

Section Six

Assessment of Environmental Effects

SECTION 6: Assessment of Environment Effects

6.1 Introduction

A number of specialist reports have been commissioned during the course of development of this Plan Change request. They are attached as appendices to this request and are as follows:

- Appendix B: Landscape Assessment: Prorata Landscapes and Environmental Design. (Dated 11 June 2009)
- Appendix C: Flood Assessment; Philip Wallace River Edge Consulting Ltd. (Dated 8 June 2009 including Lower Mangaone Modeling report dated June 2008)
- Appendix D: Urban Design Assessment; Proarch Architects Limited (dated 17 June 2009)
- Appendix E: Soil Capability Assessment: Bruce Withell (dated May 2009 and letter dated 2 June 2009)
- Appendix F: Pioneer City West: Servicing Aspects of Proposed Plan Change For Future Residential Development. Pirie Consultants Ltd (dated 15 June 2009)
- Appendix G: Pioneer West Transportation Impact Assessment: Tim Kelly Transportation Planning Ltd. (dated June 2009)

This assessment of environmental effects draws on the specialist assessments to inform this overall assessment.

6.2 Beneficial Effects

This plan change will have a number of beneficial effects on the environment as follows:

It will provide a planned approach to meeting the urban growth needs of the City when at the present time there is no long term supply of development land

It will incorporate sustainable technologies into water management, stormwater, and domestic power generation.

It will provide for the social, economic and cultural well being of the City by:

- Providing a high quality urban environment
- Providing local community commercial and employment opportunities.
- Providing for investment in the urban fabric of the City

Most of the issues are discussed in more detail below in the context of the environmental issues however before considering this it is important to put the project in the context of current land supply and demand.

6.3 Urban Growth Needs

Palmerston North City Council undertakes periodic monitoring of land supply and demand. This is necessary for a range of planning purposes including the LTCCP, Asset Management Plans and of current direct relevance the review of the Urban Growth Strategy.

Some key parameters in this analysis are:

- Statistics New Zealand population growth projections based on the 2006 Census indicate a likely growth rate of 0.3% to 1.1% per annum over the period to 2031.

- The household growth rate ranges from 0.48% to 1.46% over the same period showing the trend towards smaller households.
- The average household size is forecast to fall from 2.6 to 2.4 between 2006 and 2021.
- This means that expected household growth will average 324 new households per year for the period 2009-2029.

Building consent data shows the demand over the last 9 years has peaked at 431 in 2004 but for the last three years has averaged at about 350 dwellings. Over the last 15 years the growth in dwellings has on average been 54% Greenfield, 36% infill and 10% rural residential.

PNCC therefore considers that over the next 20 years there will be a need for 350 greenfield household units, 2300 infill and 680 rural residential.

PNCC also considers that there is a current supply of zoned land available for development of 1154 lots. However other expert assessments have put this at 1075 lots. Some 73% of this is located in Aokautere where section costs are at the premium end of the market. Only 150 sections are estimated to remain in Kelvin Grove with 40 in Milson and 100 in Ashhurst.

A Private Plan Change is being pursued for a further 100 lots on Napier Road adjoining Kelvin Grove and has recently been approved.

PNCC considers that there is a need to retain consented land of at least 1000 lots as a landbank given the time lag involved in consenting residential development.

Other than the 100 lots on Napier Road there are no other new Greenfield areas under consideration. The City is therefore now on the cusp of severely restricting supply and choice which in normal circumstances would expect to result in price increases. However, the recent significant fall in both sales and prices is providing something of a short term buffer. There are, however, signs of recovery due to low interest rates and increased confidence as well as a strong economic base to the City.

The PCWGA is expected to yield a total of 800 to 1200 household units. This will generally be at the affordable part of the market and will include 150 to 200 comprehensively designed medium density housing clustered around the heart of the development.

Councils own assessment is that there is a need to provide for an additional 1500 lots by 2013. PCWGA on its own will not be sufficient to ensure that supply, however it is large enough to make a significant contribution to a balanced urban growth strategy.

In addition there are other areas of land in this general location which have additional potential to contribute to longer term land supply. Given the nature of the resource management and subsequent detailed design and subdivision process and subsequent construction it can be expected to be between 2 and 5 years before the first stage of PCWGA lots would be available to the market.

6.4 Urban Design Assessment

The Pioneer City West Growth Area Outline Development Plan for the PCWGA has been developed by Proarch Architects who have as part of their critical review of the concept undertaken an urban design assessment of the project. This is included as Appendix D.

As part of this assessment the project has been considered in terms of the Ministry for the Environment Urban Design protocol. While this is not required in a formal sense in terms of the Resource Management Act considerations for this Plan Change, both the Council and Proarch

Architects are signatories to this protocol and it provides a relevant framework for assessment of urban design issues.

As part of this assessment an analysis has been undertaken of the accessibility to community facilities and the mapping of this is shown in **Image Folio figure 4 page 8**. This shows that the growth area good accessibility to a range of services including parks, schools, supermarket and convenience shopping which would all be accessible by cycle or car. The development of the area will include a neighbourhood shopping centre and there is provision for primary school. Both will be within walking distance for residents of the growth area.

The urban Design Assessment also concludes that:

Relationship to Context.

The context of the area is one of surrounding arterial roads and established lifestyle blocks. A planted buffer between the growth area and lifestyle areas will preserve the low density context and privacy of these areas. The proposed green buffers will also respond to an adjacent rural context at the northern, western and southern edges of the growth area. The assessment concludes that the proposed plan change appropriately addresses the urban design principle of context and relationship.

Response and Contribution to Character

The urban design concept embodied in the Pioneer City West Growth Area Outline Development Plan provides a compact “sub-community hub” with varied residential density with varied residential density filtered around the hub. This in turn filters out to the existing rural environment and lifestyle blocks where the margins are enhanced through the landscape requirements.

Connections

A strong interconnected network of streets and public spaces is proposed including three major entry boulevards, local link roads and short cul-de-sacs. All roads will accommodate cycle’s footpaths. Connections to the Mangaone Stream Walkway will provide recreational opportunities. The location and design concept are well suited to extension of existing bus routes through the growth area and a transport hub close to the commercial centre is planned.

