The rehabilitation of the Kouga Dam, including associated mining activities and water use licence application, Baviaans Local Municipality

Environmental Screening Report

June 2012
J30200

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GIBB ENGINEERING & SCIENCE

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1 INTRODUCTION

The Kouga dam wall is a 72 m high double curvature arch structure. It has a surface area of 554.5 ha and a gross storage capacity of 128.49 x 10^6 m^3. The dam is located 120 km outside Port Elizabeth, approximately 27 km west of the small town of Patensie in Eastern Cape Province. The dam is owned by the Department of Water Affairs and is operated and maintained (minor) by the Gamtoos Irrigation Board. The Kouga dam is classified as a Category III dam and is registered in terms of Dam Safety Regulations. The Kouga dam was completed in 1969 and was originally designed to be raised by another 13.72 m at a later stage.

The Kouga dam's structural monitoring systems detected defects in the dam wall suggesting that the dam's structural integrity has been compromised by the continual inelastic foundation movements and alkali aggregate reaction (AAR) within both the foundation and the right flank and some parts of the structure, respectively.

The Department of Water Affairs (DWA) appointed GIBB on 23 May 2012 to undertake a Basic Assessment, water use licence application and mining application, if required, for the rehabilitation of the Kouga dam and associated activities.

2 ENGINEERING REPORTS CONSIDERED

The following engineering reports, drawings, designs and agreements were reviewed and considered during the development of this screening report:

- ✓ Department Water Affairs NWRI: Strategic Asset Management. June 2012. Kouga Dam Rehabilitation Project: Roads and LLRCS (Project Brief) - Draft. T.C. Tshabalala and C. Oosthuizen.
- ✓ Department Water Affairs NWRI: Strategic Asset Management. July 2002. Kouga Dam, dam safety rehabilitation programme: Preliminary design report. T.C. Tshabalala.
- ✓ Memorandum of Understanding (MoU) on financial provision associated with the rehabilitation of quarries and borrowed areas used for the construction or maintenance of dams or any other water resource infrastructure. 2007. Between Department of Water Affairs and Forestry (J.I. Sindane, Director-General: Water Affairs and Forestry) and Department of Minerals and Energy (Adv S Nogxina, Director-general: Minerals and Energy).
- ✓ Department of Water Affairs and Forestry. 2007/2008. Dam Safety Rehabilitation Programme for government water works.

- ✓ Gamtoos River GWS: Kouga Dam. Investigation on sources of concrete sand and stone. Dam Safety Rehabilitation Project. Materials Laboratory, September 2011.

3 THE DEVELOPMENT PROPOSAL

The Department Water Affairs (DWA) has proposed the following remedial works for the rehabilitation of the Kouga dam and associated infrastructure:

1. Rehabilitation of the dam wall. This will ensure that the dam, which is under the jurisdiction of DWA, complies with all set safety standards.
2. Upgrade of the storm water management infrastructure. This will ensure that storm water is effectively drained downstream through the storm water infrastructure and preventing flooding of the access road.
3. Upgrade/construction of three Low Level River Crossings (LLRC). This will ensure the construction site is accessible after floods during the construction and operational phase.
4. Upgrade/surfacing of the access road. The access road connects the dam to the R332, which connects Baviaanskloof and Patensie. The upgraded road will prevent damage to crops due to dust and will ensure that the bridges will be able to take the anticipated load from the construction vehicles.

Rehabilitation works for Kouga dam will include the strengthening of the dam's flanks to prohibit downstream inelastic displacements taking place (particularly the right flank), thickening of the entire arch to improve load distribution in the dam structure, and grouting of a portion of the apron where core drills have established an existence of weak foundation materials.

Road construction shall be done according to specific design standards and design criteria listed in design reports in section 2. The access road of approx. 8.64 km will be designed as a single lane road in both directions, with a 20 m road reserve width and a 6 m carriage way width. The carriageway footprint will span approx. 7.3 m, which the surfaced 6 m carriage way falling within this footprint. The cross fall of 2% in the direction of flow is provided in order to prevent sediment being deposited on the driving surface. The surface treatment will consist of a 30 mm asphalt surfacing on top of a 150 mm G1 base, followed by 150 mm C4 sub-base, 150 mm G7 layer and G10 sub-grade layer, respectively.

