

9 Conclusions

The proposed rezoning takes cognisance of the LURP and the West Rangiora Structure Plan. An internal road network is proposed, linking the site to Oxford Road, Elm Drive and Lehmans Road.

This investigation has included an assessment of the trip generation and distribution that could be expected from the proposed plan change. This assessment, together with existing traffic flow information obtained from WDC and P01 and P018 documentation, has enabled future traffic flows to be predicted.

An analysis of the expected future traffic flows has been undertaken at the existing intersection of Oxford Road and Lehmans Road and at the proposed new T intersection with Oxford Road. The SIDRA analysis shows good levels of service at all existing and new intersections with spare capacity should the overall Westpark yield exceed the number of dwellings assumed in the analysis.

The existing intersection of Oxford and Lehmans Road meets the WDC requirements for the intersection to be upgraded to a standard rural Type C 'X' intersection; however the SIDRA modelling shows that in its current form, the intersection operates efficiently with the expected additional traffic generation. It should be noted that it is not the traffic from the proposed Westpark development that generates the upgrade need.

The new T intersection of Oxford Road/new road should be designed to urban standards at subdivision stage.

The new T intersection on Lehmans Road meets the WDC requirements for the intersection to be upgraded to a standard rural type A 'T' intersection. Intersection modelling has not been undertaken as through volumes and expected turning volumes are light and do not warrant analysis.

The ability of Oxford Road and Elm Drive to accommodate additional traffic has been assessed referencing NZS 4404:2010 (Elm Drive) and Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis (Oxford Road) and levels of service are not expected to fall below level of service C.

An analysis of the last 5 years crash data does not indicate a safety issue on the adjacent road network and a reduction in safety is not anticipated as key intersections such as Oxford Road and Lehmans Road are identified for upgrade within the West Rangiora Structure Plan and all new intersections will be constructed in accordance with WDC requirements and best practice.

With the urbanisation of this area a reduction in the speed limit on Lehmans Road and Oxford Road may be warranted with the extension of Rangiora urban limits. A reduction in speed will reduce the risk of injury crashes.

An assessment of the sight distances at the existing and future intersections indicates that safe intersection sight distance is exceeded at all locations.

Overall, it is considered that the transport-related effects of the proposed Plan Change can be satisfactorily managed within the site, and that future development in accordance with the Residential 2 Zone and Outline Development Plan is appropriate in the context of the adjacent road network.

Appendices



Appendix A

Traffic Count Data



Study Name Aurecon Lehmanns Rd - Oxford Rd
Start Date Tuesday, April 08, 2014 7:00 AM
End Date Tuesday, April 08, 2014 6:00 PM
Site Code

Report Summary

Time Period	Class.	Westbound					Northbound					Eastbound					Southeastbound					Total				
		L	T	BR	U	I	O	L	BL	R	U	I	O	HL	T	R	U	I	O	BL	BR		HR	U	I	O
Peak 1 Specified Period 7:00 AM - 10:00 AM One Hour Peak 8:15 AM - 9:15 AM	Motorcycles	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	23	158	30	0	211	318	2	11	9	0	22	33	10	281	1	0	292	168	28	9	8	0	45	51	570
	%	100%	99%	97%	0%	99%	93%	100%	100%	100%	0%	100%	100%	100%	92%	100%	0%	92%	99%	100%	100%	100%	0%	100%	98%	95%
	Other Vehicle	0	2	1	0	3	23	0	0	0	0	0	0	0	23	0	0	23	2	0	0	0	0	0	1	26
	%	0%	1%	3%	0%	1%	7%	0%	0%	0%	0%	0%	0%	0%	8%	0%	0%	7%	1%	0%	0%	0%	0%	0%	2%	4%
Peak 2 Specified Period 11:00 AM - 12:00 PM One Hour Peak 11:00 AM - 12:00 PM	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	9	161	26	0	196	175	0	10	4	0	14	13	6	150	1	0	157	166	21	3	5	0	29	42	396
	%	100%	93%	93%	0%	93%	90%	0%	100%	100%	0%	100%	100%	75%	99%	100%	0%	88%	92%	95%	100%	83%	0%	94%	91%	91%
	Other Vehicle	0	13	2	0	15	20	0	0	0	0	0	0	2	19	0	0	21	14	1	0	1	0	2	4	38
	%	0%	7%	7%	0%	7%	10%	0%	0%	0%	0%	0%	0%	25%	11%	0%	0%	12%	8%	5%	0%	17%	0%	0%	9%	9%
Peak 3 Specified Period 12:00 PM - 1:00 PM One Hour Peak 12:00 PM - 1:00 PM	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	10	159	33	0	202	186	3	5	6	0	14	18	3	146	0	0	149	167	34	8	5	0	47	41	412
	%	100%	92%	100%	0%	94%	95%	100%	100%	100%	0%	100%	95%	100%	95%	0%	0%	94%	91%	97%	100%	71%	0%	94%	100%	94%
	Other Vehicle	0	14	0	0	14	9	0	0	0	0	0	1	0	8	1	0	9	16	1	0	2	0	3	0	26
	%	0%	8%	0%	0%	6%	5%	0%	0%	0%	0%	0%	5%	0%	5%	100%	0%	6%	9%	3%	0%	29%	0%	6%	0%	6%
Peak 4 Specified Period 3:00 PM - 6:00 PM One Hour Peak 4:30 PM - 5:30 PM	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	10	173	33	0	216	195	3	5	6	0	14	19	3	154	1	0	158	183	35	8	7	0	50	41	438
	%	100%	97%	97%	0%	97%	93%	100%	100%	100%	0%	100%	97%	100%	97%	0%	0%	97%	98%	97%	100%	93%	0%	97%	100%	98%
	Other Vehicle	0	3	0	0	3	9	0	0	0	0	0	0	0	7	0	0	7	4	0	0	1	0	1	0	13
	%	0%	1%	0%	0%	1%	3%	0%	0%	0%	0%	4%	0%	0%	3%	0%	0%	3%	1%	0%	0%	7%	0%	2%	0%	2%
Approach %	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	10	295	39	0	344	275	3	14	36	0	53	26	6	205	0	0	211	312	34	16	14	0	64	59	672
	%	100%	98%	98%	0%	99%	96%	100%	100%	100%	0%	100%	100%	100%	97%	0%	0%	97%	98%	97%	100%	93%	0%	97%	100%	98%
	Other Vehicle	0	3	0	0	3	9	0	0	0	0	0	0	0	7	0	0	7	4	0	0	1	0	1	0	13
	%	0%	1%	0%	0%	1%	3%	0%	0%	0%	0%	4%	0%	0%	3%	0%	0%	3%	1%	0%	0%	7%	0%	2%	0%	2%
Approach %	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	10	295	39	0	344	275	3	14	36	0	53	26	6	205	0	0	211	312	34	16	14	0	64	59	672
	%	100%	98%	98%	0%	99%	96%	100%	100%	100%	0%	100%	100%	100%	97%	0%	0%	97%	98%	97%	100%	93%	0%	97%	100%	98%
	Other Vehicle	0	3	0	0	3	9	0	0	0	0	0	0	0	7	0	0	7	4	0	0	1	0	1	0	13
	%	0%	1%	0%	0%	1%	3%	0%	0%	0%	0%	4%	0%	0%	3%	0%	0%	3%	1%	0%	0%	7%	0%	2%	0%	2%
Approach %	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	10	295	39	0	344	275	3	14	36	0	53	26	6	205	0	0	211	312	34	16	14	0	64	59	672
	%	100%	98%	98%	0%	99%	96%	100%	100%	100%	0%	100%	100%	100%	97%	0%	0%	97%	98%	97%	100%	93%	0%	97%	100%	98%
	Other Vehicle	0	3	0	0	3	9	0	0	0	0	0	0	0	7	0	0	7	4	0	0	1	0	1	0	13
	%	0%	1%	0%	0%	1%	3%	0%	0%	0%	0%	4%	0%	0%	3%	0%	0%	3%	1%	0%	0%	7%	0%	2%	0%	2%
Approach %	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	10	295	39	0	344	275	3	14	36	0	53	26	6	205	0	0	211	312	34	16	14	0	64	59	672
	%	100%	98%	98%	0%	99%	96%	100%	100%	100%	0%	100%	100%	100%	97%	0%	0%	97%	98%	97%	100%	93%	0%	97%	100%	98%
	Other Vehicle	0	3	0	0	3	9	0	0	0	0	0	0	0	7	0	0	7	4	0	0	1	0	1	0	13
	%	0%	1%	0%	0%	1%	3%	0%	0%	0%	0%	4%	0%	0%	3%	0%	0%	3%	1%	0%	0%	7%	0%	2%	0%	2%
Approach %	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	10	295	39	0	344	275	3	14	36	0	53	26	6	205	0	0	211	312	34	16	14	0	64	59	672
	%	100%	98%	98%	0%	99%	96%	100%	100%	100%	0%	100%	100%	100%	97%	0%	0%	97%	98%	97%	100%	93%	0%	97%	100%	98%
	Other Vehicle	0	3	0	0	3	9	0	0	0	0	0	0	0	7	0	0	7	4	0	0	1	0	1	0	13
	%	0%	1%	0%	0%	1%	3%	0%	0%	0%	0%	4%	0%	0%	3%	0%	0%	3%	1%	0%	0%	7%	0%	2%	0%	2%
Approach %	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	10	295	39	0	344	275	3	14	36	0	53	26	6	205	0	0	211	312	34	16	14	0	64	59	672
	%	100%	98%	98%	0%	99%	96%	100%	100%	100%	0%	100%	100%	100%	97%	0%	0%	97%	98%	97%	100%	93%	0%	97%	100%	98%
	Other Vehicle	0	3	0	0	3	9	0	0	0	0	0	0	0	7	0	0	7	4	0	0	1	0	1	0	13
	%	0%	1%	0%	0%	1%	3%	0%	0%	0%	0%	4%	0%	0%	3%	0%	0%	3%	1%	0%	0%	7%	0%	2%	0%	2%
Approach %	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	10	295	39	0	344	275	3	14	36	0	53	26	6	205	0	0	211	312	34	16	14	0	64	59	672
	%	100%	98%	98%	0%	99%	96%	100%	100%	100%	0%	100%	100%	100%	97%	0%	0%	97%	98%	97%	100%	93%	0%	97%	100%	98%
	Other Vehicle	0	3	0	0	3	9	0	0	0	0	0	0	0	7	0	0	7	4	0	0	1	0	1	0	13
	%	0%	1%	0%	0%	1%	3%	0%	0%	0%	0%	4%	0%	0%	3%	0%	0%	3%	1%	0%	0%	7%	0%	2%	0%	2%
Approach %	Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	rs & Light Gox	10	295	39	0	344	275	3	14	36	0	53	26	6	205	0	0	211	312	34	16	14	0	64	59	672
	%	100%	98%	98%	0%	99%	96%	100%	100%	100%	0%	100%	100%	100%	97%	0%	0%	97%	98%	97%	1					



