

27 January 2016

Our Ref: G4680
Your Ref:

66 Victoria Street
P O Box 458
George
6530

Tel: +27 44 874 2177
Fax: +27 44 874 1364

Liberty Lane Trading 111 (Pty) Ltd
C/O VPM Planning CC
PO Box 173
Knysna
6570

Attention: Mr Lizemarie Botha

PER e-mail: lizemarie@vpmsa.co.za

Dear Madam

THE HILL: SEDGEFIELD: ERF 1638 AND RUYGTE VALLY REM 205/82 : AVAILABILITY OF CIVIL SERVICES FOR PROPOSED RESIDENTIAL DEVELOPMENT

On behalf of the developer we have preparing a services report in support of a Guideline amendment application by Messrs VPM Surveys. 130 Single residential units, 30 large, 40 medium and 40 small townhouse units (or retirement) and one commercial site (3020 m²) is envisaged. The services requirements are as follows.

Water

Water demand for the proposed units with an average annual daily consumption for each unit type is 272 kl/day. The developer proposes installing dual water supply systems where on-site treated sewage is used to supply baths, showers, garden taps and toilet systems and potable municipal water supply is connected to wash hand basins and kitchen zins only.

The accepted design norm is that 80% of potable water goes to sewage and the remainder is used for human consumption, gardening and other general uses. To allow for a margin of safety, this ratio is reduced to 50% and therefore the potable water requirement will be only 50% of the total requirement, i.e. 50% of 272 kl/day = 136 kl/day. The local authority has indicated that potable water will be made available to the development of 180 kl/day (see attached Annexure A). This is well within the calculated requirement as noted above.

The local authority has confirmed that their current water rights in place are:

- Karatara River Extraction: 4 MI
- Desalination: 1,5 MI

The current treatment capacity of the water purification plant is 2,5 MI per day and the reservoir storage available is sufficient for 6 days. Emergencies or droughts are dealt with as they arise but additional supply is available from boreholes to the south of The Hill should the need arise. An application is in place to convert the emergency rights of these boreholes to permanent supply which will add $\pm 0,5$ MI to the network. Current water usage in Sedgefield is $\pm 2,1$ MI per day.

www.kanteys.co.za



BRANCH OFFICES: CAPE TOWN +27 21 405 9600 DURBAN +27 31 266 6535 EAST LONDON +27 43 726 6443 GEORGE +27 44 874 2177 JOHANNESBURG +27 11 501 4760
PIETERMARITZBURG +27 33 347 5453 PORT ELIZABETH +27 41 373 0738 PORT SHEPSTONE +27 39 315 1519



DIRECTORS: C G VON GEUSAU A M SMITH G D V THERON C B VAN BRAKEL E MACIEJEWSKI (FINANCIAL DIRECTOR) G R TYNDALL (MANAGING DIRECTOR) G M E KERR B NTULI

CONSULTANTS: G S T LOWDEN C A ROSE K G MILLAR

EXECUTIVE ASSOCIATES: C G AGENBAG F B BAIN P BARKHUIZEN A H BEOSUMBAR M J BONNER L J BRINK M A L CLAPPERTON M H DOLLIE F DU PLESSIS N DUBE T M DUNNELL D HO B HOGWIND K E HOHLS C T IRELAND A JACOBS
D R JAMES N JAXA A J KRUGER B C LEE-JONES A MCKAY C A MILES R L MURRAY T PFOTENHAUER B A PHILLIPS C STEURER N A B STEVENS R THOMSON G THORLUND S A VAHED J S VAN HEERDEN G D VAN SCHALKWYK W WIGGILL
ASSOCIATES: E J A KAMPURIRA J BEUTE T J R BROWSE K DASCHNER G J R GEUSTYN D J GREEN B G JONES R K KEPPLER P R LAUBSCHER J LAVERY M M TEIXEIRA W VAN DER MERWE

Additional water demand management measures that will be implemented are the compulsory installation of a 5000 l water tank at each house. This water can further augment the “treated sewage” domestic supply.

We foresee that a reservoir will have to be constructed at the highest point on the site to provide a 48 hour storage volume. This equates to a reservoir of size $\pm 400 \text{ m}^3$ and is proposed as a round reinforced concrete structure 13 meter in diameter and 3 meters high. To minimise visual impact it is proposed that the reservoir be half buried and landscaped. If supply pressures to some of the erven are inadequate, mechanical pressure boosting at these erven will be provided.

