ATTACHMENTS
PLANNING AND STRATEGY COMMITTEE
UNDER SEPARATE COVER

9AM, MONDAY 5 AUGUST 2019
COUNCIL CHAMBER, FIRST FLOOR, CIVIC ADMINISTRATION BUILDING
32 THE SQUARE, PALMERSTON NORTH
PLANNING AND STRATEGY COMMITTEE MEETING

5 August 2019

UNDER SEPARATE COVER

13. Palmerston North City District Plan: Proposed Plan Change B - Napier Road Residential Area Extension

   1. Plan Change B: Napier Road Residential Extension Area  Page 4
Palmerston North City District Plan

Proposed District Plan Change B: Napier Road Residential Extension Area

July 2019
Contents

Part I - Proposed Plan Change ........................................................................................................ 1

1 Description of the Proposed Plan Change ................................................................................. 1

2 Proposed amendments to the District Plan .................................................................................. 1
  2.1 Definitions ............................................................................................................................... 1
  2.2 Subdivision ............................................................................................................................. 1
  2.3 Residential Zone ..................................................................................................................... 1
  2.4 Planning Maps ......................................................................................................................... 2
  2.5 Napier Road Industrial Precinct ............................................................................................. 2
  2.6 Consequential Changes .......................................................................................................... 2

Part II - Section 32 Report .............................................................................................................. 3

1 INTRODUCTION .......................................................................................................................... 3
   The Purpose of PDPCB ................................................................................................................ 3
   Statutory Requirements under the RMA ..................................................................................... 5
   Background to PDPCB ................................................................................................................ 7

2 REGULATORY AND POLICY CONTEXT ................................................................................. 8
   Current District Plan Framework ............................................................................................. 8
   Proposed Changes to the District Plan ..................................................................................... 10

3 EVALUATION OF ALTERNATIVES AND THE PREFERRED OPTION ................................. 23
   Introduction ............................................................................................................................... 23
   Alternative One: Retain the status quo .................................................................................... 24
   Alternative Two: Plan Change as proposed ............................................................................. 25
   Alternative Three: Provide for large lots (5000m²) with self-service for infrastructure ........ 27

4 IMPLEMENTATION OF THE PREFERRED OPTION: OBJECTIVES, POLICIES AND RULES 28
   Introduction ............................................................................................................................... 28
   Assessment of Proposed Objectives and Policies – Subdivision Chapter .................................. 28
   Assessment of Proposed Objectives and Policies – Residential Zone Chapter ......................... 32
   Appropriateness of Rules to Achieve Objectives ..................................................................... 36

5 AREAS PROPOSED FOR REZONING ..................................................................................... 71

6 STATUTORY EVALUATION ......................................................................................................... 72
   Section 5 Purpose of the Act ..................................................................................................... 72
Appendix 1 – Proposed District Plan Change B Amendments to the District Plan...... 83
Appendix 2 – Transportation Assessment ................................................................. 135
Appendix 3 – Stormwater Infrastructure Assessment .............................................. 197
Appendix 4 – Wastewater and Water Supply Infrastructure Assessment ............... 261
Appendix 5 – Liquefaction Report ........................................................................... 273
Appendix 6 – Noise Report ..................................................................................... 329
Appendix 7 – Land Contamination Report ................................................................. 339
Appendix 8 – Landscape and Urban Design Report .................................................. 477
Appendix 9 – Recreation Assessment Memorandum ................................................. 505
Appendix 10 – Cultural Impact Assessment ............................................................... 513
Part I - Proposed Plan Change

1 Description of the Proposed Plan Change

Proposed District Plan Change B (PDPCB) involves the rezoning of a portion of land that fronts Napier Road between Roberts Line and the Napier Road Drain from Industrial and Rural to Residential Zone. This site is near the Napier Road Residential Area and for consistency this Plan Change involves applying those provisions onto this new site, where relevant. There are some additional provisions proposed for the Napier Road Residential Extension Area to address site specific development requirements.

Amended provisions are recommended to specifically address the design requirements for subdivision and development in this area, recognising the existing topography, stormwater, potential for liquefaction, flooding and the presence of the oxbow within this site.

The provisions for the Napier Road Residential Area in the subdivision section are also proposed to be amended. This includes the inclusion of a structure plan showing how the site will be developed over time. An amendment to Objective 8 in the Residential Zone section of the plan, and new associated policies and rules are also proposed for the Residential section. This includes land use rules enabling the existing garden centre on the site given the proposed rezoning. A new Discretionary Activity is proposed to enable the development of non-residential activities across the Napier Road Residential Extension Area on a case-by-case basis.

2 Proposed amendments to the District Plan

2.1 Definitions

Add the following new definitions:

<table>
<thead>
<tr>
<th>Napier Road Residential Extension Area</th>
<th>means the area shown in Map 7.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permeable Surface</td>
<td>means any part of a site which is grassed or planted in trees or shrubs and/or is capable of absorbing water or is covered by decks which allow water to drain through to a permeable surface. It does not include any area which:</td>
</tr>
<tr>
<td></td>
<td>1. Falls within the definition of site coverage except for decks as above;</td>
</tr>
<tr>
<td></td>
<td>2. Is occupied by swimming pools; or</td>
</tr>
<tr>
<td></td>
<td>3. Is paved with a continuous surface.</td>
</tr>
</tbody>
</table>

2.2 Subdivision

Refer to Appendix 1 for the proposed changes to the Subdivision section.

2.3 Residential Zone

Refer to Appendix 1 for the proposed changes to the Residential section.
2.4 **Planning Maps**

Amend the District Plan planning maps by rezoning the following lots to Residential Zone:

- Lots 1, 2, 3 and 5 DP 74205
- Lots 1 and 2 DP 456888
- Pt Lot 1 DP 25691
- Lot 10 DP 499783
- Pt lots 2 and 3 SEC 418 Town Of Palmerston North
- Lot 1 DP 41671
- Lot 1 DP 16031 BLK XI Kairanga SD

2.5 **Napier Road Industrial Precinct**

Remove references to the Napier Road Industrial Precinct. Refer to Appendix 1 for the proposed deletions. Make consequential changes to numbering as required.

2.6 **Consequential Changes**

1. Make consequential changes, including numbering changes, as a result of the insertion of new rules and rule changes, as necessary.
Part II - Section 32 Report

1 INTRODUCTION

1.1 This report provides a summary of the evaluation undertaken by the Palmerston North City Council (the Council) in accordance with Section 32 of the Resource Management Act 1991 (RMA or the Act) in relation to Proposed District Plan Change B: Napier Road Residential Zone Extension (PDPCB) to the operative Palmerston North City District Plan (the District Plan or the Plan). PDPCB is not part of the Palmerston North City Sectional District Plan Review, rather it is a standalone plan change.

1.2 The report should be read in conjunction with the proposed amendments to the District Plan in Part I of this report, and the accompanying expert reports and research supporting the proposed plan change, Appendices 2 – 8.

1.3 This report is structured in six parts:

Part 1: Introduction
The purpose of Proposed District Plan Change B
An overview of the District Plan requirements under the Resource Management Act 1991
Background to Proposed District Plan Change B

Part 2: Regulatory and Policy Context
Current District Plan approach
Proposed changes to the District Plan
Supporting documents and expert reports
Record of consultation on proposed plan change

Part 3: Evaluation of Alternatives and the Preferred Option
Examining whether the proposed plan change is the most appropriate way to achieve the purpose of the Resource Management Act 1991

Part 4: Implementation of Preferred Option: Objectives, Policies and Rules
Examining the appropriateness of proposed objectives, policies and methods

Part 5: Analysis of Proposed Rezoning
Analysis of land proposed to be rezoned to Residential Zone

Part 6: Statutory Evaluation and Summary

List of Abbreviations

1.4 The following is a list of abbreviations referred to throughout the report:

- PDPCB – Proposed District Plan Change B: Napier Road Residential Zone Extension
- RMA or the Act – Resource Management Act 1991
- The Council or PNCC – Palmerston North City Council
- The District Plan – Palmerston North City District Plan
- PPC20A – Proposed Plan Change 20A: Residential Zone and Residential Subdivision

The Purpose of PDPCB

1.5 The primary purpose of PDPCB is to rezone land that fronts Napier Road between Roberts Line and the Napier Road Drain. This area is currently zoned Industrial and Rural. PDPCB seeks to rezone
this land to Residential Zone and introduce amend provisions in the District Plan to manage specific issues with this site. In the future following subdivision, the intention is to rezone the escarpment Conservation and Amenity Zone. The rezoning involves approximately 10.6 ha of land, and the creation of around 45-50 residential lots. See the extent of the proposed rezoning of the Napier Road Residential Extension Area is shown in Figure 1 below.

Figure 1: Napier Road Residential Extension Area

1.6 A site specific structure plan has also been prepared, recognising the existing constraints on the site. The intention is that the site will develop into residential properties over time. Given the topographic challenges of the site, the presence of the oxbow and escarpment, the potential for noise effects and the relatively narrow area of land to be rezoned, the proposed Structure Plan represents the best yield outcome while still achieving high amenity and urban design outcomes.

1.7 The land currently zoned Industrial and proposed to be amended to Residential Zone contains the recent BUPA Retirement Village development. This development has been enabled through a number of resource consents (specifically LU2207). The rezoning of that land is to better reflect the use of the land for residential purposes, rather than industrial.

1.8 The land currently zoned Rural and proposed to be amended to Residential Zone contains a variety of rural residential and commercial uses. In the future, following subdivision, the escarpment will be rezoned Conservation and Amenity, consistent with how the escarpment has been zoned between Roberts Line and James Line to create consistency in approach for the wider area. This strip of land
subject to this plan change is the last area to the north of Napier Road that has not been rezoned to Residential. The land between Roberts Line and Stoney Creek Road has been rezoned for residential use over the last few years.

1.9 The amended subdivision provisions are proposed to ensure that any future development occurs in a coordinated manner, avoids natural hazards, is sensitive to the surrounding existing uses, the state highway and neighbours, and incorporates water sensitive designs to manage stormwater. For instance, minimum floor levels and pervious surface requirements. Requirements specific to the Napier Road Residential Extension Area are specifically identified to distinguish them from other conditions that relate only to the Napier Road Residential Area (i.e. that land between Roberts Line and James Line). New requirements for geotechnical investigations and stormwater management plans for subdivision are also included.

1.10 The amended Residential Zone provisions are proposed to recognise the unique site characteristics and to ensure development occurs in an integrated and planned manner to achieve a high quality and integrated built form in the future. For instance, performance standards for active frontages and fencing rules, and requiring minimum floor levels to protect against inundation from a breach of the Manawatu River upstream of the site, new impervious surface rules to better manage stormwater ponding. New fencing rules are proposed, similar to those recently adopted in the District Plan for the Hokowhitu Lagoon Residential Area, to provide consistency for new growth areas in Palmerston North. The fencing rules, coupled with the active frontages rules, are to ensuring development faces rules and open space areas that will improve and achieve the urban design outcomes identified in the proposed objective and policies.

1.11 The Structure Plan for the Napier Road Residential Zone Extension has also been prepared to guide development. The Structure Plan recognises the constraints of the site, such as a 20m setback of buildings from the state highway to manage noise effects, and the areas of open space that will enhance the environment that currently exists. The shared path along the state highway frontage is also to enhance the walkability and cyclability of the city for the wider community. There is also a 20m setback from the edge of the oxbow to manage stormwater risk and lateral spread (with additional geotechnical investigations to manage future build development as well).

Statutory Requirements under the RMA

1.12 The Purpose of the RMA – The purpose of the RMA is to promote the sustainable management of natural and physical resources. Section 5(2) of the Act states:

“In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enable people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –

a. Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

b. Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

c. Avoiding, remedying, or mitigating any adverse effects of activities on the environment.”

1.13 Section 32 of the RMA – various amendments have altered the requirements under section 32 of the RMA which now states:

“(1) An evaluation report required under this Act must——
(a) examine the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve the purpose of this Act; and

(b) examine whether the provisions in the proposal are the most appropriate way to achieve the objectives by—
   (i) identifying other reasonably practicable options for achieving the objectives; and
   (ii) assessing the efficiency and effectiveness of the provisions in achieving the objectives; and
   (iii) summarising the reasons for deciding on the provisions; and

(c) contain a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.

(2) An assessment under subsection (1)(b)(ii) must—
   (a) identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for—
      (i) economic growth that are anticipated to be provided or reduced; and
      (ii) employment that are anticipated to be provided or reduced; and
   (b) if practicable, quantify the benefits and costs referred to in paragraph (a); and
   (c) assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions.

(3) If the proposal (an amending proposal) will amend a standard, statement, national planning standard, regulation, plan, or change that is already proposed or that already exists (an existing proposal), the examination under subsection (1)(b) must relate to—
   (a) the provisions and objectives of the amending proposal; and
   (b) the objectives of the existing proposal to the extent that those objectives—
      (i) are relevant to the objectives of the amending proposal; and
      (ii) would remain if the amending proposal were to take effect.

(4) If the proposal will impose a greater or lesser prohibition or restriction on an activity to which a national environmental standard applies than the existing prohibitions or restrictions in that standard, the evaluation report must examine whether the prohibition or restriction is justified in the circumstances of each region or district in which the prohibition or restriction would have effect.

(4A) If the proposal is a proposed policy statement, plan, or change prepared in accordance with any of the processes provided for in Schedule 1, the evaluation report must—
   (a) summarise all advice concerning the proposal received from iwi authorities under the relevant provisions of Schedule 1; and
   (b) summarise the response to the advice, including any provisions of the proposal that are intended to give effect to the advice.

(5) The person who must have particular regard to the evaluation report must make the report available for public inspection—
ITEM 13 - ATTACHMENT 1

(a) as soon as practicable after the proposal is made (in the case of a standard or regulation); or
(b) at the same time as the proposal is notified.

(6) In this section,—

objectives means,—
(a) for a proposal that contains or states objectives, those objectives:
(b) for all other proposals, the purpose of the proposal

proposal means a proposed standard, statement, national planning standard, regulation, plan, or change for which an evaluation report must be prepared under this Act

provisions means,—
(a) for a proposed plan or change, the policies, rules, or other methods that implement, or give effect to, the objectives of the proposed plan or change:
(b) for all other proposals, the policies or provisions of the proposal that implement, or give effect to, the objectives of the proposal.”

1.14 Section 32 stipulates the content and evaluation is necessary prior to notification. The evaluation report focuses only on those parts of the District Plan where changes are being proposed. In this instance, the proposed provisions seek to amend existing provisions in the District Plan by adding in some site specific requirements. On that basis a full assessment is included in this report.

1.15 Section 32AA requires Council to undertake a further evaluation if any further changes are proposed prior to making a decision on a plan change, for example, in response to submissions received. This further evaluation must be cited at any subsequent hearing.

1.16 Functions of District Councils – The Council has statutory functions under section 31 of the RMA, which include the establishment, implementation, and review of objectives, policies and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district.

1.17 The Purpose of District Plans – The purpose of a district plan under section 72 of the RMA is to assist territorial authorities to carry out their functions in order to achieve the purpose of the Act.

1.18 Preparation of District Plans – Section 73 states that there must be at all times one district plan for each district prepared by the Council in a manner set out in the First Schedule of the Act.

1.19 Matters to be Considered by Territorial Authorities – The matters to be considered by a district council when preparing or changing its district plan are set out in section 74 of the Act. This requires councils to act in accordance with its functions under section 31, the provisions of Part 2, and its duty under section 32. Section 74(2) also sets out a number of other matters Council shall have regard to including plans and strategies prepared under other acts. Importantly, section 74(3) states that when preparing a change to a district plan a territorial authority must not have regard to trade competition.

Background to PDPCB

1.20 The area of this plan change is the last area on the northern side of Napier Road between Keith Street and Stoney Creek Road that has not been rezoned to Residential. There is landowner interest in rezoning the land, as retaining a small pocket of rural land does not represent particularly sound planning, nor does it ensure a solid landbank for future residential development. There is also industrial zoned land that has been developed for residential purposes.
1.21 The area has been used for largely rural uses, with some land within the old Palmerston North Gas Works curtilage. Market gardening and plant nursery uses have also been common in this area. An existing garden centre and plant nursery currently operate within the site.

1.22 Land below the terrace between Roberts Line and James Line was rezoned in 2010 following a private plan change application. That plan change introduced a number of measures to manage flooding risk, the management of the escarpment and oxbow, and the reverse sensitivity issues surrounding the State Highway along Napier Road.

1.23 In 2013 Palmerston North City Council issued a plan change to rezone land between James Line and Stoney Creek Road for residential purposes (Whakarongo Residential Area). The 2013 plan change also introduced specific provisions relating to managing flood risk, the escarpment and reverse sensitivity issues of both the Railway (North Island-Gisborne Line) and Napier Road (State Highway 3).

1.24 The site subject to PPCB is the only remaining land that has not been rezoned or considered for rezoning to the north of Napier Road between Sutton Place and Stoney Creek Road. This plan change seeks to change this anomaly.

2 REGULATORY AND POLICY CONTEXT

Current District Plan Framework

2.1 Section 2: City View Resource Management Issues and Objectives – The overarching resource management issues and objectives for the City are outlined under section 2 of the District Plan. These Issues and Objectives establish the intent of the Plan at the strategic level. The strategic approach set out by the City View section provides a basis and direction for the identification of lower level and more specific resource management issues, objectives, policies and methods for the specific zones in the District Plan.

2.2 The City View Issues and Objectives were reviewed and updated as part of Plan Change 8. The City View issues that are directly applicable to the Residential Zone highlight:

1. Planning for residential, industrial, commercial and rural-residential growth sustains a compact, orderly and connected urban form which avoids the adverse environmental effects of uncontained urban expansion into the rural zone.

2. The provision of infrastructure, particularly within identified growth areas, shall be efficient, timely, environmentally sensitive and economically sustainable.

3. The integrated and efficient provision of, and access to, infrastructure, network utilities and local services is facilitated for all residents.

5. A variety of high quality residential living environments are provided to satisfy the needs of all residents.

9. Subdivisions, buildings and infrastructure are designed and constructed to promote a coordinated, healthy and safe environment.

10. The visual appeal of the City is enhanced.
11. The principles of good urban design are given effect to for all new subdivisions, urban intensification and major building developments, particularly those located within the City Centre or fronting key transportation routes.

12. A wide range of business and economic activities are provided for.

15. Active engagement from tangata whenua within resource management decisions.

16. The historic heritage of the City is researched, identified and preserved within the context of sustainable management.

17. The natural and cultural heritage features of the City are preserved and enhanced, including the margins of the Manawatu River and sites of significance to tangata whenua.

19. The effects of natural hazards are avoided or mitigated taking into account the effects of climate change and the significant social disruption caused by natural hazard events.

22. Appropriate noise standards are in place to protect noise sensitive activities.

24. All forms of transport, including public transport, walking, cycling and private vehicles are adequately provided for to assist with sustainable energy use and a healthy lifestyle.

2.3 Section 9: Rural Zone – The existing Rural Zone Chapter of the District Plan seeks to protect land from unnecessary and unplanned urban expansion, encourage the effective and efficient use and development of the natural and physical resources of the rural area, enhance the natural character of the zone, recognise and enhance the diversity of the rural community, and manage effects of aircraft noise on noise sensitive activity.

2.4 The rules permit most farming activities including horticulture, soil conservation and rivers control works, farm based teaching (associated with Massey University), roads, production forestry, home occupations, effluent ponds, dwellings and accessory buildings, certain industrial uses and temporary military training activities. Controlled activities include garden centres, home occupations (with retailing activities), education and early childhood facilities, relocated dwellings, dependent dwelling units. Dwellings and accessory buildings, home occupations, garden centres and education facilities not complying with performance standards are a restricted discretionary activity. Intensive farming, veterinary clinics and animal boarding, sawmills, rural industries, wind farms, quarrying, and community leisure facilities are all discretionary activities. Any activity not otherwise provided for is a Non-Complying Activity. There is also a list of Prohibited Activities in the Air Noise Zone that largely relate to noise sensitive activities. These Prohibited Activities do not apply to the proposed plan change site.

2.5 Section 10: Residential Zone – The existing Residential Zone Chapter of the District Plan seeks to provide for the City's current and future housing needs, enhance the amenity and character of the residential zone as a safe, attractive, social and healthy environment, energy efficient housing development, the predominant character is not compromised by non-residential activities, heritage values in Savage Crescent are conserved, and the effects of aircraft noise on noise sensitive activities are managed. Site specific policy is provided for Turitea Valley, Napier Road Residential Area, and the Whakarongo Residential Area.

2.6 Dwellings, accessory buildings, and minor dwelling units are permitted activities in the Residential Zone, including specific rules for the Napier Road Residential Area and the Whakarongo Residential Area. Those activities which cannot meet performance standards, multi-unit residential development,
and activities within the Awatea Stream and Jensen Street Ponding areas are restricted discretionary activities. Dwellings in Savage Crescent, changes to existing buildings in the Air Noise Contour, and domestic wind turbines are discretionary activities. Non-Complying Activities include those that do not meet provisions in the plan, dwellings in the Inner and Outer Control Contours, roading infrastructure in the Napier Road Residential Area, and external storage of derelict vehicles. Prohibited activities are new dwellings, sleep outs, relocated houses and minor dwelling units in the Air Noise Zone.

2.7 The Residential Zone also enables a number of non-residential activities such as community houses, accommodation motels, education facilities, health facilities, home occupations, structural maintenance of flood protection works, temporary military training activities.

2.8 This Plan Change proposes that these existing provisions, with amendment, would apply to the rezoned land.

2.9 **Section 12 Industrial Zone:** The existing Industrial Zone Chapter of the District Plan seeks to enable a range of industrial activities that effectively use the physical resources of the Zone, that development and growth are not unduly impeded or compromised by effects of incompatible land uses, maintain or enhance amenity values of interface areas, visual amenity and public safety.

2.10 Permitted activities includes the construction, external alteration and addition to buildings and structures, road and any other activity that complies with the performance standards. Dairy related industrial activities, ancillary activities relating to dairy industrial activity, and temporary military training activities are permitted activities in the Braeburn Industrial Area. Controlled Activities include any activities within the Napier Road Industrial Precinct that front or adjoin Napier Road. Crematoria and Permitted or Controlled activities that do not comply with the relevant performance standards are Restricted Discretionary Activities. In the Railway Road Industrial Enclave any activity requiring access to Railway Road are Restricted Discretionary. In the Braeburn Industrial Area the construction, external alteration or addition to buildings and structures are also a Restricted Discretionary activity.

2.11 Discretionary Activities include dwellings, Ancillary Retail or Office activity that do not use a sufficient amount of the gross floor area. In the Napier Road Industrial Precinct construction of a building or structure before a subdivision is approved is a Restricted Discretionary Activity. Any activity not already provide for is a Non-Complying Activity. In the Napier Road Industrial Precinct any activities that do not comply with the or encroach upon the planted buffer areas are Non-Complying Activities.

**Proposed Changes to the District Plan**

2.12 PDPBC involves the rezoning of the land between the main drain near Sutton Place and Roberts Line from Industrial and Rural to Residential Zone and Conservation and Amenity Zone. Changes are proposed to specifically provide for the site in the Subdivision Chapter, and the Residential Zone Chapter. A structure plan to guide development is also proposed.

2.13 **Subdivision** in the Napier Road Residential Extension Area is proposed to be a Restricted Discretionary Activity under existing Rule 7.6.2.2. Additional matters for discretion are included that relate specifically to the site, as well as additional assessment criteria. The proposed changes also make clear what applies to the proposed site compared with the Napier Road Residential Area.

2.14 Discretion has been restricted for the Napier Road Residential Area Extension to those matters already contained in the District Plan and a new provision relating to stormwater sensitive design principles. In terms of assessment criteria, the proposed provisions relate to liquefaction, achieving urban design outcomes, consistency with the Structure Plan, amenity and ecological values of the oxbow, connectivity achieved through subdivision layout and design (including future road connections for areas within the area not yet developed, and water sensitive design.)
2.15 Objective 7 and its policies are proposed to be amended to ensure connectivity, high quality urban living, and integrated stormwater management is achieved within the Napier Road Residential Extension Area.

2.16 **Residential** development in the Napier Road Residential Extension Area is proposed to be a permitted Activity under existing Rule 10.6.1.4 with amendments to specific to the Extension Area included. For instance, specific fencing standards, separation distances, flood hazard, permeable surface, active frontages, and servicing performance conditions included.

2.17 Existing Rule 10.6.1.3 is proposed to be amended by including specific reference to ground floor levels to mitigate flood and stormwater risk. Existing Rule 10.7.3.1 is also amended to include specific reference to the Napier Road Residential Extension Area where the permitted activity conditions are not meet by a proposal. Additional matters of discretion proposed include achieving urban design and fencing matters.

2.18 A new rule is proposed to enable the continued operation of the existing garden centre that operates from within the site. The intention of the rule is to permit the current scale and intensity of activity that has been occurring on the site since 1994.

2.19 A new rule is proposed in the Residential Zone for commercial and non-residential activities within the site as a Discretionary Activity. A performance standard is proposed requiring a noise management plan and a traffic management plan assessing the proposed activity to be prepared and submitted with any application for these activities. A specific list of assessment criteria is included to assess this type of activity given the specific site constraints in terms of space and proximity to the State Highway.

2.20 Objective 8 and corresponding policies are also proposed to be amended to identify those matters of relevance to the Napier Road Residential Area vs the Napier Road Residential Extension Area. Specific policies are included for the Extension Area such as requiring additional geotechnical investigations, development in accordance with the Structure Plan, active street frontages and managing stormwater risk.

2.21 A copy of the Subdivision and Residential sections of the District Plan with all proposed changes is included in Appendix 1.

2.22 **Industrial** provisions relating to the Napier Road Industrial Precinct in the Industrial Zone chapter are proposed to be deleted. They are no longer necessary to be in the Plan with the proposal to rezone this area to Residential Zone. The area subject to the Napier Road Industrial Precinct has already been largely developed for residential purposes (through the BUPA development). A copy of the proposed deletions are also included in Appendix 1.

**Chronology**

2.23 The following outlines the key milestones in preparing the Proposed Plan Change to date:

- **March 2018** Structure Plan workshop and site visit.
- **March – May 2018** Commissioning various technical reports to inform and support the Plan Change.
- **March – May 2018** Preparation of the proposed plan change provisions and preparation of the Section 32 report.
- **May 2018** Additional meetings with asset managers.
July 2018  Meetings with affected landowners to provide general update of progress and discuss the revised Structure Plan.

September 2018  Meeting with NZTA to discuss Structure Plan and access proposals.

January – June 2019  Amending proposed plan change provisions and Section 32 report in light of technical reports and feedback from consultation meetings.

June – July 2019  Clause 3 consultation.

July 2019  Finalise proposed plan change provisions and Section 32 report following clause 3 consultation.

Consultation with key stakeholders

Clause 3 of the First Schedule of the RMA specifies the people who must be consulted in the preparation of a plan, including plan changes. The provisions relevant to PDPCB are:

3. Consultation

(1) During the preparation of a proposed policy statement or plan, the local authority concerned shall consult—
   (a) the Minister for the Environment; and
   (b) those other Ministers of the Crown who may be affected by the policy statement or plan; and
   (c) local authorities who may be so affected; and
   (d) the tangata whenua of the area who may be so affected, through iwi authorities; and
   (e) any customary marine title group in the area.

(2) A local authority may consult anyone else during the preparation of a proposed policy statement or plan.

(3) Without limiting subclauses (1) and (2), a regional council which is preparing a regional coastal plan shall consult—
   (a) the Minister of Conservation generally as to the content of the plan, and with particular respect to those activities to be described as restricted coastal activities in the proposed plan; and
   (b) the Minister of Transport in relation to matters to do with navigation and the Minister’s functions under Parts 18 to 27 of the Maritime Transport Act 1994; and
   (c) the Minister of Fisheries in relation to fisheries management, and the management of aquaculture activities.

(4) In consulting persons for the purposes of subclause (2), a local authority must undertake the consultation in accordance with section 82 of the Local Government Act 2002.

3B Consultation with iwi authorities

For the purposes of clause 3(1)(d), a local authority is to be treated as having consulted with iwi authorities in relation to those whose details are entered in the record kept under section 35A, if the local authority—

(a) considers ways in which it may foster the development of their capacity to respond to an invitation to consult; and

(b) establishes and maintains processes to provide opportunities for those iwi authorities to consult; and

(c) consults with those iwi authorities; and

(d) enables those iwi authorities to identify resource management issues of concern to them; and

(e) indicates how those issues have been or are to be addressed.
2.25 A number of meetings have been held with key stakeholders during the preparation of the Plan Change. The key stakeholder meetings are identified in the Chronology above.

2.26 In summary feedback from parties has indicated that:

a) The landowners are generally supportive of a change in zoning to Residential. There are concerns over the minimum floor level requirements, the risk of the oxbow flooding in large events, and managing the oxbow without mechanical solutions (eg a pump).

b) Support for retaining the oxbow and development of the escarpment for wider public use (walkway), and enhancement of this area.

c) Concern over access to the State Highway, while recognising that NZTA has plans to make changes to the form of the road in this location.

d) Concern over the overall density of development possible given the site constraints and requirements for swales, permeable surfaces and active frontages. Suggestion given to enable multi-unit development, or reduce minimum lot sizes.

e) Importance of protecting the existing commercial activity where the current landowner is not intending to move operations.

Consultation with Tangata Whenua

2.27 Council meet with Wiremu Te Awe Awe, Chris Whaiaapu and Danielle Harris to discuss this Plan Change in 2018. Rangitāne o Manawatū representatives advised Council that the subject to the plan change contained no known sites of significance and that a detailed cultural impact assessment would not be necessary.

2.28 In 2019 Council had further discussions with Rangitāne o Manawatū officer Siobhan Lynch-Karaitiana given her specific ecological knowledge and interest in the oxbow. Rangitāne o Manawatū subsequently submitted to Council a Cultural Impact Assessment (CIA). This assessment discusses the value of the plan change site in the context of the Rangitāne o Manawatū Rohe and the importance of the Whakarongo Pā, Te Matai Pā and the Whakapaokopoka Lagoon (the existing oxbows that run along the base of the terrace from Sutton Place to James Line).

2.29 The CIA includes recommendations for the Plan Change site. These include protecting cultural values, stormwater quality, riparian enhancement, archaeological discovery and the need for a landscape management plan.

2.30 The proposed provisions go some way to addressing concerns raised in the CIA. Council has specified particular water sensitive design requirements to address both the quality and quantity of stormwater entering the oxbow. A riparian strip of 3m is included in provisions requiring this area to be planted along the oxbow edge. Council’s landscape expert has confirmed a 3m strip of low level wetland plants would be appropriate. This will enable some nutrient stripping before run off to the oxbow lagoon.

