



Ecological Importance and Sensitivity  
assessment for the proposed  
construction of the Taunus Diepkloof  
40km 132kv servitude, City of  
Johannesburg Metropolitan Municipality,  
Gauteng Province.

Addendum to the original report, September 2014

Drafted by  
Limosella Consulting Pty Ltd  
Reg No: 2014/023293/07  
Email: [antoINETte@limosella.co.za](mailto:antoINETte@limosella.co.za)  
Cell: +27 83 4545 454  
[www.limosella.co.za](http://www.limosella.co.za)

Prepared for:  
Envirolution Consulting  
P.O. Box 1898, Sunninghill 2157.  
223 Columbine Avenue, Mondeor, 2091  
Tel: 0861 44 44 99  
Fax: 0861 626 222  
Email: [info@envirolution.co.za](mailto:info@envirolution.co.za)  
[www.envirolution.co.za](http://www.envirolution.co.za)



## *Preamble*

Limosella Consulting (Pty) Ltd was appointed by Envirolution Consulting (Pty) Ltd to undertake a wetland delineation and functional assessment for the proposed construction of new substations and a 40km, 132 kV overhead powerline from the proposed Taunus substation to the existing Diepkloof substation, City of Johannesburg, Gauteng. An initial assessment conducted in July 2010 did not include an assessment of the Ecological Importance and Sensitivity (EIS). This assessment was subsequently done and serves to supplement the July 2010 report. Fieldwork for the EIS assessment was conducted on the 18<sup>th</sup> of September 2014.

The 2010 wetland assessment identified six hydrogeomorphic (HGM) wetland units crossed by the proposed alignment (Figure 1). Table 1 presents a summary of the position and main impacts recorded during the 2010 assessment, together with its Present Ecological Status.



