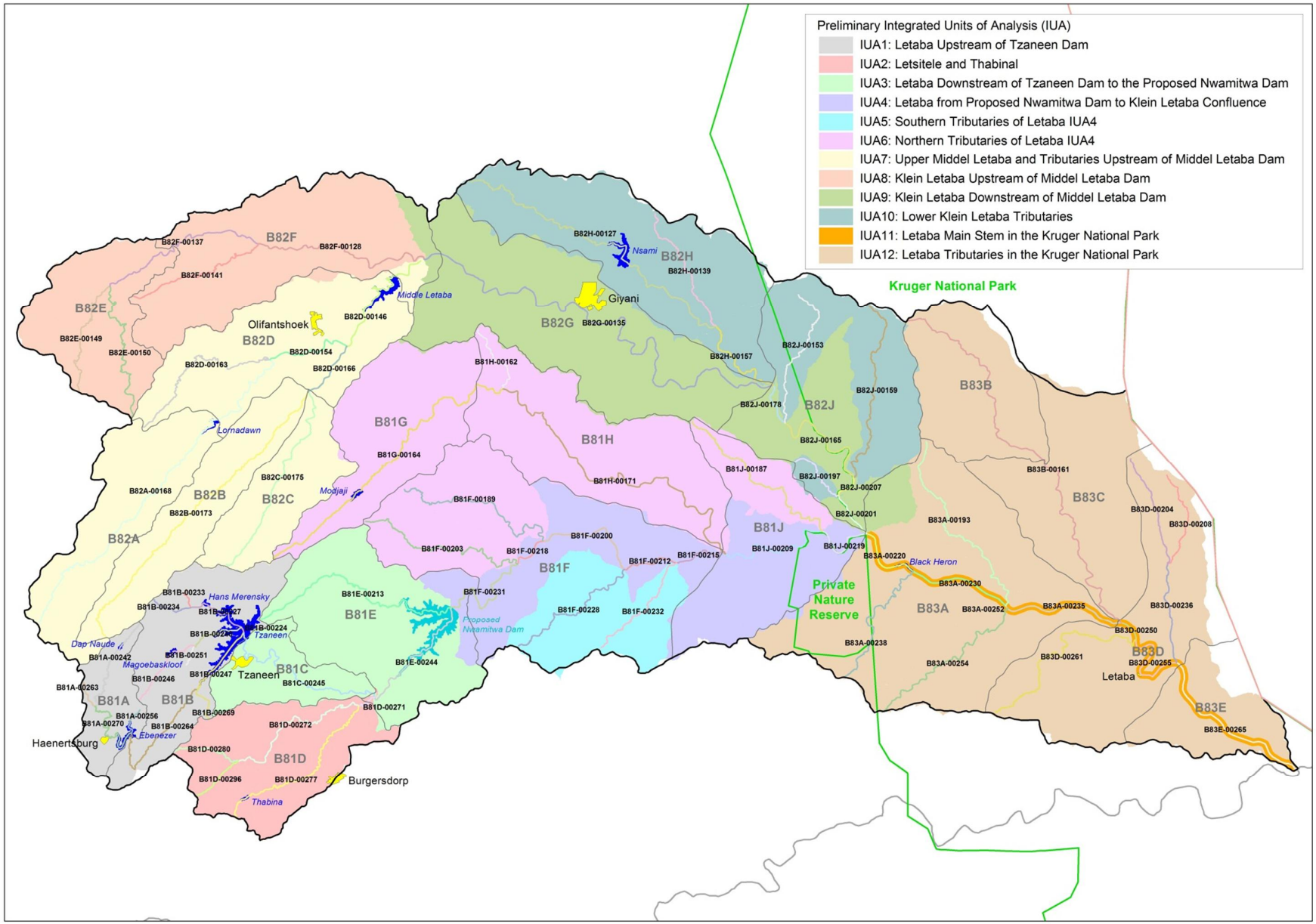
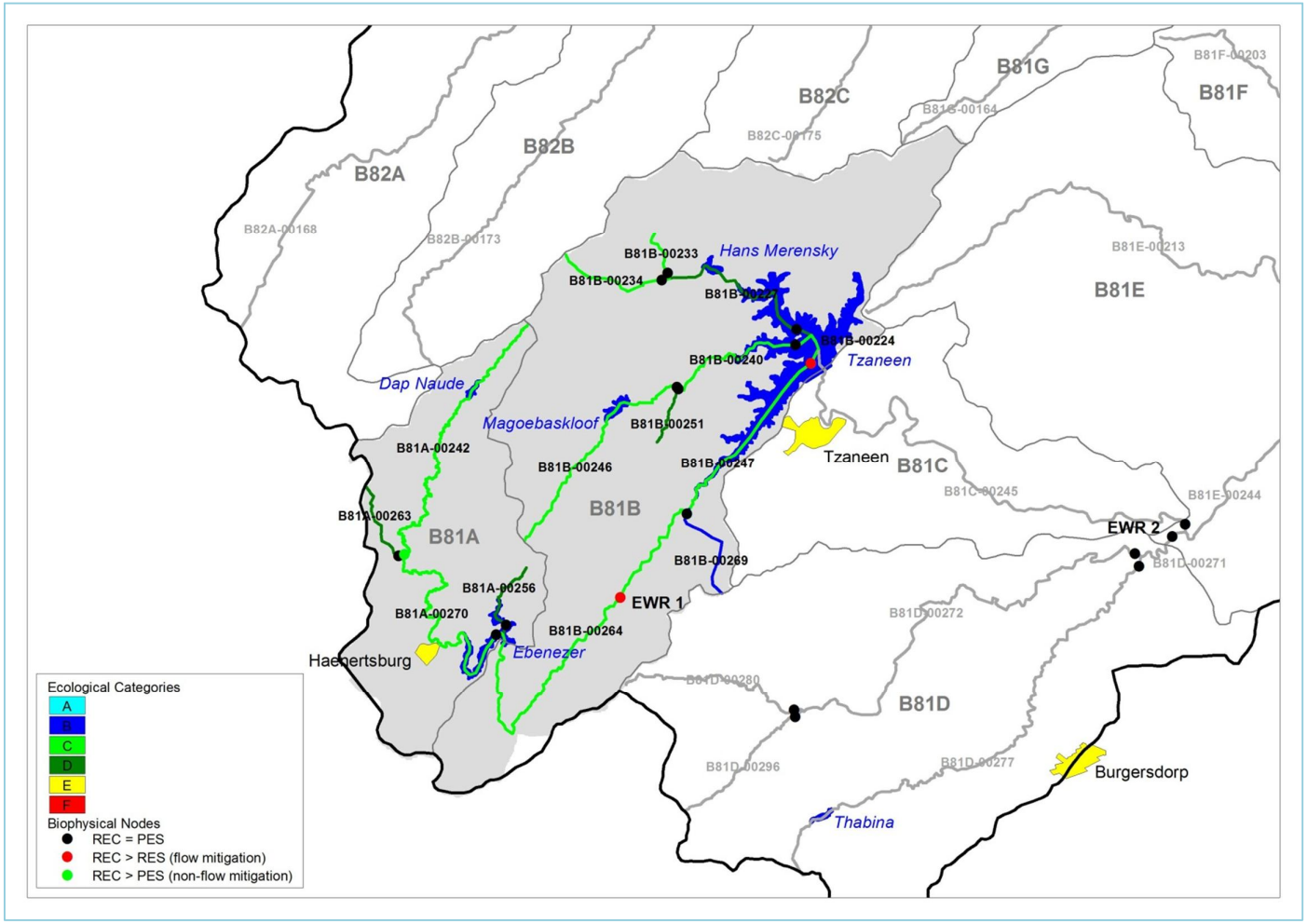
Visioning the future of the Letaba catchment – the 12 Integrated Units of Analysis (IUAs) in perspective



IUA 1: Letaba upstream of Tzaneen Dam

WATER RESOURCES: IUA 1 includes all the rivers (14 sub-quaternary reaches) falling within quaternary catchments B81A and B81B. The IUA is highly regulated by four dams, namely Dap Naude, Ebenezer, Hans Merensky and Tzaneen Dams. There are a number of river abstractions mostly by the irrigation sector and significant volumes of groundwater are utilised by the irrigation sector, with most of the utilisable exploitation potential used in the IUA. Return flows generated from the irrigations sector enter the river systems which has a negative impact on the water quality. The only future surface water resource development planned for the area is the raising of the Tzaneen Dam.

WATER QUALITY: Water quality state is Good, with few impacts other than forestry.



ECONOMY: The main economic activities are the primary industries of sub-tropical fruits, commercial forestry, the secondary industry of tomato processing as well as the tertiary industry of eco-tourism.