The design adopts a “complete street’ philosophy which seeks to achieve a safe environment for all transport options and for all groups in the community. This will provide a distinct local identity based around a garden suburb and community centre hub.

The design provides a legible street layout based on a deformed or irregular grid pattern linking to an internal ring route and four strong connections to external roads. This provides legibility along with a coherent public space landscape concept providing landmarks. Similarly there is a strong interconnected network of streets to increase safety and security; well designed shorts cul-de-sacs also offer effective surveillance.

Main and minor roads will accommodate cycles and all streets will have footpaths and the Mangaone Stream Walkway is accessible. After discussion with PNCC planned connections to adjacent areas have been identified and will be able to be protected. These will only be developed if wider urban growth is enabled in this area and in effect future proofs this plan change from future wider decisions.

Creativity

The proposal supports innovation and will foster a strong urban identity.

Custodianship

The comprehensive design concept will incorporates sustainable design solutions including Water Sensitive Urban Design and Low Impact Urban Design and Development approaches to stormwater management and rainwater harvesting.

Collaboration

A multidiscipline approach has been adopted for this Plan change and there will be further collaboration with interested parties through the Plan Change process.

The Urban Design Assessment concludes that the Plan Change is consistent with the New Zealand Urban Design Protocol and will provide an outcome consistent with good urban design principles.

6.5 Landscape and Visual Effects

A landscape assessment has been undertaken by Prorata Landscape Architecture and Environmental Design Ltd and is attached as Appendix B.

The assessment summarizes the landscape character of this part of the City

as “a transitional mixture of high density urban fringe to the northeast, smaller scale rural and rural residential lifestyle in between with a dominant open rural working landscape to the west beyond the city’s territorial boundary.”

The site itself is characteristic of the surrounding local landform, being relatively flat, expansive and homogenous in appearance. The land rises very slightly from Pioneer Highway to a very shallow ephemeral drainage channel which has been modified by farming practice over time and is of no ecological value. North of this the area crests and then drains to the north although remaining flat in appearance. Some man made drainage channels exist for farm drainage and generally run in a lineal NE to SE or NW – SW direction.

The adjacent rural residential blocks are generally defined by lineal shelter belts along the boundaries of the surrounding arterial roads. There are a couple of mature groupings of willow and poplar within paddocks towards No 1 Line and some mixed groupings of trees around the existing residence and farm buildings off No 1 Line.

In addition to these farm buildings there is an existing telecommunications aerial pylon near the centre of the area and 11 KV power lines transect the western corner of the site. However overall the area can best be described as rural in character, predominantly flat, modified and surrounded in parts by lineal shelterbelt vegetation and homogenous in appearance in terms of both landform, land cover and land use.

The visual assessment has adopted the following criteria for assessing effects:

- The existing area character and
- Potential visual effects associated with the proposed plan change including anticipated changes and the visibility of those changes
- Opportunities of the proposal to avoid reduce or mitigate any potential adverse visual effects.

Visual Absorption Capacity is a gauge to the ability of a landscape to absorb change. A ‘high’ VAC rating indicates a landscape with a high ability to absorb the proposed development. Elements that can affect a landscape’s VAC can include the following:

- The existing landscape character of the area and its level of modification
- The scale and nature of the proposed landscape change
- Proximity of the viewer to the area
- Site visibility
- Existing landscape topography
- Existing vegetation location and scale
- Scale and type of existing development around the area

Due the relatively flat and expansive landform of the Manawatu Plains along with the predominant amount of surrounding established tree groupings, shelterbelt plantings and rural residential dwellings, the visibility of the site and potential landscape change is generally viewed only within close proximity to the area. Distant public views of the site are limited to Greens Road on the Lower Tararua Ranges; however the distance of 10km renders the site scarcely visible within the overall panorama.

The visual assessment concludes on the significance of visual effects from each adjoining location as follows:

Mangaone Stream / Kawau Stream Stopbank:

- Public walkway and cycleway
- Development will be visible with buildings similar height to surrounding shelterbelt
- VAC - medium to high
- Effects mitigated by 3m wide boundary planting.

Pioneer Highway and Side Roads

- Development character will be similar scale to existing rural dwellings, though higher in density
- VAC medium to high
- Effects reduced by 3m buffer, and wide boulevard landscaped entrance.

Longburn

- View dominated by rural pasture in foreground and mid ground.
- Any view of the development will be minimal; in scale due to distance, existing plantings and existing dwellings.
- VAC – medium to high
- Any effect mitigated by barrier planting and tree lined streets.

Longburn-Rongotea Road

- Close up view
- VAC generally medium to high but in some assessed specific locations is low
- Scale and density will affect some view although height of buildings will be in keeping with existing neighbouring properties
- Planted green buffer, tree line boulevards and amenity planting will mitigate effects

No 1 Line

- Western end at rail over bridge is elevated giving view across the area.
- VAC ranges from high to low along the road.
- Effects range from dominating elevated view across rooflines to lesser midground view of residential development
- Mitigation through planted setback for power lines and Tree Lines Boulevard and roads.

Anders Road, Westberg Road and White Horse Drive

- Views from roads are generally screened by existing plantings
- VAC generally high but some exceptions.
- The development will see increased density along the boundary between the shelterbelts.
- Building height and scale will be in keeping with existing rural residential properties
- Planted buffer setbacks will mitigate effects

Wider landscape effects that could occur as part of the proposed change of zone and land use from rural to residential include:

1. An increased scale and density of residential dwellings associated with subdivision and development of the area
2. A greater sense of enclosure and reduced rural outlook for some neighbouring rural

- residential properties.
3. Replacement and reduction in parts of the open character of the rural landscape in the area.
 4. Potential for residential character to dominate the surrounding rural/ residential landscape character.
 5. Increased landscape amenity associated with plantings between buildings, vegetated roadways, reserves and open park spaces.
 6. Increased parking and hard surfaces especially within proximity of the Medium Density and Commercial Overlays.
 7. Increased sharper transition from the urban landscape character to rural landscape character at the western edge of the City.
 8. Landform alteration of the area to install infrastructure, construct road carriageways, develop central lake area and mounded edges, landforms and excavating building areas.

