

9.0 Infrastructure Master Plan

9.1 Infrastructure Master Plan

This section of the report details the infrastructure required to support the development contemplated by DSP Part 2. It provides a coordinated approach to the delivery of service infrastructure across the project area and this information will ensure that the preparation of individual local structure plans and subsequent subdivision and development will occur in an organized manner.

9.1.1 Service Infrastructure Required to Support Development

9.1.1.1 Sewerage

Water Corporation has recently reviewed their detailed strategy for sewer planning over the area. The major sewer infrastructure in the area is the Bennett Avenue wastewater pumping station and rising main. It is proposed to do an initial upgrade to the Bennett Avenue WWPS to increase the pumping rate to 260l/s. This is provisionally planned to occur in the 2012/13 financial year. Further pump rate upgrades are not expected to be needed until after 2030.

The existing pressure main from the Bennett Avenue pumping station heads to the south and east to discharge into the Spearwood main sewer. The existing Dn500 pressure main is provisionally indicated for replacement with a DN700 (or possibly duplication) around 2040 which would coincide with the Bennett Avenue pumping station being upgraded.

The rising main route would need to be within road reserves and a majority of the route would need to be accommodated within Cockburn Road.

As part of the development of the area normal extension of the existing gravity system would occur such that all lots within Cockburn Coast area would be provided with a gravity sewer catchment.

The existing sewer pumping station will remain and be upgraded as required. At this stage the buffer area of 50m is to be taken from the boundary of the Pump Station. It may be subject to further analysis with regard to where the actual buffer is measured from, in accordance with general EPA Guideline Statement No.3. Typically this buffer area would be Water Corporation land, road reserve and/or POS area.

The future possibility of having to duplicate the rising main will require reviewing Cockburn Road verges to ensure enough spare capacity is in place. In particular, the revised Cockburn Road may require sufficient width to accommodate such a significant pressure main.

An emergency outfall main DN600 exists from the sewer pumping station. This outfall will be required to remain, or at least be diverted. As such planning should attempt to locate future road reserves and/or other public land uses over the main in order to minimise relocations and hence cost. Any change to the emergency outfall would be at the cost of the development.

9.1.1.2 Water Supply

Water supply planning for the Cockburn Coast development indicates the following:

- Ultimate development will place a significant demand on the Hamilton Hill Gravity Scheme.
- In order to service the total development, the DN600 water distribution main in Forrest Road will be required to be extended at least up to Cockburn Road. This would be a DN600 water main.
- A possible route along Rockingham Road, Bellion Drive through to Cockburn Road is likely to be used, but obviously subject to detailed design and planning.
- The Forrest Road DN600 extension would be required when the capacity of the Lefroy Road DN600 is exceeded due to excessive head loss and is unable to meet required customer demands.
- To service developments along and either side of Cockburn Road heading south, a DN400 main is required south of Rollinson Road. This may be able to reduce to DN300 after about 1km depending on the demands and detailed subdivisional planning.

In order to more clearly ascertain likely timing of water supply infrastructure upgrades, the Water Corporation intend to undertake field pressure testing on the Lefroy Road DN600 main over the summer of 2010/11. The Corporation is also undertaking a review of the Hamilton Hill gravity and high level scheme,

It is worth noting that the Water Corporation modeling is based on historical water supply useage. The express brief for this development is to a medium to high density zoning as well as being very water efficient. As such, we believe this will feed into the development using significantly less water than the Water Corporation modeling indicates.

All current and future potable water supply mains will exist in road reserves. Therefore, the only specific planning implications are for road reserves to be wide enough to accommodate all services. In particular, Cockburn Road will need to be checked that it can accommodate all current and proposed infrastructure.

Costs for the installation of water supply headworks items would be levied in accordance with Water Corporation policy. Costs may need to be prefunded depending on development strategy.

9.1.1.3 Roadworks

Major roadworks infrastructure consists of two main elements for the Cockburn coast area, namely:

- Cockburn Coast Drive; This main road may be constructed outside of the 10 year horizon and would likely be decided by State Government and/or Main Roads WA as to the need and timing. It is shown to the immediate east of the Cockburn Coast development area. Cockburn Coast Drive would form

part of the regional road network and is subject to separate investigation, design, funding and construction.

- Cockburn Road; This road is the current north-south artery through the development area. It will remain as an important transportation link. Cockburn Road is currently 2 lanes and is envisioned to remain such in the near future. If Cockburn Coast Drive is not constructed by such time as traffic along the 2 lane Cockburn Road approaches saturation, it is recommended that Cockburn Road be widened to four lanes. Upgrading of Cockburn Road may also include the relocation of existing services within the existing and/or future reserve boundaries. Currently many services exist within the Cockburn Road verges.