The storm water infrastructure (approx. 4.51 km in length, 1725 m^3 in volume) will be designed to prevent damage to neighbouring properties. Down chutes with energy breakers are proposed at the discharge points of each channel to minimise erosion. The storm water designs were further based on runoff calculations using the Rational Formula and Manning's Formula, with a design annual precipitation of 500 - 600 mm,

Design Flood recurrence interval of 5 years, runoff coefficient of 0.5-0.7 and reinforced concrete as channel material. The chutes will be incorporated with gabion structures for erosion support as the maximum velocity is expected to reach 10 m/s.

A multiple culvert causeway is planned for the proposed LLRCs, which is a submersible road structure designed to be inundated from time to time. The LLRC constructed of concrete and stone masonry, is designed to pass a 1:2 year flood, which was computed by the deterministic (rational) method and amounts to 1336 m^3/s. The openings of the rectangular portal culverts, which will span the length of the river bed, will be as large as possible in order to allow as much debris as possible through the structure.

Guide-block (250 mm cubical blocks at 2 m spacing) are to be provided on the LLRCs. Guide-blocks are placed along the edges of the deck with the objective of guiding the road user, and of assisting him in gauging the depth of flow over the structure. Other associated infrastructure includes apron slabs, wing walls and inclined buttresses upstream and downstream of the LLRC. Further, where bedrock is not available, raft foundations are recommended for LLRCs.

The rehabilitation of Kouga dam will be carried out in phases that will be staggered to allow for continuous monitoring of the dam structure so that the load responsiveness of the structure can be analyzed in real time. The first two rehabilitation phases will address additional instrumentation and improvement of the access road to the dam. The third phase will address the integrity of the arch action and distribution pattern of forces from the dam wall onto its foundation as well as problems experienced with the maintenance and operation of the chute spillway. This will only involve structural work on the flanks and not any work in the central section of the arch. The fourth phase will address the integrity of the central arch.

It is expected that the rehabilitation will require 150 000 m^3 of roller compacted concrete (RCC). If immersion vibrated roller compacted concrete (IVRCC) is used the rehabilitation works will require 185 000 m^3 of coarse aggregate and 130 000m^3 of fine aggregate. It is estimated from investigation on the rock and boulders just downstream from the dam in the river bed that 270 000 m^3 of course aggregate and 180 000 m^3 of fine aggregate is likely to be available in the river bed for the proposed rehabilitation works.

4 THE RECEIVING ENVIRONMENT

The Kouga Dam is surrounded by Gamtoos Thicket and Groot Thicket, which is part of the Albany Thicket Biome. The downstream river and riparian habitat is classified as *endangered* Albany Alluvial Vegetation (Mucina & Rutherford, 2006). Conservation status and important conservation and biodiversity information is summarised in the figure below.