EGSA: This area is dominated by commercial farming and forestry. The population densities, relative to the rest of the catchment are on the lower side and the reliance on EGSA is limited. There is some utilisation by farm or plantation workers but this is not likely to be significant with regard to numbers and would be relatively ad hoc.

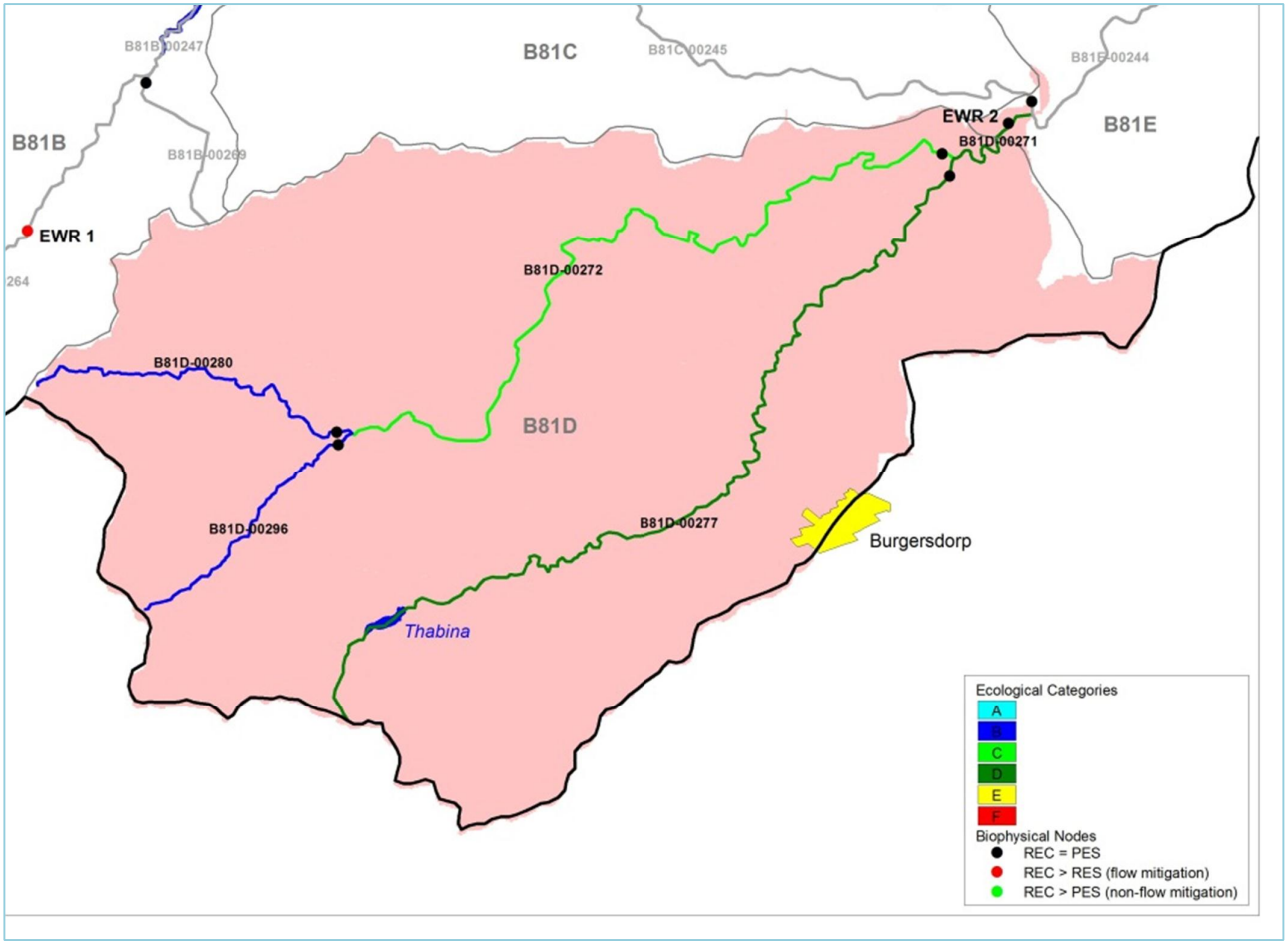
ECOLOGY: The PES of most rivers (Broederstroom, Great Letaba, Politsi and upper Mahitse) in this IUA is predominantly a C (57%). The rest of the reaches, bar one is in a D PES. The key impacts relate to flow modification (dams and forestry), sedimentation, and alien vegetation encroachment. River EI is mostly moderate. Seeps and some channelled valley-bottom wetlands occur (mainly in B81B). The Broederstroom (B81A-00270) was noted for wetland frequency, with an overall wetland PES of a C and moderate EIS.

IUA 2: Letsitele and Thabina

WATER RESOURCES: There is some storage regulation in the IUA by Thabina Dam. There is a number of river abstractions mainly for the irrigation sector and a significant amount of groundwater is utilised by both the urban/domestic and irrigation sector with most of the utilisable exploitation potential used in the IUA. Return flows or effluent is mainly produced from the urban/domestic sector, with some return flows from the irrigation sector, which has reduced the water quality of the river systems below these areas. There are no surface water resource developments planned in the IUA.

WATER QUALITY: Water quality state is dominated by elevated nutrients, salts and algal growth due to discharges from a WWTW in the Thabina, and extensive irrigation agriculture in the Middle and lower Letsitele River. Two water quality hotspots were identified in these reaches and the water quality state is generally Fair to Poor.

ECONOMY: The main economic activities are the primary industries of citrus and sub-tropical fruit and the secondary industry that consist of fruit juice processing.



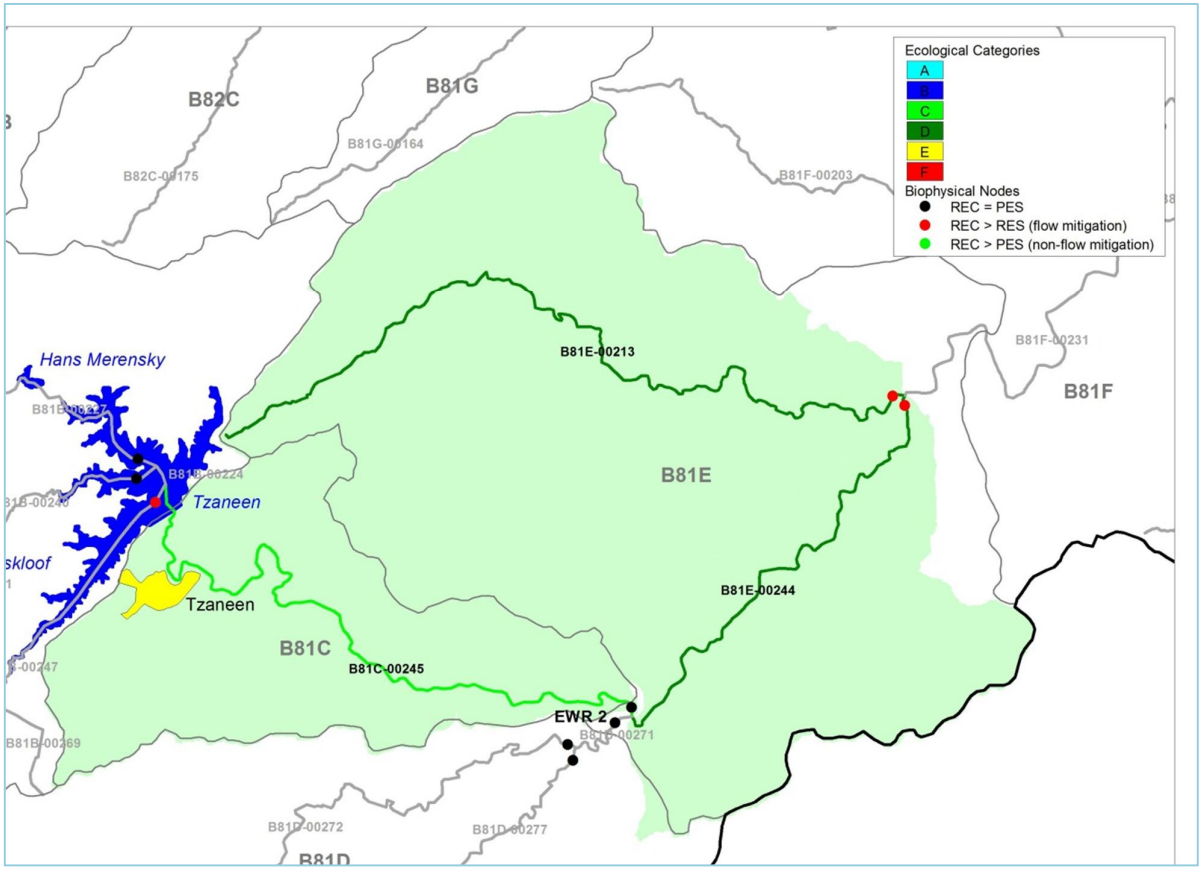
EGSA: The northern portion of the IUA is given over to commercial forestry with the Agatha Forest Reserve a dominant feature. The recreational aspects associated with EGSA are of some importance (utilisation low). The southern portion is given over to very dense closer settlement that borders on formal urban development. Townships developed as satellites to Tzaneen are present. The utilisation of EGSA is likely to be constrained given population density but the importance, is likely to be high where utilisation does take place.

