

Preliminary report on the ecological impacts of the proposed Norvalspont bulk water transfer system and associated pipelines.

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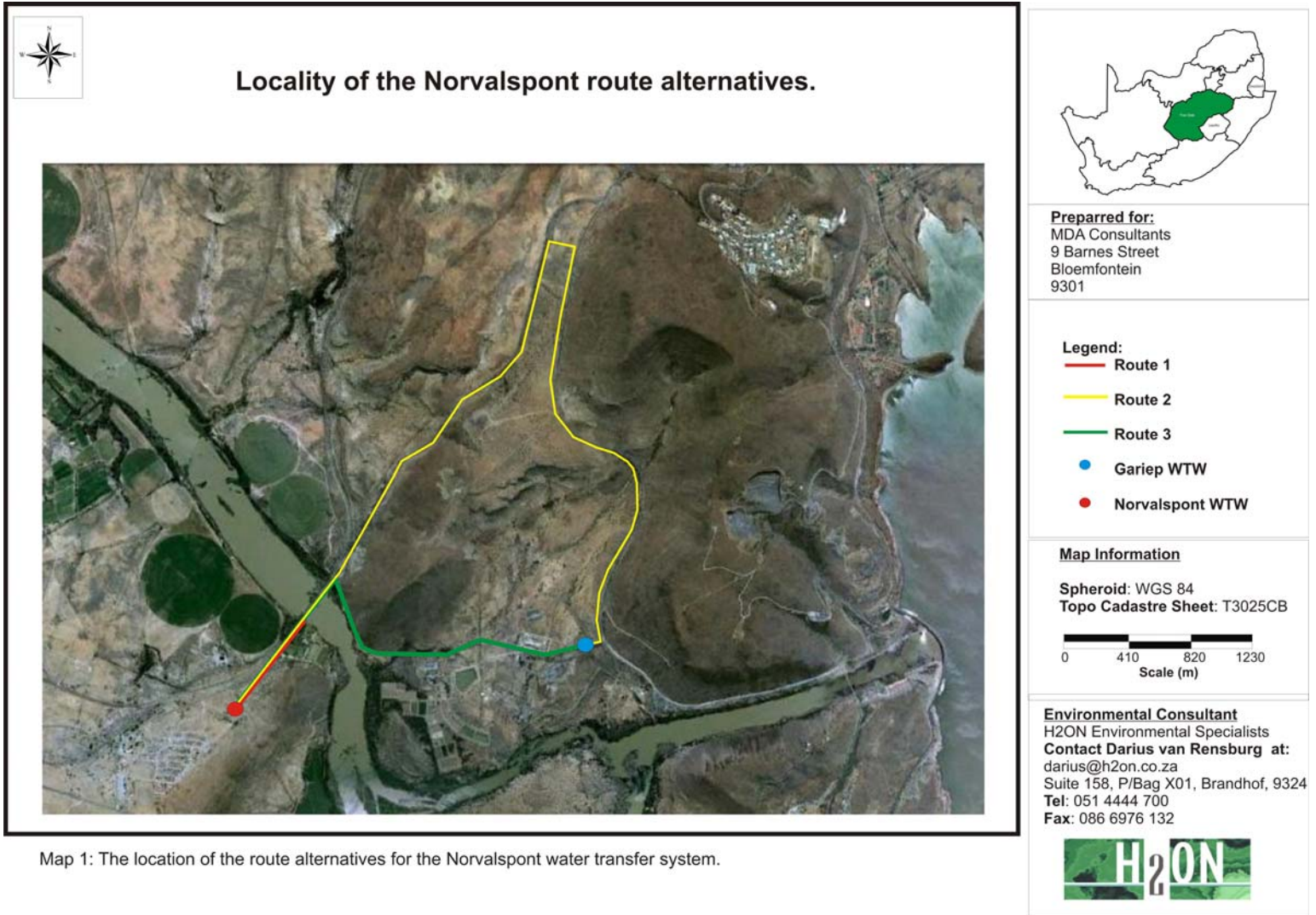
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Discussion of alternative routes

The proposed project entails the transfer of water to the Norvalspont reservoir to be utilised for drinking water. The development comprises of three alternatives (Map 1).



Map 1: The location of the route alternatives for the Norvalspont water transfer system.

