natural colours. Avoid facebrick and textured plaster finishes;
- Avoid use of foreign architecture like Swiss chalet-type architecture, Tuscan-type architecture, and A-frames etc. Other types of architecture that are excluded are the Cape Dutch style, Victorian buildings with decorations and plastered buildings with decorated gable ends;
- All construction and building methods to comply with National Building Regulations (NBR).
**Roofs**

- **Roof angles**
  - Flat corrugated iron roofs must be concealed behind parapet walls;
  - Concrete slabs can be exposed but must have an upstand beam where exposed to conceal waterproofing;
  - Slabs to have brown stone-chip covering minimum 5cm thick to conceal waterproofing;
  - Pitched roofs to have maximum pitch of 30º;
  - Thatch roofs may have a pitch of 45º;
  - Hipped ends preferred to gables;
  - Perimeter eaves/overhangs to project minimum 500mm and maximum of 750mm if thatch is used.

- **Roof materials**
  - Thatching;
  - Painted or powder coated corrugated iron sheeting in charcoal, black and grey colours;
  - No blue, green or red roofs allowed;
  - No reflective colours permitted;
  - No fibre-cement sheeting;
  - No tiled roofs.

- **Fascias, bargeboards etc.**
  - Avoid fascias and bargeboards, but if used, match the colour of roof material

- **Gutters and down pipes**
  - Aluminium or galvanized gutters and downpipes in colours to match roof colour;
  - PVC gutters and downpipes.
Walls

- External building walls
  - Natural stone preferred (no stone cladding);
  - No “Smartstone” products allowed;
  - No fabricated stone, or chipped and stained plaster allowed;
  - Plastered smooth and painted with earthy colours;
  - When walls are plastered they must have plinths of natural stone;
  - Maximum 4m wall height permitted in a singular vertical plane – if higher, add natural stone base to break up verticality;
  - No facebrick or pre-fabricated concrete walls allowed;
  - Exposed concrete work allowed in limited areas.

- Dividing walls (e.g. boundary-type walls)
  - Preferably of natural stone;
  - Plaster and paint in a earthy colour is acceptable – to match buildings and structures close by;
  - No face-brick or pre-fabricated walls.

- Retaining walls – try to avoid where ever possible
  - Step retaining walls in 1m increments;
  - Maximum height to be 2m;
  - Materials: stone gabions, natural stone, plaster and paint to match nearby structures;
  - No terraforce allowed.

- Low walls
  - Where possible, use low sitting-walls as boundary markers and as part of the landscaping design around buildings, and integrate them with the design of the new building;
  - Use the sitting walls to create positive outdoor spaces that has a view or look onto activity;
  - Add these walls in a sensitive way around existing buildings;
Indigenous trees to be planted in close proximity to these walls to create shaded seating areas.

- Colours
  - Where not indicated specifically, earthy textured colours are preferred;
  - No bright or reflective colours allowed.

**Chimneys**
- Black metal pipe with cowl;
- May be of stone if building has other stone elements;
- Comply with National Building Regulations (NBR);
- Height may exceed building envelope restriction;
- Plastered chimneys allowed as sculptural elements - paint in earthy colours.

**External floors and patios**
- Timber deck or timber plastics;
- Earth coloured tiles;
- Natural stone (e.g. slate);
- Simple concrete finishes: no texturing or patterned concrete finishes. Inlays of stone, tiles or natural materials accepted.

**Doors and Windows**
- Natural timber frames;
- Aluminium frames in charcoal allowed;
- uPVC windows allowed in darker colours (no greens, white etc);
- No imitated timber frames allowed;
- Plaster surrounds allowed around windows and doors - painted in earthy colours;
- Allow generous opening sections for windows and cross ventilation as far as possible;
- No square windows allowed;
- If possible, create windows with a view of natural elements;
- Use vertically proportioned openings.

**Pergolas and Carports**
- Natural timber structures preferred;
- If steel structures are used, paint to match roof colours;
- If masonry columns used - plaster and paint in colours above;
- Natural stone columns allowed;
- Use roofing materials as above;
- Where possible, use vegetation as shading rather than structures or metal sheeting.
**Patios and decks**
- Patios and decks can maximize space and help with the climate control of buildings. Outdoor spaces must be treated as part of the architectural scheme and create a continuity of the outdoors to the indoor spaces;
- Timber plastic preferred (low maintenance), but natural timber is also allowed.

**Balustrades**
- Natural timber structures preferred or timber plastics;
- If existing steel balustrading, paint to match building (dark colours);
- No pre-cast moulded concrete columns or columns with historical references permitted;
- Glass panels permitted;
- No decorative elements permitted;
- Use horizontal lines in combination with vertical posts;
- Avoid diamond and zigzag and other patterns.

