MOOI-MGENI TRANSFER SCHEME – PHASE 2
KWAZULU-NATAL PROVINCE, SOUTH AFRICA
DRAFT ENVIRONMENTAL IMPACT ASSESSMENT

NEAS REF: DEA/EIA/0001182/2012
DEA REF: 14/12/16/3/3/2/334
### CES Report Revision and Tracking Schedule

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Draft Environmental and Impact Assessment Mooli-Mgeni Transfer Scheme – Phase 2 KwaZulu-Natal Province, South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client Name &amp; Address</td>
<td>Trans Caledon Tunnel Authority</td>
</tr>
<tr>
<td>Document Reference</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td>Draft</td>
</tr>
<tr>
<td>Issue Date</td>
<td>November 2012</td>
</tr>
<tr>
<td>Lead Authors</td>
<td>Dr Chantel Bezuidenhout Dr Ted Avis Ms Lara Crous</td>
</tr>
<tr>
<td>Reviewer</td>
<td>Dr Ted Avis</td>
</tr>
<tr>
<td>Study Leader or Registered</td>
<td></td>
</tr>
<tr>
<td>Registered Environmental Assessment</td>
<td></td>
</tr>
<tr>
<td>Practitioner</td>
<td></td>
</tr>
<tr>
<td>Approval</td>
<td></td>
</tr>
<tr>
<td>Report Distribution</td>
<td></td>
</tr>
<tr>
<td>Circulated to</td>
<td>No. of copies</td>
</tr>
<tr>
<td>No. copies</td>
<td>No. electronic copies</td>
</tr>
</tbody>
</table>

This document has been prepared in accordance with the scope of Coastal & Environmental Services (CES) appointment and contains intellectual property and proprietary information that is protected by copyright in favour of CES. The document may therefore not be reproduced, used or distributed to any third party without the prior written consent of Coastal & Environmental Services. This document is prepared exclusively for use by CES’s client. CES accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of CES. The document is subject to all confidentiality, copyright and trade secrets rules, intellectual property law and practices of South Africa.
EXECUTIVE SUMMARY

1.1 Introduction

The Mearns Emergency Transfer Scheme (METS) was constructed by DWAF in 1983, during a period of severe drought. The METS was constructed to augment the water supply of the Mgeni System via the Midmar Dam which was at serious risk of running dry and leaving the region’s population without water. This scheme was utilised for only a short period of time until the cycle of below average rainfall came to an end and Durban could revert back to habitual water resources. During a subsequent drought in 1993 the scheme was re-commissioned by Umgeni Water. The Mgeni catchment is currently at full capacity in terms of development and therefore any additional augmentation that will be required due to population increases, periods of drought, etc. will have to be obtained from other water catchments.

1.2 Location of the Study

The study area is located in the Midlands of Kwazulu-Natal, split between the Mpofana and uMngeni Local Municipalities in the north and south respectively (Figure 2). It trends in a broad north-east/ south-west band where the town of Rosetta marks the northern limit while the southern extent is delineated by the Mpofana River, with the village of Nottingham Road forming the approximate centre. The Spring Grove Dam wall (currently under construction) forms the boundary in the north-west (2 km south-west of Rosetta Village and 8km upstream of the Mearns Weir) and the outfall weir at the Mpofana River is the boundary in the south-east.

2. Project Description

2.1 The Spring Grove Dam Pumping Station

A 5.8 MW pump station, with a maximum pumping capacity of 4.5 m³/s, will be located immediately downstream of the Spring Grove Dam on the right bank of the Mooi River (Figure 1). The pump station is proposed to be positioned as close to the dam outlet works as possible. The structure is, therefore, also advantageously situated from an environmental point of view, as it is relatively well shielded from the surrounding dwellings by the topography.

The Eskom switch yard has been positioned immediately below the dam on a relatively flat area, which removes the need for extensive earthworks. The need to create sufficient Net Positive Suction Head meant that the floor level had to be positioned at or below an elevation 1 403 masl. The dam tailwater curves show that this level is equivalent to the 1:200 year flood.

2.2 Rising Main from the Pumping Station to the Break Pressure Tank at Gowrie

The Rising Main is comprised of a pipeline from the pumping station (at Spring Grove dam) to the existing servitude as well as a pipeline adjacent to the existing servitude to the Break Pressure tank in Gowrie Village. The primary aim for the rising main is to reach the existing registered servitude as quickly as possible so as to reduce the costs and time associated in land acquisition. The existing servitude also provides a route with readymade access, a favourable profile and known conditions.

The pipeline (1600 mm in diameter and 2.5 km in length) crosses from the Spring Grove Dam to the road just east of Portion 233. At the road between Portions 233 and Portions
Figure 1: Preferred route for the MMTS-2 pipeline as identified by this EIA
103/104 of the Farm Springvale 2170, the route turns southwards to follow the road. The route then turns eastward along the boundary between Portions 103 and 104 of the Farm Springvale 2170 and continues eastward between Portions 95 and 146 (and its sub division 352/2170). It then travels north east between Portions 94/95 and 93 and then south east between Portion 93 and a number of subdivisions. At the intersection of portions 92 and 93 it travels in a north easterly direction, and then follows the north-eastern boundary of portion 92, crosses road R103 to the existing Mearns pipeline route.

2.3 Break Pressure Tank at Gowrie Village

A new, larger Break Pressure Tank (BPT) which will serve both the MMTS-1 and MMTS-2 pipelines is required. The preferred location for the BPT was identified as Option C1 (Red dot on Figure 1). It is located on the southern side of the existing bowling green and immediately east (about 50m) of the existing tank on Portion 126 of Gowrie 130. This is close to the location of the existing tank, but further away from residences in the village, and closer to the P147 road that borders the west side of Gowrie village. An additional drainage pipeline (emergency overflow from the BPT), from the BPT towards the stream southwards, is also required.

The new BPT is in close proximity to the existing BPT and therefore would not impact excessively on the visual quality of the surrounding residential area. This is especially the case since the unattractive existing break pressure tank will be removed and a new, more visually appealing structure, with an architectural response sympathetic to the architectural theme of Gowrie Village will be constructed.

2.4 Gravity Main

The Gravity Main (8.3 km in length, 900 mm diameter pipe) transfers water from the break pressure tank (BPT) to the Mpofana outfall. This route was been divided into two sections, section D and E.

From a technical perspective the preferred route for the gravity main is the route following the existing servitude, as this route follows a good technical profile, much of the land conditions are known, the servitude is already registered, and additional land acquisition costs will not be required.

3. Description of the Affected Environment

3.1 Climate

The climate of the area is largely dependent on altitude. It is a summer rainfall area with lower lying areas receiving on average 800 mm rainfall a year, increasing to 1 280 mm for higher lying areas (Udidi, 2009). The south-easterly slopes are wetter than north westerly slopes due to moist air entering from the south east (Udidi, 2009). The western areas have a colder winter average temperature of 14°C compared to the slightly warmer eastern part (17°C) due to snowfalls in the west (Udidi, 2009). Altitude also affects temperature as indicated by Table 4.1, with Bishopstowe at an altitude of 838 m above sea level having a mean maximum temperature of 23.9°C and mean minimum temperature of 11.2°C, whereas Nottingham Road at 600 m higher in altitude has a mean maximum temperature of 21.3°C and a much lower mean minimum temperature of 6.1°C.

3.2 Topography

The eastern part of the area is considered to have gentle to moderate hills, whereas the
western part is considered to be mountainous, leading towards the Drakensberg (uMngeni IDP 2002). The project area is considered to have a gentle topography, with slightly undulating slopes between Nottingham Road and Rosetta (Plate 4.1).

The site area consists of many small streams which can become dangerous during flood events. The main rivers include the Mooi and Little Mooi Rivers which are popular for trout fishing (MMTS-2, 2002). The area has a number of dams which receive high volumes of tourists as well as recreational users. For example, 1997 statistics indicate 65,600 visitors for Hazelmere Dam, 25,000 visitors for Inanda Dam and 151,000 visitors for Midmar Dam (MMTS-2, 2002). The uMngeni and Karkloof Rivers flow into the popular Howick and Karkloof waterfalls on the eastern side of uMngeni.

3.3 Geology and Soils

The geology of the area is considered to be sedimentary rocks of the Beaufort and Ecca subgroups of the Karoo Super Group (DWAF 2009). Three different formations comprise the study site. The western part is sandstone of the Tarkastad formation, the centre is predominantly mudstones and sandstone of the Estcourt formation and the east is predominantly shale of the Volkrust and Pietermaritzburg formations (Udidi, 2009).

3.4 Vegetation and Floristics

The study area occurs within the Maputaland-Pondoland-Albany area of endemism (CI 2010). This biodiversity hotspot is approximately 274,000 km² and is located on the Eastern side of Southern Africa. This hotspot is formed by the joining of three centres of endemism (Maputaland, Pondoland and Albany). Six of South Africa’s eight terrestrial biomes converge within this hotspot and levels of floristic endemism are very high. The forests occurring in the region have the highest species richness of any temperate forests in the world. In terms of flora, the region boasts almost 2,000 endemic plant species, 39 endemic genera, and 1 endemic family. In terms of IUCN ratings, there are 323 Vulnerable species, 128 Endangered species and 83 Critically Endangered plant species in the hotspot (CI, 2010).

3.5 Fauna

In terms of the fauna, vertebrate diversity is represented by fourteen endemic bird species, 26 Vulnerable, 4 Endangered and 4 Critically Endangered species (CI, 2010). In addition, there are 63 endemic reptile species with very restricted distributions. There are 14 Vulnerable and 4 Endangered reptile species. Of the 202 mammal species, 8 species are endemic. Six Mammal species are Vulnerable, 6 Endangered, and 5 Critically Endangered. Of the amphibians occurring in the hotspot, 24 species are Endemic, 3 species are Vulnerable, 6 species Endangered and 2 species Critically Endangered (CI, 2010).

3.6 Conservation and planning tools

Several conservation planning tools are available for the area. These tools allow for the determination of any sensitive and important areas from a vegetation and faunal point of view at the scoping stage of a development. They allow for the fine-tuning of plans and layouts with a view to reducing potential environmental impacts at the planning stage of the development. The tools used are outlined in Table 4.8.

3.7 Land use

The project area has traditionally been dominated by an agrarian economy, with tourism recently playing an increasingly important role. There are various land uses along the
proposed route, namely agriculture, tourism, residential and amenities (golf course). The existing servitude runs in a south-westerly direction and transverses farmland for about half its length. However, at the boundary between Portions 85 and 276 it runs south through the Bill Barnes Crane and Oribi Reserve, which is a provincially declared reserve of some 440ha in extent.

The BPT is located within Gowrie Village on the southern side of the existing bowling green and immediately east (about 50m) of the existing tank on Portion 126 of Gowrie 130. This is close to the location of the existing tank, but further away from residences in the village, and closer to the P147 road that borders the west side of Gowrie Village.

3.8 Socio-Economic environment

The project is located in the uMgungundlovu District Municipality (UDM) of the KZN Midlands. More specifically, the site is couched inbetween two local municipalities, namely Mpofana and uMngeni.

The UDM covers an area of 8,500km$^2$ in the KZN Province (UDM, 2012a). Although the district's population is diverse, it is characterised by a distinct rural ambiance with a significant portion of the district covered by farmlands. The district includes major, well-developed urban centres which exhibit high order and diversified economic activity, as well as smaller, established agricultural service-based towns supporting a commercial agriculture and tourism industry. The district further includes peri-urban settlements and commercial to impoverished informal and rural settlements (ibid.).

The UDM bears the responsibility for providing water and sanitation services to all the local municipalities under its ambit. Consequently, it has positioned itself as a water-centric, results-driven and performance-orientated municipality, aiming to provide sufficient water to all its people (UDM, 2012). Although several challenges are imbedded in this sector, such as high water losses resulting from ageing water infrastructure, several developments have been initiated in recent years whose cumulative impacts on the region should be accounted for by this EIA. The IDP of the UDM outlines several water projects such as the Makhuzeni Greater Stoffelton Water Supply Scheme in the Impendle Local Municipality. This project is providing water to settlement such as Nkothweni, KwaThunzi and KwaGade (inter alia), and is providing employment to about 97 people.

3.9 Archaeological and paleontological features of the site

While several archaeological sites exist in the general area, most of these are of low significance as they are open sites that are in a secondary context. This general pattern was confirmed during the survey, where only large structures, or features, remain intact.

The heritage survey recorded eight heritage sites. Two of which are stone walled features as well as a few historical tree boundaries. The stone walled features would require mitigation before and during construction. The trees are alien species, however they may be protected since they form part of the cultural landscape.

4. Motivation for the Project

Thekwini Municipality's water demand exceeds its water storage supply. This was evident in 1983, when during a severe drought the Mears Emergency Transfer Scheme (METS) was implemented. With a transfer capacity of 3.2m$^3$/s, the METS enabled water to be transferred from the Mooi River to the Mgeni System, which supplies the eThekwini Municipality, thus preventing crippling water shortages.
The eThekwini Municipality receives potable water from the Mgeni River (Mgeni catchment) with a yield of 334 million m$^3$/yr (Central Spatial Development Plan, 2011). This system, with four major dams has no scope of further development and water must therefore be supplied from elsewhere. 98% of water supplied to eThekwini Municipality is located outside the municipal boundaries (eThekwini Municipality Metro, 1999). This means that eThekwini Municipality does not have direct control over its water supply, which results in competition of the resource with the surrounding areas (Pietermaritzburg) for future requirements.

The construction of the Spring Grove Dam will add a much needed 60 million m$^3$/yr to the Mgeni system benefiting six municipalities - the eThekwini Metropolitan Municipality, the uMgungundlovu District Municipality, the Msunduzi Local Municipality, Ugo Municipality, Sisonke Municipality and Ilembe Municipality (totalling five million people). The completion of this project will enable other water supply projects, such as the Greater Mpofana Bulk Water Supply which will supply Mpofana and uMngeni municipalities as their water demand continues to increase.

5. Alternatives Considered

The proposed project is a linear development which traversers residential areas, nature reserves and a golf course. In order to facilitate an analysis of the various route alignment options, the overall route from the Spring Grove Dam to the discharge point on the Mpofana River was divided into the following sections:

**Rising Main**
- **Section A**: from Spring Grove Dam eastwards for approximately 1.1km to the boundary between portions 98 and 96 of farm Springvale 2170 (Figure 7-1).
- **Section B**: from the boundary between Portions 98 and 96 of Farm Springvale 2170 to the boundary between Portions 161 and 7 of farm Springvale 2170 (Figure 7-1).

**Break Pressure Tank**
- **Section C**: a short section from the end of Section B along the existing MMTS-1 pipeline servitude to the second location for the break pressure tank in Gowrie Village.

**Gravity Main**
- **Section D**: from the break pressure tank to the end of the Gowrie Golf course boundary (Figure 7-1).
- **Section E**: from the Gowrie Golf Course boundary to the discharge point of the Mpofana River.

Five options were considered for the pipeline from the pumping station at Spring Grove Dam to the existing servitude. After the scoping phase of the EIA, and based purely on an analysis of the impacts associated with the routes in Section A, it was concluded that Options A1, A2, A3 and A4 should be taken forward in the EIA process.

**Option A2 and B2** – Option A2 (yellow line Figure 7.2) leads into Option B2 (yellow line Figure 7.1) for section B. In Section A Option A2 is a preferred option for this section of the route. However, the servitude in Section B traverses new land close to newly sub-divided portions, which will result in significant opportunity costs, and thus this option was not explored further in the EIA process.

**Option A3 and B3** – Option A3 and B3 (Brown line, Figure 7-2) resulted in the majority of impacts being classified as “option preferred” (16 impacts) and hence this option was explored further in the EIA process.
Options A4 and B4 – Option A4 and B4 (Broken blue line, Figure 7-2) results in seven impacts rated as “option possibly viable” and 12 as “option preferred”. However, one impact was rated as “option not viable” and hence this route was not investigated further in the EIA.