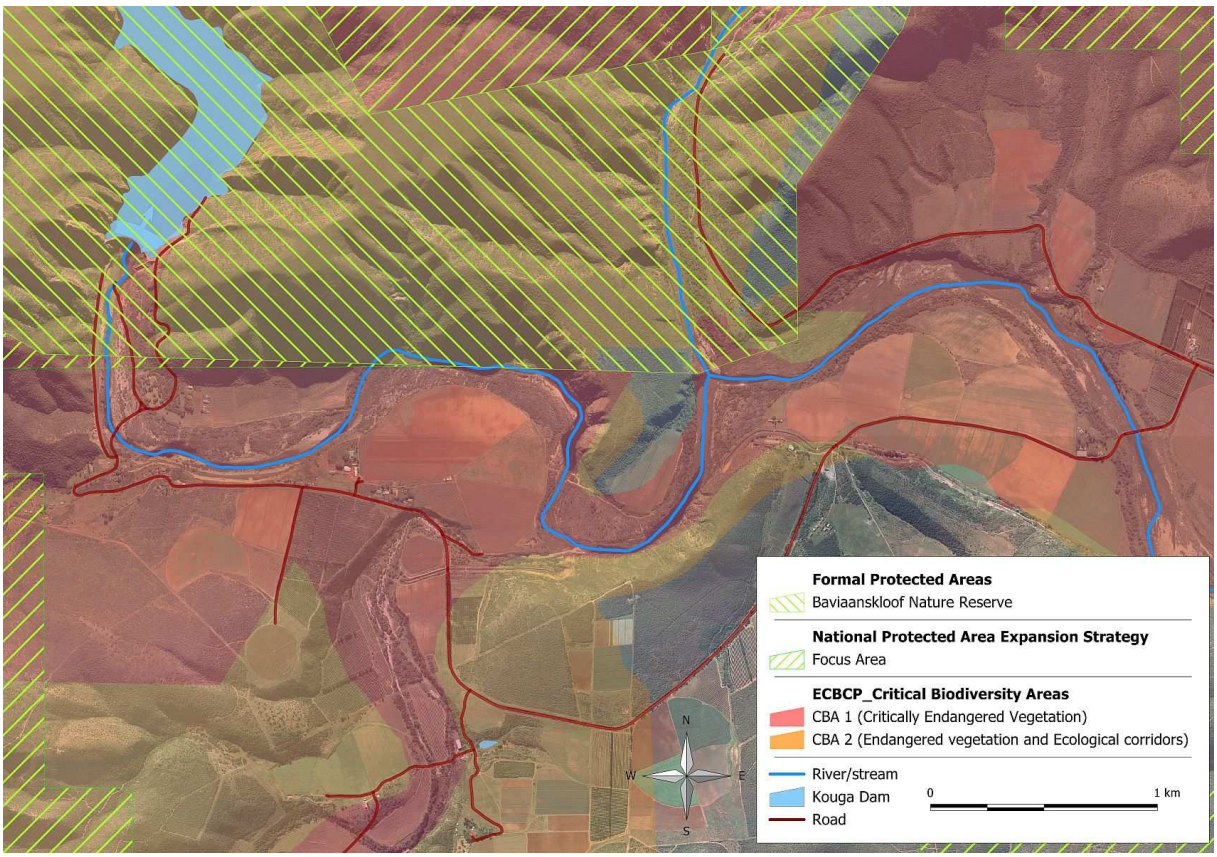


Figure 1. Conservation and biodiversity importance of the Kouga dam and surrounding area.

The Kouga Dam is located in the Baviaanskloof Nature Reserve, which is a 21 1171 ha formally protected area administered by the Eastern Cape Parks and Tourism Agency. The Baviaanskloof Nature Reserve was gazetted on 30 January 2009 through Government Notice No. 72 of 2009. The Baviaanskloof Wilderness Area, which includes private sector land, is also a World Heritage Site (see picture below).

Figure 2. Entrance to the Baviaanskloof Mega-reserve.

In terms of the National Protected Areas Expansion Strategy, a small sliver of land just downstream of the Kouga dam wall has been identified as a focus area where future expansion of the protected area should occur.

The Eastern Cape Biodiversity Conservation Plan (ECBCP), which is widely accepted by the national and provincial environmental authority as a bioregional conservation plan for the Eastern Cape, has identified the Kouga Dam and surrounding slopes as a Critical Biodiversity Area (CBA), denoted by CBA2 (faded orange in Figure 1), which indicates that the area contains *endangered* vegetation and important ecological corridors. The river and riparian vegetation downstream of the Kouga Dam wall has been classified as CBA1, which indicates that the area contains *critically endangered* vegetation (faded red in Figure 1).

5 THE NEED FOR AUTHORISATION

5.1 The National Environmental Management Act (Act 107 of 1998)

The National Environmental Management Act, No. 107 of 1998, as amended, and EIA regulations (GN R543, R544, R545, and R546 of 18 June 2010) prescribe that an environmental impact assessment process must be followed to evaluate the impact of certain activities that are deemed to have a potentially negative effect on the environment. Listed activities triggered in terms of NEMA requiring a Basic Assessment are presented in the table below.

