3. DESCRIPTION OF THE PROPOSED PROJECT

The Ntabelanga-Lalini conjunctive scheme consists of water resource infrastructure, treated domestic water supply infrastructure, raw water supply infrastructure, power generation & transmission and affected infrastructure.

3.1 PROJECT LOCATION

The Mzimvubu River Catchment is situated in the Eastern Cape (EC) Province of South Africa.

The project footprint spreads over three DMs namely the Joe Gqabi DM in the north west, the OR Tambo DM in the south west and the Alfred Nzo DM in the east and north east (**Figure 2** and **Table 4**).

The proposed Ntabelanga Dam site is located approximately 25 km east of the town Maclear and north of the R396. The proposed Lalini Dam site is situated approximately 17 km north east of the small town Tsolo.

The study area falls within the Mzimvubu to Kieskamma Water Management Area (WMA). The Tsitsa River is tributary of the Mzimvubu River and will be partially inundated by both of the proposed dams.

The Lalini Dam is located within the T35L and T35K Quaternary Catchments, whilst the Ntabelanga Dam and road upgrades are located within the T35E quaternary catchment and the particular river resource in the area is the Mzimvubu River. The pipelines traverse over several quaternary catchments, namely T20B, T34H, T34 J, T35E, T35H and T35K.

Table 4:Project Location Information

Province	Eastern Cape
District Municipality	Joe Gqabi, OR Tambo and Alfred Nzo District Municipalities
Local Municipality	Mhlontlo, Nyandeni, Umzimvubu and Elundini Local Municipalities
Ward number(s)*	Umzimvubu LM: Wards 20, 25 and 19 Elundini LM: Wards 1, 5 and 6 Nyandeni LM: Wards 1 and 10 Mhlontlo LM: Wards 1, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 and 26.
Nearest town(s)	Tsolo, Lalini, Maclear, Mthatha, Mount Frere
Farm name(s) and number(s)*	59, 61, 65, 66, Esek 41, Mahlungulu 79, 59, 63, 55, 62, 55, Nxakolo 78, Mbalishweni 54, 54, Mimosa Hoek 42, Tsitsa Drift 41, Matanga's Kraal 40, 69, 54, 66, 38, 89, 68, 58, Xokonxa 4, 81, 62, 55, 37, 379, 71, 69, 404, 63, 64, 425, 64, 65, 61, 60, 59, 118, 406, 408, 392, 390, 119, 391, 76,

	Nxotwe 58, Lower Culunca 57, 412, 73, Upper Sinxago 410, 76, 74, 72, 50, 51, 87, 84, 86, 75, 409, 397, 419.					
Coordinates of corner points of study area	Latitude (S) (DDMMSS)			Longitude (E) (DDMMSS)		
	30	48	49.025	28	23	18.024
	30	49	19.141	29	21	12.074
	31	27	6.437	29	21	22.086
	31	27	10.739	28	23	8.013

