7. SITUATION ASSESSMENT OF THE LOWER KEI SUB-AREA

7.1 General Overview

7.1.1 Topography and Rivers

The Lower Kei sub-area comprises the deeply incised lower reaches of the Great Kei River to its estuary and its two main tributaries, the Gcuwa River tributary (S70) on the left bank and the Kubusi River tributary (S60) on the right bank.

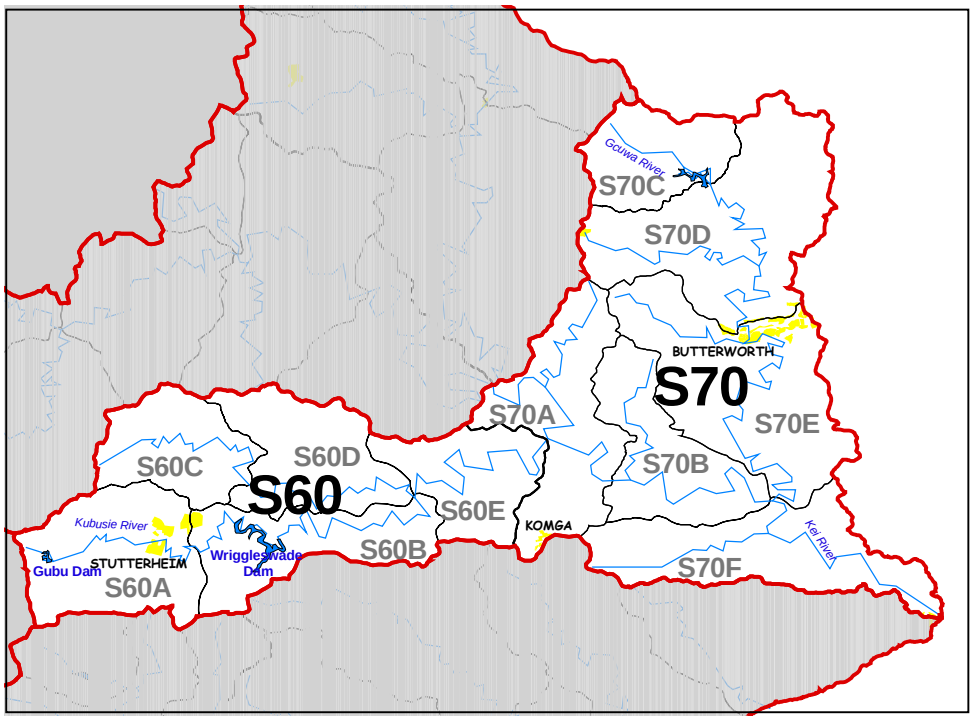

Figure 7.1 The Lower Kei Sub-area

The area is characterised by the picturesque Great Kei River valley, which is some 400 m below the surrounding plateau. On the left and right banks the valley rises steeply to meet the coastal plateau zone, which covers most of this sub-area. The Gcuwa River has its headwaters at the inland edge of this coastal plateau zone at 1200 masl. The topography of the Gcuwa River valley is undulating from its headwaters through to Butterworth before it steepens and enters the Great Kei River. The Kubusi River has its headwaters in the Amatola mountains above Stutterheim and meanders through the coastal plateau before falling away steeply to enter the Great Kei River. The coastal zone area comprises a very small section of the catchment around Kei Mouth.

7.1.2 Climate and Rainfall

As for the Amatole sub-area, the climate is moderate for most of the year, but with hot periods from December to February. Although the area receives rainfall throughout the year, it is primarily a summer rainfall region, with the months of June and July being the

driest. The mean annual precipitation (MAP) varies from 1 000 mm along the coast to 700 mm inland above Butterworth and 1200 mm in the Amatola mountains.

7.1.3 Geology, Soils and Vegetation

The area is underlain by the Adelaide and Tarkastad formations of the Beaufort series (shale, mudstones and sandstones) with dolerite intrusions, the largest of which is located on the left bank of the Great Kei River. Soils are derived from the underlying rock and are generally shallow and low in fertility.

