



Management Classes



water affairs

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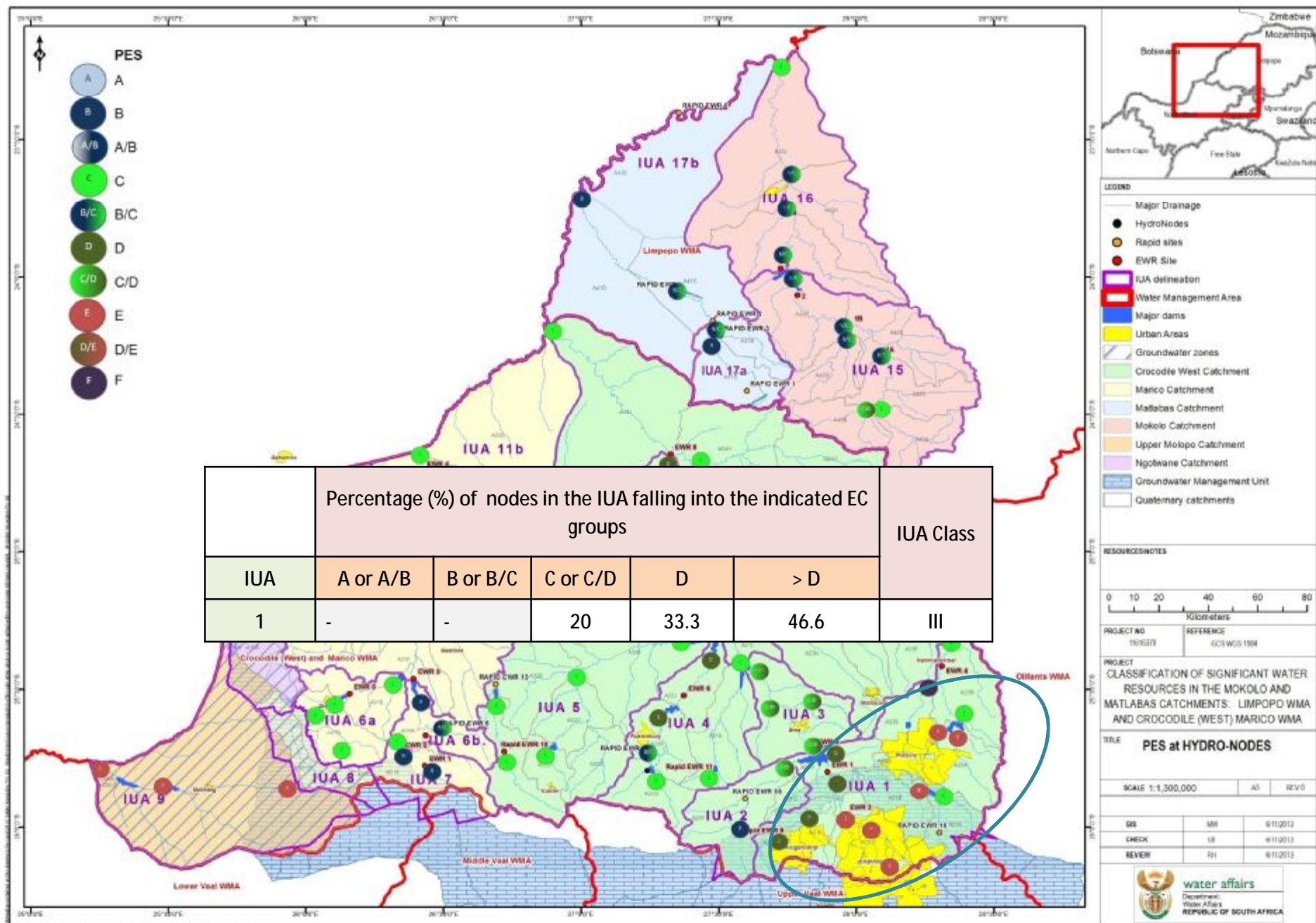
How do we determine the MC?

Management Class Descriptions

Class I	<i>Minimally used</i>	Water resource is one which is minimally used and the overall condition of that water resource is minimally altered from its pre-development condition
Class II	<i>Moderately used</i>	Water resource is one which is moderately used and the overall condition of that water resource is moderately altered from its pre-development condition
Class III	<i>Heavily used</i>	Water resource is one which is heavily used and the overall condition of that water resource is significantly altered from its pre-development condition

		Percentage (%) nodes in the IUA falling into the indicated groups				
		A or A/B	B or B/C	C or C/D	D	>D
Class I		60	40	20	1	-
Class II			60	30	5	-
Class III	Either			70	20	-
	Or				100	-







Crocodile West Catchment



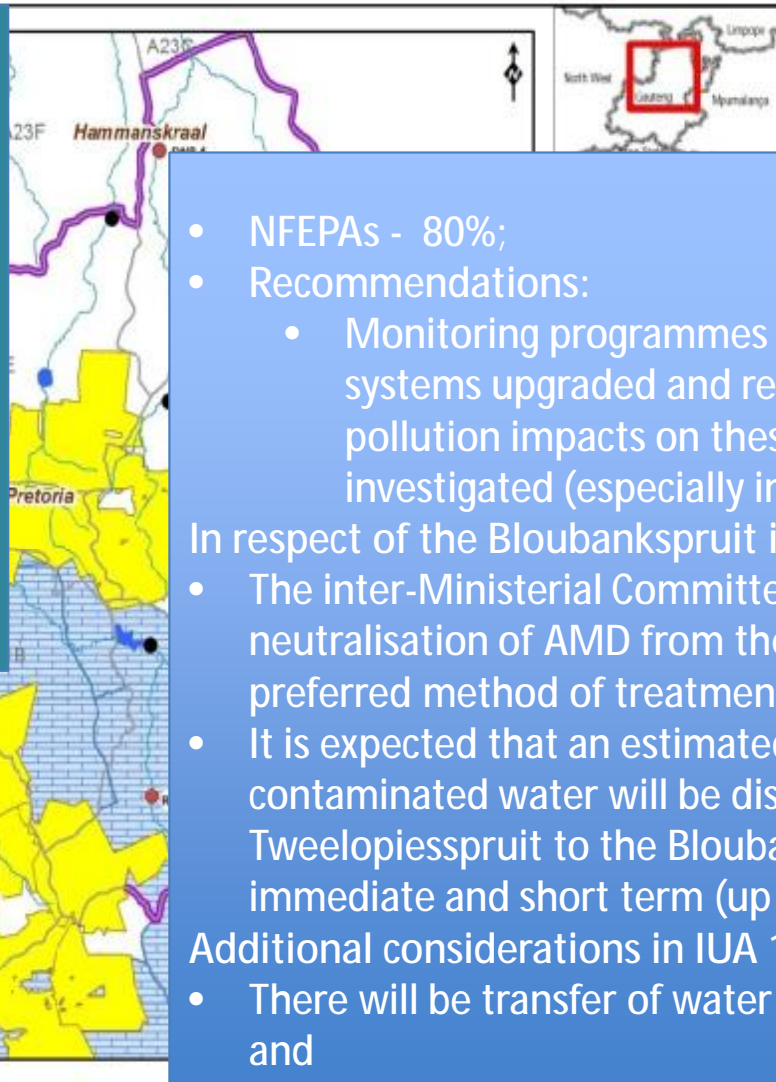
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IUA 1: UPPER CROCODILE/HENNOPS/HARTBEESPOORT

- Recommended scenario: PES (=REC) and meet the future growth in water requirements (2030)
- Recommended MC: III
- Recommended Groundwater MC: III
- Strategic wetlands:
 - Rietvlei;
 - Colbyn.



- NFEPA's - 80%;
- Recommendations:
 - Monitoring programmes for dolomite aquifer systems upgraded and reviewed. Localised pollution impacts on these aquifer systems to be investigated (especially impact from industries).

In respect of the Bloubankspruit it should be noted that:

- The inter-Ministerial Committee on AMD has approved neutralisation of AMD from the Western Basin as the preferred method of treatment; and
- It is expected that an estimated 60ML/d of sulphate contaminated water will be discharged via the Tweelopiesspruit to the Bloubankspruit for the immediate and short term (up to 7 years).

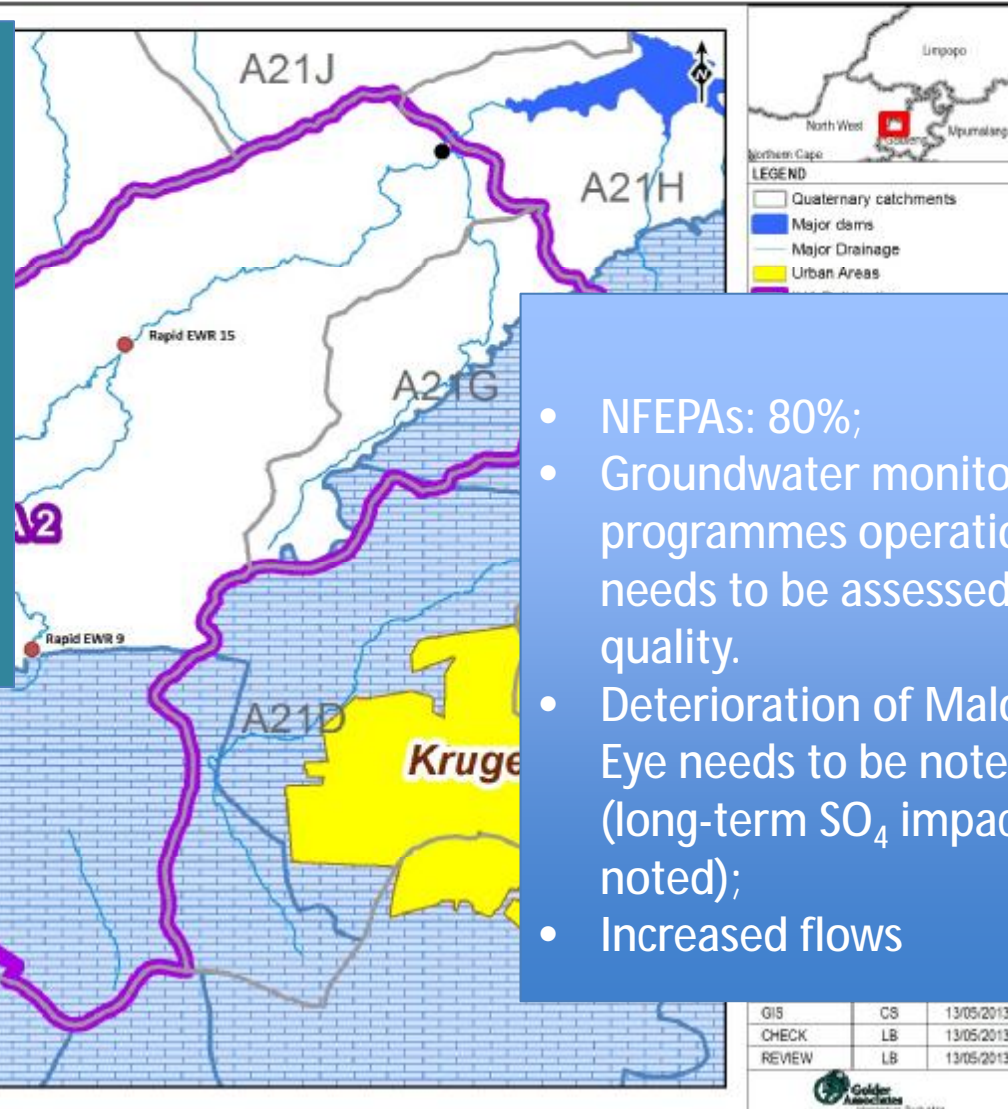
Additional considerations in IUA 1 are:

- There will be transfer of water to the Mokolo; and
- This may result in increased draw down from dams.