Aurecon New Zealand Limited

Unit 1, 150 Cavendish Road
Casebrook Christchurch 8051
PO Box 1061
Christchurch 8140
New Zealand

T +64 3 366 0821

F +64 3 379 6955

E christchurch@aurecongroup.com

W aurecongroup.com

Aurecon offices are located in:

Angola, Australia, Botswana, Chile, China,
Ethiopia, Ghana, Hong Kong, Indonesia,
Lesotho, Libya, Malawi, Mozambique,
Namibia, New Zealand, Nigeria,
Philippines, Qatar, Singapore, South Africa,
Swaziland, Tanzania, Thailand, Uganda,
United Arab Emirates, Vietnam.

Appendix E

Urban Design Statement



Memorandum

To	Daniel Thorne Senior Planner, Aurecon	From	Andrew Russell Urban Designer, Advisory Services Leader, Aurecon
Copy	Malcolm Hanrahan Project Director, Aurecon	Reference	240845
Date	7 August 2014	Pages (including this page)	4
Subject	Urban Design Statement – Westpark Rangiora Plan Change		

1 Introduction

Aurecon have been engaged by Westpark Rangiora Limited ('Westpark') to provide expert urban design advice in respect of the proposed rezoning of approximately 15ha of rural land at 198 Lehman's Road and 100 Oxford Road, Rangiora for residential development, and the subsequent preparation of the Lehman's Road – West Rangiora Outline Development Plan ('Outline Development Plan'), a copy of which is enclosed.

The following statement has been prepared to provide a summary of the relevant urban design considerations associated with the preparation of the Outline Development Plan. To this end, this statement provides an assessment of the Outline Development Plan against the New Zealand Urban Design Protocol ('Urban Design Protocol'), which sets a strategic framework for quality urban design within New Zealand.

The following should be read in conjunction with the Plan Change Request for the Westpark Rangiora development.

2 New Zealand Urban Design Protocol

The Urban Design Protocol is a voluntary commitment to specific urban design initiatives by signatory organisations, which include central and local government, the property sector, design professionals, professional institutes and other groups. Aurecon has been a signatory to the Urban Design Protocol since May 2006.

The vision of the New Zealand Urban Design Protocol is:

Making New Zealand towns and cities more successful through quality urban design.

The Urban Design Protocol sets out seven essential design qualities that together create quality urban design. In general terms, these seven Cs provide a checklist of qualities that contribute to quality urban design. To this end, in order to demonstrate that quality urban design has been achieved with respect to the Outline Development Plan, the same has been assessed against the seven Cs of the Urban Design Protocol, with these discussed below.

2.1 Context

The Lehman's Road Westpark site is situated on the western edge of the Rangiora greenfield urban limits zone (approximately 2.25km west of the town centre) and is bounded to the south by Oxford Road and to the west by Lehman's Road.

The Outline Development Plan has a total land area of approximately 15 hectares and will contribute to the urban growth and development of Rangiora in a manner consistent with the West Rangiora Structure Plan ('Structure Plan'). Accordingly the proposed development will contribute positively to a comprehensive and contextually long term view of the development of the western side of Rangiora.

2.2 Character

The existing character of the subject land is of an open and generally flat, rural landscape with lines of mature trees, particularly along Oxford Road, creating the key and dominant visual features of the setting.

The proposed residential development will create a new, low to medium density suburban character for the subject land consistent with recent residential development to the east and north.

The Structure Plan provides a series of key structuring elements for the future development of the Lehmans Road site including the:

- Continuation of an existing east-west collector road;
- Inclusion of a new, north-south roading link;
- Maintenance of mature trees along Oxford Road as a feature;
- Inclusion of stormwater reserves (one north-south and one on the south east corner) designed with high amenity values; and
- Creation of recreation reserves along the Lehmans Road and Oxford Road boundaries.

Where appropriate, these elements have been incorporated into the Outline Development Plan, assisting in establishing and reinforcing the character of the proposed development. In particular:

- Two landscaped stormwater reserves have been created at the Oxford Road edge of the development and linked by a recreation reserve along Oxford Road. These elements, when combined with the significant trees along this edge, will create a striking and compelling southern entry statement into the proposed development;
- The gently curving north-south roading link through the site is combined with a landscaped, linear stormwater reserve creating an impressive boulevard movement structure (pedestrians, bicycles and vehicles) through the heart of the development and promoting an ever changing vista;
- A linear recreation reserve for the length of the Lehmans Road boundary will create an alternative north-south pedestrian link connecting into the pedestrian network of the development and the broader precinct; and
- The continuation of the east-west collector road through the site creates an important western entry statement and links the proposed developed to existing and future development to the east.

A mix of medium and low density residential development is proposed for the subject land. The areas for 'medium density' will be developed as 'comprehensive residential development' which will see the establishment of higher density living (terrace housing or similar) and will be located adjacent to key entry points, open space, and key movement nodes. This will ensure a diverse and interesting residential character and introducing elements of counterpoint and variety at key nodal points.