Option A5 and B5 – Option A5 and B5 (Orange blue line, Figure 7-2) resulted in the same number of impacts as Option A4/B4. Thus this route was also not investigated further in the EIA.

Option C2 (Yellow Dot on Figure 7-3) is located on the southern side of the bend that takes the pipeline from Portion 24 Gowrie 130 to Portion 83 Gowrie 130. It is situated on an open, grassed recreational area close to a stand of large trees. Option C2 will result in potentially unacceptable visual impacts, since the tank will be visible from a number of nearby properties and the location interrupts an attractive vista towards a farm dam. This position resulted in two impacts categorised as “option not viable”, and after a constructive discussion with the Gowrie Village Residents Association, there was overall consensus that Break Pressure Tank (BPT) location 2 be excluded from further analysis.

Thus, the preferred option for the new break pressure tank is option C1, which is located on the southern side of the existing bowling green and immediately east (about 50m) of the existing tank on Portion 126 of Gowrie 130. This is close to the existing location, but closer to the P147 Road that borders the west side of Gowrie village. Primary mitigation measures involve establishing a second access point through the existing gate opposite the bowling green, moving the electric fence eastwards to the existing BPT and alienating a piece of land from the estate during the construction period.

Option D1, the Blue Route (Figure 7.4) is an alternative route to that of the existing servitude, and runs in an easterly direction after it passes the break pressure tank, along the existing servitude to the boundary of portions 83 and 24 (the Gowrie Golf Estate). It then travels south in Portion 24 along the boundary with Portion 83, where it crosses the road. The route then follows the road within Portion 25 of Gowrie 1930.

Preferred Option D2, the existing servitude (red line, Figure 7-4) runs in a south-westerly direction from Gowrie and traverses Portions 83, 24 and 71 to the cadastral boundary between Portions 71 and 118. This route has to cross a wetland, an existing golf course on Portion 24, as well as an existing farm dam on Portion 71. However, the existing registered servitude is available for construction without requiring any permanent servitude compensation. During the refurbishment of the existing Mearns Pipeline during 2012, it is almost certain that maintenance work will be required on the section passing through the golf course and therefore disruption will be inevitable. The golf course was constructed on the existing servitude and it is assumed that this was with the knowledge that maintenance and potentially further work will be required. However, a re-alignment to the north of the dam, as indicated on Figure 7-4 (broken red and green lines) will be required. From a technical perspective the existing servitude is the preferred option (compared to option D1) through this area due to the reduced need for land acquisition.

Option D3 (green route). This route for the gravity main is an alternative route to that of the existing servitude (Option D2), which still remains a viable although less preferred option from an environmental perspective. This is due to the impacts on the wetland habitat located upstream of the dam. The Ecological and Wetland assessment therefore recommended that Option D3 be selected for this section (to avoid the Juncus kraussii wetland community above the dam). However, this route also requires a slight re-alignment as it slopes down the hill below Gowrie Golf Course to miss the band of indigenous forest above the main channel in Wetland 8 (see inset to Figure 7.4). Thus, although more complex this route mitigates almost all impacts on the golf course, and was suggested by the golf...
course members, as well as impacts on the \textit{Juncus} wetland, provided the re-alignment to avoid the Mistbelt forest patch is implemented.

In conclusion, Option D3 becomes the preferred option in terms of mitigating environmental and social impacts as it:

i. Avoids impacts on the \textit{Juncus} wetland above the dam.
ii. Reduces social impacts on the golf course associated with the construction phase as it avoids fairways and greens.
iii. With minor realignment it avoids the Mistbelt forest patch.

However, the establishment of a second servitude also results in a number of negative impacts, including requiring access for maintenance on two servitudes (maintenance/ refurbishment work will still be undertaken in this area around the dam in the DWA existing servitude), a reduction of development potential on option D3 as building on the servitude is not allowed, the cost of land acquisition and registering the servitude.

However, the most significant cost will be the re-alignment of the pipeline around the dam, as shown on Figure 7.4 (broken red and green lines). If Option D2 is selected, the costs of re-routing can be absorbed in the MMTS 2 costs, making it less costly as it will be an incremental rather than an additional cost. Furthermore, there will not be a requirement to conduct an additional EIA for this activity. The economic analysis was conducted on all three options, i.e. D2 (existing), D2 amended (route around the dam) and D3 (new servitude). It was found that the cost of following the existing servitude (D2) and relocating the existing pipeline (D2 as amended) is approximately R15 million less than option D3.

If option D3 is preferred then the current refurbishment activities on MMTS-1 may require draining the dam, in which case there is an unavoidable impact on the \textit{Juncus} wetland. A legal opinion regarding the legality of the dam has been sought, and it has become evident that the dam was constructed illegally. It is likely that a far smaller dam under drought conditions existed in close proximity to the MMTS-1 servitude, but after the construction of the MMTS-1 pipeline, the dam wall was raised and the size increased to the point where the pipeline became submerged. Therefore from a technical, economic and environmental perspective, D2 is preferred as both pipelines can be routed away from the dam and have minimal to no impact on the \textit{Juncus wetland}. Thus, although Option D3 is preferred form a social perspective, a firm commitment from TCTA and DWA will be required to implement this option, as it results in significant additional costs. If the primary mitigation is to reduce disruption to the golf course during the 4 to 6 month construction period (as the realignment around the dam mitigates wetland impacts), then it becomes difficult to justify the additional costs.

There is only one option for section E of the route and that is the route of the existing servitude. The final section of the servitude runs in a south-westerly direction through Portion 118 and 116. At the boundary between Portion 116 and 107 the servitude turns to a general southerly direction (Figure 7.5)

TCTA appointed BKS (Pty) Ltd in 2009 to compare and evaluate two transfer systems for transferring water from the Spring Grove Dam to the Mpofana River. The two options considered were the MMTS-2 pipeline as well as a gravity conveyance system through a tunnel (BKS, 2009). The proposed tunnel option comprises a tunnel from the Spring Grove Dam to the Mpofana River outfall, conveying the transfer water under gravity with a short length of gravity pipeline at the end.

\textbf{5.1 Alternative Technology}

The main differences between the two options is cost and time. 2009 estimates suggest the capital construction cost of the pipeline would be R258 million and construction costs of the
tunnel system would be R391 million. Secondly, it was estimated that the construction of the tunnel would take eight months longer than that of the pipeline. One of the reasons for this is that a geological plan indicated that the 9.8 km long tunnel will traverse 6.8 km of sedimentary rocks and 3 km of dolerite. The dolerite/sediment interface would present tunnelling challenges through this section (please refer to the report, Preliminary Assessment of Water Transfer System – Report 1, BKS July 2009) for a detailed analysis of the two options).

6. Key findings of the specialist studies

6.1 Archaeological and Paleontological Impact Assessment

There are four types of sites that require mitigation for the MMTS-2.

- Stone walling
- Stone terracing
- Historical tree boundaries
- Palaeontological sites

The stone walling at MM01 should not be disturbed due to the rarity of these features in the area. There needs to be a 5m boundary between the fence and the walling, and a 15m buffer between the fence and the pipeline. The existing pipeline may have already damaged part of the site. The pipeline will need to be placed on the western side of the existing pipeline. The fencing will need to be supervised by an archaeologist.

The terrace at MM02 has been partially damaged by the existing line. There are two options for the line. First, the line is moved ~40m southwest of the existing line, and thus not impact on the terrace. Second, the line continues in its current position; however, this area will need:

- To be monitored by an archaeologist for potential artefacts
- Minimum width for the pipe excavations
- Terracing on each side of the excavation needs to be sand-bagged during construction
- The terracing is replaced, with the same stones, after construction.

6.2 Ecological Impact Assessment

There is a lack of pristine terrestrial habitats in the general study area. In this case, the terrestrial fauna has been severely impacted upon by human activity. Vegetation clearing for cultivation is the primary impact on the natural habitats of the region. Several bird Species of Special Concern were recorded on site, notably the Grey Crowned (Balearica regulorum), Blue (Anthropoides paradiseus) and Wattled (Bugeranus carunculatus) Cranes, with a breeding pair of each of the latter two resident in the Bill Barnes Crane and Oribi Reserve.

All the wetlands within the study area have been impacted (primarily through the creation of impoundments, cultivation within their boundaries, water abstraction and invasion of alien vegetation). Most impacts on wetland functioning were found to be moderate, whilst impacts on endangered species were generally rated as high, due to the presence of Species of Special Concern.

From an ecological perspective, the preferred route option is therefore A1, B1, D3, E on the condition that D3 is amended as it drops down the steep hill below Gowrie Golf Course to avoid the patch Eastern Mistbelt Forest.

6.3 Traffic Study

Volumes of traffic, especially heavy vehicles, will be considerable during the construction
period. However, it is probable that volumes of heavy traffic related to construction of the pipeline and related structures - the break pressure tank, the Mpofana outfall, chambers and thrust blocks and the pump station will be small when compared with measured traffic volumes for the period prior to the construction of Spring Grove Dam, and during dam construction. The impacts of these heavy vehicle trips are expected to be low, and no mitigation measures are considered necessary other than careful management and the exercise of proper controls via the Traffic Management Plan.

However, the most significant impact is likely to arise from the delivery of large volumes of concrete for the major structural elements of the Spring Grove pumping station (base slab main walls and floor slab, for instance), and this is estimated to generate 60 truck trips a day on the R103, probably once a week for about 16 weeks. If crusher run and pipe bedding material are produced on site, then up to about 20 additional heavy vehicles a day can be expected to this road.

No significant traffic-related impacts are anticipated during the operation of the pipelines, unless major maintenance is required, in which case it is probable that consultation with the local population will may be required.

6.4 Receiving Streams Study

The channels of the receiving river should be surveyed before transfers from MMTS-2 are initiated to provide a per-operational baseline of their planforms prior to increasing the transfer rate. The survey should be geo-referenced to facilitate the determination of changes to planform that may occur in the future. The initial survey should be repeated after two years of operation, and at 5-yearly intervals thereafter until it can be reasonably concluded that the channel structure and planform have stabilised under the augmented flow regime. The requirement for such a survey should be included in the Operational EMPPr for the project.

Prior to initiation of increased transfers from MMTS-2 the entire length of the receiving river system should be inspected to identify locations where bank erosion has occurred. The photograph record compiled during the geomorphological monitoring programme, together with Hunter’s (2009) review of the programme, should be used to obtain a qualitative record of the changes.

Considerations should be given to managing transfer rates in sympathy with natural flow conditions to limit rapid fluctuations of water levels.

Eroded banks should be stabilised or reinforced using gabions and mattresses, or other appropriate techniques, under the guidance and supervision of an experienced fluvial geomorphologist.

Consideration should be given, within the operational constraints of the scheme, to managing the rate and timing of transfers in harmony with the natural flow regime of the receiving rivers, using the results from the gauging stations, so that the impacts of the transfers on naturally high or low flow rates in the rivers are not exacerbated.

It is not possible to explain the reasons behind the change in ecological categories (or lack thereof) for the monitoring sites without knowing the species composition of each sample taken at each site. The sporadic sampling procedure also prevents any meaningful inferences which can be made.

Once MMTS-2 is in operation, flow will change from a periodic release of up to 3.2 m³/s (as
the current condition) to a constant release of up to 4.5m³/s. This will alter stream characteristics, thereby altering stream habitats and consequently species composition of the receiving streams. Although species composition of the bio-monitoring data is unknown, a list of invertebrate preferences for a range of flow velocities is available (Appendix A). This can be used to invert possible changes in species composition. Umgeni Water must record and make available species composition of the biomonitoring sites. This will allow any changes in species composition to be identified once MMTS-2 is operational.

Table 1: Summary of Impacts

<table>
<thead>
<tr>
<th>Impact</th>
<th>Without Mitigation</th>
<th>With Mitigation</th>
<th>No-Go option</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ISSUE 1: Impacts on geology and topography</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact 2.1: Loss of vegetation communities (Option A1)</td>
<td>MODERATE -</td>
<td>LOW -</td>
<td>MODERATE -</td>
</tr>
<tr>
<td>Impact 2.2: Physical wetland habitat destruction (Option A1)</td>
<td>MODERATE -</td>
<td>LOW -</td>
<td>MODERATE -</td>
</tr>
<tr>
<td>Impact 2.3: Loss of habitat function, ecosystem services and associated biodiversity (Option A1)</td>
<td>MODERATE -</td>
<td>LOW -</td>
<td>MODERATE -</td>
</tr>
<tr>
<td>Impact 2.4: Loss of species of special concern (Option A1)</td>
<td>HIGH -</td>
<td>MODERATE -</td>
<td>MODERATE -</td>
</tr>
<tr>
<td>Impact 2.5: Loss of vegetation communities (Option A3)</td>
<td>HIGH -</td>
<td>LOW -</td>
<td>MODERATE -</td>
</tr>
<tr>
<td>Impact 2.6: Physical wetland habitat destruction (Option A3)</td>
<td>MODERATE -</td>
<td>LOW -</td>
<td>LOW -</td>
</tr>
<tr>
<td>Impact 2.7: Loss of species of special concern (Option A3)</td>
<td>MODERATE -</td>
<td>LOW -</td>
<td>LOW -</td>
</tr>
<tr>
<td>Impact 2.8: Loss of Indigenous vegetation (Option B1 &amp; B3)</td>
<td>HIGH -</td>
<td>MODERATE -</td>
<td>LOW -</td>
</tr>
<tr>
<td>Impact 2.9: Loss of vegetation communities (Option B1 &amp; B3)</td>
<td>HIGH -</td>
<td>LOW -</td>
<td>LOW -</td>
</tr>
<tr>
<td>Impact 2.10: Physical wetland habitat destruction (Option B1 &amp; B3)</td>
<td>HIGH -</td>
<td>MODERATE -</td>
<td>LOW -</td>
</tr>
<tr>
<td>Impact 2.11: Loss of habitat function, ecosystem services and associated biodiversity (Option B1 &amp; B3)</td>
<td>HIGH -</td>
<td>MODERATE -</td>
<td>LOW -</td>
</tr>
<tr>
<td>Impact 2.12: Loss of species of special concern (Option B1 &amp; B3)</td>
<td>HIGH -</td>
<td>MODERATE -</td>
<td>MODERATE +</td>
</tr>
<tr>
<td>Impact 2.13: Loss of vegetation communities (Option D2)</td>
<td>HIGH -</td>
<td>MODERATE -</td>
<td>MODERATE +</td>
</tr>
<tr>
<td>Impact 2.14: Physical wetland habitat destruction (Option D2)</td>
<td>HIGH -</td>
<td>MODERATE -</td>
<td>LOW -</td>
</tr>
<tr>
<td>Impact 2.15: Loss of habitat function, ecosystem services and associated biodiversity (Option D2)</td>
<td>HIGH -</td>
<td>MODERATE -</td>
<td>MODERATE +</td>
</tr>
<tr>
<td>Impact 2.16: Loss of species of special concern (Option D2)</td>
<td>HIGH -</td>
<td>MODERATE -</td>
<td>MODERATE -</td>
</tr>
<tr>
<td>Impact</td>
<td>Description</td>
<td>HIGH</td>
<td>MODERATE</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>Impact 2.17</td>
<td>Loss of Indigenous vegetation (Option D2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact 2.18</td>
<td>Loss of species of special concern (Option D2)</td>
<td>HIGH</td>
<td>MODERATE</td>
</tr>
<tr>
<td>Impact 2.19</td>
<td>Loss of habitat function, ecosystem services and associated biodiversity (Option D2)</td>
<td>MODERATE</td>
<td></td>
</tr>
<tr>
<td>Impact 2.20</td>
<td>Loss of Indigenous vegetation (Option D2)</td>
<td>HIGH</td>
<td>MODERATE</td>
</tr>
<tr>
<td>Impact 2.21</td>
<td>Loss of Indigenous vegetation (Option E)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact 2.22</td>
<td>Physical wetland habitat destruction (Option E)</td>
<td>LOW</td>
<td></td>
</tr>
<tr>
<td>Impact 2.23</td>
<td>Loss of habitat function, ecosystem services and associated biodiversity</td>
<td>LOW</td>
<td></td>
</tr>
<tr>
<td>Impact 2.24</td>
<td>Loss of species of special concern</td>
<td>HIGH</td>
<td>MODERATE</td>
</tr>
<tr>
<td>Impact 2.25</td>
<td>Habitat fragmentation – loss of ecological corridors</td>
<td>HIGH</td>
<td>MODERATE</td>
</tr>
</tbody>
</table>

**ISSUE 3: Surface and groundwater pollution**

- HIGH
- LOW
- No Impact

**ISSUE 4: Impacts on archaeological, palaeontological and/or historical features**

- Impact 4.1: Impact on MM01 (large circular stone walled kraal and two possible house floors)
- Impact 4.2: Impact on MM02 (stone walled terrace)
- Impact 4.3: Impact on Rows of Trees (MM03 - MM07)
- Impact 4.4: Impact on palaeontological features

- MODERATE
- LOW
- No Impact

**ISSUE 5: Impacts on air quality**

- MODERATE
- LOW
- No Impact

**ISSUE 6: Impacts on health and safety**

- Impact 6.1: Poor sanitation conditions
- Impact 6.2: Safety hazards

- LOW
- MODERATE
- LOW
- N/A

**ISSUE 7: Noise impacts**

- MODERATE
- LOW
- No Impact

**ISSUE 8: Impacts on security**

- MODERATE
- LOW
- No Impact

**ISSUE 9: Loss of land**

- Impact 9.1: Loss of agricultural land
- Impact 9.2: Loss of land

- MODERATE
- LOW
- N/A

**ISSUE 10: Visual Intrusion and Impacts on Property Values**

- Impact 10.1: Impact on property values

- MODERATE
- LOW
- N/A

**ISSUE 11: Socio-economic Impacts**

- Impact 11.1: Increased employment opportunities
- Impact 11.2: Disruption to Social Amenities

- LOW
- MODERATE
- LOW
- N/A

**ISSUE 12: Impacts on Traffic**

- Impact 12.1: Daily maximum heavy vehicle trips on Routes 1 and 3.