IUA 2: MAGALIES

- Recommended scenario: PES (=REC) and meet the future growth in water requirements (2030)
- Recommended MC: II
- Recommended Groundwater MC: III
- Strategic wetlands:
 - Maloney's Eye



- NFEPAs: 80%;
- Groundwater monitoring programmes operational; needs to be assessed its quality.
- Deterioration of Maloney's Eye needs to be noted (long-term SO_4 impact noted);
- Increased flows



IUA 3: CROCODILE/ROODEKOPJES CATCHMENT

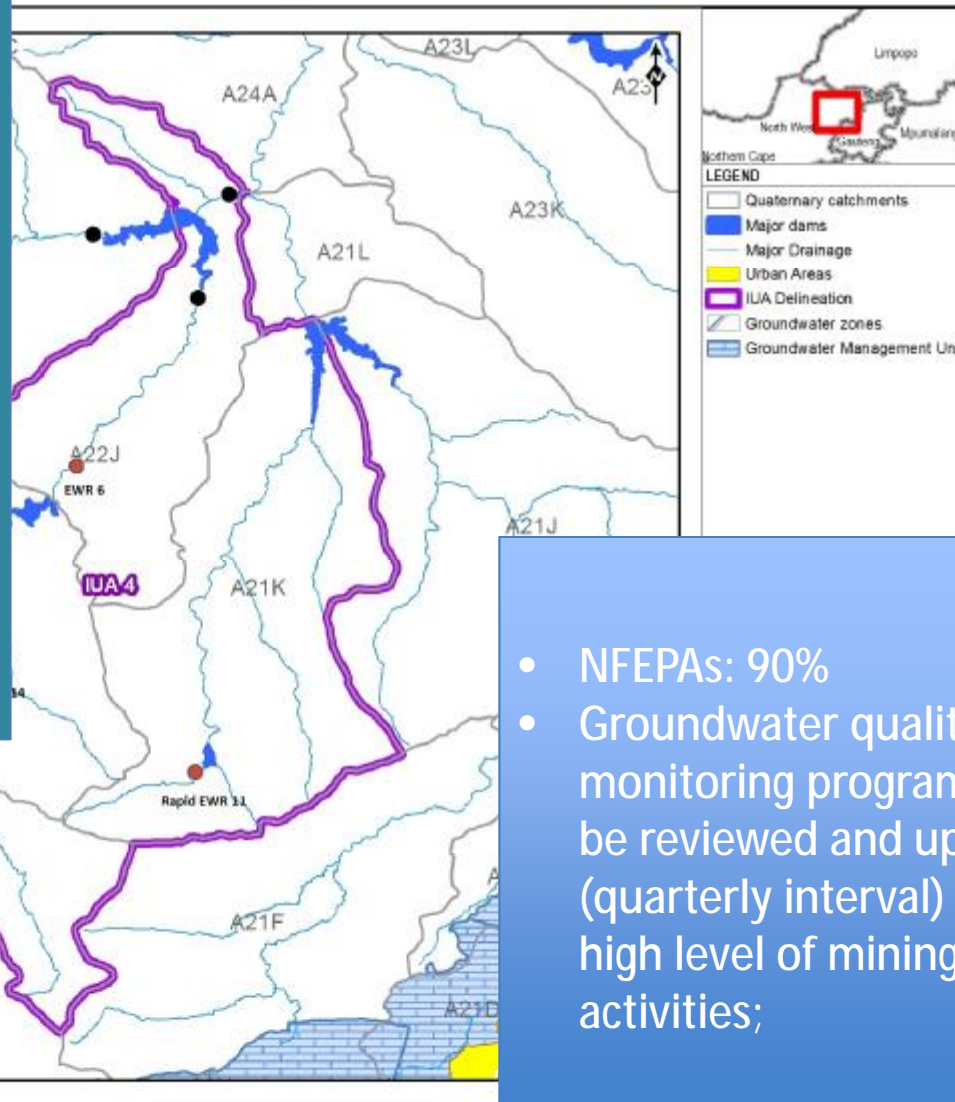
- Recommended scenario: PES (=REC) and meet the future growth in water requirements (2030)
- Recommended MC: III
- Recommended Groundwater MC: II
- Strategic wetlands: mostly associated with incised drainage lines and streams and low lying depressions, and are widely dispersed.



- NFEPAs: 90%;
The following recommendations are made:
- Groundwater level monitoring programmes to be reviewed (quarterly interval);
- Upstream water quality needs to be addressed;
- All discharges to the catchment need to adhere to the RQO that will be set in the subsequent DWA project; and
- Irrigation channels need to be maintained to prevent water losses.

IUA 4: HEX/WATERKLOOFSPRUIT/VAALKOP CATCHMENT

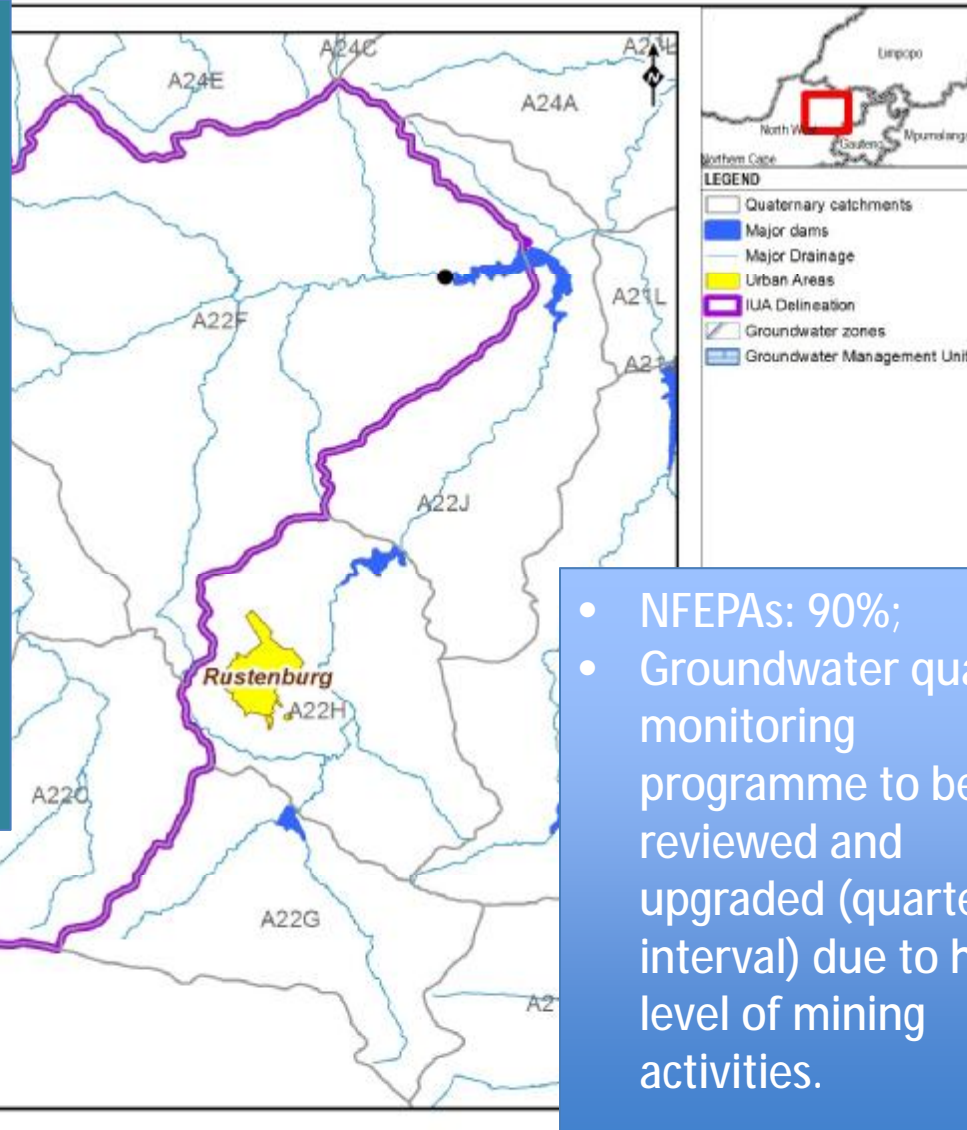
- Recommended scenario: PES (=REC) and meet the future growth in water requirements (2030)
- Recommended MC: II
- Recommended Groundwater MC: II
- Strategic wetlands:
 - Waterval Valley Bottom Mire (peatland)



- NFEPAs: 90%
- Groundwater quality monitoring programme to be reviewed and upgraded (quarterly interval) due to high level of mining activities;

IUA 5: ELANDS/VAALKOP

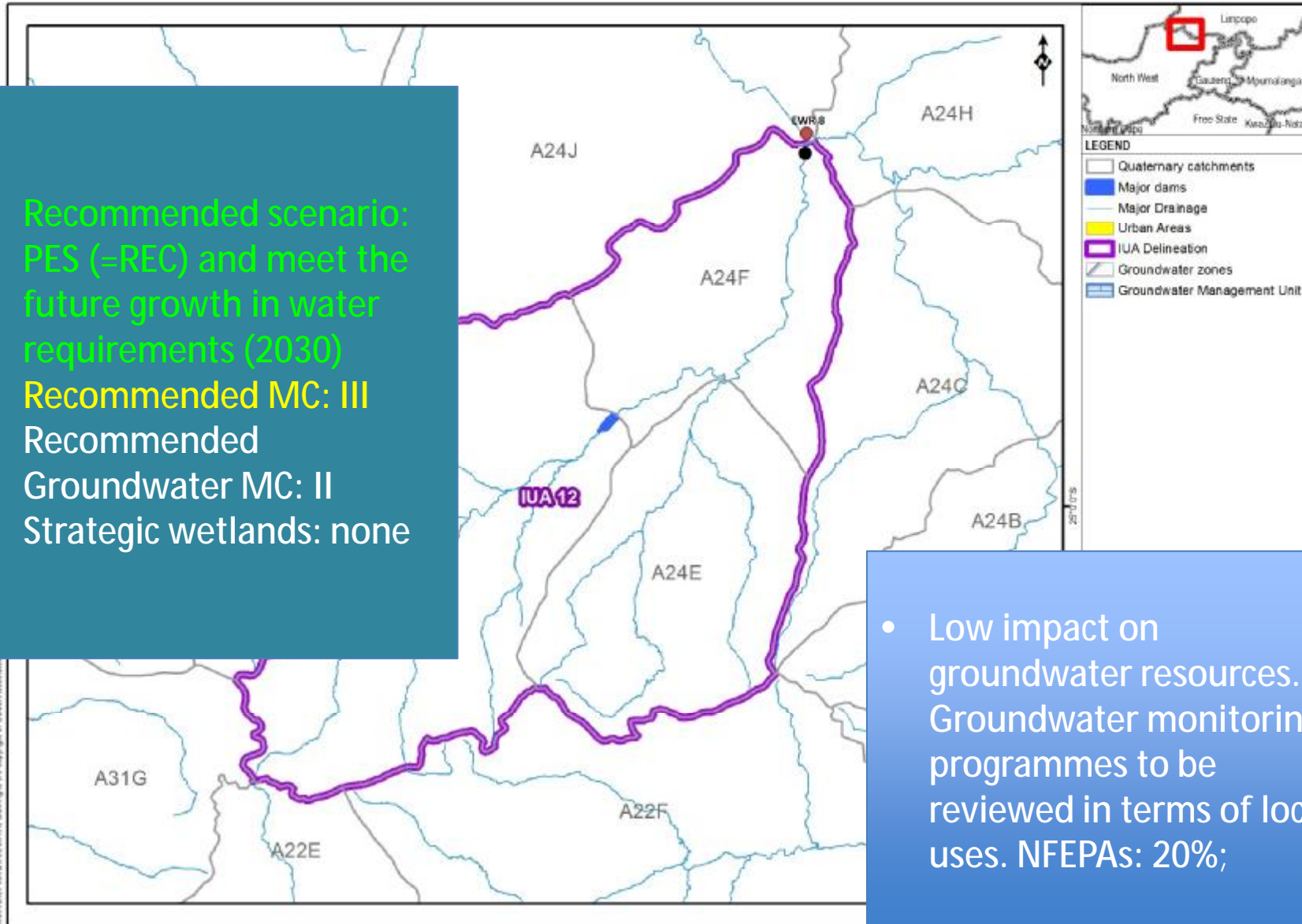
- Recommended scenario: PES (=REC) and meet the future growth in water requirements (2030)
- Recommended MC: II
- Recommended Groundwater MC: II
- Strategic wetlands:
 - Pans; Valley bottom wetlands; Hillslope seepage wetlands



- NFEPAs: 90%;
- Groundwater quality monitoring programme to be reviewed and upgraded (quarterly interval) due to high level of mining activities.