2.3 Choice

Quality urban design fosters diversity and offers people choice in the urban form of our towns and cities, and choice in densities, building types, transport options, and activities.

Choice is delivered within the Outline Development Plan in the following ways:

- A range of housing options within both medium density and low density settings;
- Alternative recreational options including linear walking and cycling routes and landscaped open space areas allowing a variety of active and passive recreational activities;
- A variety of access opportunities through different modes of movement and providing access to all, including those with disabilities;
- Opportunities for public and private transportation choices; and
- Street environments with varying character and scale from primary access routes to cloistered, quiet street settings.

2.4 Connections

Connectivity is the degree to which networks - streets, walking and cycling routes, services and infrastructure - interconnect. Good connections encourage access within a region, city, town or neighbourhood.

The Outline Development Plan provides for:

- The access connections required by the Structure Plan including the east-west collector road and the key north-south roading link;
- Alternative access points and route opportunities to enable efficient connection within and across the development to adjacent movement networks (pedestrian, cycle and vehicular) and developments;
- The integration of CPTED principles to ensure alternative route choices, good visibility day and night, open and clear navigation and safe access for all, including those with disabilities; and
- Opportunities for public and private transportation.

2.5 Creativity

Quality urban design encourages creative and innovative approaches. Creativity adds richness and diversity, and turns a functional place into a memorable place. Creativity facilitates new ways of thinking, and willingness to think through problems afresh, to experiment and rewrite rules, to harness new technology, and to visualise new futures. Creative urban design supports a dynamic urban cultural life and fosters strong urban identities.

Creativity is woven into the Outline Development Plan in the following ways:

- Clever interplay between movement structures, stormwater management, open space design and residential development areas within a difficult and elongated site to create a residential setting with variety, enclosed and open vistas, as well as recreational, living and accessibility choices;

- Medium density residential elements are grouped around open space and key movement nodes to create interest, variety, human scale, enclosure and vistas;
- Opportunities are taken to ensure variety and choice in access modes and to create movement networks of varying scale and permeability, for example, connecting walkways linked with open space and alternative walking trails; and
- Opportunities for the integration of public art and local cultural story telling.

2.6 Custodianship

Responsible custodianship aims to hand on places to the next generation in as good or better condition. The Outline Development Plan fulfils these sustainability principles by:

- Incorporating water sensitive urban design principles for water conservation and the management of water quality on and through the subject land;
- Creating an efficient planning and layout of the development land areas;
- Establishing efficient movement systems with a high degree of accessibility choice thus reducing transportation energy usage; and
- Incorporating CPTED principles to create safe and accessible public spaces.

2.7 Collaboration

The proponents of the Outline Development Plan welcome and encourage a collaborative engagement with local authorities, stakeholders and the community to ensure that opportunities for comment are maximised through the progressive master planning of the development. However, in this regard it is noted that the Outline Development Plan achieves general consistency with the Structure Plan, with this process involving extensive consultation and engagement with the community and relevant stakeholders. Notwithstanding, it is noted that as part of the wider Plan Change Request process consultation with Council and other stakeholders has occurred, with this expected to continue throughout the Plan Change process.

3 Conclusion

The Outline Development Plan has been designed to provide a comprehensive response to the urban design expectations of the New Zealand Urban Design Protocol in the ways described above. The creativity embodied in its master planning, layout and structure will generate a development providing choice, connectivity and sustainability and the resulting urban form will serve to enhance local character values.

This assessment confirms that the development proposed through the Outline Development Plan represents an appropriate response to the immediate location, the spatial context of the site and Rangiora, and to the design qualities established through the Urban Design Protocol.

Enc. Westpark Rangiora Lehmans Road Outline Development Plan



WAIMAKARIRI
DISTRICT COUNCIL

- Area of development
- existing road
- local road
- urban collector road
- proposed road design
- pedestrian cycleway access
- local purpose reserve
- stormwater management area
- comprehensive residential development



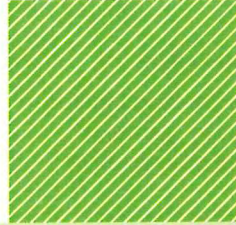
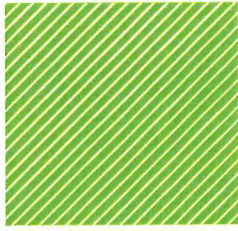
0 80 160m
SCALE 1:4000 (A4)

Lehmans Road
West Rangiora
Outline Development
Plan
183*

Appendix F

Infrastructure Assessment





aurecon

**Westpark – Plan Change – Lehmans
Road Rangiora**

Infrastructure Assessment

Westpark Rangiora Ltd

18 December 2014

Revision: 3

Reference: 240845

Document control record

Document prepared by:

Aurecon New Zealand Limited

Unit 1, 150 Cavendish Road
Casebrook Christchurch 8051

PO Box 1061
Christchurch 8140
New Zealand

T +64 3 366 0821
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com

A person using Aurecon documents or data accepts the risk of:

- Using the documents or data in electronic form without requesting and checking them for accuracy against the original hard copy version.
- Using the documents or data for any purpose not agreed to in writing by Aurecon.

Document control				aurecon		
Report title		Westpark Plan Change – Infrastructure Assessment				
Document ID			Project number		240845	
File path		C:\Users\mark.d.stone\AppData\Roaming\OpenText\OTEdit\EC_cs\c125146357\Infrastructure Report Rev 1 2014.docx				
Client		Westpark Rangiora Ltd	Client contact			
Rev	Date	Revision details/status	Prepared by	Author	Verifier	Approver
0	2 June 2014	For Client Review		MS	JAT	MJH
1	1 August 2014	Client amendments		MS	JAT	MJH
2	12 December 2014	Flood modelling results included		MS	JAT	MJH
3	18 December 2014	ECan Consent & Flood report added as appendix		MS	JAT	MJH
Current revision		3				

Approval			
Author signature		Approver signature	
Name	(Various) Jason Trist	Name	Malcolm Hanrahan
Title	Project Leader	Title	Technical Director



Westpark – Plan Change – Lehmans Road Rangiora

Date 18 December 2014
Reference 240845
Revision 3

Aurecon New Zealand Limited

Unit 1, 150 Cavendish Road
Casebrook Christchurch 8051
PO Box 1061
Christchurch 8140
New Zealand

T +64 3 366 0821
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com

Contents

1	Introduction	1
1.1	General	1
1.2	Description of the Site	1
1.3	West Rangiora Structure Plan	2
2	Water Supply	4
2.1	Existing Reticulation	4
2.2	Options for Development	4
2.3	Conclusions	4
3	Stormwater Drainage	5
3.1	Existing Drainage	5
3.2	Site Infiltration Potential	6
3.3	Options for Development	7
3.4	Waimakariri District Council Stormwater Requirements	7
3.5	Catchment Serviced	8
3.6	Proposed Stormwater Management System	9
3.7	Drainage Path	13
3.8	Water Race	13
3.9	Ashley River Breakout	14
3.10	Conclusions	16
4	Wastewater	17
4.1	Existing Reticulation	17
4.2	Options for Development	17
4.3	Constraints	17
4.4	Conclusions	17
5	Power / Telecom Services	17
5.1	Power Services	17
5.2	Telephone Services	17
6	Summary and Conclusions	18
6.1	Proposed Plan Change	18
6.2	Water Supply	18
6.3	Stormwater Drainage	18
6.4	Wastewater Services	18
6.5	Power/Telephone	18

Appendices

Appendix A

Outline Development Plan

Appendix B

Indicative Servicing Plans

Appendix C

Indicative Stormwater Management Plan

Appendix D

Swale Details

Appendix E

ECan Discharge Consent

Appendix F

Ashley River Breakout Flood Modelling

Figures

Figure 1 Water race along the eastern side of Lehmans Rd	5
Figure 2 Water race through the Westpark site	5
Figure 3 Culvert beneath Lehmans Road	6
Figure 4 Drainage path through Westpark site	6
Figure 5 Soakage testing locations	7
Figure 6 Indicative stormwater management plan	10
Figure 7 General Schematic of Stormwater Management Infrastructure	12
Figure 8 Typical Section of Stormwater Management Infrastructure	13

Tables

Table 1 Generalised soil profile on site	2
Table 2 Soakage Rates	6
Table 3 Council Requirements for Stormwater Management through Disposal of Stormwater to Ground	8
Table 4 Stormwater Management Infrastructure Concept Dimensions	12

1 Introduction

1.1 General

Westpark Rangiora Limited is pursuing a private plan change request to have the properties at 100 Oxford Road and 198 Lehmans Road, Rangiora zoned for residential purposes.