Sewage disposal

Sedgefield Municipality cannot currently accept any new sewer connections at the Municipal Sewage Treatment Plant (STP). The STP is due for an upgrade and until such time as this happens, any new developments must treat their own sewage to the required standards. Currently envisaged upgrades will improve effluent quality but unfortunately not the capacity of the existing works.

The minimum standard for treatment of sewage effluent in Sedgefield is Special Standard as opposed to General Standard which is normally the requirement laid down by Department of Water Affairs. Special Standard is a more stringent standard than General Standard and cannot be achieved with conventional bio-reactor type package plants which are often used where General Standard is acceptable. Currently MBR (Membrane Bio Reactor) technology is the only option on a package plant scale that can achieve Special Standard. For this reason options like a mini treatment plant for each house or a central non membrane type package plant were not considered for this proposed development.

Based on the water demand, the estimated sewage flow will be 80% of 272 = 218 kl/day. This equates to a peak flow of 7,24 l/s. It is proposed to install an MBR (Membrane Bio Reactor) sewage package plant on site for the development. This package plant will be positioned below the lowest contour for the residential houses as shown on the attached plan; G4680-CE-101 rev A in order to utilise gravity flow to collect all the sewage flow at the plant. The position as shown is approximate and the final position of the plant will consider topographical contours, distances from main roads, distance from the nearest houses as well as the importance of a visual screen from general public view.

The treated effluent water will be pumped and stored on site in a 400kl reinforced concrete reservoir in the approximate position as shown, and will be recycled from here into the dual water supply network as outlined above. The dimensions of the reservoir will be approximately 13m in diameter and 3m high and the rising main will comprise of a buried uPVC pipeline with a maximum diameter of 110mm. To minimise visual impact it is proposed that the reservoir be half buried and landscaped.

The on-site MBR package plant is seen as a temporary sewage treatment solution until the upgrade/expansion of the municipal treatment plant has been completed and produces effluent of the required standard. At that stage sewage from the development will be discharged at the municipal works via the newly installed municipal infrastructure. This principal has been confirmed with the local authority (see attached Annexure A). The proposed connection route for the future tie-in of The Hill effluent is indicated on the attached drawing: G4680-CE-001 rev A. This is subject to the final layout as prepared by the Municipality for future planning.

A decision will have to be made at that stage what to do about dual supply of treated sewage to the units. Possible options for utilisation of treated effluent from the Municipal Treatment Works are:

- Return of treated sewage to the Hill only.
- Recycling of treated sewage effluent back into the potable system as the case is for George Municipality. In this case the dual supply system will become redundant.

Groundwater contamination must be avoided at all times and as the development is located upstream of the emergency boreholes located to the south of the development the following mitigation measures have been considered:

- The MBR plant is located 176 meters away from the nearest borehole. This is well in excess of the National Water act 36 of 1998 Section 21 (g) – The Act's requirement that states that a sewerage disposal sites must be located 100 meters minimum away from a water resource or a borehole. Site specific conditions and the sufficiency of distances can be confirmed by a qualified Geo-hydrologist.
- The sandy nature of the sub surface soils found on site will act as a filter medium in the unlikely event of a spillage occurring.
- On site storage of minimum 4 hours will be provided at the MBR plant to facilitate response time in the case of any emergency.
- Water extracted from the boreholes undergoes a testing procedure before it is diluted in the municipal storage reservoirs, prior to distribution in the network.
- The HOA will be required to appoint a competent person to operate and maintain the MBR plant.
- The MBR plant will be installed with emergency generators to ensure power back-up in the case of a power failure from the Municipal supply. The mechanical installation will make provision for one duty and one standby pump.
- In terms of the Dept. of Health's guideline document, treated effluent will be sampled regularly (every 3 months) and records forwarded to the relevant authorities.
- Samples taken from the monitoring wells at the boreholes will act as early warning of any contamination that could occur.

Road Access

Road access will be provided via the current gravel minor provincial road no. OP06914 – Egret Street. This road will require upgrading by the developer. The envisaged upgrade comprises mainly a slight widening of the existing gravel road from 5-6 meters to 6,5 meters (14,5 meter road reserve) and providing a brick paved riding surface from the existing railway crossing to just past the main entrance to the development.