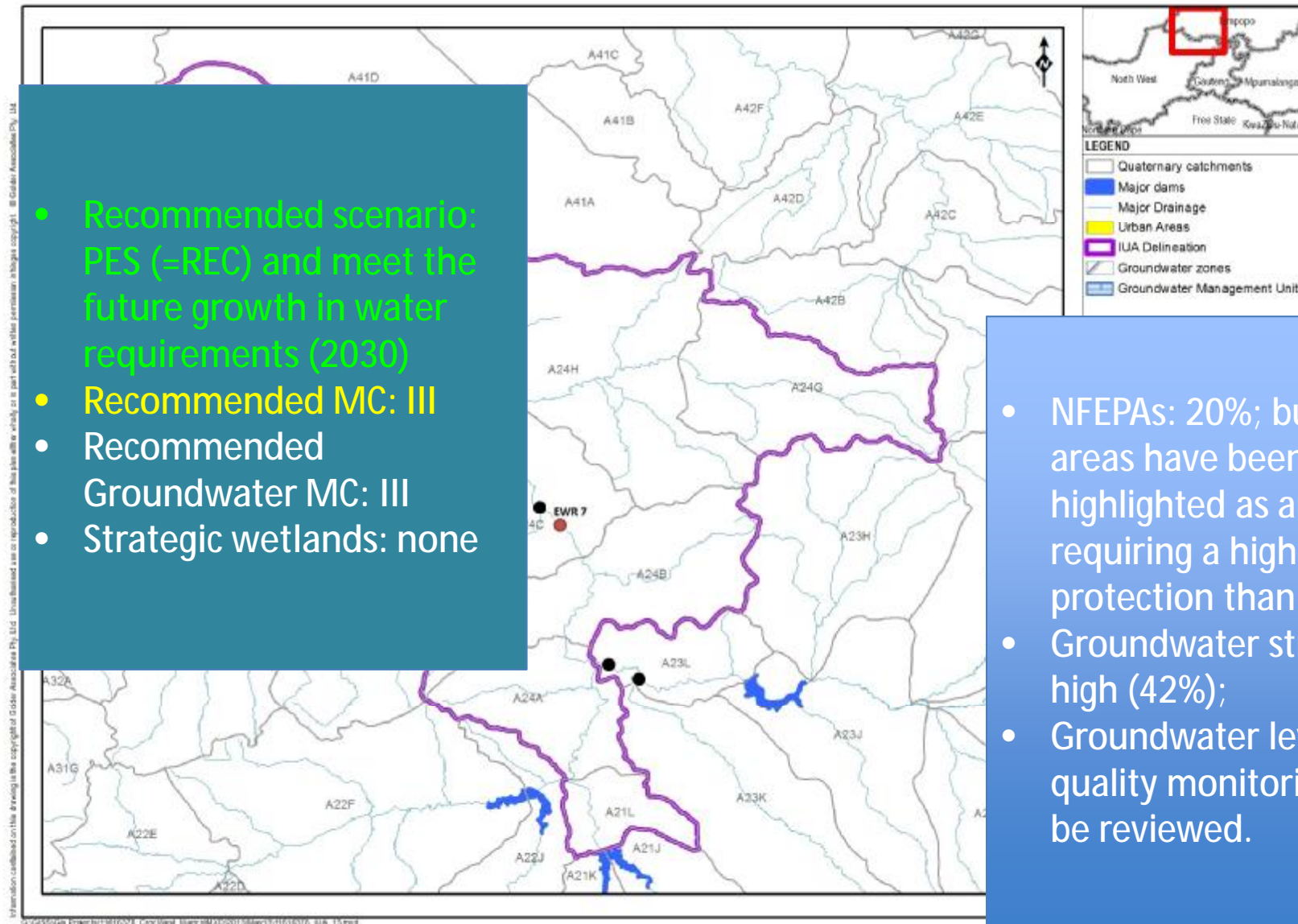
IUA 12: BIERSPRUIT

- Recommended scenario: PES (=REC) and meet the future growth in water requirements (2030)
- Recommended MC: III
- Recommended Groundwater MC: II
- Strategic wetlands: none



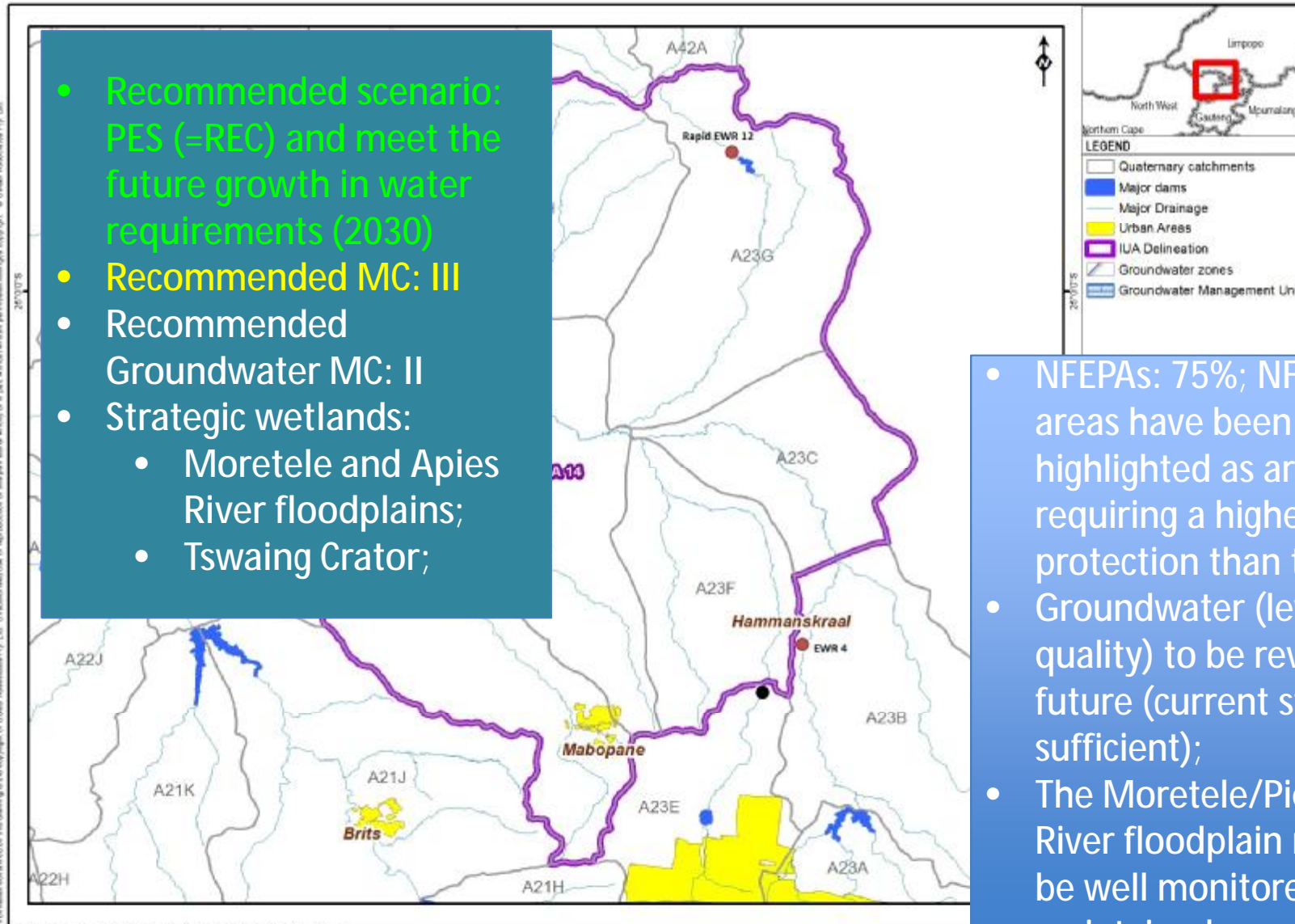
- Low impact on groundwater resources. Groundwater monitoring programmes to be reviewed in terms of local uses. NFEPA: 20%;

IUA 13: LOWER CROCODILE



IUA 14: TOLWANE/KULWANE/MORETELE/KLIPVOOR

- Recommended scenario: PES (=REC) and meet the future growth in water requirements (2030)
- Recommended MC: III
- Recommended Groundwater MC: II
- Strategic wetlands:
 - Moretele and Apies River floodplains;
 - Tswaing Crator;



- NFEPAs: 75%; NFEPAs areas have been highlighted as areas requiring a higher level of protection than the MC;
- Groundwater (levels and quality) to be reviewed in future (current status sufficient);
- The Moretele/Pienaars River floodplain needs to be well monitored and maintained