Aurecon have been engaged to provide professional planning and engineering services in relation to the plan change request. This report provides an assessment of the options for providing necessary servicing infrastructure to enable future development of the site. The services investigated include water supply, stormwater drainage, wastewater disposal and power/telephone services.

Separate reports providing geotechnical, environmental and traffic related assessments have also been prepared to support the plan change request.

The proposed Outline Development Plan (ODP) with which future development of the site is to accord is attached at Appendix A.

1.2 Description of the Site

1.2.1 General

The site comprises of the two directly adjacent parcels of land located at 100 Oxford Road and 198 Lehmans Road, Rangiora. 100 Oxford Road, which is located on the corner of Oxford and Lehmans Road, has the appellation of Pt RS 1175 and an area of 2.803ha. This rectangular shaped property has just less than 200 metres frontage to Oxford Road and 148 metres frontage to Lehmans Road.

198 Lehmans Road has the legal appellation of Pt RS 1175 and an area of 12.143 ha. It is rectangular in shape with some 650 metres frontage to Lehmans Road and a depth of just under 200 metres.

1.2.2 Surrounding land use

The site is bounded to the east by rural residential properties and Brick Kiln Lane and to the west by rural farm holdings. The Arlington Park residential subdivision bounds northern boundary with Oxford Road and rural properties to the south

1.2.3 Access

100 Oxford Road has frontage to Oxford Road along the entire length of the southern boundary and frontage along its western boundary to Lehmans Road. 198 Lehmans Road has frontages accessed from a right of way off Oxford Road adjacent to Brick Kiln Road.

1.2.4 Topography

The site is relatively flat with slight fall of approximately 1V in 160H in a SE direction. There is 5m difference in elevation between the northwest and southeast corners of the site.

1.2.5 Soils

The soil profile of the site is described in the accompanying Geotechnical Report as shown below in Table 1.

Table 1 Generalised soil profile on site

From	To	Description
Surface	0.3m – 0.4m	Topsoil – SILT; some sand, rootlets; dark brown. Moist; sand, fine.
0.3m – 0.4m	1.6m – 2.1m	Sandy SILT; light brown. Moist, low plasticity; sand, fine.
1.6m – 2.1m	15.0+m	Sandy fine to coarse GRAVEL; brownish grey. Very dense, moist, sub-rounded to sub-angular, well graded; sand, fine to coarse.

1.2.6 Hydrology

The geotechnical report refers to a number of test pits dug across the site with two of the pits encountering ground water at depths of 7.1m.

A drainage path runs across the site from west to east approximately 150 m from the southern boundary of the site but only flows in significant storm events.

A water race crosses Lehmans Road and splits into two parts in the eastern road berm. Part of the race continues east through the property and flows on through to the neighbouring rural residential properties. The other part of the water race runs south along the eastern road berm of Lehmans Road, crosses Oxford Road then heads eastwards along the southern side of Oxford Road.

The Ashley River is located approximately 1.6 kilometres north of the site and flows from west to east. Between the Ashley River and the site is a water race running from west to east approximately 0.5km from the northern boundary of the site.

1.3 West Rangiora Structure Plan

Council have developed the West Rangiora Structure Plan (WRSP) to guide future development of the land included and surrounding the plan change. The WRSP identifies important road links, servicing requirements and reserve areas and links. The WRSP has been through a consultation process with affected landowners and has been adopted as Council Policy.

1.3.1 Roading

The WRSP shows a north-south key roading link through the site connecting to a collector road on the extension of Elm Drive, which also passes through the site. Adjoining the site at its north western corner on Lehmans Road, a collector road is indicated heading to the northeast through the Arlington Residential subdivision.

The Council's District Plan, at Planning Map 168, Oxford Road, West Rangiora Outline Development Plan, indicates two roading links on the adjoining recently zoned Bain property. One of the links is the Elm Road collector road listed above, with the second a local road link near the northern extent of the eastern boundary.

1.3.2 Stormwater

The WRSP shows a stormwater management area in the southeast corner of the site next to Oxford Road. As well as the stormwater management area, a stormwater reserve is indicated running parallel to the north-south internal road to convey runoff to the stormwater management area via an open channel.



The proposed stormwater management for the site follows the WRSP in principle but locates the basins in a different configuration. However, although the WRSP shows a single stormwater management area, this does not preclude the provision of other facilities elsewhere within the catchment as an alternative.

1.3.3 Wastewater

The WRSP identifies a new pump station and western wastewater trunk main as being required to service the greater potential development area. However, some potential short to medium term capacity in the existing reticulation has been identified that could be utilised to allow the land to be developed prior to significant upgrading of the downstream infrastructure.

1.3.4 Water Supply

The WRSP indicates water mains surrounding the property in Oxford and Lehman's Roads, connecting back through the collector road on the Elm Drive extension.

1.3.5 Ashley River Flood Hazard

Environment Canterbury (ECan) has undertaken flood modelling work looking at possible breakouts of the Ashley River. The site is potentially affected from a flood breakout west of Rangiora.

The ECan flood modelling indicates that the site could be inundated to depths less than 0.25m during the 0.2% AEP Ashley River breakout event. This is classified as Low Hazard.

Development of the site will result in construction of sections sloping towards the roadways. The floor levels of the subsequent buildings will be further elevated above the roadways and 0.5% AEP peak flood level from the Ashley River breakout event.

Flood modelling has been undertaken to assess the potential impacts of the 0.5% AEP Ashley River breakout flood event on the proposed development and to identify potential impacts of the development on surrounding properties. The outcomes from this modelling are presented in Section 3.9.

The results from this flood modelling investigation are presented in the *Westpark Development Ashley River Breakout Flood Modelling (Aurecon, November 2014)* report which is attached in Appendix F



2 Water Supply

2.1 Existing Reticulation

The existing residential areas to the east and southeast of the site are serviced by Rangiora Town Water Supply. Potential points of connection to the existing reticulation exist on Oxford Road, Elm Drive extension (if this residential land is developed first) and from the future bypass road connection through Arlington Park.

2.2 Options for Development

The WRSP indicates water mains in the north-south road and east west road as being important for servicing the greater WRSP area.

Although no specific modelling has been undertaken for the water reticulation, extension of the existing network from Elm Drive and Oxford Road, along with provision of sufficient water mains within any new internal roading, is likely to be sufficient to provide the necessary firefighting and domestic water required for the development of the site. Connection to the future reticulation to the main in the bypass roading through Arlington Park will increase the security of supply by providing a third point of connection.

An indicative water supply reticulation plan is attached at Appendix B

It is not anticipated that any significant upgrading to the existing reticulation or headworks will be immediately required to service the site.

2.3 Conclusions

Existing water reticulation in neighbouring residential areas can be extended to service residential development of the site.

Any extension of the system will provide firefighting and potable water supply to the development, as well as provide for further development as indicated in the WRSP.

3 Stormwater Drainage

3.1 Existing Drainage

The site slopes gently to the southeast and is currently rural in nature, with the majority of the site grassed and divided into paddocks. There are two existing residential dwellings, ancillary buildings, landscaped grounds, and trees located in the south of the site. These properties will be retained and incorporated as part of the development. As the vast majority of the site is undeveloped it is expected that low intensity rainfall infiltrates to ground with little runoff.