ECOLOGY: The upper reaches of the Letsitele (Bobs and Mothlaka-Semeetse) falls in B PES with the primary land use being forestry. The Middle Letsitele River falls in a C PES, receiving the impacts related to forestry, agriculture, urban and rural settlements. The Thabina and lower Letsitele rivers are currently in a D PES, with the primary impacts being associated with extensive rural settlements (sedimentation, agriculture) and some flow modification (dams, forestry). Areas of High EI occur.

The quaternary (B81D) is noted for wetland frequency and diversity of types, and the Letsitele specifically (B81D-00272) for frequent channelled valley-bottom wetlands. D PES and High EIS.

IUA 3: Letaba downstream of Tzaneen Dam to the proposed Nwamitwa Dam

WATER RESOURCES: IUA 3 includes mostly the rivers (3 sub-quaternary reaches) falling within quaternary catchments B81C and B81E. The IUA is regulated by the upstream dams located in IUA 1. There are a number of river abstractions mainly by the irrigation sector. Return flows generated from the irrigations sector enter the river systems which has a negative impact on the water quality. A future resource development planned at the end of the IUA is the development of Nwamitwa Dam at the confluence of the Nwanedzi, Letsitele and Groot Letaba Rivers. There is some potential for groundwater development in the area, but the locality of the groundwater resources relative to potential users and the viability for development needs to be confirmed.



WATER QUALITY: Water quality state is dominated by elevated nutrients, salts and possible toxicants due to fertilizer / pesticide use associated with extensive (citrus) irrigation agriculture upstream of the proposed Nwamitwa Dam. Two water quality hotspots were identified in these reaches.

ECONOMY: The main economic activities are the primary industries of citrus fruit and commercial forestry which is used in the secondary industries of saw milling and fruit juice processing.

EGSA: The utilisation of EGSA tends to be low as the populations tend to be urbanised (Tzaneen) and alienated from direct use of the resources. The eastern part of the IUA is given over to commercial farming. There is some utilisation by farm or plantation workers but this is not likely to be significant with regard to numbers and would be relatively ad hoc. The northern part is mixed land use with rural closer settlement dominating significant portions. Again the utilisation of EGSA is likely to be constrained given population density but the importance, is likely to be high.

ECOLOGY: The Letaba River downstream of the Tzaneen Dam is in a PES of C, being impacted by flow modification, agriculture and runoff associated with Tzaneen town and surrounds. The lower reach of the Letaba in this IUA, after the confluence of the Letsitele, falls in a D PES, receiving the impacts related to forestry, flow modification and urban and rural settlements of the upper reaches. This reach is also locally highly impacted by agriculture and flow modification related to tributary dams. The Nwanedzi River also falls in a D PES, with primary land use and impacts being associated with urbanization and agriculture. The Letaba River is a high EI and the Nwanedzi moderate.

This IUA has a markedly high frequency and diversity of wetlands. Many however are associated with small impoundments and the general EC is a D PES. The importance is high in the Letaba and moderate in the Nwanedzi.

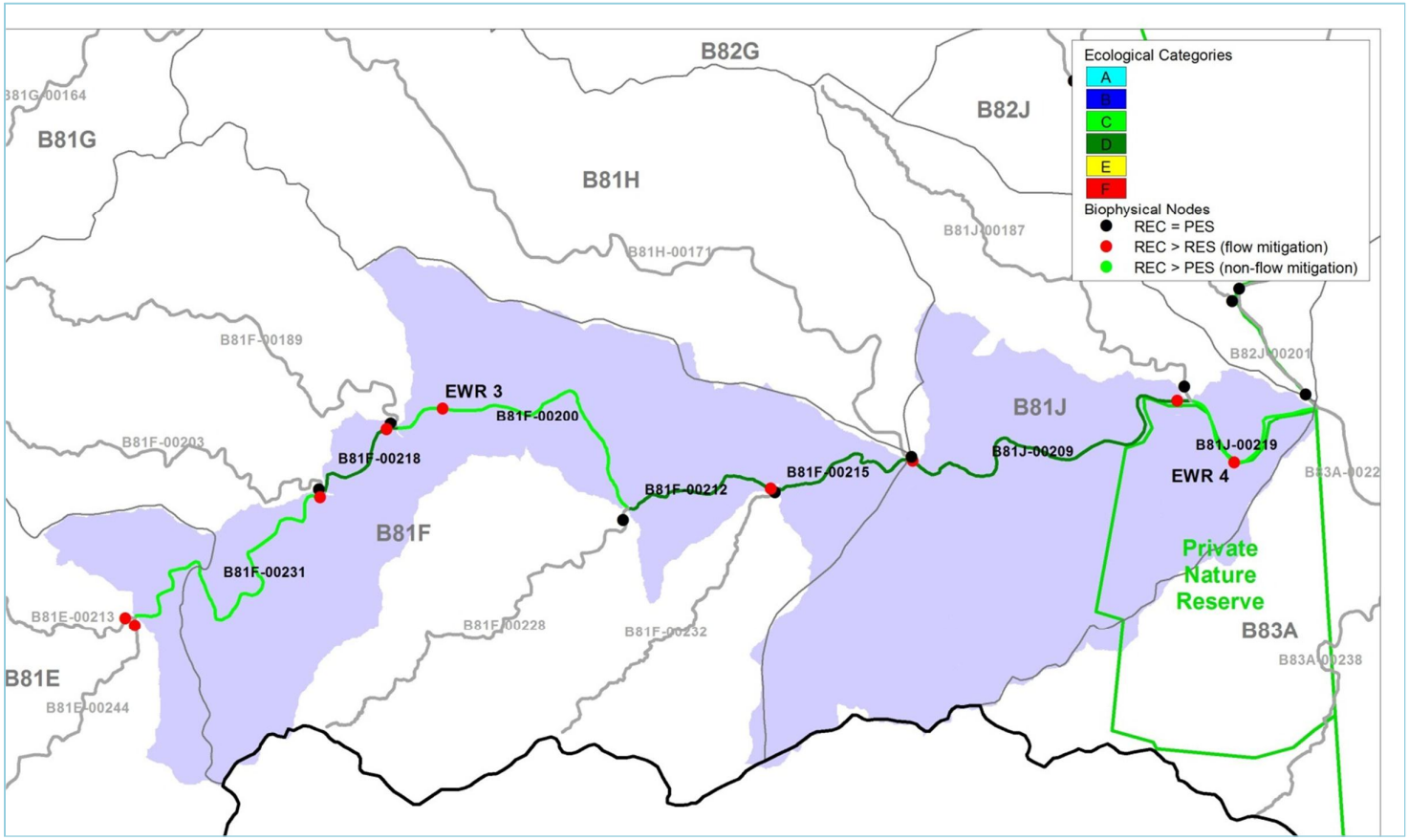
IUA 4: Letaba from Proposed Nwamitwa Damto the Klein Letaba confluence

WATER RESOURCES: IUA 4 includes only the Letaba River downstream of the Nwamitwa proposed dam site to the confluence with the Klein Letaba. The IUA is regulated by the upstream dams located in IUA 1 and water is mainly supplied to the irrigation sector. There are no surface water resource developments planned in the IUA. There is possibility for future groundwater development in the area, but the locality of the groundwater resources relative to potential users and the viability for development needs to be confirmed by the potential developer.

WATER QUALITY: Water quality state is dominated by elevated nutrients, salts and possible toxicants due to fertilizer / pesticide use associated with extensive (citrus) irrigation agriculture. Two water quality hotspots were identified in these reaches.

ECONOMY: The main primary economic activities are citrus and mangoes. The tertiary economic activity is eco-tourism.

EGSA: Includes a portion of highly developed commercial farming where utilisation of EGSA tends to be low. The northern portions are heavily dominated by the high density rural closer settlements characteristic of the former homeland areas. Again the utilisation of EGSA is likely to be constrained given population density but the importance, is likely to be high.



