

water & sanitation

Department: Water and Sanitation REPUBLIC OF SOUTH AFRICA

DEVELOPMENT OF THE RECONCILIATION STRATEGY FOR THE LIMPOPO WATER MANAGEMENT AREA (WMA) NORTH

Study Steering Committee (SSC) Meeting No. 2

18 August 2015

AGENDA ITEMS

- **1. Welcome and introduction**
- 2. Attendance and apologies
- 3. Acceptance of the agenda
- 4. Approval of SSC 1 Minutes
- **5. Matters arising from SSC 1**
- 6. Status and recap since the previous meeting
- 7. Progress on study tasks
- 8. Screening of intervention options



AGENDA ITEMS

9. SSC Terms of Reference feedback

10. Confirmation of Limpopo WMA North SSC membership

11. Discussion and comments

12.General

13.Way forward

14.Date of next meeting



ITEM 1: Welcome, introduction and purpose of meeting



TEAM INTRODUCTION

Chair: Mr Tendani Nditwani

• DWS

- Study Manager: Mr Tendani Nditwani
- Deputy Study Manager: Mr Witold Jeżewski

PSP: AECOM

- Study Leader: Mr Johan Rossouw (supported by Ms Hermien Pieterse)
- Technical Leader: Mr Gerald de Jager (Supported by Specialists and Technical Team)
- Stakeholder Participation: Ms Anelle Lotter and Ms Sibongile Bambisa

GENERAL ARRANGEMENTS

- Safety moment
- Facilities
- Tea, coffee and lunch
- Meeting arrangements
 - Introduction of attendees
 - Discussions and questions times indicated on Agenda

PURPOSE OF THIS MEETING

- Strengthen partnership between DWS and Key Stakeholders
- Update stakeholders on the progress of the study
- Screen possible intervention options
- Identify preferred options

Sand

Lephalala

Mokolo

Matlabas

Mogalakwena

Nzhelele

ITEM 2: Attendance and apologies

Nzhelele Dam

ATTENDANCE REGISTER

Attendance register distributed

- Please return to Ms Sibongile Bambisa (Jones & Wagener)
- Apologies
 - Please provide

ITEM 3: Acceptance of agenda

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wanedi River

ITEM 4: Approval of SSC 1 minutes

Limpopo River

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ITEM 5: Matters arising from SSC 1

Mapungubwe Nature Reserve

ITEM 6: Status and recap since the previous meeting

Mapungubwe Nature Reserve

WHAT IS A RECONCILIATION STRATEGY?

- <u>Strategy or plan</u> to ensure current and future water
 <u>requirements are in balance</u> with <u>available</u> water resources
 over planning period
- Basic assessments answering the following questions:
 - Is water availability adequate to meet water requirements?
 - Do we at this stage/time already need to make provision or plan for interventions?
 - What can be done to <u>balance</u> water requirements and water resources availability?

STUDY AREA



STUDY AREA – DISTRICT MUNICIPALITIES



STUDY AREA – LOCAL MUNICIPALITIES



ORGANISATIONAL ARRANGEMENTS



ROLES AND RESPONSIBILITIES OF SSC

- Provide executive support and guidance to the <u>direction</u> and <u>outcomes</u> of Strategy
- <u>Share information and data or facilitate the sharing of data</u>
- Facilitate strategic <u>linkages</u> with other stakeholders
- Studying of status reports and giving <u>comments</u> on findings
- Providing <u>strategic advice</u> to ensure that the national perspectives on water management are maintained
- Acting as <u>advocates</u> for the Strategy
- Provide <u>feedback</u> to their organisations

Refer to Draft Terms of Reference

SUMMARY OF THE MINUTES OF SSC1

Main comments:

- Irrigated areas in total have declined reference to V&V study
- A representative of the irrigation sector (Agri Limpopo) requested to present at the next SSC
- Groundwater recharge to be included as an intervention option
- Investigate potential environmental impacts due to groundwater use
- Investigate groundwater pollution mitigation measures
- All sectors should focus on water conservation
- Consider placing a moratorium on water use for any new developments such as mining
- Consider to re-use acid mine drainage (AMD) water
- Limpopo WMA North Water Resources Classification study will start soon