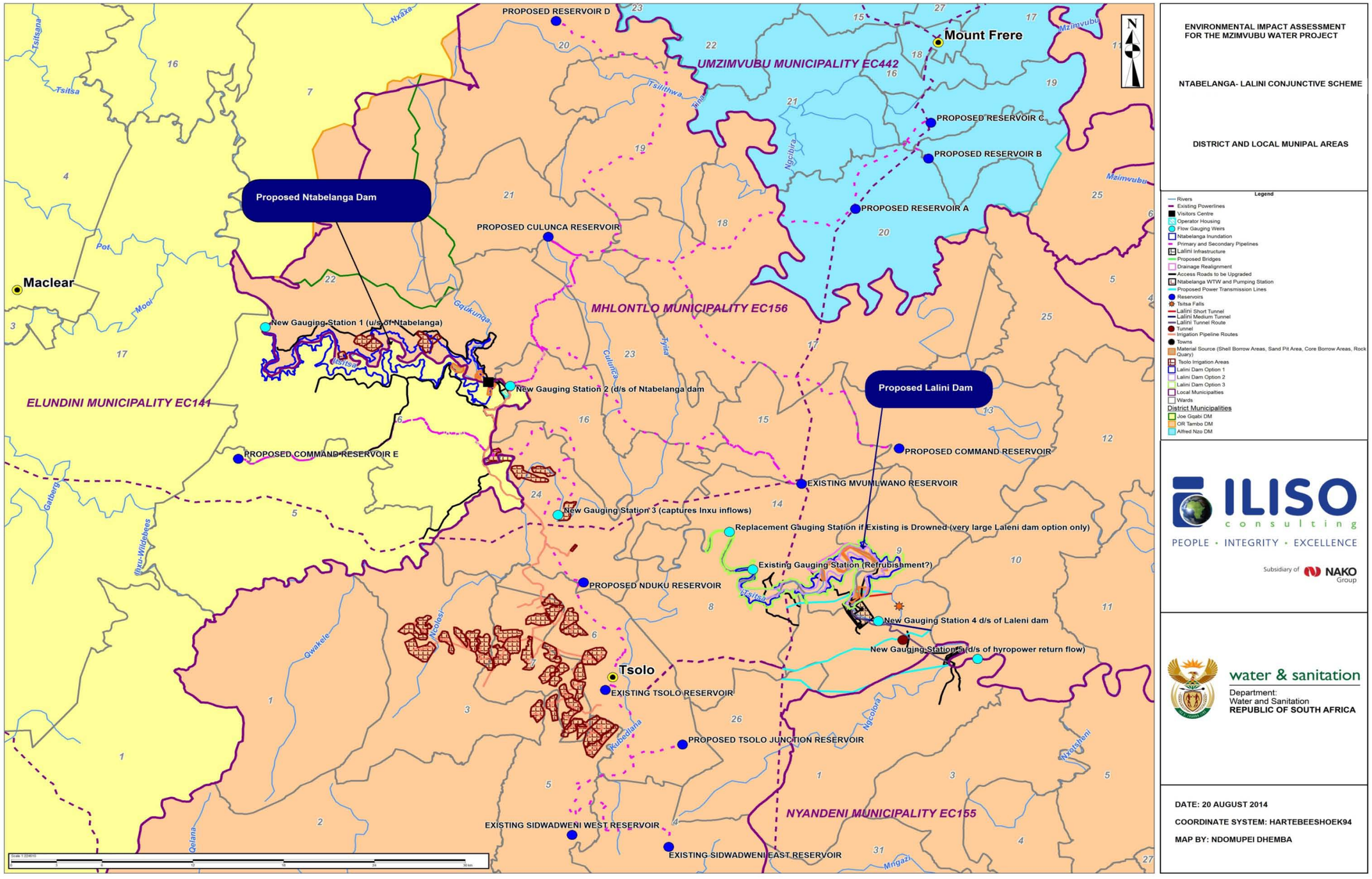

Figure 2:Study Area

The Mzimvubu River has four major tributaries, namely the Mzintlava, Kinira, Tina and Tsitsa Rivers. The proposed Ntabelanga and Lalini Dams are situated on the Tsitsa River (**Figure 3** to **Figure 7**).

Figure 3: Proposed Ntabelanga Dam upstream basin

Figure 4: Proposed Ntabelanga Dam inundated area above dam

Figure 5: Approximate location of the proposed Ntabelanga Dam

Figure 6: Approximate location of the proposed Lalini Dam

Figure 7: Tsitsa Falls downstream of the proposed Lalini Dam

3.2 WATER RESOURCES INFRASTRUCTURE

Water Resource Infrastructure includes:

- A dam at the Ntabelanga site with a storage capacity of 490 million m^3;
- A dam at the Lalini site with a storage capacity of approximately 150 million m^3;
- A pipeline and tunnel/conduit and a power house at Lalini Dam site for generating hydropower;
- Five new flow gauging stations to measure the flow that is entering and released from the dams. These flow gauging points will be important for monitoring the implementation of the Reserve and for operation of the dams;
- Wastewater treatment works at the dam sites;

- Accommodation for operations staff at the dam sites (Figure 8); and
- An information centre at each of the dam sites.