**Terraces and paving**
- Materials
  - Natural stone;
  - Clay brick pavers (red, brown, grey);
  - No concrete brick pavers;
  - Cobbles (colours in charcoal and grey colours);
  - Crushed stone;
  - Moderate use of concrete slabs allowed;
  - Concrete blocks that allows grass to grow through (not on south side of buildings and permanently shaded areas).
- Colours
  - Natural earthy colours in darker shades
- Driveways
  - Concrete pavers with grass allowed;
  - Asphalt surfaces to be avoided;
  - Cobbles and clay pavers in darker colours.
Ponds and swimming pools
- Finish in dark or earthy colours;
- Must be fully sunk into natural ground, or have natural stone surround if above surface;
- Pumps to be hidden appropriately;
- When fencing required, follow balustrade guidelines - natural timber and timber plastics preferred.

Miscellaneous items
- TV aerials and satellite dishes to be concealed in roofs or behind parapet walls;
- Plumbing to be concealed in ducts;
- Solar panels to be aligned with north facing roof slopes or on angles if concealed by parapet walls;
- No decorative items such as mouldings, finials etc. permitted.

1.3. Scale and Visibility of buildings
- Follow guidelines regarding building envelope (Section 1.1);
- Focus on horizontally proportioned buildings rather than vertical scale (no double storeys);
- Break large buildings into smaller elements and roof individually;
- Avoid large areas of roof covering;
- Vertical structures like water towers, antennas etc. should be hidden behind vegetation or existing structures;
- Connect small outbuildings (like generator rooms) to larger buildings or hide behind vegetation or timber screens.
1.4. Placement of buildings

**General**
- Group buildings together;
- Create positive communal spaces between buildings;
- Place group of buildings as close to the main entrance as possible;
- Where appropriate, link buildings as described in guidelines.

**Function**
- Functions must be relevant to each specific nature reserve;
- General functions can include a guard house, ablutions, information centre, offices related to the park, store rooms and viewing structures;
- Visitor related functions that can be appropriate include a tea garden, conference centre and an interpretation centre (exhibition space).

**Orientation**
- Orientate buildings North as far as possible;
- Entrances into buildings to be from a communal public area and as far as possible.

1.5. Accessibility for disabled

**Parking**
- Leave minimum one parking bay for disabled persons close to facilities.

**Stairs and steps**
- Stairs only allowed when ramp is also provided;
- Maximum 3 steps allowed into building with 1050mm landing between each step, maximum height of step = 150mm.
Ramps
- No ramps to be steeper than 1:8;
- 6m maximum length of ramp between landings;
- Provide non-slip strips on ramps;
- Provide handrails along ramps;
- Ramps to be minimum 1,2m wide.

Passages
- Passages to be minimum 1,2m wide;
- Allow minimum 1,3m where a wheelchair user must make a 90 deg turn off passage.

Toilets
- Provide one wheel-chair friendly toilet per toilet block for disabled people;
- Design must accommodate a 1,6m turning circle in toilet cubicle;
- Door of toilet to open outwards;
- Provide grab rails as per regulations.

Wheelchair friendly route
- Allow for at least one route per nature reserve that is wheelchair friendly (minimum 1600mm wide).

1.6. Safety and security

Guards/ Rangers
- Guards and rangers patrolling the park preferred to security at entrances

Lighting
- Provide lighting at entrances of nature reserves;
- Provide fittings that direct light down along paths connecting parking areas and buildings.
Admission
- Develop a filter-system where cars are only allowed in demarcated parking areas with main recreational areas close by, and only hiking routes and mountain bike routes further into the reserve;
- Create access gates to maintenance routes used by staff;
- Signage must be clear regarding the opening times of the nature reserve and the rules and regulations.

1.7. Furniture

Low walls planters
- All low walls and planters to be of natural stone or plastered brick in dark natural colours - walls to be designed to be used as sitting walls as far as possible.

Benches and seats and picnic tables
- Use combinations of natural materials and concrete to create contemporary furniture

Light fittings
- Use limited designs and lighting types to create coherence between elements;
- Light to be directed downwards as far as possible (no direct light);
- Limited use of upward directed light allowed - directed upwards in trees or next to structures of importance for special night time events;
- Use contemporary light fittings;
- Avoid globe-shaped luminaires that shine light in all directions.

Fences
- Use low planted hedges, low stone walls and low timber or timber plastic fences;
- Avoid galvanized steel palisades.

Rubbish bins
- Use concrete and stone combination rubbish bins in contemporary designs

Tree guards
- Use tree guards to protect new trees
Concept design of a pavilion based upon the guidelines, which could serve as a multi-purpose facility, including an interpretive centre

A close-up view of the pavilion
An aerial view of the pavilion

A side view of the pavilion
An oblique view of the pavilion

A rear view of the pavilion
2. Alterations and additions to existing buildings

Use the architectural guidelines in a creative way to make contemporary additions and/or alterations to existing buildings (paint colours, roofing material etc.).

Refer specifically to section 1.2 Architecture, and section 1.5 Disabled people when renovating or upgrading existing buildings.

3. Landscaping guidelines

Landscape character
- Preserve as much of the unique qualities of the existing landscape as possible;
- Maintain as much of the indigenous vegetation as possible;
- Do not allow planting of alien species;
- Rehabilitate and restore disturbed vegetation around new buildings and structures.