There are no known ponding areas or other drainage features across the majority of the site. In the southern portion of the site there is a drainage path and a water race, both of which run from the western to eastern edges of the site.

3.1.1 Water Race

The water race flows through the veterinary clinic on the opposite side of Lehmans Road and only part of it flows through the site. This is because it splits twice before it flows across the Westpark site: once on the western side of Lehmans Road; and once on the eastern side. These flows are directed southwards along either side of Lehmans Road in vegetated channels before crossing beneath Oxford Road. After this point the flow along the western side of Lehmans Road continues flowing southwards along Lehmans Road, while the flow along the eastern side of Lehmans Road changes direction to flow eastwards along the southern side of Oxford Road.

The water race through the site flows west to east across the site via a boxed water race. While the water race was observed to be full of water on two visits, water in the water race was not flowing.

After exiting the site the water race continues east across three subsequent properties before it is directed back to the roadside swale running along Oxford Road at a point approximately 300 m east of the site.



Figure 1 Water race along the eastern side of Lehmans Rd



Figure 2 Water race through the Westpark site

3.1.2 Drainage Path

The drainage path lies north of the water race and collects flows from an area of surrounding paddocks of about 32 hectares. A large rectangular culvert approximately 1200mm wide and 950mm high directs flows beneath Lehmans Road and through the site. The drainage path varies in depth across the site and is not always well defined, with flow becoming dispersed before leaving the site.

No other formal drainage facilities are known to exist on the site.



Figure 3 Culvert beneath Lehmans Road



Figure 4 Drainage path through Westpark site

It is noted that the above photographs were taken on the 1st June 2014 after heavy overnight rainfall across Rangiora and northern Canterbury.

3.2 Site Infiltration Potential

The ground conditions on the site are relatively well suited to incorporating soakage disposal into the stormwater system for the development. Soakage testing was undertaken at two locations at opposite ends of the site to determine the suitability of the site for rapid soakage to ground. The approximate location of the soakage tests are presented in Figure 5.

Soakage rates calculated at each of the test pit locations are presented in Table 2.

Table 2 Soakage Rates

Parameter	TP1	TP2
Depth to Gravel (m)	2.5	3.1
Test Pit Depth (m)	3.2	4.3
Measured Soakage Rate (mm/hr)	720	600
Design Soakage Rate (mm/hr)	240	200

It can be seen from Table 2 that the estimated soakage decreases towards the southern end of the site; however soakage is still great enough that rapid soakage to ground is a viable option for the site. The treatment and size of rapid soakage areas is discussed in Section 3.6.4.



Figure 5 Soakage testing locations

3.3 Options for Development

Options for development include the following:

1. Treatment, attenuation and discharge to surface water (North Brook Stream).
2. Treatment, disposal to ground, secondary attenuation and disposal to surface water.

Both of these options could be installed at either a centralised area to service the whole catchment or separate facilities to service smaller sub-catchments (as shown in the WRSP).

As the underlying ground conditions are suitable for discharging stormwater to ground, a soakage based system provides the greatest opportunity to mitigate post-development runoff into the Northbrook Stream.

3.4 Waimakariri District Council Stormwater Requirements

The proposed stormwater concept has been discussed with WDC to obtain feedback on their requirements and preferred outcomes. Council requirements for stormwater management in this area are presented in Table 3, with any additional requirements that were discussed with WDC also included.

Table 3 Council Requirements for Stormwater Management through Disposal of Stormwater to Ground

Management Feature	Requirements
Stormwater Quality Management	First flush treatment via infiltration. Distributed treatment e.g. soakage along the length of the swales is acceptable.
Stormwater Quantity Management	Detention and rapid soakage of stormwater runoff exceeding first flush volume and up to the 2% AEP storm event. Discharge of flows greater than 2% AEP storm event to existing surface water and overland flow paths. Stormwater reticulation to provide direct conveyance from dwellings and road pavements to the first flush soil infiltration basins, detention storage and rapid soakage. Discharge of rainwater from roof areas to individual rapid soak pits for up to the 10% AEP storm event. Stormwater neutrality - post-development flows leaving the site to not exceed pre-development flows.
Minimum Above Ground Detention Storage	As required to achieve stormwater neutrality and adequate operation of rapid soakage basins.
Consenting Requirements	Subdivision consent from WDC. Discharge consent from ECan.
Waterway Design	Accommodate the design freeboard including the required factor of safety. Side slopes not exceeding 4.5H:1V. Provide access along at least one side of any waterway for maintenance.

In addition to this WDC considered that the water race that runs across the site could be closed, but consent from downstream landowners must be obtained. It was also noted that consideration of the drainage path would also be necessary, whether this is maintained in its current location, realigned or diverted around the site.

3.5 Catchment Serviced

Although one option presented in the WRSP is to provide a centralised system to service the entire 15 hectare catchment, it is proposed that multiple stormwater management areas be created so that infiltration, treatment and disposal can be spread over more than one area. Separating these activities into two or more facilities will allow better utilisation of the soakage capacity of the underlying soils, and also builds more resilience into the system.

Secondary flow paths will still be provided along roadways and the central swale system to accommodate overland flow from within the site.

Overland flows from external areas which run through the site via the drainage path will be redirected through a formalised system of swales and culverts to one of the stormwater management areas.

The existing section of water race that runs through the site will be terminated at the site boundary and directed around the site along Lehmans and Oxford Roads.



3.6 Proposed Stormwater Management System

The stormwater management system has been designed in keeping with the WDC requirements specified in Table 3 and the following engineering design guidelines:

- CCC Waterways, Wetlands and Drainage Guidelines (WWDG)
- WDC Engineering Code of Practice – Part 5: Stormwater & Land Drainage
- NZTA Stormwater Treatment for State Highway Infrastructure Guideline

The proposed approach to managing stormwater from the site is to provide a primary system utilising the soakage characteristics of the site to dispose of stormwater. The primary soakage systems will be designed to dispose of runoff from 2% AEP rainfall events. The only water that will leave the site via the existing overland flow path exit point from the site up to the 2% AEP storm event is the overflow resulting from the upstream offsite catchment. However that overflow will only occur when the basin is full, otherwise it will discharge to ground.

In order to create a robust system that provides additional protection to downstream residents, a secondary system will be provided to attenuate flows before they are discharged to Northbrook Stream via the Oxford Road water race. An approach similar to that adopted in surrounding upstream developments, where the secondary system is designed to manage 2% AEP events assuming reduced soakage capacity in the primary system, is considered appropriate for this site.

Roof water runoff can be directly discharged to ground on individual sites without treatment. However runoff from roading and hardstand areas will require treatment to remove any hydrocarbons, metals or sediments it may contain before being discharged to ground.

The proposed stormwater management areas are located at the southeast and southwest corners of the site. Stormwater will be conveyed to the management areas by pipes and a central swale following the alignment of the main north-south road. Secondary flow paths will be provided along roadways throughout the development to direct overland flow to the stormwater management area.

The layout of the stormwater management system is based on the proposed location of open spaces, site topography and to minimise the length of overland flow paths on pavement surfaces. In the stormwater reserve area it is planned to install swales similar to those at a nearby development, The Oaks, however with an infiltration function incorporated for first flush treatment.

Stormwater conveyance, treatment, attenuation and rapid soakage infrastructure are discussed in the following section. An indicative stormwater management plan is shown below and attached in full in

Appendix C.