Notice number	Activity number	Description
No. R544;18 June 2010 (Listing Notice 1)	11	The trigger: The construction of (i) canals, (ii) channels, (iii) bridges or (xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. *Significance: No stormwater infrastructure is currently associated with the existing gravel road. This activity will be triggered through the construction of new minor stormwater infrastructure associated with the proposed road upgrading. The demolition and redevelopment of the low water bridges on a footprint extending beyond the existing footprint as proposed triggers this activity.*
	18	The trigger: The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a watercourse. *Significance: The rehabilitation activities will include the excavation of sand, pebbles and rock from the river bed downstream of the dam wall. The river bed classifies as a watercourse.*
	22	The trigger: The construction of a road, outside urban areas, (i) with a reserve wider than 13,5 meters or, (ii) where no reserve exists where the road is wider than 8 metres, or (iii) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010. *Significance: This activity is only likely to be triggered if the upgrading of the existing road deviates from the existing footprint as would likely be the case if the existing road is realigned along a new route through natural vegetation.*
No. R546; 18 June 2010 (Listing Notice 3) *Environmental authorisation for activities in this listing notice is only required if the activity proposed falls within any of the geographical areas identified in stipulated in R546.*	12	The trigger: The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, (a) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; (b) Within critical biodiversity areas identified in bioregional plans; *Significance: Albany Alluvial Vegetation occurs downstream of the dam wall and is classified as endangered in the national list of threatened ecosystems published in terms of NEMBA (Government Gazette 34809, under GN 1002 on 9 December 2011), as stipulated in (a) above, and is part of a CBA as identified in the ECBCP. Therefore clearance of more than 300 m^2 of Albany Alluvial Vegetation in the riverbed downstream of the dam wall will trigger regulation 12 and will require environmental authorisation via Basic Assessment before clearance commences.*
	13	The trigger: The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation (exclusion clause not applicable) in: (a) Critical biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority. (b) National Protected Area Expansion Strategy Focus areas. (c) In Eastern Cape ii.Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (ff) Areas within10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve. *Significance: The clearance of 1 ha or more is very likely in the area directly downstream of the dam wall given the large quantities of fill material needed for the road and dam wall. The area is classified as a CBA [indicated in 13(a)] in terms or the ECBCP, while a small sliver of land approx. 50 m wide and approx. 500 m downstream of the dam wall is identified as a focus area in terms of the NPAES [indicated by (b)]. In the Eastern Cape specifically, the location where clearance is to take place is partly in an existing protected area [(13)(c)ii(aa)] and NPAES focus area [(13)(c)ii(bb)], and within 5 km of a nature reserve and world heritage site [(13)(c)ii(ff)], thus will require environmental authorisation via Basic Assessment before clearance commences.*
	14	The trigger: The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation (exclusion clauses not applicable) in:

Notice number	Activity number	Description
		(a) In Eastern Cape, i. All areas outside urban areas. *Significance: Given the volumes of fill material required for the dam wall and road rehabilitation, the clearance trigger of 5 ha or more of vegetation is likely to be exceeded in the area directly downstream of the dam wall. As the clearance activity will occur outside urban areas in the Eastern Cape commencement of the activity will require environmental authorisation via Basic Assessment before clearance commences.*
	24	The trigger: The expansion of (iv) infrastructure covering 10 square metres or more, where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse (exclusion clause not applicable): (a) In Eastern Cape ii.Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve. *Significance: The Kouga Dam wall is construed as infrastructure in which case the expansion of such infrastructure by 10 m^2 or more in the downstream watercourse will trigger the need for environmental authorisation via Basic Assessment before the expansion activities commences. The dam wall is located within a protected area in terms of NEMPAA and CBA in terms of the ECBCP.*

No listed activities identified in R545 (Scoping and EIA) will be triggered by the proposed activities.

Competent environmental authority

The competent environmental authority that must consider the application for environmental authority is the national Department of Environmental Affairs (DEA). In terms of section 24C(2) of the NEMA, 107 of 1998, as amended, *The Minister must be identified as the competent authority in terms of subsection (1) if the activity (d) is undertaken, or is to be undertaken, by (i) a national department.* In this case the national Department of Water Affairs will be undertaking all the proposed activities for the rehabilitation if the Kouga Dam wall.

5.2 National Environmental Management: Biodiversity Act 10 of 2004

The Act, amongst others, provides the framework for biodiversity management and planning. Section 52 provides for the listing of threatened (critically endangered, endangered or vulnerable) and protected ecosystems (of high conservation value or of high national or provincial importance although not listed as threatened) and for activities or processes within those ecosystems to be listed as 'threatening processes', thus triggering the need to comply with the NEMA EIA regulations. The Act establishes the South African National Biodiversity Institute (SANBI), with a range of functions and powers (Chapter 2 Part 1). It also provides for the listing, control and eradication of invasive species (currently the responsibility of the Conservation of Agricultural Resources Act, 1983).

Significance: The fact that the dam wall and area to be used for mining activity falls within a protected area, is categorised as a CBA, and is classified as endangered will

require a vegetation specialist to assess all potential direct, indirect and cumulative impacts, and suggest mitigation measures.