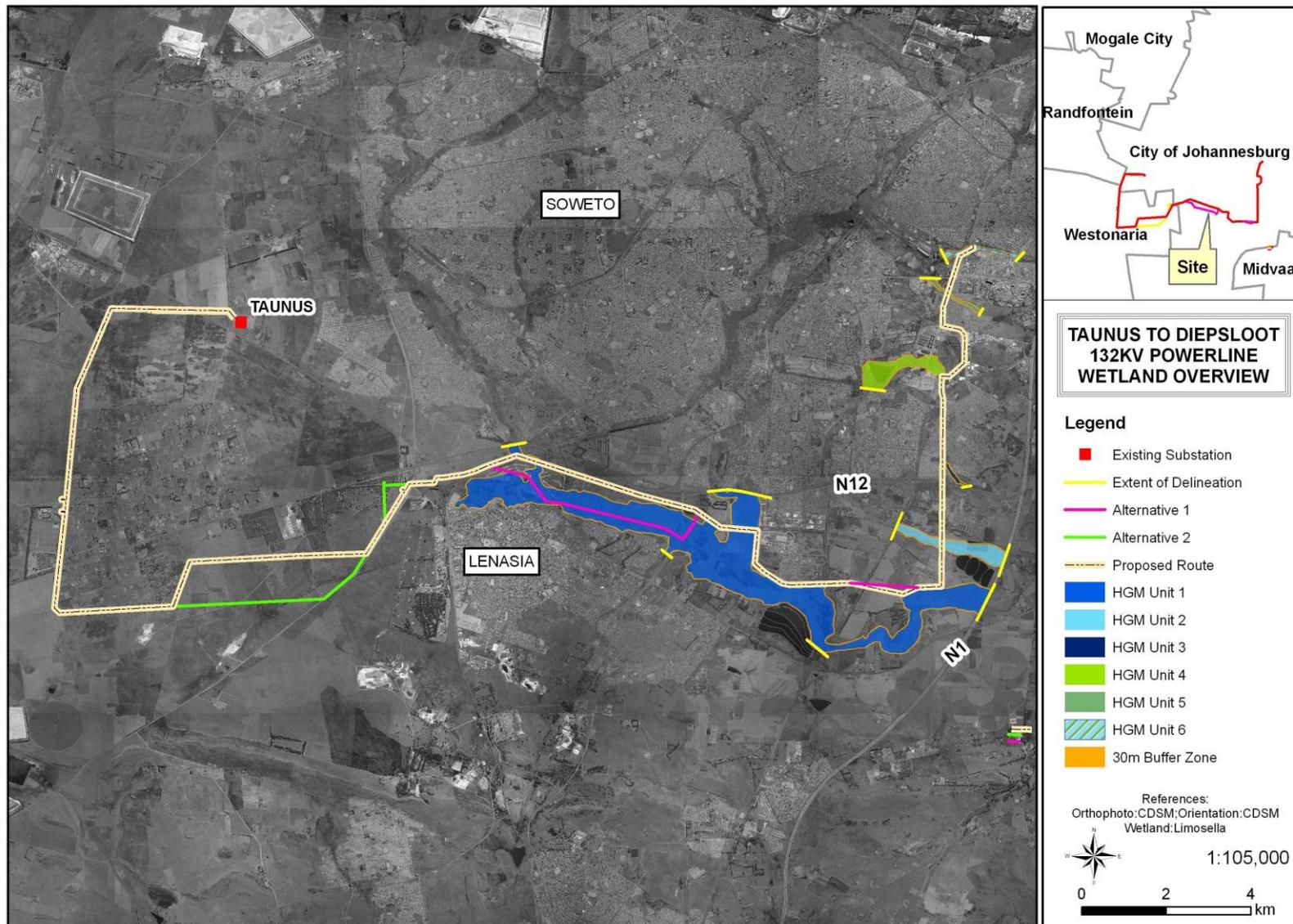


Figure 1: Position of the six HGM wetland units recorded in 2010



**Table 1: Summary of position, impacts and Present Ecological Status recorded at each HGM wetland unit**

HGM Unit	Approximate intersection with the powerline	Classification	Description	Impacts	Ecstatus
1	S 26° 18' 33.44" and E 27° 51' 34.54"	Floodplain	<i>Phragmites australis</i> dominated reed stands associated with the Klipriver, plays an important role in water quality improvement, stormwater attenuation, may contain peat	Regionally impacted by pollution from mining and sewage, further impacted by altered hydrology and sedimentation	D
2	S 26° 18' 57.11" and E 27° 55' 44.77"	Valley bottom with a channel	Canalised wetland with loss of temporary and seasonal wetland zone, characterised by grass and sedge species. Associated with the Harringtonspruit	Increased stormwater flows enhance canalisation and erosion, loss of wetland function, sedimentation and pollutant input	E
3	S 26° 18' 3.50" and E 27° 55' 49.17"	Valley bottom with a channel	Canalised wetland with with loss of temporary and seasonal wetland zone	Impacted by the N12 road, polluted by littering and sewage input. Erosion and sedimentation	E
4	S 26° 16' 39.44" and E 27° 55' 6.11"	Valley bottom with a channel	Associated with the Harringtonspruit, large areas of open water created by a dam wall	Altered hydrology through dams and road crossings. Township areas further impact on water quality and ecological integrity	F
5	S 26° 15' 48.51" and E 27° 55' 49.31"	Valley bottom with a channel	Associated with the Diepkloofspruit, canalisation has lead to the loss of temporary and seasonal wetland zones	Dominant impacts appear to be sediment and pollutant input from the adjacent township. Possible gully erosion should be verified	F
6	S 26° 15' 12.32" and E 27° 56' 12.03"	Valley bottom with a channel	Associated with the Bayleyspruit, canalisation has lead to the loss of temporary and seasonal wetland zones	Dominant impacts appear to be sediment and pollutant input from the adjacent township. Possible gully erosion should be verified	F



## 1. HGM Unit 1

Table 2 presents a summary of the Wetland Importance and Sensitivity scores obtained for HGM 1. Tables 3, 4 and 5 present the detailed ratings for the Ecological and Hydrological sensitivity/importance scores, and Direct Human Benefits.

**Table 2: A summary of scores obtained for HGM Unit 1**

WETLAND IMPORTANCE AND SENSITIVITY: HGM UNIT 1		
	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	3.2	4.2
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	2.6	4.5
DIRECT HUMAN BENEFITS	2.1	3.8

**Table 3: Ecological Importance scores in HGM Unit 1**

Ecological Importance	Score (0-4)	Confidence (1-5)	Motivation
<b>Biodiversity support</b>	<b>3.17</b>	<b>4.00</b>	
<i>Presence of Red Data species</i>	3.00	4.00	Very important regional wetland which form part of the Critically Endangered Klip River Grassland ecosystem which is the habitat for red and orange listed plants and birds and also red and orange listed or priority invertebrates. Large areas of wetland still intact (seasonal and temporary zones present) with <i>Phragmites australis</i> although downstream study area included extensive canalisation and collapse of the streambank. Wetland regionally impacted: mining pollution, sewage, increased stormwater from urban and informal settlement areas, trampling -humans & animals (grazing), hard surfaces, exotic vegetation.
<i>Populations of unique species</i>	3.00	4.00	Refer to Motivation above
<i>Migration/breeding/feeding sites</i>	3.50	4.00	Important regional wetland which is a key ecosystem feature
<b>Landscape scale</b>	<b>2.20</b>	<b>4.00</b>	
<i>Protection status of the wetland</i>	3.00	4.00	Gauteng C-plan: important area
<i>Protection status of the vegetation type</i>	1.50	4.00	24% protection target of the Eastern temperate freshwater wetlands vegetation type [15 % transformed ,5 % formally protected]
<i>Regional context of the ecological integrity</i>	3.00	4.00	Regional important ecosystem: 62% remaining natural area of ecosystem (Klipriver Higgveld Grassland GP5) 1 % formally protected (Klipriviersberg Nature Reserve and Rondebult Bird Sanctuary)= Critically endangered
<i>Size and rarity of the wetland type/s present</i>	2.00	4.00	Channeled Valley-bottom (in terms of longitudinal zonation Ollis <i>et al</i> , 2013) relative represented
<i>Diversity of habitat types</i>	1.50	4.00	Provide habitat for a variety of birds, invertebrates, small mammals including for instream biota
<b>Sensitivity of the wetland</b>	<b>2.17</b>	<b>4.67</b>	



