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District Plan Change Application

Servicing Report – Skellerup Block

Selwyn Plantation Board Limited

26 February 20010
Reference: 36951-001
Revision 2

Connell Wagner

Document Control

Document ID: P:\36951\001\WORKING DOCS\DISTRICT PLAN CHANGE APPLICATION - SERVICING - SKELLERUP BLOCK - REV1.DOC

Rev No	Date	Revision Details	Typist	Author	Verifier	Approver
1	03/03/2009	Final	BDT	BDT	MCD	GJD
2	26/02/2010	Yield amended	BDT	BDT	MCD	GJD
3						
4						

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1. Introduction

1.1 General

Selwyn Plantation Board Limited (SPBL) has engaged Connell Wagner to undertake a servicing feasibility study to support their application for a change to the Selwyn District Plan. The proposal will see the re-zoning of the Skellerup block. Refer to the locality plan in ***Appendix A***.

This report investigates the following servicing issues:

- Wastewater Disposal
- Stormwater Management
- Water Supply
- Power supply
- Telecommunications supply

Information has been drawn from the Selwyn District Council (SDC), Network Utility operators, site investigations and experience gained from recent developments on surrounding land.

1.2 Background

Preliminary site investigation work was undertaken by Connell Wagner during August 2008. The investigation included a site walkover, a topographic survey, subsurface geotechnical investigation and discussions with the services providers.

1.2.1 Skellerup Block

Land Information

C's T: CB24F/1018
Approx area: 72.7 ha

General Layout

The site is generally rectangular.

The site is bounded to the east by Dunns Crossing Road, to the north, south and West by existing farm land.

Access to site is via Dunns Crossing Road

Existing Use

The site is covered with grass and is currently used for grazing.

Topography

The site is relatively flat with a slight fall towards the south east. The general grade of the site is approximately 0.5% (1:200).

Geotechnical Investigation

A geotechnical investigation was carried out on the site in August 2008. The investigation included a walk over and test pitting in key locations to provide information on the underlying

soil conditions. The geotechnical report has been included as ***Appendix B***. A summary of the results is as follows:

The following geological model has been inferred for the Skellerup block:

- 200 – 400mm Topsoil overlying,
- Sandy GRAVEL to depth

Groundwater

Well logs from the Environment Canterbury (ECan) database indicate that the depth to groundwater in the area is approximately 8m. This depth is expected to vary seasonally and annually.

The proposed rezoning area does not fall within the Christchurch Groundwater Recharge Zone.

Distance to Existing Wells

The nearest community supply wells (178 and 184) are approximately 2600m up gradient (peizometric contour) as described by the ECan database. No wells are within 1000m of the site. The site does not currently fall within a theoretical Community Drinking Water Supply Protection Zone when plotted in accordance with the Proposed Natural Resources Regional Plan (PNRRP).

There are no existing wells less than 50m from the site. A separation distance of 50m between existing private wells and discharges to ground is generally used by ECan to trigger additional resource consent requirements.

2. Sewerage Reticulation

2.1 Outline Development Plan Servicing

The sewage from Rolleston township is processed at the sewage treatment plant located between Springston-Rolleston and Lincoln-Rolleston Roads, and then sent to the disposal area at Burnham School Road. We are advised by Council that a decision has not been made regarding the staging of the rural-residential land in the district, and will be linking this assessment with the Structure Plan process. They go on to say that until the staging had been decided, they will not be in a position to respond fully to our request for information on the capacity and connection to the Council's reticulation

The SDC is in the process of developing and adopting a Wastewater Strategy for townships within its District.

2.2 Design Flows

The proposed plan change includes re-zoning the site to cater for approximately 100 residential properties.

The Christchurch City Council Infrastructure Design Standard (Draft 2007) sets the following minimum design criteria for the design of sewerage reticulation.

Table 1 - Sewage Design Flows for Skellerup Block

Residential Sewer flows	220 l/day
Assuming population per lot	2.7 Persons/Lot
Total Lots	100 Lots
Peak to average ratio	2.5
Dilution from infiltration and inflow ratio	2.0

Average Sewer Flow *=100 Lots x 2.7 Persons/Lot x 220 l/day/Person*
=59,400 l/day
=0.69 l/s

Maximum Sewer Flow *=0.69 l/s x 2.5 x 2.0*
=3.4 l/s

There are existing connection points along Dunns Crossing Road to the existing SDC reticulated sewer system.