We envisage that the transportation studies will inform what roadworks and road widths are required. From a services point-of-view the main issue will be in the design of Cockburn Road. In addition to providing transportation solutions such as bus lanes or light rail, the road reserve will be required to accommodate servicing infrastructure. The aim of Cockburn Road's design should be to ensure a minimum of existing services are disturbed or require relocation. Due to the nature of services along Cockburn Road, any servicing relocations would be relatively costly to implement.

9.1.1.4 Drainage

Currently all rain that falls within the Cockburn Coast development area is infiltrated on site. Upon development we would require the same situation to occur. As such, all new lots would be required to infiltrate their rainfall runoff on site up to a certain return period (probably 1 in 5 years).

Flows greater than this and all roadworks would be pipe and pit drained. These flows would be directed to infiltration areas. Our expectation is that the existing drainage sumps would be phased out and aesthetically pleasing infiltration areas incorporated within POS areas and highly landscaped areas would take their place.

Landscaping and engineering design of the new infiltration areas will be critical in that it can turn existing ugly infiltration areas into POS assets.

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100 9.1.1.5 Power

Western Power have carried out a feasibility study looking at how the development may be served with a power supply from now until ultimate development from a distribution point of view.

Geographically SF505 is an ideal feeder to supply the initial stages of development. However, this feeder has high fault ratings and is not recommended due to its poor reliability. It is noted that the South Fremantle sub-station may be relocated in future and it is planned not to have any distribution feeders from this sub-station. As a result, SF505 may not exist in the future.

AMT507 L346 Orsino Boulevard runs through Cockburn Coast south along Cockburn Road and is currently lightly loaded. It may be utilised to supply the initial stages. However, AMT507 was initially installed to primarily supply Port Coogee. When Port Coogee requirements increase over time, this feeder may not have enough capacity to cater for any significant Cockburn Coast load.

AMT512 Lefroy Road feeder is considered one of the critical feeders due to its limited capacity and various reliability issues. Western Power currently has a project planned to install a new feeder in order to transfer some load from the AMT512 feeder. The project is likely to be implemented after July 2011.

In summary:

- Planning study indicates that the existing feeders within the vicinity are likely to not be able to supply the total load.
- AMT507 may be able to supply the initial stages of development, but this is dependent on the load take up timing of the Port Coogee development.

Ultimately a new feeder is likely to be required to be installed from the Amherst sub-station to the development area. It is also likely that major reinforcement will be required for both transmission and distribution assets to increase capacity.

The order of magnitude cost of installing a new feeder is approximately \$1.4 million.

Further discussion with Western Power following their feasibility study indicates a sub-station may be required within the Cockburn Coast area. A sub-station typically requires a land area of 1 hectare and hence has land planning implications. Western Power is addressing this possible requirement in conjunction with the Terminal Substation relocation.

Installation of a new feeder is proposed to occur by direct horizontal drilling within existing road reserves. Hence, future road reserves need to take into account the installation of HV infrastructure.

Existing power supply infrastructure in Cockburn road indicates that underground power cables adjacent to Cockburn Road are within private property. As such, the planning of the revised Cockburn Road reserve needs to accommodate these cables so that expensive relocations do not occur.

9.1.1.6 Telecommunications

Telstra landline telecoms system in the areas exists to a reasonable level.

The newly announced National Broadband Network (NBN) would be involved in the provision of telecommunications for the development area. Current policy is that for developments greater than 100 dwellings the NBN will provide optic fibre to each dwelling. The developer will be required to provide pipe and pit for each stage of development in accordance with NBN specifications.

This infrastructure would ensure a very high level of connectivity for the development.

9.2 Infrastructure Staging

The current Cockburn Coast area is well served with existing servicing infrastructure. The District Structure Plan indicates that the area will provide around 5,000 new dwelling and host a population of over 10,000 people, plus have commercial, retail and activity areas. Infrastructure to cater for this increase in population will need to be upgraded and extended as previously discussed.

The upgrade of this infrastructure will not be needed immediately or at the one time. It is envisaged that the infrastructure upgrades will be timed to match when population forecasts dictate as such or in accordance with properly programmed development stages.

In order to give an indication of likely infrastructure timing, we have detailed below likely timing scenarios. These timings are on the assumption that the majority of Cockburn Coast development occurs within a 15 year time horizon.

0 – 5 Years Infrastructure

- Bennett Avenue wastewater pump station upgrade by Water Corporation.
- Water supply infrastructure to augment supply to the area. Connection of main along Rockingham Road to
- Forrest Road. Main constructed along northern portion of Cockburn Road.
- Upgrade of HV Western Power feeder to support power to the area.
- Construction of an upgraded section of Cockburn Road northern. This may include relocation and rationalisation of services within the road reserve.
- Drainage infrastructure rationalisation and extension to grade out 'sumps' and connect into aesthetic POS areas for the northern development section.
- WA Gas Networks upgrade to supply infrastructure to serve the area.