<b>Sensitivity to changes in floods</b>	2.50	5.00	Yes Moderate to high
<b>Sensitivity to changes in low flows/dry season</b>	2.00	5.00	Yes Moderate -increased levels of flow is experienced even in the dry season due to stormwater and other urban run-off (sewage)
<b>Sensitivity to changes in water quality</b>	2.00	4.00	High continues nutrient inputs due to regional landuses evidence of sewage and other pollutants inputs - therefore not natural low nutrient waters
<b>ECOLOGICAL IMPORTANCE &amp; SENSITIVITY</b>	<b>3.2</b>	<b>4.2</b>	

Table 4: Hydrological Function scores for HGM Unit 1

HYDRO-FUNCTIONAL IMPORTANCE		Score	Confidence	Motivation
<b>Regulating &amp; supporting benefits</b>	<b>Flood attenuation</b>	3	4.5	Large areas of wetland still intact (seasonal and temporary zones present) with instream vegetation and buffer zone although downstream study area included extensive canalisation and collapse of the streambank. Loss of natural riparian/wetland vegetation and roughness also took place in this area: bridges, continues burning, grazing, hard surfaces and construction stockpiles, roads and other infrastructure also contributed to narrow wetland areas and reduce spreading and enhancing increased canalisation
	<b>Streamflow regulation</b>	2.5	4.5	
	<b>Sediment trapping</b>	3	4.5	Moderate capacity of wetland due to some degradation of wetland areas - Possible phosphate entries from region: urban, informal settlements, agriculture, mining and industrial
	<b>Phosphate assimilation</b>	2	4	
	<b>Nitrate assimilation</b>	2.5	4.5	
	<b>Toxicant assimilation</b>	2.5	4	
	<b>Erosion control</b>	2.5	4.5	
<b>Carbon storage</b>	2.5	4	Riparian/wetland vegetation and associated vegetation roughness reduced (transformed riparian areas and stream bank and hard surfaces created will result in an increased run-off and erosion)	
<b>Hydro-Functional Importance</b>		<b>2.6</b>	<b>4.5</b>	Degradation to some extent resulted in a reduced functioning of wetland and subsequently in a lower functionality in terms of possible carbon storage



**Table 5: Direct Human Benefit scores for HGM Unit 1**

<b>DIRECT HUMAN BENEFITS</b>		<b>Score (0-4)</b>	<b>Confidence (1-5)</b>	<b>Motivation</b>
<b>Subsistence benefits</b>	<i>Water for human use</i>	2.5	4	Possible usage by surrounding communities (informal settlements) including WTW for urban use
	<i>Harvestable resources</i>	1.5	3	Reeds
	<i>Cultivated foods</i>	2.5	5	Evidence of agriculture in marginal zone and adjacent terrestrial areas
<b>Cultural benefits</b>	<i>Cultural heritage</i>	1	2	
	<i>Tourism and recreation</i>	2	3.5	Part of the City of Johannesburg recreational areas
	<i>Education and research</i>	3	5	Universities use the Kip River as a study site for example UJ including important Klipriver forum
<b>DIRECT HUMAN BENEFITS</b>		<b>2.1</b>	<b>3.8</b>	

Figure 2 shows the characteristics of HGM Unit 1



**Figure 2: Wetland HGM 1**



## 2. HGM Unit 2

Table 6 presents a summary of the Wetland Importance and Sensitivity scores obtained for HGM 2. Tables 7, 8 and 9 present the detailed ratings for the Ecological and Hydrological sensitivity/importance scores, and Direct Human Benefits.

**Table 6: A summary of scores obtained for HGM Unit 2**

WETLAND IMPORTANCE AND SENSITIVITY: HGM UNIT 2		
	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	1.6	4.2
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1.8	4.0
DIRECT HUMAN BENEFITS	1.0	2.3

**Table 7: Ecological Importance scores in HGM Unit 1**

Ecological Importance	Score (0-4)	Confidence (1-5)	Motivation
<b>Biodiversity support</b>	<b>1.33</b>	<b>4.00</b>	
<i>Presence of Red Data species</i>	1.00	4.00	Possible but not recorded. Disturbance and degradation, loss of riparian habitat (seasonal and temporary wetland zones), trampling -humans & animals (grazing), hard surfaces, informal settlements, increased run-off of sewage and storm water from residential and light industrial areas, exotic vegetation, dams, WWTW, WTW
<i>Populations of unique species</i>	1.00	4.00	Refer to Motivation above
<i>Migration/breeding/feeding sites</i>	2.00	4.00	Possible breeding sites for bird species especially intact sections of wetland system including some invertebrates
<b>Landscape scale</b>	<b>1.60</b>	<b>4.00</b>	
<i>Protection status of the wetland</i>	3.00	4.00	Gauteng C-plan: ecological support area and important area
<i>Protection status of the vegetation type</i>	1.00	4.00	24% protection target of Tsakane Clay Grassland endangered vegetation type more than 60% transformed by cultivation, urbanisation, mining, dam building and roads. Only 1.5% protected in reserves
<i>Regional context of the ecological integrity</i>	1.00	4.00	[62% remaining natural area of ecosystem (Klipriver Highveld Grassland GP5) 1 % formally protected (Klipriviersberg Nature Reserve and Rondebult Bird Sanctuary)= Critically endangered]
<i>Size and rarity of the wetland type/s present</i>	1.00	4.00	Channeled Valley-bottom relative represented
<i>Diversity of habitat types</i>	2.00	4.00	Moderate due to intact areas providing protected nesting sites and overhanging branches provided habitat for instream biota
<b>Sensitivity of the wetland</b>	<b>1.33</b>	<b>4.67</b>	