- MODERATE
- LOW
- N/A
Impact 12.2: Disruption of regular traffic flow, public safety and public inconvenience. 
- MODERATE
- LOW
- N/A

Impact 12.3: Overloading of trucks
- HIGH
- LOW
- N/A

### Operational Phase Impacts

**ISSUE 1: Impacts on Ecological Systems and Processes**

**Impact 1.1:** Invasion of alien species
- HIGH
- MODERATE
- HIGH

**ISSUE 2: Impacts of Traffic**

**Impact 2.1:** Congestion due to increase in traffic levels during the operation phase
- LOW
- LOW
- N/A

**ISSUE 3: Economic and future development rights impacts**

**Impact 3.1:** Increased water supply
- VERY HIGH
- VERY HIGH
- HIGH

**ISSUE 4: Impacts associated with access for maintenance purpose**

**Impact 3.1:** Disruption during routine maintenance
- MODERATE
- LOW
- N/A

**ISSUE 5: Change in Stream Characteristics**

**Impact 5.1:** Altering of habitats
- MODERATE
- MODERATE
- N/A

**Impact 5.2:** Reduction in food supply
- MODERATE
- MODERATE
- N/A

### 7. EAP’s Recommendation

A decision regarding whether to proceed with the proposed development should be based on weighing up the positive and negative impacts as identified and assessed by the independent specialists. In addition to the findings of the specialist studies, it is also necessary to consider the following when making a decision:

- The key environmental constraints and site sensitivities existing on site that require appropriate consideration in the project planning process, which have been identified and delineated in this report.
- That the majority of the impacts associated with the proposed project can be mitigated by implementing the recommendations contained in the EIAR and specialist studies.
- That the preferred route has taken into account the identified environmental sensitivities and constraints associated with the required infrastructure.
- That the project has socio-economic benefits through temporary and permanent job creation as was well as increased water supply to the surrounding water stressed areas.
- That the project proponent has taken the issues raised by interested and affected parties into consideration.
- That the EIA process has enabled the provision of accurate and relevant information required for informed decision making.

Based on the above, it is believed that with appropriate mitigation, the benefits of the proposed MMTS-2 Water Transfer System will outweigh the negative impacts. It is the opinion of the EAP that Environmental Authorisation for this project should be granted for the preferred alignment described in Section 10.1 above.

It is also recommended that:

2. An Environmental Control Officer (ECO) is appointed to ensure all recommendations in the EMP as well as mitigation measures are adhered to.

3. The nature of the authorisations required from DWA- general Authorisation of licence - must be explored with DWA.

4. TCTA obtain authorisation from DWA for:
   (i) Abstracting water from the Mooi River - s21(a), as an amendment to the existing authorisation.
   (ii) Laying pipes across wetlands - s21(i), and possibly s21(j)
   (iii) Constructing the Mpofana outfall - s21(c) & (i)
   (iv) Augmenting the flow of the receiving rivers - s21(i), as an amendment to the existing authorisation.

5. A permit for the removal of species of special concern must be obtained from the Ezemvelo KwaZulu-Natal.

6. Heritage permits are obtained from Amafa (Heritage KwaZulu Natali), the provincial heritage conservation agency for KwaZulu-Natal before construction proceeds.

7. The project takes cognisance of all findings and recommendations in this report (Chapters 8 and 9), as well as any that may be issued as a condition of authorisation in the Environmental Authorisation.

8. The Way Forward

Following public review, this Draft EIAR, together with the Specialist Volume (Volume 2) and the EMP (Volume 4), will be updated as necessary and finalised, incorporating any comments received. It will then be submitted to the DEA.

Upon thorough examination of the Final EIAR, the authority (the national Department of Environmental Affairs – DEA) will issue a decision, which either authorises the project or rejects the EIAR – in which case the DEA will request additional information or clarification of certain issues. Should an Environmental Authorisation be granted, it usually carries Conditions of Approval. The project proponent is obliged to adhere to these conditions.

Within a period determined by the competent authority, all registered I&APs will be notified in writing of (i) the outcome of the application, and (ii) the reason for the decision. The public or applicant (depending on the outcome of the authorisation) will then have time in which to appeal the decision should they wish to do so. The appeals procedure will also be communicated by the EAP. Any appeal must be submitted to the responsible Legal Officer at DEA.
# TABLE OF CONTENTS

## INTRODUCTION

1.1 BACKGROUND TO THE STUDY ................................................................. 1
1.2 THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS ................. 2
   1.2.1 The EIA Process to date ............................................................... 5
   1.2.2 The Environmental Impact Assessment Report .......................... 8
1.3 DETAILS OF THE EAP ....................................................................... 11
   1.3.1 Expertise of the EAP ................................................................ 11
   1.4 ASSUMPTIONS AND LIMITATIONS ................................................. 14

## 2. PROJECT DESCRIPTION

2.1 LOCATION OF THE STUDY AREA ...................................................... 15
2.2 TECHNICAL DESCRIPTION OF THE PROPOSED ROUTE AND ASSOCIATED INFRASTRUCTURE .................................................. 15
   2.2.1 The Spring Grove Dam Pumping Station ............................. 15
   2.2.2 Rising Main from the Pumping Station to the Break Pressure Tank at Gowrie ............................... 15
   2.2.3 Break Pressure Tank at Gowrie Village ............................... 20
   2.2.4 Gravity Main ................................................................. 20
   2.2.5 Outfall Works on the Mpofana River .................................... 25
2.3 CONSTRUCTION SCHEDULING ......................................................... 25
   2.3.1 Pipelines ........................................................................ 25
   2.3.2 Spring Grove pumping station ............................................. 27
   2.3.3 Break pressure tank ............................................................ 27
   2.3.4 Mpofana River outfall ......................................................... 27

## 3. LEGISLATED REQUIREMENTS

3.1 THE CONSTITUTION ........................................................................ 27
3.2 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA) (107 OF 1998) ............................................................... 28
3.3 THE NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (10 OF 2004) ................................................................. 29
3.4 THE NATIONAL FOREST ACT (84 OF 1998) .................................. 30
3.5 THE NATIONAL HERITAGE RESOURCES ACT (25 OF 1999) ........ 31
3.6 THE ATMOSPHERIC POLLUTION PREVENTION ACT (45 OF 1965) .................................................................................. 31
3.7 THE NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT (39 OF 2004) ................................................................. 32
3.8 OCCUPATIONAL HEALTH AND SAFETY ACT (85 OF 1993) .... 32
3.9 NATIONAL WATER ACT (36 OF 1998) .......................................... 33
3.10 HAZARDOUS SUBSTANCES ACT (15 OF 1973) ............................ 34
3.11 THE ENVIRONMENT CONSERVATION ACT (73 OF 1989) .......... 34
3.12 NATURE AND ENVIRONMENTAL CONSERVATION ORDINANCE (19 OF 1974) ................................................................. 35
3.13 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (59 OF 2008) ................................................................. 35
3.14 NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT (31 OF 2004) ................................................................. 36
3.15 CONSERVATION OF AGRICULTURAL RESOURCES ACT (43 OF 1983) ................................................................. 36
3.16 NATIONAL HERITAGE RESOURCES ACT (25 OF 1999) ............ 37
3.17 THE KWAZULU-NATAL HERITAGE RESOURCES ACT (4 OF 2008) .................................................................................. 37

## 4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 CLIMATE ......................................................................................... 39
4.2 TOPOGRAPHY ................................................................................ 39
4.3 GEOLOGY AND SOILS ................................................................. 39
4.4 VEGETATION AND FLORISTICS ................................................... 42
   4.4.1 Regional Vegetation ............................................................... 42
   4.4.2 Vegetation types in the study area ........................................ 42
4.5 FAUNA ......................................................................................... 49
   4.5.1 Habitats ........................................................................ 49
   4.5.2 Birds .............................................................................. 49
   4.5.3 Reptiles ........................................................................ 50
   4.5.4 Amphibians ..................................................................... 52
   4.5.5 Mammals ....................................................................... 53
   4.5.6 Wetlands ....................................................................... 55
5. NEED AND DESIRABILITY ASSESSMENT ................................................................................. 70

5.1 BENEFITS TO eTHEKWINI MUNICIPALITY ..................................................................... 70

5.2 REGIONAL BENEFITS OF THE SCHEME ....................................................................... 71

5.3 POSSIBLE BENEFITS OF THE DEVELOPMENT TO THE LOCAL COMMUNITY ............ 72

6. PUBLIC PARTICIPATION PROCESS ..................................................................................... 73

6.1 REGISTER OF INTERESTED AND AFFECTED PARTIES .............................................. 73

6.1.1 Division of the pipeline route into sections ................................................................. 73

6.1.2 Presentation on public participation to Spring Grove Dam EMC ................................. 74

6.1.3 Notification of directly impacted landowners and Focus Group Meetings ............... 74

6.2 NOTIFICATION OF APPLICATION FOR ENVIRONMENTAL AUTHORISATION ...... 75

6.2.1 Background Information Document (BID) ................................................................. 75

6.2.2 Comments and Registration Form ............................................................................. 75

6.2.3 Written Notification of the Application for Environmental Authorisation ............... 75

6.2.4 Advertisements.......................................................................................................... 75

6.2.5 Site notices ................................................................................................................. 75

6.3 NOTIFICATION OF AVAILABILITY OF THE DRAFT SCOPING REPORT ................... 75

6.3.1 Sites where DSR was placed .................................................................................... 76

6.3.2 Public Open Day (POD) and Public Meeting ........................................................... 76

Community Meeting ........................................................................................................ 76

Comments and Responses Report ................................................................................... 76

6.4 NOTIFICATION OF AVAILABILITY OF THE FINAL SCOPING REPORT .................. 77

6.5 NOTIFICATION OF ACCEPTANCE OF THE FINAL SCOPING REPORT ..................... 77

6.6 NOTIFICATION OF INCLUSION OF uMGENI WATER PIPELINE IN DWA SERVITUDE 77

6.7 NOTIFICATION OF AVAILABILITY OF THE DRAFT EIA REPORT AND EMP ......... 77

6.7.1 Sites where Draft EIA Report and EMP was placed ................................................... 77

6.7.2 Meetings to present the Draft EIA Report and EMP .................................................. 78

6.7.3 Comments and Responses Report ........................................................................... 78

6.8 NOTIFICATION OF ENVIRONMENTAL AUTHORISATION AND APPEAL PROCEDURE .... 78

ALTERNATIVES ...................................................................................................................... 80

7.1 FUNDAMENTAL ALTERNATIVES .................................................................................... 80

7.1.1 A different type of development ................................................................................. 80

7.1.2 A different location .................................................................................................... 80

7.2 ALTERNATIVE ALIGNMENTS ....................................................................................... 80

7.2.1 Alternative Routing for the Rising Main ..................................................................... 81

7.2.2 Alternative Locations for the Break Pressure Tank ..................................................... 85

7.2.3 Alternative Routing for the Gravity main ................................................................. 85

7.2.4 Alternative Design for Break Pressure Tank ............................................................... 90

7.3 ALTERNATIVE TECHNOLOGY ..................................................................................... 91

7.3.1 Tunnel option ............................................................................................................ 91

7.4 NO DEVELOPMENT ....................................................................................................... 92

8. KEY FINDINGS OF THE SPECIALIST STUDIES ................................................................ 93

8.1 ARCHAEOLOGICAL AND PALEONTOLOGICAL IMPACT ASSESSMENT ...................... 93

8.2 ECOLOGICAL IMPACT ASSESSMENT ........................................................................ 95

8.3 TRAFFIC IMPACT ASSESSMENT .................................................................................. 95

8.3.1 Route 1: N3 at Mooi River via R103 to Rosetta ......................................................... 96

8.3.2 Route 2: N3 at Nottingham Road Intersection via P147 to P147/R103 intersection in Nottingham Road .......................................................... 97
8.3.3 Route 3: R103 between Rosetta and Nottingham Road ................................................... 97
8.3.4 Route 4: R103 from P147/R103 interchange travelling south .......................................... 98
8.3.5 Comparison with measured traffic volumes ....................................................................... 98
8.3.6 Recommendations for Traffic impacts ............................................................................. 103
8.4 IMPACT ON RECEIVING STREAMS .................................................................................. 104
8.4.1 Biomonitoring .................................................................................................................. 105

9. IMPACT ASSESSMENT ........................................................................................................... 108

9.1 IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION PHASE ...................................... 108
  9.1.1 ISSUE 1: Impacts on geology and topography ............................................................... 108
  9.1.2 ISSUE 2: Impacts on Ecological Systems and Processes .............................................. 108
  9.1.3 ISSUE 3: Surface and groundwater pollution .............................................................. 129
  9.1.4 ISSUE 4: Impacts on archaeological, paleontological and/or historical features .......... 130
  9.1.5 ISSUE 5: Impacts on air quality ...................................................................................... 133
  9.1.6 ISSUE 6: Impacts on health and safety .......................................................................... 134
  9.1.7 ISSUE 7: Noise impacts .................................................................................................. 136
  9.1.8 ISSUE 8: Impacts on security .......................................................................................... 136
  9.1.9 ISSUE 9: Loss of land ..................................................................................................... 137
  9.1.10 ISSUE 10: Visual Intrusion and Impacts on Property Values ...................................... 138
  9.1.11 ISSUE 11: Socio-economic Impacts ........................................................................... 139
  9.1.12 ISSUE 12: Impacts on Traffic ...................................................................................... 140

9.2 IMPACTS THAT MAY RESULT FROM THE OPERATIONAL PHASE ...................................... 144
  9.2.1 ISSUE 1: Impacts on Ecological Systems and Processes .............................................. 144
  9.2.2 ISSUE 2: Impacts of Traffic ............................................................................................. 145
  9.2.3 ISSUE 3: Economic and future development rights impacts ......................................... 146
  9.2.4 ISSUE 4: Impacts associated with access for maintenance purpose ............................. 146
  9.2.5 ISSUE 5: Change in Stream Characteristics .................................................................. 147