Conditions
- A landscape plan at a minimum scale of 1: 100, for rehabilitation and landscaping of each building or structure, must accompany all architectural drawings;
- The landscape plan must indicate all grading, retaining, terracing etc. if such is required by the design;
- All plants, species, spacing and approximate sizes of such must be indicated and an inventory of species (only indigenous allowed) to be used must accompany the landscape plan;
- All storm water handling, pipelines, paving, storage and refuse areas, pergola’s, screening, water features, fences, sitting walls, and other structural elements must be indicated on the landscape plan.

Restrictions
- May vary between projects, but a general landscaping intervention of a maximum of a 5m radius from the building would apply;
- No declared invasive alien plants, including trees, shrubs and grasses will be permitted;
- No temporary storage structures like “wendy-houses” permitted;
- Clear all invasive alien vegetation from landscaping area.

Hard landscaping
- Hard landscaping i.e. brick paving, tiling etc. around new structures must be kept to a minimum;
- Soften elements like retaining walls by using them as planters.

Plant species
- Rehabilitate as much of the indigenous plant material as possible and propagate use of original indigenous plant material as far as possible;
• Department of Water Affairs and Forestry’s Waterwise Gardening Programmes should be supported as far as possible when planting indigenous plants.

4. Infrastructure guidelines

Roads
• Asphalt roads only on main vehicular routes;
• Paved roads preferred;
• Make provision for storm water and prevent soil erosion along roads as far as possible;
• Service roads to have paved entrances, which must be gated, and steps must be taken to prevent soil erosion.

Walkways and hiking and mountain bike trails
• Entrances of hiking trails and mountain bike trails should be treated in a permanent material e.g. paved or raised timber walkways or timber-plastic walkways for about 10m into the trail;
• Signage is important at entrances of park, picnic areas, walkways etc. and must display information regarding times that nature reserve is open, distance of hikes and maps of trails;
• Take measures to prevent soil erosion along paths and walkways;
• Use raised boardwalks in areas where vegetation is sensitive.

Parking
• Where possible, break up parking in smaller lots or have parking on the verge of the road, instead of large parking lots;
• Paving and concrete pavers with grass preferred;
• Plant trees indigenous to specific nature reserve in parking areas to minimize radiation.

5. Construction

The construction guidelines seek to limit the impact of the construction phase on the natural environment, visiting tourists and neighbours to the nature areas. The primary impacts that need to be mitigated against are as follows:
• Ecological;
• Aesthetic;
• Erosion; and
• Nuisance (e.g. dust and noise).

Impacts
• Construction impacts should not exceed any levels deemed as causing an unacceptable level of:
  o Disturbance or degradation to important habitats and/or species as to be determined by a suitably qualified Environmental Assessment Practitioner(EAP); and
  o Nuisance to visiting tourists, neighbouring occupants of land, or important resident faunal species.
Environmental Procedures

- As required by the National environmental Management Act (NEMA) Environmental Impact Assessment Regulations (2006), an Environmental Impact Assessment (EIA) must be finalised and approved prior to the commencement of any site clearing or infrastructure development within a protected area;
- An Environmental Management Plan (EMP) must be developed for the construction and maintenance of all proposed infrastructure prior to commencement;
- An environmental control officer must be appointed to facilitate and oversee adherence to the EMP with regard to on- and off-site activities (“cradle to grave” principle);
- An independent and appropriately qualified and experienced environmental auditor must be appointed to undertake periodic (e.g. monthly) inspections to verify whether the EMP and other legal conditions associated with the development are being adhered to;
- All construction staff (e.g. contractors) must undergo training with regard to the EMP specifications prior to the initiation of construction.

Construction Methods

Excavation, management of topsoil, vegetation and other materials

- The exact extent of the construction site and proposed areas for clearing must each be clearly staked out, and no construction vehicles or site clearing may be allowed outside of these sites;
- Removal of vegetation must only occur immediately prior to construction commencing and as per the EIA and EMP specifications;
- All cleared vegetation, including Species Special Concern (SSC) that are rescued prior to site clearing, must be managed according to the EIA and EMP specifications;
- Excavation activities and clearing must be restricted to areas of construction;
- Excavated material must be dumped in stockpiles in an area designated by the ECO;
- Disturbed soils around construction areas must be sufficiently compacted and planted with removed indigenous plant material to reduce the erosion potential;
- Excess excavated material must not be allowed to accumulate on any site related to the development;
- All topsoil removed must be stockpiled in demarcated areas and watered daily (depending on the length of time between removal and replacement of topsoil) in order to prevent drying and wind erosion;
- Topsoil must be placed such that it will not be washed away by storm water or rainfall or blown away by wind; and
- Topsoil shall be replaced immediately after construction has been completed and should be anchored using grass and small shrubs that are indigenous to the immediately surrounding area (as determined by a suitably qualified and experienced botanist;
- The ECO must designate an area where concrete batching is to take place;
• Concrete and cement batching must not be permitted outside this designated area;
• Cement mixers must be placed on trays and no cement mixing will take place on the soil surface or permeable surfaces; and
• Cement bags must be disposed of as waste at a licensed waste disposal facility.

