Suite 9A, 80-84 Ballina Street, Lennox head NSW 2478
PO Box 161, Lennox Head NSW 2478
(02) 6687 4666
www.planitengineering.com.au

Planit Engineering Reference: J116 LTR 02

15 March 2017

Wayne Williamson
Northern Water Solutions Pty Ltd
PO Box 977,
Noosa Heads QLD 4567

Dear Wayne,

COBAKI - SEWER DESIGN – PRESSURE SEWERAGE SYSTEM

We are writing to clarify Council's concerns regarding the proposed pressure sewer system design proposed for Cobaki Residential Development.

Based on Tweed Shire Councils combined comments on the proposed amendments to the modification of the Cobaki Concept Approval (MP06_0316 Mod 5) and the proposed modification of the Project Approval (MP08_0200 Mod 4) with regard to the water supply and waste water treatment (Letter issued 22 February 2017), Council have stated that "The Cobaki site is well suited for gravity sewer and any approval from Council under s68 will require such".

Our opinion of this site differs from Councils statement and we believe that the installation of a traditional gravity sewer system for this site would not be undertaken in accordance with engineering best practice for the site. Sections of the Cobaki site may be suitable for the installation of a traditional gravity sewer system, these areas are to the North and West of the proposed development area where the site is elevated and grades down towards the eastern portion of the site.

The majority of the proposed development area however is located within a High Groundwater Vulnerability Area as identified on Tweed Shire Councils Planning and Flooding map base. In order to understand the extent of the groundwater area we have overlaid the Cobaki precinct layout over the groundwater mapping image as shown below and in the layout plan attached.

This area is flat, low lying and preliminary geotechnical investigations have identified that there is groundwater 1m below the surface. Acid Sulphate Soils have been identified as being present throughout the lower areas. The site is also located close to environmentally sensitive areas including SEPP14 Wetlands and the Cobaki Broadwater.