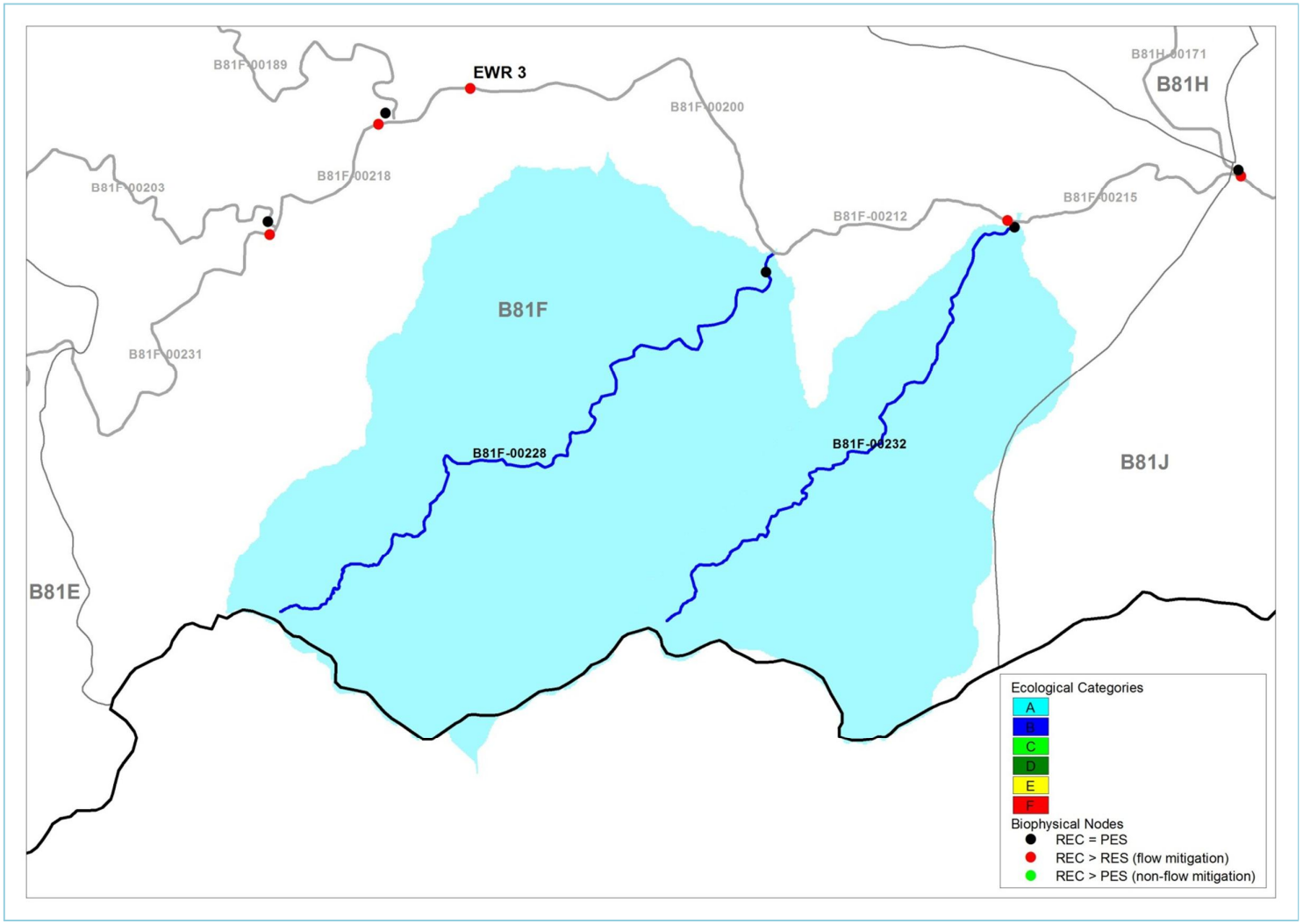
ECOLOGY: It includes 7 SQs which currently are all influenced by the operational rules of Tzaneen Dam, many instream weirs, inundation, abstraction, irrigation, private Reserves and some rural settlements. The last SQ is within the Greater Kruger National Park (Letaba Ranch). Four of the seven SQs are in a D EC and three are in a C EC. The EI is moderate. This zone is dominated by channeled valley-bottom wetlands along the Great Letaba, notably B81F-00200 (which also has thermal springs associated with it) and B81F-00231. The wetland PES ranges from a C to a C/D with moderate EIS.

IUA 5: Southern Tributaries to Letaba

WATER RESOURCES: Due to the very different hydrological nature, operation and land use from the Letaba River, these two SQs were placed in one IUA. The storage regulation is low in the IUA and there are no future resource developments planned in the IUA.

WATER QUALITY: Water quality state is Fair to Good, with some impacts due to agricultural activities. No water quality hotspots were identified.

ECONOMY: The main primary economic activities are citrus and mangoes. The tertiary economic activity is eco-tourism.



EGSA: This IUA is largely dominated by game farms and nature reserves. The EGSA associated with the recreational and aesthetic aspects would be low.

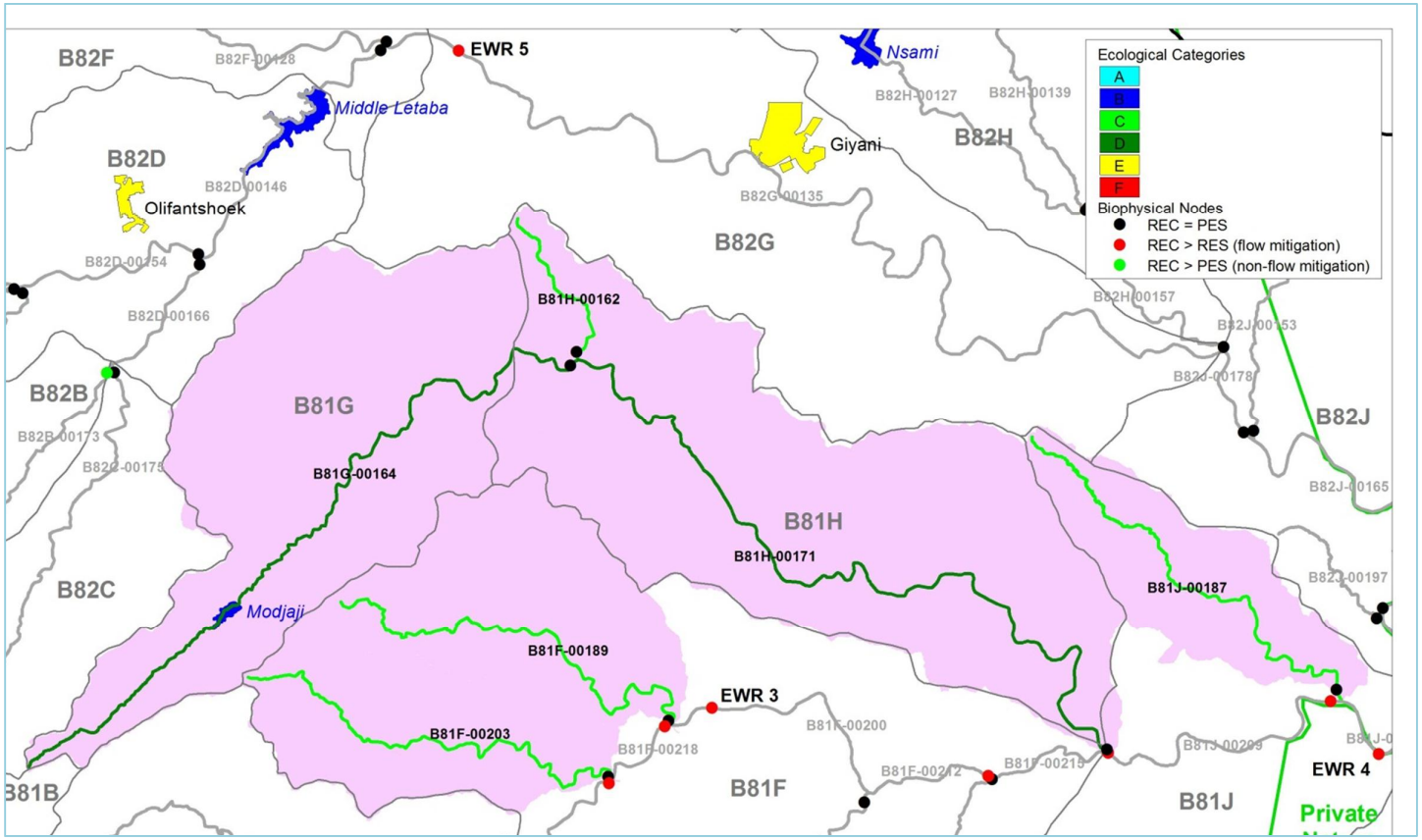
ECOLOGY: Only two tributaries and SQs are situated in this IUA, B81F-00228 (Reshwele River) and B81F-00232 (Makewena). The source and most of the rivers flows through the Ndzalama Wildflife Reserve and other private Reserves. Downstream sections have some small dams, and fields. The rivers are seasonal, with very small direct uses and due to the large sections flowing through a Reserve, relatively protected resulting in a B PES. Importance is moderate.