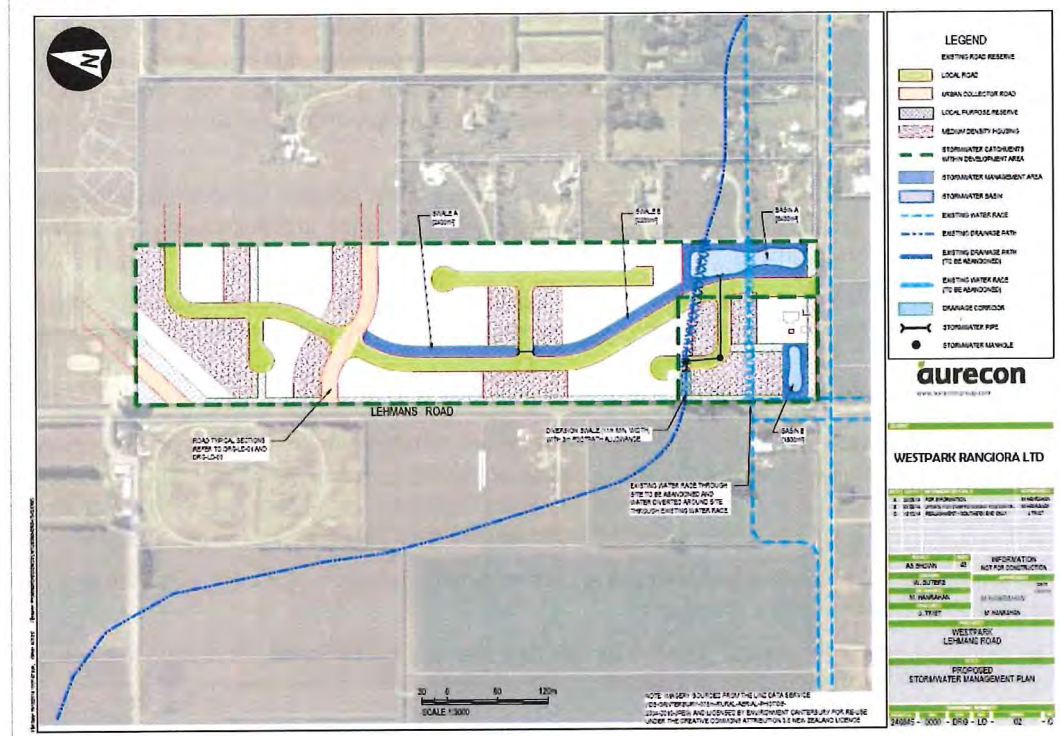


Figure 6 Indicative stormwater management plan

3.6.1 Stormwater Conveyance

A swale within the stormwater reserve area running alongside the north-south internal road will provide the primary stormwater conveyance within the site. Discharges from properties will be piped to this swale.

The swale shall have a 1m maximum depth, 4.5H:1V side batters and a freeboard depth of at least 250 mm. A 3m offset along the eastern side of the swale has been provided to enable access for maintenance purposes. The western side of the swale will extend to the road reserve boundary.

The swales will comprise infiltration areas across the base width of the swale length and be separated by check dams. These check dams will allow the first flush volume to be retained and discharged to ground via soakage, while flows in excess of this will overtop of the check dams and be conveyed to the stormwater management areas at the downstream extent of the site. While the check dams in the downstream swale section (Swale B) have sufficient capacity to capture the entire first flush volume for that catchment, not all of the first flush volume will be able to be captured by the check dams in the upstream swale section (Swale A). This excess first flush volume will be conveyed to the primary stormwater management area, where it will be treated via a first flush infiltration basin.

Typical sections of this infiltration swale have been provided in Appendix D.

3.6.2 Stormwater Treatment

Primary stormwater treatment shall be provided by first flush infiltration basins to treat the remainder of the 90% storm depth that has not been captured and treated in the infiltration swales, as per the NZTA Stormwater Treatment for State Highway Infrastructure (2010) procedures. This was deemed to provide a more reasonable estimation of storm depth than the WWDG which have been developed specifically for Christchurch conditions.

The first flush basins shall treat and dispose of the first flush volume via infiltration to ground. Stormwater runoff greater than this 90% storm depth will bypass the first flush basin and enter the stormwater detention basin and rapid soakage infrastructure.

The first flush basins shall have a 1m maximum depth, 5H:1V side batters, an allowance for up to 300mm live detention storage over the first flush storage and 250mm minimum freeboard above this.

3.6.3 Stormwater Detention

A minimum stormwater detention volume will be provided equal to the 20% AEP 18 hour storm event and any additional flow up to the 2% AEP post-development scenario will be discharged entirely to ground via a rapid soakage area constructed within the detention basin. Stormwater runoff exceeding the first flush volume will discharge to the detention storage via a flow splitter or swale overflow.

The stormwater detention basins shall have a 1.5m maximum detention depth, 5H:1V side batters and an additional 250mm minimum freeboard.

The detention basins have been sized in accordance with the WWDG and with parameters adopted from the WDC Engineering Code of Practice for the proposed development zoning.

3.6.4 Rapid Soakage

Rapid soakage is proposed within the detention basins to discharge stormwater runoff entering the basins. The soakage areas have been sized to soak to ground the difference between the 20% AEP and 2% AEP storm event volumes.

Soakage will also be provided for roof areas as individual soak pits. These areas will be designed to capture storm events up to the 10% AEP 1 hour storm event as per the New Zealand Building Code: Clause E1 Surface Water, with any flows in excess of this volume discharged as overland flow to the stormwater system.

The estimated extent of rapid soakage within the detention basins is presented in Section 3.6.5. These rapid soakage areas are smaller than the base area of the detention basins indicating that rapid soakage is feasible at this site. A larger sample of soakage testing in the location of the rapid soakage disposal areas may reduce the overall extent of rapid soakage required at the site.

The rapid soakage area gravels would need to extend a minimum of 1m beneath the level of native free draining gravels at the site.

3.6.5 Stormwater Management Infrastructure Dimensions

The first flush volume, minimum stormwater detention volume, rapid soakage area dimensions and the footprint of stormwater management infrastructure have been estimated for the proposed Westpark development. These preliminary dimensions are presented in Table 4.

Table 4 Stormwater Management Infrastructure Concept Dimensions

Basin ⁽¹⁾	First Flush Basin		Detention Basin		Footprint ⁽²⁾ (m ²)	Soakage	
	Volume (m ³)	Top Area (m ²)	Volume (m ³)	Top Area (m ²)		Depth (m)	Area (m ²)
A	500	850	3,500	3,600	5,000	1.5	950
B	150	400	550	900	1,350	1.5	150

Note:

1. Refer to Stormwater Management Plan for the location of basins within the site.
2. Footprint required for first flush basin and detention basin but excluding access corridor around infrastructure.

Access corridors of 3m will be included along sides of the basins and swales that do not border a road to ensure that sufficient access is provided for maintenance purposes.

A concept plan and typical section of the proposed stormwater management infrastructure is presented in Section 3.6.6.

3.6.6 Stormwater Concept Layout

A concept plan and typical section of the proposed stormwater management infrastructure is presented in Figure 7 and Figure 8.