2.3 Physical Constraints

At the Skellerup block, there is no existing reticulation in Dunns Crossing Road. The nearest manhole is approximately 600m north. It would be feasible to install a gravity system to service the site, but this would require a pump station at the lower end of the system, to then pump to the Council reticulation. Depending on the capacity of the existing reticulation, it may be required to pump past the nearest existing reticulation, and on to where there are larger size Council pipes.

2.4 Additional Infrastructure Requirements

It maybe that some upgrading to existing infrastructure will be required. An alternative is to extend any new reticulation through to a point on the Council system that has the capacity to accept the additional flow.

2.5 Conclusions

From preliminary calculations, the block can be serviced under gravity internally. It will require a pumping station to ultimately discharge into the existing Council network.

3. Stormwater

3.1 Existing Stormwater Management

Rolleston has no stormwater reticulation network. All stormwater is discharged directly to ground via soakage pits and basins

A resource consent for the discharge of stormwater will be required from ECan

Recent subdivisions to the north and south of the proposed rezoning site have utilised soakage to ground for stormwater management.

3.2 Options for Stormwater Disposal

3.2.1 General

As there is no reticulated stormwater network then the only practical option is the disposal of stormwater by way of pre-treatment of stormwater and discharge to ground. Discharge of private roof water directly to ground can be made without pre-treatment.

The Geotechnical Investigation Report has been prepared (included as ***Appendix B***). The report indicates that sandy gravels are present at a depth of approximately 0.2m – 0.4m on the sites. These soil conditions would allow for the effective discharge of stormwater to ground given that sandy gravels are expected to be capable of an infiltration rate of at least 1000mm/hr.

A resource consent from ECan will be required in order to discharge water containing contaminants to either surface water or ground. Stormwater from the development will need to be treated to remove contaminants, to reduce the effects on the environment to be less than minor.

It is expected that the most feasible method of pre-treatment is the use of grass swales located within the road reserve throughout the development. Additional treatment such as the use of a stormwater pond or infiltration basin may be required prior to discharging to surface or groundwater.

Stormwater from roof areas is expected to be discharged to ground via individual on-site soakage areas. During large duration events stormwater from roof areas will be directed to the road.

3.2.2 Discharge of Stormwater to Ground

Discharge of stormwater to ground has been utilised in recent subdivisions in Rolleston. Based on similar investigations in the locality, the site should have good drainage characteristics which would make discharge to ground feasible. Similar subdivisions in Rolleston have provided swales along the roads, which then discharge into soakpits. Should kerb and channel be preferred over roadside swales, a piped network would be required, which would discharge into an alternative treatment system such as an infiltration base.

In general, the first flush stormwater (stormwater from the first 15 - 25mm of any storm) is more polluted than stormwater runoff from later in a storm event. As a result, the first flush stormwater is generally treated using treatment systems which provide higher levels of contaminant removal than the treatment systems required for subsequent stormwater runoff. This first flush can be treated through a swale system or infiltration basin. Stormwater runoff from large rainfall events, which exceed the first 15-25mm runoff threshold, can be discharged directly to ground using rapid infiltration trenches or soakpits.

Flows in excess of the capacity of the primary system can be directed to the road as a secondary flow path.

3.2.3 Conclusion

Given the expected underlying ground characteristics and the topography of the site, disposal to ground can be achieved feasibly.

It is therefore recommended that the development incorporates disposal of stormwater to ground as the main means of disposal of stormwater from the development.

3.3 Estimated Contaminant Loadings

Contaminant loadings for the roading stormwater runoff have been estimated using the Auckland Regional Council's TP10 document.