**Labour and Equipment**
• Emphasis must be placed on maximising the utilisation of labour and small equipment;
• Large construction vehicles/equipment (e.g. plant) must only be used where absolutely necessary;
• Vehicular and pedestrian access for construction workers must be restricted to the construction site and other appropriate parts of the protected areas alone, as determined by the ECO, so as to avoid interfering with the experience of visiting tourists in the protected area;
• Noise levels shall be limited to less than 70 dB(A) at the immediate boundary of the construction site;
• Construction shall only occur between the hours of 8:00 am and 5:00 pm, from Monday to Friday and 8:00 am and 13:00 pm on Saturdays (but may be further restrict depending on the visitor-usage of the protected area). NO work on Sundays;
• The use of radios, television sets and other such equipment by workers shall be controlled and noise levels kept to a level that is deemed by the ECO to not constitute a disturbance to neighbouring residents, resident fauna and visiting tourists;
• The use of jackhammers and compressors must be limited as far as practically possible;

**Health and Safety**
• A complaints record must be kept to record any complaints lodged due to noise or other forms of disturbance or nuisance;
• Suitable measures must be taken to control dust arising from stockpiles, bare surfaces and transportation of materials;
• Potential dust control measures, including the covering of stockpiles, dampening of surfaces on windy days and the use of straw, must be implemented; and
• Vehicle speeds are to be limited to 40km/hr.
• It must be the contractor's responsibility to implement a health and safety plan to the satisfaction of the authorities;
• Pedestrian access to all construction sites must be restricted; and
• The proper health and safety regulations must be applied to all subcontractors and staff.

**Waste and Pollution Management**
• All waste materials must be removed from the site on a regular basis (daily for organic and weekly for inorganic materials) and disposed of at an appropriate registered waste site;
• Animal proof portable bins must be used for the storage of solid waste; and
• Hazardous waste (e.g. used oils) shall be separated from general wastes, stored separately in appropriate containers and disposed of at a licensed hazardous waste disposal facility or certified recycling facility;
• Excess excavated material shall not be allowed to accumulate on site;
• All construction waste shall be disposed off at a registered waste disposal site; and
• No routine maintenance of earth moving equipment and vehicles shall occur on site.

Fire Management
• No fires are permitted on site;
• Smoking shall not be permitted in those areas that pose a fire hazard. Such areas include areas where vegetation is such that a fire may spread rapidly e.g. vegetation stockpiles and fynbos;
• A fire officer shall be appointed by the contractor who shall be responsible for co-ordinating rapid, appropriate responses in the event of a fire;
• Sufficient fire-fighting equipment shall be maintained on site at all times;

Environmental Damage
• No wildlife may be removed from the site or surrounding areas unless approved by the ECO in conjunction with the appropriate permits obtainable from the Eastern Cape Departments of Economic Development and Environmental Affairs (DEDEA) and/or Water affairs and Forestry (DWAF);
• No hunting, killing, capturing or snaring of wildlife may occur on the site or the surroundings, the contractor shall assume responsibility in this regard for all his employees and sub-contractors.
• The construction firm or any other responsible party should be held liable for any non-conformances as specified in the EIA or EMP; and
• Any environmental damage caused during the construction phase should be rectified by such party via rehabilitation or restoration measures as recommended by a suitably qualified EAP.
6. Contractor’s regulations and quality control

**General principles**
- The Protected Area Manager, Investor (private partner), Architect, Contractor, and ECO are all responsible for quality control;
- Only adequately tested and SABS approved materials, technology, and construction methods may be used;
- Only architectural plans that fully comply with these Guidelines may be approved;
- All construction must comply with the above guidelines;
- The final result of the development and operation of infrastructure with the nature areas must be such that the quality of the natural environment (water, habitats, air etc.) is not significantly negatively affected in any way;
- Regular and systematic inspections of all infrastructure must be undertaken to ensure that it remains in an optimal aesthetic and working state; and
- An ISO 14001 Environmental Management System (EMS) must be established for all nature reserves, with particular emphasis on infrastructure and tourism amenities.

**Construction signs**
- Builders board must be erected on commencement of work and indicate builders name, telephone number, and if desired, the architects name and engineer;
- No advertising boards allowed (e.g. plumber / electrician etc).

**Storing of construction material**
- If storing facilities are required, the builders shed must be placed where interference on the site have occurred before;
- The shed must be neat and no to as little damage to the natural environment as possible;
- No material to be placed on the roads;
- Stack all construction material neatly on the site.

**Erosion control and protection of fauna and flora**
- No person may kill, injure or catch any wild creatures including birds, mammals and reptiles;
- No person shall cut, pick or destroy any natural vegetation.

**Excavations and excavated material**
- Any excavation exceeding 1m in depth from natural ground level, must receive immediate priority in terms of casting to ensure the stability of such excavation;
- Cast other excavations as soon as possible after trenches has been dug to prevent erosion;
- Use sandbagging and retaining systems to prevent unnecessary erosion and subsidence.

**Major concrete works**
- Concrete trucks may not clean their trucks in the park;
- Clean up any concrete spillage and areas where concrete was mixed immediately.
Work hours
- As determined by specific park prior to construction.