The plateau area is predominantly covered by grassveld with large areas of valley thicket in the Great Kei valley and its small steep sided tributaries. There is significant commercial forestry in the Kubusi catchment. Alien invasive plants (black and silver wattle) occur throughout the area with some heavy infestation around the Nqamakwe area and in the upper Kubusi catchment.

7.1.4 Land Use and Settlement Patterns

Land use and settlement patterns are influenced by the previous political division of the area with the right bank of the Great Kei being part of South Africa and the left bank being part of the former Transkei. The former Transkei is characterised by dispersed rural settlements and communal subsistence farming and grazing. Butterworth and Nqamakwe are the main formal towns in this area.

Butterworth is the largest town in the sub-area reflecting the only urban node in the former Transkei area where most services and higher order infrastructure are to be found. The standards of these services have declined in recent years along with the economy of the town.

The right bank comprises privately owned commercial stock, game and vegetable farms. The only formal towns in this part of the sub-area are Stutterheim, Komga and Kei Mouth.

7.1.5 Demography

The residential pattern in the former Transkei area is mainly rural with many small villages and the two main towns of Butterworth and Nqamakwe. The population in this part of the sub-area is not expected to increase substantially in the future due mainly to the lack of employment opportunities and the resultant outward migration of people. Butterworth has a population of approximately 20,000 people with a very high proportion residing in informal settlements around the town. This has implications not only for water use and management but also for other services.

Within what was the South African component of the sub-area, Stutterheim and Komga serve as service centres for the surrounding privately owned farms. Kei Mouth is mainly a tourist town with a small permanent residential population. With the upgrading of the road to Kei Mouth, the town is experiencing a property boom and the seasonal tourist population can be expected to grow substantially in the short term.

The total population of the sub-area was estimated based on 1995 data (**Ref. 24**) and Census 2001 data (**Ref. 6**) at approximately 196,000 people in the year 2000.

Table 7.1 Population Estimates of the Lower Kei Sub-Area (Year 2000)

Quaternary Catchment	Population
S60	44,000
S70	152,000
Totals	**196,000**

As for other rural areas in the Eastern Cape there is likely to be a slight decline in overall population numbers in the area from the year 2005 to the year 2015 due to many factors including the effect of HIV/AIDS, outward migration etc.

7.1.6 Economic Development

This sub-area has irrigation, stock and game farming and forestry as the main economic generator in the Kubusi catchment. However in the former Transkei area the economy is very depressed. The population generally relies on income from migrant workers and state social grant benefits with unemployment rates exceeding 60%. The only industrial and commercial complex is located in Butterworth, which has been in decline since 1994 with removal of the Regional Industrial Development Programme. Most of the industries have moved away (notably SA Breweries) and there has been a general decline in economic opportunities. The service industry is by far the largest contributor to the local economy. A proposal for dune mining of heavy metals at Wavecrest with water extraction from the Lower Kei River has been postponed indefinitely.

Tourism at Kei Mouth and Morgan Bay is currently a small contributor to the local economy but has the potential to grow significantly in the future.

7.2 Water Resources Overview

7.2.1 Surface Water

(a) Raw Water Resources and Supply Systems

The main dams in the sub-area comprise the Gubu and Wriggleswade Dams on the Kubusi River, and the Xilinxa and Gcuwa Dams on the Gcuwa River. The development of these dams is mainly for domestic water supplies to the towns and rural villages in the sub-area as well as for inter-basin transfer of water from Wriggleswade Dam to the Buffalo City supply catchments.

Within the former RSA component of the sub-area, Komga obtains its main water supply from a pump station on the Kei River and from boreholes and a spring. The water from the groundwater sources has high concentrations of nitrates and this water is mixed with the treated surface water before distribution. Kei Mouth (and Morgan Bay) obtains it water from small coastal streams. As these two resort towns grow, a

source of water from the Great Kei River upstream of the tidal reach will need to be developed. The Gubu Dam, which supplies Stutterheim and surrounding villages has adequate yield to satisfy requirements to beyond the year 2015.