ITEM 7: Progress on study tasks

Downstream of Glen Alpine Dam

TASKS AND PROGRESS

Task	Description	State	us			
Task 1	Summary of previous and current studies/ Literature Review	Final report to be signed	98%			
Task 2	Hydrological Analysis	Draft report submitted	95%			
Task 3	Current and Future Water Requirements and Return Flows	Draft report submitted	85%			
Task 4	Water Conservation and Water Demand Management	Draft report in progress	50%			
Task 5	Opportunities for Water Reuse	Draft report in progress	50%			
Task 6	Invasive Alien Plants (IAP)	Complete	100%			
Task 7	Water Quality Assessment	Draft report in progress	70%			
Percentage complete						

Percentage incomplete

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TASKS AND PROGRESS

Task	Description	Status					
Task 8	Reserve Requirement Scenarios	In progress	15%				
Task 9	Groundwater Utilisation Scenarios	Draft report in progress	60%				
Task 10	International Obligations	Draft report in progress	50%				
Task 11	Yield Analysis (WRYM)	Draft report in progress	9 75%				
Task 12	Water Quality Modelling (WQT)	Draft report in progress	1 75%				
Task 13	Planning Analysis (WRPM)	Initiated	5%				
Task 14	Review Schemes and Update Cost Estimates	In progress	45%				
Percentage complete Percentage incomplete							

TASKS AND PROGRESS

Task	Description	Statu	JS
Task 15	Review or Assess Social and Environmental Impacts	Not started	0%
Task 16	Assembly of information and formulation of Scenarios	Initiated	95%
Task 17	Stakeholder Engagement and Public Participation	SSC 2 in progress	40% 60%
Task 18	Training and Capacity Building	In progress	40% 60%

Percentage complete

Percentage incomplete

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Irrigation

Presented by: Mr Antonie van Staden

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Socio economic perspective on future water requirement

Presented by: Mr Glen Steyn

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PURPOSE

- To understand socio-economic conditions in the project area and estimate residential water requirements
- Information is derived from Stats SA, DWS and official planning reports
- Irrigation is considered elsewhere
- Findings are presented for the six different catchments

DEMOGRAPHICS

Catchment	DMs	LMs No. o Ward	No. of	No. of Wards Settlements		2011 Pop	2011 Pop
			warus	DWS	SSA	DWS	SSA
Lephalala	Capricorn & Waterberg	Blouberg Lephalale	7	39	17	62 776	52 802
Mokolo	Waterberg	Lephalale Modimolle	6	7	5	47 649	61 882
Mogalakwena	Capricorn & Waterberg	Blouberg Aganang Mogalakwena Mookgopong Modimolle	71	310	268	655 836	547 349
Nzhelele	Vhembe	Musina Mutale Thulamela Makhado	18	162	135	213290	258 027
Sand	Vhembe & Capricorn	Musina Makhado Blouberg Molemole Aganang Polokwane	79	363	288	962 041	977 604
Matlabas	Waterberg	Lephalale Thabazimbi Modimolle	5	0	0	0	0
Total		13	186	881	713	1 941 592	1897 664

DEMOGRAPHICS



POPULATION GROWTH

Catchment	Planning Pop: 2011	Ave Annual Pop Grow Rate 2011-2020 %	Ave Annual Pop Grow Rate 2021-2030 %	Ave Annual Pop Grow Rate 2031-2040 %
Lephalala	65 658	0.46	0.49	0.49
Mokolo	68 238	1.66	1.64	1.74
Mogalakwena	606 499	0.18	0.22	0.50
Nzhelele	200 027	0.51	0.53	0.58
Sand	1 025 167	1.28	1.10	1.30
Total	1 965 588	0.85	0.79	0.94