2.31 A landscape management plan for the oxbow lagoon is not supported by Council as a requirement in the District Plan. This is due to the number of landowners involved in this specific site. The area of the oxbow lagoon will be vested in Council in the future and will be enhanced as part of Council’s operational budgets in the future. This will ensure a cohesive management approach, rather than requiring landowners to complete works before vesting. This also enables Council to ensure some consistency with the results for the Whakapaokopoka Lagoon to the east.
Supporting evidence

2.32 In considering and preparing POPCB the Council commissioned relevant technical reports and supporting documents. These included:

1. Transportation Assessment
2. Stormwater Infrastructure Assessment
3. Wastewater and Water Supply Infrastructure Assessment
4. Liquefaction Report
5. Noise Report
6. Land Contamination Report
7. Landscape and Urban Design Report
8. Recreation Assessment Memorandum

2.33 Other relevant documents of the City Council have also been considered, including:

- Infrastructure Strategy (2018)
- Street Design Manual (2013)
- Retail Strategy (2003)
- Vegetation Framework (2016)
- City Development Strategy (2018)

2.34 The key findings of these reports are outlined below.

Transportation Assessment, May 2018

2.35 Council Commissioned Mr Matt Evis from WSP Opus to complete a Transportation Assessment for the site. A copy of this report is contained in Appendix 2.

2.36 The report, assesses the development of the Napier Road Residential Extension Area on operation of the transportation network and the suitability of the proposed Structure Plan arrangements based on the following assumptions:

- The speed limit on Napier Road (State Highway 3) will be reduced from 80km/h to 60km/h or less and the road will be reclassified as an Urban Arterial once the proposed Palmerston North strategic ring-route is completed;
The Roberts Line and Napier Road intersection will be upgraded to either a roundabout or signal controlled intersection in the short term, providing suitable capacity to support future growth as indicated within consultation options outlined in the Napier Road (SH3) Detailed Business Case and the draft Investment Proposal produced by the New Zealand Transport Agency.

The Structure Plan identifies two new priority-controlled T intersections onto Napier Road as well as an internal road that accommodates walking and cycling facilities. These facilities are designed to connect with existing future proposed networks in this area of Palmerston North.

The report identifies that the site is expected to create an additional 360-450 vehicle movements per day, equating to an additional 40-45 movements an hour during peak periods. The majority of these movements are expected to travel to the west of the site towards the City centre. The report states that this increased traffic flow is considered to be negligible as the westbound traffic will only increase traffic volumes by 2 – 3%.

The report continues by saying that with a reduced posted speed limit (which is understood to be supported) the proposed accesses meet both the NZ Transport Agency and Council requirements for intersection spacings and sight visibility. While the road cross sections do not adhere strictly to the Council subdivision standards they are considered in the report to be fit for purpose for the site given the relatively low yield expected.

The report concludes that “Overall, considering the traffic generating potential of the development and the status of the proposed future road network operations on Napier Road (SH3), it is concluded that the proposed site and associated Structure Plan is considered suitable for residential development.”

Stormwater Infrastructure Assessment, April 2019

Council's Consultant Stormwater Engineer has completed an assessment of the proposed change in use in relation to stormwater. A copy of that report is contained in Appendix 3.

This report discusses the hydraulic modelling and the proposed residential development of the site and looks at the likely impact on that development on the environment. Recommendations are included to manage and mitigate the adverse effects of development in the future.

The report states that stormwater from site currently discharges via a series of open drains and culverts to the oxbow lagoon and then to the Napier Road drain to the west. The level in the oxbow is controlled by a 450mm diameter outlet with a bar screen owned and maintained by Horizons Regional Council. This connects to a 600mm diameter stormwater network, which is to be upgraded as part of the BUPA development. The oxbow level is dependent on the capacity of the downstream networks and the water level in the Napier Road open drain along with the bar screens being cleared of blockages and weed growth. When the drain is elevated, stormwater is unable to discharge from the oxbow system.

The report states that based on the flood modelling completed by Horizons Regional Council and reports from Mitch Hydro Limited and Tonkin and Taylor, a minimum floor level of RL 37.8m is required for all properties due to the risk of inundation from the 0.5% AEP Manawatu River flood event. This is because the area is largely outside of the zone of protection from urban stopbanks, lower than Napier Road, contains oxbows and open drains, and is an overland flow path for catchments upstream.

The report assesses the existing flood risk (no further development than what is currently onsite) and a fully developed flood risk (the site has been development based on an assumed 500m² minimum lot size). In the fully developed scenario, the maximum predicted water level in the oxbow is RL 37.55m in the 1% AEP 24 hour duration rainfall event. The report states that “A minimum floor level of RL 37.8m will provide sufficient freeboard in the 50 year and 100 year rainfall events.” It also concludes that a
minimum floor level of RL37.8m is required for all properties. This recommendation has been included in the proposed provisions in the District Plan.

2.46 Regarding stormwater quality, the report discusses that Horizons Regional Council identifies the Oxbow as a “threatened” habitat according to Schedule F of the One Plan. This requires Council to minimize the discharge of contaminants in stormwater. In order to achieve this the report identifies that rain gardens or other biofiltration devices are required prior to discharge to the stormwater network; and that surface runoff from the road should be treated (through swales and/or rain gardens) to capture and treat the majority of the initial runoff volume.

2.47 Regarding stormwater quantity, the report recommends that a permeable area shall comprise at least 30% of the net lot area (excluding road reserve), and that road corridors shall be designed to provide areas for pervious pavements and/or grassed or planted swales to reduce the total runoff and peak stormwater flows.

2.48 The report also recommends that a Stormwater Management Plan (SMP) should be required for any development which results in a significant change in land cover, stormwater peak flows, volumes, and frequency of runoff. The SMP must be prepared by a suitably qualified stormwater design consultant, include water sensitive design components and should address:

a) Scoping of all internal stormwater infrastructure and how it will interact with the existing drainage system (including connection to the existing stormwater network, discharge to the oxbow, discharge to the Napier Road open drain and layout of treatment devices);

b) Treatment of all stormwater runoff prior to discharge to the primary network and/or direct discharge to the oxbow;

c) Protection of treatment devices and treatment of runoff during all phases of construction;

d) Outline how the development will hydraulically relate to its surrounding environs, including assessment of overland flow paths and potential flood impacts of proposed and existing development;

e) Outline how the stormwater management system will ensure that any changes in runoff from the site will be addressed;

f) Confirm the proposed stormwater mitigation will provide sufficient freeboard to the habitable dwellings under the scenario where there is no outflow from the oxbow in a 2% AEP rainfall event (including the adjustments for climate change);

g) Identify methods to avoid, remedy or mitigate potential stormwater related effects on existing dwellings as a result of the land being raised and development occurring.

Council will be looking to ensure changes in stormwater runoff will be addressed through the use of WSD components focused on the following parameters:

- Reduction in stormwater runoff by infiltration
- Reduction in peak flow discharges by flow attenuation
- “First flush” stormwater treatment

2.49 The report concludes that to address the increase in stormwater run-off and the associated contaminants from developing the site, the following is required:

- Water sensitive design elements must be incorporated in the development at lot and road corridor levels to mitigate both stormwater quantity and quality impacts.
• A stormwater treatment train comprising multiple treatment steps from source to outlet must be incorporated to effectively treat all stormwater runoff.

• The development must promote stormwater infiltration by limiting lot imperviousness area to no more than 70% of the gross area.

• A Stormwater Management Plan is required for any development within the re-zone area that addresses both stormwater quality and quantity, as outlined in this assessment, especially as it relates to the existing dwellings.

Additional items that must be addressed as part of the specific development design are as follows:

• Existing properties with floor levels below RL 37.55m are susceptible to inundation in the 1% AEP rainfall event assuming full development of the Napier Road Extension Area, BUPA site and subdivision east of Roberts Line, and the southern catchments continuing to drain to the oxbow.

• Hydrologic modelling must be undertaken using updated oxbow bathymetry and footprint based on the proposed subdivision plan, and include assessment for different downstream discharge conditions. This should include filling in of the pond at 261 Napier Road.

• A separate 900mm diameter pipe (and outfall) will be required to discharge runoff from the oxbow to the Napier Road drain. This requires an easement through the BUPA property and designated overland flow path.

• A minimum floor level of RL 37.8m is required for all properties.

• The stormwater design must incorporate the Napier road side drain and treatment of stormwater. Alternatively, an assessment on the feasibility of re-directing the Napier roadside drain and contributing catchments to reduce the inflow to the oxbow could be undertaken.

Wastewater and Water Supply Infrastructure Assessment, July 2018

2.50 Council’s Asset Planning Engineer has reviewed the proposed development. A copy of the report is contained in Appendix 4.

2.51 The report notes in relation to wastewater that the area is not currently serviced for wastewater, except for the BUPA care services NZ Limited site. "Pumping will be required for this catchment as there is insufficient gravity fall to convey wastewater from the area to the existing network."

2.52 The report continues by stating that "Liquefaction and lateral spreading pose significant residence risks for traditional gravity and as a consequence Council officers propose that the plan change area be serviced by a Pressure Sewer System instead of the traditional gravity system with lift pump stations …" The report continues by stating how the Pressure Sewer System would work and the logical staging of ‘blocks’ within the site for the system to be developed.

2.53 In relation to water supply, the report states that the site is not currently serviced for water supply (excluding the BUPA site), with the nearest connection being Napier Road and MacPherson Grove or on Roberts Line (north of Freedom Drive). The report states that "Modelling identified that the most cost effective option is to service the area as an extension of the City Main Pressure Zone from the Napier Road connection." Details of the size of connections and service corridors is included.
2.54 The report also notes that to cater for all future residential development of the lower terrace up to Stoney Creek Road may require a bore to be established in the Kelvin Grove/Whakarongo Area. While this is important for the long term planning for the Council the rezoning of this land does not require a bore to be established.

Liquefaction Report, Tonkin and Taylor, March 2017

2.55 Council commissioned Tonkin and Taylor to complete a report assessing the liquefaction and lateral spread risk for the site. The Report is a high level assessment, based on a site walkover, 12 Cone Penetration Tests (CPTs), two drilled bore holes, installation of six stand pipe piezometers and one nested stand pipe piezometer.

2.56 The results of the testing has identified that the site has a medium risk of liquefaction. These areas are shown in Appendix A of the Tonkin and Taylor Report in Appendix 5. The Report acknowledges that categories shown in Appendix A are based on widely –spaced investigations. Additional testing was recommended at a more closely-spaced level to confirm whether there are any localised areas of poorer ground conditions.

2.57 The Report also considered the risk of lateral spreading given the location of the oxbow within the site. The report states that “A strip of land approximately 40m wide along the southern limits of the existing watercourse is potentially susceptible to lateral spreading during large earthquake events (e.g. 500-year level shaking). … The area susceptible to lateral spreading is located within the areas assigned liquefaction category of Medium.” The report continues by stating that the ground surface in this area could displace towards the oxbow in a large earthquake.

2.58 The report identifies a number of options for liquefaction and lateral spread mitigation. These are grouped into enhanced foundations and ground improvement. The enhanced foundation development options and costs are:

- a standard NZS 3604¹ foundation ($15,000 to $20,000 per lot)
- enhanced foundation ($26,000 to $46,000 per lot).

2.59 In addition the report identifies ground improvement options, which are over and above the foundation costs. These ground improvement options are:

- 1.2m thick hardfill raft per lot beneath dwelling only ($36,000 to 41,000) and per lot beneath entire section ($68,000 to $100,000)
- 1.2m thick soil-cement raft per lot beneath dwelling only ($37,000 to 47,000) and per lot beneath entire section ($81,000 to $103,000)
- Stone columns or columns of highly compacted aggregate per lot beneath dwelling only ($39,000 to 67,000) and per lot beneath entire section ($65,000 to $112,000)

2.60 The report continues by noting that “If area-wide improvement is not undertaken… then buried services and pavements outside the treated areas would be susceptible to liquefaction-induced damage. The resilience of infrastructure networks could be increased by:

- Undertaking localised ground improvement along infrastructure corridors, and /or

¹ NZS 3604:2011 Timber framed buildings
2.61 Overall, based on the findings, the report considers site development. “Development of the site would be appropriate subject to the options provided. Site specific assessments required for design will provide greater clarity for foundation design and ground improvement requirements for individual lots. This assessment does not remove any requirements for site specific assessment for detailed design. All requirements for design as stated in NZS 3604 still apply.” On that basis, with the additional testing and recommendations identified through the subdivision and development of the site, the rezoning of the site to Residential Zone is considered appropriate.

**Noise Report, Acousafe, May 2018**

2.62 Council’s Noise Expert, Mr Nigel Lloyd from Acousafe Consulting and Engineering Limited, has reviewed the proposal in relation to what noise rules would apply and the implications of traffic noise if Napier Road was to remain as a state highway or become a local road. A copy of his report is contained in Appendix 6.

2.63 In terms of the noise rules, Mr Lloyd notes that the Residential Zone provisions in Rule 10.9.6.1 where reviewed as part of Plan Change 20 and updated in accordance with the last version of NZS 6802:2008 Acoustics – Environmental Noise. Mr Lloyd concludes “…that the noise limits and activity statuses that are generally applied throughout the Residential Zone can be applied to Napier Road once it becomes rezoned to Residential as part of PPC25.”

2.64 With regards to rezoning the Industrial land to Residential essentially changes the noise boundary for existing industrial activities. This has the effect of making it potentially more restrictive for the industrial uses to achieve the noise limits. The development of the BUPA retirement village has been approved by way of consent, with conditions requiring the BUPA development to have specific noise mitigation measures.

2.65 The top of the escarpment and land to be rezoned boarders the Palmerston North - Gisborne Railway Line. Mr Lloyd notes that residential development near the railway line was considered for the Whakarongo Residential Growth Area. Under that Plan Change (Plan Change 6) a new Policy and Rule were introduced to manage the reverse sensitivity between the existing Railway and future Residential Development. Mr Lloyd has recommended that “If land that is within 70 metres of the railway is to be rezoned to residential then it is recommended that this rule be cross referenced.”

2.66 In regards to Napier Road, which is currently a State Highway, Mr Lloyd notes that there is an existing rule at R10.7.1.5 (e) which requires noise mitigation and setbacks. The recommended 40 buffer area of rule R10.7.1.5 would occupy the lion’s share of the available land for development.

2.67 Mr Lloyd notes in his report that “Council has been in contact with NZTA explaining the need for new households in the City and discussing the strategic work completed over the last decade on the Joint Transport Study and other studies which all signal that it is unlikely that the affected portions of SH3 will remain state highway in the medium term. The most likely scenario is that SH3 will be a local road, managed by Council, with lower speeds and different objectives to a state highway.

There is nothing in the District Plan that controls development in relation to local roads. Work undertaken by Matthew Evis of Opus estimates that traffic count between Sutton Place and Roberts Line was appropriate 12,300 vpd in 2016 with 2.8% heavy vehicles. This could possibly increase to (slightly less than) 15,000 vehicles per day by 2028. Even should the speed limit decrease to 50/60 km/hr as a local road, then it would be sensible to provide a setback to mitigate the traffic noise. A
draft structure plan for the site I have seen uses a 20 metre setback from Napier Road. This setback includes the local access road. I consider that this is a sensible approach to take."

2.66 Mr Lloyd also notes that the BUPA development has been developed with no buffer to Napier Road (with the consent of NZTA).

2.69 Mr Lloyd has concluded that the noise provisions of the Residential Zone be referenced for this site. In terms of the rezoning of the BUPA land (which is largely developed), this is appropriate even though this may have reverse sensitivity issues for the adjacent industrial land. The industrial activities will need to rely on existing use rights until they increase their character, intensity or scale, at which time the new noise limits will come into play. In terms of the State Highway, the application of the planning controls that NZTA recommend for a state highway would be difficult to accommodation within the rezoned land due to topographical limitations. Strategic road studies indicate that the most likely scenario is for this section of Napier Road to become a local road. The proposed 20m setback from development would be appropriate.

Land Contamination Report, April 2018

2.70 Council commissioned a Preliminary Site Investigation Report by WSP Opus to assess the potential ground contamination across the site. A copy of the report is contained in Appendix 7. The report notes that parts of the site have historically been used as a garden centre, market garden and dairy farming. As part of the investigations, 20 analytical samples for heavy metals, organic pesticides and polycyclic aromatic hydrocarbons (PAH) were completed.

2.71 Part of the BUPA site had a gas works operating from the site. In obtaining the BUPA consent the applicant prepared a separate PSI report. Lot 1 D 25691 has also had a separate PSI report completed. This is referenced in this report as well.

2.72 The report notes that Coke from the old gas works site was used in the western portion of the site for roading uses. Samples from these sites were tested and the results show that levels are below the NES SCS (health) for a residential end use.

2.73 Overall the Report has concluded that the soil on the site (excluding the BUPA site) has a low risk to human health associated with potential soil contamination derived from previous uses. "This Preliminary Site Investigation identifies that the soil contamination does not exceed the stated NES SCS for a residential end use across the investigated areas and it is highly unlikely that there is a risk to human health should the proposed rezoning activity be undertaken, therefore any subdivision and land use change would be considered a permitted activity under the NES."

Landscape and Urban Design Report, July 2019

2.74 Council’s Landscape and Urban Design consultant, Stefan Steyn of WSP Opus, has prepared a report on the landscape and urban design aspects of the proposed rezoning of land, refer Appendix 8.

2.75 The Report identifies that the rezoning seeks high quality design to create a medium density subdivision layout that will achieve a high standard of amenity. In order to achieve this goal several key urban design characteristics have been considered. For instance, layout of the site to enhance amenity, lot sizes being designed to optimise sunlight, and increased open space areas to recognise the existing oxbow and opportunities for the creation of a shared path. The Structure Plan has been designed to have access to SH3 while using a vegetated set back to provide screening with an 8.9 metre wide green buffer and shared path. The trees used along the streetscape are designed to create a low avenue effect to break up visual dominance of the building façades, making for better visual amenity.
2.76 The report discusses the importance of creating a strongly defined residential neighbourhood with areas for open space. Planting is shown to create a parkland setting in the area, that will reflect the nursery land use of the site, and the enhancement of the oxbow. The report also discusses that the higher density nature of the area (compared with the current situation) will be offset through the use of open space to provide a high level of visual amenity, as well as a space for outdoor active and passive activities. These design elements have been brought together to provide safe neighbourhood that incorporates Crime Prevention through Environmental Design (CPTED) principles to create a highly desirable place to live.

2.77 The report identifies how the Structure Plan has been developed using the following “layers”: integration, arrangement of lots, connectivity, streetscape, green connections, open space and safety. Collectively these have influenced the Concept Plan included in the Report, which has ultimately formed the proposed Structure Plan to be included in the District Plan through this Plan Change.

2.78 The Report concludes that “The approach to develop the site as a medium density residential subdivision has considerable merit from an urban design perspective. Through the evaluation of different development options, a preferred site layout has been achieved. The proposed layout has the potential to produce positive urban design outcomes that will improve the amenity of the location and road corridor for residents and visitors alike.”

Recreation Assessment Memorandum, July 2019

2.79 Councils Senior Parks Planner, Aaron Phillips, has reviewed the proposed plan change from a recreation perspective. The memorandum is attached in Appendix 9. The memorandum recommends that a neighbourhood reserve be included in the plan change area that has a minimum of 1,000m² of a regular shape and another 2,500m² of land that can be met by having the neighbourhood reserves adjacent to the oxbow lagoon.

2.80 The report also highlights that loop walking tracks are preferred and identified the stopbank as providing an opportunity for a pathway to occur. Either on the top or at the ground level. This is now shown on the Proposed Structure Plan.

2.81 Mr Phillips has also provided commentary of the Council’s Biodiversity Plan 2018 and that the oxbow lagoon and escarpment provide an opportunity to further the aims of the Biodiversity Plan 2018. This is particularly relevant for when the escarpment and lagoon are vested in council as part of any future subdivision of land. While this area is not currently captured in Council’s forward planning, the area can be included in the next review of the 10 Year Plan. Mr Phillips states that it is “The Parks division preference is for Council to undertake the development of the reserve and walkways rather than have them vested in a developed state. This would allow Council to ensure integrated development.”

Relevant Council Documents

2.82 The following provides a general outline of the relevant Council documents and strategies that have also informed PDPCB.
Infrastructure Strategy (2018) - The Local Government Act 2002 requires each council to adopt an Infrastructure Strategy covering a period of at least 30 years as part of its 10 Year Plan. This Strategy covers the core activities of Roading and Footpaths, Stormwater Drainage, Wastewater Collection and Treatment and Water Supply Activities.

A draft Infrastructure Strategy has been included in the 2018-2028 LTP. Section 3 identifies and describes the Significant Infrastructure Issues facing the City, and includes:

- Renewal of infrastructure
- Development of new infrastructure for growth
- Facilities to encourage alternative transport modes
- Implementation of the Urban Design Strategy
- Wastewater treatment and upgrading
- Security of water supply
- Increasing resilience of infrastructure
- Provision of a further river crossing
- Impact of climate change

Integrated Transport Strategy (2015) – Council’s Transport Strategy is aimed at integrating land-use and transport to create an efficient user friendly transport system that meets the needs of the City’s residents, businesses and the environment. The Strategy is consistent with and endorses Council’s current planning framework. It also recognizes the need to work collaboratively with organisations controlling adjacent and connecting transport networks, transport funding and safety partners to achieve a transport system that balances everyone’s needs and expectations.

A shift in planning emphasis is needed to better balance the needs of all road users, particularly of people walking and cycling. Three drivers for change are proposed:

- Optimise use, access and movement.
- Encourage walking and cycling.
- Build resilience.

Street Design Manual (2013) - The Street Design Manual (SDM) sets out the design philosophy and vision for Palmerston North streets. A set of standard designs have been proposed to ensure a consistent and coherent network is designed that balances the needs of all street users and aesthetics. The SDM sets the challenge to take street design to the next level – being streets for people that are context-sensitive, attractive, and financially sustainable.

The aim of the SDM is to:

- Clearly communicate the design vision for Palmerston North streets.
- Introduce the road-user hierarchy into street design.
- Set out the principles and techniques for a coherent and consistent street network.

Retail Strategy (2013) – The Retail Strategy underpins the Council’s centres-based approach to commercial activities. It encourages office and retail activities to be located in the Business Zones, particularly the Inner Business Zone.
Vegetation Framework (2016) – The Vegetation Framework (VF) provides planting guidance for vegetation in the City Centre, Public Streets, Reserves, City Entrances, Green Corridors, and along the Manawatū River and its tributaries. Suggested species and themes are recommended to create a City-wide green network that celebrates and enhances local and introduced biodiversity and contributes to an environmentally healthy and attractive City.

The City Development Strategy (2018) – The City Development Strategy sets out two priorities relating to achieving the goal of an innovative and growing city:

- Priority one: Creating and enabling opportunities for employment and growth
- Priority two: Providing infrastructure to enable growth and a transport system that links people and opportunities

Under these priorities, future direction of planning for housing, office and retailing, industrial, rural, strategic partnerships, urban design, heritage management, infrastructure and strategic transport and parking are articulated.

Housing and Business Needs Assessment (2019):

A Housing and Business Needs Assessment (HBNA) was prepared under the National Policy Statement for Urban Development Capacity. The HBNA identifies a need to rezone the Napier Road Residential Area Extension for housing to help meet the city’s projected housing growth requirements. Failure to rezone the land for housing will contribute to a projected undersupply of land for housing in Palmerston North in the medium term (3 to 10 years).

3 EVALUATION OF ALTERNATIVES AND THE PREFERRED OPTION

Introduction

3.1 A key matter referred to in Section 32(3)(a) is that a proposed plan change must be assessed in terms of whether it is the most appropriate way to achieve the purpose of the Act.

3.2 Appropriateness means the suitability of any particular alternative in achieving the purpose of the RMA. To assist in determining whether the alternative (i.e. regulation or other methods) is appropriate, then the effectiveness and efficiency of the alternative should be considered.

3.3 Section 32 of the Act sets out a methodology for assessing changes to a Plan, with a focus on the consideration of alternatives, benefits and costs. In considering the alternative methods, it is necessary to consider different planning methods to achieve the purpose of the Act, including retaining the status quo, non-regulatory methods and the proposed plan change.

3.4 This part of the report identifies the alternatives considered as part of the plan change. The following three options are evaluated:

1. Retain the status quo;
2. Plan change as proposed; and
3. Provide for large lots (5000m²) with self-service for infrastructure.
Alternative One: Retain the status quo

Retain Status Quo

Retain the existing regulatory framework of objectives, policies and methods contained in the operative District Plan for the Industrial Zone and the Rural Zone.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Costs</th>
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<tbody>
<tr>
<td>• Provides a continuation of the existing District Plan approach which has a level of familiarity for Plan users.</td>
<td>• Implementation and compliance costs will be significantly higher as residential activity is not permitted and would require a full Discretionary Activity consent. There is no policy guidance in the Industrial Zone for residential uses and therefore all adverse effects on the environment would have to be minor for any application to be granted.</td>
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<tr>
<td>• Avoids the costs associated with preparing and implementing new District Plan provisions.</td>
<td>• The objectives and policies of the Rural Zone seek to retain land for productive purposes. Residential development would unlikely be consistent with the objectives and policies of the Rural Zone.</td>
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Council would not be meeting its function under section 31(1)(a) to review objectives, policies and methods to achieve integrated management of the effects of the use and development of land and physical resources of the district.

Does not assist Council in achieving its requirements under the National Policy Statement on Urban Development Capacity and providing sufficient land supply for areas of medium - high growth.

Does not recognise information Council has received on the liquefaction risk and the importance of enhanced foundation design for future development.

Development within the Rural Zone would require land to be raised for a 0.5%AEP under the One Plan.

Efficiency: The costs associated with this option significantly outweigh the benefits and therefore the status quo is not considered to be an efficient alternative. The costs associated with this option centre on not meeting best practice approaches to planning for new development, may not result in a strong urban design outcome, nor facilitate staged development over the next ten to twenty years.

Effectiveness: This option is not effective as any residential development would require full discretionary activity consents. This is not an effective way to manage land use change of the site, nor recognise that a portion of land has already been intensively developed for residential purposes. As such, this option does not present an effective alternative.

Opportunities for Economic Growth and Employment: This option has a negative impact in terms of economic growth and employment. Consenting processes to subdivide and change the land use would be costly and could see development move elsewhere. The rezoning of this land is a logical extension of the residential extent for the City.
**Risk of acting or not acting if there is uncertain or insufficient information:** There is sufficient information regarding the proposed change in zoning and therefore land use to warrant change. To retain the existing provisions would mean that this site would require Discretionary Activity consents, which is not considered an appropriate planning response, particularly when surrounding land to the north of Napier Road has already been rezoned residential, and part of the site has been developed already for a retirement village.

**Appropriateness:** This option is no longer appropriate in terms of the Council’s functions and responsibilities under the RMA, including the National Policy Statement for Urban Development Capacity. The status quo will not ensure best planning practice for land use of a site that is already being used for and landowners wishing to develop land for residential purposes.

**Alternative Two: Plan Change as proposed**

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<tr>
<th>Plan Change as proposed</th>
<th>Costs</th>
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<tbody>
<tr>
<td>Rezone the site from Industrial and Rural to Residential Zone. Include amended provisions in the Subdivision and Residential Zone chapters specific to future development on the site. Include a structure plan to guide future residential development, recognising that this will occur in a staged manner.</td>
<td>The costs of formulating and implementing new provisions for the Zone.</td>
</tr>
<tr>
<td>- The rezoning ensures the correct zoning applies to the predominant future activity on the site.</td>
<td>- The costs of rezoning and preparing a plan change.</td>
</tr>
<tr>
<td>- Recognises another growth option to provide a variety of housing choice and needs in the City.</td>
<td>- Costs associated with the enhanced foundation design to mitigate risk of liquefaction.</td>
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<td>- Clear requirements to ensure further development is planned, integrated and appropriate for the specific site.</td>
<td>- Costs associated with an increase in floor levels to mitigate stormwater ponding effects in extreme events (although these are required in the Rural Zone to achieve the 0.5% AEP as specified under the One Plan).</td>
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<tr>
<td>- Ensures a high quality urban environment is created, recognising the uniqueness of the site and its location.</td>
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<tr>
<td>- Identifies growth while managing the unique features of this site.</td>
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<tr>
<td>- Maximises yield while still achieving a high urban environment.</td>
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</table>

**Efficiency:** The benefits associated with this option outweigh the costs and therefore the plan change, as proposed, is the preferred option. PDPCB is considered to be an appropriate amendment to rezone the site and introduce specific provisions to ensure an integrated development, recognise the site specific issues relating to natural hazards and proximity to the railway line and current state highway. The change in land use will ensure the site is used efficiently and can be developed recognising the unique features of the site.

The proposed rezoning will allow residential development to occur as a permitted activity rather than Non-Complying Activity which is currently the case under the Industrial and Rural zoning.

**Effectiveness:** The provisions of PDPCB are considered to be effective in enabling a change in land use for the site, while recognising the constraints of the site and the intention of the land owners to develop residential lots on this site.
**Opportunities for Economic Growth and Employment:** This option has a positive impact in terms of significant economic growth and employment. The change in land use will ensure the site is used efficiently recognising the constraints of the oxbow and escarpment. Residential development will provide additional economic growth and employment for the City.

**Risk of acting or not acting if there is uncertain or insufficient information:** The risk of not acting is that the site could be developed for residential use under multiple Discretionary or Non-Complying Activity consents. This would likely result in a piecemeal development lacking integration and connectivity. Rezoning this land also provides additional housing development choice for the City.

Council has information, in the form of the Tonkin and Taylor Liquefaction Report, which states that development of the site is appropriate provided improvements are undertaken. In this case, to achieve protection in a 1 in 100 year earthquake event, the improvements required relate to enhanced foundation design above the Building Act Requirements. This is considered a small cost in relation to the overall land and house package values expected at the site.

The Stormwater Report has identified that specific stormwater quality and quantity measures are required for development. These are similar to those required for the land between Roberts Line and James Line to the east of this site. Increasing the land to provide protection from the risk of flooding is also identified. Based on the recommendations of this Report, the Council has sufficient information to act and rezone this land.

The Water and Wastewater Servicing Assessment Report concludes that cost efficient servicing options exist for the area. The costs of infrastructure are expected to be funded by the developer, as normally occurs. Council also has funding confirmed in the Long Term Plan programmes to fund the up sizing of trunk water mains for future growth and network resilience. On that basis Council has sufficient infrastructure information to act.

Overall, there is sufficient information to support this change.

**Appropriateness:** The rezoning and new provisions are considered to be the most appropriate way to achieve the purpose of the Act and to fulfil Council’s statutory obligation to ensure that a District Plan sustainably manages the natural and physical resources of the City.

As detailed in the assessment above, there are a number of benefits to rezoning the site to residential. An important cost that needs to be weighed up against the overall benefits of the rezoning proposal is the additional cost associated with liquefaction mitigation in the event of a significant earthquake and the raising of some land to manage stormwater risks. This is an issue the City is having to carefully consider with all new rezoning proposals. A desktop Liquefaction Report completed at the macro-scale in 2011 revealed large parts of the City located on the plains of the Manawatu River are subject to moderate to very-high liquefaction risk.

Previous plan changes (Hokowhitu Lagoon Residential Area and the Whakarongo Residential Area) have both required geotechnical investigations at the time of subdivision. The Braeburn Industrial Area and North East Industrial Zone Extension Area have been rezoned as part of the Sectional District Plan Review. Both rezoning proposals were informed by site-specific liquefaction assessments and further geotechnical investigations are required at the time of subdivision or development.