Marico Catchment



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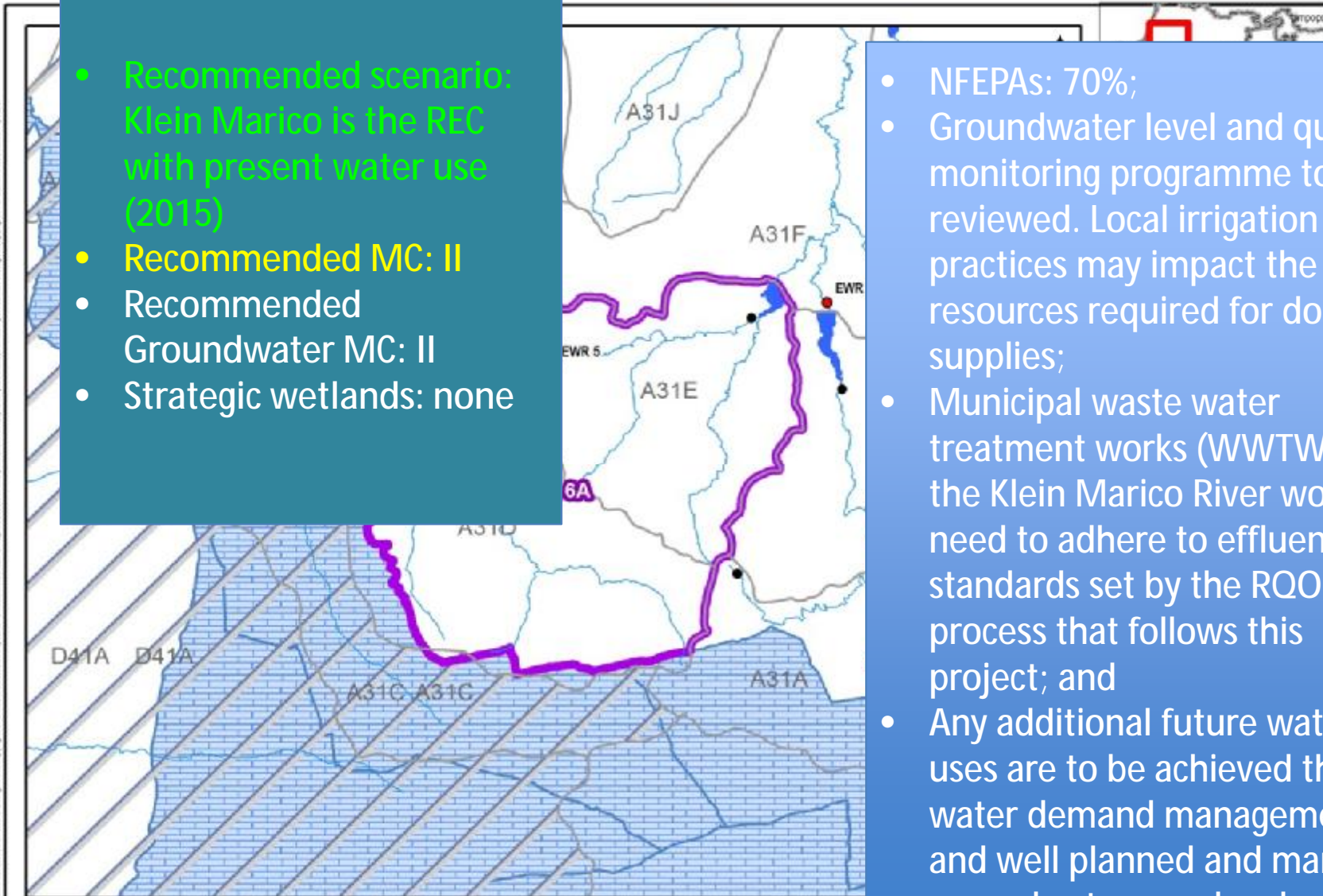
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III.A.6a. KLEIN MARICO CATCHMENT

- Recommended scenario: Klein Marico is the REC with present water use (2015)
- Recommended MC: II
- Recommended Groundwater MC: II
- Strategic wetlands: none

- NFEPAs: 70%;
- Groundwater level and quality monitoring programme to be reviewed. Local irrigation practices may impact the local resources required for domestic supplies;
- Municipal waste water treatment works (WWTW) in the Klein Marico River would need to adhere to effluent standards set by the RQO process that follows this project; and
- Any additional future water uses are to be achieved through water demand management and well planned and managed groundwater supply schemes.



IIA 6b: CROOT MARICO

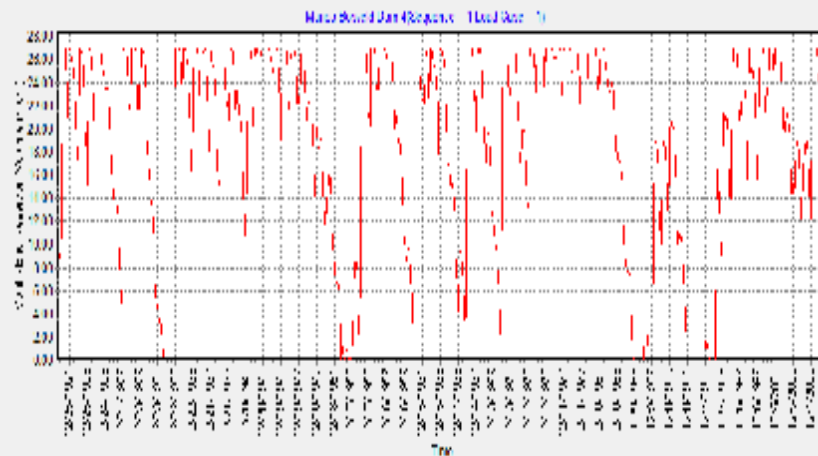
- Recommended scenario: REC with present water use (2015)
- Recommended MC: II
- Recommended Groundwater MC: II
- Strategic wetlands: none

- NFEPA: 90%;
- Groundwater level and quality monitoring programme to be reviewed. Local irrigation practices may impact the local resources required for domestic supplies.
- Municipal waste water treatment works (WWTW) would need to adhere to effluent standards set by the RQO process that follows this project.

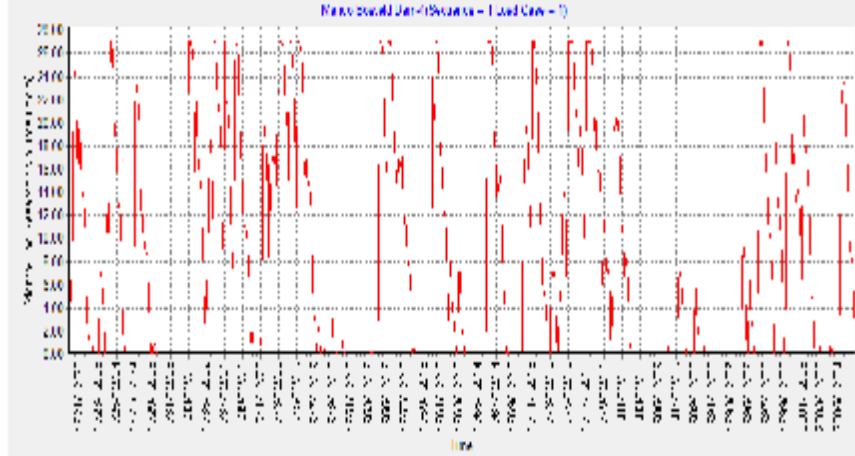


Demand curves for Marico Dam for different scenarios

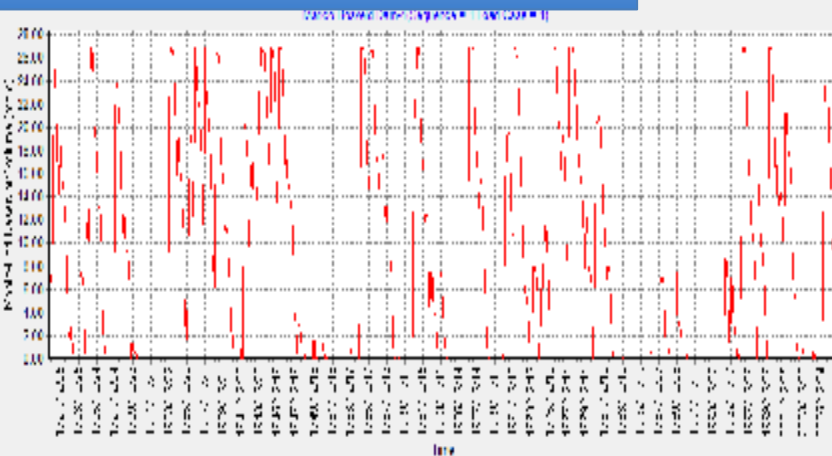
Present day flows without EWR



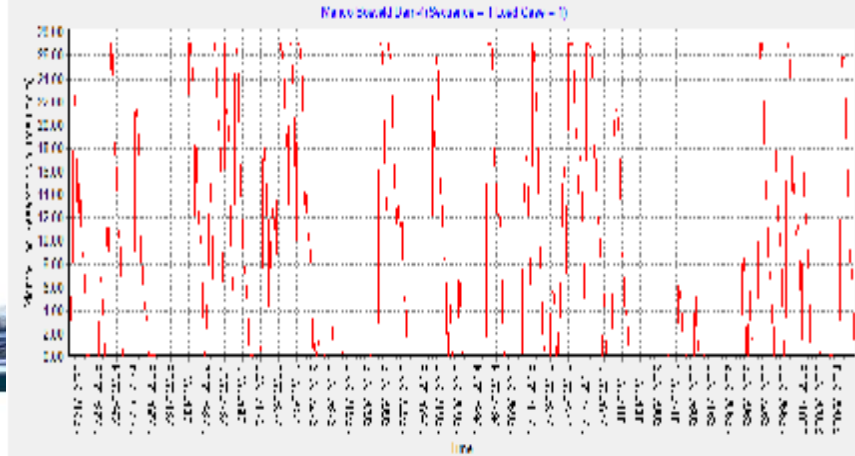
Future water use (500kl/day WWTW), PES



ESBC: Present day water use, PES

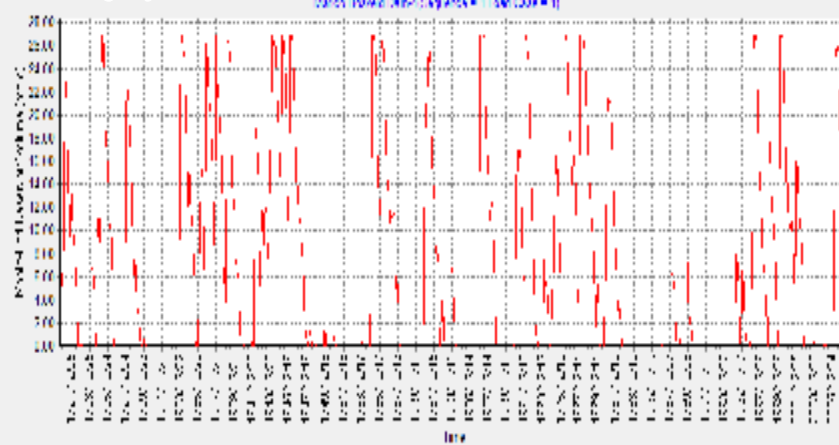


Present day water use, C category at EWR3, B category at EWR6

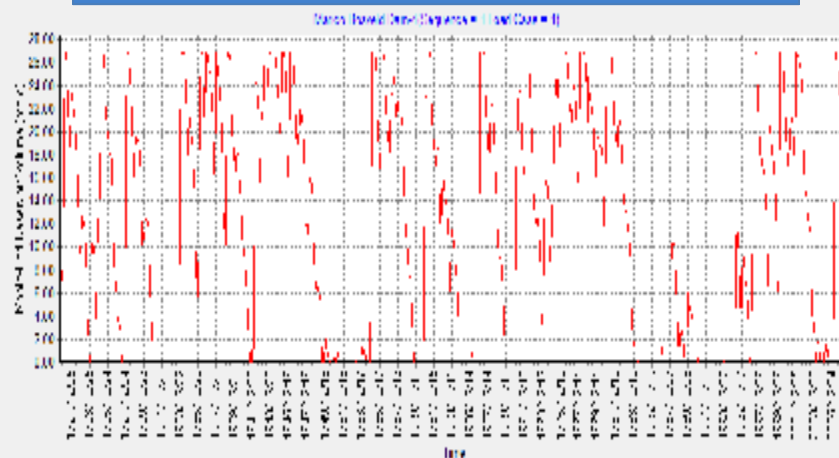


Demand curves for Marico Dam for different scenarios

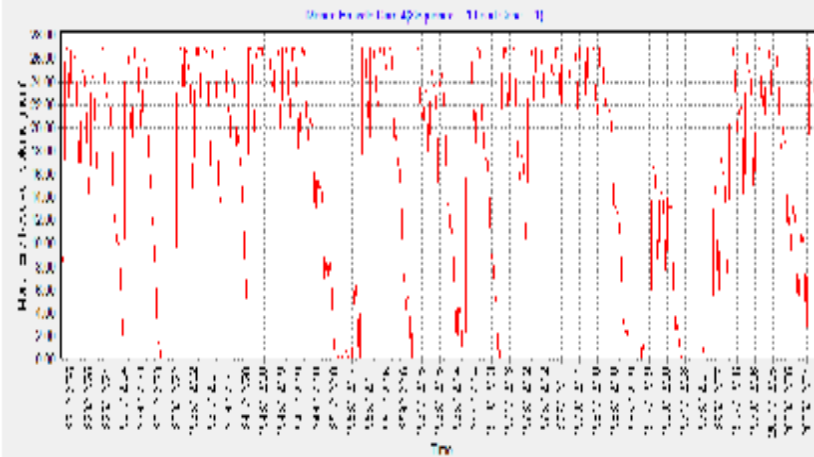
Future water use (500kl/day WWTW), C category at EWR3, B category at EWR6