IUA 6: Northern Tributaries to Letaba

WATER RESOURCES: IUA 6 includes 3 short ephemeral rivers (3 SQs) and the seasonal Molototsi River has 3 SQs. Due to the very different hydrological nature, operation and land uses from the Letaba River, these tributaries were placed in one IUA.

WATER QUALITY: Water quality state is dominated by elevated nutrients, salts and algal growth due to discharges from a WWTW in the Molototsi River, settlements and agricultural activities leading to increased instream turbidity levels. The IUA is only regulated by the Modjadji Dam located in the upper reaches of the Molototsi River. Water is supplied from the dam to the urban/domestic sector. Return flows generated from the irrigations sector enter the river systems which have a negative impact on the water quality. Groundwater is currently utilised by domestic users and there is some potential for additional groundwater development in the area, depending on the locality of the groundwater resources relative to the users and the viability for development. There is no surface water resource developments planned in the IUA.

ECONOMY: The main economic activities are citrus, mangoes and tomatoes that form part of the primary sector while tomato processing is identified as a secondary sector and the eco-tourism is part of the tertiary sector.

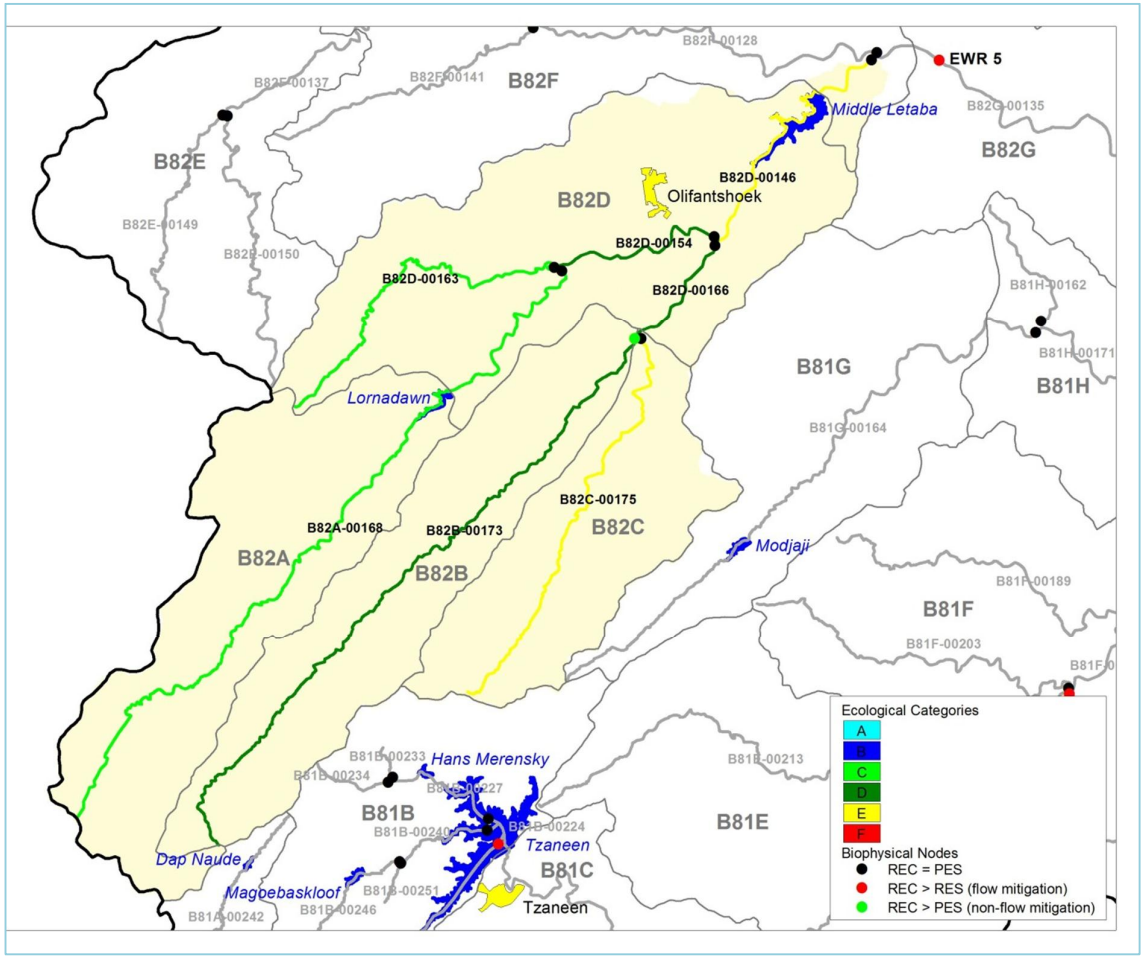


EGSA: This IUA is almost exclusively given over to the former homeland areas. As such the land use is rural closer settlement with clusters of dense village developments associated with the main road network and extensive subsistence farming. The utilisation of EGSA is likely to be relatively constrained ï albeit not as high as in other parts of the catchment, and the importance is likely to be high.

ECOLOGY: The Molototsi River is in a D PES and all the tributaries are in a C PES. It must be noted that during the Middle 90's, a rare population of *Acacia erubuscens* was found in the flood plain of the Molototsi and a tributary. This IUA is characterised by being much drier in nature then the Letaba River and largely dominated by rural settlements and subsistence agriculture. The EI is moderate.

IUA 7: Upper Middle Letaba and tributaries upstream of the Middle Letaba Dam

WATER RESOURCES: IUA 7 includes all the SQs within the B82A, B82B, B82C and B82D quaternary catchments. It includes the Middle Letaba, Koedoes, Brandboontjies, Lebjelebore and Mosukodutsi Rivers. The IUA is regulated by the Lornadawn Dam (Middle Letaba River) and the Middle Letaba Dam at the bottom of the IUA. Water is mainly supplied to the urban and irrigation sectors, with the urban domestic supply increasing constantly resulting in a reduction in irrigation supply. Significant volumes of Groundwater are also utilised in the IUA with over 50% of the Utilisable Exploitation Potential (Potable) used by the irrigation sector in B82A and the domestic sector in B82E. The viability for additional groundwater development needs to be confirmed. Return flows from both these sectors enter the river systems. There are no surface water resource developments planned in the IUA.



WATER QUALITY: The water quality state of the upper section of the Middle Letaba River is dominated by elevated nutrients, salts and possible toxicants due to fertilizer / pesticide use associated with extensive crop irrigation e.g. tomato crops. There are also elevated nutrients due to a WWTW on the Brandboontjies River. Two water quality hotspots were therefore identified in these reaches.

ECONOMY: The main economic activities evolve from the tomato production as part of the primary sector. The secondary economic activity of tomato processing is also part of IUA 7.

EGSA: The southern portion of the IUA is dominated by commercial farming and forestry. The population densities, relative to the rest of the catchment are on the lower side and utilisation of EGSA is limited. The northern portion of the IUA is heavily dominated by the high density rural closer settlements characteristic of the former homeland areas, including Olifantshoek. The utilisation of EGSA is likely to be constrained given population density but the importance is likely to be high.