Delivery/construction vehicles and speed limits
- No horse and trailer, long trucks or heavy duty transport (distance between wheel axes exceeding 6m) allowed;
- Roof trusses or reinforcing needing transportation as per truck above must have permission prior to entry;
- No trucks transporting sand, stone aggregate or ready mix concrete in excess of 6 cubic meters allowed;
- All vehicular access must be handled in such a way that minimum damage is caused to the area surrounding the building site and fauna and flora;
- All speed limits of the park to be adhered to at all times;
- Parked construction vehicles may not obstruct roads or cause damage to the natural vegetation.

Behaviour
- All construction workers to behave in a work-like manner;
- Behaviour must not disturb visitors to the park or any other activities;
- It is the responsibility of the contractor or his managers to control behaviour and noise generated by construction workers and ban disruptive or disrespectful workers from the park.

Fires
- No Fires whatsoever allowed on building site or around the site;
- A fire hydrant must be kept on the site.

Litter control
- A waste bin must be provided on site on commencement of construction;
- Litter must be picked up at the end of each working day and placed in the bin;
- Any litter spread outside the site to be picked up regularly;
- A 2m high shade cloth fence must be installed along the perimeter of the site to prevent windblown litter - install the fence as close to the new structure as possible and prevent damage to the natural environment as far as possible. A single, maximum 4m wide entrance will be permitted (close entrance with 2m high shade cloth at the end of each day;
- Clear site of all litter and building scraps particularly on Friday afternoons;
- Place litterbins or screened refuse collection area within fenced area;
- All litter and building refuse created by the construction to be removed from the park at the contractors expense;
- No burning of litter or rubbish permitted on site.

Security, Access and damage
- No workers will be permitted to enter or leave on foot;
- Builders and contractors must bring and fetch workers each day;
- Workers must be collected and dropped at the construction site;
• No workers would be allowed to walk around the park during working hours of construction period;
• Any damage to kerbsides or roads must be fixed on the cost of the contractor;
• If generators are used, it is the responsibility of the contractor to clean up any damage caused by oil leakage or other damage and reinstate the natural environment;
• The contractor must ensure that all sub-contractors, and employees engaged in this contract are aware and abide by the rules as stated here.

Toilet facilities
• A chemical toilet must be provided on site and kept in working order for the duration of the construction period and only be removed after final clean up;
• Use of flush toilets not allowed due to construction materials being flushed and resulting in serious blockages;
• Workers must utilise chemical toilet provided on site.

Final Clean up
• When the construction work is concluded, the contractor shall restore all pavements, roadways, verges, ditches, drainage channels or other street furniture to their original condition;
• The entire construction site must be cleared of all construction debris and refuse and all temporary fencing, toilets, site offices, storage facilities etc.;
• All the works and the site must be inspected by the project manager.

Insurance
• The contractor must take out at its own expense public liability assurance of any claim for damages arising from the acts or omission of it or its employees or agents;
• The contractor must indemnify the NMBM of any claims for damages arising from the construction by taking out such a contract.

Supervision
• The contractor, a supervisor or foreman must be appointed to control the site and deal with any problems that might arise concerning all of the above.
7. Maintenance guidelines

Regular maintenance is essential and can prevent higher repair costs at a later stage:

- Keep out damp and let air in;
- Regular and systematic inspections;
- Taking of immediate steps when defects are noticed.

Roofs
- Make sure that the existing roof structure is sound and watertight;
- When replacing roofs, use suggested roofing materials as per guidelines;
- Protect roofs against corrosion by suitable preparation, priming if necessary, pre-coating and painting in approved colours;
- Repaint every 6 to ten years and follow manufacturer’s instructions carefully;
- Do not leave corrugated iron unpainted.

Walls
- Investigate and treat structural problems like cracking immediately;
- Repair cracks in plaster, because they can lead to retention of damp;
- Cracks can be worsened by plant growth in soft brickwork and mortar: eradicate if persists;
- Ensure that rainwater-goods from roof are watertight to prevent water from running on wall surfaces for prolonged periods: check for blocks and leakages regularly;
- Treat rising damp in walls to prevent deterioration;

Joinery
- Retain and repair windows and doors, architraves etc. wherever possible;
- Use replacements with the same proportions, style and detailing;
- Do not replace decayed floor boards with concrete: it may encourage rising damp in walls;
- An appropriate finish is paint: external joinery should be painted with oil-based gloss enamel to a suitable colour.
8. Green Practices

Various options exist to reduce the potential environmental impacts of the construction and operation of infrastructure, particularly within nature areas, via the application of appropriate technologies and systems during the design phase and throughout the lifespan of a development. Such options are often also more cost-effective in the long-term.

Electricity
- Electricity should be provided via the existing Municipal electricity grid or solar panels linked to a battery system, depending on the site specific environmental impacts thereof;
- Generators are the least preferred option due to noise and odour impacts;
- Energy-efficient appliances must be installed and utilised where appropriate (e.g. for lighting, ventilation etc.)

Ventilation
- Ventilation should be maximised via architectural design (e.g. high ceilings etc.);
- Fans should be utilise fans where necessary;
- The use of air conditioners should be limited to circumstances where these are absolutely necessary.