10. CONCLUSION AND EAP’S RECOMMENDATIONS ............................................................... 149
  10.1 SUMMARY OF THE KEY FINDINGS OF THE EIA .......................................................... 149
  10.2 EAP’S RECOMMENDATION .............................................................................................. 153
  10.3 THE WAY FORWARD ........................................................................................................ 154

11. REFERENCES ........................................................................................................................ 156

APPENDIX A: PLAN OF STUDY FOR EIR: APPROACH TO THE ENVIRONMENTAL IMPACT
  ASSESSMENT .......................................................................................................................... 158
APPENDIX B: CURRICULUM VITAE OF EAP ............................................................................. 166
APPENDIX C: LETTER FROM DEA APPROVING SCOPING REPORT ........................................ 173
APPENDIX D: INFORMATION REQUESTED BY DEA .............................................................. 176
APPENDIX E: PUBLIC PARTICIPATION PROCESS SINCE SCOPING PHASE ............................ 178
TABLE 1.1: LISTED ACTIVITIES TRIGGERED BY THE PROPOSED DEVELOPMENT .................................. 2
TABLE 4.1: TEMPERATURE VARIABILITY WITH CHANGE IN ALTITUDE (SOURCE: UMGENI IDP, 2002) .................................................................................................................. 39
TABLE 4-2: SPECIES ENDEMIC TO THE VEGETATION TYPES (MOOI RIVER HIGHLAND
GRASSLAND, DRAKENSBERG FOOTHILL MOIST GRASSLAND AND MIDLANDS MISTBELT
GRASSLAND) FOUND IN THE STUDY AREA AND SURROUNDS ............................................. 48
TABLE 4-3: RED DATA LIST BIRDS WHICH MAY OCCUR IN THE AREA ........................................ 50
TABLE 4-4: REPTILES RECORDED FROM THE STUDY AREA AND SURROUNDS ....................... 50
TABLE 4-5: AMPHIBIANS WHICH MAY OCCUR IN THE STUDY AREA AND SURROUNDS ............ 52
TABLE 4-6: MAMMALIAN SPECIES LIKELY TO OCCUR ON THE STUDY SITE .......................... 53
TABLE 4-7: WETLANDS AND THEIR RESPECTIVE AREAS FOUND AND DELINEATED WITHIN
THE PROJECT AREA .................................................................................................................. 55
TABLE 4-8: CONSERVATION AND PLANNING TOOLS THAT NEED TO BE CONSIDERED FOR
THE PROPOSED PROJECT ......................................................................................................... 58
TABLE 8-1: RANKING OF EVALUATION CRITERIA ........................................................................ 162
TABLE 8-3: RANKING MATRIX TO PROVIDE AN ENVIRONMENTAL SIGNIFICANCE .................. 164

FIGURES
FIGURE 1.1: THE LOCATION OF THE PROPOSED DEVELOPMENT .............................................. 1
FIGURE 1.2: THE EIA PROCESS UNDER CURRENT LEGISLATION (NEMA REGULATIONS 2010) ........................................................................................................................................ 6
FIGURE 2.1: THE LOCATION OF THE PROPOSED DEVELOPMENT ............................................. 16
FIGURE 2.3: SKETCH OF THE CONSTRUCTION PROCESS OF MMTS-2 PIPELINE AND UMGENI
WATER PIPELINE .................................................................................................................... 19
FIGURE 2.9: ILLUSTRATION OF A CHAMBER ALONG THE PIPELINE ....................................... 22
FIGURE 2.7: THE ROUTE OPTIONS FOR SECTION D ..................................................................... 23
FIGURE 2.8: THE ROUTE OPTIONS FOR SECTION E ..................................................................... 24
FIGURE 2.9: POSITION OF NEW OUTFALL WORKS .................................................................... 25
FIGURE 4.2: SOIL PH WITHIN THE PROPOSED DEVELOPMENT AREA ....................................... 41
FIGURE 4.2: KZN WILDLIFE VEGETATION MAP OF THE STUDY AREA AND SURROUNDS .......... 43
FIGURE 4.3: MUCINA AND RUTHERFORD VEGETATION MAP OF THE STUDY AREA AND
SURROUNDS .............................................................................................................................. 44
FIGURE 4.4: VEGETATION MAP OF THE STUDY AREA ................................................................ 47
66
FIGURE 4.5: WETLANDS AND ALL PIPELINE ROUTE ALTERNATIVES WITHIN THE PROJECT
AREA ........................................................................................................................................... 56
FIGURE 4.6: CORRIDORS IN PROXIMITY TO THE PROPOSED PIPELINE ................................... 60
FIGURE 4.7: PROTECTED AREAS EXPANSION STRATEGY AND ITS PROXIMITY TO THE
PROPOSED PIPELINE ................................................................................................................ 61
FIGURE 4.8: TERRESTRIAL SYSTEMATIC CONSERVATION PLAN AND ITS RELEVANCE TO
THE PROPOSED PIPELINE ....................................................................................................... 63
FIGURE 4.9: LOCATION OF RECORDED SITES DURING THE SURVEY ...................................... 69
83
FIGURE 7-1: VARIOUS ROUTE ALTERNATIVES FOR THE WATER TRANSFER PIPELINE, AND
ROUTE SECTIONS WERE CONSIDERED .................................................................................. 83
FIGURE 7.2: VARIOUS ROUTE ALTERNATIVES SECTION A (PUMPING STATION TO EXISTING
SERVITUDE) WERE CONSIDERED ......................................................................................... 84
FIGURE 7-3: OPTIONS FOR THE LOCATION OF THE NEW BREAK PRESSURE TANK IN
SECTION C .................................................................................................................................. 86
FIGURE 7.5: EXISTING BREAK PRESSURE TANK (A) AND DESIGN OF BPT PROPOSED IN 2009
................................................................................................................................................... 90
FIGURE 7.6: SUGGESTED ARCHITECTURAL RESPONSES FOR THE NEW BREAK PRESSURE
TANK ............................................................................................................................................. 91
FIGURE 8.1: PALEONTOLOGICAL SENSITIVITY MAP FOR PIPELINE SOUTH OF NOTTINGHAM
ROAD ......................................................................................................................................... 94
FIGURE 8.2: ACCESS ROUTES TO SITE ...................................................................................... 96
FIGURE 8.3: HEAVY VEHICLE TRIPS ON ROUTE 1 ................................................................. 97
FIGURE 8.4: HEAVY VEHICLE TRIPS ON ROUTE 2 ............................................................. 97
FIGURE 8.5: HEAVY VEHICLE TRIPS ON ROUTE 3 ............................................................. 98
FIGURE 8.6: HEAVY VEHICLE TRIPS ON ROUTE 4 ............................................................. 98
FIGURE 8.7: DAILY MAXIMUM TRUCK TRAFFIC EXPECTED TO BE UTILISING ROUTE 1 IF THIS ROUTE IS USED TO DELIVER CONCRETE TO THE PUMPING STATION ...................... 99
FIGURE 8.8: DAILY AVERAGE TRUCK TRAFFIC EXPECTED TO BE UTILISING ROUTE 1 IF THIS ROUTE IS NOT USED TO DELIVER CONCRETE TO THE PUMPING STATION .................. 100
FIGURE 8.9: DAILY TRUCK TRAFFIC EXPECTED TO BE UTILISING ROUTE 2 DURING THE MMTS-2 CONSTRUCTION PERIOD ................................................................................. 100
FIGURE 8.10: DAILY MAXIMUM TRUCK TRAFFIC EXPECTED TO BE UTILISING ROUTE 3 IF THIS ROUTE IS USED TO DELIVER CONCRETE TO THE PUMPING STATION .............. 101
FIGURE 8.11: DAILY AVERAGE TRUCK TRAFFIC EXPECTED TO BE UTILISING ROUTE 1 IF THIS ROUTE IS NOT USED TO DELIVER CONCRETE TO THE PUMPING STATION ........ 102
FIGURE 8.12: DAILY TRUCK TRAFFIC EXPECTED TO BE GENERATED ON ROUTE 4 DURING THE MMTS-2 CONSTRUCTION PERIOD ................................................................. 102
1. INTRODUCTION

1.1 BACKGROUND TO THE STUDY

The proposed study site occurs within both the Mpofana and the uMngeni Local Municipal Areas in the KwaZulu-Natal Midlands in close proximity to Nottingham Road (Figure 1.1).

Figure 1.1: The location of the proposed development

The Mearns Emergency Transfer Scheme (METS) was constructed by DWAF in 1983, during a period of severe drought. The METS was constructed to augment the water supply of the Mgeni System via the Midmar Dam which was at serious risk of running dry and leaving the region’s population without water. This scheme was utilised for only a short period of time until the cycle of below average rainfall came to an end and Durban could revert back to habitual water resources. During a subsequent drought in 1993 the scheme was re-commissioned by Umgeni Water. The Mgeni catchment is currently at full capacity in terms of development and therefore any additional augmentation that will be required due to population increases, periods of drought, etc. will have to be obtained from other water catchments.

Construction of Phase 1 of the Mooi-Mgeni Transfer Scheme (MMTS-1), utilising the same infrastructure (pipeline and pump station) as the METS, began in 1999 and was completed in 2003. In addition to the existing infrastructure this phase also included an 8 m high diversion weir on the Mooi River at Mearns and an increase of 3.5 m to the wall height of the Midmar Dam to provide increased storage for transferred water.

Whilst MMTS-1 was under construction, DWA and Umgeni Water jointly initiated the
feasibility study of the second phase of the proposed Mooi-Mgeni Transfer Scheme (MMTS-2) in 2000. This proposed development comprised the construction of the Spring Grove Dam (a dam on the Mooi River at Spring Grove Farm, about 8 km upstream of the Mearns Weir near the town of Rosetta in the KwaZulu-Natal Midlands), a pump station and 2 gauging weirs, an artificial fish barrier weir on the Mooi River upstream of the Inchbrakie Falls on the farm Coldstream, and the construction of a transfer pipeline (including break pressure tank and outfall works) from Spring Grove Dam to the Mpofana. The final EIAR was submitted to DEA in January 2009 and was granted a positive Record of Decision (RoD) on 15 June 2009. This authorised the construction of the project activities, subject to specific conditions. Subsequently, two appeals were lodged against the RoD. The Mooi River Farmers Association appealed against the Spring Grove Dam since it was felt that other strategic resources were not considered, but this appeal was withdrawn. The second appeal was from the Mziki Homeowners Association and related to the lack of alternatives for the routing of the pipeline from the Spring Grove Dam to the existing servitude for the MMTS-1 pipeline. On 28 September 2010, the Minister of Justice and Constitutional Development upheld the appeal against the Water Transfer System, but allowed the construction of the dam, fish barrier and gauging weirs to proceed. Therefore this EIA process involves the proposed construction of the water transfer system only.

In accordance with the requirements of the National Environmental Management Act No. 107 of 1998 (NEMA), and relevant Environmental Impact Assessment (EIA) regulations made in terms of this Act (Government Notice No R.543) and promulgated in 2010, the proposed project requires a full Scoping and EIA.

### 1.2 THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The International Association for Impact Assessment (1999) defines an Environmental Impact Assessment (EIA) as, "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made."

The EIA process is guided by regulations made in terms of Chapter 5 of the National Environmental Management Act, No. 107 of 1998 (NEMA), published as Government Notice No R.543 in Government Gazette No 33306 of 2 August 2010. The regulations set out the procedures and criteria for the submission, processing and consideration of and decisions on applications for the environmental authorisation of activities.

Three lists of activities, published on 21st April 2006 and amended on 2nd August 2010, as Government Notice Numbers R.544, R.545, and R.546 define the activities that require, respectively, a Basic Assessment (applies to activities with limited environmental impacts), or a Scoping and Environmental Impact Assessment (applies to activities which are significant in extent and duration).

The activities triggered by the proposed development are listed in Table 1.1 below.

### Table 1.1: Listed activities triggered by the proposed development

<table>
<thead>
<tr>
<th>NUMBER &amp; DATE OF RELEVANT NOTICE</th>
<th>ACTIVITY NUMBER</th>
<th>DESCRIPTION OF LISTED ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNR 544</td>
<td>(9)</td>
<td>The construction of facilities or infrastructure exceeding 1000m in length for the bulk transportation of sewage and water, including storm water, in pipelines with - (i) an internal diameter of 0.36 metres or more; or</td>
</tr>
<tr>
<td>NUMBER &amp; DATE OF RELEVANT NOTICE</td>
<td>ACTIVITY NUMBER</td>
<td>DESCRIPTION OF LISTED ACTIVITY</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>(ii) a peak throughput of 120 litres per second or more. Excluding where: a) Such facilities or infrastructure are for bulk transportation of water or storm water drainage inside a road reserve; or b) Where such construction will occur within urban areas but further than 32 meters from a watercourse, measured from the edge of the watercourse.</td>
<td>(11)</td>
<td>The construction of: i. canals; ii. channels; iii. bridges; iv. dams; v. weirs; vi. bulk storm water outlet structures; vii. marinas; viii. jetties exceeding 50 square meters in size; ix. slipways exceeding 50 square meters in size; x. buildings exceeding 50 square meters in size; xi. infrastructure or structures covering 50 square meters 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.</td>
</tr>
<tr>
<td>(18)</td>
<td>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 or more than 5 cubic metres from: i. a watercourse; ii. the sea; iii. the seashore iv. the littoral active zone, an estuary or a distance 100 meters inland of the high-water mark of the sea or an estuary, whichever distance is greater. But excluding where such infilling, depositing, dredging, excavation, removal or moving: a. is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or occurs behind the development setback line.</td>
<td></td>
</tr>
<tr>
<td>(19)</td>
<td>Any activity which requires a prospecting right or renewal thereof in terms of section 16 and 18 respectively of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).</td>
<td></td>
</tr>
<tr>
<td>GNR 545 (10)</td>
<td>The construction of facilities or infrastructure for the transfer of 50 000 cubic meters or more water per day, from and to or between any combination of the following: i. water catchments; ii. water treatment works; or iii. impoundments. Excluding treatment works where water is to be treated for drinking purposes.</td>
<td></td>
</tr>
<tr>
<td>GNR 546 (4)</td>
<td>The construction of a road wider than 4 meters with a reserve less than 13.5 meters. (a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape provinces: i. in an estuary; ii. outside urban areas, in:</td>
<td></td>
</tr>
<tr>
<td>NUMBER &amp; DATE OF RELEVANT NOTICE</td>
<td>ACTIVITY NUMBER</td>
<td>DESCRIPTION OF LISTED ACTIVITY</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td></td>
<td>(aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (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 areas of a biosphere reserve; (hh) Areas seaward of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined.</td>
<td></td>
</tr>
<tr>
<td>(14)</td>
<td>The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for: (1) purposes of agriculture or afforestation inside areas identified in spatial instruments adopted by the competent authority for agriculture or afforestation purposes; (2) the undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the activity is regarded to be excluded from this list; (3) the undertaking of a linear activity falling below the thresholds in Notice 544 of 2010. (a) In Eastern Cape, Free State, KwaZulu-Natal, Gauteng, Limpopo, Mpumalanga, Northern Cape, Northwest and Western Cape provinces: i. All areas outside urban areas.</td>
<td></td>
</tr>
<tr>
<td>(16)</td>
<td>The construction of: i. jetties exceeding 10 square meters in size; ii. slipways exceeding 10 square meters in size; iii. buildings with a footprint exceeding 10 square meters or more; iv. infrastructure covering 10 square meters or more. Where such construction occurs within a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. (a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape provinces: i. in an estuary;</td>
<td></td>
</tr>
</tbody>
</table>
Because the proposed development triggers a listed activity from GNR.545, it requires a full Scoping and EIA. This process (Figure 1.2) is regulated by Chapter 3, Part 3 of the EIA regulations.