Following treatment using grassed swales with a nine minute retention time, the stormwater is expected to have the following contaminant loadings:

Contaminant	Expected Loading Following Swale Treatment
Sediment	16.3g/m3
Zinc	0.124g/m3
Copper	0.033g/m3
Total Petroleum Hydrocarbons	0.624g/m3

3.4 Conclusions

The area proposed for re-zoning is well suited to ground soakage as the primary method of stormwater removal and this method has been successfully implemented in Rolleston

As with all ground soakage systems, the efficiency can decrease over time. However, by adopting a conservative approach to the design of the systems, ensuring that there are adequate options for future upgrading and making allowance for secondary flows, ground soakage systems can provide a cost-effective long-term solution to stormwater disposal. There are alternatives that include the use of proprietary treatment devices, but there are more costly to install, and there is a reluctance from Council to accept them because they are more difficult to maintain than grassed areas.

Adequate measures would need to be implemented to ensure the effects of the discharge on the underlying groundwater are reduced to an acceptable level using suitable treatment and attenuation devices as required. The discharge will require a resource consent from ECan to discharge to ground.

4. Water Supply

4.1 Outline Development Plan Servicing

There are no water mains outside the Skellerup block, with the closest connection point being a 150mm main approximately 250m north up Dunns Crossing Road

The existing reticulation could be extended into the site, but some upgrading of the existing services may be required. Council may also consider the need for a new well, and may ask for a small area of land to be set aside for this purpose.

4.2 Required Demand

The proposed plan change includes re-zoning the site to cater for approximately 125 residential properties.

The Christchurch City Council Infrastructure Design Standard (CCCIDS) (Draft 2007) sets the following minimum design criteria for the design of sewerage reticulation.

Table 2 - Water Design Requirements

Total Additional Lots	100 Lots
Peak Living Zone Design Flow Rates	0.175 litres/second/connection

The peak expected domestic demand is therefore:

Peak Demand (Skellerup Hub) *=100 Lots x 0.175 l/s/connection*
=17.50 l/s

The water supply reticulation should comply with the New Zealand Fire Service Fire Fighting Water Supplies Code of Practice (SNZ PAS 4509:2003) for fire fighting flows, residual fire pressure and the spacing of hydrants. Residential housing without sprinkler systems is classified as W3 under the code of practice. Water demand for fire fighting is 25l/s as can be seen in Table 3.

Table 3 - New Zealand Fire Service Water Requirements

Water supply classification	Water flow required within a radial distance of 135m (l/s)	Additional water flow required within a radial distance of 270m (l/s)	Water Storage		Maximum number of fire hydrants to provide flow
			Time (min)	Volume (m3)	
W3	12.5	12.5	30	45	2

The total peak demand can be estimated using the following formula:

Peak $Demand_{Total}$ $= Demand_{Fire\ Flow} + 0.5 \times Peak\ Demand_{Domestic}$
$=25l/s + 0.5 \times 17.50l/s$
$=33.8l/s$.

In order to comply with the Fire Service Code of Practice the principal mains within the developments must have a minimum size of 100mm diameter.

4.3 Conclusions

The adjacent existing water reticulation system at the Skellerup block allows the site to be serviced easily with good connection points for the proposed residential development area.

A small utility allotment may also be required if the Council requires a well to be located on the site.

5. Power supply

At the Skellerup block, there is overhead power reticulation along Dunns Crossing Road. The reticulation is predominately 11kV – 33kV (high Voltage).

The block is located near the Rolleston District substation, and work is currently being carried out by Orion to relieve the existing load and provide spare capacity. They have also advised that they have no intention of undergrounding the existing overhead high voltage reticulation, and intend to upgrade the existing 33kV line to a 66kV line in the near future.

6. Telephone supply

We have received as-built plans from Telecom showing that there are existing telephone services along Dunns Road. This reticulation is generally a 50 pair cable, and upgrading work to this is likely to be required. The requirement for upgrading is unlikely to prohibit the development

7. Summary

The site can be serviced for sewer by means of gravity sewer reticulation and a pumping station.

The site is suited to ground soakage as a method for disposal of stormwater. Suitable long term solutions can be provided to dispose of stormwater on-site.

The site can be reticulated by potable water from the Council's water supply.

Connection to the Council's sewage and water reticulation will most likely require some upgrading to existing services.

Planned upgrades to the power reticulation in Rolleston will mean sufficient power is available for the block.

The telephone services will need to be upgraded to provide an adequate level of service.