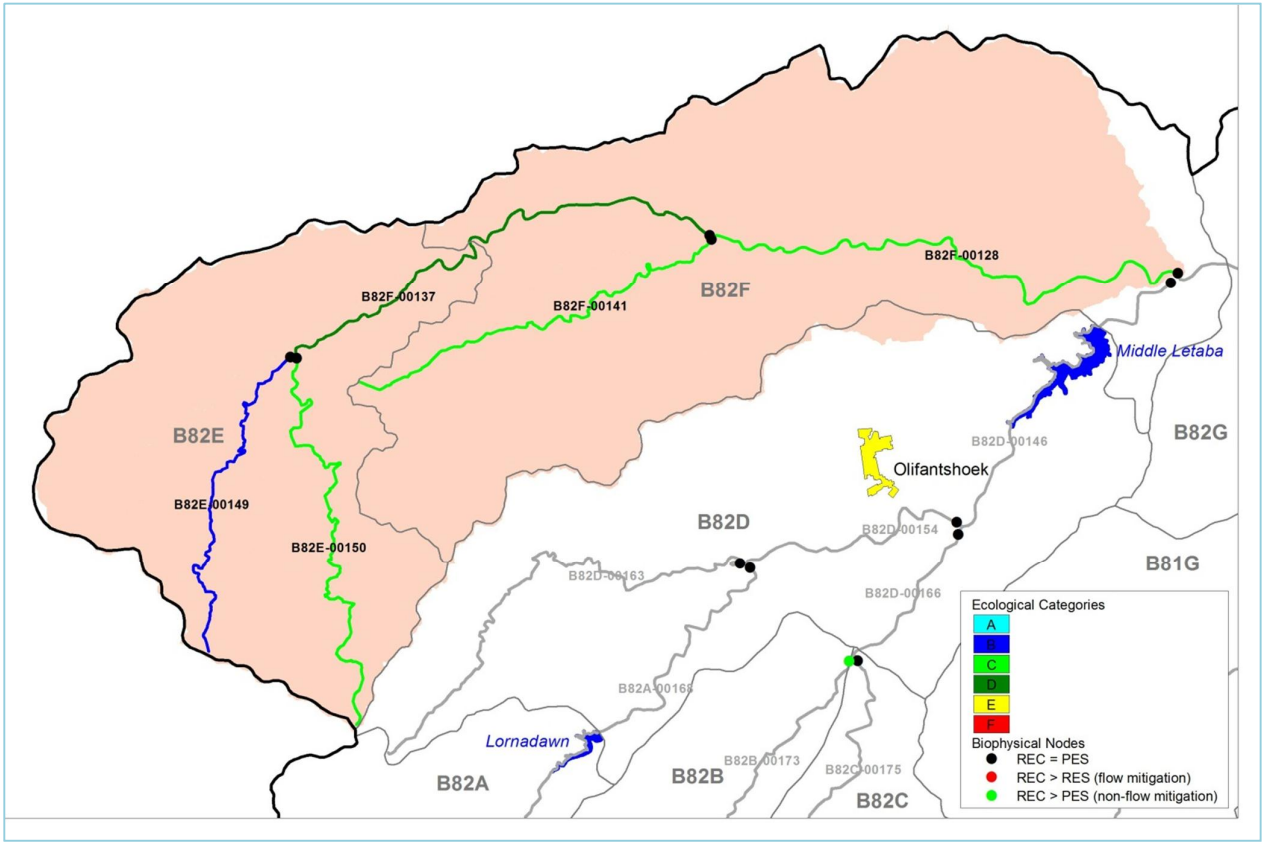
ECOLOGY: Five of the seven SQs have an EC of D and the upper Middle Letaba (B82A-00168) and Lebjelebore have an EC of C. Impacts are flow related, inundation, quality issues and other related to extensive agriculture. The EI is moderate. B82B and B82C have a high density and frequency of channelled valley bottom wetlands, with notable wetlands associated with B82B-00173 (Koedoes), B82C-00175 (Brandboontjies) and B82D-00146 (Middle Letaba). The wetlands are mostly in a D PES with a moderate EIS.

IUA 8: Klein Letaba upstream from the Middle Letaba Dam

WATER RESOURCES: IUA 8 includes B82E and almost all the SQs within the B82F quaternary catchment, and excludes only the Middle Letaba (B82D-00146), i.e. the IUA ends where the Middle Letaba joins the Klein Letaba. Other rivers included in this IUA are the Khwali and Soeketse Rivers. The main reason for the grouping is that it includes all the SQs upstream of the Klein and Middle Letaba Rivers confluence and consists mainly of 1st and 2nd (usually small, steep stream) order streams. The storage regulation is low in the IUA with no major dams present in the area. Water supply is predominantly to the urban sector which also generates some return flows that enter the river system. Significant volumes of groundwater are utilised in the IUA especially in B82E where over 70% of the Utilisable Exploitation Potential (Potable) is used by the urban sector. The viability for additional groundwater development needs to be confirmed. There are no future surface water resource developments planned for the area.

WATER QUALITY: No water quality hotspots were found in this area with water quality state generally being Good.

ECONOMY: The main economic activities is classified as part of the primary sector is identified as sub-tropical fruits and commercial forestry, while tomato processing as a secondary and eco-tourism as a tertiary sector is part of IUA 8.

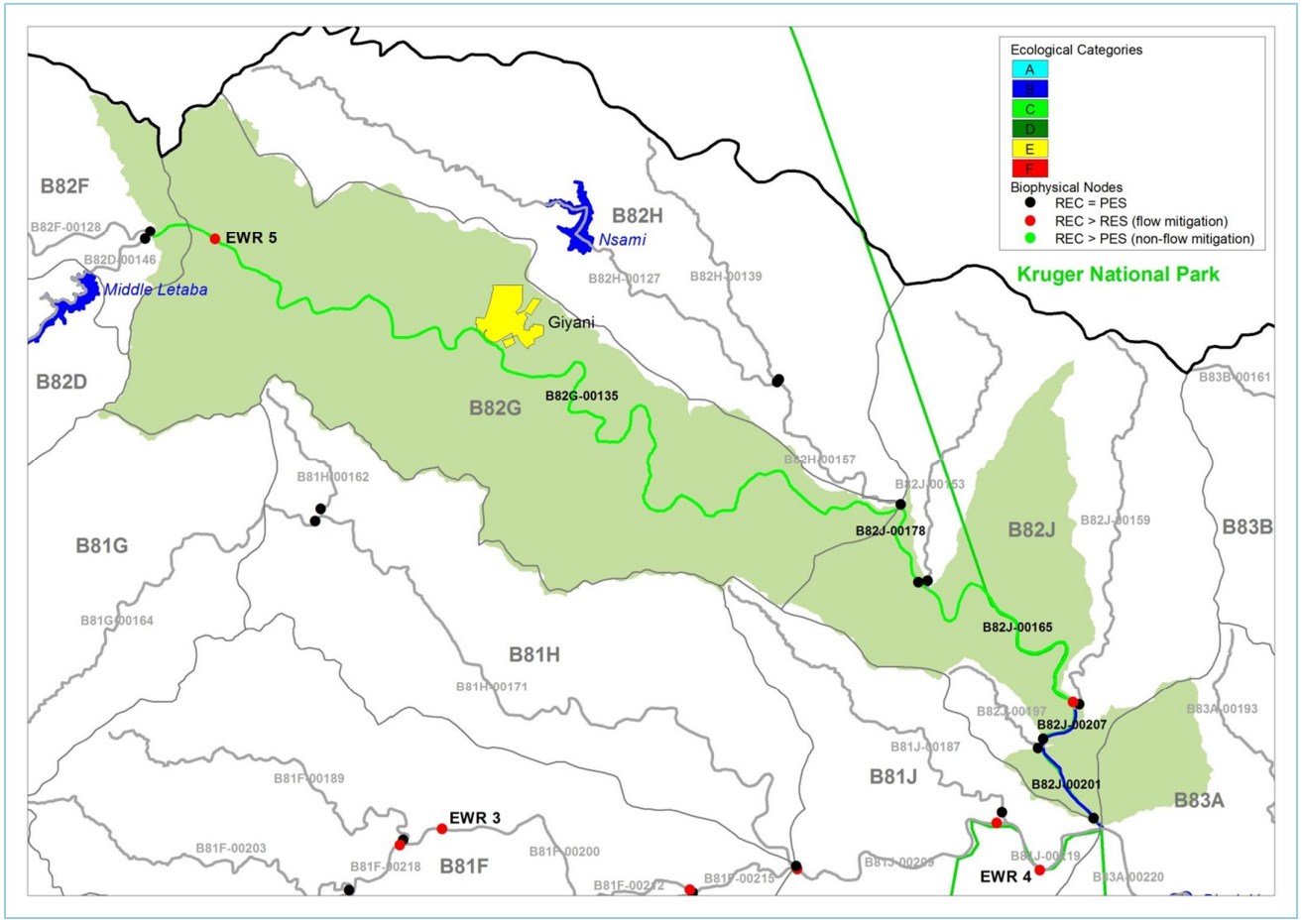


EGSA: The upper portion of the IUA has relatively low population densities with pockets of commercial farming interspersed with subsistence farming. The areas associated with subsistence farming and lower population densities are likely to have high EGSA dependence. However the lower (Eastern) potions of the IUA become very highly populated and dense closer settlement associated with the former Gazankulu homeland dominate. Again the utilisation of EGSA is likely to be constrained given population density but the importance, is likely to be high.

ECOLOGY: The PES of the IUA ranges from B (B82E-00149) to D (B82F-00137), but is predominantly a C. Impacts are non-flow related such as vegetation removal, trampling and water quality. The EI is moderate. B82E has a fairly high density of seep wetlands, none of which have been highlighted as important, while B82F-00128 (Klein Letaba) has been noted for channelled valley bottom wetlands. The PES for the Klein Letaba wetland is a C/D.