The costs and benefits of any rezoning proposal are unique and need to be assessed on a case-by-case basis. Section 32(2)(b) of the Act seeks, if practicable, for Council to quantify the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the provisions. In terms of PDPCB and the associated liquefaction risk, the rezoning and the additional cost of the provisions requiring pre-development geotechnical investigations can be quantified at a high-level based on the information contained within the Tonkin and Taylor Report in Appendix 5.
Alternative Three: Provide for large lots (5000m²) with self-service for infrastructure

**Plan Change as proposed**

Rezone the site from Industrial and Rural to have the Rural Residential Overlay imposed. This would see the Rural Residential Overlay provisions apply to this site. A structure plan to guide future residential development would be included to ensure access arrangements were appropriate for the site.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Costs</th>
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<tbody>
<tr>
<td>- Enables the introduction of low density development without the need for Council infrastructure.</td>
<td>- The costs of formulating and implementing new provisions for the Zone.</td>
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<tr>
<td>- Recognises another growth option to provide a variety of housing choice and needs in the City.</td>
<td>- The costs of rezoning and preparing a plan change.</td>
</tr>
<tr>
<td>- 5000m² is consistent with the One Plan requirements for domestic wastewater discharge minimum lot area.</td>
<td>- Costs associated with the enhanced foundation design to mitigate risk of liquefaction.</td>
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<tr>
<td></td>
<td>- Costs associated with an increase in floor levels to mitigate stormwater ponding effects in extreme events (although these are required under the Rural Zone to achieve the requirements of the One Plan).</td>
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<tr>
<td></td>
<td>- Would result in a low yield while still requiring minimum floor heights and specific stormwater management requirements.</td>
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<tr>
<td></td>
<td>- Removes ability for Council to provide for additional residential land as required by the National Policy Statement for Urban Development.</td>
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</table>

**Efficiency:** The costs associated with this option significantly outweigh the benefits and therefore this option is not considered to be an efficient alternative. The costs associated with this option centre on not meeting best practice approaches to planning for new development, may not result in a strong urban design outcome, nor facilitate staged development over the next ten to twenty years. The requirements to increase land for minimum floor heights and require all onsite wastewater treatment, alongside stormwater quality and quantity measures would significantly reduce the efficiency of development under the option.

**Effectiveness:** The existing Rural Residential Overlay provisions in the District Plan would need to be amended to reflect the stormwater servicing assessment, given if larger lot sizes where enabled. This includes the minimum floor levels. The costs of achieving these requirements and the low yield from the site is not an effective development option.

**Opportunities for Economic Growth and Employment:** This option has a limited impact in terms of economic growth and employment given the low yield that would result.

**Risk of acting or not acting if there is uncertain or insufficient information:** Council has sufficient information to enable residential development at this site, rather than large self-serviced lots. To retain Rural Zoning and impose the Rural Residential Overlay would not assist Council in achieving the urban growth requirements of the National Policy Statement for Urban Development, particularly as Palmerston North is a medium growth city.

** Appropriateness:** The application of the Rural Residential Overlay is not considered to be the most appropriate way to achieve the purpose of the Act and to fulfil Council’s statutory obligation to ensure that a District Plan sustainably manages the natural and physical resources of the City. It does not
achieve the Councils requirements under the National Policy Statement for Urban Development Capacity.

Land further east of the site has been rezoned residential with similar site characteristics. There is existing precedent that residential development, rather than rural residential is appropriate in this area of Palmerston North.

The costs and benefits of any rezoning proposal are unique and need to be assessed on a case-by-case basis. Section 32(2)(b) of the Act seeks, if practicable, for Council to quantify the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the provisions. In terms of PDPBC and the associated liquefaction risk, the rezoning and the additional cost of the provisions requiring pre-development geotechnical investigations can be quantified at a high-level based on the information contained within the Tonkin and Taylor Report in Appendix 5. This still applies should this site be developed with larger lots.

3.5 Overall the preferred option is Option 2 – Plan Change as proposed for the reasons outlined above.

4 IMPLEMENTATION OF THE PREFERRED OPTION: OBJECTIVES, POLICIES AND RULES

Introduction

4.1 Under Section 32(1)(b), the RMA requires an assessment of the extent to which each objective is the most appropriate to achieve the purpose of the Act. The RMA has an overarching single purpose of sustainable management. The intention of PDPBC is to ensure the District Plan is consistent with the purpose of the Act. The application of section 5 of the Act involves an overall broad judgment of whether a proposal will promote the sustainable management of natural and physical resources.

4.2 Under Section 32(3)(b) of the RMA the Council must examine whether, having regard to the efficiency and effectiveness, the policies, rules, or other methods are the most appropriate for achieving the objectives of the plan change.

Assessment of Proposed Objectives and Policies – Subdivision Chapter

4.3 PDPBC seeks to amend the new objective and corresponding policies in the Subdivision Chapter as follows:

Objective 7

To ensure that development of the Napier Road Residential Area and Napier Road Residential Extension Area proceeds in a manner that:

- provides for and protects sustainable and efficient land transport connectivity and integrated development
- is sensitively designed to enable a safe and appropriate interface with the adjoining conservation and amenity zone and state highway network
- avoids or mitigates the adverse effects of flooding and stormwater, including managing the effects of the associated flood hazard avoidance or mitigation measures
- minimises any adverse landscape effects on the surrounding rural environment and landscape features of the site
4.4 POPCB proposes to amend Objective 7 to specifically address subdivision within the Napier Road Residential Extension Area. The site has similar features to that of the Napier Road Residential Area and many of the matters listed would also apply to the Napier Road Residential Extension Area. There are some additional matters specific to the Napier Road Residential Extension Area which have been added to the objective to ensure the correct matters are assessed. These include specific reference to the Napier Road Residential Extension Area to provide clarity that provisions apply specifically to the proposed rezoned area and not wider Napier Road Residential Area defined in the Plan.

4.5 The Objective ensures that the key factors which make this site unique are managed and careful design will create a high quality integrated development for the future, such as connectivity and managing stormwater.

4.6 Objective 7, like s5 of the RMA, is enabling and provides clear outcome statements for what development in this area is to achieve. The Objective ensures the key factors making this site unique are managed and that careful design will create a high quality integrated development for the future. The site has rich history, with an oxbow of good quality and surrounding vegetation. These characteristics can all be protected and enhanced through careful and sensitive subdivision design.

4.7 Overall proposed amended Objective 7 is considered to be fit for purpose and provide an effective and efficient platform for achieving the purpose of the Act.

Objective 7

To ensure that development of the Napier Road Residential Area and Napier Road Residential Extension Area proceeds in a manner that:

- provides for and protects sustainable and efficient land transport connectivity and integrated development
- is sensitively designed to enable a safe and appropriate interface with the adjoining conservation and amenity zone and state highway network
- avoids or mitigates the adverse effects of flooding and stormwater, including managing the effects of the associated flood hazard avoidance or mitigation measures
- minimises any adverse landscape effects on the surrounding rural environment and landscape features of the site
- enhances and restores the natural features of the site, with sensitive integration of stormwater design and the ecological functioning of the oxbow wetland
- provides for an integrated extension of the urban boundary and contributes towards the City’s short term residential growth
- facilitates pedestrian and cycle connections between the oxbow lagoon, Napier Road Residential Extension Area and the wider City pathway network
- carries out stormwater management in an integrated manner that incorporates water sensitive design principles and practices in the Napier Road Residential Extension Area

### Policies

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<tr>
<td>7.1</td>
<td>To prevent subdivision <strong>within the Napier Road Residential Area</strong> until a road is constructed and vested with Council that links the site to James Line.</td>
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<tr>
<td>7.2</td>
<td>To ensure that development is undertaken in an integrated manner and generally in accordance with the Napier Road Residential Area Structure Plan (Refer Map 7.5) and the Napier Road Residential Extension Area Structure Plan (Refer Map 7.8).</td>
</tr>
<tr>
<td>7.3</td>
<td>To ensure that all necessary stormwater and flooding infrastructure, and earthworks required to maintain flood mitigation, are in place and approved to engineering standard as a matter of priority at the time of subdivision, with ongoing controls in place to ensure the integrity of flood risk measures and stormwater mitigation, particularly on adjoining landowners.</td>
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<tr>
<td>7.4</td>
<td>To protect the landscape and ecological values of the Oxbow Wetland and Escarpment while providing for sensitively designed stormwater disposal for the area and passive recreational use.</td>
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<tr>
<td>7.5</td>
<td>To require a Comprehensive Reserve Development Plan to be lodged at the time of subdivision <strong>within the Napier Road Residential Area</strong> for the oxbow wetland and escarpment areas as defined on the Structure Plan Map 7.5 for the site.</td>
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<tr>
<td>7.6</td>
<td>To require a Comprehensive Landscape and Engineering Plan for the noise bund <strong>within the Napier Road Residential Area</strong> to be lodged at the time of subdivision.</td>
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<tr>
<td>7.7</td>
<td>To ensure that the water supply for the residential development has sufficient capacity and pressure to meet the needs of all development including New Zealand Fire Services requirements.</td>
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### Explanation

The Napier Road Residential Area (NRRA) will provide land for short term residential greenfield growth. Challenges for developing the site include ensuring an attractive interface to SH 3 and entrance to the east of the City, ensuring sustainable, efficient and safe land transport connections, ensuring that appropriate controls are in place to manage flooding and stormwater effects, and providing for the ongoing restoration and ecological enhancement of the oxbow and escarpment features of the site, while providing for passive recreational access. The NRRA also provides an opportunity for a unique residential development, with sensitive integration and management of the landscape and ecological features of the site, the oxbow wetland and escarpment. The structure plan for the site sets out the urban design and general layout outcomes for the site.

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<tr>
<td>7.8</td>
<td>To require the use of Water Sensitive Stormwater Design within the Napier Road Residential Extension Area whereby all lots and road design incorporates pervious surfaces, rain gardens or other biotreatment devices to manage and treat stormwater prior to discharging to the stormwater network.</td>
</tr>
<tr>
<td>7.9</td>
<td>To require a comprehensive Stormwater Management Plan to be lodged at the time of subdivision within the Napier Road Residential Extension Area that outlines how a reduction in stormwater runoff and peak flow discharges through flow attenuation is achieved.</td>
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<tr>
<td>7.10</td>
<td>To manage development by requiring additional geotechnical investigations prior to the future use of the land within the Napier Road Residential Extension Area.</td>
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</table>
7.11 To impose consent notices on titles outlining measures required to implement recommendations from any technical reports to achieve land stability and water sensitive stormwater designs within the Napier Road Residential Extension Area.

Evaluation of Efficiency and Effectiveness Taking Account of Benefits, Costs and Risk

Efficiency and Effectiveness

The above policies all seek to achieve amended Objective 7. Collectively they are considered to be efficient and effective to meet Objective 7 by ensuring that subdivision and development is efficient, meets housing needs and choice, recognises the unique environment and the strong recreational amenity that surrounds the site.

The proposed changes also seek to distinguish those matters that are specific to the Napier Road Residential Area and the Napier Road Residential Extension Area. This ensures the policy guidance is specific to the location of development and that the key management aspects are provided for.

Policies 7.1 to 7.7 are existing and changes have been made to ensure only those matters specific to the Napier Road Residential Extension Area apply to the plan change area. In some cases, the existing provisions are specific to the Napier Road Residential Area and it is not appropriate for them to also apply to the proposed rezoning site. For instance, the noise bund was specific to the Napier Road Residential Area and is not relevant or necessary for the new site. Unless otherwise proposed, the provisions are considered to be appropriate and remain an efficient and effective approach to managing development.

Policies 7.8 to 7.11 are proposed to be added. Policies 7.8, 7.9 and 7.11 are necessary to ensure stormwater is carefully managed within the site. The oxbow currently operates as a stormwater detention area. Council is progressively imposing water sensitive design requirements on new developments. These policies provide clarity for developers that design needs to include water sensitive stormwater design. This is to recognise that while the site has a relatively small catchment size, design can, and should, include measures that see stormwater being managed naturally onsite, rather than through hard engineering techniques. Water sensitive design can be easily achieved in berm design and sub-surface road design. This approach is consistent with contemporary design techniques and ensures a more holistic management view to stormwater.

Policy 7.11 is proposed as it clearly indicates how Council will deal with specific recommendations identified in the Report that is lodged at the time of subdivision. While conditions are often imposed on subdivision consents, once subdivision is completed future landowners may not be aware of the requirements for how they are to achieve stormwater or land stability for each site. The inclusion of this policy provides clarity for developers and future land owners that consent notices are anticipated for development in this site.

Policy 7.10 reflects the recommendations of the Liquefaction Report that development must complete more localised testing to identify more fine-grained information on liquefaction and lateral spread so that site specific recommendations for foundations are assessed and provided. Any rezoning of land requires that natural hazards are identified and managed, and appropriate mitigation measures are applied.

The proposed provisions are also consistent with the provisions recently included in the District Plan for the Hokowhitu Lagoon Residential Area and the Whakarongo Residential Area. This ensures all greenfield development has similar requirements and approach, maintaining the District Plan integrity.
Benefits and Costs

The benefit of these policies is that they establish a policy framework for managing development in a relatively unique and constrained environment. Given land ownership, development is likely to occur in a staged fashion over a number of years. The development of the site requires careful consideration of natural hazards and stormwater management. This is clearly identified in the policies.

The costs associated with these policies largely relate to how future subdivision and development is planned and undertaken. Careful design will be required to manage the site constraints. The additional assessments required will better inform development resulting in a high quality environment that has cohesive and integrated design. The requirement for water sensitive designs while adds costs to development, it is best practice nationally. Overall the balance between benefits and costs is appropriate given that this is the last site north of Napier Road that can be used for residential development between Main Drain and Stoney Creek Road.

Risk

Sufficient information exists to make the proposed changes which are also an evolution of the operative District Plan approach. The changes are generally enabling in nature and have the purpose of clarifying the direction for the development of the Napier Road Residential Extension Area within the Residential Zone. The changes are supported by adopted City Council strategy and technical assessments.

Alignment with Objective 7

The proposed policies are closely aligned with the intent to enable the sustainable use and development of the proposed Napier Road Residential Extension Area, while recognising the unique characteristics of the site (particularly the open space created by the oxbow) and the constraints of the site (being relatively narrow and bordering the State Highway). The approach above is considered consistent with achieving the outcomes sought by Objective 7.

Assessment of Proposed Objectives and Policies – Residential Zone Chapter

PPCPCB includes amending Objective 8 and corresponding policies in the Residential Zone Chapter as follows:

Objective 8

To ensure development within the Napier Road Residential Area and the Napier Road Residential Extension Area:

- Protects and provides for sustainable and efficient land transport connectivity.
- Avoids, remedies or mitigates reverse sensitivity with SH 3, the railway line, and surrounding rural land.
- Provides for a visual connectivity between the Residential Zone and the adjoining conservation and amenity zone.
- Does not lead to buildings which are visually intrusive on the landscape.
- Does not lead to land use which adversely affects flood control measures.
- Protects development from natural hazards.
4.9 The amendments proposed to existing Objective 8 specifically address the site and the creation of a high quality and diverse living environment. The site is unique in that it is surrounded by the escarpment and oxbow, mature trees and key arterial roading network. Development of the site needs to recognise this and embrace these aspects in future development.

4.10 The amended Objective is enabling in focus and reflects the importance of good design to achieve a high quality environment and ensures consistency with development on adjacent land along Napier Road. It is considered to provide an effective and efficient platform for achieving the purpose of the Act, including providing for the social, cultural and economic wellbeing of the community. The existing objective is still considered to be appropriate and relevant in achieving the purpose of the Act, hence the minor changes proposed.

4.11 Assessment against proposed amended Objective 8 and associated policy is as follows:

**Objective 8**
To ensure development within the Napier Road Residential Area and the Napier Road Residential Extension Area:

- Protects and provides for sustainable and efficient land transport connectivity
- Avoids, remedies or mitigates reverse sensitivity with SH 3, the railway line, and surrounding rural land.
- Provides for a visual connectivity between the Residential Zone and the adjoining conservation and amenity zone
- Does not lead to buildings which are visually intrusive on the landscape
- Does not lead to land use which adversely affects flood control measures.
- Protects development from natural hazards.
- Creates a high quality and diverse living environment.

**Policies**

8.1 **For the Napier Road Residential Area**, to prevent development until a road is constructed and vested with Council that links the Napier Road Residential Area to James Line.

8.2 To ensure that development is undertaken in accordance with the Napier Road Residential Area Structure Plan (Map 7.5) and the Napier Road Residential Extension Area Structure Plan (Map 7.8).

8.3 To control ground level heights and earthworks to ensure the integrity of the Noise Bund (within the Napier Road Residential Area) and avoid flooding risks.

8.4 To mitigate the effects of reverse sensitivity from residential development on SH 3 and adjoining farm land.

8.5 **For the Napier Road Residential Area**, to control the height of buildings to minimise adverse visual effects on the surrounding rural environment and ensure the noise bund integrity as a noise mitigating measure.

8.6 To control the height and scale of fencing on properties directly adjoining the Conservation and Amenity Zone to ensure visual connectivity and social surveillance of the Zone.
8.7 To control the location of buildings in relation to the escarpment and oxbow to protect against the risk of natural hazard.

8.8 For the Napier Road Residential Extension Area,

a. To manage development by requiring additional geotechnical investigations prior to the future use and development of land.

b. To require development in accordance with the Napier Road Residential Extension Area Structure Plan (Map 7.8).

c. To encourage active street frontages through design controls for new dwellings, garaging, and fencing.

d. To manage the risk of stormwater flooding by encouraging low impact stormwater design, requiring minimum floor levels and by ensuring all lots have adequate pervious surfaces.

Explanation

The Napier Road Residential Area lies to the north of a high speed rural state highway. Noise mitigation measures are important to protect the operation of SH 3 and the amenity of those living within the NRRA. The development of the site is not considered appropriate until a key road connection is established with James Line via Rosalie Terrace to ensure efficient and sustainable land transport connections. The Plan has controls in place to ensure that building development and earthworks do not compromise noise mitigation and flooding effects, or increase visual effects to the surrounding environment. Fencing on properties directly adjoining the conservation and amenity zone will be managed so that there is good visual connectivity and social surveillance with the Conservation and Amenity Zone. Buildings have a special setback to protect against the risk of escarpment failure and a wave surge into buildings adjacent to the oxbow lake and escarpment.

Evaluation of Efficiency and Effectiveness Taking Account of Benefits, Costs and Risk

Efficiency and Effectiveness: The above policies all seek to achieve proposed Objective 8, and are considered to be efficient and effective to enable the future residential use of the site, while managing any potential adverse effects. Existing Policies have been reviewed and amended to recognise what is relevant for Napier Road Residential Area verses the Napier Road Residential Extension Area.

The proposed changes also seek to distinguish those matters that are specific to the Napier Road Residential Area and the Napier Road Residential Extension Area. This ensures the policy guidance is specific to the location of development and that the key management aspects are provided for.

Policies 8.1 to 8.7 are existing, and changes have been made to ensure only those matters specific to the Napier Road Residential Extension Area apply. In some cases, the existing provisions are specific to the Napier Road Residential Area and should not be applicable to the proposed rezoning site. For instance, the noise bund was specific to the Napier Road Residential Area and is not relevant or necessary for the new site. Unless otherwise proposed, the provisions are considered to be appropriate and remain an efficient and effective approach to managing development.

Policy 8.8 is proposed to be added and identifies specific policy considerations for development of the site. Requiring geotechnical investigations prior to future use of land is intended to cover the situation where development occurs in the absence of subdivision. The need for additional geotechnical investigations is required as a recommendation of the Tonkin and Taylor Report.

Development in general accordance with the structure plan and the encouragement of active street frontages is to ensure a high quality urban residential area is developed. This is consistent with other similar residential plan changes in Palmerston North.
Managing stormwater and requiring minimum floor levels is also recommended in the technical reports supporting this plan change. Council is progressively imposing water sensitive design requirements on new developments to manage stormwater. These policy provisions provide clarity for those who develop land in this area in the future that design needs to include water sensitive stormwater design. This is to recognise that while the site has a relatively small catchment size, design can, and should, include measures that see stormwater being managed naturally onsite, rather than through hard engineering techniques. Water sensitive design can be easily achieved in berm design and sub-surface road design. This approach is consistent with contemporary design techniques and ensures a more holistic management view to stormwater.

The proposed provisions are also consistent with the provisions recently included in the District Plan for the Hokowhitu Lagoon Residential Area and the Whakarongo Residential Area. This ensures all greenfield development has similar requirements and approach, maintaining the District Plan integrity.

**Benefits and Costs:** The benefit of these policies is that they establish a policy framework for managing development in a relatively unique and constrained environment. Given land ownership, development is likely to occur in a staged fashion over a number of years. The development of the site requires careful consideration of natural hazards and stormwater management. This is clearly identified in the policies.

The Stormwater Report confirms that a minimum floor level of RL 37.8m is required to manage the risk of flooding should there be a breach of the Manawatu River upstream of the site. The report also outlines that a minimum floor level of RL 37.8m (including freeboard) is required to manage stormwater ponding risks. The existing ground level is lower than Napier Road and without raising the land there is an increase in the risk of flooding and ponding. To minimise and mitigate this risk minimum floor levels are proposed in the provisions. There are costs associated with raising the land in total or raising the land for access and buildings. The decision on how to address this is left for the developer.

The costs associated with these policies largely relate to how future subdivision and development is planned and undertaken. Careful design will be required to manage the site constraints. The additional assessments required will better inform development resulting in a high quality environment that has cohesive and integrated design.

Overall the balance between benefits and costs is appropriate given that this is the last site north of Napier Road that can be used for residential development between Main Drain and Stoney Creek Road.

**Risk:** Risks of natural hazards are proposed to be managed as outlined above. Without raising the land or at least achieving the minimum floor levels there is a high risk of flooding and ponding. The raising of the land is necessary to manage and mitigate the risk of flooding and ponding and therefore is appropriate. With the proposed minimum floor level provisions residential development is considered to be appropriate for this site. The minimum floor level specified is also required for access to ensure in an event people can egress to safety.

Sufficient information exists to make the proposed changes which are also an evolution of the operative District Plan approach. The changes are generally enabling in nature, and have the purpose of clarifying the direction for the development of the Napier Road Residential Extension Area within the Residential Zone. The changes are supported by adopted City Council strategy and technical assessments.
Alignment with Objective 8: The proposed policies are closely aligned with the intent to enable the sustainable use and development of the proposed Napier Road Residential Extension Area, while recognising the unique characteristics of the site (particularly the open space created by the oxbow) and the constraints of the site (being relatively narrow and bordering the State Highway). The approach above is considered consistent with achieving the outcomes sought by Objective 8.

Appropriateness of Rules to Achieve Objectives

Subdivision

4.12 The PDPCB proposes to amend a number of existing rules in the Subdivision Chapter relating to the Residential Zone. The following table provides an assessment of the proposed amended rule provisions and whether they are the most appropriate to achieve the proposed objectives and related policies.

<table>
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<tr>
<th>Key Provisions</th>
<th>Rule Provisions</th>
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| Rule R7.6.1.1 | 1. Any subdivision, except a subdivision provided for in R7.6.1.1(2) below, which complies with the Performance Standards below and which is not specified in R7.6.2.1 or Rule as a Restricted Discretionary Activity, R7.6.3.1 as a Discretionary Activity, or R7.6.4.1 as a Non-Complying Activity is a Controlled Activity. Council restricts its control to the consideration of the following matters:  
  - Subdivision design and layout, the size, shape and arrangement of lots, the location of design and access.
  - The layout and design of services and service connections to network infrastructure.  
  
2. Any cross lease, company lease, boundary adjustment or unit title subdivision around existing buildings or buildings under construction which does not result in the creation of any new undeveloped separately disposable lot, cross lease, or company area or any unit, and which complies with the Performance Standards (e) and (f) below and which is not specified in R7.6.2.1 as a Restricted Discretionary Activity, R7.6.3.1 as a Discretionary Activity, or R7.6.4.1 as a Non-Complying Activity is a Controlled Activity. Council restricts its control to the consideration of the following matters:  
  - Subdivision design and layout, the size, shape and arrangement of cross lease and company lease areas, units and the location and design of access.
  - The layout and design of services and service connections to network infrastructure.  
Performance Standards for Controlled Activities under R 7.6.1.1  
(a) Existing Buildings  
Where any land proposed to be subdivided contains existing buildings there shall be no increase in the degree of non-conformity with any
### Permitted Activity standard for the Residential Zone.

#### (b) Lot Size

i. In the Aokautere Development Area (refer Map 10.1), but excluding the Parklands Area,
   - each lot shall contain 400m² of contiguous developable land, and
   - the average area of lots available for residential purposes shall be at least 600m². In calculating the average lot area, no lots over 1000m² shall be included.

ii. In the Aokautere Parklands Area each lot shall contain 1300m² of contiguous developable land.

iii. In the Napier Road Residential Extension Area, Ashhurst, Bunnythorpe and Longburn village residential areas – each lot must be at least 500m².

iv. In the Palmerston North urban area – each lot must be at least 350m².

#### NOTE TO PLAN USERS

All subdivisions in the Petersons Road, Hewitts Road, and Aokautere Village residential areas identified on Map 7.1 default to R7.6.4.1.

#### (c) Shape Factor

For subdivisions in the Aokautere Development Area or Ashhurst, Bunnythorpe and Longburn village residential areas, where the subdivision will result in more than six allotments intended for residential purposes, each allotment shall be able to contain a circle of 18 metres in diameter. In the Aokautere Development Area, the required circle shall be entirely comprised in Developable Land.

#### (d) Access

i. Access to lots from a public road may be provided by way of either:
   
   i. an access leg at least 3 metres wide forming part of the lot; or
   
   ii. a shared access consisting of up to six strips lying adjacent to one another and giving access to no more than five other lots, and in respect of which reciprocal rights-of-way are granted or reserved; or
   
   iii. an access lot or strip held in common ownership with the lot and up to five other lots, or
   
   iv. any right-of-way running with and appurtenant to the land in which the lot is comprised.

ii. No two or more access strips to lots may lie adjacent to one another unless easements are granted over each access strip in a manner which enables joint use of a single driveway, and a single point of access to a public road.

iii. The width of shared access shall be as follows:
<table>
<thead>
<tr>
<th>Number of Sites</th>
<th>Minimum Width of Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – 3</td>
<td>3.5 metres</td>
</tr>
<tr>
<td>4 - 6</td>
<td>5.0 metres</td>
</tr>
</tbody>
</table>

iv. Access shall comply with the access performance standards of R20.4.2(a) of the Land Transport Section.

(e) Essential Services

i. All essential services must be available for connection within 30 metres of the nearest point of the land being subdivided.

ii. All new lots must have sewer, stormwater and water supply services that are connected to essential services.

iii. All new essential services proposed in a subdivision must be located in public service corridors either where they are to vest in Council or service in excess of 6 lots.

Explanation

The intent of performance standard (ii) is to ensure that in extending new sewer, stormwater and water supply services to a new subdivision they must connect to essential services and must be located through a public service corridor, which will be vested in Council. Please refer to Diagram 7.3A and 7.3B for examples of how this will be applied.

Where a new essential service is not located in a public service corridor, Council is concerned about its ability in the future to maintain that service. At some stage the service (pipe) will need to be fixed or replaced. If the pipe, which is covered by an easement, runs through a number of private properties, access to the easement may be difficult and quite often private landowners will have constructed fences, gardens etc. over the easement thus impeding replacement of the pipe. Although an easement is in place on the title, landowners are seldom aware of the development restrictions related to such easements and these areas still get developed. Council has continual problems with structures, fences, gardens, driveways etc. over easements and when maintenance is required, the costs to Council and the landowners are increased.

Additionally, where services are to be connected into the City Council reticulated systems, it is necessary to ensure these connections are efficient and sustainable. This is influenced by how services are connected. The location of services is vital to the long term efficiency of the City infrastructure networks. The provision and location of essential services through a public corridor will ensure a well-managed network and will ensure logical and orderly development outcomes in urban areas avoiding premature development before the necessary infrastructure is in place to service it.

(f) Esplanade Reserves

In respect of lots less than 4 hectares in area, an esplanade reserve at least 20 metres wide shall be set aside from such lots along the bank.
of any river whose bed has an average width of 3 metres or more where the river flows through or adjoins the lot concerned.

(g) Pacific Drive Extension Area

All subdivisions in the Pacific Drive Extension area shown on Map 7.1B Pacific Drive Extension Area, with a lot size below 3000m² shall ensure that a water supply is able to be connected to, which at the time of subdivision is able to provide and maintain an adequate supply of potable water that:

i. Makes provision for firefighting requirements for residential areas;
ii. Accommodates the anticipated flows and demands on the supply, and withstand the anticipated pressure and loads.
iii. Is able to service each lot to be created;
iv. Is compatible with other utility systems;
v. Avoids the likelihood of potable water contamination;
vi. Permits appropriate access for firefighting;
vii. Has a design life of at least 70 years;
viii. Avoids the likelihood of leakage.

<table>
<thead>
<tr>
<th>NOTE TO PLAN USERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 For any subdivision applications identified on Map 10.6.1.3 (Areas in which minimum floor levels apply) please refer to the Residential Section, R10.6.1.3 and associated Explanations. This rule relates to minimum floor levels in Amberley Avenue, Escort Grove, Rangitane Park and Racecourse Road Areas.</td>
</tr>
<tr>
<td>2 All subdivisions must comply with the National Environmental Standard for Assessing and Managing Contaminants in Soil.</td>
</tr>
<tr>
<td>3 Any subdivision and development that is located on any Site of Cultural Heritage Value, as listed in Section 17 of the District Plan, must also comply with R17.16.2.5</td>
</tr>
</tbody>
</table>

(h) Street Trees

The layout of the subdivision and the location of any associated new or altered vehicle crossing does not require:

(i) the removal of any tree planted on any public road, or
(ii) modification, excavation or construction within the area directly beneath the dripline of the tree.

**Explanation**

Street Trees make a significant contribution to the quality of the public the space and character of the Residential Zone. Subdivision design that results in the removal of established Street Trees is discouraged. Council will consider applications in regard to the health and maturity of the tree, the provision of a replacement tree, and whether alternative site access arrangements are possible. As a Road Controlling Authority, the
Council has the authority to refuse permission for the removal of a tree.

**NOTE TO PLAN USERS**

For any subdivision applications in areas identified as being within the National Grid Subdivision Corridor or within 100m of the Turitea (Linton) National Grid Substation and 25m of the Bunnythorpe National Grid Substation, as identified on the Planning Maps, that is not a subdivision for the purposes of accommodating a network utility, also refer to R7.17.1.2 and R7.17.1.3.

(i) Earthworks

   i. Any earthworks undertaken on the land being subdivided shall comply with R6.3.6.1(b) for Permitted Activity standards.

   ii. Any subdivision within the Aokautere Development Area will be accompanied by an earthworks plan identifying any restructuring of land, earthworks or other works to create land with improved slope and soil stability necessary to enable the development of house sites, services and accessways.

**Alignment with Objectives**

**Purpose:** Managing future subdivision is essential to ensuring the site is developed in an integrated manner, good urban design and landscape outcomes are achieved resulting in a high quality residential environment in the future.

The key change in Rule 7.6.1.1 relates to requiring a minimum lot size of 500m². This is considered appropriate to recognise the constraints of this site relating to stormwater management (including the proposed provisions relating to permeable surface). The other areas within Palmerston North City that also require a 500m² minimum lot size are also areas where higher density is not desirable for a variety of reasons (including retaining a low density environment by having larger lot sizes).

This rule has been operational for some time and recently reviewed under Plan Change 20. Given the recent review of this rule under Plan Change 20 it is considered that further assessment of the other provisions is unnecessary. Therefore, only the proposed change of adding a minimum lot size for the Napier Road Residential Extension Area is assessed above.