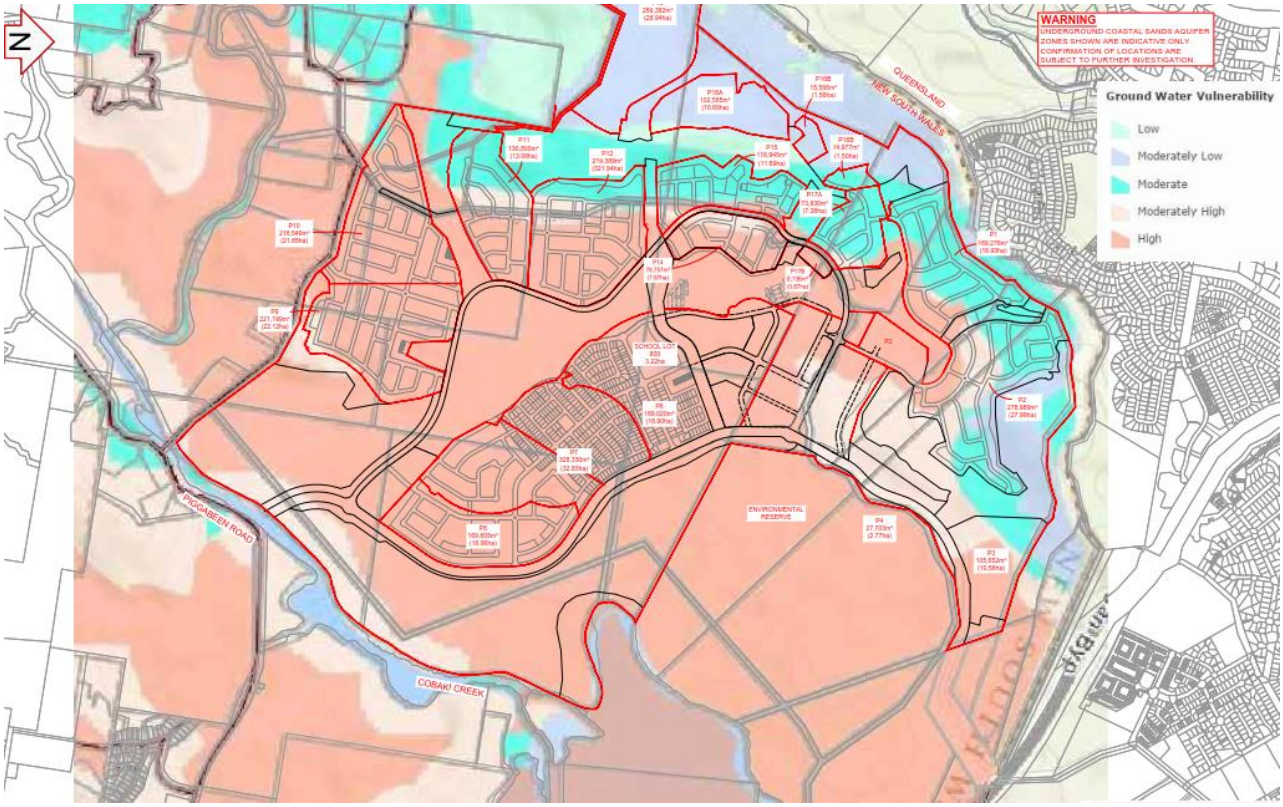

Figure 1 – Cobaki – Tweed Shire Council Groundwater Vulnerability Mapping Overlay

Whilst the lower areas of the proposed development site will require filling as part of the development process, due to the flatness of the site a traditional gravity sewer system would require numerous Sewer Pump Stations to be constructed in the lower areas of the site, with gravity sewers up to 4m deep which would require the gravity sewer network to be constructed below the groundwater level and within Acid Sulphate Soils.

To construct this type of system extensive dewatering would be required throughout the site and the excavated material would need to be tested and treated in accordance with an Acid Sulphate Soil management plan. Whilst this system could be constructed using these methods the construction process would present significant environmental risk to the SEPP14 wetlands and Cobaki Broadwater, through potential leaching of acid sulphate soils and spills/overflows into the existing waterways during the dewatering process.

Once a traditional gravity sewer system is constructed below the water table it will continue to be susceptible to groundwater infiltration and inflow issues. In standard gravity sewer systems infiltration and inflow can cause flow increases up to 5 times the Average Dry Weather Sewer Flow. Where the system is located below groundwater infiltration and inflow can be as high as 10-15 times Average Dry Weather Flow. In a traditional gravity system these peak flows need to be designed for to ensure the system operates during peak flows, catering for flows this high requires all downstream collection, pumping and treatment infrastructure to be significantly upsized to cater for these increased flows.

Due to the high level of the water table and the close proximity of the Cobaki Broadwater, there is the potential for the groundwater to be tidally influenced, if this is the case and a gravity sewer is installed below the water table, there is a high probability that any Infiltration and Inflow that may occur would be highly saline and may cause significant issues downstream at Tweed Shire Council's Waste Water Treatment Plant.

Due to the risks associated with a traditional gravity sewer system in this type of land form we believe that a low-pressure sewer system is a much more practical and environmentally responsible system to install to service the proposed development.

Based on the Water Services Association of Australia - Pressure Sewerage Code, WSA 07-2007, Section 1.2.1 Pressure Sewer System Philosophy, and Section 1.2.2 Application of Pressure Sewerage clearly identify the preferred applications for low-pressure sewerage systems over traditional gravity sewer systems.