Present day water use, D category at EWR3, PES



Present day water use, PES without floods/freshets at EWR3



IUA 7: KAALOOG-SE-LOOP

- Recommended scenario: REC with present water use (2015)
- Recommended MC: I
- Recommended Groundwater MC: II
- Strategic wetlands:
 - Marico eye; tufa waterfalls;

- NFEPAs: 90%; Groundwater level monitoring programme to be reviewed due to high impact on Grootpan dolomite aquifer system and long-term, sustainable management of resource;
- The eyes must be closely monitored and strict conditions set in relation to water use



IUA 9: MOLOPO

- Recommended scenario: REC with present water use (2015)
- Recommended Groundwater MC: III
- Strategic wetlands:
 - Molopo and Bodibe peatlands



IUA 9- D41A (Dolomite Aqf.):

- Groundwater monitoring programmes for aquifer system need to be reviewed in the light of localized over abstraction, viz. the Grootfontein dolomite aquifer system.
- No EWR; Groundwater contribution to the upper Molopo River from the Molopo Eye needs to be sustained/managed;

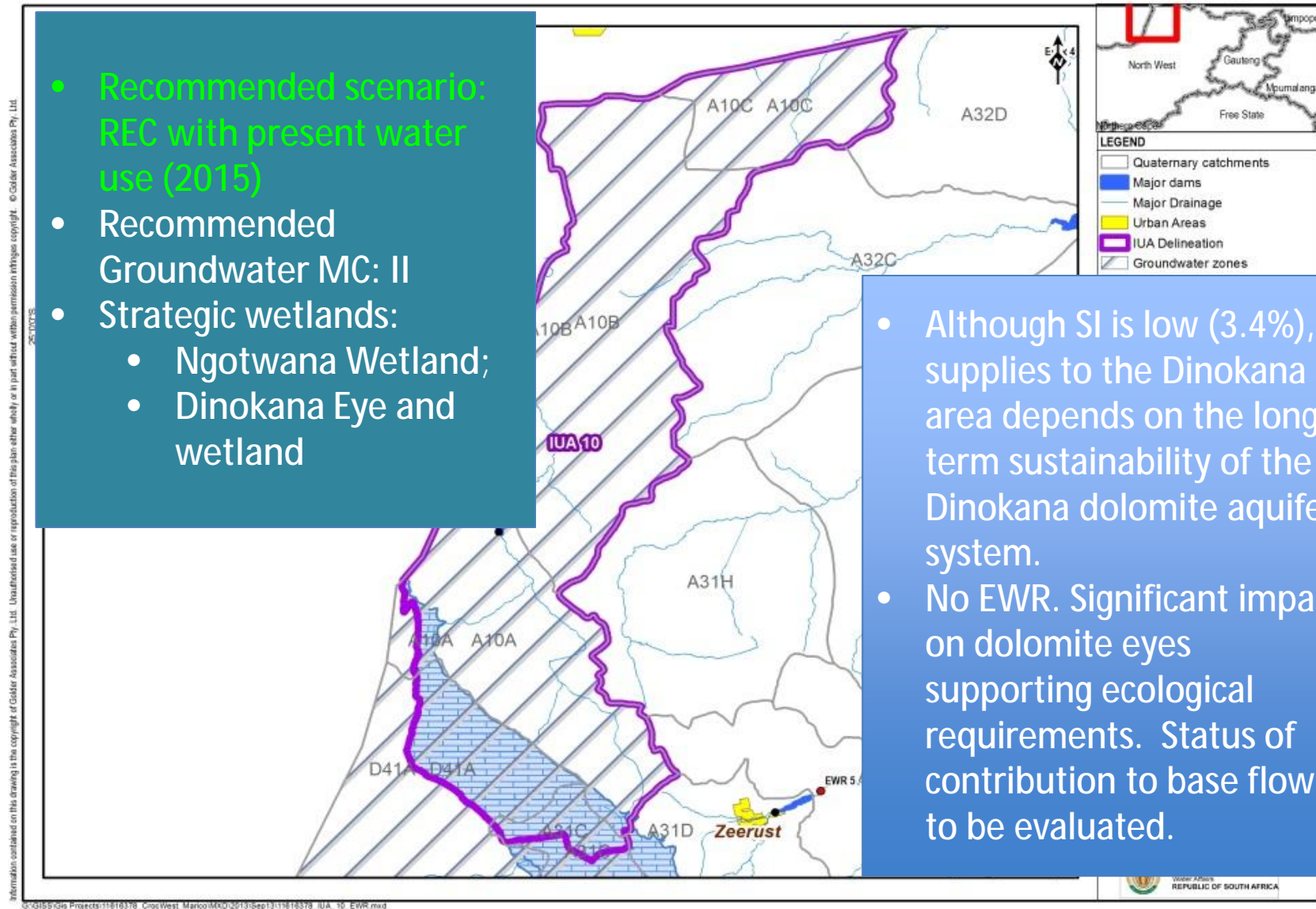
IUA 9- D41A (Other Aqf.)

- Low groundwater use; limited monitoring required.
- ²No EWR: Groundwater contribution to base flow not existing due to deep water table status (a result of low groundwater recharge status).

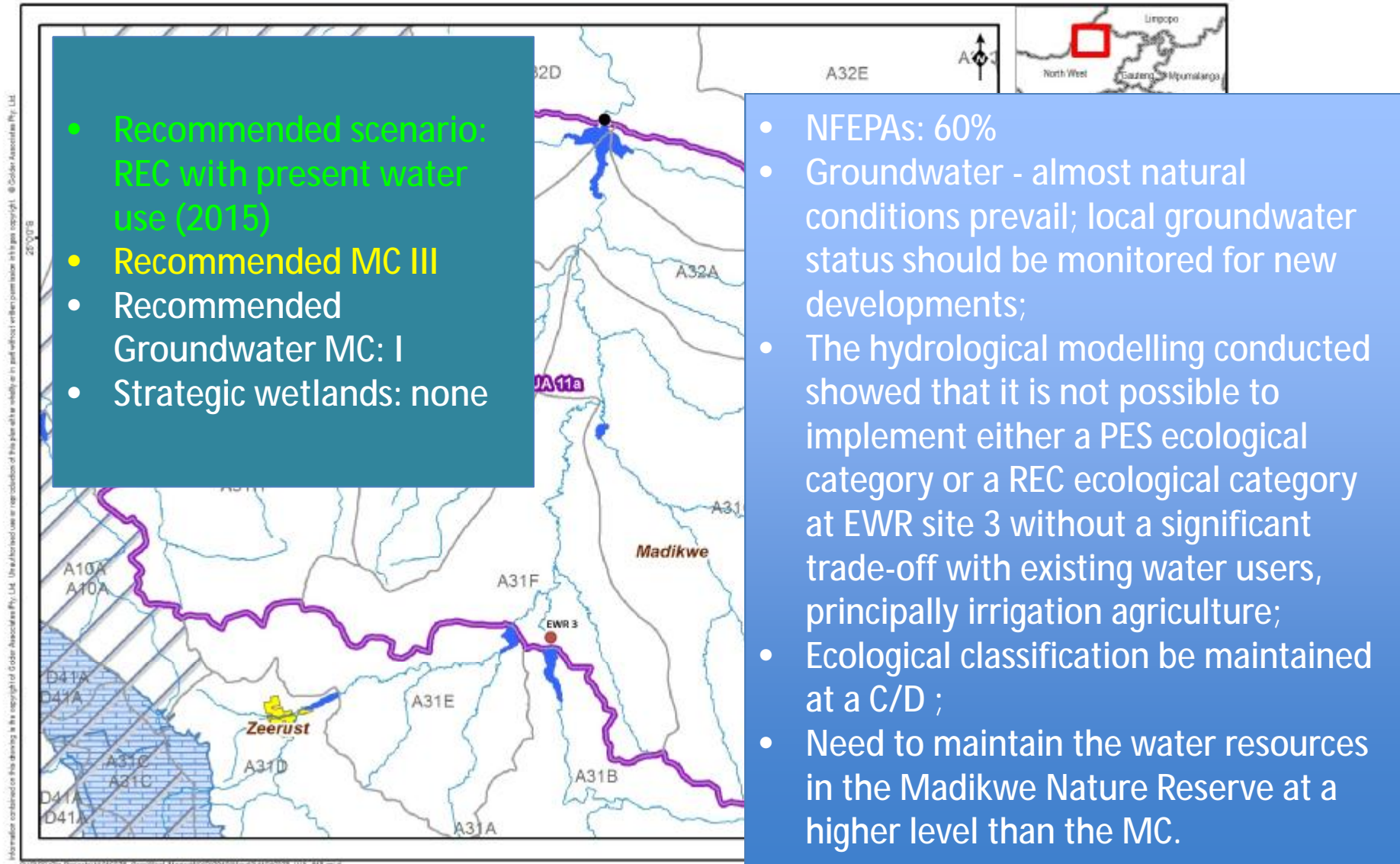
IUA 10: DINOKENG EYE/NGOTWANE DAM

- Recommended scenario: REC with present water use (2015)
- Recommended Groundwater MC: II
- Strategic wetlands:
 - Ngotwana Wetland;
 - Dinokana Eye and wetland

- Although SI is low (3.4%), supplies to the Dinokana area depends on the long-term sustainability of the Dinokana dolomite aquifer system.
- No EWR. Significant impact on dolomite eyes supporting ecological requirements. Status of contribution to base flow to be evaluated.



