

## 4.7 Infrastructure

The project team prepared an estimate of the development yield in order to assess the future infrastructure demand from Varsity Station Village. Given that the actual development yield will be determined at the time of development, it was felt that a maximum development yield estimate should be used in infrastructure planning purposes. These maximum estimates are provided below.

Development type	Yield range or maximum design threshold
Residential	400 to 1,000 dwelling units
Retail	9,200 sq.m
Commercial	50,000 sq.m

Residential development yields are now expected to be between 600 to 900 dwelling units. This equates to a population of between 1,250 to 1,900 persons, based on an average household size of 2.1 persons.

### 4.7.1 Water

The Varsity Station Village site is located within the Gold Coast City Council's Reedy Creek Water Supply District water supply zone. There are no existing water supply networks within the proposed site. There is an existing reticulation system along Scottsdale/Casua Drive, consisting of a 450mm diameter main and a 750mm diameter main which service the Varsity Lakes area and are in close proximity to the site.

#### Estimation of water requirements

The water requirements for the proposed development were calculated based on the average demand per capita consumption and equivalent tenements. The average day per capita consumption (AD) is the average daily water demand over a year.

The equivalent tenement demand (ET) is the demand placed on infrastructure for water consumption and sewage discharge based upon an equivalent dwelling unit. The equivalent tenement demand includes the residential, commercial and retail development categories. The average day demand of 880 litres per day demand was taken from the Gold Coast City Council's recommended values and assumed to be constant throughout the build period. The equivalent tenement used in this report equals an equivalent population of 3.2.

The population figures were estimated based on the densities set out in Council's "Our Living City – Gold Coast Planning Scheme Policies" – policy 3A – Policy for Infrastructure Water Supply Network developer Contributions.

The water requirements were calculated by multiplying the average day per capita consumption or equivalent tenement demand with the number of equivalent tenement demand of each respective development category. The equivalent tenement demand was derived from the density and unit or area where applicable.

#### Water supply demands

The future demand model is yet to be finalised, it is expected that the maximum number of residential dwellings and the retail/commercial development areas will be distributed as follows.

Development type	Number / Area	Density	ET	AD (kl/d)
Residential	1,000 Units	0.55-1.0 ET/Dwellings	550-1,000	484-880
Retail	0.92 ha	16 ET/ha	15	13
Commercial	5 ha	16 ET/ha	80	70
Total			645-1,095	567-963

Conservative (highest) values of equivalent tenement demand shall be used in the reticulation network design for both water supply and sewerage.

#### Peaking factors for water supply

The water supply network demand peaking factors relative to average day demands given in the following table are obtained from the Gold Coast City Council Land Development Guidelines.

Demand category	MDMM	MD	MH
Residential single family	1.48	1.79	4.22
Residential multi family	1.30	1.50	2.51
Commercial	1.12	1.20	2.35

The maximum hour demand is to be taken from the diurnal patterns for a maximum day design. From the available data, the maximum hour demands were calculated for the three types of development within the project area.

#### Standard of service

The standard of service adopted for the planning study is generally in accordance with the Land Development Guidelines. The design of the reticulation network shall be based on the parameters below.

##### 1. Pressure parameters (excluding fire fighting)

Criteria	Residual Pressure
Minimum residual head	22m head at the building pad
Maximum residual head	90m head at the building pad

##### 2. Pipeline parameters

Criteria	
Pipe capacity - trunk and reticulation mains	<ul style="list-style-type: none"> <li>Size for peak hour flow</li> <li>Size for peak hour flow + Fire Flow</li> </ul>
Friction equation	Hazen - Williams
Maximum velocity	2.5 m/s
Minimum velocity	N/A

##### 3. Fire fighting parameters

Type of fire	Fire flows	Base demand	Residual pressure
Residential	15 L/s @ 2 hrs	2/3 Peak Hour Demand	12m
Commercial	30 L/s @ 4 hrs	2/3 Peak Hour Demand	12m

The schematic plan should be developed based on the network analysis satisfying the above parameters and should form part of the supporting material for future development applications.

## 4.7.2 Sewer

### Priority infrastructure plan

Gold Coast Water plans and delivers water infrastructure. Their current Priority Infrastructure Plan is to be updated in 2008. They have been requested to incorporate the Varsity Station Village population and demand parameters in this 2008 update.

### Summary

The two trunk water supply mains mentioned above will be able to cater for the early stages of the development. Gold Coast Water has been requested to incorporate the ultimate demand requirements into their Priority Infrastructure Planning scheme that is to be updated in 2008. This will ensure that water demand for the ultimate development within the transit oriented community is taken into consideration in the Gold Coast City Council's upgrades for the zone. In addition, detail modelling work will have to be carried out during the development phase to confirm the hydraulic capacity of the existing system including reservoir capacities and fire fighting capacity.

The proposed development area is located within the Gold Coast City Council's Merrimac Wastewater District sewerage catchment area. At present there are no sewer lines within the proposed development site with the exception of a single line service for the TrackStar Alliance's temporary site office.

