

Report

Proposed Rudolf Steiner School, Welcome Bay - Drainage Report

Prepared for Waldorf Schools Trust

By Beca Infrastructure Ltd (Beca)

31 October 2008

© Beca 2009 (unless Beca has expressly agreed otherwise with the Client in writing).

This report has been prepared by Beca on the specific instructions of our Client. It is solely for our Client's use for the purpose for which it is intended in accordance with the agreed scope of work. Any use or reliance by any person contrary to the above, to which Beca has not given its prior written consent, is at that person's own risk.



Revision History

Revision N°	Prepared By	Description	Date
A	Tom Jarratt		

Document Acceptance

Action	Name	Signed	Date
Prepared by	Tom Jarratt		
Reviewed by			
Approved by			
on behalf of	Beca Infrastructure Ltd		

Table of Contents

1	Introduction	1
2	Existing Drainage Regime	1
2.1	Wastewater Drainage	1
2.2	Stormwater Drainage	1
3	Site Proposals	1
3.1	General	1
3.2	Proposed Stormwater Catchments	2
3.3	Proposed Stormwater Storage	2
3.4	Proposed Wastewater Disposal	2
4	Conclusion	3

1 Introduction

Waldorf Schools Trust have commissioned Beca to assist with a proposed plan change to rezone land at Welcome Bay Road, Welcome Bay from Greenbelt and Rural Residential Zone to Education Centre Zone. The site is currently occupied by an existing school and kindergarten with a roll of 220 pupils. Waldorf Schools Trust proposes to further develop the site to accommodate up to 650 pupils between the ages of 3 and 18.

This report examines the existing drainage regime of the site and makes recommendations for future drainage on the site, based on the master plan of future development produced by William Algie (architect).

2 Existing Drainage Regime

2.1 Wastewater Drainage

The school site has been developed gradually since 1992. The first septic tank on the site appears to have been installed during 1990 or 1991. This was designed for 30 pupils and has a capacity of 4100 litres. It is thought to discharge to two soakholes and is shown on a drawing at Appendix A, labelled as ST1.

The first septic tank was followed by a second in 1992. The second tank has a capacity of 3300 litres. It was designed to discharge to two 900mm diameter soakholes, but as-built drawings indicate only a single soakhole. This is marked ST2 on the drawing at Appendix A.

A third septic tank was added sometime between 2006-2008. This has a capacity of 3300 litres and discharges to a 90m long soakage trench. This is labelled as ST3 on the drawing at Appendix A.

If the tanks have been regularly maintained and the soakage is still working effectively, then each of the 3300 litre tanks should be sufficient for approximately 30 people and the 4100 litre tank sufficient for 50 people.

2.2 Stormwater Drainage

It appears that the stormwater drainage for the buildings and car parks on the site is drained either to soakage trenches or directly to the "flying fox" gully on the site. In general, the lower part of the driveway drains directly to Welcome Bay Road, the mid-section of the driveway drains via a grip on the eastern boundary to a gully on the neighbour's property and the upper-section of the driveway drains via a small ditch to the head of the culvert underneath the playing field. Where the camber of the drive is towards the school (i.e. the west), it is assumed that the stormwater runs off into the grassed areas around the buildings and soaks away or runs overland to the gully system at the western boundary.

3 Site Proposals

3.1 General

It is proposed to construct a new school campus on the site, probably in stages over the next 20 years. Most, if not all, of the existing buildings on the site will be demolished in stages as new buildings are constructed.

The school site is approximately 6.5 ha in area. The existing buildings, car parks and driveway cover approximately 0.55 ha of the site (8%). The master plan drawing indicates that future development of the site might cover approximately 1.4 ha (22%) of the site.

3.2 Proposed Stormwater Catchments

For the purposes of stormwater drainage, the proposed development can be divided into four catchments each of which represents, approximately, a quarter of the site and a quarter of the new development. This assessment has been necessarily "broad-brush" and refinement of all of the following figures will be required as development progresses. It is considered that the approach taken has been relatively conservative and is, therefore, a relatively robust approach. The most northerly quarter, Catchment 1, would continue to discharge stormwater to the "flying fox" gully. This represents a reduction in peak discharge for a 10 minute / 10 year storm, of approximately 48 litres/second when compared with the existing situation.

Catchment 2 would drain directly to the largest pond on the site. It would require the creation of a new point discharge to the pond which would discharge approximately 110 litres/second for a 10 minute / 10 year storm. Catchments 3 and 4 would drain to the gully at two separate locations upstream of the main pond. Each of these catchments would discharge approximately 110 litres/second at a new point discharge for a 10 minute / 10 year storm. Environment Bay of Plenty (EBoP) require that any new point discharges with a flow of over 125 litres/second for a 10 minute / 10 year storm has a consent. EBoP have yet to be consulted on the potential stormwater scheme for the site, so it is not yet possible to confirm if they will require stormwater consents.

3.3 Proposed Stormwater Storage

To provide attenuation to pre-development rates, Catchments 2, 3 and 4 would require approximately 465 cubic metres of storage for the critical 50 year event. Catchment 1 should not require any stormwater attenuation since the area of impervious surfacing that drains to it would be reduced post-development. This reduction in stormwater runoff has not been offset against the increased runoff from the other areas, thus providing an additional factor of safety within the calculations.

The largest pond on the site has been created within the gully by the construction of an earth dam. In order for this pond to be used as storage for the critical 50 year storm event, the dam could be repaired where it has been breached and the outfall pipe from the pond to the gully below improved such that it is capable of carrying the existing discharge from the pond for up to a 50 year storm event.

3.4 Proposed Wastewater Disposal

Whilst the site is being developed, it is anticipated that the existing septic tanks on the site will be retained. The exception to this is septic tank ST3, the soakage field for which is thought to be located in the area where the new Early Childhood Centre would be constructed. If, during the construction of the Early Childhood Centre, dispersal drains are uncovered, alternative provision for the affected septic tank must be made. There is little room in this area for a replacement soakage field which could service the affected septic tank and/or a new one for the Early Childhood Centre. A new connection to TCC's sewer system is therefore likely to be required sooner rather than later in the redevelopment process of the site.

If buildings located higher up the site were developed first, then there is a possibility to construct a new septic tank to deal with wastewater on an interim basis, until the site had been further developed to a level where a connection to the public sewer system is unavoidable. A new soakage field for a septic tank at the upper end of the site would have to be located on the existing

playing field. This playing field is understood to be filled ground and, potentially, has a relatively low permeability. It has, therefore, been assessed that soakage could be provided for approximately 1200 litres of effluent per day, which equates to an additional 30 people on the site.

A new septic tanks and soakage field suitable for approximately 30 people is likely to cost in the order of \$15,000 to \$30,000. A new pumped connection to the TCC sewer system is likely to cost in the order of \$30,000 to \$50,000 for the basic infrastructure but a budget of around \$15,000 should be allowed for telemetry which is very likely to be required if the pump is vested in Council.

4 Conclusion

Stormwater drainage from the site can be relatively easily dealt with by discharging it to the existing gully to the west of the site. Stormwater can also be attenuated in this location by making amendments to the dam of the largest pond on the site, subject to the approval of EBoP.

Wastewater would best be dealt with by connection to the main sewer. Although this is likely to prove more expensive than a soakage field in the short-term, in the long-term it is likely to be significantly cheaper.