Figure 8: Location of accommodation and wastewater treatment works at the Ntabelanga Dam

Two thirds of the water at the Ntabelanga Dam will be utilised for hydro-energy, one sixth for potable water and one sixth for irrigation.

3.2.1 The Ntabelanga Dam

The technical characteristics of the proposed Ntabelanga Dam are summarised below:

- Dam wall crest length: 407 m
- Maximum dam wall height: 67 m
- Mean Annual Runoff of River at Dam: 415 million m^3/a
- Volume impounded by dam: 490 million m^3
- Spillway capacity: 5 530 m^3/sec
- Dam type: RCC with integral spillway
- Surface area of lake behind dam: 31.5 km^2
- Backwater reach upstream of dam 15.5 km

Water levels at the Ntabelanga Dam will vary considerably as water is released to the Lalini Dam for hydropower generation. **Figure 9** shows anticipated monthly variations of water levels at the dam. The monthly variations will be the same whether base load or peaking power is generated. The daily variations would however be different depending on the power generation option.

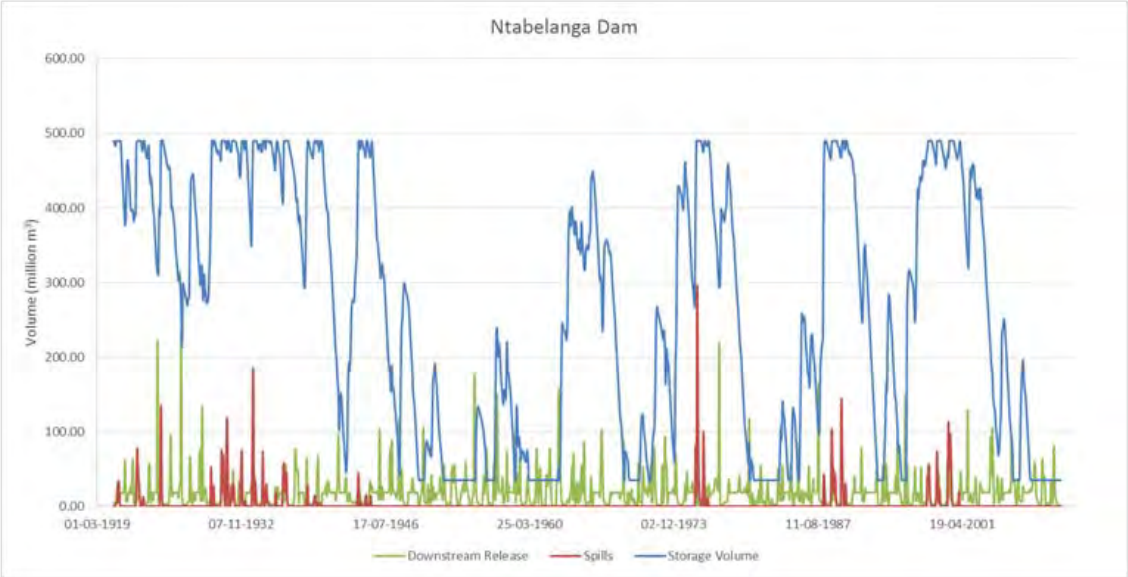

Figure 9: Monthly variation of water levels at Ntabelanga Dam

3.2.2 The Lalini Dam

The Lalini Dam characteristics are summarised below:

- Dam wall crest length: 383 m
- Maximum dam wall height 56.8 m
- Mean Annual Runoff of River at dam: 828 million m^3/a
- Maximum volume impounded by dam: 248 million m^3
- Surface area of lake behind dam: 14.7 km^2
- Backwater reach upstream of dam: 24.5 km^2

Water levels at the Lalini Dam will vary considerably as water is released for hydropower generation. **Figure 10** shows anticipated monthly variations of water levels at the dam. The monthly variations will be the same whether base load or peaking power is generated. The daily variations would however be different depending on the power generation option.