Of the above anticipated changes, the most significant in terms of landscape effect is the increased scale and density of development within the area, introducing a change in landscape character through tighter landscape patterns and higher building density.

The most significant views of this change in landscape character are within the western corner of the area along Longburn Rongotea Road and No 1 Line. Here the existing railway overpasses increases visibility due to elevating viewers up above the development exposing them to the scale and expansiveness of the area. The area boundaries within this area are also relatively devoid of rural residential properties and vegetation found around other parts of the area boundary. Views from Pioneer Highway are also relatively open, however the reduction in area width through this section of site, the increased setback from the road due to the existing 40m section of road reserve, the flatness of view and proposed 3m green barriers all help to reduce the effects. All other views are likely to over time be reduced through planting mitigation either from the 3m green barrier, establishing shelterbelt plantings within the surrounding rural residential properties as well as the expected amount of street tree plantings proposed through the area.

The change in landscape character from the scale of development will enclose the existing rural landscape further and reduce the 'openness' of this landscape for surrounding rural residential dwellers and viewers, though the majority have in some shape or form chosen to enclose themselves already with various shelterbelts, hedges and tree plantings out of necessity for wind protection and increased personal privacy from other neighbouring rural residential dwellings. While the change of zone will ultimately change the existing landscape character, elements of the proposed plan will contribute to retaining existing rural amenity values including the 3m wide green barriers as well as tree lined boulevards and roads through the area. This introduced vegetation at maturity will be high enough and dense enough in scale to significantly reduce the effects of the dominance of building scale, density and residential character through the area, as well as assist in retaining aspects of the existing rural landscape character and context.

Residential development of the area will increase the defined transition between the highly modified urban landscape character and the rural landscape character at this western gateway much like the sharp transition to the northern edge of the city. Again through appropriate planting mitigation methods the existing transitional character could be partially preserved.

It is likely an increase in amenity will occur as a natural reaction to residential development. The mixed uses of the development will result in various densities and variations of vegetation, landscape structures, lighting, fencing to occur between residential properties. The central lake will enhance this level of amenity by providing possible habitat opportunity for development of wildlife and indigenous planting around the margins and between the surrounding zones.

This level of residential development on the existing landscape is likely to result in increased hard surfaces from driveways, carriageways and parking spaces especially from the commercial, school and medium density overlay. This in turn results in increased surface runoff from the area. Appropriate mitigation methods associated with sustainable urban design could reduce this adverse effect significantly.

The anticipated landscape effects are not expected to have any significant effects on habitat or natural landscape systems within the subject area. The area involved has previously been heavily modified through intensive farming practices.

6.6 Flood Risk

An initial flood risk assessment of the PCWGA and surrounding area was undertaken by Philip Wallace of River Edge Consulting Limited in June 2008. This assessed the following flood scenario

- a 4000m³/s flow in the Manawatu River, which approximates to the 200 year flood and
- A 115m³/s flow in the Mangaone Stream which is the upstream channel capacity.

A MIKE FLOOD model was built of the area. The Manawatu River inflow was scaled from the February 2004 flood event and the Mangaone inflow was based on the recorded hydrograph at Milson Line for that event, but was shifted in time so that the peak coincided with the Manawatu peak.

Peak floodplain levels are shown in the **Image Folio figures 50 on page 58 and figure 51 on page 59** and show that water does not leave the floodway of the Mangaone, but water does spill from the Manawatu River downstream towards Longburn. **Image Folio figure 52 on page 60** shows the peak levels down the Mangaone Stream and shows that generally there is approximately one metre freeboard. Near a bridge crossing on the left bank in the vicinity of the racecourse, a very small amount of water leaves the MIKE 11 channel. This however does not travel far.

As part of this assessment a check on results was undertaken by the following modelling

- City Reach MIKE 11 model was rerun with a 4000m³/s flow which showed that predicted river levels at the Mangaone confluence were about 0.5m higher than the MIKE FLOOD model. The differences are mainly due to the different modelling methods.
- The MIKE 21 component was removed from the first model. The results gave similar levels at the confluence to those predicted by the City Reach model. This showed that there would be some minor bank spilling out of the Mangaone channel on the right bank immediately downstream of Pioneer Highway, as well as on the left bank at the downstream (Totara Rd) bridge.
- A second MIKE FLOOD model was constructed, this time only allowing spillage downstream of Pioneer Highway for a few hundred metres. Peak flood levels are confined to a local depression just downstream of Pioneer Highway.
- If freeboard is added, the flooded area would extend over a larger area to the west of this depression. However, it would be a simple matter to form a low barrier to prevent that possibility.

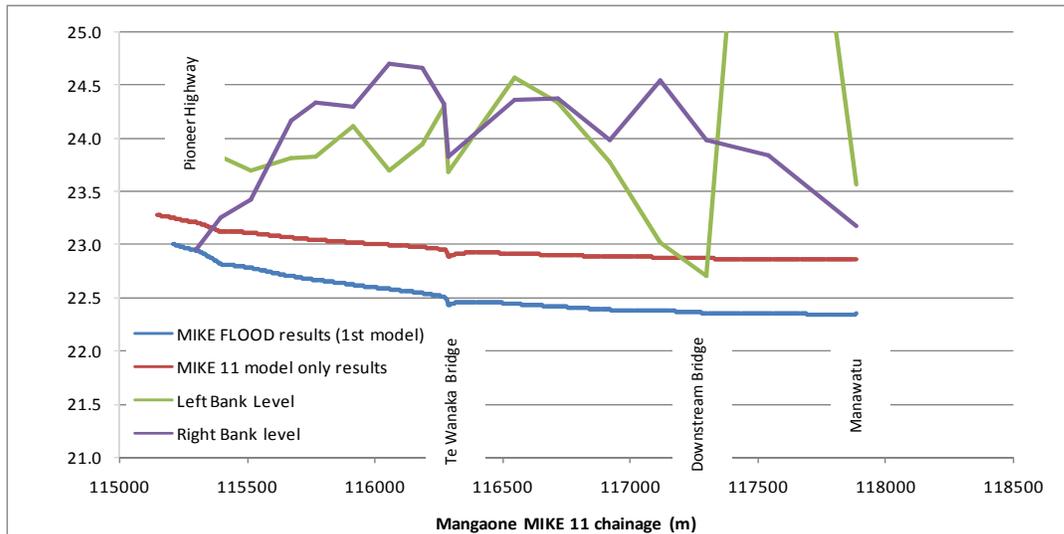


Image Folio Figure 52 page 60: Mangaone Stream channel peak flood levels

This 2008 assessment therefore concluded that a 200 year flood and maximum capacity flow from the Mangaone Stream will not adversely affect the area proposed for development in this plan change request.