<b>Sensitivity to changes in floods</b>	2.00	5.00	Yes Moderate Yes Low, this wetland system receive increased flow even in dry season from stormwater, sewage and other inputs  High continues nutrient inputs due to adjacent landuses evidence of sewage and other pollutants inputs - therefore not natural low nutrient waters
<b>Sensitivity to changes in low flows/dry season</b>	1.00	5.00	
<b>Sensitivity to changes in water quality</b>	1.00	4.00	
<b>ECOLOGICAL IMPORTANCE &amp; SENSITIVITY</b>	<b>1.6</b>	<b>4.2</b>	

Table 8: Hydrological Function scores for HGM Unit 1

HYDRO-FUNCTIONAL IMPORTANCE		Score	Confidence	Motivation	
<b>Regulating &amp; supporting benefits</b>	<b>Flood attenuation</b>	1.5	3	Canalisation and streambank collapse, extensive loss of natural riparian/wetland vegetation (loss of temporary and seasonal zones) and roughness. Bridges, roads, dams (including various Water treatment works dams downstream before confluence with Klip River system) and other infrastructure also contributed to narrow wetland areas and reduce spreading and enhancing increased canalisation	
	<b>Streamflow regulation</b>	2	3		
	<b>Water Quality Enhancement</b>	<b>Sediment trapping</b>	2	4	Low to moderate capacity of wetland due to degraded condition - Possible phosphate entries from surrounding urban, informal settlements, small scale agriculture and light industrial and use of phosphate detergents
		<b>Phosphate assimilation</b>	1.5	3	
		<b>Nitrate assimilation</b>	1.5	5	Low to moderate capacity due to degraded condition - Evidence of sewage input due to malfunctioning sewage infrastructure and urban runoff (lack of sufficient ablation infrastructure at informal settlements)
		<b>Toxicant assimilation</b>	2	4	
		<b>Erosion control</b>	2	4	
	<b>Carbon storage</b>	2	4	Degradation and Impaired functioning of wetland resulted in low functionality in terms of possible carbon storage	
<b>Hydro-Functional Importance</b>		<b>2.6</b>	<b>4.5</b>		



**Table 9: Direct Human Benefit scores for HGM Unit 2**

DIRECT HUMAN BENEFITS		Score (0-4)	Confidence (1-5)	Motivation
Subsistence benefits	<i>Water for human use</i>	2	4	Possible usage by surrounding communities from informal settlements
	<i>Harvestable resources</i>	0	1	None current
	<i>Cultivated foods</i>	2	4	Possible small -scale agriculture in marginal zone and adjacent terrestrial areas
Cultural benefits	<i>Cultural heritage</i>	0	1	
	<i>Tourism and recreation</i>	2	3.5	Part of the City of Johannesburg recreational areas
	<i>Education and research</i>	0	1	None known
<b>DIRECT HUMAN BENEFITS</b>		<b>1</b>	<b>2.3</b>	

Figure 3 shows HGM Unit 2



**Figure 3: Characteristics of wetland HGM 3**



### 3. HGM Unit 3

Table 10 presents a summary of the Wetland Importance and Sensitivity scores obtained for HGM 3. Tables 11, 12 and 13 present the detailed ratings for the Ecological and Hydrological sensitivity/importance scores, and Direct Human Benefits.

**Table 10: A summary of scores obtained for HGM Unit 3**

WETLAND IMPORTANCE AND SENSITIVITY: HGM UNIT 3		
	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	1.7	4.2
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1	4.0
DIRECT HUMAN BENEFITS	0.7	1

**Table 11: Ecological Importance scores in HGM Unit 3**

Ecological Importance	Score (0-4)	Confidence (1-5)	Motivation
<b>Biodiversity support</b>	<b>1.33</b>	<b>4.00</b>	
<i>Presence of Red Data species</i>	1.00	4.00	Possible but not recorded. Disturbance and degradation, loss of riparian habitat (seasonal and temporary wetland zones), trampling -humans & animals (grazing), hard surfaces, informal settlements, increased run-off of sewage and storm water from residential and light industrial areas, exotic vegetation, dams, WWTW, WTW
<i>Populations of unique species</i>	1.00	4.00	Refer to Motivation above
<i>Migration/breeding/feeding sites</i>	2.00	4.00	Possible breeding sites for bird species especially intact sections of wetland system including some invertebrates
<b>Landscape scale</b>	<b>1.60</b>	<b>4.00</b>	
<i>Protection status of the wetland</i>	3.00	4.00	Gauteng C-plan: ecological support area and important area 24% protection target of Tsakane Clay Grassland endangered vegetation type more than 60% transformed by cultivation, urbanisation, mining, dam building and roads. Only 1.5% protected in reserves
<i>Protection status of the vegetation type</i>	1.00	4.00	[62% remaining natural area of ecosystem (Klipriver Highveld Grassland GP5) 1 % formally protected (Klipriviersberg Nature Reserve and Rondebult Bird Sanctuary)= Critically endangered]
<i>Regional context of the ecological integrity</i>	1.00	4.00	
<i>Size and rarity of the wetland type/s present</i>	1.00	4.00	Channeled Valley-bottom relative represented
<i>Diversity of habitat types</i>	2.00	4.00	Moderate due to intact areas providing protected nesting sites and overhanging branches provided habitat for instream biota
<b>Sensitivity of the wetland</b>	<b>1.33</b>	<b>4.67</b>	