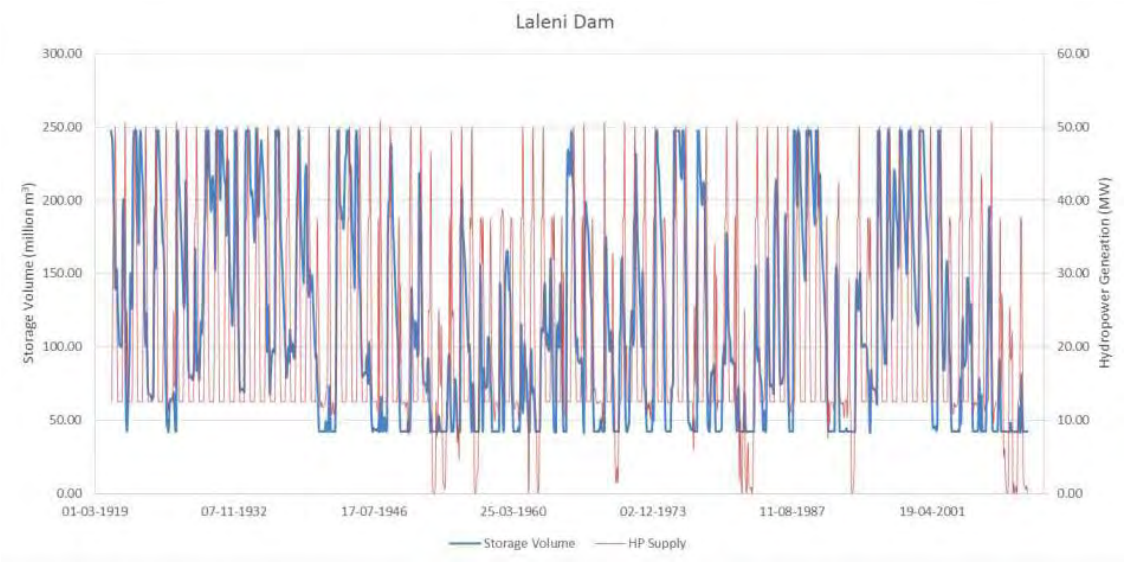

Figure 10: Monthly variation of water levels at Lalini Dam

3.2.3 The construction of the dam

Construction of each dam will require construction camps, lay down areas, and storage sites. The site will accommodate the following:

- Concrete Batching Plants, including bulk storage silos for cementitious materials;
- Site Offices and Parking - comprising two office blocks (one to house the personnel of the Resident Engineer, and one to house the Site Agent and his personnel) and 20 covered parking bays per office block, and a taxi rank;
- Materials testing Laboratory;
- Workshops and Stores - approximately five buildings;
- Reinforcing Steel Bending Yard;
- Permanent Housing for married operating personnel;
- Helipad;
- Weather Station;
- Sand and crushed stone Stockpile Areas – less than 450 m x 250 m with access roads (above area of inundation);
- Areas for the handling of hazardous substances;
- An explosives storage magazine;
- Wash bays for construction plant;
- Radio communication infrastructure;
- Facilities for the bulk storage and dispensing of fuel for construction vehicles;
- Power lines;
- A small-scale sewage treatment plant; and
- Upgrading existing gravel access road.

Construction activities will commence with the stripping of vegetation and topsoil to establish access and construction roads, site offices, dam foundations and crusher and concrete mixer stations. Topsoil will be stockpiled for reuse during the

rehabilitation stage, whilst cleared woody vegetation suitable for firewood will be stockpiled for collection by the local population for a period of time, after which it will be burnt.

Soon after commencement the river will be diverted to expose the rock foundations for the concrete spillway section / outlet works. During this period, coffer dams will be constructed to protect all foundation activities in the riverbed against flood damage (**Figure 11**). Excavators, bulldozers and trucks will be engaged to remove all loose material on the foundation of the dam until sound founding material is exposed. Limited controlled blasting will be necessary.

