SEAGULLS BEACH HOTEL & RESORT

OVERVIEW REPORT ON CIVIL INFRUSTRUCTURE , SOIL CONDITIONS AND FURTHER DESIGN CONSIDERATIONS

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1. INTRODUCTION

Camdekon Engineers cc were appointed by Seagulls Trading Company (Pty) LTD, Mr Mark Povey, to do a overview of the services pertaining to the civil infrastructure of the Seagulls Hotel site along the Eastern Cape Wild Coast.

This report details the status quo of the existing engineering infrastructure pertaining to potable water, sewerage, roads, and storm water drainage for the proposed site.

Design considerations are also addressed in this report to assist the client in the development

The site was visited on the 12 November 2011.

2. DESIGN STANDARDS

The design standards applicable to the design of the civil engineering infrastructure for this development are obtained from the "Guidelines for the Provision of Engineering Services and Residential Amenities in Residential Township Development" (the Red Book) by The Department of Housing, 2000.

In addition to the design standards from the "Red Book" the services that are required for this development, must also comply with the design standards of the Amathole District Municipality.

3. PLANNED DEVELOPMENT

The area surrounding the Seagulls Hotel development consists of five rural villages as well as some 24 private beach cottages, and the Trennary's Hotel.

From information gathered from local residence there are plans to develop a Abalone and Oyster farm west of the Hotel premises.

It is imminent that with the upgrade of the access road to the region the development in the area will increase

4. MUNICIPAL SERVICES

4.1 WATER

a) Existing Infrastructure:

The Amathole District Municipality acts as the water services authority in the area and supply water to the development from storage reservoirs located at an elevation of some 78m msl.
These reservoirs are positioned some 2km from the site.

Water supply is via a 50mm main and during periods of high demand water supply becomes problematic and supply to the hotels and cottages can be interrupted.

With future development planned for the area the supply will be placed under even more stress and a upgrade of the distribution network should be considered.

In light of the above it be essential that the planned development allow for onsite storage of water for domestic use to bridge periods of interrupted supply.
The Seagulls Hotel has on site storage capacity in the form of a 75 cum reservoir, diameter of the structure is 8m and the water depth is 3m.
The reservoir is located at a level of 25m msl

The reservoir was built with solid blocks and has no roof cover. The reservoir is severely silted and cracked and current efforts are being made to correct and reinstate the structure. See photo report Annexure A
The water supply to the structure is metered and fitted with a isolation valve.

We recommend that the structure be replaced with a reinforced concrete reservoir including a roof and fitted with, inlet, outlet, overflow and scour arrangements as standard practice.

b) Water Quality :

The quality of the water supply to the region is hugely dependent on the skills level of the purification plant operator, as well as the quality of the raw water abstracted from the source.

Samples from the water produced by the ADM plant have been analyzed and were found to have Turbidity greater than that of class 1 water, see Annexure B

It is recommended that measures be implemented to control the turbidity level of the water supplied and that on site filtration be established to reduce the effect.

In order to make water free of harm full bacteria the Chlorination of all water supplied to the site is recommended

c) Alternate water source :

Springs do occur on the hotel site, these have been sampled and flows have been determined by SRK, and reported on separately. See Annexure C
The spring analysis also revealed high turbidity levels, and Faecal Coliforms .

It is very likely that the building activity that will follow as well as the construction of the new access road to the hotel will negatively affect the yield and the quality of the water from these springs.

If these springs are to be developed the water would have to be stored below ground and elevated to either the hotel supply reservoir or to a elevated tank, or used for irrigation

It is recommended that the water be pumped to the hotel reservoir and treated together with the municipal water prior distribution to the hotel complex.

d) Potable water demand

The Annual Average Daily Demand (AADD) can be calculated as follows based on the Spatial Needs list provided by the client:
In accordance the SABS Code 0252-1:1994

Hotels without resident staff 200 – 250l/bed per day
excluding garden use : 140 bed facility

Allowance must be made for Special events that may be conducted at the facility, for this a further 5000 litres supply must be allowed for and must be taken up into the peak demand of the building

Average annual daily demand (AADD) 37 200 litre

The peak was calculated at 13 based on the equivalent erven and resulted in a peak flow of 5.6 l/s.