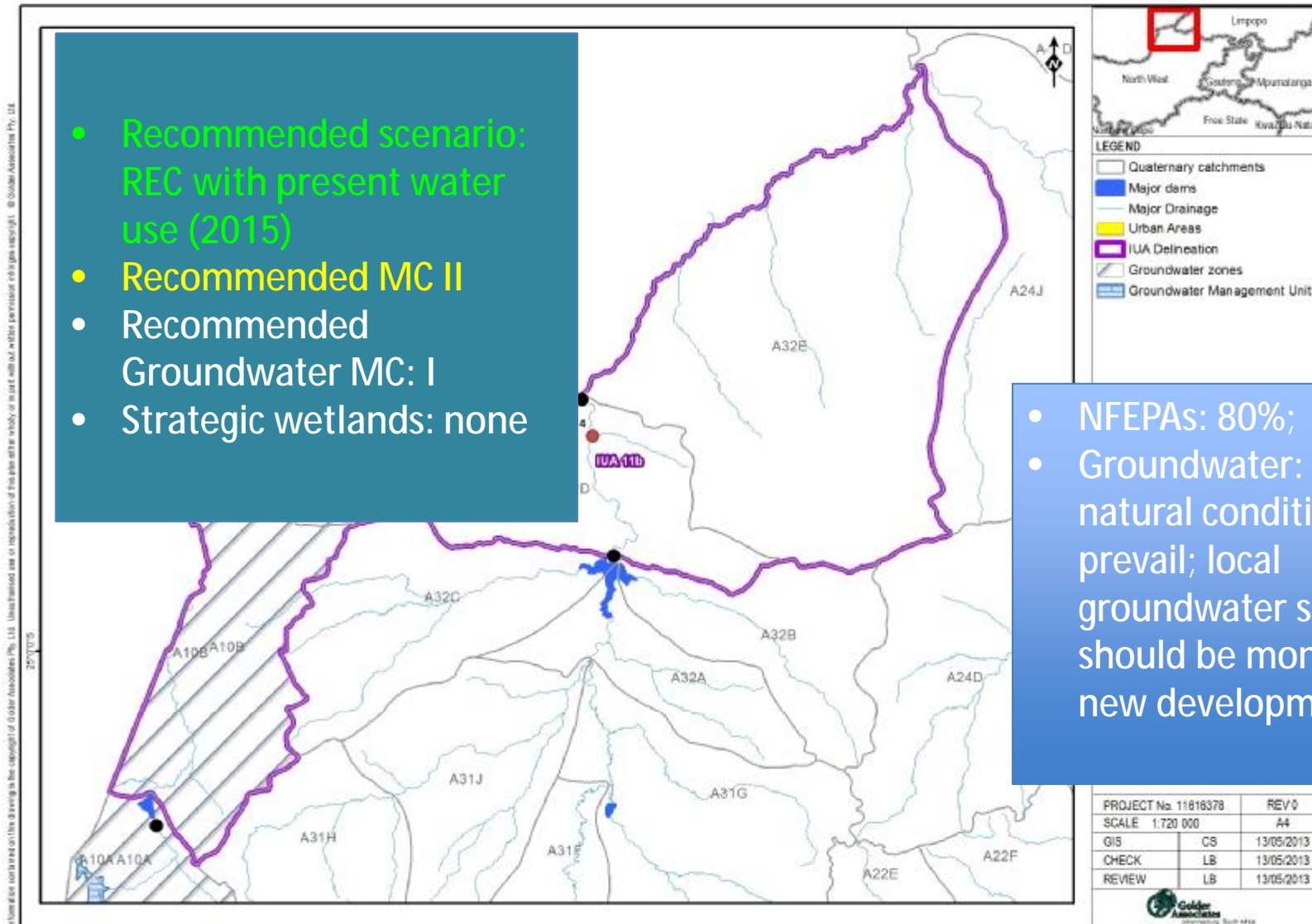
IUA 11a: GROOT MARICO/MOLATEDI DAM



IUA 11b: GROOT MARICO/SEASONAL TRIBUTARIES

- Recommended scenario: REC with present water use (2015)
- Recommended MC II
- Recommended Groundwater MC: I
- Strategic wetlands: none

- NFEPA: 80%;
- Groundwater: almost natural conditions prevail; local groundwater status should be monitored for new developments;





Matlabas Catchment

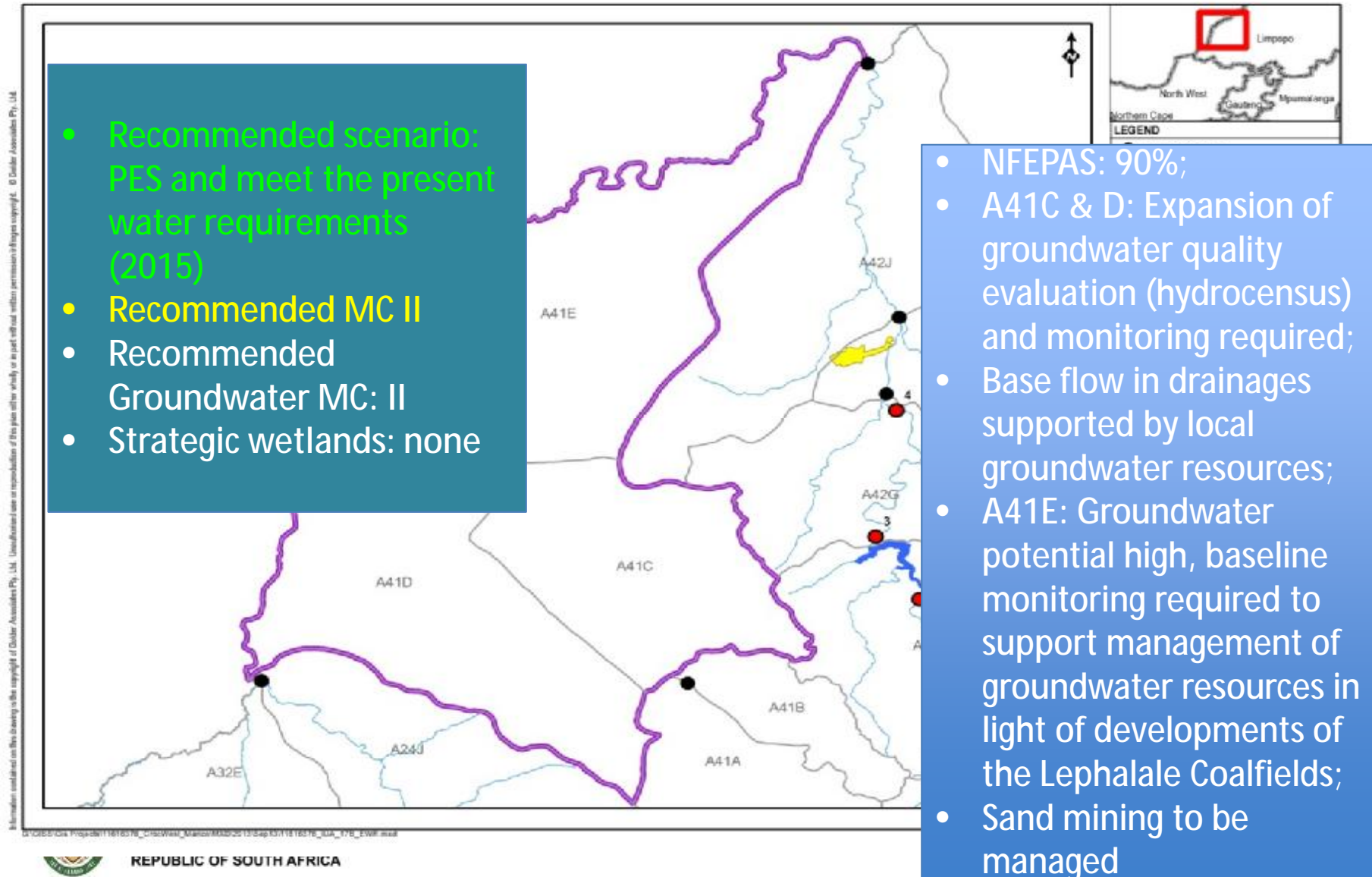


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IUA 17b: MATLABAS





Mokolo Catchment

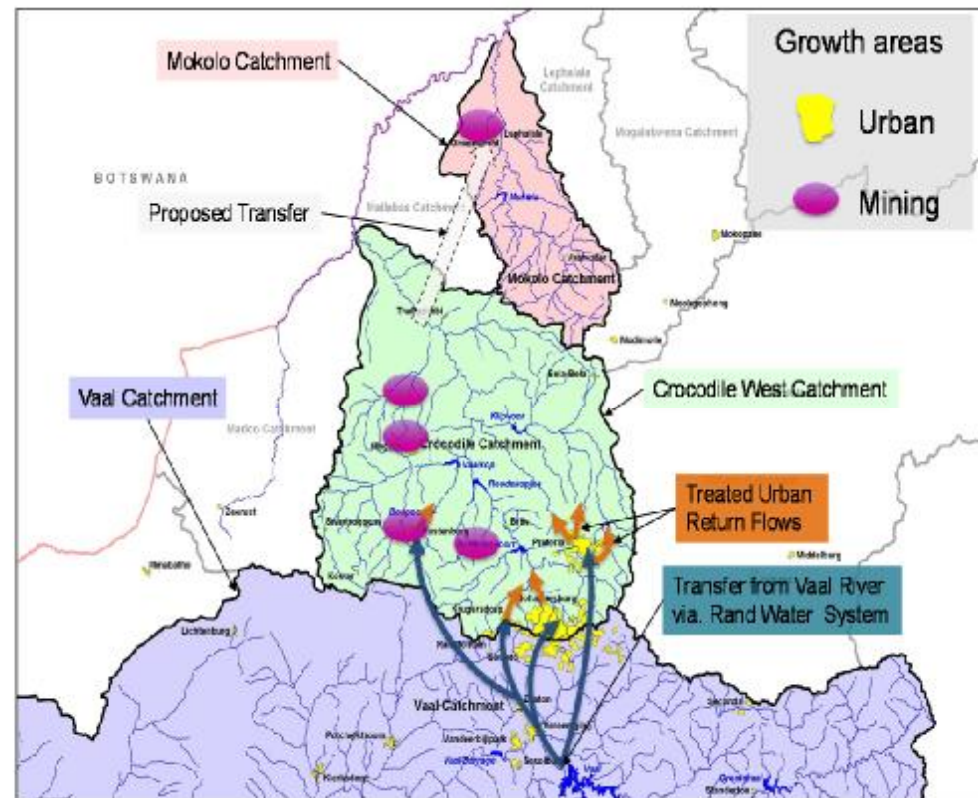


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Constraints to the catchment economy

- Two additional coal-fired power stations after Medupi in Waterberg area;
- Coal mining for power generation as well as export to Mpumalanga;
- More comprehensive attention to coal mining for other purposes;
- Detailed analyses of urban and rural water requirements.



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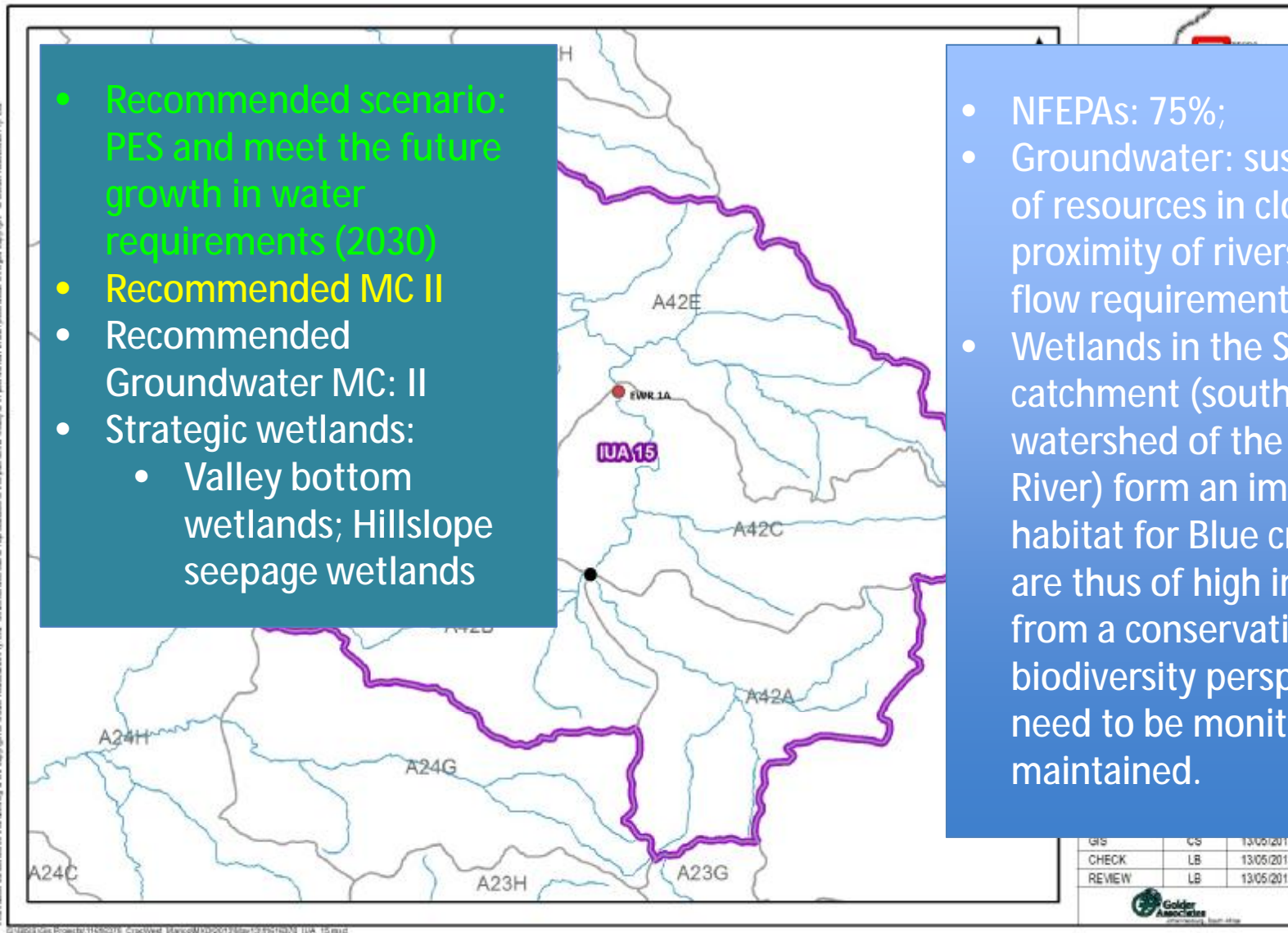
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IUA 15: UPPER MOKOLO