Housing estates north and northeast of Casua Drive are serviced by gravity sewers that discharge to pumping station SS72. This pumping station pumps into a 375 mm diameter VC pipe which runs along Crown Court. Flow is then by gravity and trunk mains to the Merrimac Wastewater Treatment Plant, which is located on Boowaggan Road.

### Proposed upgrading works at the Merrimac Water Treatment Plant by Gold Coast City Council

The capacity of Merrimac Wastewater Plant was recently upgraded by approximately 60 percent to cater for the growing demands in this region. The plant will subsequently have the necessary capacity to handle additional flow from Varsity Station Village. Hydraulic capacity of the treatment works will need to be further investigated with Gold Coast Water.

### Summary

A network of gravity sewers within the Varsity Station Village site is expected to drain towards a collection point near the north-east corner of the development and pumped to the existing pumping station SS72. Gravity sewers will convey the sewage from the southern precincts directly to SS72. The existing pumping station may provide a suitable short term solution for the early stages of development. The ultimate development will require the existing pumping station to be upgraded and the 100 mm diameter PVC rising main from the pumping station SS72 to the trunk main along Crown Court will need to be replaced by a larger rising main due to the increased flow. Detailed modelling work will have to be carried out during development to confirm the capacities and sizing.



### 8.7.3 Stormwater

The existing terrain of the site slopes in the general direction of west to east, towards Scottsdale Drive. Scottsdale Drive which borders the eastern boundary of the site rises from the Coromandel Lane end of the site to its highest point near the middle of the Varsity Station Village site before falling towards the New Bridge Access road. This sets the pattern of existing stormwater drainage flow paths and the major discharge points are through the southern, south-eastern and north-eastern corners towards the nearby natural water courses.

The TrackStar Alliance is constructing Varsity Lakes station, access roads and the rail track at the western boundary of the site. Stormwater flow towards the track will be directed parallel to the track towards Coromandel Lane and the New Bridge Access road. Existing storm water flow paths will change to accommodate the proposed road and rail layouts. However, the major stormwater flow directions and discharge points are not expected to change significantly. The drainage within each of the Village precincts will be channelled generally alongside the roads.

Run-off treatments will include natural swales, detention and other urban drainage techniques in order to ensure the quality of discharge into the natural water courses satisfies best practice guidelines.

### 8.7.4 Electricity and telecommunications

#### Energex

The site is adjacent to the Mudgeeraba sub-station. Electrical infrastructure requirements are therefore expected to be met relatively easily. The TrackStar Alliance is expected to lay 11kV cables within the site as part of the Varsity Lakes station project. These will service the Railway station and facilities. Energex who are responsible for the provision of electrical infrastructure will determine the spare capacity on this 11kV line and lay additional cables for Varsity Station Village.

Since Varsity Station Village will develop over a period of several years, the local load will increase in stages. Energex allows an estimate of 3-5kVA per household (the figure will vary depending on the size of the house and on the demographic group of the residents). A new zone substation may have to be incorporated during the final stage of the development. A 33kV line will have to be laid to connect this new substation to Mudgeeraba substation. The new substation will occupy a relatively small space, and if required can be housed within the basement of a building. However the lead times for Energex to install cables and substations are long and therefore contact with Energex should be established at an early stage. All supply will be underground.

The electricity easement that currently runs through the site along the Scottsdale Drive/Casua Dive frontage will be reduced in width once the high voltage powerlines are undergrounded. The exact width and location of the reduced easement will

be determined by Energex during their detailed design process which is likely to be completed by the end of 2008.

#### Telecommunications

The area around Varsity Station Village is well serviced by telecommunications infrastructure. Telstra or another telecommunication service provider is expected to readily assess the needs of the development at various stages and provide the infrastructure and connections as the development progresses.

It is important to recognise the growing demand for fast internet connection and in particular broadband facilities. Since a large proportion of the population may be university students, it is likely that there will be a requirement for fast and reliable internet services and provision for these should be made early in the development process.



### 8.7.5 Land management

The TrackStar Alliance is currently constructing the railway station, railway line and access roads within the site. Remediation of the landfill within the site is being carried out by TrackStar as part of this Varsity Lakes station project. This work is programmed to be completed by the end of 2009.

A review of the draft Site Management Plan and Remediation Action Plan as referred to in TrackStar document RVL-L-050707-006 dated July 2007, indicates that the Site Management Plan is based on the strategy to remove 389,000m<sup>3</sup> of waste materials from the former landfill site to enable backfilling with suitable engineered fill. Given the remedial strategy provided in the Site Management Plan and the procedures provided in the Remediation Action Plan it is expected that the risk of contamination as a result of the former landfill will be very low. The decontamination works will require verification once final works by TrackStar are completed and validation sampling is undertaken. It is anticipated that the remediation works will be extremely successful and that the site will be removed from the Environmental Management Register altogether.