5.3 National Environmental Management Protected Areas Act 57 of 2003

The objectives of this Act within the framework of the National Environmental Management Act, include the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. The Act provides for the involvement of parties other than organs of State in the declaration and management of protected areas. On 9 November 2007 the minister of Environmental Affairs and Tourism published a link to the register of protected areas in terms of the National Environmental Management: Protected Areas Act, 57 of 2003, through Government Notice 1051 of 2007.

This register of protected areas listed the Baviaanskloof Nature Reserve as a Protected Area and World Heritage Site.

5.4 National Water Act (Act 36 of 1998)

Section 21(a), (c) and (i) of the National Water Act (NWA) stipulates that taking water from a watercourse, impeding or diverting the flow of water in a watercourse, as well as the alteration of the bed, banks, course or characteristics requires an application for a water use licence. General authorisations in terms of section 39 of the NWA for the impeding or diverting the flow of water in a watercourse [21(c)] or altering the bed, banks or characteristics of a watercourse [21(i)] was gazetted in 2004 (GN No. 398 of 2004).

However, the impeding or diverting the flow, or altering the bed, banks or characteristics of a watercourse was excluded from the provisions of the general authorisation if these water uses would occur within a distance of 500 meters upstream or downstream to any wetland or any water resource. The Kouga Dam itself is regarded as a water resource, as per the definition of a water resource, therefore the general authorisation would not apply.

Significance: It is thus envisaged that the upgrade of the three bridges, altering the beds and banks of the watercourse through mining activities, removal of alien vegetation, taking water from the watercourse for construction and batching related activities, and expansion of the dam wall as per scope of works will thus require authorisation through a WULA/s to the DWA, the competent regulating authority. Further, the DWA is not yet exempted from submitting a WULA to itself, which means that the legal requirements of the NWA, 36 of 1998 must be fulfilled. As the Kouga Dam is an artificial structure the input of a wetland specialist is not required. An Environmental Assessment Practitioner (EAP) will provide the relevant information required by the relevant WULA forms, which will accompany the application for environmental authorisation to the DEA and DWA.

5.5 Minerals and Petroleum Resources Development Act (Act 28 of 2002)

The Minerals and Petroleum Resources Development Act (MPRDA) (No 28 of 2002) refers to mining as “any operation or activity for the purposes of winning any mineral on, in or under the earth, water or any residue deposit, whether by underground or open working or otherwise and includes any operation or activity incidental thereto”. Section 27 of the MPRDA, as amended, alludes to the fact that application for a mining permit is required when the mining area in question does not exceed 5 ha in extent. In the event that the mining area exceeds 5 ha in extend application for a mining right will be trigged.

As per the requirements of the MPRDA, all mining activities, including the extraction of material from borrow pits and quarries, require authorisation from the Department of Mineral Resources (DMR). As per the provision of Section 106(1) of the Act, on 25 June 2004 the Minister of Mineral Resources, by notice in Government Gazette No. 26501, exempted various organs of state from the provisions of sections 16, 20, 22 and 27 of the Act in respect of any activity to remove any mineral for the construction and maintenance of dams, harbours, roads and railway lines and for purposes incidental thereto.

Section 106(2) of the MPRDA, 2002, however required the exempted authority to submit an environmental management programme for approval in terms of section 39(4). With the amendment of the MPRDA, 2002, through the Mineral and Petroleum Resources Development Amendment Act, No. 49 of 2008, section 106(2) was amended as follows:

> *“Despite subsection (1), the organ of state so exempted must submit relevant environmental reports required in terms of Chapter 5 of the National Environmental Management Act, 1998, to obtain an environmental authorisation.”*

This amended provision required the exempted authority to submit all relevant environmental reports to the competent environmental authority for environmental authorisation.

Further to this, a Memorandum of Understanding drafted and accepted between the Department of Water Affairs and Forestry (DWAF) and the Department of Minerals and Energy (DME) confirmed that DWAF was exempted from applying for a mining permit of mining right to DME, however agreed that the provisions pertaining to environmental management, financial provision and mine closure in terms of MPRDA, 2002, as amended, and its supporting Regulations, still applied to quarrying and burrowing activities undertaken by DWAF during the development or maintenance of water resource infrastructure.

Significance: The Department of Water Affairs is thus exempted from preparing and submitting an application for a mining permit or mining right to the DME, however they are still required to submit an application for environmental authorisation in terms of NEMA, are still bound to financial provisions of the MPRDA, and are still required to

conduct mining under a dedicated environmental management plan, and to submit a mine closure report for rehabilitation of the mining area upon completion of the activities. The application for environmental authorisation in terms of NEMA, as amended, and MPRDA, as amended, including associated regulations for these acts has been streamlined in that a single environmental assessment process can be followed which will satisfy the requirements of both NEMA and MPRDA, resulting in a single submission of the application to the DEA for consideration. In the spirit of cooperative governance the DEA will consult with DME before an authorisation is granted.