Water Management
- All waste must be recycled to the greatest practical extent possible (a range of appropriate waste disposal options must be investigated for each development node);
- Rain water should be collected from hard structures (buildings and roads) via a collection system;
- Such collection systems should incorporate bypass systems to accommodate storm flow conditions (e.g. heavy flow down roads);
- Grey water should be collected, subjected to primary treatment where necessary and/or possible (e.g. via a pond system) and re-used for landscaping purposes;
- Only “green detergents” should be permitted for all cleaning purposes.

Sewage Management
A wide variety of sewage management technologies are nationally and international available. At present water-borne systems and septic tanks are the most predominant forms of waste water management in the Municipality, but neither of these approaches are without environmental impacts. In light of the varying feasibility of the different options available due to different geohydrological characteristics of the nature areas and the reach of the existing waste water infrastructure system in the Municipality, a fixed approach cannot be applied.

Consequently, a variety of forms of sewage management are highlighted below, including their strengths and weaknesses, in order to inform and facilitate further investigation into the most appropriate option for each area.
Full bore waterborne sewerage

An in-house full-flush toilet connected to a sewer (pipe) network which drains to a wastewater treatment facility.

<table>
<thead>
<tr>
<th>Principles of operation</th>
<th>Operational and institutional requirements</th>
<th>Costs</th>
<th>Experience and comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste from the toilet, and possibly domestic wastewater, is flushed using significant volumes of water into the sewer system for removal to a treatment facility. There are several types of such facilities and these treat effluent to high standards prior to discharge into the aquatic environment.</td>
<td>Requires a reliable and uninterrupted household water connection and spatially regular permanent settlements. Specific design criteria must be applied throughout the sewerage network. Skilled, organised and effective operation and maintenance capability is required for sewers and the full functioning of wastewater treatment facilities.</td>
<td>Capital: R6 000-R7 000 taking bulk and sewerage costs into account. Operating: R400-R800 per annum.</td>
<td>Widely used and generally the aspiration of all South Africans, although unaffordable to many, particularly in terms of access to sufficient volumes of household water. Appropriate anal cleansing material is required. The health consequences of failure are devastating in comparison to on-site, dry sanitation.</td>
</tr>
</tbody>
</table>
### Septic tank and soakaway or small bore solid-free sewer

**Septic tank and soakaway:** An in-house full flush-toilet connected via pipe and plumbing fixtures to an underground watertight settling chamber (the “digester”) with a liquid outlet to a subsoil drainage/soakaway system.

**Small bore solid-free sewer:** An in-house toilet discharging to a septic tank (or on-site digester) with liquid disposal via a small diameter sewer to a central collection sump or existing sewer system.

<table>
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<tbody>
<tr>
<td><strong>Septic tank and soakaway</strong></td>
<td>Waste from the toilet, and generally domestic wastewater is flushed into the settling chamber where it is retained for at least 24hrs to allow settlement and biological digestion. Partially treated liquid then pass out of the tank and into the subsoil drainage/soakaway system. Digested sludge gradually builds up in the tank and requires eventual removal by tanker.</td>
<td>Capital: R7 000-R8 500 Operating: R200-R450 per emptying, depending on emptying frequency.</td>
<td>Widely used by formal rural households and farm areas, where reliable water supply is available. Provides a high level of service and user convenience. Failures due to poor design and construction, and use of inappropriate anaerobic cleansing material. Soakaway system is particularly prone to failure in the long-term if detailed soil testing is not carried out.</td>
</tr>
<tr>
<td><strong>Small bore solid-free sewer</strong></td>
<td>As for the septic tank and soakaway except that the liquid effluent is conveyed by a system of small-diameter pipes to a communal treatment point (which may be off-site treatment works reached either via existing sewers or by tanker).</td>
<td>Although its water requirements may be less than those of a septic tank and soakaway, a household connection is needed. Ensure access for emptying of septic tank, as well as availability of sludge treatment and disposal. Routine maintenance of pipe network essential.</td>
<td>Within the septic tank and soakaway range detailed above if septic tank systems already in place, otherwise capital cost much higher.</td>
</tr>
</tbody>
</table>
Aqua-privy and soakaway

- Fly screen
- Vent pipe
- Water tank may be hand filled
- Air (ventilation)
- Seat cover
- Low flush pedestal
- Access cover
- Scum
- Down pipe maintained below water level
- Liquid
- Sludge
- Soakaway (soakpit or drainage trench)
- Water tight tank
- Digester

A toilet with a water-seal arrangement, a straight or curved chute running from the seat to below the water level, with some form of waste collection and disposal system.

### Principles of operation
- After defecation, the pan requires flushing with a few liters of water. An aqua-privy requires the addition of water to keep the end of the chute submerged. Containment of the waste may vary from a sealed container to a solids collection system and effluent soakaway.

### Operational and institutional requirements
- Appropriate for small volumes of water and can accept domestic wastewater - generally carried by hand to the latrine. Ensure access for mechanical emptying of contained waste, and suitable subsoil drainage (high reliance on the soil environment in rendering the effluent harmless) and/or availability of sludge treatment and disposal.