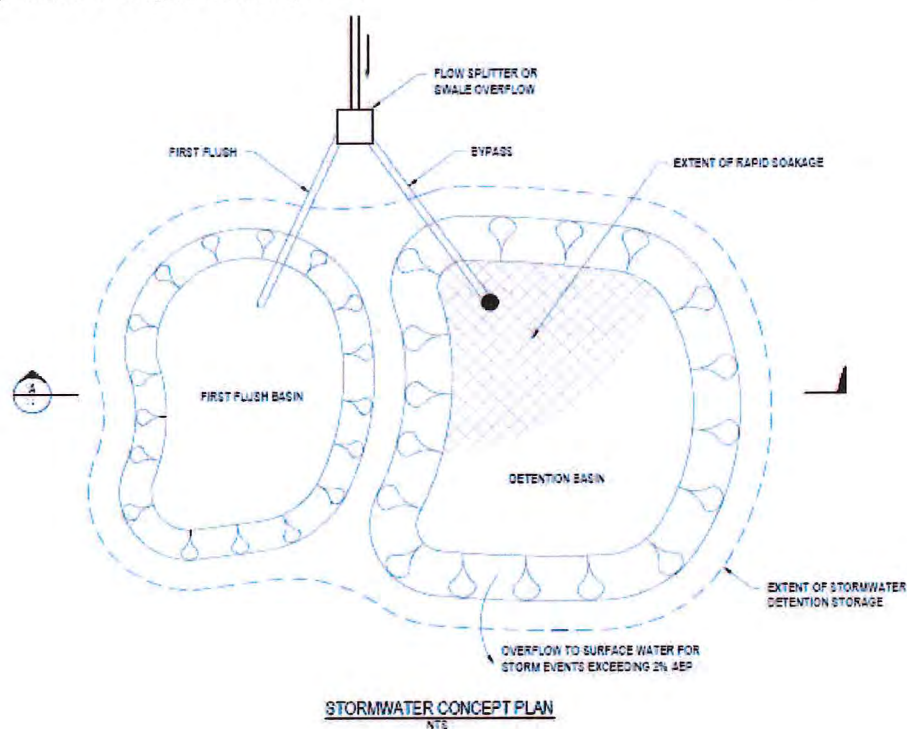


Figure 7 General Schematic of Stormwater Management Infrastructure

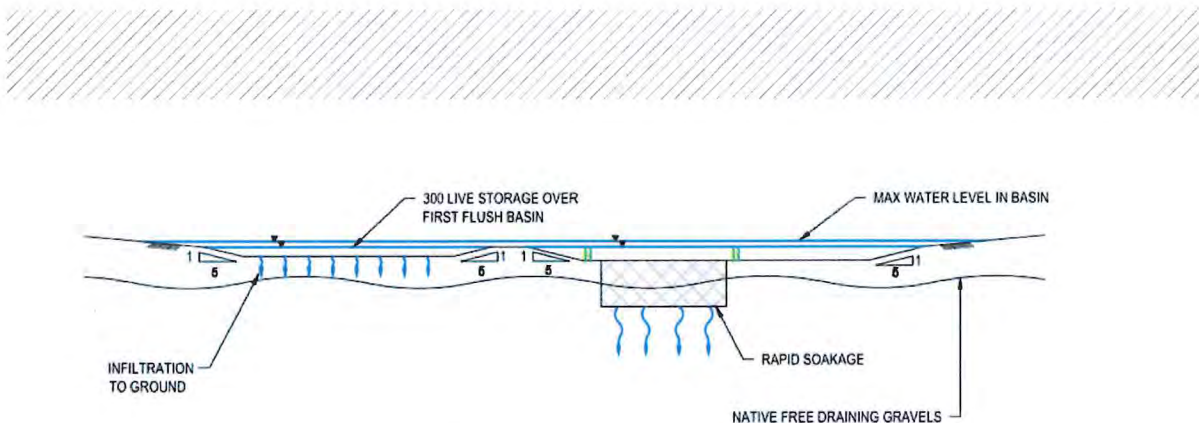


Figure 8 Typical Section of Stormwater Management Infrastructure

A Stormwater Management Plan for the proposed development is included in Appendix C.

The Stormwater Discharge Consent was issued by ECan on 3rd December 2014 a copy of the consent has been included in Appendix E.

3.7 Drainage Path

The existing drainage path will be maintained through the site but will be directed via a swale and pipe system to the large stormwater basin in the southeast corner of the site.

The swale will be sized to convey the 2% AEP storm event based on the existing contributing catchment. Following this the flow will be piped beneath the main road in a conduit designed to take the 10% AEP storm event, with additional flow up to the 2% AEP storm event being directed across the road as overland flow.

Maintaining the drainage path through the site will result in additional discharge into the large stormwater basin. However, no additional capacity will be required in this basin as the external catchment contributing to the drainage path will have a much longer time of concentration than the catchment within the site. Therefore the 2% AEP storm event runoff from within the site will fill the stormwater basin before the offsite flow reaches it. Offsite stormwater will then overtop the basin and discharge through the existing drainage path as per the existing pre-development situation.

3.8 Water Race

The water race will be terminated at the point where it meets the western boundary of the Westpark development site. Flows that previously ran through the site will be directed southwards along Lehmans Road and across Oxford Road in the existing water race. This flow will be discharged to the water race that runs along Oxford Road, which the existing section of water race running through the Westpark site and subsequent properties is ultimately discharged to.

The capacity of existing water races both upstream, across the site and downstream of the site has been estimated using detailed cross section survey of the water races.

The water across the site has dimensions of approximately 1800mm by 500mm and a very flat grade. The capacity of this water race has been estimated as 100 L/s. However, as the water in the water race is not always flowing it is expected that there may be some issues with regard to grade or blockage. On a site visit undertaken on the 10th of June 2014 after a significant rainfall event, it was observed that the water race through the site was not flowing and flow was instead being conveyed through the water race along the eastern side of Lehmans Road.

The capacity of the water races adjacent Lehmans Road, along the southern side of Oxford Road (upstream of Acacia Avenue) and Oxford Road (downstream of Acacia Avenue where the two water races meet) has been estimated as 255L/s, 325L/s and 210L/s respectively. The combined capacity of the water race across the site (100L/s) and along Oxford Road (upstream of Acacia Avenue) (325L/s)



exceeds the capacity of the water race on Oxford Road (downstream of Acacia Avenue) (210L/s). Therefore removal of the water race across the site will not reduce the capacity of the water race network.

Consultation is currently being undertaken with landowners downstream of the site whose properties the water race runs through in order to obtain their permission to cut off the flow at Lehmans Road.

3.9 Ashley River Breakout

As discussed in Section 1.3.5 Environment Canterbury (ECan) has undertaken flood modelling work looking at possible breakouts of the Ashley River. The site is potentially affected from a flood breakout west of Rangiora.

The ECan flood modelling indicates that the site could be inundated to depths less than 0.25m during the 0.2% AEP Ashley River breakout event. This is classified as Low Hazard.

Development of the site will result in construction of sections sloping towards the roadways. The floor levels of the subsequent buildings will be further elevated above the roadways and 0.5% AEP peak flood level from the Ashley River breakout event.

Preliminary hydraulic modelling has been undertaken to test the potential impact of the proposed development on flooding behaviour during the 0.5% AEP Ashley River breakout event and ensure minimum floor levels are set 350mm above this event.

The key findings from this investigation are listed below:

Ashley River Breakout Flood Event

Construction of raised building platforms within the Westpark Development will reduce peak flood levels immediately downstream of the site but increase peak flood levels to the north and south of the site, including at the existing Rangiora vet clinic site.

These predicted flood impacts could be mitigated with the following measures:

- Raised landscape bund beside the proposed Bypass Road to the west of the Arlington Park Development. This will capture floodwater and direct it to the south.
- Construction of an earth bund around the Rangiora vet clinic site.
- Construction of a new box culvert beneath Oxford Road to convey floodwater beneath Oxford Road from the proposed swale along the western boundary of the Westpark Development to the existing swale in the eastern berm of Lehmans Road. The final size of this culvert needs to be determined during detailed design of flood mitigation measures following the hearing.
- Potential upgrade of the existing box culvert beneath Lehmans Road. This will convey any increased floodwater on western side of Lehmans Road beneath Lehmans Road to the proposed swale and then beneath Oxford Road via the new box culvert.

It is expected that a solution to reduce flood levels in the vicinity of the Rangiora vet clinic site (in addition to the proposed bund around the site) can be found using additional culvert capacity if required.

It is considered that an increase in flood levels of up to 50mm typically is acceptable in rural areas as a result of the 0.5% AEP Ashley River breakout flood event given the infrequency of this event.

Proposed Building Platforms

The 0.5% AEP Ashley River breakout flood event flood model predicts peak flood depths in local roadways through the Westpark Development typically not exceeding 150mm.



It is also expected that the proposed kerb and channel and swale (to the stormwater management area) will be overwhelmed by a 0.5% AEP local rainfall event.

Therefore it is recommended that all FFLs are raised at least 350mm above the proposed top of kerb level within the development to ensure that the proposed freeboard during the 0.5% AEP Ashley River breakout event can be achieved. FFLs will be set during detailed design to ensure that the proposed freeboard requirements are achieved.