The access of Egret Street onto the N2 was the subject of a Traffic Impact Assessment and was found to be inadequate for the proposed development, see the Traffic Impact Assessment (attached Annexure B). The intersection onto the N2 as well as the railway crossing will subsequently require upgrading.

The width of internal roads will vary between 4,5m and 5,5m, built in 11m and 12m wide road reserves. The roads will have brick paved surfaces and sloped to allow overland flow as far as possible to allow for un-concentrated stormwater flows.

Telecommunication Services

If the development elects to have a terrestrial telecom service, the developer will install cable ducts and junction boxes to all properties for the future installation of telecommunication cables by the landline supplier of choice. To minimize the environmental impact of the installation of the ducts, the ducts will follow the roads where possible or where this is not an option ducts will follow other services routes.

Wireless communication is also an option, in which event the ducts will not be required.

Stormwater disposal

Stormwater infrastructure will be provided by the developer – see drawing G4680-CE-102 rev A. All necessary precautions will be taken to prevent erosion.

Design Philosophy

Stormwater management will be according to recommendations contained in the Red Book i.e. Guidelines for Human Settlement Planning and Design as compiled by the CSIR.

A dual drainage system will be adopted. The minor flood with 1:5 year or less recurrence intervals will be carried in a formal system comprising swales, the streets and conduits. The major flood with 1:50 year recurrence interval will be carried in the streets and the formal system mentioned above and only where the latter capacity is exceeded, then in overland open or piped channels and infiltration into the sandy surface material and natural watercourses.

During the detail design phase, minor storm runoff from catchment areas will be calculated and kerb inlets will be positioned and sized to match runoff volumes. The capacity of road kerbs will also be checked against major runoff volumes. Stormwater servitudes will be provided between residential erven where necessary to accommodate overland open channels with sufficient capacity to carry major storm runoff from the edge of the road to the nearest natural watercourse.

Specific Considerations

Increased overland flow

Runoff from the land will increase as a result of the development, but this will be accommodated in the design of the minor and major stormwater system. The increased runoff will not affect any existing or proposed properties, since all properties are well above the 1:100 year flood lines for all the natural watercourses.

Increased overland flow velocities

Various measures will be incorporated to mitigate increased flow velocities like:

- Energy dissipaters and stilling basins at stormwater pipe outlets. Reno mattress aprons with stilling basins where appropriate will be provided at all culvert outlets and mitre drain outlets. At selected mitre drain outlets, large stones will be effective as energy dissipaters.
- Lining of open channels with grass and or stone pitching where required.
- Utilisation of invader tree logs to act as flow speed calming structures places across flow paths and anchored properly.

Quality of water

The development is mainly residential and long term contamination of stormwater run-off is not a concern. The site is most vulnerable during the construction phase and it will be necessary to utilize silt screens and onion bags to trap silt before the run-off joins the natural watercourses. Once vegetation in all the disturbed areas of the development is well established and ground surfaces have consolidated, no further measures will be required. These measures will be the subject of the Environmental Management Plan (EMP) which will be issued to the contractor at construction stage. The Environmental Control Officer (ECO) will be responsible for enforcing the EMP.

Protection of slopes that occur on the property

Natural slopes that have been disturbed and where sheet flow occurs will be landscaped and re-vegetated. Where flow is concentrated, measures will be incorporated as proposed above.

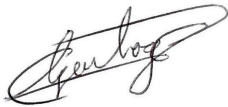
Solid Waste disposal

Knysna Municipality will dispose of the solid waste (see attached Annexure C). Collection of the waste will be the subject of an agreement between the Developer and Local Authority and as contained in a signed Services Agreement. On site collection to a central transfer station will be the responsibility of the developer/HOA.

Do not hesitate to contact us should you want to discuss anything further or if you require further information.

Yours faithfully

KANTEY & TEMPLER (Pty) Ltd

A handwritten signature in black ink, appearing to read 'C G Agenbag', written in a cursive style.

C G AGENBAG Pr Eng

Annexure A – Water and Sewer from Municipality

Annexure B – Traffic Impact Assessment (TIA)

Annexure C – Solid Waste from Municipality

Drawings: G4680-CE-101 rev A
G4680-CE-001 rev A
G4680-CE-102 rev A