The **first alternative (Route 1)** entails a pipeline from the Norvalspont reservoir to the Orange River. An extraction point will be constructed on the banks of the Orange River. Water will then be transferred to the Norvalspont WTW. The vegetation on the banks of the river at this point is relatively disturbed and not in a good condition. The construction of an extraction point will not have a large impact on the area. However, a protected tree species, *Celtis africana* (White Stinkwood) occurs on the banks of the river in this area (Figure 1). Permits would have to be acquired to remove this species. The route of the pipeline occurs along the existing pipeline and it is anticipated that this area is already in disturbed condition.



Figure 1: *Celtis africana* (White Stinkwood) on the Orange River bank.

The **second alternative (Route 2)** entails a pipeline from the Norvalspont reservoir to the Gariiep reservoir. This route follows the tarred road. A bridge attachment would be placed on the bridge over the Orange River. The area along the tarred road is in a degraded condition and placement of the pipeline along this route would not have a large on the area. However, several specimens of the protected Aloe species (*Aloe broomi*) occur close to the road. In areas where this species would be affected by the pipeline the species would have to be transplanted to areas adjacent to the pipeline.

The **third alternative (Route 3)** entails a pipeline from the Norvalspont reservoir to the Gariiep reservoir. This route would cross the Orange River by means of a bridge attachment and would then follow the river banks for a short distance. From the river banks the route would then cross natural vegetation with a relative slope to the Gariiep reservoir. In this area the route would also cross a seasonal stream.

Where the route follows the river bank the impacts are anticipated to be numerous and substantial. The pipeline route may follow two routes along the river bank:

Placing of the pipeline within the floodplain would cause mobilisation of the substrates and this would leave the area vulnerable to erosion during flooding events. These floods are large in magnitude and would remove any disturbed substrates and would possibly expose the pipeline. Furthermore, the removal of any vegetation along the river banks would expose the soil surface to erosion. The area also contains the protected tree species, *Celtis africana* (White Stinkwood), for which permits would have to be acquired to remove it. This area must be regarded as sensitive and the impact on the environment is considered to be substantial. However, the area contains a dirt road within the floodplain. This dirt road is regarded as a disturbed area. Placing of the pipeline within or immediately adjacent to this road would substantially mitigate the impact. Erosion measures would also have to be implemented.

Placing of the pipeline above the floodplain on the steep slopes would also cause disturbance of the soil surface. This area would not be subjected to flooding but as a result of the steep slope erosion would still be substantial. Erosion measures would have to be implemented in this area.

From the river bank this route crosses an area of moderate slope consisting of Besemkaree Koppies Shrubland. The vegetation is relatively undisturbed and has a moderate species diversity. A single footpath crosses this area. The area contains a variety of succulent species of which *Aloe grandidentata* and *Aloe broomii* are protected (Figure 2). These species would have to be transplanted where they are going to be affected by the pipeline. This area also contains numerous specimens of the protected Wild Olive tree (*Olea europaea* subsp. *africana*)(Figure 3). Permits will have to be acquired for those that need to be removed. An annual stream occurs in this area and the pipeline would have to cross this stream. The stream is in a relatively good condition and few anthropogenic impacts could be identified. As a watercourse it is regarded as a sensitive area. The construction of the pipeline through this stream would have a relatively high impact. The excavation of a trench as well as the movement of the construction vehicles over the stream would considerably degrade the stream banks and –bed. Placement of the pipeline aboveground in this area would considerably mitigate the impact on the stream. The placement of rubber tracks for the movement of the construction vehicles over the stream may also alleviate the impact of the construction vehicles on the stream.



Figure 2: *Aloe broomii* (left) and *Aloe grandidentata* (right).



Figure 3: A specimen of Wild Olive (*Olea europaea* subsp. *africana*).

Conclusion

All of the alternatives discussed are feasible. However, they differ in their magnitude of impact.

The first alternative would have a moderate impact on the banks of the Orange River and a low impact on the area of natural shrubland up to the reservoir. In conclusion this alternative would have a low impact and is preferred for the development.

The second alternative would have a low impact on the area since it would be located along a tarred road where disturbance is high. The impact on the Orange River would also be low since it would cross the river by means of a bridge attachment. In conclusion this alternative would have a low impact and is preferred for the development.

The third alternative would have a high impact on the area since it would be located on the banks of the Orange River, would transect a natural, undisturbed area and would cross an undisturbed annual stream. Mitigation measures may alleviate the impact but this may complicate the implementation of this alternative. The alternative may still be considered but it should be kept in mind that mitigation measures would be extensive and design would have to be altered to accommodate these.