**Benefits and Costs:** The introduction of a minimum lot size is appropriate given the constraints of the site. The minimum lot size is a small change and no other changes are proposed to the rest of this rule. The size of sections, coupled with the need to manage natural hazards and permeable surfaces is a management approach or response to manage the constraints of the site. The proposed lot size allows for an average sized house while achieving water sensitive design solutions (such as swales and rain gardens) and permeable surfaces to achieve stormwater attenuation.

While this small increase in minimum lot size would reduce the yield compared with other areas within Palmerston North, those areas do not need to manage stormwater in the same way as this site. Climate change is creating more high intensity events for shorter periods and the minimum lot size (coupled with the other requirements proposed as part of this plan change) seek to manage the effects of these events in the future for this area.
The costs of this change are considered to be minor while the benefits of enabling additional land within the City to be rezoned for residential use has high benefit in terms of housing choice and location.

**Risks:** The minor change proposed recognises the site specific characteristics of the Napier Road Residential Extension Area. As outlined in the Stormwater Report, development within the site must ensure that stormwater discharge volume increases are minimised and runoff peak flows and velocities are managed. The report requires permeable surface areas and water sensitive designs. One way to achieve permeable surfaces, and still allow for the market led housing is to require a minimum lot size of 500m². Without the larger lot size, house footprints would need to be smaller, which is considered to take away choice for landowners. A minimum lot size of 350m² (allowed in the wider Palmerston North area) is therefore not appropriate for this area given the need to manage stormwater. There is sufficient information to make the proposed changes.

**Efficiency and Effectiveness:** The only change proposed in this rule by this plan change is to include a minimum lot size which is intended to achieve a lower level of density to achieve the desired urban design and stormwater management outcomes sought for the site. The proposed changes are minor and retain the efficient development of land for Palmerston North. While the provision could be included in Rule 7.6.2.2, this would create inconsistency for plan users.

**Reasonably Practicable Alternatives:** The main alternative options considered include:

- Including the provisions in Rule 7.6.2.2.

**Alignment with Objectives:** The proposed changes align with Objective 7.

<table>
<thead>
<tr>
<th>Key Provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule R7.6.2.2</td>
</tr>
<tr>
<td>Subdivision within the Napier Road Residential Area and Napier Road Residential Extension Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rule Provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subdivision within the Napier Road Residential Area or the Napier Road Residential Extension Area that is not specified in R7.6.3.1 or R7.6.4.1 and complies with the performance standards below is a Restricted Discretionary Activity.</td>
</tr>
</tbody>
</table>

**Performance Standards for Activities under R7.6.2.2**

(a) **Controlled Activity Performance Standards**

Compliance with R7.6.1.1(a) – (e) and (h)

(b) **Flood Protection**

i. For the Napier Road Residential Area, that each allotment created has a building site above the 0.2% AEP flood extent plus 500 millimetres freeboard and that a consent notice is imposed on titles for individual land owners. Access to occupied structures shall also be above the 0.2% AEP flood extent.

ii. For the Napier Road Residential Extension Area, that each allotment created has a building site above the 0.5% AEP flood extent (RL 37.3) plus 500 millimetres freeboard (RL 37.8) and that a consent notice is imposed on titles for individual land owners. Access to occupied structures shall also be above the 0.5% AEP flood extent.

**Guidance Note:** Compliance with this standard does not mean that land is not identified as being subject to a natural hazard under the Building Act.
(c) Geotechnical Investigations

For the Napier Road Residential Extension Area, the requirement for a report from a Chartered Professional Geotechnical Engineer identifying:

i. the potential liquefaction and lateral spread risks to the site and infrastructure that supports development. This report must also contain recommendations as to the location, design and construction of foundations and infrastructure that are appropriate to mitigate any characteristic or feature identified.

ii. suitable setbacks for buildings from the top or bottom of the existing escarpment.

A copy of any site investigations including bore logs and/or cone penetration tests must accompany the report.

(d) Stormwater Management Plan

For the Napier Road Residential Extension Area, the requirement for a report from a Chartered Professional Stormwater Engineer identifying the potential stormwater risks to the site and infrastructure that supports development. This report must cover:

i. A site specific hydrologic modelling assessment using updated oxbow bathymetry and footprint based on the proposed subdivision plan, and include assessment for different downstream discharge conditions.

ii. Scoping of all internal stormwater infrastructure and how it will interact with the existing drainage system including connection to the existing stormwater network and discharge to the Napier Road open drain and layout of treatment devices.

iii. Treatment of all stormwater runoff prior to discharge to the primary network and/or direct discharge to the oxbow.

iv. Protection of treatment devices and treatment runoff during all phases of construction.

v. Outline how the development will hydraulically relate to its surrounding environs, including assessment of overland flow paths and potential flood impacts of proposed and existing development.

vi. Outline how the stormwater management system will ensure that any changes in runoff from the site will be addressed.

vii. Confirm the proposed stormwater mitigation will provide sufficient freeboard to the habitable dwellings under the scenario where there is no outflow from the oxbow in a 2% AEP rainfall event (including the adjustments for climate change).

viii. Identify methods to avoid, remedy or mitigate potential stormwater related reverse-sensitivity effects on dwellings in existence as of 1 August 2019.

This report must also contain recommendations as to the location, design and construction of stormwater infrastructure that are appropriate to mitigate any characteristic or feature identified. A copy of any site calculations must accompany the report.

The stormwater design must incorporate the Napier roadside drain and treatment of stormwater. Alternatively an assessment on the feasibility of re-directing the Napier roadside drain and contributing catchment to reduce the inflow to the oxbow could be undertaken.

(e) Road Corridors
For the Napier Road Residential Extension Area:

i. All road corridors vested in Council shall be designed to provide areas for pervious pavements and/or grassed/planted swales to reduce total runoff and peak flows.

ii. Surface runoff from all roads shall be treated prior to entering the piped stormwater network. This requires design and inclusion of swales, rain gardens, tree pits or other appropriate biofiltration devices.

NOTE TO PLAN USERS

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2011) also applies to earthworks and a consent may be required under those provisions.

The Council will reserve its discretion to the following matters:


ii. The size, shape and arrangement of lots, cross lease and company lease areas, units and access.

iii. Design of the noise mitigation method within the Napier Road Residential Area.

iv. The long term stability and integrity of the mitigation method.

v. Effects of flood avoidance or mitigation in terms of the ensuring satisfactory ground levels and stability of earthworks.

vi. Effects of structures within the oxbow that exacerbate flooding and runoff to adjoining sites.

vii. Reverse sensitivity effects.

viii. The restoration and preservation of the Oxbow and Escarpment for its ecological values as a recreational feature and as a stormwater conduit.

ix. Lodgement of a Comprehensive Reserve Management Plan for the oxbow and escarpment for the Napier Road Residential Area.

x. Lodgement of a Comprehensive Landscape and Engineering Plan for the noise bund for the Napier Road Residential Area.

xi. Design and layout of the subdivision in accordance with the Structure Plan for the Napier Road Residential Area (Refer Map 7.5) and the Napier Road Residential Extension Area (Map 7.8).

xii. Inclusion of stormwater treatment and management services.

xiii. The provision of pedestrian access, including possible pedestrian access between the upper and lower terrace.

xiv. Enhancement of the Napier Road entrance to the city.

xv. How stormwater sensitive design principles and practices are integrated into subdivision design.

Assessment Criteria

In considering an application and determining whether to grant consent and what conditions to impose, the Council will have regard to the following assessment criteria in assessing the matters for discretion:
<table>
<thead>
<tr>
<th>a. Restoration and preservation of the Oxbow and Escarpment, ecologically, as a recreational feature and as a stormwater conduit shall be addressed through the implementation of a Comprehensive Reserve Management Plan within the Napier Road Residential Area, which shall be prepared:</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. by a suitably qualified landscape architect and drainage engineer in consultation with Council experts;</td>
</tr>
<tr>
<td>ii. to the satisfaction of the PNCC Parks and Property Manager and Water and Waste Manager.</td>
</tr>
<tr>
<td>And shall cover, but not be limited to:</td>
</tr>
<tr>
<td>iii. Restoration and enhancement design ensures a natural look with long grasses, not mown on the embankment side, with a mown and managed look on the road reserve side.</td>
</tr>
<tr>
<td>iv. Inclusion of stormwater treatment devices.</td>
</tr>
<tr>
<td>v. Pedestrian access, including possible pedestrian access between the upper and lower terrace.</td>
</tr>
<tr>
<td>b. Noise mitigation measures that are undertaken within the Napier Road Residential Area shall be addressed through the implementation of a Comprehensive Landscape and Engineering Plan, which shall be prepared:</td>
</tr>
<tr>
<td>i. by a suitably qualified landscape architect and acoustic engineer</td>
</tr>
<tr>
<td>ii. in consultation with the New Zealand Land Transport Agency</td>
</tr>
<tr>
<td>iii. to the satisfaction of the Principal Planner in consultation with Senior Landscape Architect.</td>
</tr>
<tr>
<td>c. For the Napier Road Residential Extension Area:</td>
</tr>
<tr>
<td>i. The degree to which issues of liquefaction and lateral spread have been assessed and proposed to be managed onsite to mitigate any adverse effects.</td>
</tr>
<tr>
<td>ii. The degree to which lots have been designed to maximise sunlight, open space, privacy whilst achieving a high quality urban environment.</td>
</tr>
<tr>
<td>iii. The extent to which the proposal is consistent with the Napier Road Residential Extension Area Structure Plan pedestrian opportunities and layout.</td>
</tr>
<tr>
<td>iv. The extent to which the amenity and ecological values of the oxbow lagoon are maintained and/or enhanced.</td>
</tr>
<tr>
<td>v. How the proposed subdivision, road layout and design enables connectivity with adjoining sites and areas.</td>
</tr>
<tr>
<td>vi. Whether the proposed subdivision ensures connectivity to property and roads that have been developed or have the potential to be developed in the future.</td>
</tr>
<tr>
<td>vii. The extent to which the proposal incorporates water sensitive stormwater design principles and achieves pervious surfaces.</td>
</tr>
</tbody>
</table>

**Non-Notification**

i. No application under R7.6.2.2 is required to be publicly notified.
Alignment with Objectives

**Purpose:** The District Plan currently contains a rule for subdivision within the Napier Road Residential Area as a Restricted Discretionary Activity. The Napier Road Residential Extension Area has many similar characteristics and for clarity and consistency new provisions are proposed to incorporate the additional land covered by the Napier Road Residential Extension Area. There are some provisions of the existing rule that do not apply to the Extension Area (such as those relating to the noise bund) and changes are proposed to clearly articulate/define where the differences are.

Managing future subdivision within the Napier Road Residential Area, which is a relatively constrained site, is essential to ensuring the site is developed in an integrated manner, ensuring good urban design and landscape outcomes resulting in a high quality residential environment in the future. Development consistent with the Structure Plan is critical to achieve the outcomes sought under Objective 7.

Careful design is necessary to achieve the overall intent of the Structure Plan, specifically the future connectivity, access to open space, and the need to ensure water sensitive designs are implemented to manage stormwater.

**Benefits and Costs:** The proposed amendments to the rule are necessary to recognise the constraints of the site and ensure any potential effects are managed and mitigated. The proposed changes are consistent with other recent plan changes, such as Hokowhitu Lagoon Residential Area, which introduces requirements for stormwater management and the need to complete additional geotechnical investigations at the time of subdivision.

While the requirement for additional reports to inform development is required, the benefits are considered to outweigh the costs. The requirement for a geotechnical investigation was recommended by Tonkin and Taylor and will ensure the appropriate foundation design is used to manage and potentially avoid liquefaction risk. The requirement for a Stormwater Management Plan was recommended by Council’s Stormwater Engineer to ensure the site can appropriately manage stormwater attenuation and velocities. This also seeks to manage and potentially avoid stormwater ponding risk. The requirements are necessary to ultimately achieve a high quality urban environment recognising the unique characteristics of the site. There does however remain a degree of choice over design.

The Stormwater Report confirms that a minimum floor level of RL 37.8m is required to manage the risk of flooding should there be a breach of the Manawatu River upstream of the site and to manage stormwater ponding risks. The existing ground level is lower than Napier Road and without raising the land there is an increase in the risk of flooding and ponding. To minimise and mitigate this risk minimum floor levels are proposed in the provisions. It is understood that the fill costs will range from $1.9m-$3.4m to fill to RL 37.8m over the whole site. The cost range is based on the quality of fill used and transportation from the fill source to the site. These costs are not dissimilar to other parts of Palmerston North where land raising has been required to mitigate flooding and stormwater risks.

The costs of the proposed changes are considered to be minor while the benefits of enabling additional land within the City to be rezoned for residential use has high benefit in terms of housing choice and location of development for the future.

**Risks:** The purpose of the proposed changes are to manage the potential risks and constraints on the site. The changes reinforce and enhance the recently added provisions for the Whakarongo Residential Area and the Hokowhitu Lagoon Residential Area and includes recommendations from technical advice. There is sufficient information to make the proposed changes.
**Efficiency and Effectiveness:** The proposed changes are efficient in that they enable development of the Napier Road Residential Extension Area while managing potential effects. The proposed amendments are consistent with provisions for the Napier Road Residential Area (in relation to flood protection) and the Hokowhitu Lagoon Residential Area (in relation to geotechnical investigations). This ensures consistency of approaches across the District Plan for areas where there are flooding, stormwater and geotechnical risks.

**Reasonably Practicable Alternatives:** The main alternative options considered include:
- Relying on a general subdivision rule to provide for development within the Napier Road Residential Extension Area.

**Alignment with Objectives:** The proposed changes align with Objective 7.

### Residential Zone

4.13 The PDPCB proposes changes to the Residential Zone objectives, policies and rules. The following provides an assessment of the proposed amended provisions and whether they are the most appropriate to achieve the proposed objectives and related policies.

<table>
<thead>
<tr>
<th>Key Provisions</th>
<th>Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule R10.6.1.1 Dwellings and Accessory Buildings</td>
<td>Any dwelling or accessory building is a Permitted Activity provided it complies with the Performance Standards detailed in Clauses(a) to (j)</td>
</tr>
</tbody>
</table>

**NOTE TO PLAN USERS**

Also refer to the following rules:
- R10.6.1.3 Amberley Avenue, Escort Grove, Rangitane Park and Awapuni Racecourse Minimum Floor Level Areas;
- R10.6.3.4 Awatea Stream and Jensen Street Ponding Areas;
- R10.6.1.6 Limited Development Land in the Ackautere Development Area;
- R6.3.6 Earthworks;
- R17.6.1-17.9.1 Cultural and Natural Heritage;
- R23.7.3, 23.9.2 and 23.11.2 Utilities

Non-regulatory Design Guidelines have been prepared for Elmira Avenue and Manapouri Crescent. Although these Design Guidelines have no legal effect under the District Plan they are intended to offer practical advice for developing and maintaining properties in a way that enhances the unique neighbourhood.

**Performance Standards**

**(a)** Height - including Maximum Height and Height Recession Planes.

Maximum Height
### 51

i. No building may exceed a maximum height of 9 m; and  

ii. Any buildings or structures must comply, in terms of maximum height, with R 13.4.7.1.  

iii. No fence within the 10 or 15 metre offset boundary, as shown on Map 10.6.1.1 “Landscape Provisions – Pacific Drive Extension”, shall exceed a maximum of 1 metre above the existing ground level, and any solid fence shall be of neutral or recessive colour.

**NOTES**  

a. The elevation shown on the coordinate schedule on Map 10.6.1.1 shall be used as a benchmark of existing ground level.

b. Acceptable colours include those from the following colour range from British Standard 5252 (as at 1 January 2010):  
   00 A (01, 03, 05, 07, 09, 11, 13)  
   02 A (03, 07, 11), 02 C (39 & 40)  
   04 B (15, 17, 19, 21, 23, 25, 27, 29), 04 C (39 & 40)  
   06 A (03, 07, 11), 06 C (37, 39 &40), 06 D (44, 45)  
   08 A 14, 06 B (15, 17, 19, 21, 23, 25, 27, 29), 08 C (37, 39, 40), 08 D (44 & 45)  
   10 A (01, 03, 05, 07, 09, 11), 10 B (15, 17, 19, 21, 23, 25, 27, 29), 10 C (37, 39), 10 D (44, 45)  
   12 B (15, 19, 21, 23, 25, 27, 29), 12 C (37, 39 & 40), 12 D (44, 45)  
   14 C (37, 39 & 40), 14 D (44, 45)  
   16 A (03, 07, 11), 16 C (37, 39 & 40), 16 D (44, 45)  
   18 A 14, 18 B (15, 17, 19, 21, 23, 25, 27, 29), 18 C (39 & 40)  
   20 C 39, 40  
   22 C 39, 40  
   24 C 39, 40

iv. No building or permanent structure (other than a fence which is covered by (iii)) within the 10 or 15 metre offset boundary as shown on Map 10.6.1.1 “Landscape Provisions – Pacific Drive Extension” shall exceed a maximum height of 0.6 metres above the existing ground level. Note: The elevation shown on the coordinate schedule on Map 10.6.1.1 shall be used as a benchmark of existing ground level.

v. On any allotment containing all or part of the 10 or 15 metre offset boundary, no building on any part of the allotment beyond the 10 or 15 metre offset boundary, shall exceed a maximum height of 7 metres above the existing ground level shown on the coordinate schedule on Map 10.6.1.1 “Landscape Provisions – Pacific Drive Extension.”

**Height Recession Planes**

i. All buildings shall comply with the following recession planes:
| a. | All parts of a building shall be contained within a 45° plane commencing at 2.8 metres above ground level inclined inwards at right angles in plan. See Figure 10.1. |
| b. | Where a boundary adjoins an access strip the measurement will apply at the furthest boundary of the access strip. |
| c. | These height recession planes and absolute height control shall not apply to: |
| | a. antennas, aerials, chimneys and architectural appurtenances (such as ornamental towers, turrets, finials, spires, flagpoles and gargoyles) provided these do not exceed the recession plane or absolute height control by more than 5 metres vertical distance. |
| | b. solar photovoltaic panels, and solar water heaters provided these do not exceed the recession plane or absolute height control by more than 0.5 metres vertical distance. |
| | c. any boundary common with a reserve or street. |
| d. | Gable roof ends, including the sloping edge of mono-pitch roofs, may penetrate the height recession plane by no more than one third (1/3) of the gable end height. |
| e. | In applying the height recession plane to properties on Pacific Drive adjoining the offset boundaries, as shown on Map 10.6.1.1 “Landscape Provisions – Pacific Drive Extension”, the plane shall commence from the 10 or 15 metre offset boundary (whichever applies). |
| **(b) Overlooking** | Any part of a building that is outside the building envelope formed by the height recession planes and the maximum height limit shall not contain a window. Skylights shall be excluded from this provision. |

**Explanation**

In dealing with the issue of the height of buildings in the Residential Zone, it is clear that there are a number of associated effects. Most of these effects impact on adjacent sites and dwellings and it is therefore important that any control, as far as possible, attempts to control these effects without becoming unnecessarily complex or restrictive in terms of the design of any dwelling. The major effects which arise from the height of buildings are:

| i. | Effects on the penetration of sunlight and daylight to adjacent sites and buildings. |
| ii. | Effects associated with overlooking which may lead to actual or perceived loss of privacy for outdoor areas or dwellings on adjacent sites. |
| iii. | Effects arising from the physical bulk of the building which may lead to a feeling of loss of privacy due to the perception that the building on the adjacent site is oppressive. |

While some of these effects can be dealt with by a recession plane approach, it is also necessary to control the location of windows to address the privacy issues. Equally it is also important that any recession plane is related to the orientation of the building in relation to the sun. For instance a building close to a southern boundary is likely
to have the greatest effect on neighbouring properties. However this is also an approach which needs to be modified if there is no adjacent residential neighbour or where for instance it is a boundary to a road, school or right of way.

Figure 10.1

Height Recession Plane

Maximum Height:
9 metres for buildings in the Residential Zone
This line assumes that the site is flat

45°

Ground Level at Boundary

2.8 m

Distance from Boundary (metres)

Scale 1 : 100

(c) Separation Distances

i. Any dwelling on a lot with frontage to a public road shall be located a minimum of:
   a. 3 metres from the boundary with any road unless it contains a garage or carport facing the road and having direct access from the road, in which case the minimum separation distance for that part of the dwelling containing the garage or carport shall be 6 metres.
   b. 1.5 metres from any other boundary.

ii. Any dwelling without frontage to a public road shall be located a
minimum of 1.5 metres from any boundary.

iii. Where two dwellings (or one dwelling and one minor dwelling) are built on the same site,
   a. Any part of the façade of a dwelling shall be located at least 3 metres from any other dwelling on the same site.
   b. Where two dwellings are joined by their respective garages, the separation distance provisions of (a) shall not apply.
   c. Any part of a dwelling shall be located at least 1.5 metres from the edge of any driveway or right-of-way serving another dwelling on the same site.

iv. Accessory Buildings shall be located a minimum of:
   a. 3 metres from the boundary with any road unless it is a garage or carport facing the road and having direct access from the road, in which case the minimum separation distance shall be 6 metres.
   b. 1.0 metre from any other boundary.

v. For corner sites the requirements of (i) and (iv) shall only apply to one road frontage.

**Explanation**

An important aspect of residential amenity is the physical distance between dwellings within the same site or an adjoining site. Where two dwellings are built on adjoining sites, such that each is only the minimum distance from the boundary, they often appear to intrude on each other’s living space and privacy. Where residential buildings are in close proximity there may also be adverse effects in terms of daylight and sunlight penetration.

Likewise, the physical distance between dwellings and the street-front contribute to the character and amenity values of individual streets. The placement of buildings in close proximity to the street front boundary can result in effects on surrounding property and street character.

The approach establishes more specific requirements for the street frontage or property; however this is balanced with less fixed regulation for the remainder of the site.

The overall effects of the separation distances should be to reduce the effects of one dwelling on another or on an adjacent site. Where a variation to these separation distances is considered appropriate as part of the overall design of the dwelling, this can be dealt with by way of a Restricted Discretionary Activity consent.

(d) Site Area, Site Coverage and Number of Buildings

i. Site Area
   a. A minimum net site area of 350m² for each dwelling unit unless subject to the standards of (b)-(d) below.
   b. A minimum net site area of 1300m² of contiguous developable land in the Aokautere Parklands Area.
   c. A minimum net site area of 400m² of contiguous developable land in the Aokautere Development Area (refer
### Map 10.1

<p>| | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>d.</td>
<td>A minimum net site area of 500m² for each dwelling unit in the Napier Road Residential Extension Area, Ashhurst, Bunnythorpe and Longburn village residential areas.</td>
</tr>
</tbody>
</table>

**Explanation**

The site area control provides a standard for densities on sites to avoid the creation of developments which appear overcrowded and have negative effects on adjoining properties or create poor on-site amenity. The site area control ensures sites are of a sufficient size to accommodate necessary buildings and sufficient on-site private open space.

Variations in the minimum site area are a product of existing development constraints, but also recognising the unique character of both urban and village residential environments.

For example, given the particular topographic and geological characteristics of the Aokautere area, the intent of this rule, as it relates to the Aokautere Development and Parklands Areas, is to ensure that there is an alignment between minimum lot size and the minimum area of developable land necessary to accommodate a residential building platform.

Additionally, when subdivided for the purposes of residential development the Parklands Area is intended to act as a transition area between close urban development in the Aokautere Development Area and rural-residential development in, for example, the Moonshine Valley and Potson Hill areas. The provision of larger residential building platforms in this area therefore will provide a clear gradation of development in the Aokautere area.

Within the Aokautere Development Area (refer Map 10.1) it is essential that there is sufficient useable or restructured land to ensure that there is a stable building platform on which to safely establish a dwelling and associated facilities such as garaging and open space.

---

**ii. Site Coverage**

The maximum amount of site which may be covered by buildings shall be:

- a. 40% on sites of less than 500 m²
- b. 200 m² on sites of 500 m² to 572 m²
- c. 35% on sites over 572 m²
- d. 30% for sites within the Napier Road Residential Extension Area.

**Explanation**

When a dwelling is placed on its site much of the effect of the building on the overall amenity of the neighbourhood arises from the perceived bulk of the building. This in turn relates to the height of the building and the proportion of the site which is covered by buildings. This can lead to a feeling that neighbouring properties are being overlooked or are...
physically "oppressed" by the building. This effect is magnified where the building is double storied and is at maximum site coverage.

The site coverage control is intended to deal with both the "bulk" effect and the physical coverage of the site while still allowing for adequate development potential particularly on small sites.

iii. Number of buildings used for residential living per site
The number of buildings per lot shall be no more than:
   a. Two dwelling units; or
   b. One dwelling and one minor dwelling unit; or
   c. One dwelling unit and one sleep-out.

   Except for the Napier Road Residential Extension Area where only one dwelling per lot shall be permitted.

Explanation
In most cases each lot contains one dwelling, although this is not always the case. The above standard incorporates flexibility to construct minor dwellings and sleep-out accommodation in most areas. However, in order to provide certainty to adjacent properties and maintain residential amenity standards, it is necessary to limit the number of buildings and intensity of accommodation units.

(e) On-site Amenity
Every dwelling shall be provided with an outdoor amenity area which can meet the following requirements: Refer to Figure 10.2

   i. A minimum open area of 36 m² free of driveways, parking spaces, buildings and manoeuvring area.
   ii. Is able to accommodate a circle of 4.5 metres in diameter.
   iii. The area has a gradient no greater than 1 in 20.
   iv. Has direct contact with a main living area for a length of not less than 2 metres.
   v. Is orientated to the east, west or north of the dwelling.

Explanation
Much of the enjoyment of a site comes from the availability and useability of open space within the site. To be effective the open space must allow good daylight and sunlight penetration and be readily accessible from the main living areas of the dwelling.

The rules are intended to ensure that through good design that any site has effective open space available which adds positively to on-site amenity values.

NOTE TO PLAN USERS
Applications for the construction of a second dwelling or a minor dwelling unit will incur the payment of a Development Contribution. Refer to the Development Contributions Policy for further information.
Explanation

This diagram is to be read in accordance with performance condition 10.6.1.1(e), as it provides a visual representation of what is required by the Performance Standards. The diagram complements the conditions which are intended to ensure that through appropriately designed sites, effective open space will be achieved, adding positively to on-site amenity values.

The diagram clearly shows that the preferred location (the tick) for amenity areas is to the east, west or north of the dwelling, with the 4.5 metre diameter within a length of no less than two metres from the main living area. The undesired location of the main amenity area is shown by the cross on the diagram, as the 4.5 metre diameter is not directly located off the living area.

(f) Aokautere Development Area

Within the Aokautere Development Area (Map 10.1) all dwellings and accessory buildings shall be located on developable land.

Explanation

Development within the Aokautere Development Area is constrained by the terrain. Areas are identified as either Developable or Limited Development Land. The primary purpose of these divisions is to establish stability controls for housing development. The limitations have however also shaped the nature of housing development and the character of the Aokautere area.

(g) Access and Parking

Compliance with the following performance standards of R20.4.2:

20.4.2(a) Vehicle Access;
20.4.2(b)(ii) Parking Provision Standards for all zones except the Inner Business Zone;
20.4.2(g)(i) Cycle Parking Provision and Design

**Explanation**
The performance standards attempt to mitigate the effects created by the movement of vehicles in residential areas.

**(h) Air Noise Control**

**i.** In the Outer Control Contour identified on Map 10.6.6.1, all buildings must be constructed in compliance with:
- Any bedroom in a building used by a noise sensitive activity must achieve the following minimum standard of external sound insulation:
  \[
  D_{T\omega} + Ctr > 25 \text{ dB}.
  \]
- Any habitable room, other than a bedroom, in a building used by a noise sensitive activity must achieve the following minimum standard of external sound insulation:
  \[
  D_{T\omega} + Ctr > 20 \text{ dB}
  \]
- Any room used for communal activities must achieve the following minimum standard of external sound insulation:
  \[
  D_{T\omega} + Ctr > 20 \text{ dB}
  \]

**ii.** In the Inner Control Contour identified on Map 10.6.6.1, all buildings must be constructed so that:
- Any bedroom in a building used by a noise sensitive activity must achieve the following minimum standard of external sound insulation:
  \[
  D_{T\omega} + Ctr > 30 \text{ dB}
  \]
- Any habitable room, except for a bedroom, in a building used by a noise sensitive activity must achieve the following minimum standard of external sound insulation:
  \[
  D_{T\omega} + Ctr > 25 \text{ dB}
  \]
- Any room used for communal activities must achieve the following minimum standard of external sound insulation:
  \[
  D_{T\omega} + Ctr > 25 \text{ dB}
  \]

**iii.** All habitable rooms must be designed, constructed and maintained in accordance with a design report prepared by a suitably qualified and experienced member of the Acoustical Society of New Zealand stating that the proposed design will achieve compliance with the requirements of performance standards (h)(i) – (ii), including a 5dBA safety margin.

**iv.** Ventilation - Where bedrooms with openable windows are proposed, a positive supplementary source of fresh air ducted from outside is required at the time of fit-out. For the purposes of this requirement, a bedroom is any room intended to be used for sleeping. The supplementary source of air is to achieve a minimum of 7.5 litres per second per person.
NOTE TO PLAN USERS

Proposed activities that do not meet the performance standards in (h) are Non-Complying Activities under R10.7.5.2.

The following deeming provisions apply in circumstances where a proposed dwelling/building straddles the boundary of noise contours shown on Map 10.6.6.1:

1. Where a dwelling/building is proposed on the 55 Ldn noise contour line, the dwelling/building is deemed to be outside of the Outer Control Contour.
2. Where a dwelling/building is proposed on the 60 Ldn Noise Contour line shown on Map 10.6.6.1, the dwelling/building is deemed to be within the Outer Control Contour.
3. Where a dwelling/building is proposed on the 65 Ldn noise contour line, the dwelling/building is deemed to be within the Air Noise Contour.

Explanation

As a consequence of air noise projection work and other investigative work undertaken by Palmerston North Airport Limited, and the Palmerston North City Council respectively, a large area of land surrounding the Palmerston North Airport has been identified as being subject to varying levels of noise exposure associated with aircraft operations.

The noise emission levels resulting from these operations have been predicted using methods recommended by New Zealand Standard 6805:1992 - Airport Noise Management and Land Use Planning. Noise emission levels are identified as equal loudness contours around the airport. Map 10.6.6.1 - Air Noise Control included in this Plan defines these contours and identifies those areas around the airport, expressed as discrete noise zones, within which specific noise attenuation measures apply.

For the purposes of this Plan, three distinct noise contours have been developed as follows:

a. Air Noise Contour - the Air Noise boundary is generally the 65 Ldn noise contour. Due to the high level of aircraft operational noise predicted within this contour the establishment of any new noise sensitive activities, such as dwellings, are prohibited.

b. Inner Control Contour - the Inner Control Contour incorporates the land between the 60 Ldn and 65 Ldn predicted noise contours. The objective of this Contour is to provide for a level of sound insulation in the design of dwellings and other buildings used for regular accommodation which adequately reduces the level of noise exposure experienced.

c. Outer Control Contour - the Outer Control Contour incorporates the land between the 55 Ldn and 60 Ldn predicted noise contours. The objective of this Contour is to provide for a level of sound insulation in the design of dwellings and other buildings used for regular accommodation which reflects the reduced level of aircraft noise exposure experienced within this area. As the maximum aircraft noise level in this Contour is five decibels less than in the Inner Control Contour, sound insulation requirements are also correspondingly reduced by five decibels.