Section 1.2.1 states – *"Compared to a traditional gravity system, pressure sewer systems have negligible inflow/infiltration issues and are not limited by the strict grade controls. As a result the pipes are smaller and can be laid shallower, allowing reduced depths of excavation or other construction options, which lowers construction costs."*

It also states – *"It is particularly suited for flat terrain, involving very long strip developments, or along lengthy waterways, bad ground and environmentally sensitive areas. Because of the limited depth required and the opportunity for trenchless technologies, less damage to the environment will occur during the construction phase than the conventional gravity sewerage alternative."*

Section 1.2.2 states – "*Consideration should be given to the use of a pressure sewer system in one or more of the following circumstances:*

a) *Insufficient natural slope i.e. in flat countryside or to serve low lying communities*
b) *Isolated, low density communities.*
c) *In densely populated areas where difficult construction or right-of-way conditions exist.*
d) *Terrain has high undulations with relatively high relief.*
e) *Where the system outfall is at the same or a higher elevation than most or all of the serviced area.*
f) *Poor subsoil e.g. high ground water table, unstable rock or rock condition.*
g) *Obstacles to the sewer route e.g. utility services, waterways.*
h) *In aquifer protection zones.*
i) *Where there are only seasonal flows.*
j) *Where it is necessary to minimize the impact of construction work.*
k) *Where it is necessary to minimize the environmental impact.*
l) *Where the downstream system has limited peak flow capacity.*
m) *Where slop stability issues make construction of a gravity system impractical."*

The use of pressure sewer throughout the proposed development also needs to be considered in relation to the NWS design parameters for the proposed WWT. The WWTP design requires:

- The maximum sewerage design flow must equal 1 ADWF plus 10% as per Sydney Water's Pressure Sewer design code.
- 24 hours redundancy must be provided in the sewerage system network and storages to accommodate for power outages, break downs and planned maintenance.
- No sewerage spills or discharge may occur due to wet weather events.
- The design must take into account that the area is subject to 132 wet days per year.
- The system design must take into account the low flat areas which are subject to a high water table and ASS soils,
- There can be no discharge to land, water ways or ground water due to protected wet lands and waterways in the area.
- Sewerage flows must be controlled from the sewerage network to the WWTP at all times, 24 hours per day, 7 days per week.

Given the constraints of the Cobaki development site several of the above circumstances are applicable to the site and therefore a pressure sewer system is the most practical system to install under these conditions.

The benefit of the proposed pressure sewer system for Cobaki development is that there is a sealed pump unit to service every 4 houses within the proposed development, this allocation of pump units throughout the development builds emergency storage capacity within the entire pressure sewer network. Each pump unit is connected to a SCADA system that reports in real time data back to the control centre, which can monitor and control the entire pressure sewer network 24/7. The SCADA type control system provides the network operator

with a high level of operational flexibility and allows the entire network to be remotely controlled and operated. This is particularly relevant if an emergency situation was to occur due to power outages, burst pipework, planned maintenance or breakdown situations where there is the potential for sewage overflow to occur, the network operator will receive an alarm that will automatically shut down the system or switch on pumps to minimise any potential for spills to the environment during adverse conditions. This degree of operational flexibility is not available in a traditional gravity sewer application and meets or exceeds the performance of sewer pump stations servicing a conventional gravity sewer reticulation system, which is extremely beneficial in environmentally sensitive areas where spills to the environment are not acceptable.

Due to the reduced Infiltration and Inflow with a pressure sewer systems, it ensures that all downstream infrastructure does not need to be excessively upsized to cater for wet weather events, the system has been designed to cater for peak sewer flow generation with a 10% allowance for Infiltration and Inflow.

The lower sewerage flow generation together with the incorporation of a recycled water reuse system within the development from the proposed WWTP will increase the percentage of wastewater reuse that occurs within the development thereby producing a better environmental outcome for the development on the whole.

Based on the above and based on best practice engineering we believe that a pressure sewer system is the best engineering design solution for the development and will minimise the impact to the environment during both the construction and operation of the system and reduce the risk to community health.

We ask that Council take this into account under Clause 15(2) of the regulations the protection and promotion of public health, the protection of the environment and the safe guarding of assets when assessing any s68 application.

Should you have any queries in regards to any of the above please do not hesitate to contact me on 0407889049 or alternatively via email andreww@planitengineering.com.au.

Yours sincerely

Andrew Wells
Director – Infrastructure

Encl. Planit Dwg J116 0001