Velocity	**Pipe internal diameter**
1 m/s	84.4mm
1.2m/s	77mm
1.5m/s	68.94mm

It is recommended that a **90mm diameter class 9** pipe be used for the bulk reticulation of the site.

e) Fire Fighting

According to the "Red Book" classification the category of fire risk applicable to this facility is considered to be "Low risk". The fire fighting requirement on the water supply can be reduced to the "Low risk Group 2" category.

The water demand for fire-fighting in Low Risk - Group 2 areas is 500 l/minute or 8 l/s with one hydrant open for a duration of 1 hours. The minimum residual head required is 6 m.

The flows to be allowed for in the supply mains will be in the order of 8l/s and will result in the installation of a **90mm diameter water main, with a velocity of 1.5m/s.**

It is envisaged that the domestic as well as the fire reticulation mains be combined into a singular installation.

Adequate consideration must be given to the availability of the firefighting equipment available to the municipality and designed to satisfy the requirements of the local fire department.

f) Storage recommendations

The total demand for domestic 24 h reserve and fire supply equates to 67 000 litres, allowing for a fire duration of 1 hour.

It is recommended that the reservoir outlet be configured that the 30 000 litres required for fire flow always be retained for emergency use, but in times of water interruption the supply be drawn down to allow 36h of domestic supply.

If the funding allows it is recommended that 48h storage be allowed for the site in the form of a additional 40cum reservoir.

4.2 SANITATION

a) Existing Waste Water Controll

The hotel currently operates a septic tank and soak away system.

b) Existing Sewer Reticulation Network

The existing hotel network will have to be upgraded and As Built data will be recorded when a contractor is appointed to the site

c) Wastewater Discharge

The Average Dry Weather Flow (ADWF) from the development is estimated to be 90% of the domestic water demand (potable demand, excluding irrigation). In the worst case scenario during a "special event" the ADWF can be calculated as follows based on the water demand calculated above.

Average annual daily demand (AADD)	37 200 litre
ADWF : 90% x 37 200 litres	33 480 litres
Peak dry weather flow (PDWF) : ADWF x 4 (over 24h)	1.55 l/s

We have allowed for a 15% ingress of storm water into the sewer system in order to determine the Peak wet weather flow

Peak wet weather flow (PWWF): PDWF x 15%	1.78 l/s

It is envisaged that the sewer network installation on the site wil be done by using PVC soil vent pipe system. The min diameter of the installation will be 100mm as to accommodate the rodding equipment.

Rodding eyes will be installed at the head of runs and Manhole structures on all bend points or junctions.

Grades will be not flatter than 1:100. Sewer runs will start at grades equivalent to 1:60.

d) Sewer pump station

A sewer pump station will have to be installed along the Eastern boundary of the site along the lowest contour.
The pump station will be equipped with two sewer pumps : One duty one standby.
The sump will have the following dimensions : Dry well 2.5 x 2.5m, wet well of 2.5m x 2.5m allowing 4h storage based on ADWF, the depth of the sump will be dependent on the grade of the approaching pipe work

4.3 STORMWATER

a) Existing Infrastructure

The site is well drained with an average slope of 7.5% or 30V:400H in a south-eastern direction.

The catchment area is well grassed and comprises a area of 0.0737km^2.

Storm water from the Western side of the site is cut off by the infrastructure created by the access road to the hotel and cottages.

A marshy area at the southern end of the site is fed by springs.

The existing storm water infrastructure at the hotel comprises of open channel flow.

b) Storm water Infrastructure

Storm water generation on the site will be controlled and it is envisaged that pending the final site layout that a series of detention ponds and natural open spaces be created along the natural water course on the site, to control runoff.

Water detention will release the water over a greater period of time reducing the peak intensity runoff. This will assist in prevention of soil erosion and minimize damage to the system

It is envisaged that the 1:50y flood be retained and the 1:5 year flood released.

Initial storm water flows on the site have been calculated as follow

Return period in Years	Peak flows in cum/sec
1:2	0.237
1:5	0.834
1:10	1.388
1:20	2.014
1:50	2.950
1:100	3.736
1:200	4.570

The standard design flood method was used in calculating the floods for the various return periods. The following characteristics were used in the formula.

Height difference on the 85 – 10 Slope , 21m
Area of catchment 0.0737 km2
Drainage zone 22 in accordance the WRC reports

The entire site is to be vegetated as to prevent erosion and scour of the natural environment, the maximum velocities that are allowed for the sheet flow of water will be 2.5m/s

See Annexure

4.4 ROADS AND TRAFFIC

a) Existing Infrastructure

The existing roads are lightly trafficked and the road surface fit for purpose.