This was followed by a further report dated June 2009 which considered more specifically the plan change area. This report notes that while flooding of the land may have occurred from the Mangaone Stream downstream of Tremaine Avenue in 1953, the upgrading of flood protection since that time means that this will not be repeated.

However after consultation with Horizons Regional Council this assessment also modeled a 0.2% AEP (500 year) flood. This confirmed that under this event floodwater would remain on the south side of Pioneer Highway until close to the Rongotea road intersection. Further, at this point the floodwater would flood back into the Plan Change area. It is reported that the lowest part of the Plan Change area is 0.5m higher than any area affected by this modeled flood event. The results also showed that flood waters from the Manawatu River will not flood the Plan Change area.

The assessment therefore confidently concludes that the Plan Change area is not subject to flood risk from events up to the 0.2% (500 year) flood.

6.7 Transportation Impacts

A Transportation Impact Assessment has been undertaken by Tim Kelly Transportation Ltd and is attached as Appendix G.

The existing transportation infrastructure in the vicinity of the growth area is dominated by the three arterial roads that adjoin the area. These are:

Pioneer Highway SH56

- Defined as an arterial in the PNCC District Plan and as a regional route by NZTA.
- One lane in each direction with sealed shoulders and good visibility
- Speed limit of 100kph reducing to 50kph at the edge of the urban area.
- Te Wanaka Road intersects opposite the area.
- Rongotea Road intersection is cross roads with give way on Rongotea Rd and Shirriffs Road with right turn bay on the highway.
- Traffic volume of 8970 vehicles per day in 2007.

Rongotea Road

- District Arterial in the Manawatu District Plan.
- One lane in each direction with 6.6 – 7.4 m wide seal.
- Good visibility and 100kph speed limit.

No 1 Line

- A continuation of Tremaine Avenue which is a major route to and from industrial areas on the north side of the City.
- Defined as a principal road in PNCC District Plan.
- One lane in each direction with 7.3 – 8.5 m wide seal.
- Good visibility and 100kph speed limit.
- Typical daily traffic flow of 1850 vehicles per day.

Anders Road and Westberg Road

- Access to low density rural residential area
- One lane each way
- 70kph speed limit, no footpaths.

Currently the two major intersections at SH56 / Rongotea Road and Rongotea Rd / No 1 line, perform satisfactorily with acceptable levels of delay. However both have a significant accident record along with the Te Wanaka Rd intersection. The primary contributing factors are failure to give way at intersections and loss of control due to excessive speed for the conditions.

Rongotea Road forms part of a planned ring road route around Palmerston North City involving a new river crossing to the east of the City. However, it is not clear when this work will proceed. An existing bus service extends to within 1.2kms from the area. This is the Highbury / Takaro loop service which connects with the city centre and has a frequent service on weekdays and reduced service at weekends.

Levels of traffic likely to be generated by the development will be significant and four points of vehicular access are proposed to distribute the traffic and provide for connectivity to and within the growth area. These are shown on the Pioneer City West Growth Area Outline Development Plan and are:

- SH56 - four armed roundabout at Te Wanaka Road
- Rongotea Road – priority intersection with right turn bay.
- No 1 Line - priority intersection with right turn bay

The creation of a new roundabout is expected to require a review of the speed limit regime on SH56 in this area because of the frequency of intersections resulting in a transitional 70 kph zone between the new roundabout and Maxwells Line and possibly on Rongotea Rd where it borders the growth area.

A hierarchy of internal roading is proposed which will be consistent with the high quality urban environment within this area;

- major boulevards linking to the external access points on the No. 1 Line, Rongotea Road and SH56 frontages – these would be approximately 30m in width, comprising a two-way carriageway, a planted median and wide berms to incorporate shared footpaths/cycleways, planting and drainage swales;
- main routes within the development linking to/from the boulevards;
- link roads connecting the main routes and used to penetrate the development; and
- Cul-de-sacs serving up to 12 properties.

- Provision for 3 future link roads to adjacent land in the event that wider urban growth is enabled in this area. Two of these provide connectivity to the adjacent land to the south and one connects to White Horse Drive.

The likely scale of development, together with the permeability of the zone is likely to justify and facilitate the provision of bus services through the area. Preliminary discussions with the Horizons Regional Council confirm that the potential exists for changes to bus services in this area to service the development and hence provide linkages to its catchment area. It is understood that none of the existing services in this area operate on a fully commercial basis and all require a degree of on-going subsidy support.

The promotion of walking and cycling are integral to the development. Internally, the boulevards will provide shared pedestrian / cycle facilities and all other roads will have footpaths to both sides. A network of off-road pedestrian and cycle routes will provide routes which are shorter than road distances and which offer a convenient alternative for short-distance travel. Externally, there is potential for connectivity to be provided to the existing urban footpath and cycle networks within Palmerston North. The Transportation Impact Assessment has estimated the levels of traffic activity likely to be generated by the area, and the distribution of this additional traffic onto the adjacent road network. From this, the overall increases in traffic volumes and intersection turning movements have been identified, allowing impacts upon the operation of the network to be assessed. The assessment has been undertaken for a 'design' year of 2015, and for the weekday morning and evening commuter peak periods when traffic demands are greatest.