(i) Turitea / Aokautere Residential Zone Setback
No development, fencing, structures, buildings or earthworks except those within the maximum height permitted in R10.6.1.1(a) shall be located within the 10 or 15 metre setback line as shown on Map 10.6.1.1 “Landscape Provisions – Pacific Drive Extension”.

**Explanation**

Structures on ridgelines tend to be prominent in the landscape when viewed from the floor of the adjoining valley. Height controls and development setbacks from the escarpment can greatly reduce visual impact of development.

The escarpment top which marks the boundary of the Turitea Valley with the Aokautere residential area of Pacific Drive is rounded in nature. The previous practice of building, developing, or carrying out earthworks over the rounded lip of the escarpment top, tended to create adverse effects on the visual amenity of the Turitea Valley below. A setback from the escarpment edge, applicable to almost all man-made modifications, can help maintain the rural character of the Turitea Valley and the escarpment by hiding modifications, when viewed from the valley floor.

(j) **Pacific Drive Extension Area Water Supply Requirements**

New dwellings within the Pacific Drive Extension Area (Map 10.6.1.1) shall be provided with connections to a water system which is able to supply a flow and pressure able to meet the required peak hourly flow for domestic consumption for the area served: and

i. Be able to supply a flow not less than that required for firefighting in a residential area;

and

ii. Be capable of receiving and maintaining a supply that meets the needs of the Drinking Water Standard for New Zealand, Department of Health (2000).

**Alignment with Objectives**

**Purpose:** This rule essentially enables dwellings within the site. The proposed changes to this rule are relatively minor and relate to site area and restricting development to only one dwelling per site within the Napier Road Residential Extension Area.

The remainder of the provisions have been recently reviewed through PC20 and PC22, and as a result no additional evaluation is considered necessary. This PDPCB does not alter the provisions for this rule under either of those Plan Changes. Therefore, this assessment only covers the new proposed provisions that have been included specifically for the Napier Road Residential Extension Area.

**Benefits and Costs:** This proposed rule enables activities to occur, with a minor change for the Napier Road Residential Extension Area to manage site specific constraints. The changes have been included in this rule, rather than R10.6.1.4 to maintain the current approach in the District Plan (where other rules cross reference back to this rule). Maintaining the current approach assists plan users who are already familiar with the current structure and maintains the integrity of the District Plan. This also ensures the Napier Road Residential Area and the Napier Road Residential Extension Area are managed in a very similar way. The benefits of this approach is considered to outweigh any costs given the intention to have a low/medium density development for this site.
**Risks:** Managing flooding risk and stormwater is important for this site. The proposed restriction of one dwelling per site is to ensure sufficient permeable surfaces exist and to discourage high density development. There are other areas within the City where high density development is more appropriate.

**Efficiency and Effectiveness:** The proposed changes are efficient in that they enable a development framework within the Napier Road Residential Extension Area to manage key issues and potential effects from development. This is appropriate given the site constraints relating to flooding and stormwater risk which are sought to be managed through the proposed provisions. The proposed approach is seen as an efficient and effective way to manage the potential adverse effects of subdivision within the site. No other changes are proposed to this rule, and the assessment of the wider rule through PC20 and PC22 still apply.

**Reasonably Practicable Alternatives:** The main alternative option considered includes:

- Retaining the existing Rule with no changes. This would enable a higher density than desired for this location of the City.

**Alignment with Objectives:** The proposed changes align with Objective 8.

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## Key Provisions

<table>
<thead>
<tr>
<th>Rule R10.6.1.3</th>
<th>Rules</th>
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<tbody>
<tr>
<td>Amberley Avenue, Escort Grove, Rangitane Park, and Awapuni Racecourse, Napier Road Residential Area and Napier Road Residential Extension Area Minimum Floor Level Areas</td>
<td>ii. Within the area shown as <strong>Area A</strong> on Map 10.6.1.3 The Amberley Avenue Minimum Floor Levels Area, any residential building erected must have a habitable floor level above 23.45 m in terms of the Palmerston North City Council datum of levels.</td>
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<td>iii. Within the area shown as <strong>Area B</strong> on Map 10.6.1.3 The Amberley Avenue Minimum Floor Levels Area, any residential building erected must have a habitable floor level above 23.31m in terms of the Palmerston North City Council datum of levels.</td>
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<td>iv. Within the area shown as <strong>Area C</strong> on Map 10.6.1.3 The Rangitane Park Ponding Area, any residential building erected must have a habitable floor level above 22.63 m in terms of the Palmerston North City Council datum of levels.</td>
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<td></td>
<td>v. Within the area shown as <strong>Area D</strong> on Map 10.6.1.3 The Escort Grove Minimum Floor Levels Area, any residential building erected must have a habitable floor level above 23.20 m in terms of the Palmerston North City Council datum of levels.</td>
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<td>vi. Within the area shown as <strong>Area E</strong> on map 10.6.1.3 The Awapuni Racecourse Minimum Floor Level Area, any residential building erected must have a ground floor level above 24 metres, with the ground level for residential allotments and any other building or accessory building above 23.60 metres, and all roads above 23.60 metres (measured at the invert of the channel level) being in terms of the Palmerston North City Council datum of levels.</td>
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<td>vii. Within the land zoned residential in the Napier Road Residential Area (Map 7.5), any residential building, any other building or accessory building erected must have a ground floor above the 0.2% AEP flood event plus 500mm freeboard. Access to occupied structures shall be above the 0.2% AEP flood event.</td>
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viii. **Within the land zoned residential in the Napier Road Residential Extension Area (Map 7.8), any residential building, any other building or accessory building erected must have a minimum floor height above the 0.5% AEP flood extent (RL 37.3) plus 500 millimetres freeboard (RL 37.8). Access to habitable structures shall also be above the 0.5% AEP flood extent.**

**Guidance Note:** Compliance with this standard does not mean that land is not identified as being subject to a natural hazard under the Building Act.

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<th>Alignment with Objectives</th>
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**Purpose:** The District Plan has a specific rule for minimum floor levels where buildings must achieve a specified level in order to manage a flood or stormwater risk. Under the plan change a new standard is proposed to be included in Rule 10.6.1.3 for the Napier Road Residential Extension Area in a similar manner to that which exists for the Napier Road Residential Area (R10.6.1.3.vi).

**Benefits and Costs:** The inclusion of a minimum floor level has been recommended in the Stormwater Report. It is also consistent with the provisions of Policy 9-2 of the One Plan. In assessing future subdivision consents, Council is required to assess Natural Hazards under section 106 of the Act. The proposed changes seek to ensure consistency with both the Act and the One Plan.

As discussed earlier, there is a cost in either raising the whole land, as what occurred in the Napier Road Residential Area, or just increasing building platforms. The solution is up to the developer of the land. Nevertheless, the increased costs in achieving the levels recommended in the Stormwater Report and by Horizons Regional Council enable the site to be developed for residential purposes. Even if the land remained Rural Zone minimum floor levels would be required under the One Plan as proposed here.

**Risks:** The Stormwater Report confirms that a minimum floor level of 37.8m is required to manage the risk of flooding should there be a breach of the Manawatu River upstream of the site and stormwater ponding risks. The existing ground level is lower than Napier Road and without raising the land there is an increase in the risk of flooding and ponding. To minimise and mitigate this risk minimum floor levels are proposed in this rule and other relevant places in the District Plan.

Council has a duty under section 31of the RMA to manage control the effects of use and develop of land to avoid or mitigate Natural Hazards. The recommendations of both Horizons and the Stormwater Report have been included in the proposed provisions to manage the known risk.

**Efficiency and Effectiveness:** The proposed changes are efficient in that they enable a development framework within the Napier Road Residential Extension Area that seek to manage key issues and potential effects from development. Requiring a minimum floor level ensure critical design outcomes are achieved, but there is design freedom for how this is achieved by the developer in the future. This is appropriate given the technical recommendations and the characteristics of this site. This approach is also consistent with the approach taken for the Napier Road Residential Area, thereby ensuring District Plan integrity and consistency.

**Reasonably Practicable Alternatives:** The main alternative option considered includes:

- Including specific minimum floor levels within the rule enabling dwellings within the Napier Road Residential Extension Area.

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**Alignment with Objectives:** The proposed changes align with Objective 8.
<table>
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<th>Key Provisions</th>
<th>Rules</th>
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</table>
| Rule R10.6.1.4  Dwellings in the Napier Road Residential Area and the Napier Road Residential Extension Area | Any dwelling, which is not a Restricted Discretionary Activity or a Non-Complying Activity, is a Permitted Activity provided it complies with the Performance Standards detailed in Clauses(a) – (e).

**NOTE TO PLAN USERS**

Notwithstanding the activity status set out in R10.6.1.4, all development that occurs prior to the provision of a road constructed that links the Napier Road Residential Area site to James Line via Rosalee Terrace shall be a non-complying activity and subject to R10.6.5.4. Once the requirements of R10.6.5.4 have been met, development within the Napier Road Residential Area will be a Permitted Activity and R10.6.1.4 will apply.

**Performance Standards**

**a) Height Recessions Planes, Overlooking, Site Area and Coverage, On-site Amenity, Access and Parking**

Compliance with R10.6.1.1(a) (Height Recession Planes), R10.6.1.1(b) (Overlooking), R10.6.1.1(d) (Site Area, Site Coverage and Number of Buildings), R10.6.1.1(e) (On-site Amenity), R10.6.1.1(g) (Access and Parking).

**b) Maximum Building Height**

No building should exceed a maximum height of 7 metres from the minimum floor levels set in R10.6.1.3(vi).

**c) Acoustic Insulation and Setbacks**

*For the Napier Road Residential Area:*

1. All buildings constructed within 80 metres of the carriageway edge of State Highway No.3 shall be in compliance with a noise insulation from outside to inside any habitable space Dn,T, W+Ctr >30dB. Compliance with this standard shall be achieved by ensuring that habitable rooms are designed, constructed and maintained in a manner that:
   - accords with the schedule of typical building construction set out in Appendix 1; or
   - accords with an acoustic design report signed by a suitably qualified and experienced acoustic engineer stating that the design as proposed will achieve compliance with the performance standard. If assumptions are made regarding the performance of an acoustic bund then any assumptions shall be justified in the report and the overall design shall demonstrate compliance with an internal noise level of 35dB L[A]eq(24hr) in living rooms and 30dB L[A]eq(24hr) in bedrooms.

Provided that:

1. No residential building is constructed within 30 metres of the carriageway edge of State Highway No.3.
2. Any external mitigation measures used in assumptions about the internal noise levels, such as noise reducing
bunds, are also properly maintained to a standard that is equal or better than the assumptions made in the report.

3. For bedrooms a positive supplementary source of fresh air is ducted from outside to achieve a minimum of 7.5 litres per second per person.

ii. No residential building is constructed within 30 metres of the carriageway edge of State Highway 3.

**Explanation**
The intention of this rule is to provide for a reduction of approximately 30dB for road traffic noise for dwellings constructed further than 30 metres from the road and closer than 80 metres to the road.

d) **Fencing**

i. If a fence is erected on those properties along the property boundary directly adjoining the Conservation and Amenity Zone then either one or the other provision below shall apply:
   - maximum height of 0.5 metres; or
   - is not erected over more than half of the property boundary.

ii. **Within the Napier Road Residential Extension Area, the maximum height of fencing adjoining a public road or public open space is 1.8 metres except as provided below:**

1. Where a fence is erected along a property boundary directly adjoining public open space:
   - The fence must not exceed 1.1 metres in height for more than half the property boundary length; or
   - If the fence is of open construction, the fence must not exceed 1.8 metres in height.

2. Where a fence is erected along a property boundary directly adjoining a road frontage:
   - A maximum height of 1.1 metres applies except that solid fencing may be erected to 1.8 metres over not more than 1/3 of the frontage width, and
   - No part of a solid fence above 1.1 metres in height shall be located within 1.8 metres of a driveway, except for gate posts relating to a fence of open construction;
   - If the fence is of open construction, the fence must not exceed 1.8 metres in height.

3. Where a side fence is within the front yard or next to a driveway, and within 3 metres of the street edge, a maximum height of 1.1 metres applies. Should a side fence connect to that part of any front fence on the same lot which is permitted by (i) below to rise to 1.8 metres, it may also rise to the same level.

4. Where a fence is erected on the road frontage of a corner site, the requirements of 1-3 shall only apply to one road frontage.
e) Separation Distances

Compliance with R10.6.1.1(c) except

i. those dwellings on properties directly adjoining the escarpment and oxbow lake, any dwelling shall be located at least 10m back from the bottom of the escarpment or boundary of the Conservation and Amenity Zone.

ii. Within the Napier Road Residential Extension Area:
   1. No building shall be located within 20 metres of the edge of the oxbow lake.
   2. Any lot that shares a boundary with Napier Road shall have a minimum building setback of 20 metres from the Napier Road boundary.
   3. Any building containing a noise sensitive activity within the Napier Road Residential Extension Area shall comply with Rule 10.6.1.5(e)(ii).
   4. No buildings or structures shall be located within 3m of the toe of the stopbank.

Guidance Note: Resource consent is required from Manawatu Whanganui Regional Council for work within 8m of the toe of the stopbank.

f) Flood Hazards

Compliance with R10.6.1.3.

g) Permeable surface

For the Napier Road Residential Extension Area:

i. A minimum of 30% of the net site area shall, excluding road, be of permeable surface. This includes decks provided the surface material of the deck allows for water to drain through to a permeable surface.

ii. Each lot must incorporate rain gardens or other biofiltration device to treat road and hard stand runoff prior to discharge to the Council’s stormwater network.

h) Active frontage

Within the Napier Road Residential Extension Area, any houses on lots sharing a boundary with a road must exhibit the following design requirements:

i. Any side or rear garage wall that is within 3 metres and fronting the street edge must be screened by landscaping along 70% of the frontage with vegetation capable of growing to a minimum of 1 metre tall. Glazing shall be provided for at least 10% of the surface area of these street fronting walls.

ii. Windows from a main living area facing the street.

iii. Where the site is on a road corridor, the requirements of i and ii shall only apply to one road frontage.

i) Oxbow Lagoon Landscaping

Within the Napier Road Residential Extension Area, all lots adjoining the oxbow lagoon shall provide a minimum 3 metre buffer of low level native wetland landscaping at the landward side of the oxbow edge.
Guidance Note: Earthworks are provided for under Rule R6.3.6.1(b) of the District Plan. Plan Users must also comply with the requirements of the Heritage New Zealand Pouhere Taonga Act.

1. Permeable surface – new definition to be included in the Definitions Chapter.
Any part of a site which is grassed or planted in trees or shrubs and/or is capable of absorbing water or is covered by decks which allow water to drain through to a permeable surface. It does not include any area which:
1. Falls within the definition of site coverage except for decks as above;
2. Is occupied by swimming pools; or
3. Is paved with a continuous surface.

Alignment with Objectives

Purpose: This rule has been amended to include the Napier Road Residential Extension Area. As previously mentioned, the site of this Plan Change and the Napier Road Residential Area are similar and there are efficiencies in combining provisions for both areas. Some provisions are specific to one of the areas and the rule has been amended to reflect that.

New provisions relating to fencing have been proposed. This is consistent with the approach taken under PC23 for the Hokowhitu Lagoon Residential Area. There is a clear urban design outcome that is to be achieved for the Napier Road Residential Extension Area. The area is unique, bounded by an oxbow and escarpment where high amenity and community use is fundamental to its success. The Structure Plan promotes the unique characteristics relating to open space for this site. Many developments throughout the city are resulting in neighbourhoods with high fences. These inhibit passive surveillance and have the opposite effect of creating a safe and attractive residential environment for those that live in the area.

Yard setbacks are intended to avoid streets where houses are placed close together resulting in a sense of bulk and high density not sought for the development of this site.

As discussed previously, the Stormwater Report includes recommendations on minimum floor levels and permeable surfaces. Parts of the Napier Road Residential Extension Area are low lying in nature. Minimum floor levels for buildings and accesses are required to avoid potential adverse effects of surface water ponding and flooding. Permeable surface requirements recognise the importance to avoid high density development and hard stand areas within the site. These provisions collectively manage natural hazard risk.

Provisions for active frontages builds on the concepts introduced in PC23 for the Hokowhitu Lagoon Residential Area and again seek to ensure a high quality urban environment results whereby blank walls do not face the road.

Servicing provisions are specific to the site and recommended by technical reports supporting the plan change.

The proposed oxbow landscaping requirement is to enhance the overall ecological value of the oxbow and to enable a small amount of treatment for land runoff from those properties which border the oxbow. This seeks to achieve an improved stormwater quality as sought under the Stormwater Report prepared for this Plan Change.

Benefits and Costs: The provisions proposed are largely the same as for other recently residentially zoned areas. The additional provisions are either required to mitigate effects from natural hazards (in the case of floor level requirements), or to achieve the high quality urban
environment sought for this area. While the requirement for an increase in floor level will add additional costs, the benefits are considered to outweigh the costs.

In relation to the fencing and setback performance conditions, these will contribute to amenity and neighbourhood character for the Napier Road Residential Extension Area. They are necessary to ultimately achieve a high quality urban environment recognising the unique characteristics of the site. There remains a considerable degree of choice over design and placement of fencing, enabling development flexibility.

**Risks:** The Stormwater Report confirms that a minimum floor level of RL 37.8 is required to manage the risk of flooding should there be a breach of the Manawatu River upstream of the site and stormwater ponding risks. As discussed earlier, the existing ground level is lower than Napier Road and without raising the land there is an increase in the risk of flooding and ponding. To minimise and mitigate this risk minimum floor levels and permeable surfaces are proposed in the provisions.

Council has a duty under section 31 of the RMA to manage control the effects of use and develop land to avoid or mitigate Natural Hazards. The recommendations of both Horizons and the Stormwater Report have been included in the proposed provisions to manage the risk.

The other changes reinforce and enhance the existing provisions reviewed through recent plan changes, including PC23 for the Hokowhitu Lagoon Residential Area and PC6 Whakarongo Residential Area Plan Change. The provisions are also consistent with the Landscape and Urban Design Report. There is sufficient information to make the proposed changes.

**Efficiency and Effectiveness:** The proposed changes are efficient in that they enable a development framework that manages key issues and potential effects from development. The provisions and framework proposed also is effective and efficient in that critical design outcomes are stated in a way that enables freedom for how they are achieved for each development. This is appropriate given the unique nature of this site.

**Reasonably Practicable Alternatives:** The main alternative options considered include:

- Applying the provisions of the Napier Road Residential Area that would not recognise the constraints of the site.

**Alignment with Objectives:** The proposed changes align with Objective 8.

<table>
<thead>
<tr>
<th>Key Provisions</th>
<th>Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule R10.6.3.1 Buildings or structures that do not comply with Performance Standards for Permitted or Controlled Activities</td>
<td>Any building or structure which does not comply with the Performance Standards for Permitted or Controlled Activities in relation to:</td>
</tr>
<tr>
<td>i. Height, including Maximum Height and Height Recession Planes</td>
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<td>ii. Overlooking</td>
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<td>iii. Separation Distances</td>
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<td>iv. Site Area, Site Coverage and Number of Buildings</td>
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<tr>
<td>v. On-Site Amenity</td>
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<td>vi. Access and Parking</td>
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<tr>
<td>vii. Turitea / Aokautere Residential Zone Setback</td>
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<tr>
<td>viii. Aokautere Development Area</td>
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<tr>
<td>ix. Fencing in the Hokowhitu Lagoon Residential Area</td>
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<tr>
<td>x. Glazing in the Hokowhitu Lagoon Residential Area as per R 10.6.1.5(f)</td>
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<tr>
<td>xi. Floor levels within the Hokowhitu Lagoon Residential Area as per R 10.6.1.5(b)</td>
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</tr>
<tr>
<td>xii. Outdoor amenity in the Golf Ball Hazard Area (as shown in</td>
<td></td>
</tr>
</tbody>
</table>
Map 7.7.2.7)

xiii. *Separation distances within the Napier Road Residential Extension Area*

xiv. *Permeable surfaces in the Napier Road Residential Extension Area*

xv. *Fencing in the Napier Road Residential Extension Area*

xvi. *Floor levels within the Napier Road Residential Extension Area*

xvii. *Active frontages within the Napier Road Residential Extension Area*

are Restricted Discretionary Activities with regard to:

- Effects on Adjoining Residential Neighbours and the Manawatū Golf Course
- Design, Scale and Appearance
- Effects on the surrounding Residential Environment and Streetscape
- The Safe and Efficient Operation of the Roading Network, and internal circulation and manoeuvring areas
- Site Layout
- Visual effects on the rural character and amenity of the Turitea Valley
- Natural Hazards
- *The impact on achieving the design elements and outcomes of the Napier Road Residential Extension Area Structure Plan (Map 7.6),*
- *Fencing location and height within the Napier Road Residential Extension Area*
- *Effects from a non-compliance with the separation distances for the Napier Road Residential Extension Area*

In determining whether to grant consent and what conditions to impose, if any. Council will, in addition to the City View objectives in Section 2 and the Residential Zone objectives and policies, assess any application in terms of the following assessment criteria:

**Assessment Criteria**

a. The extent to which the design, scale and appearance of any building, fence or structure compliments the ambience and amenity values of the surrounding residential area, and Manawatū Golf Course

b. The extent to which the building relates to the character of its setting, contributes to the quality of adjoining public open space, streetscapes and residential properties, and Manawatū Golf Course and avoids visual dominance.

c. To take into account the particular features of the site and its relationship to adjoining sites in assessing the appropriateness of the proposed design.

d. The extent to which new buildings retain reasonable visual privacy and daylighting for adjacent residential properties.

e. The extent to which outdoor space is accessible and of a useable size with access to daylight and sunlight.

f. The extent to which the non-compliance leads to a better or more
efficient use of the site and/or creates a higher level of on-site amenity.

g. To avoid, remedy or mitigate any adverse effects of noise or other environmental disturbance on any adjoining dwelling.

h. The degree to which the non-compliance results in a development density that, if not consistent with the surrounding residential environment, does not lead to a perception of excessive density.

i. The extent to which any off-site parking generated by the activity can be safely accommodated without creating detrimental effects on the efficient operation of the roading network or amenity of the surrounding neighbourhood.

j. To ensure the location, design and appearance of any building or structure has minimal impact on, and is complementary to, the rural character and visual amenity of the Turitea Valley.

k. The extent to which natural hazards are avoided or mitigated.

l. Where a proposal falls under R10.6.3.1(iv) Site Area, Site Coverage and Number of Dwellings, the Council will also assess any application under the relevant assessment criteria in R10.6.3.3.

m. Whether alternative glazing options in the Hokowhitu Lagoon Residential Area can adequately mitigate the potential adverse effects of stray golf balls.

n. For the Napier Road Residential Extension Area
   i. The extent to which the proposal is consistent with the Napier Road Residential Extension Area Structure Plan and will result in a high quality amenity environment.
   ii. The extent to which internal noise levels and amenity will be protected.
   iii. The extent to which the proposed fencing achieves active frontages to public space.
   iv. The extent to which separation distances are achieved to mitigate stormwater and liquefaction risks.
   v. How the proposed development achieves the minimum floor levels to provide protection in an 0.5% AEP flood event.

Explanation

Sometimes it is not possible for a dwelling to meet all the performance standards which are required for it to be treated as a permitted activity. In such situations the proposal must be assessed on a case by case basis to determine if some circumstance exists which makes it unreasonable to meet performance standards or if it is possible to achieve the desired outcome or avoid, remedy or mitigate the identified environmental effect, through another means.

Some land in the Aokautere area is vulnerable to slope instability, erosion and subsidence and therefore buildings and structures should only be established on such land where the natural hazard has been avoided or mitigated. In most cases, residential allotments will have been created with sufficient developable land to enable dwellings and accessory buildings to be safely established. In circumstances where buildings or structures are proposed on land
that is subject to slope instability, erosion or subsidence hazard, they should only be allowed where the hazard is avoided or mitigated.

The assessment policies provide applicants with a vehicle by which wider design flexibility can be sought as well as a guide to how such applications will be assessed.

### Alignment with Objectives

**Purpose:** Amendments are proposed to this rule to specifically address those matters relating to the new provisions for the Napier Road Residential Extension Area when dwellings do not meet the permitted activity conditions.

As outlined earlier, key setbacks, permeable surface, fencing, floor levels and active frontages are all necessary to manage site constraints and development outcomes and have been recommended by technical reports prepared to support this Plan Change.

In those instances where the permitted activity conditions are not able to be met, this rule applies. It is important that plan users have sufficient guidance for how proposals will be assessed.

Collectively, these provisions seek to achieve a high quality urban residential development. Setbacks are intended to reduce any sense of bulk or high density for the site; minimum floor levels and permeable surfaces are necessary to manage natural hazard risk, while the active frontages and fencing provisions are to ensure passive surveillance and an attractive urban environment for those who reside in the zone in the future.

**Benefits and Costs:** The provisions are largely the same as for other residentially zoned areas. The additional provisions are specific to the key constraints for the site which require careful management. They are also considered necessary to achieve the high quality urban environment that is to be achieved in this area.

The provisions of this rule only apply if the permitted activity provisions are not met. Therefore, it is appropriate that a consent is obtained where the assessment is made for those matters that are non-compliant with the key provisions. This is necessary to ensure development addresses those matters to address the specific constraints of this site. The costs associated with obtaining consent are considered to be appropriate to address the specific requirements for development within this site.

**Risks:** The changes reinforce and enhance the existing provisions reviewed through PPC20A, PPC23 and includes recommended changes from technical advice. This recognises the site specific characteristics of the Napier Road Residential Extension Area. There is sufficient information to make the proposed changes.

**Efficiency and Effectiveness:** The proposed changes are efficient in that they enable a development framework within the Napier Road Residential Extension Area that seeks to manage key issues and potential effects from development. Residential development is a permitted activity subject to specific conditions. This rule will only apply where those conditions are not met. This is an efficient approach to ensure the key matters for development are managed so that any adverse effects are mitigated or avoided. This framework is efficient and effective in that the critical design outcomes are stated, but design freedom exists as to how these outcomes are reached. This is appropriate given the unique characteristics of the site.

**Reasonably Practicable Alternatives:** The main alternative option considered includes:
- Developing a full discretionary activity rule for those residential developments that cannot meet the permitted activity conditions.

**Alignment with Objectives:** The proposed changes align with Objective B.

<table>
<thead>
<tr>
<th>Key Provisions</th>
<th>Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R10.7.1.11 Garden Centre at 261 Napier Road</strong></td>
<td>The garden centre situated at 261 Napier Road on land described as Lot 1 DP 456688, is a Permitted Activity in respect of the following listed activities provided the following Performance Standards are complied with.</td>
</tr>
</tbody>
</table>

**Performance Standards**

a. **Nature of the Activity**

That the garden centre and bulk garden supplies shall occur from the existing building and that no extension or alteration be made that would have the effect of increasing the scale or intensity of the operation as at 1 August 2019.

b. **Hours of Operation**

That the shop be open for business between 8am – 6pm 7 days a week.

c. **Signs**

Compliance with Rule R6.1.5.

d. **Noise**

Compliance with Rule R9.11.1.

**Alignment with Objectives**

**Purpose:** The overall intent for the Napier Road Residential Extension Area is to enable residential development. However there is an existing commercial activity – a garden centre – that is currently operating in the area. The landowner is not intending to move his operations, and as such a rule enabling the continued operation at the same scale and intensity as currently occurring is therefore appropriate. In terms of noise, compliance with the existing rural noise levels (which currently apply to the site) is also appropriate as this is the existing use rights that are for the current operation.

**Benefits and Costs:** This rule enables an existing activity within the site to continue. While existing use rights under the Act apply, it is considered that a rule in the District Plan enabling the current activity to continue is appropriate and removes any question on the ability for the land owner to continue his activity. This rule means that the current landowner does not need to apply for any consents to enable what is an existing activity going forward. The benefits are considered to outweigh the costs.

**Risks:** The activity of the garden centre has been in operation from the site for many years. The change in zoning means what is currently operating would not be in the future. The activity is technically part of the existing environment and while would operate under existing use rights, including a rule in the District Plan removes any uncertainty for all parties. Enabling the existing activity at the same scale and intensity is considered appropriate as part of this plan change.

**Efficiency and Effectiveness:** This rule is considered to be an efficient and effective means for the landowner to continue his business until such time as he intends to sell his property (which at this stage is not intended). Including a rule in the District Plan is more appropriate than just relying on existing use rights under the Act.
**Reasonably Practicable Alternatives:** The main alternative option considered includes:
- The landowner relying on existing use rights under the Act.

**Alignment with Objectives:** The proposed changes align with Objective 4 by giving clear guidance on the existing use.

<table>
<thead>
<tr>
<th>Key Provisions</th>
<th>Rules</th>
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<tbody>
<tr>
<td>Rule R10.7.4.12 Commercial and Non-Residential Activities within the Napier Road Residential Extension Area</td>
<td>Any commercial or non-residential activity within the Napier Road Residential Extension Area is a Discretionary Activity.</td>
</tr>
<tr>
<td><strong>Performance Standard</strong></td>
<td></td>
</tr>
<tr>
<td>i.</td>
<td>The following information must be submitted to the Council on lodgement of an application under this Rule.</td>
</tr>
<tr>
<td></td>
<td>a. A Noise Management Plan prepared by a suitably qualified acoustic expert</td>
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<tr>
<td></td>
<td>b. A Traffic Impact Assessment prepared by a suitably qualified traffic engineer or traffic planner.</td>
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<tr>
<td></td>
<td>c. A Stormwater Management Plan prepared by a Chartered Professional Stormwater Engineer identifying the potential stormwater risks to the site and infrastructure that support development. The report must cover.</td>
</tr>
<tr>
<td></td>
<td>1. How onsite stormwater retention and detention measures will achieve hydraulic neutrality in the 1% AEP plus climate change storm with no increase in stormwater effects on surrounding areas.</td>
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<td></td>
<td>2. On-site water sensitive design measures that will be installed to achieve hydraulic neutrality.</td>
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<td></td>
<td>3. A site specific hydrologic modelling assessment using updated oxbow bathymetry and footprint based on the proposed development plan, and include assessment for different downstream discharge conditions.</td>
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<tr>
<td></td>
<td>4. Scoping of all internal stormwater infrastructure and how it will interact with the existing drainage system including connection to the existing stormwater network and discharge to the Napier Road open drain and layout of treatment devices.</td>
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<tr>
<td></td>
<td>5. Treatment of all stormwater runoff prior to discharge to the primary network and/or direct discharge to the oxbow.</td>
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<tr>
<td></td>
<td>6. Protection of treatment devices and treatment runoff during all phases of construction.</td>
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<tr>
<td></td>
<td>The stormwater design must incorporate the Napier roadside drain and treatment of stormwater. Alternatively an assessment on the feasibility of re-directing the Napier roadside drain and contributing catchments to reduce the inflow to the oxbow could be undertaken. A copy of any site calculations must accompany the report.</td>
</tr>
<tr>
<td>ii.</td>
<td>All development must achieve a minimum floor height above the 0.5% AEP flood extent (RL 37.3) plus 500 millimetres freeboard (RL 37.8).</td>
</tr>
</tbody>
</table>
Access to occupied structures shall also be above the 0.5% AEP flood extent.

iii. A minimum of 30% of the net site area shall, excluding road reserve, be of permeable surface. This includes decks provided the surface material of the deck allows for water to drain through to a permeable surface.

iv. Each development must incorporate rain gardens or other biotitration device to treat road and hard stand runoff prior to discharge to the Council’s stormwater network.

v. Any Commercial or non-residential activity shall not utilise more than 20% of the total developable land within the Napier Road Residential Extension Area.