Within the former Transkei area, Butterworth obtains its raw water supply from the Gcuwa weir, which in turn obtains water released 50 km upstream from the Xilinxa Dam. The Gcuwa weir is over 90% silted up. The Xilinxa dam was constructed to supply rural and urban domestic and industrial requirements. The allocation from this dam is 9,4 million m^3/a. No allocation has been made for irrigation. The Xilinxa Dam also supplies raw water for the Kotana RWSS, which serves approximately 20 000 people in the surrounding rural area. The yield and allocation of water from Xilinxa Dam was undertaken by the former Transkei homeland authorities. Due to the changing demand patterns especially from Butterworth these allocations may no longer be applicable. It is reported that the system is not presently under stress but ecological Reserve requirements and requirements for water for additional rural villages in the area will need to be reconciled with the available yield from the system. Refer to Strategy No. 1.1.

The small town of Nqamakwe obtains its water from boreholes. The Toleni RWSS, supplying water to over 47 000 people, was recently rehabilitated under DWAF's BoTT programme based on water sourced from the small Toleni Dam and a new borehole supply. Water supply of approximately 10 – 12 l/c/d is provided at 98% assurance from these sources.

Table 7.2 Main Rivers and Dams in the Lower Kei Sub-area

Catchments	Rivers	Main Dams	Owner
S60	Kubusi	Gubu Wriggleswade	DWAF
S70	Gcuwa Toleni	Xilinxa Gcuwa Toleni	DWAF DWAF DWAF

Accurate flow gauging data is not available for the rivers in the former Transkei, resulting in hydrological calculations with a low degree of confidence.

Table 7.3 Available Water in the Lower Kei Sub-Area (Year 2000)

Type of Water Resource	Amount (million m^3/a)
Total surface water resource yield	87
Subtract:	
- Ecological Reserve	15
- Invasive alien plants	6
Net surface water yield available for use	66
Available groundwater resource	0
Usable return flows	10
Total Local Yield	**76**

(b) Water Supply Infrastructure

Bulk water supply infrastructure for Komga and the two RWSSs mentioned above has recently been upgraded. The state of water supply infrastructure within Butterworth and Nqamakwe is poor due to a lack of financial resources and poor operating and maintenance procedures. This results in large water losses especially in Butterworth. Recent attempts at instituting a water conservation and demand programme have met with apathy from the local municipality. A further motivation for this programme is the possible re-allocation of water from Xilinxa Dam for rural water supply schemes. No problems have been reported with respect to Kei Mouth's or Stutterheim's water supply infrastructure.

(c) Institutional Arrangements

The majority of existing bulk water supply infrastructure for the regional water supply schemes in this sub-area has been developed, operated and maintained by DWAF. The process of transferring assets and the responsibility for operation and maintenance to the Amatole District Municipality was initiated in July 2003 and is scheduled to be complete by June 2005. As with other sub-areas the lack of financial and skilled manpower resources will be a major constraint towards successfully achieving this goal.

7.2.2 Groundwater

Very little use is currently made of groundwater. The total available groundwater resource in the area is unknown with estimates varying by orders of magnitude. The best groundwater potential is in the inland areas of the sub-area with the potential reducing towards the coast. However, due to the fact that surface water supply schemes cover most of the sub-area where the major demand exists, the groundwater resource is only used for providing domestic supplies to smaller settlements and towns (Komga and Nqamakwe).

7.2.3 Current Water Requirements

The main feature of this area is the inter-basin allocation of 18 million m^3/a from Wriggleswade Dam to the Buffalo/Nahoon Rivers for urban use within the BCM. Local use is evenly split between irrigation, domestic/industrial and afforestation.

Table 7.4 Local Water Requirements* in the Lower Kei Sub-area (Year 2000)

Sector	Amount (million m^3/a)
Irrigation	14
Urban**	10
Rural***	3
Afforestation	11
Total Local Requirement	**38**

*At a 1 in 50 year assurance.