The development has been assumed to comprise:

- Up to 800 standard residential dwellings;
- Up to 200 medium density residential units
- 4,000m² gross floor area (GFA) of commercial development in the form of small local shops primarily servicing the development itself with up to 50 associated or ancillary residential units; and
- A primary school
- 32,800 m² area of "special use" which might be retirement village, business park or residential.

The assessed overall external vehicular activity summarised in the table below.

Time Period	Inbound	Outbound	2-Way
AM Peak Period (/hour)	350	660	1,010
PM Peak Period (/hour)	590	400	990
All-Day (/day)	4,670	4,670	9,340
Table 4.3 Estimated Overall External Traffic Generation (2015)			
<i>Units = Vehicle Movements</i>			

The location of the area to the west of Palmerston North and between the SH56 and No. 1 Line routes results in a good level of accessibility by road to the city. Also, the state highway network serving the more general lower North Island area is easily accessed without a requirement to traverse the central Palmerston North urban area. The forecast change in traffic volumes on each of the main road sections in the vicinity of the development area have been estimated and are shown in the Table below.

Road	Section	Time Period	2015		Change	
			Base	With Development	Number	%
SH56	E of access	AM	790	1,110	320	41%
		PM	820	1,140	320	39%
	W of access	AM	790	960	170	22%
		PM	820	1,000	180	22%
	W of Rongotea	AM	710	860	150	21%
		PM	800	950	150	19%
Rongotea Rd	S of access	AM	200	310	110	55%
		PM	170	270	100	59%
	N of access	AM	200	360	160	80%
		PM	170	320	150	88%
	N of No. 1 Line	AM	270	320	50	19%
		PM	200	250	50	25%
No. 1 Line	W of Rongotea	AM	310	410	100	32%
		PM	320	420	100	31%
	W of access	AM	400	530	130	33%
		PM	380	510	130	34%
	E of access	AM	400	800	400	100%
		PM	380	780	400	105%

Table 4.5 Estimated Traffic Increases (2015)
Units = Vehicle Movements/Hour

On Rongotea Road, the lower background traffic volumes means that, whilst some percentage increases are significant, the absolute volume increases would be modest with the total volumes well within the overall capacity of the road.

On SH56 and the No. 1 Line, the absolute traffic increases would be more significant. With the city being the principal origin / destination of the generated traffic movements, those sections of road to the east of the development area would experience the greatest increases in traffic volumes. On SH56, the increases would be 320vehicles/hour, or 39 – 41% of the background volumes. On the No. 1 Line, the increases would be 400vehicles/hour of the background volume, or 100 – 105% of background volumes.

Whilst it is likely that the immediate rural road network could accommodate these increases without the formation of congestion, there would be some loss of operating efficiency which would be evident through reduced speeds.

Analysis of the performance of individual intersections shows that all of the intersections assessed are capable of accommodating the forecast traffic volumes whilst providing an acceptable level of service:

For a 70km/hr speed zone, the PNDP recommends that intersections be separated by a minimum distance of 400m, with an available sight distance of 220m. All of the new intersections would ensure safety by meeting these separation and sight-distance criteria, together with the physical separation of right turn manoeuvres from the main routes;

The availability of multiple access points together with a comprehensive internal road network would result in a dispersal of vehicle movements within the development. As such, road sections and intersections within this area would be easily able to accommodate the expected levels of traffic activity within a free-flow environment.

To the west of the development area, additional traffic demands would be lower and would disperse quickly onto the rural road network, which has a high degree of spare capacity and hence an ability to accommodate this traffic.

To the east, all of the additional traffic generated between the development area and the Palmerston North urban area would use either SH56 / Pioneer Highway or the No. 1 Line. In the immediate environment of the development, these are rural roads which would be generally capable of accommodating the traffic increases. However, within a distance of one kilometre, both of these routes become urban in nature with a 50 km/hr speed limit, frequent intersections and driveways.

Levels of traffic generation associated with the development of the area will be affected by the success of measures to promote alternative forms of transportation. Development on the scale anticipated is likely to justify the provision of a bus service, and this will be further encouraged by a 'bus-friendly' design which provides for through running and frequent stops within the development area.

The development area will promote walking and cycling for internal movement, with a range of convenient and attractive facilities. The uptake of these modes for external travel is reliant upon formation of safe and convenient linkages with the existing networks in the adjoining urban area. Ideally, such linkages should be off-road, though this would appear to require land currently beyond the control of the applicant. Efforts are required to establish such linkages, which would then promote a reduction in private vehicle usage.

The overall conclusions of the assessment are that:

- residential development on this scale would generate a significant number of trip movements;
- even though significant opportunities would exist to promote travel by walking, cycling and bus services, the number of vehicle movements would be significant;
- the use of up to four points of access onto the adjacent road network would allow this traffic to disperse, with the result that the intersections required could accommodate expected traffic demands whilst providing an acceptable level of service;
- most of the additional vehicle movements would be focussed upon the adjacent Palmerston North urban area;
- whilst these movements could be accommodated by the immediate rural road network, it is likely that impacts would arise along the urban sections of both Tremain Avenue and SH56 / Pioneer Highway, in terms of additional delays at intersections and side roads;
- such impacts can only be reliably quantified with the application of the established traffic model (which can reasonably be included as part of work commissioned by PNCC associated with the urban growth strategy);

- expansion of the urban fringe to the west of the city will inevitably necessitate a review of the speed limit regime in this area, as the existing 100 km/hr speed environment will be inconsistent with increased levels of traffic activity and intersections;
- whilst an expansion of the 70 km/hr speed zone is recommended, any change to the speed limit regime requires close liaison with the relevant roading agencies and consideration of safety issues together with impacts upon through and local traffic movements;
- reduced speed limits, together with improved access for Te Wanaka Road would improve the road safety environment in this area; and
- the Applicant has indicated a willingness to work with the relevant roading agencies to secure high standard walking and cycling facilities to connect the site with the existing facilities within the established urban area along both the SH56 and No. 1 Line / Tremaine Avenue routes.

The area offers many benefits for growth in terms of its high standard of accessibility. The promotion of alternative transportation modes and a co-ordinated approach to the management of the road network in this area in a manner consistent with such growth will ensure that potential adverse effects upon the transportation network can be largely mitigated.