WATER SERVICE LEVELS

Service Level	Lephalala	Mogalakwena	Mokolo	Nzhelele	Sand	Total	Level %
Total	13 387	138 707	15 833	64 825	268 935	502 080	100.0
HHs Below RDP %	14.6	17.4	10.0	33.0	15.9	18.3	18.3
Inside Dwelling %	9.9	18.5	50.8	15.3	27.7	23.8	23.8
Yard Connections %	28.8	44.0	33.2	24.3	38.0	37.4	37.4
Street tap <200m %	46.7	20.5	5.9	27.4	18.4	20.5	20.5

WATER SERVICE LEVELS



RESIDENTIAL WATER REQUIREMENTS

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Year	Indicator	Home Conn	Yard Conn	Communal	Total
2011	Planning Population	467 810	744 958	752 820	1 965 588
25%	Level of service	0.238	0.379	0.4	1.0
water	Consumption Rate {/p/d	200	80	60	
losses	Total Residential Requirement mcm/a	49.5	31.5	23.9	105.0
	Annual Pop Growth Rate %: 2011-2020				1
2020	Level of service	0.22	0.515	0.265	1
ZZ% water	Planning Population	465 476	1 089 636	560 687	2 115 799
losses	Consumption Rate {/p/d	200	80	60	
	Total Residential Requirement mcm/a	48.3	45.2	17.4	110.9
	Annual Pop Growth Rate %: 2021-2030				1
2030	Level of service	0.2	0.615	0.185	1
ZU% water	Planning Population	456 590	1 404 014	422 346	2 282 950
losses	Consumption Rate l/p/d	200	90	60	
	Total Residential Requirement mcm/a	46.7	64.6	12.9	124.2
	Annual Pop Growth Rate %: 2031-2035				1
2040	Level of service	0.2	0.7	0.1	1
vater losses	Population	499 467	1 748 134	249 733	2 497 335
	Consumption Rate {/c/d	200	90	60	
	Total Residential Requirement mcm/a	50.3	79.2	7.5	137.1
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HOUSEHOLD AFFORDABILITY


SUMMARY

- Project area population is approximately 2 million people in 2011, growing to 2.5 million in 2040
- Sand catchment represents 51% of the population and Mogalakwena 29%
- Residential water requirement is estimated to increase from <u>105 million m³/a</u> in 2011 to <u>137 million m³/a</u> in 2040
- Projection is sensitive to water loss reduction assumptions, but planning information is inadequate
- Sanitation is far below RDP standards, but water implications for upgrading have not yet been included

ITEM 8: Screening of intervention options

Mutshedzi Dam

METHODOLOGY OVERVIEW

- Identify intervention options and measures from previous studies
- **Prepare Starter Document** *Distributed to SSC members*
- Screening workshop (SSC 02)
- Identify advantages and disadvantages based on current knowledge
- Undertake strategy level comparisons of preferred options
 - Costs
 - Environmental and socio economic impacts
 - Engineering feasibility
 - Yield potential / requirement reduction
- Formulate scenarios to balance water requirements and availability until 2040
- Reconciliation Strategy

SCREENING WORKSHOP OBJECTIVES

- Present and discuss the list of intervention measures as obtained from previous studies
- Add additional intervention options
- Select preferred options / intervention measures to be further evaluated
- Obtain consensus within SSC on:
 - Options to evaluate
 - Level of further investigation

TYPICAL INTERVENTIONS

- Management interventions
 - WC/WDM
 - Eliminating unlawful water use
 - Optimal system operation
 - Removal of IAPs
 - Transfer of water allocations (Section 25 of Water Act)
 - Compulsory licensing
- Infrastructure development
 - Groundwater development
 - Water re-use (wastewater reclamation)
 - Augmentation schemes (e.g. inter-catchment transfers)
 - Surface water development (e.g. storage, river abstractions)



Water conservation and water demand management (WC/WDM)



WHAT IS WC/WDM?