IUA 9: Klein Letaba downstream from the Middle Letaba Dam

WATER RESOURCES: IUA 9 focuses on the remainder of the main channel of the Klein Letaba River and excludes all its tributaries which fall into Ecological IUA 10. The IUA is regulated by upstream dams, mainly the Middle Letaba Dam. There are a number of river abstractions mainly by the urban/domestic sector from where return flows are also generated that enter the river systems. There are no surface water resource developments planned in the IUA.



WATER QUALITY: There is a water quality hotspot around Giyani due to urban-related impacts, including the WWTW at Giyani. Water quality state is Fair to Poor, primarily due to elevated nutrients.

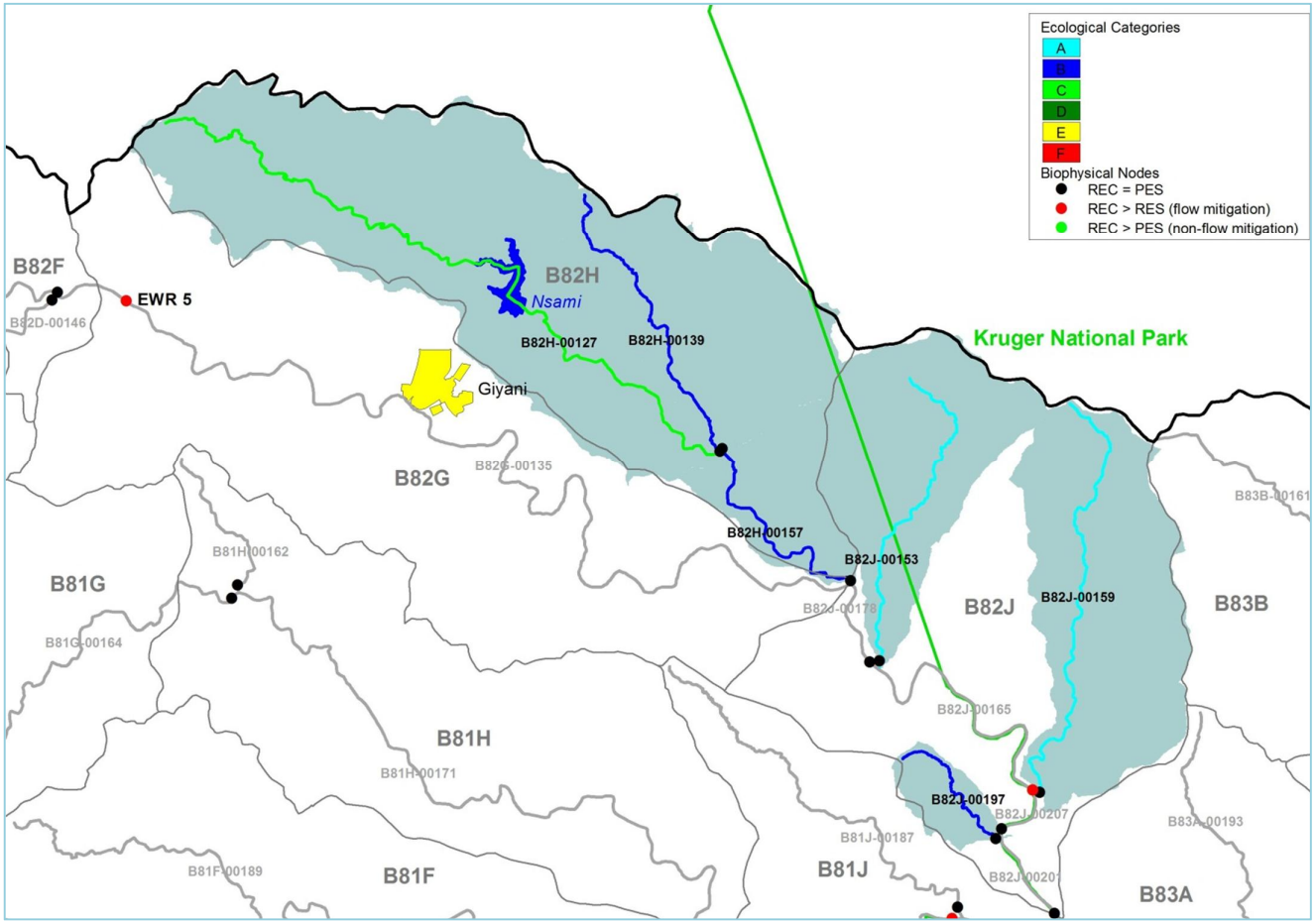
ECONOMY: The economic activities are minimal and consist mainly of banana production that forms part of the primary sector.

EGSA: The IUA is very highly populated and dense closer settlement associated with the Giyani region of the former Gazankulu homeland dominate. The Giyani town is a formal urban area. Again the utilisation of EGSA is likely to be constrained given population density but the importance is likely to be high. Along with the Tzaneen area this is possibly the most highly populated portion of the catchment. A portion of the Eastern part of the IUA falls within the Kruger National Park. For these portions recreational and aesthetic aspects of EGSA utilisation is of importance but direct consumptive use is low.

ECOLOGY: The IUA starts at the confluence of the Middle and Klein Letaba Rivers and ends at the confluence of the Klein and Great Letaba Rivers. The IUA has a predominant EC of a C, with the exception of the last 2 SQs, which are short sections that have an EC of a B. The last 3 SQs of the Klein Letaba River (B82J-00165, B82J-00207 and B82J-00201) form the boundary of the KNP. The impacts are associated with water quality and largely non-flow related impacts. Importance is high. The Klein Letaba (at B82G-00135) has been outlined for notable wetlands, both for frequency of occurrence and diversity of types of wetlands, including thermal springs. Wetlands are mostly in a C/D PES with a moderate EIS. This section also has notable non-riparian wetlands outlined as important in the NFEPA Wetcluster coverage.

IUA 10: Lower Klein Letaba tributaries

WATER RESOURCES: IUA 10 includes the ephemeral tributaries (5 SQs) in the lower Klein Letaba up to the Kruger National Park (KNP) boundary. The IUA is regulated by the Nsami Dam. Water is mainly supplied to the urban and irrigation sectors. Return flows from the urban sector enter the river systems resulting in a reduction in water quality. There are no future surface water developments planned in the IUA. There is possibility for future groundwater development in the area, but the locality of the groundwater resources relative to potential users and the viability for development needs to be confirmed.



WATER QUALITY: Subsistence agriculture dominates in this area, with rural communities and cattle grazing impacting on water quality of the lower Nsama River, especially during the dry season. Washing, agriculture and overgrazing take place within the riparian zone. Water quality state is Good to Fair, with no water quality hotspots identified.

ECONOMY: The economic activities are minimal and consist mainly of banana production that forms part of the primary sector.

EGSA: The Western portion of the IUA is very highly populated and again dense closer settlements associated with the former Gazankulu homeland dominate. The utilisation of EGSA is likely to be constrained given population density but the importance, is likely to be high. The lower (Eastern) portion is located within the Kruger National Park. For these portions recreational and aesthetic aspects of EGSA utilisation is of importance but direct consumptive use is low.