<b>Sensitivity to changes in floods</b>	2.00	5.00	Yes Moderate Yes Low, this wetland system receive increased flow even in dry season from stormwater, sewage and other inputs High continues nutrient inputs due to adjacent landuses evidence of sewage and other pollutants inputs - therefore not natural low nutrient waters
<b>Sensitivity to changes in low flows/dry season</b>	1.00	5.00	
<b>Sensitivity to changes in water quality</b>	1.00	4.00	
<b>ECOLOGICAL IMPORTANCE &amp; SENSITIVITY</b>	<b>1.6</b>	<b>4.2</b>	

Table 12: Hydrological Function scores for HGM Unit 3

HYDRO-FUNCTIONAL IMPORTANCE		Score	Confidence	Motivation	
<b>Regulating &amp; supporting benefits</b>	<b>Flood attenuation</b>	1	3	Canalisation and extensive loss of natural riparian/wetland vegetation resulted in low capacity of flood attenuation, streamflow regulation and sediment trapping: bridges, roads (N12) and other infrastructure also contributed to narrow wetland areas and reduce spreading and enhancing increased canalisation	
	<b>Streamflow regulation</b>	1	3		
	<b>Sediment trapping</b>	1	4		
	<b>Water Quality Enhancement</b>	<b>Phosphate assimilation</b>	1	3	Low capacity of wetland due to degraded condition - Possible phosphate entries from surrounding urban, informal settlements, small scale agriculture and light industrial and use of phosphate detergents
		<b>Nitrate assimilation</b>	1	4	Low capacity due to degraded condition - Evidence of extensive sewage input due to malfunctioning sewage infrastructure and urban runoff (lack of sufficient ablation infrastructure at informal settlements)
		<b>Toxicant assimilation</b>	1	4	Low capacity due to impaired functioning of wetland and subsequent low toxicant assimilation
		<b>Erosion control</b>	1	4	Riparian/wetland vegetation and associated vegetation roughness absent, transformed riparian areas and stream bank and hard surfaces created will result in an increased run-off and erosion
<b>Carbon storage</b>	2	1			
<b>Hydro-Functional Importance</b>		<b>2.6</b>	<b>4.5</b>		



**Table 13: Direct Human Benefit scores for HGM Unit 3**

<b>DIRECT HUMAN BENEFITS</b>		<b>Score (0-4)</b>	<b>Confidence (1-5)</b>	<b>Motivation</b>
<b>Subsistence benefits</b>	<i>Water for human use</i>	1	4	Possible usage by surrounding communities from informal settlements
	<i>Harvestable resources</i>	0	1	None current
	<i>Cultivated foods</i>	3	5	Evidence of small -scale agriculture in marginal zone and adjacent terrestrial areas
<b>Cultural benefits</b>	<i>Cultural heritage</i>	0	1	
	<i>Tourism and recreation</i>	0	1	
	<i>Education and research</i>	0	1	None known
<b>DIRECT HUMAN BENEFITS</b>		<b>0.7</b>	<b>1</b>	

Figure 4 shows HGM Unit 3



**Figure 4: Characteristics of wetland HGM unit 3**



#### 4. HGM Unit 4

Table 14 presents a summary of the Wetland Importance and Sensitivity scores obtained for HGM 4. Tables 15, 16 and 17 present the detailed ratings for the Ecological and Hydrological sensitivity/importance scores, and Direct Human Benefits.

**Table 14: A summary of scores obtained for HGM Unit 4**

WETLAND IMPORTANCE AND SENSITIVITY: HGM UNIT 4		
	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	2.5	4.2
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1.8	4.0
DIRECT HUMAN BENEFITS	0.9	2.3

**Table 15: Ecological Importance Scores in HGM Unit 4**

Ecological Importance	Score (0-4)	Confidence (1-5)	Motivation
<b>Biodiversity support</b>	<b>2.50</b>	<b>4.00</b>	
<i>Presence of Red Data species</i>	2.50	4.00	Possible but not recorded: Extensive disturbance and degradation, loss of seasonal and temporary wetland zones due to impoundments (dam walls), road crossings, trampling -humans & animals (grazing), hard surfaces, informal settlements, increased run-off of sewage and storm water and adjacent landfill including exotic vegetation. Although the presence of water in the dam throughout the year and extensive reed beds ( <i>Phragmites australis</i> and possible <i>Phragmites mauritianus</i> ) which provide habitat for breeding of water birds and birds requiring these areas for nesting and also possible sources of food for other birds. Refer to Motivation above
<i>Populations of unique species</i>	2.50	4.00	
<i>Migration/breeding/feeding sites</i>	2.50	4.00	
<b>Landscape scale</b>	<b>2.50</b>	<b>4.00</b>	Possible breeding sites for diversity of avifauna
<i>Protection status of the wetland</i>	3.00	4.00	Gauteng C-plan: ecological support area 24% protection target of Tsakane Clay Grassland endangered vegetation type more than 60% transformed by cultivation, urbanisation, mining, dam building and roads. Only 1.5% protected in reserves  [62% remaining natural area of ecosystem (Klipriver Highveld Grassland GP5) 1 % formally protected (Klipriviersberg Nature Reserve and Rondebult Bird Sanctuary)= Critically endangered]
<i>Protection status of the vegetation type</i>	1.00	4.00	
<i>Regional context of the ecological integrity</i>	1.00	4.00	