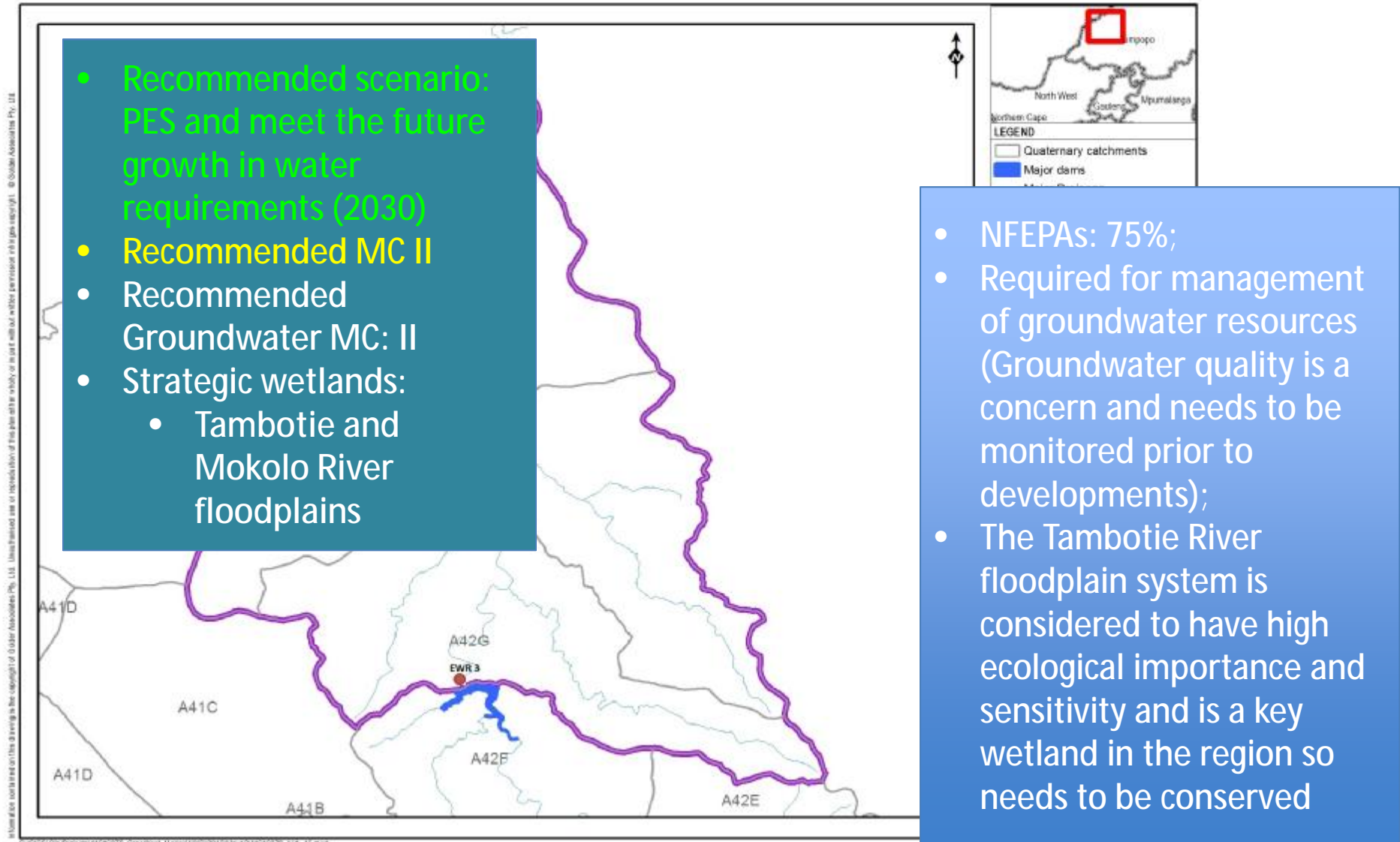
- Recommended scenario: PES and meet the future growth in water requirements (2030)
- Recommended MC II
- Recommended Groundwater MC: II
- Strategic wetlands:
 - Valley bottom wetlands; Hillslope seepage wetlands

- NFEPAs: 75%;
- Groundwater: sustainability of resources in close proximity of rivers with base flow requirements reviewed;
- Wetlands in the Sand River catchment (southern-most watershed of the Mokolo River) form an important habitat for Blue cranes and are thus of high importance from a conservation and biodiversity perspective so need to be monitored and maintained.





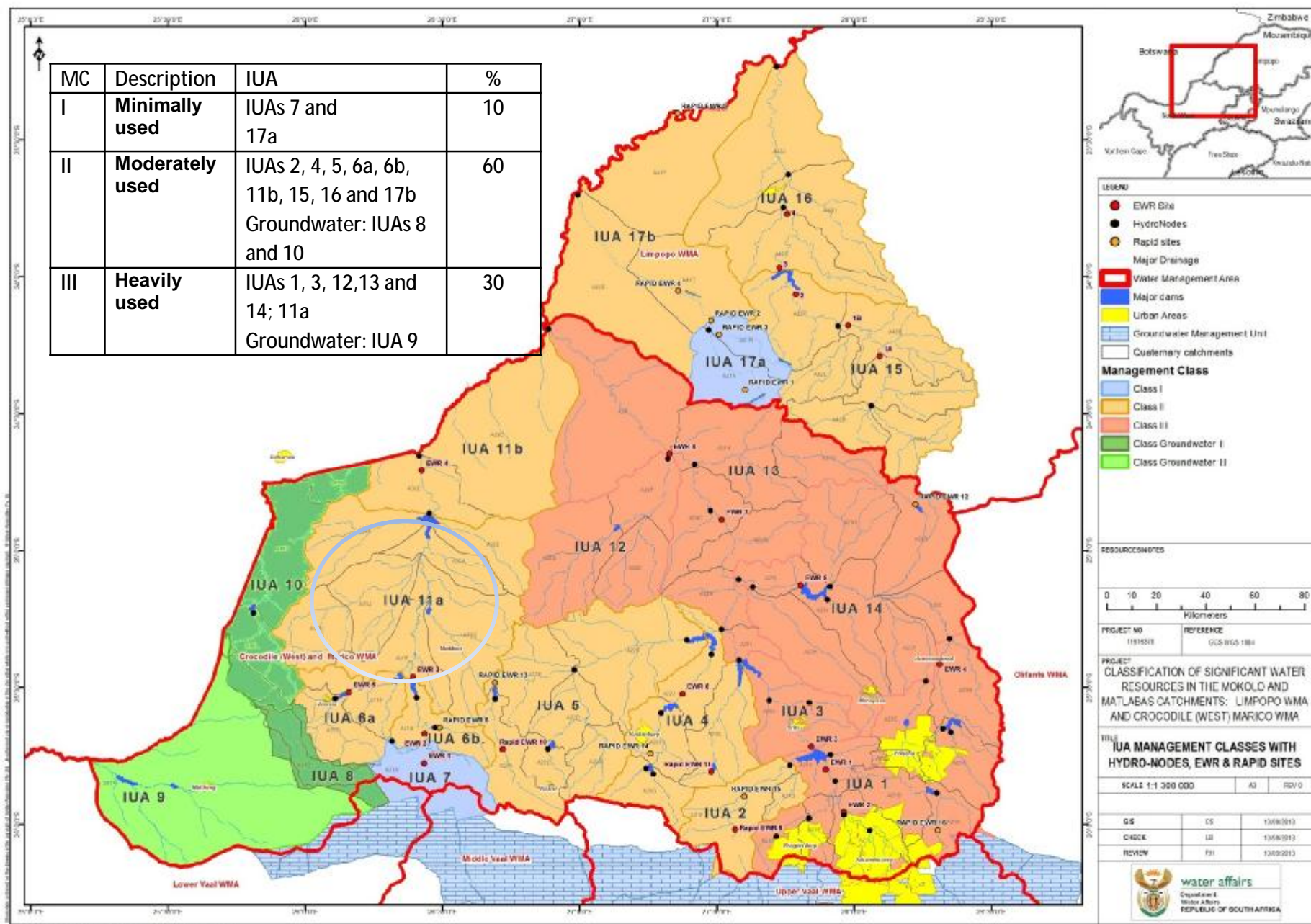
IUA 16: LOWER MOKOLO



- Recommended scenario: PES and meet the future growth in water requirements (2030)
- Recommended MC II
- Recommended Groundwater MC: II
- Strategic wetlands:
 - Tambotie and Mokolo River floodplains

- NFEPA: 75%;
- Required for management of groundwater resources (Groundwater quality is a concern and needs to be monitored prior to developments);
- The Tambotie River floodplain system is considered to have high ecological importance and sensitivity and is a key wetland in the region so needs to be conserved

MC	Description	IUA	%
I	Minimally used	IUAs 7 and 17a	10
II	Moderately used	IUAs 2, 4, 5, 6a, 6b, 11b, 15, 16 and 17b Groundwater: IUAs 8 and 10	60
III	Heavily used	IUAs 1, 3, 12, 13 and 14; 11a Groundwater: IUA 9	30