6.8 Water Supply

The development area does not have access to any reticulated water supply. The nearest existing water mains which have to be extended to service the subdivision are:

- No. 1 Line near Amberley Avenue, 225mm diameter water main, and
- Pioneer Highway (SH56) near Maxwells Line, 150mm diameter water main.

The proposed water main reticulation for the plan change area is shown in the **Image Folio figure 31 page 38**. This involves:

- extension of the 225mm diameter water main near Amberley Avenue along No. 1 Line to proposed Road 1 of the development for a distance of 980 metres.
- extension of the 150mm diameter water main in Pioneer Highway (SH56) near Maxwells Line along Pioneer Highway to proposed Road 2 of the development for a distance of 890 metres.

PNCC has advised that they consider there is no need to increase the size of this water main to cater for further development of adjoining areas.

The 225mm diameter water main continues through the development along Roads 1 and 2 to join with the 150mm water main at the intersection of Road 2 and Pioneer Highway (SH56) forming a ring main. The 225mm diameter water main is sufficient to fully service the development's water supply requirements.

The assessed working pressures of the existing mains are 800kpa. If the loss in head pressure in extending both mains creates working pressures below the minimum permitted then this will be rectified with the installation of a booster pump in a position determined by a pressure network analysis.

The 150mm diameter water main along Pioneer Highway (SH56) including the crossing of the carriageway and the attachment to the Mangaone Stream bridge is subject to NZ Transport Agency requirements who have given their verbal approval.

The extension of the water mains along Tremaine Avenue/No 1 Line and Pioneer Highway provides an opportunity for a reticulated water supply to be provided to adjoining properties and for the extension into and developing other areas beyond this future subdivision.

As part of the environmentally sustainable design all roof water from residential houses is to be collected and stored in 25000 litre underground, in ground or above ground tanks for re-use in watering lawns, gardens and all other outdoor uses, toilet cisterns, dish washers and washing machines i.e. for all situations except human consumption. Plans and details of the operation of the detention tanks are explained in Appendix F. A similar system will also be provided for the School area and the Medium Density developments. This will be of considerable benefit to the conservation of water usage and will result in less water usage per person than would occur if the current procedures are utilised.

All roads within the development are to be provided with a water main of minimum 100mm diameter for water supply and fire fighting requirements. The system is to be designed in accordance with the requirements of the PNCC – Engineering Standards for Land Development (July 2007) and all public mains will be installed in public areas i.e. roads or reserves.

6.9 Sewage Disposal

The natural grades of the plan change area fall both towards Pioneer Highway (SH56) and No. 1 Line from a high area mid way between these two roads. (Refer point A on **Image Folio Figure 32 page 39**) The low point is where the Railway Line meets Rongotea Road.

The plan change area does not have access to any reticulated sewage system. The nearest existing sewer mains for the development to connect to are:

- A 300mm diameter sewer main at the intersection of Tremaine and Amberley Avenues. This main then continues along Amberley Avenue across Pioneer Highway (SH56) to the Maxwells Line pumping station. The distance along No. 1 Line from proposed Road 1 of the development to this main is 1230 metres.
- A 300mm diameter rising main from Aotearoa Cool Stores in Longburn which runs along Pioneer Highway and then down Shirriffs Road. The distance along Pioneer Highway to the intersection of Rongotea and Shirriffs Roads to connect to this main from proposed Road No. 2 is 600 metres.

The Pumping Station at the intersection of Pioneer Highway and Maxwells Line is 1020 metres from proposed Road 2 of the development.

A number of options for servicing the Plan change area have been investigated and evaluated. These are reported in detail in Appendix F. Two pumping stations are necessary for all options considered and these have been allocated a position in each case which is outside any stormwater overland flow path.

The options assessed are

Option 1: Installing a 150mm diameter rising main along Road 2 from Pump Station 2 to Point A (the high point), then a 250mm diameter gravity sewer along Roads 1 and 2 to discharge into Pump Station 1. The entire sewage discharge from the development is then pumped from Pump Station 1 through a 250mm diameter rising main along No. 1 Line to the existing 300mm diameter sewer main at Amberley Avenue.

Option 2: Installing a 200mm diameter rising main along Roads 1 and 2 from Pump Station 1 to point A, then a 300mm diameter gravity sewer along Road 2 to discharge into Pump Station 2. The entire sewage discharge from the development is then pumped from Pump Station 2 through a 250mm diameter rising main along Pioneer Highway crossing the bridge over the Mangaone Stream and then to the P.N.C.C. Pumping Station in Maxwells Line.

Option 3: All sewer mains gravitate to either pump station, essentially splitting the catchment in two. A larger sewer main, 250mm diameter, needs to be installed, possibly in Road 1 to act as a trunk main discharging into Pump Station 1. All of the sewage from the northern (No 1 Line) sector is then pumped from Pump Station 1 through a 200mm diameter rising main along No. 1 Line to the existing 300mm diameter sewer main at Amberley Avenue. All of the sewage from the southern (Pioneer Highway) sector is then pumped from Pump Station 2 through a 200mm diameter rising main along Pioneer Highway crossing the bridge over the Mangaone Stream and then to the P.N.C.C. Pumping Station in Maxwells Line.

Option 4: This is a variation of Option 3 whereby the sewage from the northern sector is still pumped to Amberley Avenue but the sewage from the southern (Pioneer Highway) sector is then pumped into the existing 300mm rising main from Aotearoa Cool Stores, Longburn at the intersection of Pioneer Highway, Rongotea and Shirriffs Roads. Sewage from the southern sector is drained from the intersection of proposed Road 2 with Pioneer Highway by a 250mm diameter gravity sewer to Pump Station 2 on the eastern side of the intersection of Rongotea Road and Pioneer Highway, where it is then pumped for approximately 30 metres distance through a 200mm diameter rising main to the existing 300mm rising main.