The applicants will be applying for a Water Use Licence (Issued by the Department of Water Affairs – DWA) in terms of the National Water Act (Act No. 36 of 1998) for any and/or all development that may be planned within 500 m of any wetland that may occur within the development footprint (a wetland specialist was consulted to delineate all seasonal wetlands on the proposed development site, refer to Chapter 9 of this report). It should be noted that Section 27(2) of the National Water Act states that a responsible authority may not issue a licence to itself without the written approval of the Minister. Water Use Licence applications fall outside the scope of this EIA and it is therefore up to the applicant to ensure that all authorisations are in place before construction commences. However, proof of application for these water use licences are available in Appendix D of this report as it was requested from DEA upon approval of the Scoping Report.

The competent authority that must consider and decide on the application for authorisation in respect of GNR 544-546 activities listed in Table 1.1 is the national Department of Environmental Affairs (DEA), and is the relevant authority which reviewed and approved the Scoping Report and subsequently will review the Environmental Impact Assessment Report (EIAR) and issue the environmental authorisation.

### 1.2.1 The EIA Process to date

The overall EIA process is summarised in Figure 1.2 below.
Figure 1.2: The EIA process under current legislation (NEMA Regulations 2010)
A detailed description of the Scoping phase for the proposed development and the outcomes thereof are included in Volume 1: Coastal & Environmental Services, July 2012: Final Environmental Scoping Report: Mooi-Mgeni Transfer Scheme – Phase 2, KwaZulu-Natal Province, South Africa, CES, Grahamstown”.

A Plan of Study (PoS) for the detailed EIAR phase was also submitted together with the Final Scoping Report (FSR), in fulfilment of section 28 (1) (n) of the EIA regulations (2010).

DEA advised the Environmental Assessment Practitioner (EAP) in terms of Regulation 31(1) (a) to, — proceed with the tasks contemplated in the PoS for environmental impact assessment i.e. the detailed EIA Phase.

DEA also requested that — comments from all relevant authorities be submitted to the Department with the Final Environmental Impact Assessment Report.

Following review of the FSR, DEA issued their approval of the FSR and PoS for EIA and instructed the EAP to proceed with the EIA Process as contemplated in the PoS on the 28th of August 2012 (Appendix C).

The aim of the detailed EIA Phase is to undertake a comprehensive evaluation and study that addresses all the issues raised in the Scoping Phase, and produce a report that contains all the relevant information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation 36. More specifically, the EIA Phase has seven key objectives:

- Describe the biophysical and socio-economic environment that is likely to be affected by the proposed development.
- Undertake specialist studies to address the key biophysical and socio-economic issues.
- Assess the significance of impacts that may occur from the proposed development.
- Assess the alternatives proposed during the Scoping Phase.
- Provide details of mitigation measures and management recommendations to reduce the significance of impacts.
- Provide a framework for the development of Environmental Management Plans (EMPs).
- Continue with the public participation process.

This EIAR phase includes the following steps:

1. **Specialist Studies**, which include the specialist assessments identified in the Scoping Report and any additional studies required by the authorities. This required the appointment of specialists to gather baseline information in their fields of expertise, to assess the impacts and make recommendations to mitigate negative impacts and optimise benefits.

2. **Environmental Impact Assessment Report**. The main purpose of this report, the EIAR, is to gather and evaluate environmental information, so as to provide sufficient supporting arguments to evaluate overall impacts, consider mitigation measures and alternative options, and make a value judgement in choosing the best development alternative.

3. **Comments Report**, which compiles comments, issues and concerns raised by I&APs during the EIAR review period and the authorities and the relevant responses to these comments.

**Environmental Management Programme**, which informs the client and the technical team of the guidelines which will need to be followed during construction and operation to ensure
that there are no lasting or cumulative negative impacts of these processes on the environment.

1.2.2 The Environmental Impact Assessment Report

In accordance with regulation 31 of GNR 543 of the EIA regulations which states that, "an environmental impact assessment report must contain all information that is necessary for the competent authority to reach a decision contemplated in terms of regulation 35 – Decisions on applications", the overall purpose of the EIAR is to communicate the findings of the EIA to the authorities in order to inform the decision as to whether or not to authorise the proposed project. More specifically, the objectives of the EIAR are to:

- Confirm which issues have been investigated further and addressed in the EIAR;
- Identify and assess impacts of feasible alternatives within the development proposal;
- Provide a comprehensive assessment of predicted impacts that may result from the proposed project, in accordance with the specified impact assessment methodology;
- Where alternatives have been assessed, make recommendations for the best practice environmental option (BPEO);
- Recommend actions to mitigate negative impacts or enhance benefits;
- Provide recommendations for monitoring programmes.

This report is the third of a number of reports produced in the EIA process. This EIAR has been produced in accordance with the requirements as stipulated in Section 31 (2) of the EIA regulations (GNR 543), which clearly outlines the content of environmental impact assessment reports, and Chapter 6 (GNR 543) which covers the activities necessary for a successful Public Participation Process (PPP).

Nature of this Report

In accordance with the EIA Regulations (2010), an EIA report must contain all the information that is necessary for the competent authority to consider the application and to reach a decision (Table 1.2).

Table 1.2: EIA regulation requirements and structure of the report

<table>
<thead>
<tr>
<th>EIA Regulation Requirements</th>
<th>Section/Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Details of the Environmental Assessment Practitioner (EAP) and their expertise</td>
<td>Section 1.3</td>
</tr>
<tr>
<td>A detailed description of the proposed activity</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>A description of the property on which the activity is to be undertaken and the location of the activity on the property</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>A description of the environment that may be affected by the activity and the manner in which it may be affected</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>Details of the public participation process conducted</td>
<td>Chapter 5 and Appendix E</td>
</tr>
<tr>
<td>A description of the need and desirability of the proposed activity</td>
<td>Chapter 6</td>
</tr>
<tr>
<td>Identification of potential alternatives to the proposed activity</td>
<td>Chapter 7</td>
</tr>
<tr>
<td>An indication of the methodology used in determining the significance of potential environmental impacts</td>
<td>Appendix A</td>
</tr>
<tr>
<td>A description and comparative assessment of alternatives</td>
<td>Chapter 7</td>
</tr>
<tr>
<td>A summary of the findings and recommendations of specialist reports.</td>
<td>Chapter 8</td>
</tr>
</tbody>
</table>
EIA Regulation Requirements | Section/Chapter
---|---
A description of all environmental issues, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures | Chapter 9
A description of any assumptions, uncertainties and gaps in knowledge | Section 1.4
An opinion as to whether the activity should or should not be authorised | Chapter 10
An environmental impact statement which contains a summary of the findings and a comparative assessment of the positive and negative implications. | Chapter 10
A Draft Environmental Management Programme (EMPr) | Volume 4
Copies of the Specialist Reports | Volume 2
Any additional information that may be required by the competent authority. | Appendix D

In line with Table 1.2, this report, which forms Volume 3 of the suite of EIA documents related to the proposed project, is structured as follows:

**Chapter 1 – Introduction:** Provides background information on the proposed project, a brief description of the EIA process required by NEMA and its regulations, and describes the key steps in the EIA process that have been undertaken. The details and expertise of the Environmental Assessment Practitioner (EAP) who compiled this report are also provided in this Chapter.

**Chapter 2 – Project Description:** Provides a detailed description of the proposed development, the properties on which the development is to be undertaken and the location of the development on the properties.

**Chapter 3 – Relevant Legislation:** Provides details of all relevant legislation that was taken into account during the environmental impact assessment process.

**Chapter 4 – Description of the Affected Environment:** Provides a description of the environment that may be affected by the proposed activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected.

**Chapter 5 – Public Participation Process:** Provides details of the public participation process conducted in terms of regulation (31) sub-regulation (1) including:

- Steps undertaken in accordance with the Plan of Study (PoS);
- A list of all persons, organisations and organs of state that were identified and registered as I&APs in relation to the application;
- A summary of the comments received from, and a summary of the issues raised by registered I&APs, the date of receipt of these comments and the response of the EAP to those comments; and
- Copies of any representations, objections and comments received from registered I&APs.

**Chapter 6 – Need and Desirability:** Provides a description of the need and desirability of the proposed activity, including advantages and disadvantages of the proposed activity.

**Chapter 7 – Alternatives:** Provides a description of the alternatives to the proposed...
development or parts of the proposed development. It also includes a comparative assessment of viable alternatives.

**Chapter 8 – Methodology for Assessing Impacts:** Provides an indication of the methodology used in determining the significance of potential environmental impacts.

**Chapter 9 – Key Findings of the Specialist Studies:** This Chapter summarises the findings of the specialist studies which are included in full in *Volume 2: Mooi-Mgeni Transfer Scheme – Phase 2, KwaZulu-Natal Province, South Africa: Specialist Report (CES, October 2012).*

**Chapter 10 – Assessment of Impacts:** Provides -

- A description of all environmental issues relating to all phases of the proposed development that were identified during the EIA process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures.
- An assessment of each identified potentially significant impact, including:
  1. Cumulative impacts;
  2. The nature of the impact;
  3. The extent and duration of the impact;
  4. The probability of the impact occurring;
  5. The degree to which the impact can be reversed;
  6. The degree to which the impact may cause irreplaceable loss of resources; and
  7. The degree to which the impact can be mitigated.

**Chapter 11 – Conclusions and Recommendations:** Provides –

- An opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.
- An environmental impact statement which contains –
  1. A summary of the key findings of the environmental impact assessment; and
  2. A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives.

**Chapter 12 – References:** Cites any texts referred to during preparation of this report.

**Appendices**

**Volume 1 - Final Scoping Report:** The FSR has already been submitted to and approved by the DEA (Appendix D). This report is not included in the Final EIA submission as it has already been approved by the Department.

**Volume 2 - Specialist Reports:** Provides copies of the specialist reports complying with Regulation 32 of the EIA Regulations (GNR 543).

**Volume 3 – Environmental Impact Assessment Report:** This report represents the draft EIAR that will be released for public review upon submission to DEA.

**Volume 4 - Environmental Management Programme:** Provides an Environmental Management Programme (EMP) that complies with Regulation 33 of the EIA
Regulations (GNR 543).

1.3 DETAILS OF THE EAP

In terms of Section 31 (2), an environmental impact assessment report must include –

(a) The details of -
   i. The EAP who compiled the report; and
   ii. The expertise of the EAP to carry out an environmental impact assessment.

In fulfilment of the above-mentioned legislative requirement as well as Section 17 of the EIA Regulations (2010) which states that, “an EAP must have expertise in conducting environmental impact assessments, including knowledge of the Act, these Regulations and any guidelines that have relevance to the proposed activity”, provided below are the details of the Environmental Assessment Practitioner (EAP) that prepared this Environmental Impact Assessment Report (EIAR) as well as the expertise of the individual members of the study team.

Coastal and Environmental Services (CES)
Physical Address: 67 African Street, Grahamstown 6139
Postal Address: P.O. Box 934, Grahamstown 6140
Telephone: +27 46 622 2364
Fax: +27 46 622 6564
Website: www.cesnet.co.za
Email: t.avis@cesnet.co.za

1.3.1 Expertise of the EAP

CES is one of the largest specialist environmental consulting firms in southern Africa. Established in 1990, and with offices in Grahamstown, East London and Port Elizabeth in South Africa and Maputo in Mozambique, we primarily specialise in assessing the impacts of development on the natural, social and economic environments. CES’s core expertise lies in the fields of strategic environmental assessment, environmental management plans, environmental management systems, ecological/environmental water requirements, environmental risk assessment, environmental auditing and monitoring, integrated coastal zone management, social impact assessment and state of environment reporting. In addition to adhering to all relevant national legislative requirements, which we are often required to review and summarise for specific projects, acquisition of equity funding from the majority of financial institutions demands that developments must meet certain minimum standards that are generally benchmarked against the Policy and Performance Standards of the International Finance Corporation and the World Bank Operational Directives and Policies. The quality of our work during our long and extensive association with heavy mineral mining in Africa (we have worked on large projects in South Africa, Mozambique, Malawi, Kenya, Madagascar and Egypt) has been acknowledged by international lenders such as the World Bank and the International Finance Corporation, and the large mining companies continue to approach us as their preferred environmental consultant for this type of project.

Provided below are short curriculum vitae (CVs) of each of the team members involved in the proposed Mooi-Mgeni Transfer Scheme – Phase 2 development.

Dr Ted Avis (Project Leader and Report Reviewer)
Ted is a leading expert in the field of Environmental Impact Assessments, having project-managed numerous large-scale EIAs to international standards (e.g. World Bank and International Finance Corporation). Ted has also project managed and provided professional
input to the State of Environment reports and Strategic Environmental Assessments produced by CES.

**Dr Chantel Bezuidenhout (Project Manager and Report Production)**
Chantel holds a MSc and PhD in Botany and a BSc degree in Botany and Geography from NMMU. Chantel's main focus is estuarine ecology and as a result she has been involved in a number of ecological reserve determination studies. Recently she has been focused on environmental management and has been involved in number of environmental impact assessments and management plans. She is currently employed in the Grahamstown office of CES.

**Ms Lara Crous (Report Production)**
Lara holds a BSc (Environmental Science and Geography) as well as a BSc Honours (Environmental Science) from Rhodes University. Her honours thesis evaluated Grahamstown's Municipal water supply, focussing on aluminium for which she received a distinction. She is currently writing up her MSc (fisheries science) thesis on using constructed wetland technology in the treatment and beneficiation of brewery effluent. Lara presented her preliminary results at the International Water Association’s conference on Wetland Systems for Water Pollution Control in Venice, 2010. She is interested in environmental, municipal and effluent water quality.

**Internal Specialists**

**Mr Bill Rowlston (Receiving Streams)**
Bill has more than 35 years experience in the English and South African water sectors. He spent 24 years with the Department of Water Affairs and Forestry in Pretoria, where he contributed to the development of approaches for protecting water resources, including the determination of the ecological Reserve. Bill was closely involved with the development of the National Water Policy (1997) and the National Water Act (1998), and was responsible for compiling the National Water Resource Strategy, First Edition (2005), much of which he wrote. He also supervised the development of guidelines for the preparation of sub-national catchment management strategies. He joined CES in April 2007.

**Mr Jadon Schmidt (Wetland and Ecological Assessment)**
Jadon holds a BSc degree in Geology and Botany, a BSc Honours degree in Botany (both from NMMU) and an MBA from Rhodes University with a core environmental management & sustainability focus. His MBA thesis addressed resource economic issues of marine protected areas. He is currently completing an MSc in estuarine ecology dealing specifically with sea level rise impacts on sediment and vegetation dynamics. Climate change, wetland ecology, renewable energy and resource economics are among his professional interests.

**Ms Tarryn Martin (Ecological Assessment)**
Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and a MSc with distinction in Botany from Rhodes University. Tarryn's Master’s thesis examined the impact of fire on the recovery of C3and C4Panicoid and non-Panicoid grasses within the context of climate change. She has spent time at Rhodes University working as a research assistant and has spent many years working within the corporate tourism industry as a project manager. Her research interests include biodiversity conservation, ecotourism and climate change.

**External Specialists**

**Gavin Anderson (Heritage Specialist)**
Gavin holds a BA (Soc. Sci), BA (Hons) and an M.Phil (in archaeology and social
psychology) degree from the University of Cape Town. His honours thesis examined the artefacts from Andriesgrond Cave, Clanwilliam. His M. Phil combined archaeology and social psychology theory to evaluate the social and gender identities of San hunter-gatherers and Khoikhoi herds of the Western Cape over the last 4000 years. This included analyses of rock paintings, stone tools, beads, etc. Gavin started working for the Natal Museum (Pietermaritzburg) in 1994, where he was the CEO of the Institute for Cultural Resources Management that undertook archaeological impact assessments. In 2004 Gavin And Louise Anderson started Umlando and undertakes Archaeological and Heritage impact assessments. Gavin has two popular books published on San paintings.