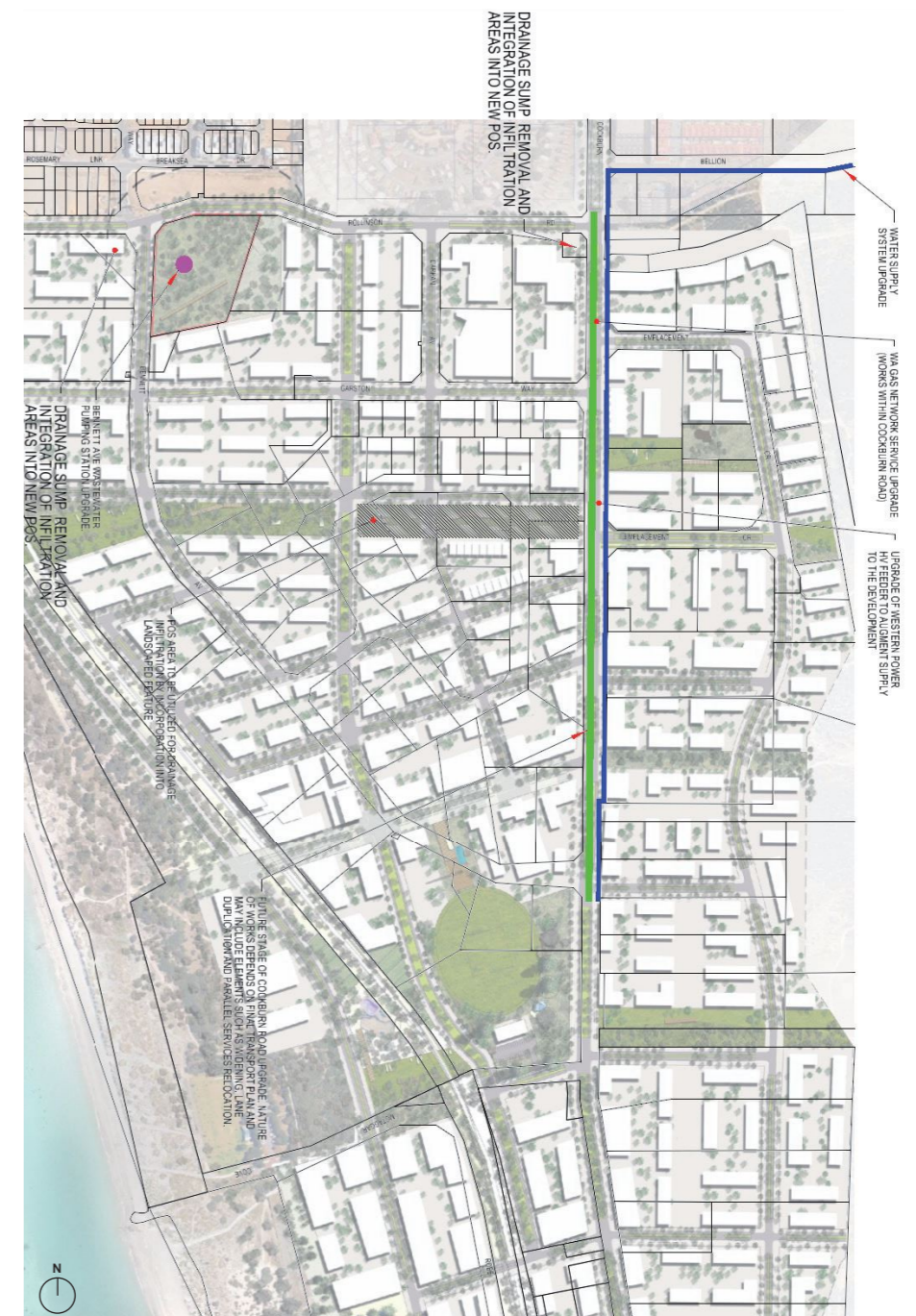


Figure 75_0-5 Year Infrastructure Staging

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5 – 10 Years Infrastructure

- Construction of an upgraded central section of Cockburn Road. This may include relocation and rationalisation of services within the road reserve.
- Possible relocation of the Terminal Substation by Western Power and construction of a Zone Substation.
- Drainage infrastructure rationalisation and extension to grade out 'sump' and connect into aesthetic POS areas for the central development section along Cockburn Road.



Figure 76_5-10 Year Infrastructure Staging

10 – 15 Years Infrastructure

- Construction of an upgraded central section of Cockburn Road. This may include relocation and rationalisation of services within the road reserve.
- Possible relocation of the Terminal Substation by Western Power and construction of a Zone Substation.
- Drainage infrastructure rationalisation and extension to grade out 'sump' and connect into aesthetic POS areas for the southern section along Cockburn Road.



Figure 77_10-15 Year Infrastructure Staging

+15 Years Infrastructure

- Bennett Avenue WWPS ultimate upgrade to ~380 l/s.
- Bennett Avenue WWPS rising main replacement and upgrade size of duplication.



Figure 78_+15 Year Infrastructure Staging