It is recommended that the final site grading layout be added to the Ashley River breakout flood model and the model rerun to ensure that the 350mm freeboard requirement is achieved.

The results from this investigation are presented in the *Westpark Development Ashley River Breakout Flood Modelling* (Aurecon, November 2014) which is attached in Appendix F.



3.10 Conclusions

Feasible options exist for management and disposal of stormwater from the Westpark development site.

It is proposed that a treatment and disposal system will be constructed to service the site, with conveyance systems through and around the site for the external drainage path catchment and water race respectively.

The ground conditions are suitable for a soakage based stormwater system. Roof water can be discharged directly to ground on site and runoff from roading and hardstand areas can be treated using an infiltration basin or similar.

A secondary system discharging to Northbrook Stream via the Oxford Road water race can also be provided.

Proposed buildings at the site can be raised above the 0.5% AEP Ashley River breakout flood event and impacts on surrounding areas mitigated with a combination of flood mitigation measures.



4 Wastewater

4.1 Existing Reticulation

Potential points of connection to the existing gravity wastewater reticulation are the Acacia Ave main to the south and east of the site in Oxford Road. The terminal end of the Acacia Ave line is approximately 3.5m depth at the manhole in Oxford Road.

4.2 Options for Development

The levels of the receiving wastewater reticulation are such that the whole site can be drained by gravity to the Oxford Road connection point.

An indicative wastewater reticulation plan is attached at Appendix B

4.3 Constraints

Very few constraints exist with regard to provision of gravity wastewater serving to the site. The area that may need further consideration is the depth required to cross under the stormwater management area in the southeast of the site. However, due to the depth of the reticulation at Oxford Road, no difficulties are anticipated with regard to these matters.

4.4 Conclusions

The existing Council gravity wastewater reticulation can be extended from Oxford Road to service future development of the plan change area.

5 Power / Telecom Services

5.1 Power Services

MainPower New Zealand has confirmed that the existing power infrastructure can be extended to service development of the proposed plan change area.

5.2 Telephone Services

Telecom New Zealand has confirmed that their existing telecommunications infrastructure can be extended to service development of the proposed plan change area.



6 Summary and Conclusions

6.1 Proposed Plan Change

Westpark Rangiora Limited are pursuing a private plan change request to have the properties at 100 Oxford Road and 198 Lehmans Road, Rangiora zoned for residential purposes.

This report investigates the feasibility of providing water supply, stormwater, wastewater, power and telephone infrastructure to service the proposed development.

The servicing options assessed and presented in the report give consideration to the WRSP prepared by Council to guide future development within the area.

6.2 Water Supply

The existing Rangiora water supply reticulation can be readily extended to provide firefighting and potable water supply to the site, as well as providing for future development to the west in accordance with the WRSP.

6.3 Stormwater Drainage

The site falls to the southeast draining into the Northbrook Stream catchment.

The ground conditions within the area are suited to soakage-based stormwater management.

A central stormwater swale draining to two stormwater management areas in the southeast and southwest corners of the site is proposed. The stormwater management system will utilise ground soakage for disposal of stormwater, with a secondary system discharging to the Northbrook Stream via the Oxford Road water race.

The stormwater management system is proposed to service the 15 hectare plan change site only.

The proposed system is consistent with the intent of the WRSP.

Proposed buildings at the site can be raised above the 0.5% AEP Ashley River breakout flood event and impacts on surrounding areas mitigated with a combination of flood mitigation measures.

6.4 Wastewater Services

The site can be serviced by extension of the Council gravity wastewater reticulation.

6.5 Power/Telephone

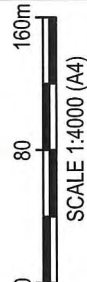
Existing power and telephone infrastructure can be extended to service development of the site.



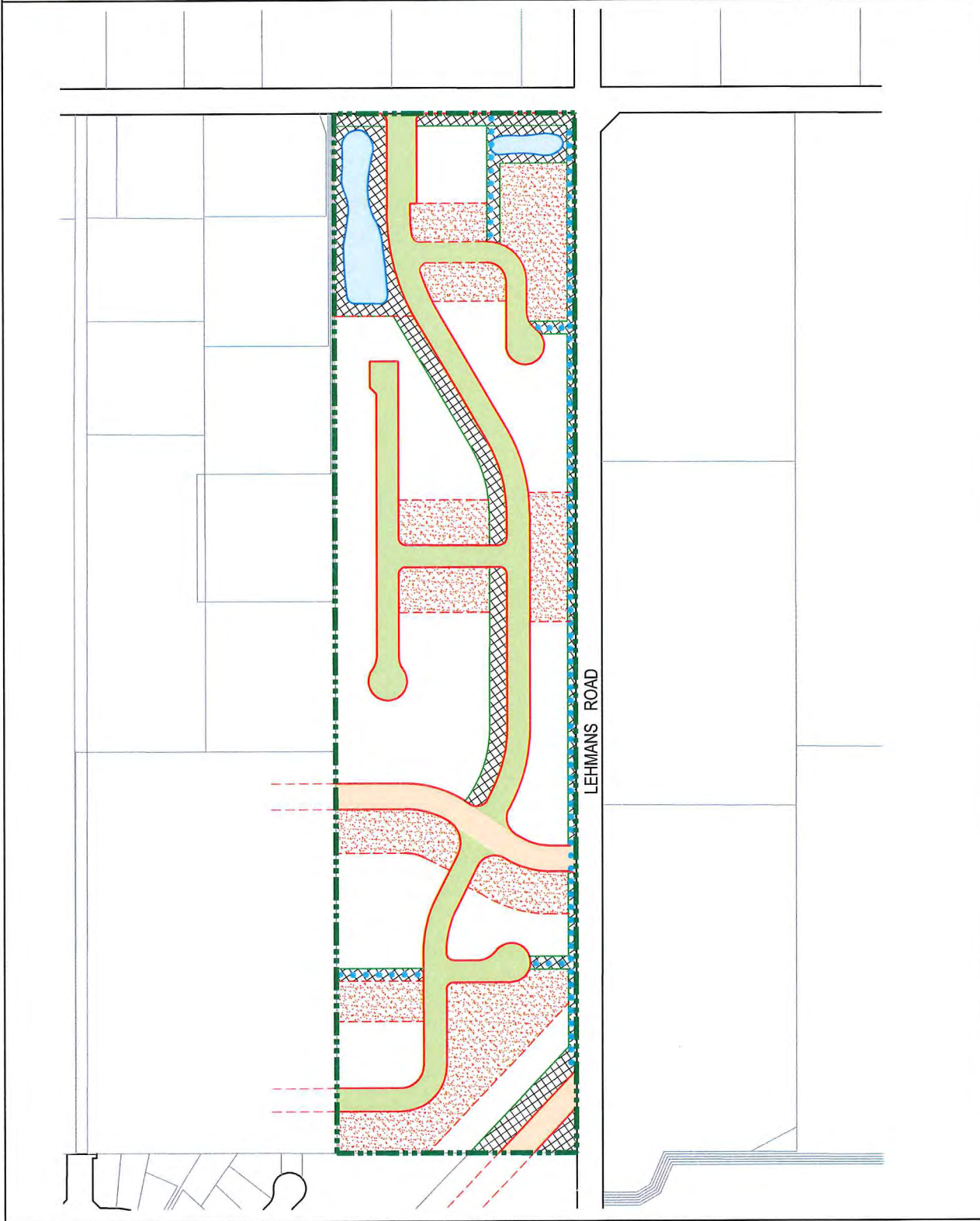
Appendix A

Outline Development Plan

- Area of development
- existing road
- local road
- urban collector road
- proposed road design
- pedestrian cycleway access
- local purpose reserve
- stormwater management area
- comprehensive residential development



Lehmans Road
West Rangiora
Outline Development Plan
175*





Appendix B

Indicative Servicing Plans