Water Resource Management



Distribution Management



Consumer Demand Management



Return Flow Management



Water quality management Customer education - reduce wastage Rehabilitation of water source Storage optimisation



Pressure management Metering: water balance per zone, inaccuracies, smart meters O&M of assets: ageing infrastructure Loss reduction: leakages, inspections



Retro-fitting

Effective billing: billing, collections

Policy and regulation enforcement: free basic water, indigent register



Minimising infiltration Minimising pollution

Eliminating unlawful water use



ELIMINATING UNLAWFUL WATER USE

- Concern in the Study Area
- Total ESTIMATED unlawful irrigation use > 21 million m³/a



Actual unlawful irrigation water use to be verified as part of

Validation and Verification Study

Groundwater development

Limpopo River

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WATER LEVELS 1960 - 1979



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WATER LEVELS 1980 - 1989



WATER LEVELS 1990 - 1994



WATER LEVELS 1995 - 1999



WATER LEVELS 2000 +



GROUNDWATER EXPLOITABLE POTENTIAL



CURRENT UTILIZATION (% OF EXPLOITABILITY)



Water re-use opportunities



WwTW LOCATION, CRITICAL RISK RATING (CRR) AND CAPACITY



OVERVIEW OF QUALITY AND QUANTITY

Description	Number
Total number of WwTW in study area	21 plants
Total capacity	81 Mℓ/d (29.4 million m³/a)
Total number of WwTW with river discharge	13 plants
Return flows	81.5 Mł/d (29.7 million m³/a)
Number of plants < 2 Mł/d	11
Number of plants 2-6 Ml/d	6
Number of plants > 6 Mł/d	4
70 - 100% high to critical risk	13
50 - <70% medium risk	5
0 - <50% low risk	3

* Only WwTW within Limpopo WMA North

RECOMMENDATIONS

- Most WwTW in study area are small or medium sized plants (< 6 Ml/d) and in remote/rural areas
- Lack of effective O&M: Poor Cumulative Risk Rating (CRR)/Green Drop scores
- Construction and lifecycle cost of advanced processes are very high (short lifecycle if there is lack of maintenance)
- Industries and mines can use advanced technologies to produce process water
- Sustainable solution is to upgrade current WwTW, operate and maintain to produce good quality effluent

Catchment-specific interventions

Mapungubwe Nature Reserve

MATLABAS RIVER CATCHMENT



MATLABAS INTERVENTION OPTIONS

Intervention option	Supply Area	Volume (million m ³ /a)	Implementation time			
Approved / definite intervention options						
MCWAP	 Temo coal mine Thabametsi coal mine Waterberg JV 	± 31	2021			
MBET*	 Boikarabelo Coal Mine and Power Station 	5.8	2018			
Other possible intervention options						
Groundwater	 Boikarabelo Coal Mine and Power Station 	0.2 - 1 2018				
development	Glenover MineDomestic water requirements	To be further investigated by study team.				
WC/WDM	M Not considered viable – very little domestic water requirements and new industrial operations will incorporate efficient water use.					
* Managen Deille nah ala Effluen (Transform						

* Marapong-Boikarabelo Effluent Transfer

MOKOLO RIVER CATCHMENT



MOKOLO INTERVENTION OPTIONS

Intervention option	Supply Area	Volume (million m ³ /a)	Implementation time/ comments
Planned/approved interver	ntion options		
MCWAP	 Medupi Power Station Steenbokpan coal mines Domestic (Lephalale and Steenbokpan) 	Phase-1: 29 Phase-2A: 100	Phase-1: 2015 Phase-2A: 2021
Other possible interventio	n options		
WC/WDM	DomesticIrrigation	10-20% 5%	Phased in over 5-10 years
Eliminating unlawful use & compulsory licensing	Irrigation	± 2	3-4 years
Groundwater development	 Domestic water requirements 	To be further investigate	ed by study team.
Raising Mokolo Dam	 Lephalale and environs 	Raise 12 m: 17 Raise 15 m: 22	Technical and costs issues
Water allocation transfer (Section 25)	Domestic	Refer to Section 25 of the Legal issues/constraints	ne Water Act.