5.6 National Heritage Resources Act (Act 25 of 1999)

The National Heritage Resources Act (NHRA) stipulates in section 38 that certain developments may not commence without prior notification of the proposed development being given to the responsible heritage resources agency. Section 38(1) specifically stipulates that:
(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
(b) the construction of a bridge or similar structure exceeding 50 m in length; or
(c) any development or other activity which will change the character of a site (i) exceeding 5 000 m^2 in extent, will require consultation with the responsible heritage resources agency.

Significance: The type of activities proposed as part of the rehabilitation of the Kouga Dam wall requires a level one Heritage Impact Assessment (HIA). The HIA will be submitted to the South African Heritage Resources Agency for comment and based on the outcome of the HIA SAHRA may recommend that a level 2 HIA, which will involve a more detailed assessment of the study site including site visits. Should the independent Environmental Impact Assessment Practitioner on investigation of the specific circumstances conclude that significant heritage resources are unlikely to be affected by the proposed projects, an application will be lodged to SAHRA to waive the need for an HIA.

6 PROPOSED METHODOLOGY

GIBB will conduct the Basic Assessment, required environmental reports for mining activities and WULA simultaneously. The WULA forms and mining activities application will accompany the Basic Assessment Report when it is submitted to the competent authority.

6.1 Basic assessment

Tasks GIBB proposes to undertake during the Basic Assessment process include:

1. Project management
2. Application for Environmental Authorisation
3. Basic Assessment Report
4. Public Participation Process (PPP)
5. Environmental Management Programme (EMP)

6.2 EMPr for mining activities ito NEMA and MPRDA

Tasks GIBB proposes to undertake for the proposed mining activities EIA and EMProg include:

1. Description of the baseline environment
2. Description of the proposed mining operation
3. Assessment of the potential impacts of the proposed activity
4. Assessment of alternative land use or developments that may be affected
5. Assessment of the potential impacts of the proposed land use
6. Public Participation Process (PPP)
7. Identification of monitoring and management measures for environmental impacts
8. Environmental Management Programme (EMPr)

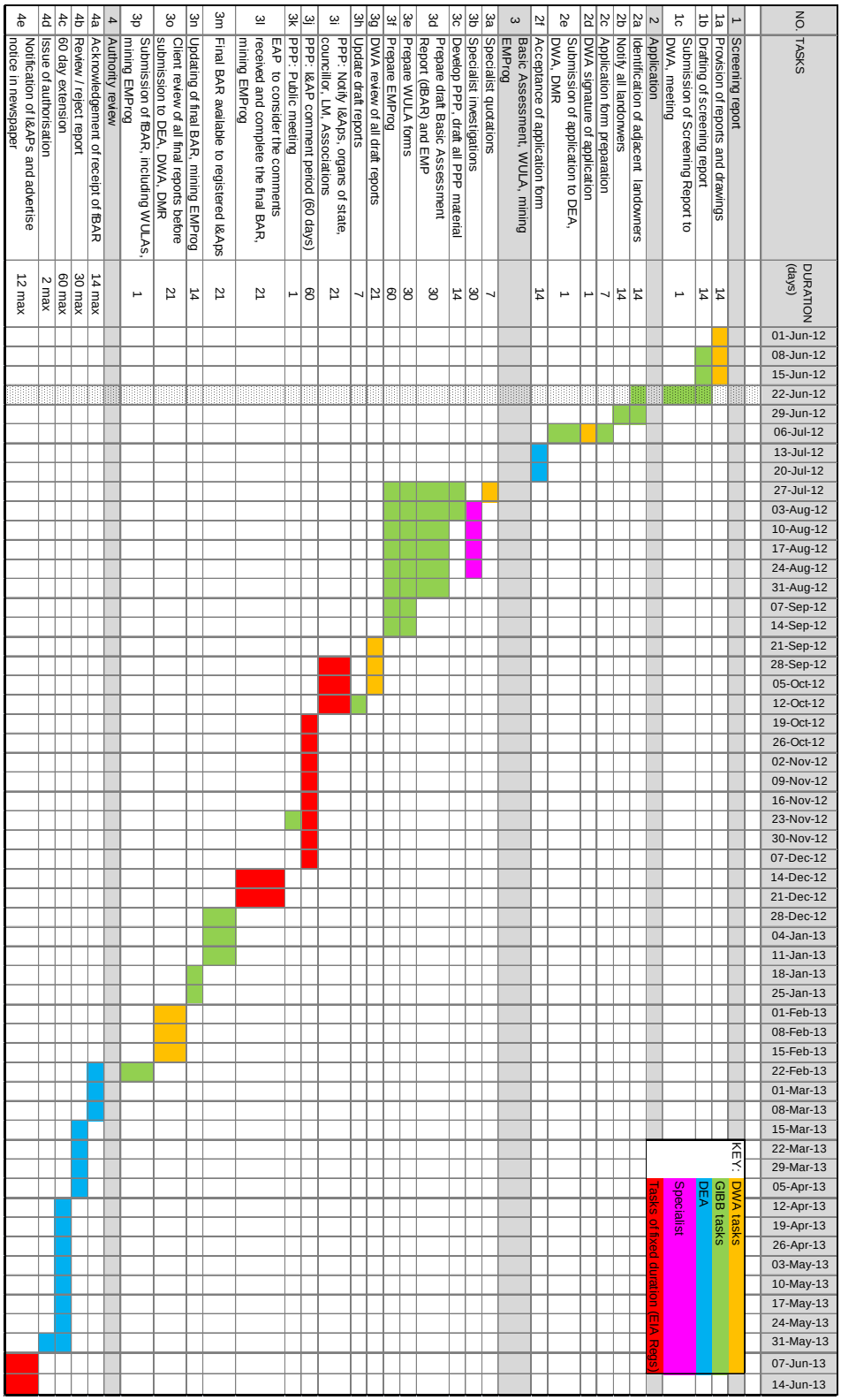
6.3 Water Use Licence Application (WULA)