### Costs
- Capital: R2 000–R3 500 which can increase where soils not well suited to drainage.
- Operating: R150–R300 per annum where subsoil drainage is available.

### Experience and comment
- International acceptance demonstrated where water used for anal cleansing and users squat. Blockages occur through use of inappropriate anal cleansing material. Experience in SA has seen failures through lack of user education and/or poor design and construction, use where inappropriate and limited provision of affordable emptying service.
**Conservancy tank**

A storage system, i.e. a sealed tank, where low-flow or full-flush toilet systems are used.

- **Principles of operation**
  - Waste is flushed into the tank where it is contained in isolation from the surrounding environment before removal by tanker for treatment.

- **Operational and institutional requirements**
  - Tank sizing dependent on flush volumes, domestic wastewater levels and frequency of emptying. Ensure access for mechanical emptying and availability of treatment and disposal facilities.

- **Costs**
  - Costs depend on size and emptying frequency.
  - Cost: At R2 000 - R5 000 depending on tank structure and tank volume.
  - Operating: R550 per household per annum (based on an estimated emptying cost of R181 per tank) assuming the tank is emptied, on average, 3 times per year.

- **Experience and comment**
  - Widely used, particularly in more sensitive soil and geographical environments.
No Water Consumption Toilet trade as NOWAC Toilet System

<table>
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<tr>
<td>Fill main chamber with water to activate the system. No additional water will be required in future. Waste drops into the water in the main chamber where the organic material decomposes. The process is natural and executed by organisms. The waste moves around in the main chamber for a period of approximately 180 days. The brown water moves into the second chamber. This chamber is fitted with an anaerobic filter and is situated in the main chamber. It is destroyed approximately 100% of all dangerous pathogens before it flows over into an anaerobic filter where the remains of the pathogens are destroyed by organisms and oxygen. The volume of the overflow equals the volume of the waste per person. This overflow of uncontaminated water flows into a soak away, which can be seen as an additional filter.</td>
<td>Operates:  • Without additional water  • With only the seat as mechanical part  • Without any chemicals  No maintenance required for 15 – 20 years. After 15 – 20 years the sand layer at the bottom of main chamber is removed with a pump after which this system will work for another 15 – 20 years. Note: Only sand and not the water will be pumped out.</td>
<td>Capital: 5000 – 6000 per unit which includes:  • The complete system  • The concrete top structure  • The transport  • The installation  • The training of each household  Note: Installation costs can increase in rocky areas and against steep slopes. Operating: No costs up to 15 – 20 years.</td>
<td>Similar systems are accepted internationally in echo sensitive areas and where water is scarce.</td>
</tr>
</tbody>
</table>
Shallow sewerage

A toilet, usually in-house, flushed using lower volumes of water than either conventional sewerage or septic tanks, to smaller diameter sewers laid at flatter gradients and shallower depths between dwellings on a block. On-site shallow inspection chambers are provided.

<table>
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<td>Waste from the toilet and possibly domestic wastewater, but at much lower volumes than for conventional sewerage, is flushed into the on-site sewerage system and progressively washed down to either a dedicated treatment facility or into street sewers and then on to a major treatment works.</td>
<td>Requires reliable household availability of water and high levels of connection into the sewerage system are necessary. Can, however, be laid out in less formal and spatially irregular settlements. Less stringent design criteria - but organised and effective operation and maintenance capability is required. This can be delegated to residents for on-site sewers. Significant user education and acceptance of shared management of the system is critical.</td>
<td>Capital: R 2500 to R 3000 - savings of up to 50% over conventional sewerage capital costs. Operational: R300 - R450 assuming that all maintenance is provided by the service provider. Drops to R312 where residents are responsible for operation and maintenance of block (not bulk) sewers.</td>
<td>Have not been used widely in South Africa although used, with reported success, under a wide range of conditions in a number of South American countries, Ghana, Pakistan and Greece. Pilot projects have been completed in Durban and Free State, with ongoing monitoring to determine overall success and sustainability. These indicate savings of up to 50% over conventional sewerage capital costs.</td>
</tr>
</tbody>
</table>
9. Signage

The signage guidelines have been developed in order to maximise the effectiveness of information transfer to users of the nature areas, to ensure that all signage is aesthetically pleasing and sympathetic to the surrounding environment, and to maintain and strengthen the Nelson Mandela Bay brand. In order to achieve these objectives it is recommended that all signage within the Nelson Mandela Bay Municipality's nature areas be developed in a manner that is consistent with the Nelson Mandela Bay Municipality Corporate Identity Guidelines and the guidelines mentioned below.

These guidelines have been developed in a consistent manner with the Nelson Mandela Bay Municipality Corporate Identity Guidelines and have sought to provide additional consideration to the issues of aesthetics and information transfer with the context of natural and/or conservation areas.

Furthermore, it is recommended that an Information Kiosk or interpretive centre be constructed at the entrance site of each nature area, which should include both a directional map of the area and various informative and interpretive signage. An Information Kiosk or Interpretive Centre would serve as a means to inform the public about the area, in addition to providing an accessible and reliable place for such information.