MOKOLO RIVER CATCHMENT

WATER BALANCE (domestic, industrial & mining)





LEPHALALA INTERVENTION OPTIONS

Intervention option		Supply Area	Volume (million m ³ /a)	Implementation time/comment
Possible intervention	optio	ons		
WC/WDM	• [Domestic (rural) Irrigation	1-2% 5%	Phased in over 5-10 years
Eliminating unlawful use & compulsory licensing	•	Irrigation	± 5.2	3-4 years
Groundwater development	• (Ga- Phahladira cluster area Ga-Seleka area	> 1.24	To be further investigated by study team.
Removal of invasive alien plants (IAP)	• [Domestic/irrigation	< 1.2	IAPs reduce stream flow. If removed, increase in stream flow does not relate to available yield.
Increased river abstraction	• [Domestic	Only recommendation – to be further investigated by study team.	
Surplus water from the ORWRDP 2B (via Pruissen)	• [Domestic	Only recommendation expected. ORWRDF later stage to determ	on – at this stage no surplus water 9 water requirements to be revised at nine if surplus water is available.



MOGALAKWENA INTERVENTION OPTIONS

Intervention option	Supply Area	Volume (million m ³ /a)	Implementation time/comment	
Planned/approved interv	ention options			
Magalies Water Transfer	Modimolle & Mookgopong	8.5	2018 Water to be transferred from Klipvoor Dam	
ORWRDP 2B and 2G	 Mokopane area (Mogalakwena LM and mines) 	56	2015-2020 Water to be transferred from Flag Boshielo Dam	
Aganang Bulk Water Supply Scheme	Aganang East supply area	3.7	2015/2016 Phase 1: Groundwater development Phase 2: ORWRDP distribution	
Water allocation transfer (Section 25)	 Mogwadi area (Sand River catchment) 	1.6	Unclaimed irrigation allocated water from Glen Alpine Dam to be transferred to Mogwadi.	
Other possible intervention options				
WC/WDM	 Domestic Irrigation Mining and industrial 	2% 5% 1.5%	Phased in over 5-10 years. Lined canal to be implemented downstream of Glen Alpine Dam	
Eliminating unlawful use & compulsory licensing	Irrigation	± 6	3-4 years	

MOGALAKWENA INTERVENTION OPTIONS

Intervention option		Supply Area	Volume (million m ³ /a)	Implementation time/comment
Other possible intervention options				
Additional groundwater development	•	Rural domestic supply	To be further investigated by study team.	
Raise Glen Alpine Dam	٠	Domestic	Only recommendation – to be further investigated by study team.	
Crocodile West to Mokopane	٠	Mokopane	25	2018 Alternative to ORWRDP – 2B and 2G.
Removal of IAP	٠	Domestic/irrigation	< 2.6	IAPs reduce stream flow. If removed, increase in stream flow does not relate to available yield.
Raise Donkerpoort Dam	٠	Domestic	Only recommendation – to be further investigated by study team. Safety concerns and high costs.	
Polokwane effluent transfer	•	Mokopane mines	11	Effluent to be rather used by Polokwane LM itself.
Proposed Groenvley Dam (NW from Mokopane)	Study team in process of obtaining previous study information.			
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MOGALAKWENA RIVER CATCHMENT

WATER BALANCE (domestic, industrial & mining)





SAND INTERVENTION OPTIONS

Intervention option	Supply Area	Volume (million m ³ /a)	Implementation time/comment
Planned/approved interve	ention options		
Nandoni Dam to Makhado LM transfer	Louis TrichardtSinthimule/Kutama	12	First half by 2015 Second half by mid-2017
Nandoni Dam to Matoks transfer	Matoks	5.5	2019/2020
Glen Alpine Dam transfer	 Mogwadi (Molemole West supply area) 	2.0	2020 1.6 sourced from unused irrigation allocation, 0.6 sourced from water savings.
Re-use: Polokwane wastewater reclamation plant	Industrial	± 12	2015/2016 Phase 1: 20 Mł/d (7 million m³/a) Phase 2: 40 Mł/d (15 million m³/a) * Assume 80% can be re-used.
Other possible intervention options			
WC/WDM	DomesticIrrigation	5% 5%	Phased in over 5-10 years Mining WC/WDM considered to be insignificant (not applicable to new mines).