The tasks GIBB proposes to undertake during WULA include:

1. Pre-application consultation meeting with DWA;
2. Information gathering and application;
3. Assessment & Review (Liaison with DWA);
4. Completion of all the required application forms;
5. Submission of WULAs to DWA;

7 PROPOSED PROJECT PROGRAMME

A detailed programme for the BA, WULA and mining EMProg is outlined in the table below. Our programme indicates a total time period of 8 months to submission of the fBAR, WULA and mining EMProg to DEA.



8 CONCLUSION

- ✓ The screening exercise has identified that the area downstream of the Kouga Dam wall is regarded as a very sensitive environment, which suggest that rehabilitation and mining activities in this area should commence with caution, as is entrenched in the principles of integrated environmental management.

- ✓ Besides the proximity of the Baviaans World Heritage Site, no other heritage resources were noted in the vicinity of the study site. SARHA will advise whether a level 1 HIA (desktop), a more detailed level 2 HIA is required for the proposed activities, or whether these requirements may be waived altogether

- ✓ An assessment by a vegetation specialist should be conducted to assess what potential impact the further destruction of Albany Alluvial Vegetation downstream of the dam wall will have on its conservation target and status.

- ✓ The vegetation specialist should also assess whether any threatened or protected species, in terms of the National Environmental Management: Biodiversity Act, 10 of 2004, is present in the area earmarked for mining activities, which is expected to be notable in size.

- ✓ The competent environmental authority for consideration of the application for environmental authorisation is the national Department of Environmental Affairs, as the applicant is a national department (Department of Water Affairs).

- ✓ A Basic Assessment application for environmental authorisation, including WULA/s and an EMProg for proposed mining activities, must be prepared for consideration by the DEA.

- ✓ Copies of the final BAR, WULA/s and EMProg for mining activities will be sent to DWA and DMR for comment. The DEA shall communicate with the DWA and DME in the spirit of co-operative governance.

DOCUMENT CONTROL SHEET
(FORM IP180/B)

CLIENT	:	Department of Water Affairs
PROJECT NAME	:	Kouga dam rehabilitation **PROJECT No. :** P8962
TITLE OF DOCUMENT	:	Screening Report for the rehabilitation of the Kouga Dam, and associated mining activities, Baviaans Local Municipality
ELECTRONIC LOCATION	:	**Q:\P8962 (Kouga dam rehab EIA)\EIA proposal_Kouga Dam rehabilitation EIA_v3.docx**

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