NMA Effective Social Strategists (Public Participation Process)
NMA Effective Social Strategists (Pty) Ltd is a fully HDI and woman owned consulting practice that specialises in the fields of Social Research, Social Facilitation and Community Participation for a wide range of Development Projects. Formerly known as Thebe Development Consultants (Pty) Ltd, the subsidiary Company was formed in 1995 by Thebe Properties (Pty) Ltd, which was a company within Thebe Investment Corporation. In January 1998 Thebe Development Consultants (Pty) Ltd was purchased by Nomi Muthialu, its Executive Manager, as a going concern and launched as Nomi Muthialu & Associates (Pty) Ltd. In 2006 the company changed its name to NMA Effective Social Strategists (Pty) Ltd.

NMA has a small dedicated team of 12 professionals specialising in social processes and public participation. The company’s head office is based in Johannesburg.

NMA has extensive experience conducting public participation processes for the planning and implementation of large development projects and has specific experience in undertaking the public participation component on numerous Environmental Impact Assessments, both for Basic Assessments and for Scoping and EIA. NMA also has extensive experience in conducting the public participation process on EIAs for linear projects. NMA undertook the public participation for the EIA for the proposed N2 Wild Coast Toll Highway between Gonubie outside East London and Isipingo outside Durban. The national Department of Environmental Affairs has said that this is the largest EIA ever undertaken in South Africa with more than 17 000 interested and affected parties registered on the project database.

Ms Nomi Muthialu (Managing Director)
Ms Muthialu has a Bachelor of Arts Degree (Psychology), a Master’s in Business Administration and several diplomas and certificates in Public Participation and Social Impact Assessment. She is Vice President of the Southern African Affiliate of the International Association for Public Participation (IAP2) and Deputy Presiding Member of the International Federation Board of IAP2. She has extensive experience in Social Research, Public Participation and Social Impact Assessment, and started working as a practitioner in 1990. She has been responsible for the strategy formulation, project management and implementation of the public participation component of numerous large development projects (for both the planning and implementation phases) and on a number of EIAs including several large linear projects. These projects include the Berg Water Project, the N2 Wild Coast Toll Highway, the N1 N2 Winelands Toll Highway and the N4 Witbank to Maputo Toll Road. She has been the Managing Director of NMA Effective Social Strategists (Pty) Ltd since 1998.

Mr Julian Drew (Senior Project Manager)
Mr Drew holds a BSc in Civil Engineering and a certificate in Social Impact Assessment. He has 22 years’ experience in the field of public participation, social facilitation and social research and has been the project manager for the public participation process on several large linear EIAs. These EIAs include the Eskom Bantamsklip Transmission Lines in the
Western Cape, the N1 N2 Winelands Toll Highway and the N2 Wild Coast Toll Highway which, according to the Department of Environmental Affairs, was the largest public participation process ever undertaken for an EIA in South Africa. He is also an experienced freelance journalist and was a lecturer at the Institute for the Advancement of Journalism.

Ms Dilona Somai (Project Coordinator)
Ms Somai holds a BSc in Geography and Environmental Management and is currently undertaking a BSc Honours degree in Environmental Management. She has worked as an Education Officer in the environmental sector and is currently employed as a Project Coordinator at NMA Effective Social Strategists (Pty) Ltd in Johannesburg.

1.4 ASSUMPTIONS AND LIMITATIONS

The following limitations and assumptions are implicit this report –

- The primary assumption underpinning this EIA and the individual specialist studies upon which this EIAR is based is that all information received from the proponent (Trans Caledon Tunnel Authority) and other stakeholders including registered I&APs was correct and valid at the time of the study.
- To ensure that the significance of impacts were not under-estimated, the specialists assessed impacts under the worst-case scenario situation.
2. PROJECT DESCRIPTION

2.1 LOCATION OF THE STUDY AREA

THE STUDY AREA is located in the Midlands of Kwazulu-Natal, split between the Mpofana and uMngeni Local Municipalities in the north and south respectively. It trends in a broad north-east/ south-west band where the town of Rosetta marks the northern limit while the southern extent is delineated by the Mpofana River, with the village of Nottingham Road forming the approximate centre (Figure 2.1). The Spring Grove Dam wall (currently under construction) forms the boundary in the north-west (2 km south-west of Rosetta Village and 8 km upstream of the Mearns Weir) and the outfall weir at the Mpofana River is the boundary in the south-east.

2.2 TECHNICAL DESCRIPTION OF THE PROPOSED ROUTE AND ASSOCIATED INFRASTRUCTURE

2.2.1 The Spring Grove Dam Pumping Station

A 5.8 MW pump station, with a maximum pumping capacity of 4.5 m³/s, will be located immediately downstream of the Spring Grove Dam on the right bank of the Mooi River (Figure 2.2). The pump station is proposed to be positioned as close to the dam outlet works as possible. The structure is, therefore, also advantageously situated from an environmental point of view, as it is relatively well shielded from the surrounding dwellings by the topography.

The Eskom switch yard has been positioned immediately below the dam on a relatively flat area, which removes the need for extensive earthworks. The need to create sufficient Net Positive Suction Head meant that the floor level had to be positioned at or below an elevation 1 403 masl. The dam tailwater curves show that this level is equivalent to the 1:200 year flood.

2.2.2 Rising Main from the Pumping Station to the Break Pressure Tank at Gowrie

The Rising Main is comprised of a pipeline from the pumping station (at Spring Grove dam) to the existing servitude as well as a pipeline adjacent to the existing servitude to the Break Pressure tank in Gowrie Village. The primary aim for the rising main is to reach the existing registered servitude as quickly as possible so as to reduce the costs and time associated in land acquisition. The existing servitude also provides a route with readymade access, a favourable profile and known conditions.

The preferred option (Option A1 – purple line Figure 2.2) for the section from the pumping station to the existing servitude was chosen from five options (discussed in chapter 7), as this route alignment eliminates all impacts associated with Section B, since it links in early with the existing servitude (Option B1). Options A3 and B3 were, however, also explored further in the EIA process.

The pipeline (1600 mm in diameter and 2.5 km in length) crosses from the Spring Grove Dam to the road just east of Portion 233. At the road between Portions 233 and Portions 103/104 of the Farm Springvale 2170, the route turns southwards to follow the road. The route then turns eastward along the boundary between Portions 103 and 104 of the Farm Springvale 2170 and continues eastward between Portions 95 and 146 (and its sub division 352/2170), It then travels north east between Portions 94/95 and 93 and then south east
Figure 2.1: The location of the proposed development
Figure 2-2: Preferred route for the MMTS-2 pipeline
between Portion 93 and a number of subdivisions. At the intersection of portions 92 and 93 it travels in a north easterly direction, and then follows the north-eastern boundary of portion 92, crosses road R103 to the existing Mearns pipeline route. The pipeline (1600 mm in diameter and 4.11 km in length) will then follow the existing MMTS-1 pipeline route which runs in a south easterly direction and transects Portion 85 of the Farm Springvale 2170. From the border between Portion 85 and Portion 276/2170 it runs in a southerly direction and transects Portion 90 before it reaches Gowrie Village. The width of the servitude for the rising main will be 40 m during construction (15 m temporary servitude in addition to the 25 m servitude) and 25 m during operation.

*Inclusion of Umgeni Water Pipeline*

Umgeni Water is establishing a potable bulk water supply scheme to service the Mpofana and uMngeni Local Municipalities in the Natal Midlands. The intent is to improve and increase local potable water supply to the towns of Mooi River, Rosetta, Nottingham Road, Balgowan, Lidgetton, Lions River, Mount West and surrounding areas. The overall scheme has been the subject of an Environmental Impact Assessment (Terratest, 2011). The proposed scheme would source water from the proposed Spring Grove Dam. The Water Treatment Works and associated infrastructure is proposed to be located on Property 233/2170 and 234/2170 of Spring Grove, as this location is in close proximity to both the Spring Grove Dam and the proposed MMTS-2 infrastructure, with which the proposed Water Treatment Works and associated infrastructure must be linked. This property has been expropriated by the TCTA.

To minimise environmental and construction related impacts, and reduce the need to establish new servitudes, UW, TCTA and DWA have discussed the possibility of including the UW pipeline within the existing MMTS-1 servitude where possible. Thus, the UW pipeline (660 mm diameter) will be included within the servitude of the rising main and existing pipeline. The UW pipeline will follow the route of the MMTS-2 rising main and, at Gowrie, the UW pipeline will extend further eastwards (along road R103) over a distance of approximately 2.2 km. Both pipelines will be constructed at the same time, but the laying of the UW pipeline will lag behind the MMTS-2 pipeline by approximately 1500 m (Figure 2.3). This means the period for construction of the pipelines should not be extended by a significant period (maybe a month).

The UW pipeline was to originally follow another route on the west side of the road (blue line Figure 2.4). This would have meant that UW would have to register an additional 5.7 km of servitude. For economic, logistical and environmental reasons (going through sensitive areas as well) it was decided to include the UW pipeline within the MMTS-2 servitude as there is enough space to accommodate the two pipelines side by side, which would reduce the length of disturbance (3 km instead of 5.7 km). This would minimise the social impacts, i.e. nuisance factor to landowners, negate the need to acquire additional land and register an additional servitude and reduce the environmental impact i.e. traverse through fewer sensitive areas. Furthermore, it’s logical and cost effective to construct both pipelines at the same time, as only a single rehabilitation activity is required.

The environmental impacts associated with including the UW pipeline along a 3 km length of the MMTS-2 servitude is also assessed in this report. Although include in this EIA, it needs to be borne in mind that the UW EIA process requires a positive environmental authorisation before this section of the pipeline can be constructed. If the UW EIA process is delayed or should they receive appeals on their process this will cause delays, and given the urgency to complete the MMTS-2 pipeline, it is possible that of the transfer pipeline may proceed without the UW potable pipeline.
Figure 2.3: Sketch of the construction process of MMTS-2 pipeline and Umgeni Water pipeline.

Figure 2.4: Original path of the Umgeni Water pipeline (Blue Route) and the shared route (Red line) of the Umgeni Water pipeline with the new MMTS-2 pipeline.
2.2.3 Break Pressure Tank at Gowrie Village

A new, larger Break Pressure Tank (BPT) which will serve both the MMTS-1 and MMTS-2 pipelines is required. The preferred location for the BPT was identified as Option C1 (Figure 2.2). It is located on the southern side of the existing bowling green and immediately east (about 50m) of the existing tank on Portion 126 of Gowrie 130. This is close to the location of the existing tank, but further away from residences in the village, and closer to the P147 road that borders the west side of Gowrie Village. An additional drainage pipeline (emergency overflow from the BPT), from the BPT towards the stream southwards, is also required.

The new BPT is in close proximity to the existing BPT and therefore would not impact excessively on the visual quality of the surrounding residential area. This is especially the case since the unattractive existing break pressure tank will be removed and a new, more visually appealing structure, with an architectural response sympathetic to the architectural theme of Gowrie Village will be constructed.

Pipeline routes from the proposed new break pressure tank towards the south - Technically the best position for the new drainage pipeline is on the western side of the two existing pipelines. Space to the west is limited but it is feasible to install the new drainage line as indicated on the layout in Figure 2.6 (yellow lines on figure). The plan is to space the new gravity main approximately 8m to the east of the existing pipeline, to reduce the risk of damage to the existing pipeline during construction and to allow adequate space for scour valve chambers (built off-centre from the pipelines). This route is shown as the broken orange line on Figure 2.6.

Pipeline route towards the east

Five of the properties on the southern side of the layout encroach onto the DWA servitude with the existing pipeline installed within three of the properties. Technically the best position for the new pipeline would be on the northern side of the existing pipeline as indicated on the layout. The new pipeline cannot cross over the existing one, as this is technically difficult and could result in damage to the existing pipeline. Further to the east along the pipeline route there are obstructions on the southern side of the pipeline (power lines at Zenzani etc.) which means that the pipeline would need to cross the existing MMTS-1 a second time to avoid these. This supports the recommendation of installing the new pipeline on the northern side of the existing pipeline, as it will run to the north of the MMTS-1 for the entire length from Gowrie Village. Hence, the new pipeline will be north of the existing pipeline route along the section is orientated south-south east (i.e. along the southern boundary of the nine erven in the southern section of Gowrie Village). The implication is some loss of gardens established within the servitude, particularly for the first three houses (Figure 2.6).

BKS have located the new pipeline closer than 8m from the existing over the four affected properties in an attempt to mitigate the impact of the new pipeline and of construction. One may further attempt to limit the width of the construction activities over the affected area.

2.2.4 Gravity Main

The Gravity Main (8.3 km in length, 900 mm diameter pipe) transfers water from the break pressure tank (BPT) to the Mpofana outfall. This route was been divided into two sections, section D and E.

The preferred route, from a technical perspective, for section D is the route of the existing servitude (Option D2 – red line Figure 2.7). This route runs in a south-westerly direction from Gowrie and traverses Portions 83, 24 and 71 to the cadastral boundary between Portions 71 and 118. This route posed various environmental difficulties in that it would cross a wetland, an existing golf course on Portion 24, as well as an existing farm dam on Portion 71. To avoid these sensitive areas, re-alignment of the route, north of the dam as well as the golf course has occurred.
Figure 2.6 – More detailed layout of the pipeline through Gowrie Village (Section C). The red line shows the existing servitude.
The existing registered servitude is available for construction and without requiring any permanent servitude compensation. Only a small amount of temporary servitude would need to be compensated for. Thus, from technical perspective the existing servitude is the preferred option through this area due to the reduced need for land acquisition.

There was only one option available for section E of the route and that is the route of the existing servitude. The final section of the servitude runs in a south-westerly direction through Portion 118 and 116 (Figure 2.8). At the boundary between Portion 116 and 107 the servitude turns to a general southerly direction. From here it transects Portions 107 and 106. At the boundary between Portion 106 and 75 the servitude once again turns to follow a south-westerly direction. From here it transects Portions 75, 85, 74 and 56. At the boundary between Portions 56 and 50 the servitude turns to run in a general westerly direction and transects Portions 59, 10 and 11. There are no alternatives for the last section of the route even though it does transect some sensitive areas. It is therefore suggested that some realignment in Portion of 75 of Waterford 15946 and Portion 10 of Bosch Fontein 901 might be required to mitigate these impacts.

The transfer pipeline as well as the UW pipeline will include a number of chambers (Figure 2.9) to accommodate air valves at high points on the pipeline profile and scour valves at low points, to facilitate access to the pipeline for maintenance purposes.

Figure 2.9: Illustration of a chamber along the pipeline.
Figure 2.7: The route options for Section D
Figure 2.8: The route options for Section E
2.2.5 Outfall Works on the Mpofana River

A new outfall works (exact duplication of exiting works) will be constructed adjacent to the existing outfall works (Figure 2.10) to accommodate the MMTS-2 system.

Figure 2.9: Position of new outfall works

2.3 CONSTRUCTION SCHEDULING

The total construction period is 21 months (91 weeks) from date of commencement to end of construction and is scheduled as follows:

2.3.1 Pipelines

(i) Pipes will be laid using one team for the gravity main and two teams working concurrently on the pumping mains, but construction of the UW pumping main will lag behind the MMTS-2 pumping main by 1 500m. With the inclusion of the UW pipeline the overall extension of the construction period is estimated to be a month.

(ii) Preparation of the servitude (erection of fencing, provision of crossing points, accommodation works and topsoil stripping) will commence 4 weeks after access is granted, to allow for negotiations with landowners in respect of crossing points and other accommodation works, and will progress at an average rate of 500m / week.

(iii) Duration of servitude preparation will therefore be:
- MMTS-2 gravity main: 17 weeks (week 9 to week 25)
- MMTS-2 and UW pumping mains: 14 weeks (week 31 to week 44)

(iv) Construction of temporary crusher run access roads along the servitude will commence 1 week after servitude preparation has commenced, and will progress at the same rate as servitude preparation, as unsuitable ground conditions are identified.

(v) Duration of road construction will therefore be:
- MMTS-2 gravity main: 17 weeks (week 10 to week 26)
- MMTS-2 and UW pumping mains: 14 weeks (week 32 to week 45).