SAND INTERVENTION OPTIONS

Intervention option	Supply Area	Volume (million m ³ /a)	Implementation time/ comment
Other possible interventi	on options		
Eliminating unlawful use & compulsory licensing	Irrigation	± 7	3-4 years
Zhove Dam (Zimbabwe) transfer	Musina SEZ & LEIP	30	2018
Groundwater development	Groundwater resources over-exploited in most of catchment – hence further development not encouraged. To be further investigated by study team.		
Removal of IAP	 Domestic/irrigation 	< 1.0	IAPs reduce stream flow. If removed, increase in stream flow does not relate to available yield.
SAND RIVER CATCHMENT

WATER BALANCE (domestic, industrial & mining)



NZHELELE RIVER CATCHMENT



NZHELELE INTERVENTION OPTIONS

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Intervention option	Supply Area	Volume (million m ³ /a)	Implementation time/comment			
Planned/approved intervention options						
Nzhelele Valley Bulk Wat	er Supply	> 11.4	2020			
 Groundwater development 	 Individual groundwater schemes 	> 0.9	Equipping > 23 existing boreholes and siting, drilling and testing of nine new boreholes.			
 Augmenting supply from Nzhelele Dam 	Nzhelele supply area	> 0.5	New pipelines, pump stations and reservoirs, upgrading of existing pump stations, WTW and raising Nzhelele Dam.			
 Augmenting supply from Mutshedzi Dam 	 Mutshedzi supply area 	> 10	Upgrading existing WTW and pipelines, new pump stations and reservoirs and raising of Mutshedzi Dam.			
 Supply from Vondo Dam Scheme 	 Nzhelele supply area Mutshedzi supply area 		Pipeline from Vondo Dam to Mutshedzi supply area to Nzhelele supply area.			
Luphephe and Nwanedi Regional Bulk Water Supply	 Luphephe and Nwanedi supply area 	1.1	Newly constructed WTW. Unused irrigation allocation from Luphephe and Nwanedi dams to be allocated to domestic users.			
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NZHELELE INTERVENTION OPTIONS

Intervention option	Supply Area	Volume (million m ³ /a)	Implementation time/comment			
Other possible intervention options						
WC/WDM	Domestic (rural)Irrigation	2% 2%	Phased in over 5-10 years. Mining WC/WDM considered to be insignificant (not applicable to new mines).			
Eliminating unlawful use & compulsory licensing	Irrigation	± 0.8	3-4 years			
Groundwater development	Domestic supply	To be further investigated by study team.				
Water allocation transfer (Section 25) (CoAL)	Makhado Coal Mine	2.5	2018 Water to be purchased from the irrigation sector.			
Proposed dam on Mutamba River (CoAL)	Coal mines	To be further investigated by study team.				
Re-use of effluent from Louis Trichardt and Musina (CoAL)	Coal mines	Not supported by DWS as treated effluent from Louis Trichardt should rather be used by the town itself.				

NZHELELE INTERVENTION OPTIONS

Intervention option	Supply Area	Volume (million m ³ /a)	Implementation time/comment		
Other possible intervention options					
Removal of IAP	Domestic/irrigation	< 2.1	IAPs reduce stream flow. If removed, increase in stream flow does not relate to available yield.		
Proposed Wylliespoort Dam	To be further investigated by study team.				
Proposed Tshipise Dam	To be further investigated by study team.				

NZHELELE RIVER CATCHMENT

WATER BALANCE (domestic, industrial & mining)



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Item 9: SSC Terms of reference feedback

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Item 10: Confirmation of Limpopo WMA North SSC Membership



ITEM 11: Discussion and comments

Limpopo River

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Item 12: General



COMMUNICATION

• DWS project website:

https://www.dwa.gov.za/projects.aspx

Item 13: Way forward

Mapungubwe Nature Reserve

WAY FORWARD

- Compile proceedings of the meeting
- Obtain unknown information
- Prioritise options based on SSC2
- Further evaluate and update costs of preferred intervention options
- Workshops/meetings with specific stakeholders to discuss specific technical matters, if required.
- Compilation and distribution of Newsletter 1
- Continuation of the study

Item 14: Date of next meeting



DATE OF NEXT MEETING

• SSC 3:





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Thank you

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