<b>Size and rarity of the wetland type/s present</b>	<b>1.00</b>	<b>4.00</b>	Channeled Valley-bottom relative represented  Moderate due to reedbed habitat: <i>Phragmites australis</i> and possible <i>Phragmites mauritianus</i> and providing nesting sites also habitat types for fish species adapted to lentic systems
<b>Diversity of habitat types</b>	<b>2.00</b>	<b>4.00</b>	
<b>Sensitivity of the wetland</b>	<b>1.67</b>	<b>4.67</b>	
<b>Sensitivity to changes in floods</b>	2.50	5.00	Yes Moderate to high
<b>Sensitivity to changes in low flows/dry season</b>	1.50	5.00	low due to changes in the hydrology: dams in system
<b>Sensitivity to changes in water quality</b>	1.00	4.00	High continues nutrient inputs due to adjacent landuses evidence of sewage and other pollutants inputs, also adjacent landfill - therefore not natural low nutrient waters
<b>ECOLOGICAL IMPORTANCE &amp; SENSITIVITY</b>	<b>2.5</b>	<b>4.2</b>	

Table 16: Hydrological Function scores for HGM Unit 4

HYDRO-FUNCTIONAL IMPORTANCE		Score	Confidence	Motivation	
<b>Regulating &amp; supporting benefits</b>	<b>Flood attenuation</b>	<b>1.5</b>	<b>3</b>	Extensive change of hydrological regime: dams, bridges, hard surfaces, roads, and other infrastructure although some riparian vegetation ( <i>Phragmites</i> sp.) will allow for some functionality	
	<b>Streamflow regulation</b>	<b>2</b>	<b>3</b>		
	<b>2</b>	<b>4</b>	<b>4</b>		
	<b>Water Quality Enhancement</b>	<b>1.5</b>	<b>4</b>	<b>3</b>	Low to moderate capacity of wetland due to degraded condition - Possible phosphate entries from surrounding urban, informal settlements, landfill and light industrial and use of phosphate detergents
		<b>1.5</b>	<b>4</b>	<b>4</b>	Low to moderate capacity due to degraded condition - evidence of sewage input, urban runoff including lack of sufficient ablation infrastructure at informal settlements located within wetland
		<b>Toxicant assimilation</b>	<b>1.5</b>	<b>4</b>	Low to moderate rating due to impaired functioning of wetland and subsequent low toxicant assimilation
		<b>Erosion control</b>	<b>2</b>	<b>4</b>	Riparian/wetland vegetation and associated vegetation including roughness reduced. The transformed riparian areas and stream bank and hard surfaces created including adjacent landfill will result in an increased run-off and erosion
<b>Carbon storage</b>	<b>2</b>	<b>4</b>	Degradation and Impaired functioning of wetland resulted in moderate functionality in terms of possible carbon storage		
<b>Hydro-Functional Importance</b>		<b>1.8</b>	<b>4</b>		



**Table 17: Direct Human Benefit scores for HGM Unit 4**

DIRECT HUMAN BENEFITS		Score (0-4)	Confidence (1-5)	Motivation
Subsistence benefits	<i>Water for human use</i>	2	4	Possible usage by communities from informal settlements located within and surrounding the wetland as it is one of the only sources of water in the area
	<i>Harvestable resources</i>	1.5	3.5	Fish from the dam(s)
	<i>Cultivated foods</i>	2	4	Possible small -scale agriculture in marginal zone and adjacent terrestrial areas
Cultural benefits	<i>Cultural heritage</i>	0	1	
	<i>Tourism and recreation</i>	0	1	
	<i>Education and research</i>	0	1	None known
<b>DIRECT HUMAN BENEFITS</b>		<b>0.9</b>	<b>2.3</b>	

Figure 5 shows the characteristics of HGM Unit 4



**Figure 5: Characteristics of wetland HGM unit 4**



## 5. HGM Unit 5

Table 18 presents a summary of the Wetland Importance and Sensitivity scores obtained for HGM 5. Tables 19, 20 and 21 present the detailed ratings for the Ecological and Hydrological sensitivity/importance scores, and Direct Human Benefits.