**Industrial demand has been included in the urban demand.

*** Stockwatering has been included in the rural water requirements.

7.2.4 Yield Balance

Based on the above, the yield balance in the year 2000 for the Lower Kei sub-area is estimated to have a surplus water balance even with inter-basin transfer of 18 million m^3/a to the Buffalo / Nahoon catchments.

Table 7.5 Reconciliation of the Lower Kei Sub-area in Year 2000 (million m^3/a)

Description	With Transfer from Wriggleswade Dam	Without Transfer from Wriggleswade Dam
Total local yield	76	76
Transfer in	0	0
Total yield	76	76
Local local requirement	38	38
Transfer out	18	0
Total requirement	56	38
Water Balance	**20**	**38**

The inter-basin water transfer from Wriggleswade Dam to the AWSS is reserved for urban use within the BCM. Transfers are currently only made during serious droughts, but these transfers will increase as the demand within the BCM grows.

It should be borne in mind that the above reconciliation is based on a desktop study for the ecological Reserve requirements as undertaken in the NWRS. The level of

confidence on the Reserve requirements is low and it does not optimise the yield of the sub-area.

Water usage within Butterworth has changed substantially since 1994 when approximately 25% of the water was used by the brewery. This industry, together with almost all other large industries, has moved elsewhere. What was at one stage a scenario requiring the development of additional water resources and infrastructure has changed to a situation of surplus water. Because of this surplus and major institutional problems within the local municipality, little attention has been paid to the need for more water. However, with the need for ongoing provision of basic water supplies in the rural areas, the water requirements of Butterworth and the ecological Reserve of the catchment should be re-analysed.

7.2.5 Future Water Requirements

Future water requirements will come mainly from the extension of basic water supplies to the peri-urban population around Stutterheim, the rural population in the sub-area and for the growth of the Kei Mouth/Morgan Bay area. Recent feasibility studies have been undertaken into the possibility of mining ilmenite in the Wavecrest area and using water from the Great Kei River. The scheme has been postponed indefinitely. The study did however detail the feasibility of supplying water to the scheme from the Great Kei River.

7.2.6 Water Quality

(a) Surface Water Quality

Water quality of the rivers is generally suitable for domestic and agricultural use. However, serious pollution of the Gcuwa River is occurring downstream of Butterworth due to leachate from the unlicensed solid waste site on the banks of the river. This pollution is further exacerbated by stormwater runoff from the town, poor operation of the effluent treatment works and possible runoff from the few remaining industries in town (tanneries etc). These are not monitored. The number of monitoring points in the sub-area is small and no monitoring occurs downstream of Butterworth which is potentially one of the largest sources of pollution into the Kei River. Generally, Butterworth has expended little on infrastructure services in recent years. This is compounded by the lack of financial and skilled manpower resources to address the many problems. The ADM has been involved in feasibility studies for a regional solid waste site for the town for a number of years. A feasible site has been identified but the large capital cost for implementation is proving to be a stumbling block.

Due to the expansion of water supply to the rural areas it can be expected that the quality of the rivers and groundwater may deteriorate without the implementation of appropriate sanitation to these areas. DWAF have recognised this and have embarked on a widespread sanitation implementation programme in the rural areas.

A comprehensive soil conservation programme should also be implemented by the Department of Agriculture to reduce the loss of topsoil and the amount of sediment reaching the rivers and the estuary of the Great Kei catchment.

(b) Groundwater Quality

Groundwater quality in the inland area is generally good but deteriorates towards the coast.

7.3 Key Issues

Based on a detailed situation assessment of the Lower Kei sub-area as outlined above the following key issues have been identified.

7.3.1 Water Balance and Reconciliation

Issue : Water supply and allocations from the Gcuwa River system to Butterworth and the Regional Water Supply Schemes need investigation.

Issue : The importance of the ecological Reserve for the Great Kei estuary requires that a more accurate systems analysis and yield balance be undertaken.

7.3.2 Water Resources Protection

Issue : Serious pollution of the Gcuwa River and Kei River downstream of Butterworth is occurring.

7.3.3 Water Conservation and Demand Management

Issue : High water losses in Butterworth require the urgent implementation of a WCDM programme.