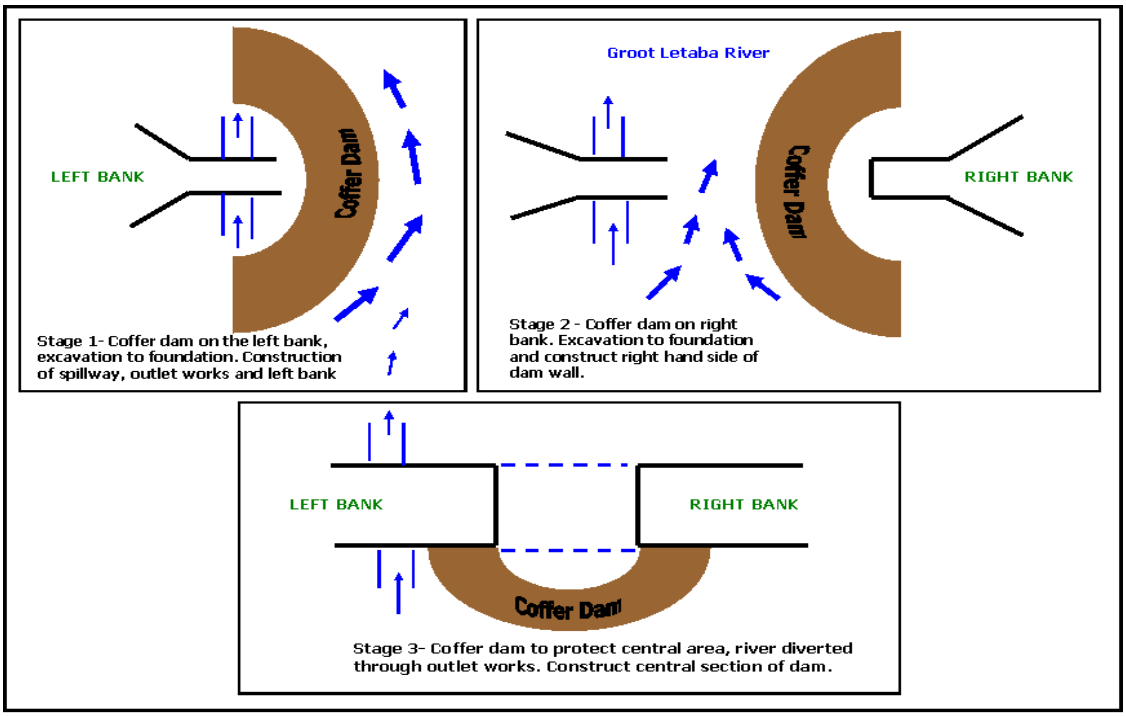

Figure 11: Typical Stages of River Diversion

Sand required for the production of concrete will be obtained from borrows areas in the dam basins. Stone for concrete production will be obtained from rock quarried in the dam basin and crushed to the required size in a crushing plant.

Concrete production at the batching plant will then commence and placement in the central spillway section, outlet works, non-overspill flanks and apron areas of the dam wall, probably by roller compaction techniques and the use of high tower and mobile cranes, will occur 24 hours a day, seven days a week, for a period of time.

The temporary site administrative buildings will be erected complete with security fencing, a water supply, sewage purification plant and an overhead power supply line.

After construction activities have been completed all the crushers, mixers and site offices, etc. will be removed and the construction site rehabilitated. All temporary access roads not in the dam basin will be ripped and covered with topsoil and planted with suitable grass and tree cover. The aim is to return the whole construction site as close as possible to its undeveloped appearance. Areas that are inundated by water in the dam basin will be shaped to avoid unintended ponding and no grass will be planted.

Permanent houses will be erected within the project area to accommodate operation and maintenance staff.

3.2.4 Flow gauging weirs

Five new flow measuring weirs will be required in order to measure the flow that is entering and released from the dams (an example of a flow gauging weir is shown in **Figure 12**. These flow gauging points will be important for monitoring the implementation of the Reserve and for operation of the dams.

Positions of the weirs are indicated on **Figure 1**.

Each weir will take about six months to construct and will be a low concrete structure with erosion control measures on both banks to prevent out-flanking. It is envisaged that construction of the weirs will form part of the dam construction contract.

Figure 12: Flow Gauging weir in the Crocodile River at Nooitgedacht