**Table 18: A summary of scores obtained for HGM Unit 5**

WETLAND IMPORTANCE AND SENSITIVITY: HGM UNIT 5		
	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	2.2	4.2
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1.9	4.0
DIRECT HUMAN BENEFITS	0.8	1.0

**Table 19: Ecological Importance Scores in HGM Unit 5**

Ecological Importance	Score (0-4)	Confidence (1-5)	Motivation
<b>Biodiversity support</b>	<b>1.50</b>	<b>4.00</b>	
<i>Presence of Red Data species</i>	1.00	4.00	Not recorded. Extensive disturbance and degradation, loss of riparian habitat (55%+) (seasonal and temporary wetland zones), trampling -humans & animals (grazing), hard surfaces, informal settlements, increased run-off of sewage and storm water from residential and light industrial areas including taxi ranks etc, exotic vegetation Refer to Motivation above
<i>Populations of unique species</i>	1.00	4.00	
<i>Migration/breeding/feeding sites</i>	2.50	4.00	
<b>Landscape scale</b>	<b>2.50</b>	<b>4.00</b>	
<i>Protection status of the wetland</i>	3.00	4.00	Gauteng C-plan: ecological support area and important area 24% target of Soweto Highveld Grassland endangered vegetation type [62% remaining natural area of ecosystem (Klipriver Highveld Grassland GP5) 1 % formally protected= Critically endangered]  [62% remaining natural area of ecosystem (Klipriver Highveld Grassland GP5) 1 % formally protected (Klipriviersberg Nature Reserve and Rondebult Bird Sanctuary)= Critically endangered]  Channeled Valley-bottom relative represented  Moderate due to intact areas such as the Telkom property west of Dynamo Street with <i>Phragmites australis</i> and possible <i>Phragmites mauritanus</i> and exotic <i>Salix babylonica</i> providing protected nesting sites and overhanging branches provided habitat for instream biota
<i>Protection status of the vegetation type</i>	1.00	4.00	
<i>Regional context of the ecological integrity</i>	1.00	4.00	
<i>Size and rarity of the wetland type/s present</i>	1.00	4.00	
<i>Diversity of habitat types</i>	2.00	4.00	



<b>Sensitivity of the wetland</b>	<b>2.17</b>	<b>4.67</b>	
<i>Sensitivity to changes in floods</i>	2.50	5.00	Yes Moderate to high
<i>Sensitivity to changes in low flows/dry season</i>	3.00	5.00	Yes High
<i>Sensitivity to changes in water quality</i>	1.00	4.00	High continues nutrient inputs due to adjacent landuses evidence of sewage and other pollutants inputs - therefore not natural low nutrient waters
<b>ECOLOGICAL IMPORTANCE &amp; SENSITIVITY</b>	<b>2.2</b>	<b>4.2</b>	

Table 20: Hydrological Function scores for HGM Unit 5

HYDRO-FUNCTIONAL IMPORTANCE		Score	Confidence	Motivation	
<b>Regulating &amp; supporting benefits</b>	<b>Flood attenuation</b>	<b>1.5</b>	<b>3</b>	Loss of natural riparian/wetland vegetation and roughness to ensure flood attenuation, streamflow regulation, sediment trapping: bridges, continues burning, hard surfaces and construction stockpiles, roads and other infrastructure also contributed to narrow wetland areas and reduce spreading and enhancing increased canalisation	
	<b>Streamflow regulation</b>	<b>2</b>	<b>3</b>		
	<b>Sediment trapping</b>	<b>2.5</b>	<b>4</b>		
	<b>Water Quality Enhancement</b>	<b>Phosphate assimilation</b>	<b>2</b>	<b>3</b>	Moderate capacity of wetland due to degraded condition - Possible phosphate entries from surrounding urban, informal settlements, small scale agriculture and light industrial and use of phosphate detergents
		<b>Nitrate assimilation</b>	<b>1.5</b>	<b>5</b>	Low to moderate capacity due to degraded condition - Evidence of extensive sewage input due to malfunctioning sewage infrastructure and urban runoff (lack of sufficient ablation infrastructure at informal settlements)
		<b>Toxicant assimilation</b>	<b>2</b>	<b>4</b>	Moderate rating due to impaired functioning of wetland and subsequent low toxicant assimilation
		<b>Erosion control</b>	<b>2</b>	<b>4</b>	Riparian/wetland vegetation and associated vegetation roughness reduced and limited, transformed riparian areas and stream bank and hard surfaces created will result in an increased run-off and erosion
<b>Carbon storage</b>	<b>2</b>	<b>4</b>	Degradation and Impaired functioning of wetland resulted in low functionality in terms of possible carbon storage		
<b>Hydro-Functional Importance</b>		<b>1.9</b>	<b>4</b>		



**Table 21: Direct Human Benefit scores for HGM Unit 5**

DIRECT HUMAN BENEFITS		Score (0-4)	Confidence (1-5)	Motivation
Subsistence benefits	<i>Water for human use</i>	2	4	Possible usage by surrounding communities from informal settlements
	<i>Harvestable resources</i>	0	1	None current
	<i>Cultivated foods</i>	3	5	Evidence of small -scale agriculture in marginal zone and adjacent terrestrial areas
Cultural benefits	<i>Cultural heritage</i>	0	1	
	<i>Tourism and recreation</i>	0	1	
	<i>Education and research</i>	0	1	None known
<b>DIRECT HUMAN BENEFITS</b>		<b>0.8</b>	<b>1</b>	

Figure 6 shows the characteristics of HGM Unit 5



**Figure 6: Characteristics of wetland HGM unit 5**



## 6. HGM Unit 6

Table 22 presents a summary of the Wetland Importance and Sensitivity scores obtained for HGM 6. Tables 23, 24 and 25 present the detailed ratings for the Ecological and Hydrological sensitivity/importance scores, and Direct Human Benefits.