In determining whether to grant consent and what conditions to impose, if any, Council will, in addition to the City View objectives in Section 2 and the Objectives and Policies for the Residential Zone, assess any application in terms of the following further assessment criteria:

a. The extent to which the effects of noise, hours of operation and other environmental disturbance on surrounding residential neighbourhoods are avoided, or can be remedied or mitigated.

b. To avoid, remedy or mitigate the visual impact of any activities, and to preserve the character and amenity of the residential environment.

c. Whether the Noise Management Plan prepared by an acoustical consultant identifies available noise management measures to avoid, remedy or mitigate adverse effects of noise, including best practicable options adopted to minimise sound emissions.

d. The extent to which the effects of the generation of additional traffic are addressed through efficient and effective parking and access provisions.

e. The extent to which additional traffic generated impacts on the safe and efficient operations of the roading network and internal circulation and manoeuvring areas, taking into account the location of the activity on the major arterial route of Napier Road.

f. The extent to which appropriate landscaping elements have been incorporated to enhance the character, ambience and amenity values of the adjoining residential neighbourhood.

g. The extent to which on-site planting has been implemented to reduce the activities visual intrusion on adjacent properties and break up areas of hard surfacing, such as fence lines and paved areas.

h. The extent to which proposed development achieves hydraulic neutrality in the 1% AEP plus climate change storm event.

i. The extent to which flood mitigation has been provided for and does not result in effects on other downstream properties.

j. The extent to which design contributes to positive streetscape outcomes, given the gateway function of Napier Road. This includes, but is not limited to:
   - Active frontages
   - Landscaping
   - Avoidance of blank walls fronting the public realm
   - Minimising carparking at the road frontage.
Alignment with Objectives

**Purpose:** The overall intent for the Napier Road Residential Extension Area is to enable residential development. There is always a possibility that some form of commercial or non-residential activity is desired within the site due to its prominence to State Highway 3. The site has a number of constraints which result in a new commercial or non-residential activity, such as a service station, retail store or restaurant unsuitable as permitted activities, due to the potential of adverse effects. This rule has been included so that should commercial or non-residential development is proposed then specific assessment is undertaken so that any effects can be adequately managed.

**Benefits and Costs:** This rule requires a full discretionary activity consent for any commercial or non-residential development. The intention is to enable specific assessment of these activities within the relatively narrow site. Key considerations are the requirement to supply a noise management plan, a traffic impact assessment, a limit on amount of land able to be used for commercial or non-residential activities, and a stormwater management plan. In all instances, these are necessary to ensure any development does not have significant adverse effect on the predominant residential uses, or does not affect the ability of Napier Road State Highway to function as a major transportation route for the wider area. As discussed earlier stormwater management is critical to how this site is to be development. Commercial and non-residential uses have the potential to create large impervious surfaces that will require careful management so that effects do not occur downstream on residential properties.

The reports required as part of any consent application are considered to be necessary and recommended by the relevant technical reports. These matters need to be carefully considered for any development. On that basis the additional costs of requiring these reports is considered to be appropriate to manage potential effects and assess the appropriateness of the proposed development within the site.

**Risks:** The technical assessments identify the importance of assessing commercial and non-residential activities as these have potential adverse effects on nearby residential activities. The access to the site while suitable for residential activities is not considered suitable for large scale commercial and non-residential activities so further assessment should be undertaken by applicants when an actual development is proposed. This enables the specific effects to be assessed. Given the site constraints and the intention that this site enable residential development the Council has sufficient information with which to make this rule.

**Efficiency and Effectiveness:** This rule signals to plan users that commercial and non-residential activities may not be suitable for this site and that specific assessment is required. This rule is considered to be more appropriate than a Non-Complying Activity which is considered to be more onerous for future developers. The requirement for additional reports reflects those effects of most concern should commercial and non-residential development be proposed within this relatively small residential area.

The proposed framework is efficient and effective in that the critical design outcomes are stated, but design freedom exists as to how these outcomes are managed following specific technical reports being prepared. This is appropriate given the unique characteristics of the site.

**Reasonably Practicable Alternatives:** The main alternative option considered includes:

- Developing a Non-Complying activity rule for those commercial and non-residential developments.

**Alignment with Objectives:** The proposed changes align with Objective 8.
5 AREAS PROPOSED FOR REZONING

5.1 PDPCB proposes rezoning of area between Sutton Place and Roberts Line, comprising of approximately 10.6 ha held within the following legal descriptions:

- Lots 1, 2, 3 and 5 DP 74205
- Lots 1 and 2 DP 456688
- Pt Lot 1 DP 25691
- Lot 10 DP 499783
- Pt lots 2 and 3 SEC 418 Town Of Palmerston North
- Lot 1 DP 41671
- Lot 1 DP 16031 BLK XI Kairanga SD

5.2 To retain the Industrial and Rural zoning is unnecessary and does not reflect the current or future use of the site. Retaining the two zones and relying on consent applications for future residential and non-residential activities will likely result in administrative difficulties, unnecessary time and cost implications and would not enable development nor achieve a high urban amenity outcomes. The current objectives and policies of the two zones do not enable residential use as intended for the Napier Road Residential Extension Area. Therefore when considering the gateway tests for Non-Complying Activities any residential development would have to have less than minor effect for Council to even consider granting consent. This is an extremely onerous and unnecessary approach when rezoning could address the issues, as proposed in this plan change.

5.3 Figure 2 below shows the proposed change in zoning from Industrial and Rural Zone to Residential Zone.

5.4 As outlined above, the site has been assessed at a high level to have some liquefaction and lateral spread risk. This risk can be mitigated through additional geotechnical and lateral spread risk. The costs of enhanced foundations for the site are not considered significant compared with the estimated capital value of the residential development. Overall it is considered that the proposed rezoning of the site is appropriate.

5.5 As outlined in the Stormwater Report, minimum floor levels are required to mitigate natural hazards. These requirements are consistent with the provisions of the One Plan and reflect similar approaches introduced into the District Plan in recent times for the adjacent Napier Road Residential Area, Whakarongo Residential Area and the Hokowhitu Lagoon Residential Area. Any development, including that within the Rural Zone is required by Horizons to achieve a 1:200 AEP level. That is what the provisions are based on for this Plan Change.
5.6 In addition, Council is required to have sufficient landbank for future residential development. Calculations to date show that there is a deficit of available greenfield land in Palmerston North in the medium term to meet projected demand. There is a strategic need for this area of land to be rezoned residential now.

5.7 Overall the proposed rezoning is considered to be appropriate.

6 STATUTORY EVALUATION

Section 5 Purpose of the Act

6.1 The purpose of the Act (Section 5(1)) is to promote the sustainable management of natural and physical resources. Enabling people to make provision for their social, economic and cultural well-being and health and safety, is qualified by the goals described in paragraphs (a), (b) and (c) of Section 5(2) as follows.

(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and  
(b) Safeguarding the life supporting capacity of air, water, soil and ecosystems; and  
(c) Avoiding, remediating, mitigating any adverse effects of activities on the environment.
6.2 Of note with respect to the duties contained in Part 2 however, is the fact that they are by no means confined solely to effects. The definition of "sustainable management" refers not only to "... avoiding, remedying, or mitigating any adverse effects ..." but also the conjunctive requirement of "sustaining the potential of natural and physical resources ... to meet the reasonably foreseeable needs of future generations."

6.3 Meeting the reasonable foreseeable needs of future generations requires consideration of how resources, inclusive of urban infrastructure and development, are to be used and to what extent they are to be used. These are primarily issues of allocation and scale and therefore, by inference, of efficiency.

6.4 The scope of the statutory obligations contained within Part 2 of the Act extends beyond the sole consideration of the management and control of the effects of activities.

6.5 The proposed objectives and policies are founded on a statutory obligation to manage the use and development of physical resources in a way that sustains the potential of physical resources to meet the reasonably foreseeable needs of future generations while managing environmental effects. The proposed changes to the subdivision chapter and residential zone chapter are necessary to reflect the intended change in land use. Enabling residential uses while managing the effects created by the constraints of the site will ensure the natural and physical resources of the site are efficiently used. Rezoning this land to residential offers additional housing choice and location for the residents of Palmerston North. Overall, the PDPCB is considered to be consistent with promoting the purpose of the Act.

Section 6 Matters of National Importance

6.6 Section 6 of the Act identifies matters of national importance for consideration. Of relevance to PDPCB are the following matters:

a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development;

b) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;

c) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers;

6.7 In this instance, the proposed structure plan recognises through open space areas, the oxbow, vegetation along the escarpment, and the constraints of having a major arterial road fronting the site. The intention is for the oxbow and escarpment to be ultimately vested and Council and become part of the recreation network enjoyed by residents throughout the City. The oxbow has been identified by Horizons as a rare and threatened habitat. On that basis this plan change seeks to also protect the oxbow and over time enhances the escarpment through planting and future public use.

6.8 Overall, PDPCB is therefore considered to have particular regard to these matters, as required by Section 6 of the Act.

Section 7 Other Matters

6.9 Section 7 raises a number of related matters, with respect to:
ITEM 13 - ATTACHMENT 1

(b) The efficient use and development of natural and physical resources;

c) The maintenance and enhancement of amenity values; and …

(f) Maintenance and enhancement of the quality of the environment.

6.10 The change in zoning, and compliance with the proposed objectives and rules, will ensure amenity values are maintained and potentially enhanced within and surrounding the newly rezoned land. The structure plan, which will be part of the District Plan and corresponding rules, will ensure development is integrated and managed well over time. PDPCB is therefore considered to have particular regard to these matters, as required by Section 7 of the Act.

Section 8 Treaty of Waitangi

6.11 PDPCB does not propose to alter any sites that are listed within the District Plan as being of particular significance to iwi. However, Council has commissioned a Cultural Impact Assessment (CIA) for the site, which has resulted in plan provisions which are intended to address ecological concerns related to the future use and management of the oxbow. Council has also signalled the need for the oxbow environs to be set aside as a reserve as part of the structure plan. The intent is for Council to develop the oxbow and escarpment once it has been vested through subdivision. Once in Council ownership, there will be opportunity for Council to work with Rangitāne o Manawatū to determine how the oxbow environs could be developed/restored in a manner that addresses the non-RMA related matters raised in the CIA. Overall, the proposal is considered to be consistent with Section 8 of the Act.

Other Matters to be considered

6.12 The Act requires consideration to also be given to other statutory documents where these are relevant. Those documents include:

- Any National Policy Statement;
- Any National Environmental Standards;
- New Zealand Coastal Policy Statement;
- Regional Policy Statement;
- Regional Plans;
- Plans of adjacent territorial authorities;
- Relevant management plans under other statues;
- Relevant planning documents recognised by an iwi authority.

National Policy Statement on Urban Development Capacity 2016

6.13 The National Policy Statement on Urban Development Capacity 2016 (NPS-UD) provides direction to decision-makers on planning for urban environments. It recognises the significance of well-functioning urban environments, with particular focus on ensuring that local authorities, through their planning, both:

- Enable urban environments to grow and change in response to the changing needs of the communities, and future generations, and
- Provide enough space for their populations to happily live and work.

6.14 PDPCB must give effect to the NPS-UD. There are four key themes in the NPS-UD:

- Outcomes for planning decisions
ITEM 13 - ATTACHMENT 1

Evidence base to support planning decisions

Responsive planning

Co-ordinated planning evidence and decision-making.

6.15 In terms of outcomes for planning decisions, the focus of the NPUS-UD is about ensuring local authorities have sufficient housing and business land development capacity for the short, medium and long term and that this is well serviced by development infrastructure and other infrastructure. PDPCB will provide additional residential choice and supply for the short and medium term, without compromising the industrial or rural land needs of the City.

6.16 Under the NPS-US Palmerston North City is considered a medium growth location.

6.17 The NPUS-UD requires housing and business land assessments to be completed on a 3 yearly basis. PNCC is yet to complete its housing and business land assessments under the NPUS-UD, but does regularly monitor its residential land supply and currently meets both the short and medium term requirements of the NPUS-UD. Council is however developing a Future Development Strategy to identify how the Council will achieve the requirements of the NPUS-UD. PDPCB, if fully developed for residential purposes, will provide approximately 50 additional lots (excluding the existing BUPA development) and choice for residents in the City.

6.18 PDPCB is an example of the responsive planning required under the NPUS-UD, where an additional 20% margin of feasible development capacity over the projected demand is required. In addition to PDPCB, PNCC is also investigating a series of other residential zoning adjustments to ensure it is meeting is responsive planning obligations under the NPUS-UD.

6.19 Palmerston North City is a medium growth urban area so is not captured by the minimum targets policies within the NPUS-UD. PNCC has recently released a City Development Strategy towards achieving the goal of an innovative and growing city.

6.20 Palmerston North City Council recently completed a Housing and Business Needs Assessment (HBNA), as required under the National Policy Statement for Urban Development Capacity (NPSUDC). The HBNA identifies the Napier Road Residential Extension Area as a future development area and is intended to provide additional housing capacity in the medium term (0 to 10 year timeframe). The HBNA identifies a need for additional housing capacity in the medium and long terms to meet projected housing demand. The NPSUDC directs Councils provide further development capacity and enable development where there is insufficient capacity to meet projected demand. Proposed Plan Change B assists Council’s in ensuring that the requirements of PC3 of the NPSUDC are met.

6.21 The NPUS-UD also requires Council to consider the feasibility of development areas. In this instance, consideration has been given to whether the proposed rezoning is commercially viable, considering likely costs, and yield of future development. As discussed throughout this report, this site requires specific liquefaction, and minimum floor levels to manage flood and stormwater risks. The proposed provisions are similar to those of the adjacent Napier Road Residential Area and the recently rezoned Hokowhitu Lagoon Residential Area. The need for site specific assessment and mitigation are a common aspect of any greenfield development now. While this site has a relatively low yield of between 45-50 lots, other development nearby has achieved similar outcomes. On that basis the proposed redevelopment is considered to be feasible.
National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

6.22 New Zealand has a legacy of soil contamination that is mainly associated with past practices involving storage and use of hazardous substances, and disposal of hazardous wastes. Common past activities and industries that have led to the creation of contaminated sites in New Zealand including manufacture and use of pesticides, coal, gas, petroleum, mining, timber treatment, sheep dipping.

6.23 In this instance, Council has commissioned a report for the site on the likelihood for soil contamination. As discussed earlier in the report, the testing has confirmed that the levels of contamination are well within that required for residential use and the rezoning is appropriate.

Horizons Regional Council

6.24 The provisions of the One Plan are relevant and have been considered. Of particular relevance is the following provisions.

Objective 3-3: The strategic integration of infrastructure with land use
Urban development occurs in a strategically planned manner which allows for the adequate and timely supply of land and associated infrastructure.

Objective 3-4: Urban growth and rural residential subdivision on versatile soils
To ensure that territorial authorities consider the benefits of retaining Class I and II versatile soils for use as production land when providing for urban growth and rural residential subdivision.

Policy 3-4: The strategic integration of infrastructure with land use
Territorial Authorities must proactively develop and implement appropriate land use strategies to manage urban growth, and they should align their infrastructure asset management planning with those strategies, to ensure the efficient and effective provision of associated infrastructure.

Policy 3-5: Urban growth and rural residential subdivision on versatile soils
In providing for urban growth (including implementing Policy 3-4), and controlling rural residential subdivision (“lifestyle blocks”), Territorial Authorities must pay particular attention to the benefits of the retention of Class I and II versatile soils for use as production land in their assessment of how best to achieve sustainable management.

6.25 Council Infrastructure staff have reviewed the proposal and have confirmed that services can be provided for development to occur on the site. Extension of services are necessary, including the development of a low pressure system to manage wastewater. Overall there is sufficient capacity in the network to enable development as proposed following construction and extension to the existing network connection points.

6.26 This site is a mix of commercial, residential and rural residential activity. The current productive capacity is limited. Given the history of the site and current use, it is not considered that the future intended use for residential purposes significantly alters the use of those sites for production land, compared to the current situation.

6.27 Overall it is considered that PDPCB is consistent with the above objectives and policies in the One Plan.
Summary

6.28 On the basis of the above assessment, and with reference to other discussion and assessment in this Report, the proposed changes presented in PDPCB are consistent with Council’s statutory obligations under the Act.

6.29 This plan change will enable the community to provide for their social, economic and cultural wellbeing while recognising the potential environmental effects for residential uses.

6.30 This evaluation has been undertaken in accordance with Section 32 of the Act in order to identify the need, benefits and costs arising from PDPCB and the appropriateness of the proposed approach having regard to its effectiveness and efficiency relative to other means of achieving the purpose of the Act. The evaluation demonstrates that the proposed plan change meets the requirements of Section 32 of the Act.
Appendix 1 – Proposed District Plan Change B Amendments to the District Plan
SECTION 4: DEFINITIONS

<table>
<thead>
<tr>
<th>Napier Road Residential Extension Area</th>
<th>means the area shown in Map 7.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permeable Surface</td>
<td>means any part of a site which is grassed or planted in trees or shrubs and/or is capable of absorbing water or is covered by decks which allow water to drain through to a permeable surface. It does not include any area which:</td>
</tr>
<tr>
<td></td>
<td>1. Falls within the definition of site coverage except for decks as above;</td>
</tr>
<tr>
<td></td>
<td>2. Is occupied by swimming pools; or</td>
</tr>
<tr>
<td></td>
<td>3. Is paved with a continuous surface.</td>
</tr>
</tbody>
</table>

SECTION 7: SUBDIVISION

Note to users: Wording in Red indicates changes proposed by Proposed District Plan Change B: Napier Road Residential Extension Area.

OBJECTIVE 7

To ensure that development of the Napier Road Residential Area and Napier Road Residential Extension Area proceeds in a manner that:

- provides for and protects sustainable and efficient land transport connectivity and integrated development
- is sensitively designed to enable a safe and appropriate interface with the adjoining conservation and amenity zone and state highway network
- avoids or mitigates the adverse effects of flooding and stormwater, including managing the effects of the associated flood hazard avoidance or mitigation measures
- minimises any adverse landscape effects on the surrounding rural environment and landscape features of the site
- enhances and restores the natural features of the site, with sensitive integration of
86
stormwater design and the ecological functioning of the oxbow wetland

- provides for an integrated extension of the urban boundary and contributes towards the City’s short term residential growth
- facilitates pedestrian and cycle connections between the oxbow lagoon, Napier Road Residential Extension Area and the wider City pathway network
- carries out stormwater management in an integrated manner that incorporates water sensitive design principles and practices in the Napier Road Residential Extension Area.

POLICIES

7.1 To prevent subdivision within the Napier Road Residential Area until a road is constructed and vested with Council that links the site to James Line.

7.2 To ensure that development is undertaken in an integrated manner and generally in accordance with the Napier Road Residential Area Structure Plan (Refer Map 7.5) and the Napier Road Residential Extension Area Structure Plan (Refer Map 7.8).

7.3 To ensure that all necessary stormwater and flooding infrastructure, and earthworks required to maintain flood mitigation, are in place and approved to engineering standard as a matter of priority at the time of subdivision, with ongoing controls in place to ensure the integrity of flood risk measures and stormwater mitigation, particularly on adjoining landowners.

7.4 To protect the landscape and ecological values of the Oxbow Wetland and Escarpment while providing for sensitively designed stormwater disposal for the area and passive recreational use.

7.5 To require a Comprehensive Reserve Development Plan to be lodged at the time of subdivision within the Napier Road Residential Area for the oxbow wetland and escarpment areas as defined on the Structure Plan Map 7.5 for the site.

7.6 To require a Comprehensive Landscape and Engineering Plan for the noise bund within the Napier Road Residential Area to be lodged at the time of subdivision.

7.7 To ensure that the water supply for the residential development has sufficient capacity and pressure to meet the needs of all development including New Zealand Fire Services requirements.

Explanation

The Napier Road Residential Area (NRRA) will provide land for short term residential greenfield growth. Challenges for developing the site include ensuring an attractive interface to SH 3 and entrance to the east of the City, ensuring sustainable, efficient and safe link transport connections, ensuring that appropriate controls are in place to manage flooding and stormwater effects, and providing for the ongoing restoration and ecological enhancement of the oxbow and escarpment features of the site, while providing for passive recreational access. The NRRA also provides an opportunity for a unique residential development, with sensitive integration and management of the landscape and ecological features of the site, the oxbow wetland and escarpment. The structure plan for the site sets out the urban design and general layout outcomes for the site.

7.8 To require the use of Water Sensitive Stormwater Design within the Napier Road Residential Extension Area whereby all lots and road design incorporates pervious surfaces, rain gardens or other biofiltration devices to manage and treat stormwater prior to discharging to the stormwater network.

7.9 To require a comprehensive Stormwater Management Plan to be lodged at the time of subdivision within the Napier Road Residential Extension Area that outlines how a reduction in stormwater runoff and peak flow discharges through flow attenuation is achieved.

7.10 To manage development by requiring additional geotechnical investigations prior to the future use of the
ITEM 13 - ATTACHMENT 1

87

To impose consent notices on titles outlining measures required to implement recommendations from any technical reports to achieve land stability and water sensitive stormwater designs within the Napier Road Residential Extension Area.

7.6 Residential Zone

7.6.1 RULES: CONTROLLED ACTIVITIES

R7.6.1.1 Controlled Activities

1. Any subdivision, except a subdivision provided for in R7.6.1.1(2) below, which complies with the Performance Standards below and which is not specified in R7.6.2.1 as a Restricted Discretionary Activity, R7.6.3.1 as a Discretionary Activity, or R7.6.4.1 as a Non-Complying Activity is a Controlled Activity. Council restricts its control to the consideration of the following matters:

- Subdivision design and layout; the size, shape and arrangement of lots, the location of design and access.
- The layout and design of services and service connections to network infrastructure.

2. Any cross lease, company lease, boundary adjustment or unit title subdivision around existing buildings or buildings under construction which does not result in the creation of any new undeveloped separately disposable lot, cross lease, or company area or any unit, and which complies with the Performance Standards (e) and (f) below and which is not specified in R7.6.2.1 as a Restricted Discretionary Activity, R7.6.3.1 as a Discretionary Activity, or R7.6.4.1 as a Non-Complying Activity is a Controlled Activity. Council restricts its control to the consideration of the following matters:

- Subdivision design and layout; the size, shape and arrangement of cross lease and company lease areas, units and the location and design of access.
- The layout and design of services and service connections to network infrastructure.

Performance Standards for Controlled Activities under R 7.6.1.1

(a) Existing Buildings

Where any land proposed to be subdivided contains existing buildings there shall be no increase in the degree of non-conformity with any Permitted Activity standard for the Residential Zone.

(b) Lot Size

i. In the Aokautere Development Area (refer Map 10.1), but excluding the Parklands Area,
   - each lot shall contain 400m2 of contiguous developable land; and
   - the average area of lots available for residential purposes shall be at least 600m2. In calculating the average lot area, no lots over 1000m2 shall be included.

ii. In the Aokautere Parklands Area each lot shall contain 1300m2 of contiguous developable land.

iii. In the Napier Road Residential Extension Area, Ashhurst, Bunnythorpe and Longburn village residential areas – each lot must be at least 500m2.

iv. In the Palmerston North urban area – each lot must be at least 350m2.

NOTE TO PLAN USERS

All subdivisions in the Pettersons Road, Hewitts Road, and Aokautere Village residential areas identified on
Map 7.1 default to R7.6.4.1.

(c) **Shape Factor**

For subdivisions in the Aokautere Development Area or Ashhurst, Bunnythorpe and Longburn village residential areas, where the subdivision will result in more than six allotments intended for residential purposes, each allotment shall be able to contain a circle of 18 metres in diameter. In the Aokautere Development Area, the required circle shall be entirely comprised in Developable Land.

(d) **Access**

i. Access to lots from a public road may be provided by way of either:
   
   i. an access leg at least 3 metres wide forming part of the lot; or
   
   ii. a shared access consisting of up to six strips lying adjacent to one another and giving access to no more than five other lots, and in respect of which reciprocal rights-of-way are granted or reserved; or
   
   iii. an access lot or strip held in common ownership with the lot and up to five other lots; or
   
   iv. any right-of-way running with and appurtenant to the land in which the lot is comprised.

ii. No two or more access strips to lots may lie adjacent to one another unless easements are granted over each access strip in a manner which enables joint use of a single driveway, and a single point of access to a public road.

iii. The width of shared access shall be as follows:

<table>
<thead>
<tr>
<th>Number of Sites</th>
<th>Minimum Width of Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – 3</td>
<td>3.5 metres</td>
</tr>
<tr>
<td>4 - 6</td>
<td>5.0 metres</td>
</tr>
</tbody>
</table>

iv. Access shall comply with the access performance standards of R20.4.2(a) of the Land Transport Section.

(e) **Essential Services**

i. All essential services must be available for connection within 30 metres of the nearest point of the land being subdivided.

ii. All new lots must have sewer, stormwater and water supply services that are connected to essential services.

iii. All new essential services proposed in a subdivision must be located in public service corridors either where they are to vest in Council or service in excess of 6 lots.
ITEM 13 - ATTACHMENT 1

89

Explanation

The intent of performance standard (ii) is to ensure that in extending new sewer, stormwater and water supply services to a new subdivision they must connect to essential services and must be located through a public service corridor, which will be vested in Council. Please refer to Diagram 7.3A and 7.3B for examples of how this will be applied.

Where a new essential service is not located in a public service corridor, Council is concerned about its ability in the future to maintain that service. At some stage the service (pipe) will need to be fixed or replaced. If the pipe, which is covered by an easement, runs through a number of private properties, access to the easement may be difficult and quite often private landowners will have constructed fences, gardens etc. over the easement thus impeding replacement of the pipe. Although an easement is in place on the title, landowners are seldom aware of the development restrictions related to such easements and these areas still get developed. Council has continual problems with structures, fences, gardens, driveways etc. over easements and when maintenance is required, the costs to Council and the landowners are increased.

Additionally, where services are to be connected into the City Council reticulated systems, it is necessary to ensure these connections are efficient and sustainable. This is influenced by how services are connected. The location of services is vital to the long term efficiency of the City infrastructure networks. The provision and location of essential services through a public corridor will ensure a well-managed network and will ensure logical and orderly development outcomes in urban areas avoiding premature development before the necessary infrastructure is in place to service it.

(f) Esplanade Reserves

In respect of lots less than 4 hectares in area, an esplanade reserve at least 20 metres wide shall be set aside from such lots along the bank of any river whose bed has an average width of 3 metres or more where the river flows through or adjoins the lot concerned.

(g) Pacific Drive Extension Area

All subdivisions in the Pacific Drive Extension area shown on Map 7.1B Pacific Drive Extension Area, with a lot size below 3000m² shall ensure that a water supply is able to be connected to, which at the time of subdivision is able to provide and maintain an adequate supply of potable water that:

i. Makes provision for firefighting requirements for residential areas;

ii. Accommodates the anticipated flows and demands on the supply; and withstand the anticipated pressure and loads.

iii. Is able to service each lot to be created;

iv. Is compatible with other utility systems;

v. Avoids the likelihood of potable water contamination;

vi. Permits appropriate access for firefighting;

vii. Has a design life of at least 70 years;

viii. Avoids the likelihood of leakage.

NOTE TO PLAN USERS

1 For any subdivision applications identified on Map 10.6.1.3 (Areas in which minimum floor levels apply) please refer to the Residential Section, R10.6.1.3 and associated Explanations. This rule relates to minimum floor levels in Amberley Avenue, Escort Grove, Rangitane Park and Racecourse Road Areas.

2 All subdivisions must comply with the National Environmental Standard for Assessing and Managing Contaminants in Soil.

3 Any subdivision and development that is located on any Site of Cultural Heritage Value, as listed in Section 17 of the District Plan, must also comply with R17.16.2.5.

(h) Street Trees

The layout of the subdivision and the location of any associated new or altered vehicle crossing does not require:
(i) the removal of any tree planted on any public road, or
(ii) modification, excavation or construction within the area directly beneath the dripline of the tree.

Explanation
Street Trees make a significant contribution to the quality of the public space and character of the Residential Zone. Subdivision design that results in the removal of established Street Trees is discouraged. Council will consider applications in regard to the health and maturity of the tree, the provision of a replacement tree, and whether alternative site access arrangements are possible. As a Road Controlling Authority, the Council has the authority to refuse permission for the removal of a tree.

NOTE TO PLAN USERS
For any subdivision applications in areas identified as being within the National Grid Subdivision Corridor or within 100m of the Turitea (Linton) National Grid Substation and 25m of the Bunytorhe National Grid Substation, as identified on the Planning Maps, that is not a subdivision for the purposes of accommodating a network utility, also refer to R7.17.1.2 and R7.17.1.3.

(i) Earthworks

i. Any earthworks undertaken on the land being subdivided shall comply with R6.3.6.1(b) for Permitted Activity standards.

ii. Any subdivision within the Aokautere Development Area will be accompanied by an earthworks plan identifying any restructurings of land, earthworks or other works to create land with improved slope and soil stability necessary to enable the development of house sites, services and accessways.

7.6.2 RULES: RESTRICTED DISCRETIONARY ACTIVITIES

R7.6.2.2 Subdivision Within the Napier Road Residential Area and Napier Road Residential Extension Area

Subdivision within the Napier Road Residential Area or the Napier Road Residential Extension Area that is not specified in R7.6.3.1 or R7.6.4.1 and complies with the performance standards below is a Restricted Discretionary Activity.

Performance Standards for Activities under R7.6.2.2

(a) Controlled Activity Performance Standards

Compliance with R7.6.1.2(a) – (e) and (h).

(b) Flood Protection

i. For the Napier Road Residential Area, that each allotment created has a building site above the 0.2% AEP flood extent plus 500 millimetres freeboard and that a consent notice is imposed on titles for individual land owners. Access to occupied structures shall also be above the 0.2% AEP flood extent.

ii. For the Napier Road Residential Extension Area, that each allotment created has a building site above the 0.5% AEP flood extent (RL 37.3) plus 500 millimeters freeboard (RL37.8) and that a consent notice is imposed on titles for individual land owners. Access to occupied structures shall also be above the 0.5% AEP flood extent.

Guidance Note: Compliance with this standard does not mean that land is not identified as being subject to a natural hazard under the Building Act.

(c) Geotechnical Investigations

For the Napier Road Residential Extension Area, the requirement for a report from a Chartered
Professional Geotechnical Engineer identifying
i. the potential liquefaction and lateral spread risks to the site and infrastructure that supports
development. This report must also contain recommendations as to the location, design and
construction of foundations and infrastructure that are appropriate to mitigate any characteristic
or feature identified.
ii. suitable setbacks for buildings from the top or bottom of the existing escarpment.
A copy of any site investigations including bore logs and/or cone penetration tests must accompany the
report.