Option 5: This is a variation of Options 2 and 4 whereby all of the sewage from the development is still pumped from Pump Station 1 and/or drained to the intersection of proposed Road 2 and Pioneer Highway but then, as per Option 4, drained from the intersection of proposed Road 2 with Pioneer Highway by a 300mm diameter gravity sewer to Pump Station 2 on the eastern side of the intersection of Rongotea Road and Pioneer Highway, where it is then pumped for approximately 30 metres distance through a 250mm diameter rising main to the existing 300mm rising main.

All roads are proposed to have a sewer main of minimum 150mm diameter. Rising mains from the pumping stations have been determined at a minimum size of 200mm diameter to reduce friction losses. The rising main from Pump Station 1 to the receiving gravity main at Point A within the development is approximately 1100 metres. The distance from Pump Station 2 at the intersection of proposed Road 2 and Pioneer Highway and Point A is approximately 600 metres. Details of the sizing of the pump stations is included in Appendix F.

The design of servicing for the development enables sewer services to be installed for No1 Line, Anders and Westberg Roads and White Horse Drive. Provision is also available for the servicing additional properties and/or replacement of the existing rising main in Pioneer Highway and Te Wanaka Road.

The preferred option is Option 5. This is because the assessment has concluded that it is the most practical and cost effective. The option avoids the construction of rising mains along No. 1 Line to Amberley Avenue and/or along Pioneer Highway (SH56) to Maxwells Line and also avoids associated issues with safety and traffic disruption during construction.

It also has the added benefit of assisting in the extension of gravity services to adjoining areas of the City which either presently or for future development require the installation of a rising main service.

This assessment therefore concludes that water supply services can be reticulated to the growth area without any adverse effects. The developer will be responsible for construction of mains services and these will then be vested in the Council. Development contributions will also be collected for each unit of development under the Local Government Act to fund wider City wide infrastructure needs.

6.10 Stormwater

A detailed analysis of the stormwater that would need to be discharged from the proposed subdivision has been undertaken to determine:

- the required capacity of the primary flow path
- the required capacity of the secondary flow path
- the impact on the downstream channel in which the flow is to be discharged
- the potential impact on downstream properties.

The design requirements adopted are:

- that the primary flow path must carry at least a 5-year return period flow
- that the secondary flow path must carry flows in excess of that carried by the primary flow path and provide protection to habitable floors in a 100-year return period flood
- that the freeboard to habitable floors over and above the 100 year flood level is not less than 500 mm and
- that consideration be given to the effects of global warming to 2080.

The proposed development area has a total area of 73 hectares of which 63 hectares drains to the west at the intersection of No. 1 Line and Rongotea Road with 10 hectares draining towards Pioneer Highway. None of the development area is subject to flooding from the Mangaone Stream or any other source.

The 63 hectares draining to the north-west, currently drains towards a roadside drain located along the eastern side of Rongotea Road. This drain passes beneath the railway line and under Rongotea Road via a 1200mm diameter culvert that discharges into an old stream channel. From this culvert a drain continues along the eastern side of Rongotea Road at the base of the ramp for the railway over bridge to No. 1 Line and then continues along the eastern side of the Rongotea Road to Whiskey Creek, approximately 1 km from the No.1 Line intersection.

It is proposed that all dwellings be required to have detention tanks for roof water collection and it is expected that this will reduce the effective area for run off by 50%. Similarly it is proposed that the major roads will incorporate central medians with an infiltration system.

As a result it is expected that the 63 hectares draining to the east will have 29 hectares of impervious area and 17.5 hectares of pervious area. The time of concentration for the impervious and pervious part of the catchment have been determined at 0.63 hrs and 0.84 hrs respectively.

The roading network will accommodate the secondary flow paths. The contour of the building areas and the roading network will be designed to ensure the peak water level of the secondary flow path is greater than 500 mm below the anticipated habitable floor levels.

Updated rainfall data has been obtained for the area from Hydronet Ltd who provided a HIRDS analysis and an evaluation of the short duration rainfall records from the Palmerston North AgResearch Area opposite Massey University. This provides better information on short duration high intensity storms.

As a result it is estimated that:

- ***the peak runoff for the 10-year and the 100-year storms for the entire plan change area will be 2 cumecs and 3.7 cumecs respectively when taking into consideration global warming to 2080.***

- ***the additional runoff from the 63 hectare area that will arise as a result of the developed land during a 72 hr -100 year storm will be 34,000 cubic metres.***
- ***the maximum increase in peak flow from the area is 2 cumecs.***
- ***the 100 year peak run off from the whole area draining to Rongotea Road including the Anders Road area will be 7 cumecs.***
- ***the additional peak runoff from the 10 hectare part of the area that discharges into the Pioneer Highway drains and eventually discharge into the old Mangaone Stream will be 0.7 cumecs.***

Two options have been investigated for the disposal of the stormwater to the west. These are:

- into a reticulated network provided by PNCC that would divert the stormwater back towards the east and ultimately into the Manawatu River, or
- into the existing roadside drainage network that ultimately discharges into Whiskey Creek and ultimately to the Manawatu River at Rangiotu.

PNCC has no plans at present to construct a reticulated stormwater system however this may change in the future as urban growth options are further explored. In the meantime, the most practicable option will be to discharge to the existing drain along Rongotea Road.

The existing capacity of the roadside drain is limited by the existing culverts. However, these can all be upgraded to ensure that the additional 2 cumec peak flow does not adversely affect the plan change area or the adjacent downstream properties.

In particular, the culvert beneath No.1 Line is too small to pass the existing 4 cumec flow and is conservatively estimated to require a minimum culvert size of 1650mm diameter or equivalent sized box culvert. From No.1 Line to Whiskey Creek there is adequate capacity in existing drains.

The impact on the flow in Whiskey Creek has been assessed by considering the effective additional catchment area. This analysis indicates that the additional flow in Whiskey Creek would be less than 1% and thus the increase in depth in a channel full flow in the creek would be less than 30 mm and the effect of this is considered to be minor. The impact of the additional runoff into the Taonui Basin would increase the depth of ponding in the basin by less than 1.5 mm during a 100-year flood in the Manawatu catchment where the Mangaone Spillways and the Oroua Spillways caused ponding in an area of some 2,500 hectares. This is only be considered to be minor but is an issue that concerns Horizons Regional Council.