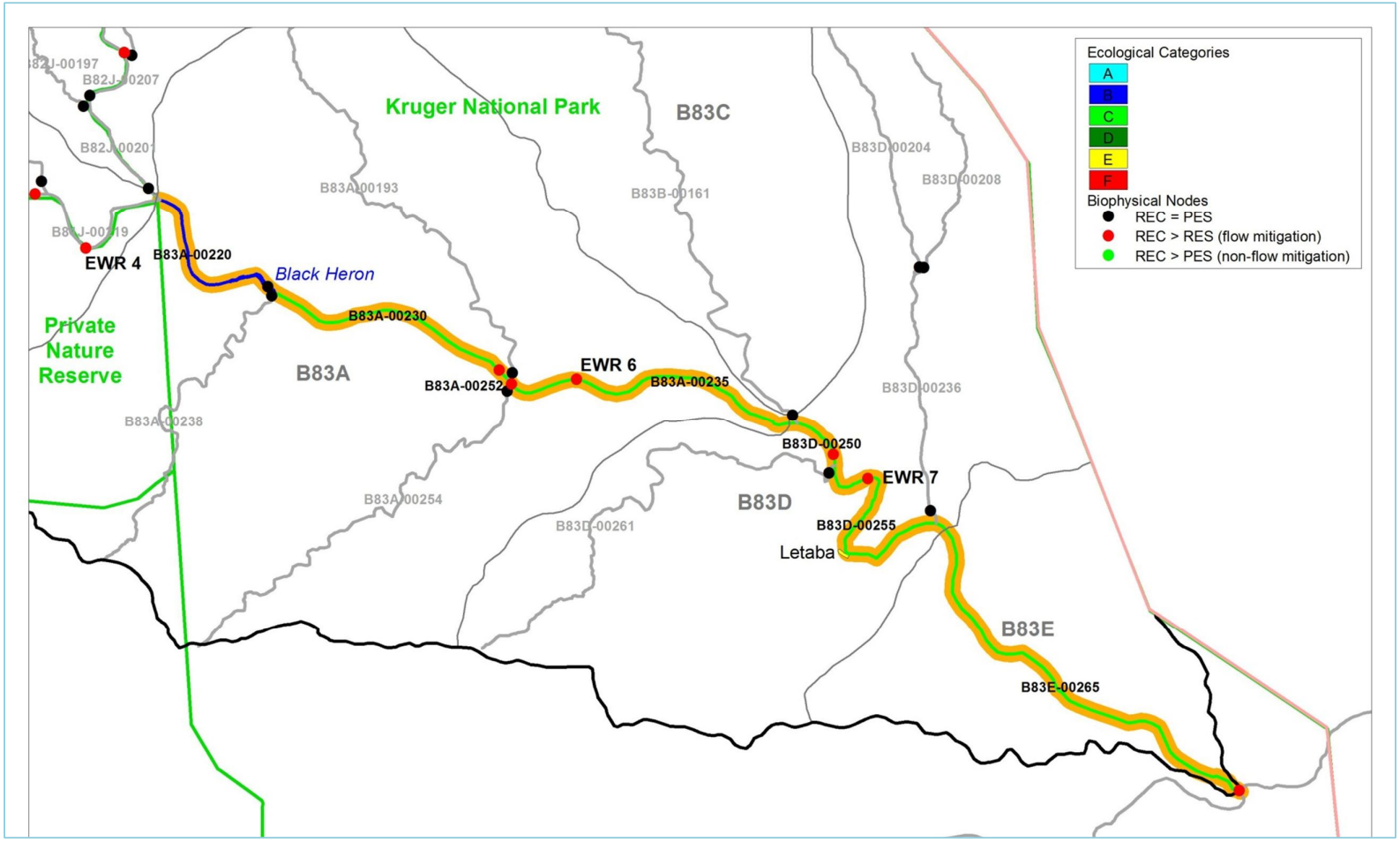
ECOLOGY: The Nsama River with tributary Magobe (3 SQs) are surrounded by rural settlements with associated impacts (overgrazing and riparian vegetation removal) with PES C to B, while the Nalatsi and Byashishi originates in the KNP with only the lower reaches running through rural areas with a PES of an A. The EI is high and moderate. The Nsama River (B82H-00127) is the only SQ that has been outlined for notable wetlands, both for frequency of occurrence and diversity of types of wetlands. The wetland PES is a C with a moderate EIS.

IUA 11: Letaba Main Stem in the Kruger National Park (KNP)

WATER RESOURCES: The entire portion is located within the Kruger National Park and comprises the main Letaba River only. The Letaba River main stem in the IUA is regulated by upstream dams in the catchment. There are no major dams and there are also no surface water developments planned in the IUA.

WATER QUALITY: Few impacts are found in this reach although water quality state is still Fair to Good due to upstream impacts.

ECONOMY: The main economic activity in IUA 11 is eco-tourism that forms part of the tertiary sector.



EGSA: Recreational and aesthetic aspects of EGSA utilisation are of importance but direct consumptive use is low.

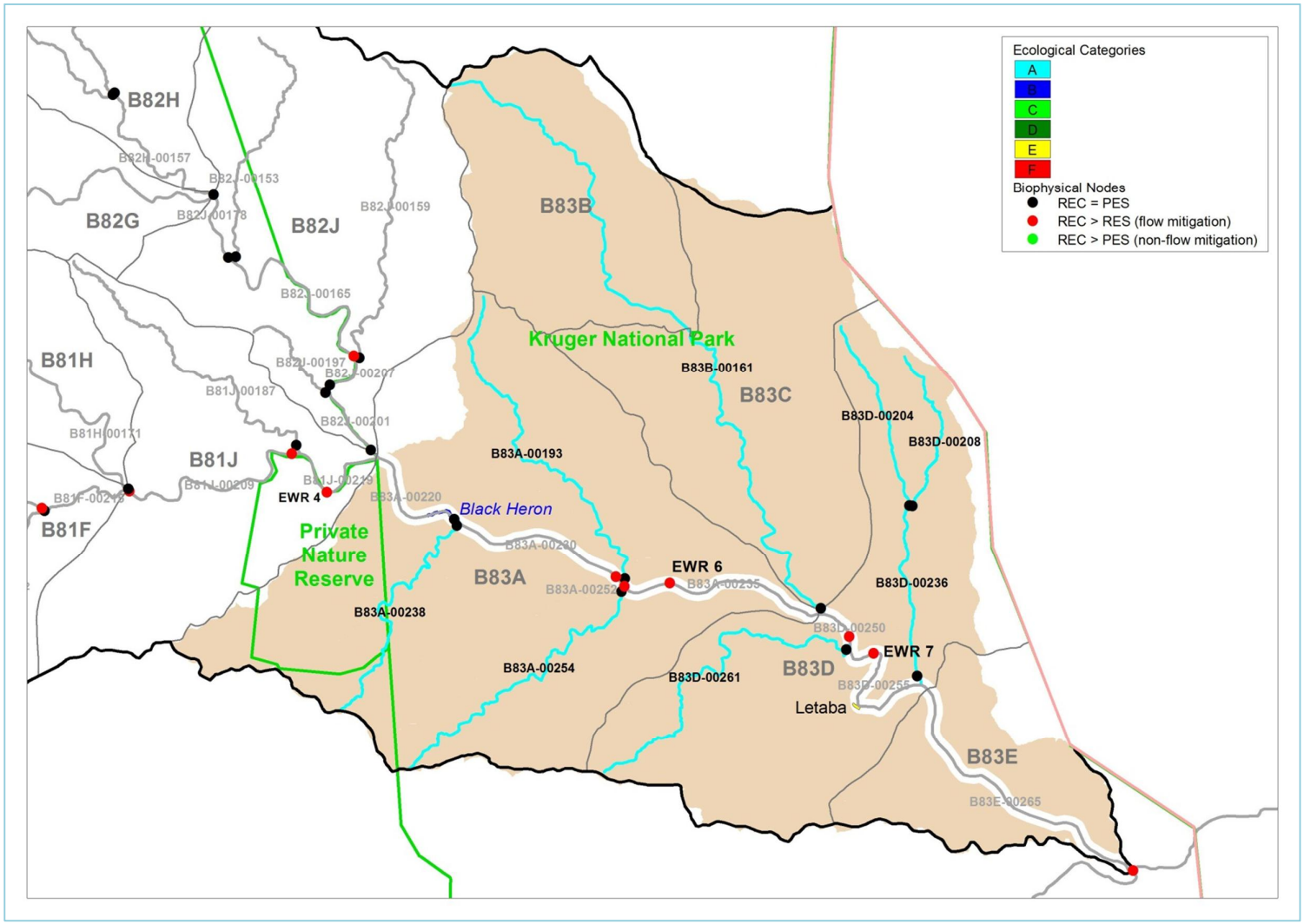
ECOLOGY: Although the main stem runs through a national park, lower flows due to abstraction and dams upstream, renders the 6 SQs of this river an EC mostly in a C PES with a high EI. The B83D-00255 (Letaba River) has a B PES (well conserved within KNP) but low EIS (few or no endemic or threatened species or habitats).

IUA 12: Letaba Tributaries in the Kruger National Park (KNP)

WATER RESOURCES: IUA 12 consists of all the tributaries of the Letaba downstream from the Klein Letaba confluences within the KNP. The storage regulation is low in the IUA with no major dams present in the area. There are also no major surface or groundwater developments planned in the IUA.

WATER QUALITY: Few impacts are found in this reach although water quality state is still Fair to Good due to upstream impacts.

ECONOMY: The main economic activity in IUA 12 is eco-tourism that forms part of the tertiary sector.



EGSA: Recreational and aesthetic aspects of EGSA utilisation are of importance but direct consumptive use is low.

ECOLOGY: The 8 SQs of the tributaries to the Letaba all originate in the KNP and are largely natural, displaying ECs of mostly A and one B. The EI is high.

The Tsende River is dominated by channelled valley-bottom wetlands has a PES of an A/b (well conserved within KNP) but low EIS (few or no endemic or threatened species or habitats).

EC	DESCRIPTION OF ECOLOGICAL CATEGORIES
A	Unmodified, natural.
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.
F	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

The Present Ecological State (PES) is described in terms of Ecological Categories (EC) of A to F with A being almost natural and F meaning critically modified. See table above for a description of the EC. Refer to each map of every IUA to understand the legend.