(d) Stormwater Management Plan

For the Napier Road Residential Extension Area, the requirement for a report from a Chartered
Professional Stormwater Engineer identifying the potential stormwater risks to the site and infrastructure
that supports development. This report must cover:

i. A site specific hydrologic modelling assessment using updated oxbow bathymetry and footprint
based on the proposed subdivision plan, and include assessment for different downstream
discharge conditions.

ii. Scoping of all internal stormwater infrastructure and how it will interact with the existing drainage
system including connection to the existing stormwater network and discharge to the Napier Road
open drain and layout of treatment devices.

iii. Treatment of all stormwater runoff prior to discharge to the primary network and/or direct
discharge to the oxbow.

iv. Protection of treatment devices and treatment runoff during all phases of construction.

v. Outline how the development will hydraulically relate to its surrounding environs, including
assessment of overland flow paths and potential flood impacts of proposed and existing
development.

vi. Outline how the stormwater management system will ensure that any changes in runoff from the
site will be addressed.

vii. Confirm the proposed stormwater mitigation will provide sufficient freeboard to the habitable
dwellings under the scenario where there is no outflow from the oxbow in a 2% AEP rainfall event
(including the adjustments for climate change).

viii. Identify methods to avoid, remedy or mitigate potential stormwater related reverse-sensitivity
effects on dwellings in existence as of 1 August 2019.

This report must also contain recommendations as to the location, design and construction of stormwater
infrastructure that are appropriate to mitigate any characteristic or feature identified. A copy of any site
calculations must accompany the report.

The stormwater design must incorporate the Napier roadside drain and treatment of stormwater.
Alternatively an assessment on the feasibility of re-directing the Napier roadside drain and contributing
catchments to reduce the inflow to the oxbow could be undertaken.

(e) Road Corridors

For the Napier Road Residential Extension Area:

i. All road corridors vested in Council shall be designed to provide areas for pervious pavements,
and/or grassed/planted swales to reduce total runoff and peak flows.

ii. Surface runoff from all roads shall be treated prior to entering the piped stormwater network. This
requires design and inclusion of swales, rain gardens, tree pit or other appropriate biofiltration
devices.

NOTE TO PLAN USERS

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2011) also
applies to earthworks and a consent may be required under those provisions.
The Council will reserve its discretion to the following matters:

ii. The size, shape and arrangement of lots, cross lease and company lease areas, units and access.
iii. Design of the noise mitigation method within the Napier Road Residential Area.
iv. The long term stability and integrity of the mitigation method.
v. Effects of flood avoidance or mitigation in terms of the ensuring satisfactory ground levels and stability of earthworks.
vi. Effects of structures within the oxbow that exacerbate flooding and runoff to adjoining sites.
vii. Reverse sensitivity effects.
viii. The restoration and preservation of the Oxbow and Escarpment, for its ecological values as a recreational feature and as a stormwater conduit.
ix. Lodgement of a Comprehensive Reserve Management Plan for the oxbow and escarpment for the Napier Road Residential Area.

x. Lodgement of a Comprehensive Landscape and Engineering Plan for the noise bund for the Napier Road Residential Area.
xii. Design and layout of the subdivision in accordance with the Structure Plan for the Napier Road Residential Area (Refer Map 7.5) and the Napier Road Residential Extension Area (Map 7.3).
xiii. Inclusion of stormwater treatment and management services.
xiv. The provision of pedestrian access, including possible pedestrian access between the upper and lower terrace.
xv. Enhancement of the Napier Road entrance to the city.

How stormwater sensitive design principles and practices are integrated into subdivision design.

Assessment Criteria

In considering an application and determining whether to grant consent and what conditions to impose, the Council will have regard to the following assessment criteria in assessing the matters for discretion:

a. Restoration and preservation of the Oxbow and Escarpment, ecologically, as a recreational feature and as a stormwater conduit shall be addressed through the implementation of a Comprehensive Reserve Management Plan within the Napier Road Residential Area, which shall be prepared:

   i. by a suitably qualified landscape architect and drainage engineer in consultation with Council experts;

   ii. to the satisfaction of the PNCC Parks and Property Manager and Water and Waste Manager.

   And shall cover, but not be limited to:

   iii. Restoration and enhancement design ensures a natural look with long grasses, not mown on the embankment side, with a mown and managed look on the road reserve side.

   iv. Inclusion of stormwater treatment devices.

   v. Pedestrian access, including possible pedestrian access between the upper and lower terrace.

b. Noise mitigation measures that are undertaken within the Napier Road Residential Area shall be addressed through the implementation of a Comprehensive Landscape and Engineering Plan, which shall be prepared:

   i. by a suitably qualified landscape architect and acoustic engineer

   ii. in consultation with the New Zealand Land Transport Agency

   iii. to the satisfaction of the Principal Planner in consultation with Senior Landscape Architect.

c. For the Napier Road Residential Extension Area:

   i. The degree to which issues of liquefaction and lateral spread have been assessed and proposed to be managed onsite to mitigate any adverse effects.

   ii. The degree to which lots have been designed to maximise sunlight, open space, privacy whilst achieving a high quality urban environment.
iii. The extent to which the proposal is consistent with the Napier Road Residential Extension Area Structure Plan pedestrian opportunities and layout.

iv. The extent to which the amenity and ecological values of the oxbow lagoon are maintained and/or enhanced.

v. How the proposed subdivision, road layout and design enables connectivity with adjoining sites and areas.

vi. Whether the proposed subdivision ensures connectivity to property and roads that have been developed or have the potential to be developed in the future.

vii. The extent to which the proposal incorporates water sensitive stormwater design principles and achieves pervious surfaces.

Non-Notification

No application under R7.6.2.2 is required to be publicly notified.
Map 7.8 - Napier Road Residential Extension Area Structure Plan
SECTION 10:  RESIDENTIAL ZONE

Note to users:  Wording in Red indicates changes proposed by Proposed District Plan Change B: Napier Road Residential Extension Area.

OBJECTIVE 8

To ensure development within the Napier Road Residential Area and the Napier Road Residential Extension Area:

- Protects and provides for sustainable and efficient land transport connectivity.
- Avoids, remedies or mitigates reverse sensitivity with SH 3, the railway line, and surrounding rural land.
- Provides for a visual connectivity between the Residential Zone and the adjoining conservation and amenity zone.
- Does not lead to buildings which are visually intrusive on the landscape.
- Does not lead to land use which adversely affects flood control measures.
- Protects development from natural hazards.
- Creates a high quality and diverse living environment.

POLICIES

8.1 For the Napier Road Residential Area, to prevent development until a road is constructed and vested with Council that links the Napier Road Residential Area to James Line.

8.2 To ensure that development is undertaken in accordance with the Napier Road Residential Area Structure Plan (Map 7.5) and the Napier Road Residential Extension Area Structure Plan (Map 7.8).

8.3 To control ground level heights and earthworks to ensure the integrity of the Noise Bund (within the Napier Road Residential Area) and avoid flooding risks.

8.4 To mitigate the effects of reverse sensitivity from residential development on SH 3 and adjoining farm land.

8.5 For the Napier Road Residential Area, to control the height of buildings to minimise adverse visual effects on the surrounding rural environment and ensure the noise bund integrity as a noise mitigating measure.

8.6 To control the height and scale of fencing on properties directly adjoining the Conservation and Amenity Zone to ensure visual connectivity and social surveillance of the Zone.

8.7 To control the location of buildings in relation to the escarpment and oxbow to protect against the risk of natural hazard.

8.8 For the Napier Road Residential Extension Area,

a. To manage development by requiring additional geotechnical investigations prior to the future use and development of land.

b. To require development in general accordance with the Napier Road Residential Extension Area
Structure Plan (Map 7.8).

c. To encourage active street frontages through design controls for new dwellings, garaging, and fencing.
d. To manage the risk of stormwater flooding by encouraging low impact stormwater design requiring minimum floor levels and by ensuring all lots have adequate pervious surfaces.

Explanation

The Napier Road Residential Area lies to the north of a high speed rural state highway. Noise mitigation measures are important to protect the operation of SH 3 and the amenity of those living within the NRRA. The development of the site is not considered appropriate until a key roading connection is established with James Line via Rossie Terrace to ensure efficient and sustainable land transport connections. The Plan has controls in place to ensure that building development and earthworks do not compromise noise mitigation and flooding effects, or increase visual effects to the surrounding environment. Fencing on properties directly adjoining the conservation and amenity zone will be managed so that there is good visual connectivity and social surveillance with the Conservation and Amenity Zone. Buildings have 2 special setbacks to protect against the risk of escarpment failure and a wave surge into buildings adjacent to the estuary and escarpment.

10.6.1 RULES: PERMITTED ACTIVITIES

R10.6.1.1 Dwellings and Accessory Buildings

Any dwelling or accessory building is a Permitted Activity provided it complies with the Performance Standards detailed in Clauses (a) to (j).

NOTE TO PLAN USERS

Also refer to the following rules:

- R10.6.1.3 Amberley Avenue, Escort Grove, Rangitane Park and Awapuni Racecourse Minimum Floor Level Areas;
- R10.6.3.4 Awatea Stream and Jensen Street Ponding Areas;
- R10.6.1.6 Limited Development Land in the Aokautere Development Area;
- R6.3.6 Earthworks;
- R17.6.1-17.9.1 Cultural and Natural Heritage;
- R23.7.3, 23.9.2 and 23.11.2 Utilities

Non-regulatory Design Guidelines have been prepared for Elmira Avenue and Manapouri Crescent. Although these Design Guidelines have no legal effect under the District Plan they are intended to offer practical advice for developing and maintaining properties in a way that enhances the unique neighbourhood.

Performance Standards

(a) Height - including Maximum Height and Height Recession Planes.

Maximum Height

i. No building may exceed a maximum height of 9 m; and

ii. Any buildings or structures must comply, in terms of maximum height, with R 13.4.7.1.

iii. No fence within the 10 or 15 metre offset boundary, as shown on Map 10.6.1.1 “Landscape Provisions – Pacific Drive Extension”, shall exceed a maximum of 1 metre above the existing ground level, and any solid fence shall be of neutral or recessive colour.

NOTES
a. The elevation shown on the coordinate schedule on Map 10.6.1.1 shall be used as a benchmark of existing ground level.

b. Acceptable colours include those from the following colour range from British Standard 5252 (as at 1 January 2010):
   00 A (01, 03, 05, 07, 09, 11, 13)
   02 A (03, 07, 11), 02 C (39 & 40)
   04 B (15, 17, 19, 21, 23, 25, 27, 29), 04 C (39 & 40)
   06 A (03, 07, 11), 06 C (37, 39 & 40), 06 D (44, 45)
   08 A (14, 06 B (15, 17, 19, 21, 23, 25, 27, 29), 08 C (37, 39, 40), 08 D (44 & 45)
   10 A (01, 03, 05, 07, 09, 11), 10 B (15, 17, 19, 21, 23, 25, 27, 29), 10 C (37, 39),
   10 D (44, 45)
   12 B (15, 19, 21, 23, 25, 27, 29), 12 C (37, 39 & 40), 12 D (44, 45)
   14 C (37, 39 & 40), 14 D (44, 45)
   16 A (03, 07, 11), 16 C (37, 39 & 40), 16 D (44, 45)
   18 A (14, 18 B (15, 17, 19, 21, 23, 25, 27, 29), 18 C (39 & 40)
   20 C 39, 40
   22 C 39, 40
   24 C 39, 40

iv. No building or permanent structure (other than a fence which is covered by (iii)) within the 10 or 15 metre offset boundary as shown on Map 10.6.1.1 “Landscape Provisions – Pacific Drive Extension” shall exceed a maximum height of 0.6 metres above the existing ground level. Note: The elevation shown on the coordinate schedule on Map 10.6.1.1 shall be used as a benchmark of existing ground level.

v. On any allotment containing all or part of the 10 or 15 metre offset boundary, no building on any part of the allotment beyond the 10 or 15 metre offset boundary, shall exceed a maximum height of 7 metres above the existing ground level shown on the coordinate schedule on Map 10.6.1.1 “Landscape Provisions – Pacific Drive Extension”.

**Height Recession Plan**

i. All buildings shall comply with the following recession planes:

   a. All parts of a building shall be contained within a 45° plane commencing at 2.8 metres above ground level inclined inwards at right angles in plan. See Figure 10.1.

ii. Where a boundary adjoins an access strip the measurement will apply at the furthest boundary of the access strip.

iii. These height recession planes and absolute height control shall not apply to:

   a. antennas, aerials, chimneys and architectural appurtenances (such as ornamental towers, turrets, finials, spires, flagpoles and gargoyles) provided these do not exceed the recession plane or absolute height control by more than 5 metres vertical distance.

   b. solar photovoltaic panels, and solar water heaters provided these do not exceed the recession plane or absolute height control by more than 0.5 metres vertical distance.

   c. any boundary common with a reserve or street.

iv. Gable roof ends, including the sloping edge of mono-pitch roofs, may penetrate the height recession plane by no more than one third (1/3) of the gable end height.
v. In applying the height recession plane to properties on Pacific Drive adjoining the offset boundaries, as shown on Map 10.6.1.1 “Landscape Provisions – Pacific Drive Extension”, the plane shall commence from the 10 or 15 metre offset boundary (whichever applies).

(b) Overlooking

Any part of a building that is outside the building envelope formed by the height recession planes and the maximum height limit shall not contain a window. Skylights shall be excluded from this provision.

**Explanation**

In dealing with the issue of the height of buildings in the Residential Zone, it is clear that there are a number of associated effects. Most of these effects impact on adjacent sites and dwellings and it is therefore important that any control, as far as possible, attempts to control these effects without becoming unnecessarily complex or restrictive in terms of the design of any dwelling. The major effects which arise from the height of buildings are:

i. Effects on the penetration of sunlight and daylight to adjacent sites and buildings.

ii. Effects associated with overlooking which may lead to actual or perceived loss of privacy for outdoor areas or dwellings on adjacent sites.

iii. Effects arising from the physical bulk of the building which may lead to a feeling of loss of privacy due to the perception that the building on the adjacent site is oppressive.

While some of these effects can be dealt with by a recession plane approach, it is also necessary to control the location of windows to address the privacy issues. Equally it is also important that any recession plane is related to the orientation of the building in relation to the sun. For instance a building close to a southern boundary is likely to have the greatest effect on neighbouring properties. However this is also an approach which needs to be modified if there is no adjacent residential neighbour or where for instance it is a boundary to a road, school or right of way.
(c) **Separation Distances**

i. Any dwelling on a lot with frontage to a public road shall be located a minimum of:
   
   a. 3 metres from the boundary with any road unless it contains a garage or carport facing the road and having direct access from the road, in which case the minimum separation distance for that part of the dwelling containing the garage or carport shall be 6 metres.
   
   b. 1.5 metres from any other boundary.

ii. Any dwelling without frontage to a public road shall be located a minimum of 1.5 metres from any boundary.

iii. Where two dwellings (or one dwelling and one minor dwelling) are built on the same site;
   
   a. Any part of the façade of a dwelling shall be located at least 3 metres from any other dwelling on the same site.
   
   b. Where two dwellings are joined by their respective garages, the separation distance
provisions of (a) shall not apply.

c. Any part of a dwelling shall be located at least 1.5 metres from the edge of any driveway or right-of-way serving another dwelling on the same site.

iv. Accessory Buildings shall be located a minimum of:
   a. 3 metres from the boundary with any road unless it is a garage or carport facing the road and having direct access from the road, in which case the minimum separation distance shall be 6 metres.
   b. 1.0 metre from any other boundary.
   v. For corner sites the requirements of (j) and (iv) shall only apply to one road frontage.

(d) Site Area, Site Coverage and Number of Buildings

i. Site Area
   a. A minimum net site area of 350m² for each dwelling unit unless subject to the standards of

   Explanation

   An important aspect of residential amenity is the physical distance between dwellings within the same site or an adjoining sites. Where two dwellings are built on adjoining sites, such that each is only the minimum distance from the boundary, they often appear to intrude on each other’s living space and privacy. Where residential buildings are in close proximity there may also be adverse effects in terms of daylight and sunlight penetration.

   Likewise, the physical distance between dwellings and the street-front contribute to the character and amenity values of individual streets. The placement of buildings in close proximity to the street front boundary can result in effects on surrounding property and street character.

   The approach establishes more specific requirements for the street frontage or property; however this is balanced with less fixed regulation for the remainder of the site.

   The overall effects of the separation distances should be to reduce the effects of one dwelling on another or on an adjacent site. Where a variation to these separation distances is considered appropriate as part of the overall design of the dwelling, this can be dealt with by way of a Restricted Discretionary Activity permit.

   (b)-(d) below.

   b. A minimum net site area of 1300m² of contiguous developable land in the Aokautere Parklands Area.

   c. A minimum net site area of 400m² of contiguous developable land in the Aokautere Development Area (refer Map 10.1).

   d. A minimum net site area of 500m² for each dwelling unit in the Napier Road Residential Extension Area, Ashhurst, Bunnythorpe and Longburn village residential areas.

   Explanation

   The site area control provides a standard for densities on sites to avoid the creation of developments which appear overcrowded and have negative effects on adjoining properties or create poor on-site amenity. The site area control ensures sites are of a sufficient size to accommodate necessary buildings and sufficient on-site private open space.

   Variations in the minimum site area are a product of existing development constraints, but also recognising the unique character of both urban and village residential environments.

   For example, given the particular topographic and geological characteristics of the Aokautere area, the intent of this rule, as it relates to the Aokautere Development and Parklands Areas, is to ensure that there is an alignment between minimum lot size and the minimum area of developable land necessary to accommodate a residential building platform.

   Additionally, when subdivided for the purposes of residential development the Parklands Area is intended to act as a transition area between close urban development in the Aokautere Development Area and rural-residential development in, for example, the Moonshine Valley and Palson Hill areas. The provision of larger residential building...
ii. Site Coverage

The maximum amount of site which may be covered by buildings shall be:

- a. 40% on sites of less than 500 m²
- b. 200 m² on sites of 500 m² to 572 m²
- c. 35% on sites over 572 m²
- d. 30% for sites within the Napier Road Residential Extension Area

**Explanation**

When a dwelling is placed on its site much of the effect of the building on the overall amenity of the neighbourhood arises from the perceived bulk of the building. This in turn relates to the height of the building and the proportion of the site which is covered by buildings. This can lead to a feeling that neighbouring properties are being overlooked or are physically "oppressed" by the building. This effect is magnified where the building is double storied and is at maximum site coverage.

The site coverage control is intended to deal with both the "bulk" effect and the physical coverage of the site while still allowing for adequate development potential particularly on small sites.

iii. Number of buildings used for residential living per site

The number of buildings per lot shall be no more than:

- a. Two dwelling units; or
- b. One dwelling and one minor dwelling unit; or
- c. One dwelling unit and one sleep-out.

*Except for the Napier Road Residential Extension Area where only one dwelling per lot shall be permitted.*

**Explanation**

In most cases each lot contains one dwelling, although this is not always the case. The above standard incorporates flexibility to construct minor dwellings and sleep-out accommodation in most areas. However, in order to provide certainty to adjacent properties and maintain residential amenity standards, it is necessary to limit the number of buildings and intensity of accommodation units.

(e) On-site Amenity

Every dwelling shall be provided with an outdoor amenity area which can meet the following requirements: Refer to Figure 10.2

- i. A minimum open area of 36 m² free of driveways, parking spaces, buildings and manouevring area.
- ii. Is able to accommodate a circle of 4.5 metres in diameter.
- iii. The area has a gradient no greater than 1 in 20.
- iv. Has direct contact with a main living area for a length of not less than 2 metres.
- v. Is orientated to the east, west or north of the dwelling.

**Explanation**
102

Much of the enjoyment of a site comes from the availability and useability of open space within the site. To be effective the open space must allow good daylight and sunlight penetration and be readily accessible from the main living areas of the dwelling.

The rules are intended to ensure that through good design that any site has effective open space available which adds positively to on-site amenity values.

NOTE TO PLAN USERS

Applications for the construction of a second dwelling or a minor dwelling unit will incur the payment of a Development Contribution. Refer to the Development Contributions Policy for further information.

FIGURE 10.5

Explanation

This diagram is to read in accordance with performance condition 10.6.1(e), as it provides a visual representation of what is required by the Performance Standards. The diagram complements the conditions which are intended to ensure that through appropriately designed sites, effective open space will be achieved, adding positively to on-site amenity values.

The diagram clearly shows that the preferred location (the tick) for amenity areas is to the east, west or north of the dwelling, within a 4.5 metre diameter within a length of no less than two metres from the main living area. The undesired location of the main amenity area is shown by the cross on the diagram, as the 4.5 metre diameter is not directly located off the living area.

(f) Aokautere Development Area

Within the Aokautere Development Area (Map 10.1) all dwellings and accessory buildings shall be located on developable land.

Explanation
(g) Access and Parking

Compliance with the following performance standards of R20.4.2:

- 20.4.2(a) Vehicle Access;
- 20.4.2(b)(ii) Parking Provision Standards for all zones except the Inner Business Zone;
- 20.4.2(g)(i) Cycle Parking Provision and Design

**Explanation**
The performance standards attempt to mitigate the effects created by the movement of vehicles in residential areas.

(h) Air Noise Control

i. In the Outer Control Contour identified on Map 10.6.6.1, all buildings must be constructed in compliance with:

- Any bedroom in a building used by a noise sensitive activity must achieve the following minimum standard of external sound insulation:
  \[ D_{T,w} + Ctr > 25 \text{ dB} \]

- Any habitable room, other than a bedroom, in a building used by a noise sensitive activity must achieve the following minimum standard of external sound insulation:
  \[ D_{T,w} + Ctr > 20 \text{ dB} \]

- Any used for communal activities must achieve the following minimum standard of external sound insulation:
  \[ D_{T,w} + Ctr > 20 \text{ dB} \]

ii. In the Inner Control Contour identified on Map 10.6.6.1, all buildings must be constructed so that:

- Any bedroom in a building used by a noise sensitive activity must achieve the following minimum standard of external sound insulation:
  \[ D_{T,w} + Ctr > 30 \text{ dB} \]

- Any habitable room, except for a bedroom, in a building used by a noise sensitive activity must achieve the following minimum standard of external sound insulation:
  \[ D_{T,w} + Ctr > 25 \text{ dB} \]

- Any room used for communal activities must achieve the following minimum standard of external sound insulation:
  \[ D_{T,w} + Ctr > 25 \text{ dB} \]

iii. All habitable rooms must be designed, constructed and maintained in accordance with a design report prepared by a suitably qualified and experienced member of the Acoustical Society of New Zealand stating that the proposed design will achieve compliance with the requirements of performance standards (h)(i) – (ii), including a 5dBA safety margin.

iv. Ventilation - Where bedrooms with openable windows are proposed, a positive supplementary source of fresh air ducted from outside is required at the time of fit-out. For the purposes of this requirement, a bedroom is any room intended to be used for sleeping. The supplementary source of air is to achieve a minimum of 7.5 litres per second per person.
NOTE TO PLAN USERS

Proposed activities that do not meet the performance standards in [h] are Non-Complying Activities under R10.7.5.2.

The following demarcation provisions apply in circumstances where a proposed dwelling/building straddles the boundary of noise contours shown on Map 10.6.6.1:

1. Where a dwelling/building is proposed on the 55 Ldn noise contour line, the dwelling/building is deemed to be outside of the Outer Control Contour.
2. Where a dwelling/building is proposed on the 60 Ldn Noise Contour line shown on Map 10.6.6.1, the dwelling/building is deemed to be within the Outer Control Contour.
3. Where a dwelling/building is proposed on the 65 Ldn noise contour line, the dwelling/building is deemed to be within the Air Noise Contour.

Explanation

As a consequence of air noise projection work and other investigative work undertaken by Palmerston North Airport Limited, and the Palmerston North City Council respectively, a large area of land surrounding the Palmerston North Airport has been identified as being subject to varying levels of noise exposure associated with aircraft operations.

The noise emission levels resulting from these operations have been predicted using methods recommended by New Zealand Standard 6805:1992 - Airport Noise Management and Land Use Planning. Noise emission levels are identified as equal loudness contours around the airport. Map 10.6.6.1 - Air Noise Control included in this Plan defines these contours and identifies those areas around the airport, expressed as discrete noise zones, within which specific noise attenuation measures apply.

For the purposes of this Plan, three distinct noise contours have been developed as follows:

a. Air Noise Contour - the Air Noise boundary is generally the 65 Ldn noise contour. Due to the high level of aircraft operational noise predicted within this contour the establishment of new noise sensitive activities, such as dwellings, are prohibited.

b. Inner Control Contour - the Inner Control Contour incorporates the land between the 60 Ldn and 65 Ldn predicted noise contours. The objective of this Contour is to provide for a level of sound insulation in the design of dwellings and other buildings used for regular accommodation which adequately reduces the level of noise exposure experienced.

c. Outer Control Contour - the Outer Control Contour incorporates the land between the 55 Ldn and 60 Ldn predicted noise contours. The objective of this Contour is to provide for a level of sound insulation in the design of dwellings and other buildings used for regular accommodation which reflects the reduced level of aircraft noise exposure experienced within this area. As the maximum aircraft noise level in this Contour is five decibels less than in the Inner Control Contour, sound insulation requirements are also correspondingly reduced by five decibels.

(i) Turitea / Aokautere Residential Zone Setback

No development, fencing, structures, buildings or earthworks except those within the maximum height permitted in R10.6.1.1(a) shall be located within the 10 or 15 metre setback line as shown on Map 10.6.1.1 “Landscape Provisions – Pacific Drive Extension”.

Explanation

Structures on ridgelines tend to be prominent in the landscape when viewed from the floor of the adjoining valley. Height controls and development setbacks from the escarpment can greatly reduce visual impact of development.

The escarpment top which marks the boundary of the Turitea Valley with the Aokautere residential area of Pacific Drive is rounded in nature. The previous practice of building, developing, or carrying out earthworks over the rounded tip of the escarpment top, tended to create adverse effects on the visual amenity of the Turitea Valley below. A setback from the escarpment edge, applicable to almost all man-made modifications, can help maintain the rural character of the Turitea Valley and the escarpment by hiding modifications, when viewed from the valley floor.

(j) Pacific Drive Extension Area Water Supply Requirements

New dwellings within the Pacific Drive Extension Area (Map 10.6.1.1) shall be provided with connections to a water system which is able to supply a flow and pressure able to meet the required peak hourly flow for domestic consumption for the area served: and
i. Be able to supply a flow not less than that required for firefighting in a residential area;

And

ii. Be capable of receiving and maintaining a supply that meets the needs of the Drinking Water Standard for New Zealand, Department of Health (2000).

R10.6.1.3 Amberley Avenue, Escort Grove, Rangitane Park, and Awapuni Racecourse, Napier Road Residential Area and Napier Road Residential Extension Area Minimum Floor Level Areas

i. Within the area shown as Area A on Map 10.6.1.3 The Amberley Avenue Minimum Floor Levels Area, any residential building erected must have a habitable floor level above 23.45 m in terms of the Palmerston North City Council datum of levels.

ii. Within the area shown as Area B on Map 10.6.1.3 The Amberley Avenue Minimum Floor Levels Area, any residential building erected must have a habitable floor level above 23.31 m in terms of the Palmerston North City Council datum of levels.

iii. Within the area shown as Area C on Map 10.6.1.3 The Rangitane Park Ponding Area, any residential building erected must have a habitable floor level above 22.63 m in terms of the Palmerston North City Council datum of levels.

iv. Within the area shown as Area D on Map 10.6.1.3 The Escort Grove Minimum Floor Levels Area, any residential building erected must have a habitable floor level above 23.20 m in terms of the Palmerston North City Council datum of levels.

v. Within the area shown as Area E on map 10.6.1.3 The Awapuni Racecourse Minimum Floor Level Area, any residential building erected must have a ground floor level above 24 metres, with the ground level for residential allotments and any other building or accessory building above 23.80 metres, and all roads above 23.60 metres (measured at the invert of the channel level) being in terms of the Palmerston North City Council datum of levels.

vi. Within the land zoned residential in the Napier Road Residential Area (Map 7.5), any residential building, any other building or accessory building erected must have a ground floor above the 0.2% AEP flood event plus 500mm freeboard. Access to occupied structures shall be above the 0.2% AEP flood event.

vii. Within the land zoned residential in the Napier Road Residential Extension Area (Map 7.8), any residential building, any other building or accessory building erected must have a minimum floor height above the 0.5% AEP flood extent (RL 37.3) plus 500 millimetres freeboard (RL 37.8). Access to habitable structures shall also be above the 0.5% AEP flood extent.

**Guidance Note:** Compliance with this standard does not mean that land is not identified as being subject to a natural hazard under the Building Act.

**Explanation**

The area enclosed by Monrad Street, Pioneer Highway and the Mangoaue Stream in the Amberley area drains to the Mangoaue Stream by way of piped outlets to the Kawau Stream and Pioneer Highway Drain. Generally the residential area lies below the level to which water rises within the stopbanks of these watercourses. At times of high flow, automatic gates close and flood water is prevented from entering the area from the watercourses. Some water will continue to drain to Rangitane Park, but in extreme circumstances, ponding will occur within the streets and then on property. Consequently, the area of potential surface flooding on a 100 year return period, has been identified as the Amberley Avenue Minimum Floor Levels Area.

Escort Grove follows a remnant of one of many watercourses which traversed the area. Stormwater is drained from the area by way of a pipeline access from Totara Road into the watercourse within Rangitane Park. When rainfall exceeds the capacity of the piped system to remove it, initially ponding will occur in the street. With continuing rainfall, this ponding will extend into property until overland flow across Totara Road commences. The area subject to ponding on a...
106

100 year flood return period has been identified as the Escort Grove Minimum Floor Levels Area.

The stream within Rangitane Park is the lower reach of the stormwater system draining a catchment bounded by Pioneer Highway, Botanical Road, College Street and the Mangaweka Stream. It enters the Mangaweka Stream by way of a floodgated structure, which automatically prevents further outflow when water levels within the Mangaweka rise above those in the Park. As water continues to flow from the catchment, it is stored within the ponding area until falling levels in the Mangaweka Stream permit the outflow to resume. This potential ponding area, based on a 100 year flood return period, has been identified as the Rangitane Park Minimum Floor Levels Area.

The Awapuni Racecourse Minimum Floor Level Area has been identified in order to ensure that dwelling/other buildings will not be adversely affected by flooding and ponding and to ensure there will not be an adverse effect on the ponding areas in the vicinity. The flood levels for the area have been determined as being between 23.32 metres and 23.39 metres on low-lying areas of the site. Low lying areas need to be raised to a ground level of 23.80 metres. In addition, floor levels for residential buildings will be above 24.00 metres providing a 600mm freeboard above flood level, which means the area has the same level of protection as the stopbank. For other buildings and accessory buildings the ground level will be above 23.80 metres and roads will be above 23.60 metres so there will be no overland flow path from the Mangaweka into the City.

The Napier Road Residential Area represents an extension to the urban boundary of Palmerston North City. Minimum floor levels above the 0.2% AEP flood event plus 500mm freeboard are required to avoid or mitigate the effects of inundation from the Manawatu River.

In each case a minimum floor area has been established for each area to ensure that any dwelling is not inundated with water when the area functions as a ponding area.