**Table 22: A summary of scores obtained for HGM Unit 6**

WETLAND IMPORTANCE AND SENSITIVITY: HGM UNIT 5		
	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	2.2	4.2
HYDROLOGICAL/FUNCTIONAL IMPORTANCE	1.2	4.0
DIRECT HUMAN BENEFITS	0.8	1.0

**Table 23: Ecological Importance Scores in HGM Unit 6**

Ecological Importance	Score (0-4)	Confidence (1-5)	Motivation
<b>Biodiversity support</b>	<b>1.33</b>	<b>4.00</b>	
<i>Presence of Red Data species</i>	1.00	4.00	Not recorded. Extensive disturbance and degradation, loss of riparian habitat (80%+) (seasonal and temporary wetland zones), trampling -humans & animals (grazing), hard surfaces, small-scale agriculture, informal settlements, canalisation and collapse of stream bank due to increased run-off of sewage and storm water from residential and light industrial areas including taxi ranks etc, gully erosion, exotic vegetation Refer to Motivation above
<i>Populations of unique species</i>	1.00	4.00	
<i>Migration/breeding/feeding sites</i>	2.00	4.00	
<b>Landscape scale</b>	<b>1.60</b>	<b>3.80</b>	Possible breeding sites for swallows within active channel and other bird species and some invertebrates although motivation above apply due to extensive disturbance and degradation of habitat
<i>Protection status of the wetland</i>	3.00	4.00	Gauteng C-plan important area 24% target of Soweto Highveld Grassland endangered vegetation type [62% remaining natural area of ecosystem (Klipriver Highveld Grassland GP5) 1 % formally protected= Critically endangered]  [62% remaining natural area of ecosystem (Klipriver Highveld Grassland GP5) 1 % formally protected (Klipriviersberg Nature Reserve and Rondebult Bird Sanctuary)= Critically endangered]
<i>Protection status of the vegetation type</i>	1.00	4.00	
<i>Regional context of the ecological integrity</i>	1.00	4.00	
<i>Size and rarity of the wetland type/s present</i>	1.00	4.00	



<i>Diversity of habitat types</i>	2.00	3.00	Moderate due to active channel zone with limited marginal areas (riparian areas and natural buffer areas)
<b>Sensitivity of the wetland</b>	<b>2.17</b>	<b>4.67</b>	
<i>Sensitivity to changes in floods</i>	2.50	5.00	Yes Moderate to high
<i>Sensitivity to changes in low flows/dry season</i>	3.00	5.00	Yes High
<i>Sensitivity to changes in water quality</i>	1.00	4.00	High continues nutrient inputs due to adjacent landuses evidence of sewage and other pollutants inputs - therefore not natural low nutrient waters
<b>ECOLOGICAL IMPORTANCE &amp; SENSITIVITY</b>	<b>2.2</b>	<b>4.2</b>	

Table 24: Hydrological Function scores for HGM Unit 6

HYDRO-FUNCTIONAL IMPORTANCE		Score	Confidence	Motivation	
Regulating & supporting benefits	Flood attenuation	1	3	Extensive canalisation and streambank collapse, extensive loss of natural riparian/wetland vegetation and roughness. Bridges, roads and other infrastructure also contributed to narrow wetland areas and reduce spreading and enhancing increased canalisation	
	Streamflow regulation	1	3		
	Sediment trapping	1	4		
	Water Quality Enhancement	Phosphate assimilation	1.5	3	Low to Moderate capacity of wetland due to degraded condition - Possible phosphate entries from surrounding urban, informal settlements, small scale agriculture and light industrial and use of phosphate detergents
		Nitrate assimilation	1.5	4	Low to moderate capacity due to degraded condition - Evidence of extensive sewage input due to malfunctioning sewage infrastructure and urban runoff (lack of sufficient ablation infrastructure at informal settlements)
		Toxicant assimilation	1.5	4	Low to moderate rating due to impaired functioning of wetland and subsequent low toxicant assimilation
		Erosion control	1	4	Riparian/wetland vegetation and associated vegetation roughness absent, transformed riparian areas and stream bank and hard surfaces created will result in an increased run-off and erosion
Carbon storage	1	4	Degradation and impaired functioning of wetland resulted in low functionality in terms of possible carbon storage		
<b>Hydro-Functional Importance</b>		<b>1.2</b>	<b>4</b>		



**Table 25: Direct Human Benefit scores for HGM Unit 6**

DIRECT HUMAN BENEFITS		Score (0-4)	Confidence (1-5)	Motivation
Subsistence benefits	<i>Water for human use</i>	2	4	Possible usage by surrounding communities from informal settlements
	<i>Harvestable resources</i>	0	1	None current
	<i>Cultivated foods</i>	3	5	Evidence of small -scale agriculture in marginal zone and adjacent terrestrial areas
Cultural benefits	<i>Cultural heritage</i>	0	1	-
	<i>Tourism and recreation</i>	0	1	-
	<i>Education and research</i>	0	1	None known
<b>DIRECT HUMAN BENEFITS</b>		<b>0.8</b>	<b>1.0</b>	

Figure 7 shows the characteristics of HGM Unit 6



**Figure 7: Characteristics of wetland HGM unit 6**