(vi) Delivery of pipes to site will commence 2 weeks after preparation of the servitude has commenced. Pipes will be delivered direct to the servitude, and pipes will be strung along the servitude close to the positions where they will be laid.

(vii) Duration of pipe deliveries will therefore be:
- MMTS-2 gravity main: 17 weeks (week 11 to week 27)
- MMTS-2 pumping main: 14 weeks (week 33 to week 46).
- UW pumping main: 14 weeks (week 37 to week 50).

(viii) Average rate of pipe laying for all pipelines is assumed to be 4 pipes a day. Commencement of laying the UW pumping main will lag behind the MMTS-2 pumping main by 1 500m / 4 weeks. Duration of pipe laying will therefore be:
- MMTS-2 gravity main: 23 weeks (week 12 to week 34)
- MMTS-2 pumping main: 19 weeks (week 34 to week 52)
- UW pumping main: 19 weeks (week 38 to week 56).

(ix) Laying pipe bedding material will precede pipe laying by 1 week. Commencement of laying pipe bedding material for the UW pumping main will lag behind the MMTS-2 pumping main by 4 weeks.

(x) Duration of laying pipe bedding material will therefore be:
- MMTS-2 gravity main: 23 weeks (week 11 to week 33)
- MMTS-2 pumping main: 19 weeks (week 33 to week 51).
- UW pumping main: 19 weeks (week 37 to week 55).

(xi) Construction of chambers and thrust blocks will lag pipe laying by 4 weeks, and will proceed at the same rate as pipe laying.

(xii) Duration of concrete work will therefore be:
- MMTS-2 gravity main: 23 weeks (week 16 to week 38)
- MMTS-2 pumping main: 19 weeks (week 37 to week 55).
- UW pumping main: 19 weeks (week 41 to week 59).
2.3.2 Spring Grove pumping station

(i) Excavation for the pumping station is assumed to commence one week after access to the site is granted, and take 9 weeks (week 6 to week 14).
(ii) Concrete work is assumed to commence immediately after excavation is complete, and take 26 weeks (week 15 to week 40).
(iii) The remaining work (pipework, fittings, control systems and superstructure) is assumed to take up to 15 weeks (week 41 to week 55)

2.3.3 Break pressure tank

Concrete work on the BPT is assumed to take 10 weeks (week 27 to week 36).

2.3.4 Mpofana River outfall

Concrete work on the outfall is assumed to take 10 weeks (week 13 to week 22).

3. LEGISLATED REQUIREMENTS

The following legislation was taken into consideration during the environmental impact assessment process:

3.1 The Constitution

This is the supreme law of the land. As a result, all laws, including those pertaining to the proposed development, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, everyone
has the right:

1. To an environment that is not harmful to their health or well-being; and
2. To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:
   ii. Prevent pollution and ecological degradation;
   iii. Promote conservation; and
   iv. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

---

**Relevance to the proposed pipeline route:**

- Obligation to ensure that the proposed development will not result in pollution and ecological degradation; and
- Obligation to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development.

---

3.2 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA) (107 OF 1998)

The objective of NEMA is: “To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith.”

A key aspect of NEMA is that it provides a set of environmental management principles that apply throughout the Republic to the actions of all organs of state that may significantly affect the environment. The proposed development has been assessed in terms of possible conflicts or compliance with these principles. Section 2 of NEMA contains principles (see Box 3.1) relevant to the proposed project, and likely to be utilised in the process of decision making by DEA.

**Box 3.1: NEMA Environmental Management Principles**

| (2) | Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably. |
| (3) | Development must be socially, environmentally and economically sustainable. |
| (4)(a) | Sustainable development requires the consideration of all relevant factors including the following:
   i. That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
   ii. That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
   iii. That waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner. |
| (4)(e) | Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle. |
The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.

The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.

The costs of remediying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.

Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

As these principles are utilised as a guideline by the competent authority in ensuring the protection of the environment, the proposed development should, where possible, be in accordance with these principles. Where this is not possible, deviation from these principles would have to be very strongly motivated.

NEMA introduces the duty of care concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution, and may lead to the prosecution of managers or directors of companies for the conduct of the legal persons.

In addition NEMA introduced a new framework for environmental impact assessments, the EIA Regulations (2010) discussed previously.

Relevance to the proposed pipeline route:

- The developer must be mindful of the principles, broad liability and implications associated with NEMA and must eliminate or mitigate any potential impacts.
- The developer must be mindful of the principles, broad liability and implications of causing damage to the environment.

3.3 THE NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (10 OF 2004)

This Act provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act 107 of 1998 (see Box 3.2 below). In terms of the Biodiversity Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations).
- Application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all developments within the area are in line with ecological sustainable development and protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.
CHAPTER 4

Provides for the protection of species that are threatened or in need of national protection to ensure their survival in the wild;

- To give effect to the Republic’s obligations under international agreements regulating international trade in specimens of endangered species; and
- Ensure that the commercial utilization of biodiversity is managed in an ecologically sustainable way.

CHAPTER 5 (Part 2)

Section 73

A person who is the owner of land on which a listed invasive species occurs must:

a) Notify any relevant competent authority, in writing, of the listed invasive species occurring on that land;

b) Take steps to control and eradicate the listed invasive species and to prevent it from spreading; and

c) Take all required steps to prevent or minimise harm to biodiversity.

Section 75

- Control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs.
- Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.
- The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

The objectives of this Act are to provide, within the framework of the National Environmental Management Act, for:

- The management and conservation of biological diversity within the Republic; and
- The use of indigenous biological resources in a sustainable manner.

The Act’s permit system is further regulated in the Act’s Threatened or Protected Species Regulations, which were promulgated in February 2007.

Relevance to the proposed pipeline route:

- The proposed development must conserve endangered ecosystems and protect and promote biodiversity;
- Must assess the impacts of the proposed development on endangered ecosystems;
- No protected species may be removed or damaged without a permit; and
- The proposed site must be cleared of alien vegetation using appropriate means.

3.4 THE NATIONAL FOREST ACT (84 OF 1998)
The objective of this Act is to monitor and manage the sustainable use of forests. In terms of Section 12 (1) (d) of this Act and GN No. 1012 (promulgated under the National Forests Act), no person may, except under licence:

- Cut, disturb, damage or destroy a protected tree; or
- Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree.

Relevance to the proposed pipeline route:

- If any protected trees in terms of this Act occur on site, the developer will require a licence from the DWAF to perform any of the above-listed activities.

3.5 THE NATIONAL HERITAGE RESOURCES ACT (25 OF 1999)

The protection of archaeological and paleontological resources is the responsibility of a provincial heritage resources authority and all archaeological objects, paleontological material and meteorites are the property of the State. "Any person who discovers archaeological or paleontological objects or material or a meteorite in the course of development must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority".

Relevance to the proposed pipeline route:

- No person may alter or demolish any structure or part of a structure, which is older than 60 years or disturb any archaeological or paleontological site or grave older than 60 years without a permit issued by the relevant provincial heritage resources authority.
- No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter or deface archaeological or historically significant sites.

3.6 THE ATMOSPHERIC POLLUTION PREVENTION ACT (45 OF 1965)

This Act is currently the central legislation for the prevention of air pollution. Part IV deals with dust control – "Whenever dust originating on any land in a dust controlled area is causing a nuisance to persons residing or present in the vicinity of that land, the owner or occupier may be required to take the prescribed steps or adopt the "best practicable means" for the abatement of the dust".

Relevance to the proposed pipeline route:

The "best practicable means" for the abatement of dust during construction if approved have to be taken.
All appliances used for preventing or reducing to a minimum the escape into the atmosphere of noxious or offensive gases have to be properly operated and maintained and the best practice means for achieving this implemented.
3.7 THE NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT (39 OF 2004)

As with the Atmospheric Pollution Prevention Act 45 of 1965, the objective of the new Air Quality Act is to protect the environment by providing the necessary legislation for the prevention of air pollution.

3.8 OCCUPATIONAL HEALTH AND SAFETY ACT (85 OF 1993)

The objective of this Act is to provide for the health and safety of persons at work (See Box 3.3 below). In addition, the Act requires that, “as far as reasonably practicable, employers must ensure that their activities do not expose non-employees to health hazards” (Glazewski, 2005: 575). The importance of the Act lies in its numerous regulations, many of which will be relevant to the proposed development. These cover, among other issues, noise and lighting.

Relevance to the proposed pipeline route:

The developer must be mindful of the principles and broad liability and implications contained in the OHSA and mitigate any potential impacts.

Box 3.3: Health and safety of persons at work according to the occupational health and safety act

<table>
<thead>
<tr>
<th>8: GENERAL DUTIES OF THE EMPLOYERS TO THEIR EMPLOYEES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(1)</strong> Every employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees.</td>
</tr>
<tr>
<td><strong>(2)</strong> Without derogating from the generality of an employer's duties under subsection (1), the matters to which those duties refer include in particular- The provision and maintenance of systems of work, plant and machinery that, as far as is reasonably practicable, are safe and without risks to health; Taking such steps as may be reasonably practicable to eliminate or mitigate any hazard or potential hazard to the safety or health of employees, before resorting to personal protective equipment; Establishing, as far as is reasonably practicable, what hazards to the health or safety of persons are attached to any work which is performed, any article or substance which is produced, processed, used, handled, stored or transported and any plant or machinery which is used in his business, and he shall, as far as is reasonably practicable, further establish what precautionary measures should be taken with respect to such work, article, substance, plant or machinery in order to protect the health and safety of persons, and he shall provide the necessary means to apply such precautionary measures; Providing such information, instructions, training and supervision as may be necessary to ensure, as far as is reasonably practicable, the health and safety at work of his employees; As far as is reasonably practicable, not permitting any employee to do any work or to produce, process, use, handle, store or transport any article or substance or to operate any plant or machinery, unless the precautionary measures contemplated in paragraphs (b) and (d), or any other precautionary measures which may be prescribed, have been taken;</td>
</tr>
</tbody>
</table>
Taking all necessary measures to ensure that the requirements of this Act are complied with by every person in his employment or on premises under his control where plant or machinery is used;
Enforcing such measures as may be necessary in the interest of health and safety;
Ensuring that work is performed and that plant or machinery is used under the general supervision of a person trained to understand the hazards associated with it and who have the authority to ensure that precautionary measures taken by the employer are implemented; and authority as contemplated in Section 37 (1) (b).

### 14: GENERAL DUTIES OF EMPLOYEES AT WORK

Every employee shall at work:

- **(a)** Take reasonable care for the health and safety of himself and of other persons who may be affected by his acts or omissions;
- **(b)** As regards any duty or requirement imposed on his employer or any other person by this Act, cooperate with such employer or person to enable that duty or requirement to be performed or complied with;
- **(c)** Carry out any lawful order given to him, and obey the health and safety rules and procedures laid down by his employer or by anyone authorized thereto by his employer, in the interest of health or safety;
- **(d)** If any situation which is unsafe or unhealthy comes to his attention, as soon as practicable report such situation to his employer or to the health and safety representative for his workplace or section thereof, as the case may be, who shall report it to the employer; and
- **(e)** If he is involved in any incident which may affect his health or which has caused an injury to himself, report such incident to his employer or to anyone authorized thereto by the employer, or to his health and safety representative, as soon as practicable but not later than the end of the particular shift during which the incident occurred, unless the circumstances were such that the reporting of the incident was not possible, in which case he shall report the incident as soon as practicable thereafter.

### 15: DUTY NOT TO INTERFERE WITH, DAMAGE OR MISUSE THINGS

[S. 15 substituted by S. 3 of Act No. 181 of 1993.]

No person shall intentionally or recklessly interfere with, damage or misuse anything which is provided in the interest of health or safety.

### 3.9 NATIONAL WATER ACT (36 OF 1998)

The Act regulates the protection, use, development, conservation, management and control of water resources in South Africa. The principal concerns in terms of the Act are the potential for the proposed development to pollute surface and groundwater resources, and to ensure that water is used as efficiently as possible.

The Act also stipulates that wetlands and estuaries are extremely sensitive environments and as such, the section 21(c) and (i) water use General Authorisation does not apply to:

Any wetland or any water resource within a distance of 500 meters upstream or downstream from the boundary of any wetland; and
Any estuary or any water resource within a distance of 500 meters upstream or downstream from the salt mixing zone of any estuary.

Since the proposed pipeline will cross various streams and wetlands a Water Use License is required.
Relevance to the proposed pipeline route:

19 (1) An owner of land, a person in control of land or a person who occupies or uses the land on which—
(a) any activity or process is or was performed or undertaken; or
(b) any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.

3.10 HAZARDOUS SUBSTANCES ACT (15 OF 1973)

The Act aims to manage hazardous substances. It is the principal national legislation that controls the transportation, and manufacturing, storage, handling, treatment or processing facilities for any substance that is dangerous or hazardous (Groups I-IV). Specific regulations governing the conveyance of hazardous substances, including Group I substances, by road may also be relevant.

Relevance to the proposed pipeline route:

Manage the hazardous waste in such a manner that it does not endanger human health or the environment.
Prevent the waste from being used for an unauthorised purpose.

3.11 THE ENVIRONMENT CONSERVATION ACT (73 OF 1989)

The purpose of this Act is to provide for the effective protection and controlled utilization of the natural environment governed by the following regulations:

- Protection of the natural environment:
  - An area can be declared by a competent authority to be a protected natural environment.
  - Every owner/holder of land situated within a declared protected natural environment shall comply with directions issued by the competent authority.
  - Control of activities which may have a detrimental effect on the environment
  - No person shall undertake an activity or cause an activity which may have a detrimental effect on the environment without written consent from the competent authority
  - Such land activities include:
    - Land use and transformation;
    - Water use and disposal;
    - Resource removal, including natural living resources;
    - Resource renewal;
    - Agricultural processes;
    - Industrial processes;
    - Transportation;
    - Energy generation and distribution; and
    - Recreation.

Implications for the proposed pipeline route:
The developer must be mindful of the principles, broad liability and implications associated with the ECA and must eliminate or mitigate any potential impacts. The developer must be mindful of the principles, broad liability and implications of causing damage to the environment.

3.12 NATURE AND ENVIRONMENTAL CONSERVATION ORDINANCE (19 OF 1974)

The purpose of this ordinance is to consolidate and amend the laws relating to nature and environmental conservation. This ordinance provides a schedule of endangered and protected wild animals and flora.

The competent authority may:
Establish a provincial nature reserve on any land under his control or management; and
By agreement or expropriation acquire any land which he considers necessary and suitable for the purpose of establishing a provincial nature reserve thereon.

Responsibility of a private nature reserve owner:
Manage, control and develop such reserve for the propagation, protection and preservation of fauna and flora.

3.13 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (59 OF 2008)

This legislation aims to enforce an integrated approach to waste management, with emphasis on prevention and reduction of waste at source and, where this is not possible, to encourage reuse and recycling in preference to disposal. Section 16 (Chapter 4) of this Act deals with the general duty in respect to waste management and emphasises that, "A holder of waste must, within the holder's power, take all reasonable measures to:- avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated; reduce, re-use, recycle and recover waste; where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner; manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts; prevent any employee or any person under his or her supervision from contravening this Act; and prevent the waste from being used for an unauthorised purpose".

Chapter 4, Part 3 of this Act deals with reduction re-use and recovery of waste, Part 4 deals with waste management activities, Part 5 covers storage collection and transportation of waste, Part 6 deals with treatment, processing and disposal of wastes, Part 7 covers industry waste management plans and Part 8 deals with contaminated land. Chapter 5 covers all issues regarding the licensing of waste management activities.

Implications for the proposed pipeline route:

All wastes (general and hazardous) generated during the construction may only be disposed of at appropriately licensed sites (Section 26(s1) of the NEM: Waste Act 59 of 2008). Cognisance must also be taken of the relevant provincial legislation in this regard. It should also be noted that all controlling authority and regulations pertaining to litter in terms of the Environmental Conservation Act of 73 of 1989, have been delegated to the provinces.
3.14 NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT (31 OF 2004)

The purpose of this Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa’s biological diversity and its natural landscapes and seascapes.