IMPLICATIONS OF PREFERRED SCENARIO IMPLEMENTATION



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Water quality implications

	IUA	EWR site	Quat	River	PES	EIS	REC	WQ	Changes in water quality expected for recommended scenarios
CROCODILE WEST	1	EWR 1	A21H	Crocodile: Upstream of the Hartbeespoort Dam	D	Mod	D	D	It is not expected that water quality will deteriorate further, rather that with management options relating to improved operation in WWTW (based on the implementation of the Green Drop) as well as the AMD project implementation the water quality can be improved to a C/D category. Water use license conditions should also be reviewed to implement more stringent discharge standards regarding nutrients, in particular phosphorus. A study on the implementation of the waste discharge charge system in relation to phosphate is currently being undertaken in the Upper Crocodile catchment.
		EWR 2	A21C	Jukskei: Heron Bridge School	E	Mod	D	D	
		EWR 4	A23B	Pienaars: Downstream of Roodeplaat Dam	C	High	C	B/C	It is possible that the water quality may deteriorate at this point due to potential lower levels in the dams to support the MCWAP transfer project.
		EWR 16	A21A	Rietvlei upstream Rietvlei Dam	C	Low	C	D	It is not expected that water quality will deteriorate further, however it will be difficult to improve it from a D. Improved storm water management within the industrial and urban areas could help.
	2	EWR 9	A21F	Magalies: Downstream of Malony's Eye	B	V High	B	B	No changes expected.
		EWR 15	A21F	Lower Magalies before confluence with Skeerpoort	C/D	Low	C/D	C	
	3	EWR 3	A21J	Crocodile: Downstream of Hartbeespoort Dam in Mount Amanzi	C/D	High	C/D	D	Water quality is not expected to deteriorate and may improve if the water entering the dam improves as described for IUA 1, however if the dam levels is maintained at lower levels because of the MCWAP transfer some water quality impacts may be seen
	4	EWR 6	A22J	Hex: Upstream of Vaalkop Dam	D	Mod	D	C/D	No changes expected.
		EWR 11	A21K	Sterkstroom: Upstream Buffelspoort Dam	C	High	C	C	
		EWR 14	A22H	Waterkloofspruit downstream Rustenburg Nature Reserve	B/C	Low	B/C	B	
	5	EWR 10	A22A	Elands: Upstream Swartruggens Dam	C	High	B/C	C	No changes expected.
		EWR 13	A22E	Elands downstream Lindleyspoort Dam	C	Low	C	C	
	14	EWR 5	A23J	Pienaars/Moretele: Downstream of the Klipvoor Dam in Borakalalo National Park	D	High	C	C/D	No changes expected.
		EWR 12	A23G	Buffelspruit before confluence with Plat	B/C	Mod	B/C	B	
	13	EWR 7	A24C	Crocodile: Upstream of the confluence with the Bierspruit	D	Mod	D	D	No changes expected. An improvement is difficult at this point due to the low flows.
		EWR 8	A24H	Crocodile downstream the confluence with Bierspruit in Ben Alberts Nature Reserve	C	Mod	C	C	No changes expected.



Water quality implications (2)

	IUA	EWR site	Quat	River	PES	EIS	REC	WQ	Changes in water quality expected for recommended scenarios
MARICO	7	EWR 1	A31A	Kaaloog-se-Loop: Below gorge	B	V High	B	A/B	No changes expected.
		EWR 2	A31B	Groot Marico: Upstream confluence with Sterkstroom	B	V High	B	B	No changes expected.
	11a	EWR 3	A31F	Groot Marico: Downstream Marico Bosveld Dam	C/D	High	C/D	B/C	No changes expected.
	11b	EWR 4	A32D	Groot Marico: Downstream Tswasa Weir	C	High	C	B	No changes expected.
	6a	EWR 5	A31E	Klein Marico Downstream Klein Maricopoort Dam	C	Mod	C	C	Increased development may impact on the Klein Marico, however improved management of WWTW and sewer surcharges can maintain the category as a C.
	6b	EWR 6	A31B	Polkadraaispruit before confluence with Marico	B/C	Mod	B	C	No changes expected.
MOKOLO	15	EWR 1a	A42C	Mokolo at Vaalwater	C/D	High	B	B	No changes expected
		EWR 1b	A42E	Mokolo at Tobacco	B/C	High	B	B	
		EWR 2	A42F	Mokolo at Ka'ingo	B/C	V High	B	B	
	16	EWR 3	A42G	Mokolo below Mokolo Dam in the Gorge	B/C	V High	B	B	Flows in the catchment are variable, with reductions in low and moderate flows, and unseasonal releases from Mokolo Dam having an impact on water quality. Increased urbanisation, mining and power stations development may have an impact on the category B and stringent conditions must be included in all IWULs to ensure water quality is maintained as a category B.
		EWR 4	A42G	Mokolo: Malalatau	C	V High	B	B	
MATLABAS	17a	EWR 1	A41A	MatlabasZynKloof	B	V High	A	B	No changes expected. Increased TDS because of scouring of the transfer pipe where it crosses the Matlabas is possible. Strict measures must be put in place to maintain the category B.
		EWR 2	A41C	Matlabas at Haarlem East (A4H004)	C	High	B/C	B	
		EWR 3	A41B	Mamba River Bridge	B/C	Mod	B/C	B	
	17b	EWR 4	A41C	Matlabas at Phofu	B	Mod	B	B	





Socio-economic implications



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Crocodile West catchment

GDP/ IUA	Crocodile-West GDP Baseline - Adjusted for Aquatic ecosystem services (2012)	Crocodile-West GDP ESBC - Adjusted for Aquatic ecosystem services (2012)	Crocodile-West GDP Scenario 3 - Adjusted for Aquatic ecosystem services (2030)	Crocodile-West Ecosystem Services Baseline - (2012)	Crocodile-West Ecosystem Services ESBC - (2012)	Crocodile-West Ecosystem Services Scenario 3 - (2030)
IUA 1	553,146	570,320	725,087	722	722	722
IUA 2	2,167	2,235	2,841	47	47	47
IUA 3	12,123	12,499	15,891	318	318	318
IUA 4	26,195	27,009	34,338	645	645	645
IUA 5	7,985	8,233	10,467	107	107	107
IUA 12	3,554	3,664	4,659	112	112	112
IUA 13	3,583	3,694	4,697	262	262	262
IUA 14	36,397	37,527	47,710	324	324	324



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Marico catchment

GDP/IUA	GDP Baseline - Adjusted for Aquatic ecosystem services (2012)	GDP ESBC - Adjusted for Aquatic ecosystem services (2012)	Klein Marico GDP Scenario 3 - Adjusted for Aquatic ecosystem services (2030)	Groot Marico GDP Scenario 3 - Adjusted for Aquatic ecosystem services (2030)
IUA 6a – Klein Marico	856	856	856	856
IUA 6b – Groot Marico	367	367	367	367
IUA 7- Groot Marico	145	145	145	145
IUA 8 – Klein Marico	110	110	110	110
IUA 9 - Ngotwane	10,944	10,944	10,944	10,944
IUA 10 - Molopo	897	897	897	897
IUA 11a - Groot Marico	1,844	1,844	1,844	1,844
IUA 11b - Groot Marico	612	612	612	612

GDP/IUA	Klein Marico Ecosystem Services Baseline - (2012)	Klein Marico Ecosystem Services ESBC - (2012)	Klein Marico Ecosystem Services Scenario 2 - (2030)	Groot Marico Ecosystem Services Scenario 2 - (2030)
IUA 6a – Klein Marico	457	457	457	457
IUA 6b – Groot Marico	546	546	546	546
IUA 7 - Groot Marico	335	335	335	335
IUA 8 – Klein Marico	285	285	285	285
IUA 9 - Ngotwane	23	23	23	23
IUA 10 - Molopo	180	180	180	180
IUA 11a - Groot Marico	270	270	270	270
IUA 11b - Groot Marico	61	61	61	61



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Mokolo and Matlabas catchments

GDP/IU A	GDP Baseline - Adjusted for Aquatic ecosystem services (2012)	GDP ESBC - Adjusted for Aquatic ecosystem services (2012)	Mokolo GDP Scenario 1 - Adjusted for Aquatic ecosystem services (2030)	Mokolo Ecosystem Services Baseline - (2012)	Mokolo Ecosystem Services ESBC - (2012)	Mokolo Ecosystem Services Scenario 1 - (2030)
IUA 15	686	686	686	234	234	234
IUA 16	3,180	3,180	9,888	54	54	54

GDP/IU A	GDP Baseline - Adjusted for Aquatic ecosystem services (2012)	GDP ESBC - Adjusted for Aquatic ecosystem services (2012)	Matlabas Ecosystem Services Baseline - (2012)	Matlabas Ecosystem Services ESBC - (2012)
IUA 17a	176	176	58	58
IUA 17b	213	213	427	427



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CROCODILE WEST CATCHMENT

Preferred Scenario: Ecological category = REC + future water use as per the Crocodile-West Reconciliation Strategy

IUA	Catchment area	MC associated with preferred scenario	Implications of implementation
1	Upper Crocodile/Hennops/Hartebeespoort	III	<p>Future Water Requirements driven by:</p> <ul style="list-style-type: none"> • Future urban expansion in Gauteng, leading to significantly increased return flows; • Additional future mining activities in the Rustenburg area, primarily related to platinum mining; • Future water use requirements around Lephalale, which would necessitate a water transfer from the Crocodile directly to Lephalale <ul style="list-style-type: none"> • Water supply, does not constrain the future growth and development of the economy, with the exception of agriculture. • The Recommended (REC) ecological category for the Crocodile West catchment is achievable. • From 2018 onwards, the augmentation of the water supply system through using the surplus water stored in dams, would start reducing dam water levels in especially the Hartbeespoort Dam, Roodeplaat Dam and Rietvlei Dam during the dry winter seasons. • There are potential future costs associated with the treatment of AMD and nutrient loads in the Crocodile West River.
2	Magalies	II	
3	Crocodile/ Roodekopjes	III	
4	Hex/Waterkloofspruit/Vaal kop	II	
5	Elands/Vaalkop	II	
12	Bierspruit	III	
13	Lower Crocodile	III	
14	Tolwane/Kulwane/Moretele/Klipvoor	III	



MARICO CATCHMENT

IUA	Catchment area	MC associated with scenario	Implications of implementation
6a	Klein Marico/Kromellemboog	II	<p>Preferred Scenario: Ecological category = REC + present water use.</p> <p>Future water use and river flows are driven by:</p> <ul style="list-style-type: none"> Possible future urban expansion in towns, leading to marginal increased demands for domestic water No large scale additional future use is envisaged and additional future water uses are to be achieved through water demand management and well planned and managed groundwater supply schemes.
6b	Groot Marico/Marico Bosveld Dam	II	<p>Preferred Scenario: PES, AIP clearing, present water use (incl emerging farmers)</p> <p>No additional significant future water supply is possible in the Groot Marico.</p> <p>The key water source here is the dolomitic outflow, and this supply is current used at a maximum rate, both in the Groot Marico and towards the south towards Lichtenburg.</p> <p>Preferred Scenario: ESBC: Ecological = PES, present water use</p> <ul style="list-style-type: none"> Groundwater supply adequate
11a	Groot Marico/Molatedi Dam	III	
11b	Groot Marico/seasonal tributaries	II	
7	Kaaloog-se-Loop	I	
8	Malmaniesloop	III	
9	Molopo	II	
10	Dinokeng Eye/Ngotwane Dam	III	



MOKOLO CATCHMENT

Preferred Scenario: Scenario 1: PES, future water use (groundwater abstraction, transfer of water to Mokolo – MCWAP)

IUA	Catchment area	MC associated with scenario	Implications of implementation
• MOKOLO CATCHMENT			
15	Upper Mokolo	II	<ul style="list-style-type: none"> The Lephalale area is forecast to experience a very significant growth in coal mining, power generation and industrial economic activity. This will not directly affect the Mokolo River; The water required for this expansion is significant.
16	Lower Mokolo	II	<ul style="list-style-type: none"> These water requirements are to be met through a water transfer from the Crocodile West River, directly to the Lephalale. Extensive coal mining IUA 16 could affect aquifers and could lead to AMD in future; and The aesthetic appeal of IUA 16 may be negatively affected.



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**Thank you for participation
throughout the WRCS process**



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