The site is services with a district road access that is currently undergoing a upgrade to a black top surface.
The access road upgrade is planned in phases and when complete will link the hotel with Kentani as well as the pont crossing the Kei river.
The road construction will terminate at the Seagulls Hotel entry.

The internal roads and parking areas at the Hotel consist of gravel and concrete combination and are in need of a upgrade.

b) New Infrastructure

With the upgrade of the new access road to the Hotel complex it is advised that the developer get in touch with the design engineers of the roads project and allow for a intersection design to tie into the new road alignment.

The construction thereof may not be done now but it will have been approval for later construction.

With the upgrade of the access road the storm water as well as the sub soil drainage affecting the road will be addressed

It is recommended that water from the road along the western boundary be channeled along the new tarred road to discharge along controlled storm water in and outlets.

The upgrade of the hotel internal roads will be done to a gravel surface, it is envisaged that the layer works of the road and parking areas will consist of a insitu layer of natural material compacted to 90% Mod AASHTO density and two layers of G5 quality gravel compacted to 93 % and 95% respectively.

If the developer has sufficient funding it would be recommended that 60mm concrete pavers be installed and that all parking and road edges be defined with a Fig 3 Kerb.

The effect of the Kerb and paved road surface will greatly assist in the storm water control and will result in a cleaner and more user friendly access and parking.

Due to the high water table and the occurrence of spring water across the site the installation of sub soil drainage across the road and parking areas is advised, this will ensure that the layer works are kept dry from infiltration and will increase life expectancy of the trafficked areas.

Gravel material is increasingly difficult to come by and it would be advised that the developer negotiate with the current roads contractor, to stockpile sufficient material to be used in the development at a later stage.

5. SOILS INVESTIGATIONS

The developer required a geotechnical investigation into the soil conditions of the site, and requested Camdekon to obtain quotations for the work. Two quotes were obtained and are attached herewith see Annexure E

Herewith a brief description of what will be addressed in the soils report.

A) Introduction
B) Terms of reference
C) Site description
    i. Erf no
    ii. Location
    iii. Surroundings
    iv. Proximity to other infrastructure
    v. Locality plan
D) Method of investigation (4-5 Trial pits across the site see preferred location)
    i. Trial pits
    ii. Soil profiling
    iii. Indicator tests
    iv. Grading tests
    v. MOD AASHTO tests
    vi. CBR
    vii. Foundation indicators

viii. DCPS

E) Geology

F) Field testing

i. Report of the trial holes and a description of each with material classification
ii. Indication of clay silt and rock depths
iii. Depth of pits etc
iv. Trail hole photos

G) DCP Testing

i. DCP testing along 6 positions across the site (as shown)
ii. DCP tests in trial hole positions where no refusal is met

H) Laboratory testing

i. Samples in trail holes to be tested for
    a. Equivalent plasticity index
    b. % clay
    c. Linear shrinkage
    d. Mod AASHTO density
    e. CBR
    f. OMC
    g. Heave potential
    h. CBR Swell

I) Geotechnical appraisal

i. Type of substructures to be considered

J) Conclusion

Ones the soils investigation has been completed will it be possible to do a accurate design of the foundation layout of the structures to be constructed.

6. STRUCTURAL

The existing infrastructure shows very little sign of serious structural defects taking into consideration the age of the existing buildings, similarly buildings surrounding the Hotel premises also show little sign of structural defect.

Pending the outcome of the soils investigation report will it be possible to determine the correct approach toward foundation design, as well as founding depth etc.

7. CONCLUSION

The site is well located for a development of this nature and poses no significant restraints regarding civil and structural infrastructure.

The water infrastructure is supplied from the water authority (Municipality " ADM ") and though the water supply it expected to be treated and free of Bacteria it is advised that on site Chlorination of the domestic water be allowed for. Water storage for a 48h supply must be allowed for as well as dedicated fire storage for 1h supply. Springs on the site are to be developed and water used as supplement to the Municipal supply.

The existing storage reservoir must be upgraded and fitted with a roof and made vermin and bird proof. Fittings and controls are to be fitted.

The sewer infrastructure must be upgraded and the installation of a sewer pump station and treatment plant will be required.

Roads and Storm water as well as the Sub soil infrastructure of the site will be upgraded to serve the needs of the developer and must tie into the existing upgrade of the access road.