Colour and font
The corporate colour palette of the NMB brand is as follows:
- yellow (C – 15; M – 40; Y – 100; K – 0);
- red (C – 20; M – 100; Y – 100; K – 25); and
- blue(C – 100; M – 50; Y – 0; K – 15).

Three different types of signage are typically found within nature areas, namely directional, informative and interpretive signage. Each of these types of signage have been assigned an appropriate colour based on the purpose of the type of signage, the NMB brand colours, and the typical location of such signage with a nature area.

These categories and colours are as follows:

Directional signage
Background colour of this category is blue (C – 62; M – 25; Y – 8; K – 0).
An example of this category is a map of area.

Informative signage:
Background colour of this category is yellow (C – 11; M – 24; Y – 58; K – 0).
An example of this category is restroom signage.

Interpretative signage
Background colour of this category is green (C – 62; M – 7; Y – 53; K – 0).
An example of this category is information on specific flora or fauna found in an area.

- All three divisions need to be readable, and function as a means to communicate key messages to the users of the nature areas. The colours used are a slightly softer tone than the NMB brand to ensure that the signage blends in with the environment, yet continues to promote and strengthen the NMB brand.
• The font applied throughout the signage is Century Gothic, bolded for headings, regular for normal text.

**Recommended Material**

• The material used for the signage must be long lasting, particularly in light of the extreme weather experienced in Nelson Mandela Bay. The recommended materials are Chromadex or Aluminium.

**The front end of signage:**

Chromadex is the most favourable material to use, for the following reasons:

• It is easily changeable;
• It is a local material, which is easily accessible;
• It is zinc plated and powder coating and lasts for up to 15 years;
• It is cheaper than aluminium, which is double the cost.

2mm Aluminium sheeting is a more durable material to use, but the cost of this material is very high.

Both materials are supplied with an anodised aluminium frame, which cannot rust.

**Vinyl on signage**

• Vinyl used on both materials is Cast Vinyl, which lasts up to 7-10 years
• This vinyl is specifically designed for outdoors.
• Vinyl easy changeable.

**Mounting of signage**

• Recommended mounting of signage is uni-rail mounting e.g. Back mounting of standard traffic signs. This mounting is aesthetically pleasing, as it does not show where poles and signage are fitted together; and
• The polls used for the signage can either be wooden or galvanized. The wooden polls are recommended for aesthetic reasons.
SMALL DIRECTIONAL SIGNAGE

LARGE DIRECTIONAL SIGNAGE

The 54-hectare tranquil Settler’s Park, which lies along the banks of the Baakens River, is located in the heart of the city. It also offers recommended short walks that may commence from any of these entrances. The Park facilities include a flower display house, a Marquette of the 1820 Settlers’ Statue and grassed areas ideal for picnicking. The Park is rich in bird life, small buck and other fauna.
SMALL INFORMATIVE SIGNAGE

NO FIRES

LARGE INFORMATIVE SIGNAGE

SETTLER’S PARK

- Info Kiosk
- Picnic Area
- First Aid
- No Littering
- No Pets
- No Fires
- No Drinking
- No Camping
SMALL INTERPRETIVE SIGNAGE

KEI BOTTLEBRUSH

Occurs on grassy hillsides and among rocks on the steep sides of river valleys. The Xhosa place roots on either side of their kraals to ward off sickness and protect the animals from theft.

LARGE INTERPRETIVE SIGNAGE

FLORA IN SETTLER’S PARK

The 54-hectare tranquil Settler’s Park, which lies along the banks of the Baakens River, is located in the heart of the city. The Park is rich in indigenous flora and Park facilities include a flower display house offering flora found in the Park.
**SMALL DIRECTIONAL SIGNAGE**

**PICNIC AREA**

- Font: Century Gothic Bold
- Colour: White
- Left Aligned

**LARGE DIRECTIONAL SIGNAGE**

**WELCOME TO SETTLER’S PARK**

The 54-hectare tranquil Settler’s Park, which lies along the banks of the Baakens River, is located in the heart of the city. It also offers recommended short walks that may commence from any of these entrances. The Park facilities include a flower display house, a Marquette of the 1820 Settlers’ Statue and grassed areas ideal for picnicking. The Park is rich in bird life, small buck and other fauna.
SMALL INFORMATIVE SIGNAGE

LARGE INFORMATIVE SIGNAGE
SMALL INTERPRETIVE SIGNAGE

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SMALL DIRECTIONAL SIGNAGE - Based on A3 (297 x 420 mm) size signage

LARGE DIRECTIONAL SIGNAGE - Based on A1 (594 x 841 mm) size signage

The 54-hectare tranquil Settler’s Park, which lies along the banks of the Baakens River, is located in the heart of the city. It also offers recommended short walks that may commence from any of these entrances. The Park facilities include a flower display house, a Marquette of the 1820 Settlers’ Statue and grassed areas ideal for picnicking. The Park is rich in bird life, small buck and other fauna.
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Queries or Comments

If you have any queries or comments regarding these guidelines, please contact:

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