The objectives of this Act are:

To provide, within the framework of national legislation, including the National Environmental Management Act, for the declaration and management of protected areas;
To provide for co-operative governance in the declaration and management of protected areas;
To effect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity;
To provide for a representative network of protected areas on state land, private land and communal land;
To promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas;
To promote participation of local communities in the management of protected areas, where appropriate; and
To provide for the continued existence of South African National Parks.

Implications for the proposed pipeline route:

The existing servitude transects the proclaimed Bill Barnes Crane and Oribi Nature Reserve.

3.15 CONSERVATION OF AGRICULTURAL RESOURCES ACT (43 OF 1983)

The purpose of this Act is to provide for control over the utilization of the natural agricultural resources in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants.

This is achieved by:

Production potential of land is maintained,
Preventing and combating erosion,
Preventing and combating weakening or destruction of the water sources, and
Protecting vegetation and combating of weeds and invader plants.

The Act provides a list of declared weeds and invader plants as well as indicators of bush encroachment.

In terms of weeds and invader plants:

A land user shall control any category 1 plants that occur on any land or inland water surface.
No person shall, except in or for purposes of a biological control reserve –
Establish, plant, maintain, multiply or propagate weeds and invader plants;
Import or sell propagating material of category weeds and invader plants; and
Acquire propagating material of weeds and invader plants.
Implications for the proposed pipeline route:

If any declared weed and/or invader species listed in terms of this Act is present on site, it will have to be removed.

3.16 NATIONAL HERITAGE RESOURCES ACT (25 OF 1999)

The protection of archaeological and palaeontological resources is the responsibility of a provincial heritage resources authority and all archaeological objects, palaeontological material and meteorites are the property of the State. "Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority".

Implications for the proposed pipeline route:

- An archaeological impact assessment must be undertaken during the detailed EIAR phase of the proposed project.
- No person may alter or demolish any structure or part of a structure, which is older than 60 years or disturb any archaeological or palaeontological site or grave older than 60 years without a permit issued by the relevant provincial heritage resources authority.
- No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter or deface archaeological or historically significant sites.

3.17 THE KWAZULU-NATAL HERITAGE RESOURCES ACT (4 OF 2008)

To provide for the conservation, protection and administration of both the physical and the living or intangible heritage resources of the Province of KwaZulu-Natal; to establish a statutory Council to administer heritage conservation in the Province; to determine the objects, powers, duties and functions of the Council; to determine the manner in which the Council is to be managed, governed, staffed and financed; to establish Metro and District Heritage Forums to assist the Council in facilitating and ensuring the involvement of local communities in the administration and conservation of heritage in the Province; and to provide for matters connected therewith.

Implications for the proposed pipeline route:

- No person may destroy, damage, excavate, alter, write or draw upon, or otherwise disturb any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without the prior written approval of the Council having been obtained on written application to the Council.
- Upon discovery of archaeological or palaeontological material or a meteorite by any person, all activity or operations in the general vicinity of such material or meteorite must cease forthwith and a person who made the discovery must submit a written report to the Council without delay.
- No person may exhume, remove from its original position or otherwise disturb, damage, destroy, own or collect any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic
fortification, meteorite or meteorite impact site without the prior written approval of the Council having been obtained on written application to the Council.

- No person may bring any equipment which assists in the detection of metals and archaeological and palaeontological objects and material, or excavation equipment onto any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, or meteorite impact site, or use similar detection or excavation equipment for the recovery of meteorites, without the prior written approval of the Council having been obtained on written application to the Council.
4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

According to regulation 31 (2) of the EIA regulations (2010), An Environmental Impact Assessment Report must include –
(d) A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity.

IN LINE with the above-mentioned legislative requirement, this chapter provides a description of the natural and socio-economic environments that could potentially be impacted by the proposed development.

4.1 CLIMATE

The climate of the area is largely dependent on altitude. It is a summer rainfall area with lower lying areas receiving on average 800 mm rainfall a year, increasing to 1 280 mm for higher lying areas (Udidi, 2009). The south-easterly slopes are wetter than north westerly slopes due to moist air entering from the south east (Udidi, 2009). The western areas have a colder winter average temperature of 14°C compared to the slightly warmer eastern part (17°C) due to snowfalls in the west (Udidi, 2009). Altitude also affects temperature as indicated by Table 4.1, with Bishopstowe at an altitude of 838 m above sea level having a mean maximum temperature of 23.9°C and mean minimum temperature of 11.2°C, whereas Nottingham Road at 600 m higher in altitude has a mean maximum temperature of 21.3°C and a much lower mean minimum temperature of 6.1°C.

<table>
<thead>
<tr>
<th>Altitude (m) above sea level</th>
<th>Mean max temp °C</th>
<th>Mean min temp °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bishopstowe</td>
<td>838</td>
<td>23.9</td>
</tr>
<tr>
<td>Cedara</td>
<td>1067</td>
<td>22.5</td>
</tr>
<tr>
<td>Nottingham Road</td>
<td>1438</td>
<td>21.3</td>
</tr>
</tbody>
</table>

4.2 TOPOGRAPHY

The eastern part of the area is considered to have gentle to moderate hills, whereas the western part is considered to be mountainous, leading towards the Drakensberg (uMngeni IDP 2002). The project area is considered to have a gentle topography, with slightly undulating slopes between Nottingham Road and Rosetta (Plate 4.1).

The site area consists of many small streams which can become dangerous during flood events. The main rivers include the Mooi and Little Mooi Rivers which are popular for trout fishing (MMTS-2, 2002). The area has a number of dams which receive high volumes of tourists as well as recreational users. For example, 1997 statistics indicate 65 600 visitors for Hazelmere Dam, 25 000 visitors for Inanda Dam and 151 000 visitors for Midmar Dam (MMTS-2, 2002). The Umgeni and Karkloof Rivers flow into the popular Howick and Karkloof waterfalls on the eastern side of Umgeni.

4.3 GEOLOGY AND SOILS

The geology of the area is considered to be sedimentary rocks of the Beaufort and Ecca subgroups of the Karoo Super Group (DWAF 2009). Three different formations comprise the study site. The western part is sandstone of the Tarkastad formation, the centre is predominantly mudstones and sandstone of the Estcourt formation and the east is predominantly shale of the Volkrust and Pietermaritzburg formations (Udidi, 2009).
Plate 4-1: The topography of the study site. A: The north-western portion of the site where construction of the Spring Grove Dam wall is underway. B: Undulating hills on either side of the R103. C: Steep southern aspect slope below the Gowrie Golf Course. D: Gentle slope near the southern boundary of the Gowrie Golf Course

Lions River, underlain by the Volksrust and Pietermaritzburg formation is comprised of highly weathered red orange, yellow brown and light blue grey soft rock shale (Drennan, Maude and Partners, 2009). Moist silty clay soils with high silt content are characteristic of this formation (Drennan, Maude and Partners, 2009).

Rosetta is underlain by the Estcourt formation which is comprised of highly weathered soft rock siltstone and sandstone with moist, silty or sand clay soils (average of 28% clay) (Drennan, Maude and Partners, 2009).

The Nottingham Road to Rosetta area has permanent wetlands with the most significant being the valley bottom wetland in the Crane Sanctuary (Drennan, Maude and Partners 2009). The depth to bedrock for both formations ranges from 1m to 3m.

Overall, soils are acidic with a pH range of 3.8 to 5.94 (Figure 4.1) in the project area (Drennan, Maude and Partners, 2009). The region is considered to have high agricultural potential, although fertilizer is required as nutrient levels are low due to leaching (from being in a high rainfall area). Soil in the eastern part is suggested to be well suited for intensive farming, but there are problems with phosphorous fixation as well as aluminium toxicity (source: uMngeni IDP, 2002). Soil erosion originating from poorly-sited tracks/roads has resulted in numerous incised trenches (dongas) across the area (Drennan, Maude and Partners, 2009).
Figure 4.2: Soil pH within the proposed development area
4.4 VEGETATION AND FLORISTICS

The study area occurs within the Maputaland-Pondoland-Albany area of endemism (CI 2010). This biodiversity hotspot is approximately 274 000 km\(^2\) and is located on the Eastern side of Southern Africa. This hotspot is formed by the joining of three centres of endemism (Maputaland, Pondoland and Albany). Six of South Africa's eight terrestrial biomes converge within this hotspot and levels of floristic endemism are very high. The forests occurring in the region have the highest species richness of any temperate forests in the world. In terms of flora, the region boasts almost 2 000 endemic plant species, 39 endemic genera, and 1 endemic family. In terms of IUCN ratings, there are 323 Vulnerable species, 128 Endangered species and 83 Critically Endangered plant species in the hotspot (CI, 2010).

4.4.1 Regional Vegetation

Ezemvelo KZN Wildlife has mapped the vegetation of the area in more detail (Figure 4.2), but the vegetation types are the same as the Mucina and Rutherford (2006) descriptions (Figure 4.3). According to these descriptions the proposed pipeline will pass predominantly through Drakensberg Foothill Moist Grassland (which is listed as Least Threatened). However, it will also affect Mooi River Highland Grassland (which lies to the north and west of the proposed pipeline), as well as Midlands Mistbelt Grassland (which lies to the south and east of the proposed pipeline):

Drakensberg Foothill Moist Grassland vegetation type occurs in the KwaZulu-Natal and Eastern Cape provinces. The area is moderately rolling and mountainous, incised with gorges containing dry vegetation types and forest. The majority is dominated by forb-rich grassland (a grassland with a large amount of non-grass species) dominated primarily by *Themeda triandra* and *Tristachya leucothrix*. This vegetation type is classified as Least threatened by Mucina and Rutherford (2006), with a conservation target of 23% and 2-3% statutorily conserved. Over 20% has been transformed for cultivation, plantations and urban sprawl.

Mooi River Highland Grassland is restricted to the KwaZulu-Natal Province. It comprises gently rolling landscapes dominated by grassland, in which *Themeda triandra*, *Heteropogon contortus* and *Tristachya leucothrix* are dominant. This vegetation type is listed as Vulnerable, with a conservation target of 23%. Only a very small piece of it is statutorily conserved and the majority (almost 60%) has been transformed for cultivation or plantations.

Midlands Mistbelt Grassland vegetation type occurs in the KwaZulu-Natal and Eastern Cape provinces. This area is a hilly and rolling landscape, characterised by an east facing scarp formed by dolerite intrusions. This vegetation type is dominated by forb-rich, tall, sour *Themeda triandra* grasslands that have been transformed by the invasion of *Aristida junciformis* subsp. *junciformis*. This vegetation type is classified as Endangered (one of the most threatened vegetation types in KwaZulu-Natal) by Mucina and Rutherford (2006), with a conservation status of 23% and only 0.5% statutorily conserved. More than 50% has already been transformed for plantations, cultivated land or by urban sprawl.

4.4.2 Vegetation types in the study area

An investigation of the site determined that the majority of the site is covered by cultivated lands or forestry plantations (Plate 4-2). As a result, there is very little natural vegetation on the site. Sites of natural vegetation are restricted to the Bill Barnes Crane and Oribi Nature Reserve and on a few farms that have not been utilised or only sparsely grazed where pockets of Drakensberg Foothill Moist Grassland occur. Wetland and riparian vegetation and two very small sections of Eastern Mistbelt Forest on the southern slopes to the north east of Zenzani Village and below the Gowrie Golf Course (Plate 4-2) were also noted. There are also several invasive species recorded on site, particularly Black Wattle (*Acacia mearnsii*), Bugweed (*Solanum mauritianum*), and American Bramble (*Rubus cuneifolius*, Plate 4-3).
Figure 4.2: KZN Wildlife Vegetation Map of the study area and surrounds
Figure 4.3: Mucina and Rutherford Vegetation Map of the study area and surrounds.
The results of the vegetation assessment have determined the existence of four vegetation types within the study site, namely:

- Drakensberg Foothill Moist Grassland,
- Eastern Mistbelt Forest,
- Wetlands
- Transformed vegetation

**Drakensberg Foothill Moist Grassland**

This vegetation is restricted to the Bill Barnes Crane and Oribi Nature Reserve and on a few farms which have not been transformed to pastures or plantations. The dominant species which occur are *Themeda triandra* and *Tristachya leucothrix*, *Eragrostis curvula*, *Eragrostis plana*, *Heteropogon contortus* and interspersed in areas with herbaceous species like *Helichrysum auronitens*. It is limited in its distribution, and is likely that it would have covered the majority of the site, should there have been no agricultural activities. Invasive species, predominantly a hybrid of the *American Bramble* (*Rubus cuneifolius*), occur within this vegetation type. It is imperative that any remaining areas of this vegetation type are not cleared for agriculture. This vegetation only occurs in three localities on site (Figure 4.4).

**Eastern Mistbelt Forest**
Eastern Mistbelt Forests are small (<1 ha) to large (>1500 ha) forests. They occur in an extensive band at middle altitudes (850-1600 m above sea level) often on steep eastern to western slopes of the mountains or escarpments from the Kokstad to the midlands of KwaZulu-Natal. The habitat is characterized by heavy summer mist. The forests are dominated by Xymalos monospora, Podocarpus henkeli, P latifolius, P. falcatus, Celtis africana, Kiggelaria africana and Ocotea bullata in the canopy. Understorey species vary in importance and include tree/shrub species such as Eugenia zuluensis, Trichocladosellipticus, Maytenus mossambicensis and Peddiea africana, and a range of fern species often at high density.

There are a number of deciduous and semi-deciduous species such as Celtis africana, Calodendrum capense, Ptaeroxylon obliquum, Kiggelaria africana and Zanthoxylum davyi. The forests are generally moist. Historically they were surrounded by grassland, but in many areas are now surrounded by commercial timber plantations, as is the case for the study site (Von Maltitz et al. 2003).

Only two small pockets of Eastern Mistbelt Forest occur on steep, southern aspects slopes of the site (Figure 4.4). They contain tree species like Podocarpus falcatus, Ilex mitis var. mitis and Rhamnus prinoides. Most of this vegetation type on site has been cleared for commercial pine plantations and it is imperative that the remaining extent of the Eastern Mistbelt Forest pockets be conserved.

Wetland vegetation
Wetland vegetation is common across the site (Figure 4.4) but is generally disturbed by agricultural activities and heavily invaded in areas by species like Bugweed (Solanum mauritianum), Black Wattle (Acacia mearnsii) and many other ruderal grass species. Dominant species identified within the wetland vegetation were Typha capensis, Phragmites australis, Juncus kraussii, several Cyperus spp. and Ficinia cinnamomea, although some of these species can themselves be considered invasive in wetland systems and can be indicative of disturbance.

Transformed Vegetation
The mistbelt area in the KwaZulu Natal Midlands once had a large grassland component, which is now almost entirely transformed by agriculture and commercial timber, which also dominates the study area (Figure 4.4). The majority of the site is covered by cultivated lands and forestry plantations. The cultivated areas either consist of annual and/or perennial pastures such as rye grass (Lolium spp.), Eragrostis curvula and Eragrostis plana and crops such as maize. The plantations consist almost entirely of pine (Pinus pinaster).

Plant species

Invasive and problematic species
The area is heavily invaded by alien invasive species (Plate 4-3), although the number of species is quite low. The vast majority of the invaded area is covered by Bugweed (Solanum mauritianum), Black Wattle (Acacia mearnsii), Pearl Acacia (Acacia podalyrifolia), various Bleugum (Eucalyptus) species and the American Bramble (Rubus cuneifolius).

This is a severe problem on site as the indigenous vegetation, and particularly possible species of special concern, could be crowded out by these species.

These invaders are required to be removed by law, as they are each Category 1: Declared Weeds (may not occur on any land or inland water surface other than in biological control reserves) or Category 2 (may not occur on any land or inland water surface other than a demarcated area or a biological control reserve): Declared Invaders (The Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)).
Figure 4-4: Vegetation map of the study area