GAMMA SUB-STATION

Specialist report: Land use

1. Broad overview of findings

1.1 Biophysical factors

The dominating form of land-use in the study area is agriculture, with no urban nodes in the affected vicinity. The form of agriculture adopted in any area is a function of the biophysical factors: in this case there are by three key characteristics which constrain the type of agriculture that can be practised:

- ***Rainfall***: the bulk of the study area experiences approximately 200 of rainfall per annum. Typically, such low rainfall regimes are also highly variable, with years of little or no rainfall and others where it could be double or triple the long term average. Further the summer rainfall pattern is such that the bulk of the precipitation in any summer could be received in two or three rainfall events. The limited rainfall severely limits the type and scale of agriculture that can be practiced. (See Figure 1: Rainfall distribution in the study area)
- ***Soils***: The study area is mainly underlain by sedimentary rocks belonging to the Karoo sequence, comprising thick successions of shale, sandstone and mudstone of the Ecca and Beaufort Groups. Large areas from the Gamma Sub-station to Aberdeen are blanketed by alluvium and calcrete. The study area is characterised by primarily thin residual soils and transported soils of varying thickness. Overall, the soils in the study area are primarily shallow and weakly developed, with surface limestone and rocks and are unsuitable for agriculture. (See Figure 2: Soil types in the study area)
- ***Vegetation***: The vegetation patterns of the study area are the outcome of the interaction between the rainfall and soil conditions described above. They in turn are the prime determinant of the land-use type that will prevail in the area. The study area falls into the Nama Karoo biome, which is described as fragile and sensitive. (See Figure 3: Biomes in the study area)

1.2 Land potential

The conditions described above give rise to a very low level of primary productivity in the study area, which limits primary land-use to extensive livestock production, the dominant

form of agriculture throughout the region. Production systems include sheep, goats, cattle, and in recent years, game animals.

Approximately 80% of the Karoo veld types are severely degraded, an outcome of nearly two centuries of a specific land-management pattern which involved:

- Effectively stable stock numbers on the rangeland, leading to an unvarying level of demand for herbage. In contrast, the supply of herbage is dependent on rainfall which is extremely variable. Thus the incremental supply of herbage in any given year could vary from nothing to twice the long-term notional average, while the pressure from live-stock remained the same. The prudent response to these conditions is to is to impose a very light stocking rate, thus allowing for the possibility that carry-over herbage from good years could sustain the system in poor years; but
- There has been persistent heavy stocking relative to the productivity of the system over the entire time-span, thus precluding the opportunity to preserve fodder or to allow recovery periods for the plants.

The effect of this has been the virtual elimination of basal cover of any sort, leaving a landscape dominated by small shrubs and bushes, growing singly or in small mixed clumps, separated by bare fragile soil vulnerable to erosion in the intense summer storms the area is subject to. It can be argued that in the study area degradation is so far advanced it can go no further, which must be related to the impact that the sub-station and its development process can have on the local ecology.

To summarise, the land in the region has very low potential and most of it is degraded, in the drier areas severely degraded. The direct impact of the development on land-use will therefore not be significant.

2. Impact of development

The development will be limited to civil engineering works, within the boundary fence of the site. The development itself will therefore have no impact on the land use of the surrounding unaffected area and no mitigation actions are necessary there.

Within the site boundary, the construction work will consist of bush-clearing over the whole site and land-levelling where construction items are to be installed. The only hazard arising from this is the possibility of severe erosion from rain and some wind

erosion, for as long as the raw soil surface is left uncovered. If the site were to experience a rain storm of say 25 to 50 mm while the surface was exposed, not only would the on-site soil formation be damaged but the flow of water off site would deliver sediment to the nearby drainage lines. It seems likely that this is the only hazard likely to arise from the construction programme.

3. Mitigating actions

Three mitigating activities are deemed to be necessary:

1. Since sedimentation from erosion is the most important likely impact to the off-site surroundings, in a general sense ground works must in all cases be planned to minimise erosion. In essence, this amounts to designing drainage so that water accumulation across the ground surface is kept to below that volume which might cause erosion. The elevated area in the north of the site at point B on the diagram might present specific problems that will need to be attended to.
2. The exposure of the soil due to bush clearing and land levelling should be timed to occur during the dry winter months of the year.
3. As is proposed in the Scoping Report, as soon as is technically possible, the exposed surface area which will not be covered in concrete should be protected by a layer of crushed stone.
4. All land-clearing, drainage and shaping must be conducted within the provisions of the Conservation of Agricultural Resources Act 43 of 1983 (CARA), in order to protect Eskom from possible action in regard to soil conservation.

4. Conclusion

It must be recognised that this is not valuable land and therefore the damage done either to the surface of the site or collateral damage off-site will not result in costly losses. It remains necessary to respect the fragility of the environment and to ensure in particular that excessive sediment is not delivered to the adjacent drainage lines.