Consequently, a small detention dam is proposed for the development area that will detain up to 10,000 cubic meters of the peak runoff. This will reduce the impact on the Taonui Basin to approximately 1.1 mm of additional ponding depth in a 100 year storm event.

All roads within the development will incorporate a kerb and channel system so that runoff will be disposed by soakage infiltration and subsoil drainage. This will eliminate the possibilities of silts and other containments entering the reticulated system and ultimately the surrounding natural waterways and furthermore reduce the peak discharge of flows by extending the time of concentration.

Disposal of overland flows is to be achieved by the installation of suitably sized culvert at No 1 line. This is necessary to ensure that No 1 Line does not act as a stop bank by retaining overland flowing stormwater thereby creating ponding upstream, with the potential risk of inundation of dwellings. The maximum size of this culvert is 1800mm diameter however the

final size and shape is dependent upon space available under the carriageway of No 1 Line. An additional culvert is not required under the railway line as existing 2100mm diameter culvert has sufficient capacity to deal with all flood events.

Stormwater that drains to Pioneer Highway is to be disposed by piping to the open drains on the southern side of Rongotea Road. The peak runoff from this development is 1.2 cumecs with a total runoff including that from the catchment upstream of this development being 2.2 cumecs. A 1500mm diameter pipe is required to cater for the flow although it would be prudent to install a larger pipe to fully cater for future development in the catchment.

The option of discharge of the runoff from the development to the Mangaone Stream has been investigated but has been dismissed as only low flows in the stream enables a gravity discharge necessitating the pumping of stormwater at all other times.

6.11 Contamination

The plan change area has been used for grazing of beef and sheep, and associated forage crop production and maize. Review of the history of the farming practices has not identified any potential risk of ground contamination associated with farming practice or any risk of buried chemicals.

6.12 Productivity of Soils and Geotechnical Risk

The area is generally flat with gradual drainage north and south from a central high point. The soil and ground conditions are similar to adjacent developed areas and the land is suitable for urban development in terms of geotechnical risk.

Bruce Withell, a Registered Farm Management and Agricultural Consultant have assessed the productive capacity of the soils. His report is attached as Appendix E.

The NZ land Resource Inventory Worksheets record almost the entire area as Class IIw2. However, Bruce Withell's assessment concludes that the soils are a type of Class IIw1 with a small intrusion of Class Iw1. He describes the soils as predominantly recent soils of low lying river terraces that have the constraints of a moderate level of wetness, despite sub surface drainage. The soil name is Kairanga Silt Loam with an overlap with Te Arakura Silt Loam in parts.

The narrow belt of Class 1 soil which crosses the block is Manawatu Silt Loam which is one of the most fertile and versatile soils in the District. However Bruce Withell concludes that the soils of the plan change area are much less desirable for intensive uses than the free draining friable river terrace soils of which there is a considerable resource in the locality. The area of Class 1 soil affected is in his opinion too small to be significant.

Bruce Withell considers that it is unlikely that the land would ever be returned to dairying and that the current farming mode of dry stock grazing, wintering of herds and maize and silage production is the only form of productive farming that would occur.

He concludes that the loss of Class II soil to the region will not have any measurable effect on the region's productive capacity and that from a productivity perspective it is appropriate for development.

6.13 Conclusions on Effects

It is widely accepted that there is a need to establish and plan additional land for the growth of Palmerston North. This request for a plan change seeks to address part of the future land supply needs for urban growth in a sustainable manner. The integrated development plan for

the development of 73 hectares of land west of the City will provide an opportunity to design and construct an integrated Greenfield development while being well connected to the rest of the City.

The development plan has been developed to provide services and facilities for a new residential community with a heart to the area provided by commercial activities and open space and surrounded by medium density housing. The likely yield of 1000-1100 dwelling units will make a major contribution to meeting ongoing growth demands.

A number of specialist reports have considered key design issues, sustainability initiatives and potential adverse effects on the environment.

Key benefits include opportunities to achieve:

- high quality urban design outcomes
- avoidance of flood risk
- planned open space and streetscape amenity.
- a range of housing types including integrated medium density housing
- sustainability measures to reduce stormwater flows, and require solar electricity generation.
- strong public transport, cycling and pedestrian connections and services

The key risks of adverse effects include:

- Loss of services on the nearby roading network
- Loss of amenity for nearby existing rural residential owners and occupiers
- Inefficient infrastructure servicing
- Loss of productive soils to urban activities

These risks have been assessed through specialist assessments. In particular, the Transportation Assessment has concluded that traffic generated from the growth area can be accommodated within the existing network without undue adverse effects on efficiency and safety. The availability of multiple access points together with a comprehensive internal road network will result in a dispersal of vehicle movements within the development. As a result roads and intersections within the area will be able to accommodate the expected levels of traffic activity within a free-flow environment.

The exception is on SH56 Pioneer Highway where the establishment of an intersection with Te Wanaka Road is likely to necessitate a speed reduction in this vicinity to 70 kph. This will result in some loss of efficiency but this will be counterbalanced by providing an improvement in the poor safety record at this location.

Specific measures have been proposed to mitigate the risk of effects on the amenity of adjacent dwellings through a 3 metre deep planted buffer. This has been considered in the landscape assessment and is considered effective mitigation however notwithstanding this it is accepted that there will be an inevitable change in the character of the area from rural to urban which may be resisted by some living in the adjacent areas. Consultation to date however has not identified strongly held concerns.

Assessment of servicing of the area shows that for both water supply and wastewater the growth area can be efficiently served without adverse effects on the wider networks. Stormwater similarly can be accommodated with some culvert improvements and retention with only minor increase in flood flows to the Taonui Basin flood storage area. Retention measures include detention pond storage as well as individual house roof water collection and storage.

While there will be a loss of Class II soils the soil assessment concludes that given the soil type and limited productive value of the property there will be no material adverse effects from a change to urban development.

In all respects it is concluded that any adverse effects are unlikely to be more than minor and that there will be significant environmental benefits from facilitating development of this growth area in the manner proposed by way of a change to the District Plan.