R10.6.1.4 Dwellings in the Napier Road Residential Area and the Napier Road Residential Extension Area

Any dwelling, which is not a Restricted Discretionary Activity or a Non-Complying Activity, is a Permitted Activity provided it complies with the Performance Standards detailed in Clauses(a) – (ej)

**NOTE TO PLAN USERS**

Notwithstanding the activity status set out in R10.6.1.4, all development that occurs prior to the provision of a road constructed that links the Napier Road Residential Area site to James Line via Rosalie Terrace shall be a non-complying activity and subject to R10.6.5.4. Once the requirements of R10.6.5.4 have been met, development within the Napier Road Residential Area will be a Permitted Activity and R10.6.1.4 will apply.

Performance Standards

a) **Height Recession Planes, Overlooking, Site Area and Coverage, On-site Amenity, Access and Parking**

Compliance with R10.6.1.1(a) (Height Recession Planes), R10.6.1.1(b) (Overlooking), R10.6.1.1(d) (Site Area, Site Coverage and Number of Buildings), R10.6.1.1(e) (On-site Amenity), R10.6.1.1(g) (Access and Parking).

b) **Maximum Building Height**

No building should exceed a maximum height of 7 metres from the minimum floor levels set in R10.6.1.3(vi) or vii.

c) **Acoustic Insulation and Setbacks**

For the Napier Road Residential Area:

i. All buildings constructed within 80 metres of the carriageway edge of State Highway No.3 shall be in compliance with a noise insulation from outside to inside any habitable space of Dn,T,W+Ctr >30dB. Compliance with this standard shall be achieved by ensuring that habitable rooms are designed, constructed and maintained in a manner that:

- accords with the schedule of typical building construction set out in Appendix I; or
- accords with an acoustic design report signed by a suitably qualified and experienced acoustic engineer stating that the design as proposed will achieve compliance with the performance standard. If assumptions are made regarding the performance of an acoustic
ITEM 13 - ATTACHMENT 1

107

bund then any assumptions shall be justified in the report and the overall design shall demonstrate compliance with an internal noise level of 35dB L1eq(24hr) in living rooms and 30dB L1eq(24hr) in bedrooms.

Provided that:

1. No residential building is constructed within 30 metres of the carriageway edge of State Highway No.3.
2. Any external mitigation measures used in assumptions about the internal noise levels, such as noise reducing bunds, are also properly maintained to a standard that is equal or better than the assumptions made in the report.
3. For bedrooms a positive supplementary source of fresh air is ducted from outside to achieve a minimum of 7.5 litres per second per person.
   ii. No residential building is constructed within 30 metres of the carriageway edge of State Highway 3.

Explanation
The intention of this rule is to provide for a reduction of approximately 30dB for road traffic noise for dwellings constructed further than 30 metres from the road and closer than 80 metres to the road.

d) Fencing

i. If a fence is erected on those properties along the property boundary directly adjoining the Conservation and Amenity Zone then either one or the other provision below shall apply:
   • maximum height of 0.5 metres; or
   • is not erected over more than half of the property boundary.

ii. Within the Napier Road Residential Extension Area, the maximum height of fencing adjoining a public road or public open space is 1.8 metres except as provided below:

   1. Where a fence is erected along a property boundary directly adjoining public open space:
      • The fence must not exceed 1.1 metres in height for more than half the property boundary length; or
      • If the fence is of open construction, the fence must not exceed 1.8 metres in height.

   2. Where a fence is erected along a property boundary directly adjoining a road frontage:
      • A maximum height of 1.1 metres applies except that solid fencing may be erected to 1.8 metres over not more than 1/3 of the frontage width, and
      • No part of a solid fence above 1.1 metres in height shall be located within 1.8 metres of a driveway, except for gate posts relating to a fence of open construction;
      • If the fence is of open construction, the fence must not exceed 1.8 metres in height.

   3. Where a side fence is within the front yard or next to a driveway, and within 3 metres of the street edge, a maximum height of 1.1 metres applies. Should a side fence connect to that part of any front fence on the same lot which is permitted by (f) below to rise to 1.8 metres, it may also rise to the same level.

   4. Where a fence is erected on the road frontage of a corner site, the requirements of 1-3 shall only apply to one road frontage.

e) Separation Distances

Compliance with R10.6.1.1(c) except

i. those dwellings on properties directly adjoining the escarpment and oxbow lake, any dwelling shall
be located at least 10m back from the bottom of the escarpment or boundary of the Conservation and Amenity Zone.

ii. **Within the Napier Road Residential Extension Area:**
   1. No buildings shall be located within 20 metres of the edge of the oxbow lake.
   2. Any lot that shares a boundary with Napier Road shall have a minimum building setback of 20 metres from the Napier Road boundary.
   3. Any building containing a noise sensitive activity shall comply with Rule 10.6.1.5(e)[iii].
   4. No buildings or structures shall be located within 3m of the toe of the stopbank.

**Guidance Note:** Resource Consent is required from Manawatu Whanganui Regional Council for work within 8m of the toe of the stopbank.

f. **Flood Hazards**
   Compliance with R10.6.1.3.

g. **Permeable surface**
   For the Napier Road Residential Extension Area:
   i. A minimum of 30% of the net site area shall, excluding road, be of permeable surface. This includes decks provided the surface material of the deck allows for water to drain through to a permeable surface.
   ii. Each lot must incorporate rain gardens or other biofiltration device to treat road and hard stand runoff prior to discharge to the Council’s stormwater network.

h. **Active frontage**
   Within the Napier Road Residential Extension Area, any houses on lots sharing a boundary with a road must exhibit the following design requirements:
   i. Any side or rear garage wall that is within 3 metres and fronting the street edge must be screened by landscaping along 70% of the frontage with vegetation capable of growing to a minimum of 1 metre tall. Glazing shall be provided for at least 10% of the surface area of these street fronting walls.
   ii. Windows from a main living area facing the street.
   iii. Where the site is on a road corner, the requirements of i and ii shall only apply to one road frontage.

i. **Oxbow Lagoon: Landscaping**
   Within the Napier Road Residential Extension Area, all lots adjoining the oxbow lagoon shall provide a minimum 3 metre buffer of low level native wetland landscaping at the landward side of the oxbow edge.

**Guidance Note:** Earthworks are provided for under Rule R6.3.6.1(b) of the District Plan. Plan Users must also comply with the requirements of the Heritage New Zealand Pouhere Taonga Act.

**10.6.3 RULES: RESTRICTED DISCRETIONARY ACTIVITIES**

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1 Permeable surface – new definition to be inserted into the Definitions chapter
   Any part of a site which is grassed or planted in trees or shrubs and/or is capable of absorbing water or is covered by decks which allow water to drain through to a permeable surface. It does not include any area which:
   1. Falls within the definition of site coverage except for decks as above;
   2. Is occupied by swimming pools; or
   3. Is paved with a continuous surface.
R10.6.3.1 Buildings or Structures that do not comply with Performance Standards for Permitted or Controlled Activities.

Any building or structure which does not comply with the Performance Standards for Permitted or Controlled Activities in relation to:

i. Height, including Maximum Height and Height Recession Planes
ii. Overlooking
iii. Separation Distances
iv. Site Area, Site Coverage and Number of Buildings
v. On-Site Amenity
vi. Access and Parking
vii. Turitea / Aokautere Residential Zone Setback
viii. Aokautere Development Area
ix. Fencing in the Hokowhitu Lagoon Residential Area
x. Glazing in the Hokowhitu Lagoon Residential Area as per R 10.6.1.5 (f)
xi. Floor Levels within the Hokowhitu Lagoon Residential Area as per R 10.6.1.5(b)

xii. Outdoor amenity in the Golf Ball Hazard Area (as shown in Map 7.7.2.7)

xiii. Separation distances within the Napier Road Residential Extension Area
xiv. Permeable surfaces in the Napier Road Residential Extension Area
xv. Fencing in the Napier Road Residential Extension Area

xvi. Floor levels within the Napier Road Residential Extension Area

xvii. Active frontages within the Napier Road Residential Extension Area.

are Restricted Discretionary Activities with regard to:

- Effects on Adjoining Residential Neighbours and the Manawatū Golf Course
- Design, Scale and Appearance
- Effects on the surrounding Residential Environment and Streetscape
- The Safe and Efficient Operation of the Roading Network, and internal circulation and manoeuvring areas
- Site Layout
- Visual effects on the rural character and amenity of the Turitea Valley
- Natural Hazards
  - The impact on achieving the design elements and outcomes of the Napier Road Residential Extension Area Structure Plan (Map 7.8).
  - Fencing location and height within the Napier Road Residential Extension Area.
  - Effects from a non-compliance with the separation distances for the Napier Road Residential Extension Area.

In determining whether to grant consent and what conditions to impose, if any, Council will, in addition to the City View objectives in Section 2 and the Residential Zone objectives and policies, assess any application in terms of the following assessment criteria:
Assessment Criteria

a. The extent to which the design, scale and appearance of any building, fence or structure compliments the ambience and amenity values of the surrounding residential area and Manawatū Golf Course.

b. The extent to which the building relates to the character of its setting, contributes to the quality of adjoining public open space, streetscapes and residential properties and Manawatū Golf Course, and avoids visual dominance.

c. To take into account the particular features of the site and its relationship to adjoining sites in assessing the appropriateness of the proposed design.

d. The extent to which new buildings retain reasonable visual privacy and daylighting for adjacent residential properties.

e. The extent to which outdoor space is accessible and of a useable size with access to daylight and sunlight.

f. The extent to which the non-compliance leads to a better or more efficient use of the site and/or creates a higher level of on-site amenity.

g. To avoid, remedy or mitigate any adverse effects of noise or other environmental disturbance on any adjoining dwelling.

h. The degree to which the non-compliance results in a development density that, if not consistent with the surrounding residential environment, does not lead to a perception of excessive density.

i. The extent to which any off-site parking generated by the activity can be safely accommodated without creating detrimental effects on the efficient operation of the roading network or amenity of the surrounding neighbourhood.

j. To ensure the location, design and appearance of any building or structure has minimal impact on, and is complementary to, the rural character and visual amenity of the Turitea Valley.

k. The extent to which natural hazards are avoided or mitigated.

l. Where a proposal falls under R10.6.3.1(iv) Site Area, Site Coverage and Number of Dwellings, the Council will also assess any application under the relevant assessment criteria in R10.6.3.3.

m. Whether alternative glazing options in the Hokowhitu Lagoon Residential Area can adequately mitigate the potential adverse effects of stray golf balls.

n. For the Napier Road Residential Extension Area:

i. The extent to which the proposal is consistent with the Napier Road Residential Extension Area Structure Plan and will result in a high quality amenity environment.

ii. The extent to which internal noise levels and amenity will be protected.

iii. The extent to which the proposed fencing achieves active frontages to public space.

iv. The extent to which separation distances are achieved to mitigate stormwater and liquefaction risks.

v. How the proposed development achieves the minimum floor levels to provide protection in an 0.5% AEP flood event.

Explanation

Sometimes it is not possible for a dwelling to meet all the performance standards which are required for it to be treated as a permitted activity. In such situations the proposal must be assessed on a case by case basis to determine if some circumstance exists which makes it unreasonable to meet performance standards or if it is possible to achieve the desired outcome or avoid, remedy or mitigate the identified environmental effect, through another means.

Some land in the Aokautere area is vulnerable to slope instability, erosion and subsidence and therefore buildings and structures should only be established on such land where the natural hazard has been avoided or mitigated. In most cases, residential allotments will have been created with sufficient developable land to enable dwellings and accessory buildings to be safely established. In circumstances where buildings or structures are proposed on land that is subject to

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ITEM 13 - ATTACHMENT 1
10.7 Non-Residential Activities

Introduction

There is a range of activities which need to be provided for in the Residential Zone because they are compatible with dwellings or because of the opportunity they offer to people to gain convenient access to a service or to work from home.

A number of these activities are variants on single dwellings such as community houses, or are community facilities such as pre-schools. In all cases, the important issue is the effect of the activity, it is those effects which have determined how the activity will be treated. As far as possible, activities have been made Permitted Activities. However where the nature or extent of effects are uncertain, the activity has become a Controlled or Discretionary activity.

A limited set of non-residential activities are provided for to ensure the Residential Zone provisions support the centres based approach for commercial activities in the City and the associated hierarchy of business zones.

R10.7.1.11 Garéen Centre at 261 Napier Road

The garden centre situated at 261 Napier Road on land described as Lot 1 DP 456688, is a Permitted Activity in respect of the following listed activities provided the following Performance Standards are complied with:

Performance Standards

a. Nature of the Activity

That the garden centre and bulk garden supplies shall occur from the existing building and that no extension or alteration be made that would have the effect of increasing the scale or intensity of the operation as at 1 August 2019.

b. Hours of Operation

That the shop be open for business between 8am – 6pm 7 days a week.

c. Signs

Compliance with Rule R6.1.5.

d. Noise

Compliance with Rule R9.11.1.

R10.7.4.12 Commercial and Non-Residential Activities within the Napier Road Residential Extension Area

Any commercial or non-residential activity within the Napier Road Residential Extension Area is a Discretionary Activity.

Performance Standards

i. The following information must be submitted to the Council on lodgement of an application under this rule:

   a. A Noise Management Plan prepared by a suitably qualified acoustic expert

   b. A Traffic Impact Assessment prepared by a suitably qualified traffic engineer or traffic planner.
c. A Stormwater Management Plan prepared by a Chartered Professional Stormwater Engineer identifying the potential stormwater risks to the site and infrastructure that support development.
   The report must cover:
   1. How onsite stormwater retention and detention measures will achieve hydraulic neutrality in the 1% AEP plus climate change storm with no increase in stormwater effects on surrounding areas.
   2. On-site water sensitive design measures that will be installed to achieve hydraulic neutrality.
   3. A site specific hydrologic modelling assessment using updated oxbow bathymetry and footprint based on the proposed development plan, and include assessment for different downstream discharge conditions.
   4. Scoping of all internal stormwater infrastructure and how it will interact with the existing drainage system including connection to the existing stormwater network and discharge to the Napier Road open drain and layout of treatment devices.
   5. Treatment of all stormwater runoff prior to discharge to the primary network and/or direct discharge to the oxbow.
   6. Protection of treatment devices and treatment runoff during all phases of construction.

The stormwater design must incorporate the Napier roadside drain and treatment of stormwater. Alternatively an assessment on the feasibility of re-directing the Napier roadside drain and contributing catchments to reduce the inflow to the oxbow could be undertaken. A copy of any site calculations must accompany the report.

ii. All development must achieve a minimum floor height above the 0.5% AEP flood extent (RL 37.3) plus 500 millimeters freeboard (RL 37.8). Access to occupied structures shall also be above the 0.5% AEP flood extent.

iii. A minimum of 30% of the net site area shall, excluding road reserve, be of permeable surface. This includes decs provided the surface material of the deck allows for water to drain through to a permeable surface.

iv. Each development must incorporate rain gardens or other biofiltration device to treat road and hard stand runoff prior to discharge to the Council’s stormwater network.

v. Any Commercial or non-residential activity shall not utilise more than 20% total of the developable land within the Napier Road Residential Extension Area.

In determining whether to grant consent and what conditions to impose, if any, Council will, in addition to the City View objectives in Section 2 and the Objectives and Policies for the Residential Zone, assess any application in terms of the following further assessment criteria:

a. The extent to which the effects of noise, hours of operation and other environmental disturbance on surrounding residential neighbourhoods are avoided, or can be remedied or mitigated.

b. To avoid, remedy or mitigate the visual impact of any activities, and to preserve the character and amenity of the residential environment.

c. Whether the Noise Management Plan prepared by an acoustical consultant identifies available noise management measures to avoid, remedy or mitigate adverse effects of noise, including best practicable options adopted to minimise sound emissions.

d. The extent to which the effects of the generation of additional traffic are addressed through efficient and effective parking and access provisions.

e. The extent to which additional traffic generated impacts on the safe and efficient operations of the roading network and internal circulation and manoeuvring areas, taking into account the location of the
activity on the major arterial route of Napier Road.

f. The extent to which appropriate landscaping elements have been incorporated to enhance the character, ambience and amenity values of the adjoining residential neighbourhood.

g. The extent to which onsite planting has been implemented to reduce the activities visual intrusion on adjacent properties and break up areas of hard surfacing, such as fence lines and paved areas.

h. The extent to which proposed development achieves hydraulic neutrality in the 1% AEP plus climate change storm event.

i. The extent to which flood mitigation has been provided for and does not result in effects on other downstream properties.

j. The extent to which design contributes to positive streetscape outcomes, given the gateway function of Napier Road. This includes, but is not limited to:

- Active frontages
- Landscaping
- Avoidance of blank walls fronting the public realm
- Minimising carparking at the road frontage.

10.8 Rules: Noise - Non-Residential Activities

R10.8.1 NOISE

Sound emissions from any fixed mechanical plant, or from any non-residential activity, when measured at or within the boundary of any other site (other than land from which the noise is emitted or a road) shall not exceed the following:

- 7.00am to 10.00pm: 45dB LAeq (15mins)
- 10.00pm to 7:00am: 40dB LAeq (15mins)
- Night-time Lmax: 10:00pm to 7:00am: 65dBA Lmax

Refer also to Section 6: Noise.

Explanation

The rules for the Residential Zone are intended to control the noise from any items of fixed mechanical plant, and from non-residential activities situated in a Residential Zone. The mechanical plant items include, but shall not be limited to, residential and non-residential heat-pumps, fans, pumps, and generators. Care needs to be taken with the installation of those plant items that they are sensibly selected, located and operated such as not to cause a nuisance to neighbours.

The limit of 45 dB LAeq (15mins) during the days is purposefully stringent and sets out to discourage noise even moderate noise generators from establishing in the quiet residential environment. Such activities may be appropriately located in the Residential Zone in areas where the ambient sound levels are high at times when the activity takes place. This would be closer to main roads or activity areas for example. To be acceptable the level of the activity should not intrude into the existing sound environment. Such activities would be assessed as discretionary activities and the application would need to be submitted with a noise impact assessment. To have the limit that is less than 45 dBA during daytime would be overly stringent and could prove difficult to enforce. The night-time 40dB LAeq (15mins) and 65dBA Lmax limits are designed to protect sleep in quiet residential areas. This Rule provides a moderately strict noise control regime.
12. INDUSTRIAL ZONE

12.1 Introduction

Palmerston North City accommodates a wide range of industries. These have largely established within the Palmerston North urban area around the North Island Main Trunk Railway line (NIMTR) and also in a number of small pockets adjacent to the central business area and along the river, for example Joseph and Church Streets, and Roxburgh Crescent.

Established industry outside the Palmerston North urban area has largely developed in Ashhurst, for example Mulgrave and Custom Streets, or, in a small number of cases within the rural area. These industries have generally evolved in response to local demands, for example service stations or workshops servicing local communities, or are the product of larger urban industrial areas being unsuited to the accommodation of such industries, in particular those industries with an odour component.

A range of non-industrial activities have traditionally been allowed within the city’s industrial areas. These include a range of semi-industrial hardware and building supply retailers, community and leisure facilities, and convenience and support services for industrial area workers such as lunch bars and creches. A small number of residential activities are also located within this area. Industry has a vital role in the economic well-being of communities.

Since 2000 there has been a general decline in manufacturing employment in Palmerston North, which has been off-set by employment growth in the logistics and supply chain sector, including wholesale trade, transport, postal, warehousing and non-store retailing. Employment growth in the industrial sector has been concentrated in Milton and Kelvin Grove, reflecting the expansion and development of new distribution centres in the North East Industrial Zone and Kelvin Grove.

Industry is only likely to develop and remain within the city when a favourable economic climate prevails. Adequate land and infrastructure also needs to exist for the establishment and development of that industry. Both established and developing industrial areas and their supporting infrastructure therefore represent a significant community resource in terms of the investment in industrial land, buildings and infrastructure, and the actual and potential economic and social benefits that could result from this investment.

The primary function of the Industrial Zone is to recognise established and developing industrial areas within the city and to enable these areas to be utilised for a wide range of industrial activities. Additionally the city’s Industrial Zone has a subsidiary function in providing for supplementary activities essential to the operation of industry (for example industrial services and convenience shops for workers) and other non-industrial activities, such as community and leisure facilities and semi-industrial retailers, including building suppliers and home renovation firms, which cannot be as readily accommodated, for economic and operational reasons, within other zones.

Given the proximity of a large portion of the industrial area to residential areas, and an extensive interface between these areas, it will be necessary to control the effects of industrial land use and development to ensure that an appropriate level of amenity protection is afforded to adjacent residential areas.

In 2008, the Napier Road Industrial Precinct (as shown on Structure Plan 12.1) and the Midhurst Street Industrial Areas (as shown in Structure Plan 7.4) were specifically developed to meet the demand for small to medium-sized industrial sites in the City (also refer to the Subdivision Section). Development within the Napier Road Industrial Precinct and the Midhurst Street Industrial Area is managed by reference to Structure Plan 12.1 and 7.2 to achieve the desired environmental results and the integrated provision of infrastructure.

Major dairy manufacturing and processing activities are located at the Longburn Dairy Manufacturing Site and the Braeburn Industrial Area where they are supported by strategic transport infrastructure. The activities occupy a single site straddling Reserve Road. The Braeburn Industrial Area provides additional land for the future expansion of Fonterra Co-Operative Group’s (Fonterra) existing site at Longburn. The purpose of the
area is to primarily provide for dairy related industrial activities to support the on-going operational and growth needs of Fonterra. It is envisaged that the Braeburn Industrial Area will remain in the single ownership of Fonterra and is not for the purpose of meeting the wider industrial land needs of the City. In this regard, subdivision has been made a non-complying activity. Planning provisions have been developed to provide for a narrowed range of activities for area. The use of a comprehensive development plan seeks to ensure comprehensive and coordinated site planning of the Braeburn Industrial Area is considered before development is approved. The restricted discretionary classification of development recognises the greenfields nature of the area and the importance of ensuring planning for services is considered at the earliest stage of development. Infrastructure provision is to be privately provided and maintained and will be to a standard that meets the operational requirements of the dairy related industrial activities.

NOTE TO PLAN USERS
This part of the Plan should be read in conjunction with Section 14 Hazardous Substances.

12.2 Resource Management Issues

The following resource management issues have been identified in the Industrial Zone:

1. The need to enable a wide and diverse range of industrial activities, and recognise the changing needs of industry.
2. The effects, including cumulative effects, of Industrial Zone retail and office development on the established physical resources in industrial areas and the viability of the City's business areas.
3. The inefficient use and development of the physical resources in the Industrial Zone by non-industrial activities.
4. The impact of activities and new building development on the character and amenity of the Industrial Zone and adjoining residential, rural and recreation areas and arterial roads.
5. Reverse sensitivity issues associated with noise sensitive activities such as residential dwellings and offices establishing within industrial areas.
6. The need for safe, accessible and convenient access to industrial sites and activities while maintaining a safe and efficient roading network.
7. The need for new developments within the Industrial Zone to be in general accordance with any relevant structure plan or comprehensive development plan to ensure achievement of the desired environmental results and the integrated provision of infrastructure.
8. The potential for aircraft to undershoot or overshoot the Palmerston North Airport runway

Explanation

As described in the introductory section, the Industrial Zone within Palmerston North accommodates a wide range of industrial and non-industrial activities. Recent industrial trends in Palmerston North suggest a declining manufacturing sector and growing logistics and supply chain sector. The controls around development within the City's industrial areas need to enable and provide for these growth trends while managing associated environmental effects.

It is important that the City's industrial areas are able to accommodate a wide and diverse range of industrial activities. Enabling a broad range of activities promotes the efficient use of physical resources that flows from the co-location of complementary activities. This approach also provides flexibility for the market to respond to an increasingly dynamic and globalised market place.

The development and expansion of activities within the City's 'Industrial Zone' raises several issues which require attention within this plan.

The effects of retail and office development not associated with industrial activities have been identified as an issue for a number of reasons. If no controls are put in place, the lower cost of industrial land, and its visibility from arterial roads, is likely to encourage the unplanned dispersal of retailing and office activities into the industrial area.

This would raise two concerns. Firstly, it would quickly lead to the inefficient use and further development of the physical resources, particularly buildings and infrastructure which have already been developed within the business areas to meet...
the needs of business activities. Secondly, it would displace industrial activities which would then have to try to establish in areas, such as the rural area, where their potential adverse environmental effects would be much harder to control. Cumulative effects of office and retail development within the Industrial Zone arise when successive consents over time are applied for and granted within the Industrial Zone.

Additionally, retail and office dispersal into the industrial area is likely to bring with it demands for higher amenity standards, particularly with regard to provision for pedestrians and parking. This would lead to an inefficient allocation of resources into these areas, as these facilities already exist within the business areas and would once again contribute to displacing industries the activities of which created adverse effects on the new “higher quality” amenities.

Many of the City’s industrial areas are in close proximity to established and developing residential areas. These areas are particularly sensitive to a range of effects commonly associated with industrial activity including the effects of building height, form and design, and the effects of activities such as noise, light, hours of operation and traffic generation. Hence it is necessary that activity effects are addressed when providing for these activities and in assessing those activities which require a consent by the Plan.

Poor visual amenity within the City’s industrial areas is seen as an issue, given that it affects the quality of environment for workers, within these areas, and neighbours and the appearance of these areas for those who pass through them. The management of adverse amenity effects is particularly important on those sites with frontage to the City’s arterial road network. Because these roads serve as the main entry points for Inter-Regional traffic, and accommodate the highest traffic volumes, they are critically important to the City. Managing the effects of new buildings, alterations to buildings, and industrial activities, particularly on visual amenity, through controls on bulk, setback, landscaping and access is important for these roads.

Other non-industrial activities such as residential activities also have the potential to affect the operation and viability of the City’s industrial areas because of potential reverse sensitivity effects. This is therefore raised as an issue. While the provision for residential accommodation within industrial areas provides for “start-up” premises for smaller industrial businesses, residential activities can displace industrial activities and create reverse sensitivity effects. The provision of residential accommodation within the City’s industrial areas therefore needs to be carefully managed and assessed on a case-by-case basis.

The Napier Road Industrial Precinct, Midhurst Street Industrial Area and the Braeburn Industrial Area are located in close proximity to existing rural, residential and recreation areas. The Napier Road Industrial Precinct and Braeburn Industrial Area also directly face Napier Road, and State Highway 56 respectively, two of the four main entrances to the City. Specific planning provisions, including structure plans and comprehensive development plans, have therefore been developed to manage the potential interface effects of industrial development in the Napier Road Industrial Precinct, and Midhurst Street Industrial Area and the Braeburn Industrial Area. Being Greenfield industrial areas, the respective structure plans and comprehensive development plan also ensure the integrated provision of infrastructure is provided at the earliest stage of development.

Nuisance effects such as dust and odour can be an issue in the Industrial Zone. These effects can be caused by discharges from industries in the Zone or by wind-blown dirt from unsealed yards. Every discharge to air from an industrial or trade premise requires a discharge permit from the Manawatu-Wanganui Regional Council unless the discharge is expressly provided for by Rule 14-12 of the One Plan. Compliance with the conditions of rules of this District Plan does not exempt any person from compliance with requirements in the One Plan.

### 12.3 Objectives and Policies

Within the broad framework of the City View objectives in Section 2, the following specific objectives and policies apply to the Industrial Zone:

**OBJECTIVE 1**

To enable a range of activities that efficiently use the physical resources of the Industrial Zone.

**POLICIES**

1.1 To enable the continued growth, development and redevelopment of industry within the Industrial Zone.

1.2 To provide for a wide range of activities within the Industrial Zone subject to meeting performance standards.

1.3 To enable activities which are compatible with, or complementary, or ancillary to industrial activities to
establish within the Industrial Zone.

1.4 To require development to be in general accordance with any relevant Structure Plan to ensure an integrated and sustainable pattern of development.

1.5 To prevent the construction of buildings or structures in the Napier Road Industrial Precinct before a complete subdivision is approved by the Palmerston North City Council in circumstances where such buildings or structures will result in piecemeal development before comprehensive works have been carried out sufficient for the entire Precinct including the provision of adequate access and stormwater management systems.

Explanation

Palmerston North City contains several established industrial areas. Collectively they represent a substantial community investment in land, buildings and infrastructure for industrial purposes. Provided that this investment is adequately managed it should continue to assist in providing for, and securing, economic and social well-being within the city through facilitating the ongoing development of industry.

By identifying existing industrial areas and ensuring the Plan enables industry to develop and expand within these areas it is anticipated that this will promote the more effective and efficient use of existing industrial land and infrastructure.

As well as promoting the continued use of existing and established industrial resources, defining where industry can establish within the city provides certainty to existing and prospective residential owners and commercial operators, concerned with the location of industry within the city. The identification of industrial areas also enables industrial operators to plan the development, redevelopment or expansion of industry with confidence and certainty.

Part of providing for the effective use of land and associated infrastructure within industrial areas, is to enable a range of non-industrial activities, which have a functional role in supporting and servicing industry, to establish within these areas. This ensures that industrial areas are adequately supported and serviced by activities which assist in attracting industry to these areas and which provide for the general convenience of workers.

Industrial areas also contain a range of buildings and sites ideally suited, in terms of size and cost, to the establishment of a range of non-industrial activities, such as recreational leisure and community facilities, car sales yards and building materials supply centres. These activities are generally accepted by the Council and community as appropriate activities within the city’s Industrial Zone and are generally compatible with industrial activities.

The Industrial Zone provides for a relatively unrestricted range of permitted activities, subject to specific performance standards to control environmental effects. Performance standards for parking, access, loading, lighting, signs, noise, outdoor storage and hazardous substances focus on controlling adverse effects associated with the operation of activities. Performance standards for the construction, alteration and addition to buildings focus on actively managing building scale, form and quality where a site is nearby a residential area or is fronting an arterial road.

Development within the Napier Road Industrial Precinct and the Midhurst Street Industrial Area is managed by reference to Structure Plans 12.1 and 7.4 which includes an identified local road network and planted buffer areas identifying these future infrastructure corridors and planted buffer areas will help to ensure that they are protected from future development and that their primary function is not compromised.

Within the Napier Road Industrial Precinct it is also important that a stormwater system that is sufficient to manage stormwater generated by the Precinct and total catchment area that drains to the west and northwest corner of the Napier Road Industrial Precinct is designed and installed prior to development.

The Longburn Dairy Manufacturing Site and the Braeburn Industrial Area includes major dairy manufacturing and processing activities being undertaken on an extensive site and being supported by private infrastructure. The sites straddle Reserve Road and are adjacent to the NIMTR which is directly connected to on-site processing activities. The objective and policy framework aims to enable the continued efficient use of these sites and associated infrastructure for regionally significant economic activity.

OBJECTIVE 3

Activities and development maintain or enhance the amenity values of those areas at the interface with the Industrial Zone.

POLICIES

3.1 To manage the adverse environmental effects of Industrial Zone activities on those areas at the interface with the Industrial Zone.

3.2 To manage adverse amenity effects of building mass and height on industrial sites adjoining a site in
the Residential, Institutional, Recreation or Conservation and Amenity Zones, or sites that front arterial roads.

3.3 To require high quality frontage landscaping that contributes to the amenity and streetscape on industrial sites that are opposite a site in the Residential, Institutional, Recreation or Conservation and Amenity Zones, or sites that front arterial roads.

3.4 To control the construction of fences at the frontage of industrial sites opposite a site in the Residential, Institutional, Recreation or Conservation and Amenity Zones, or fronting arterial roads so that amenity is not detracted from.

3.5 To ensure that activities in the Industrial Zone that are adjacent or opposite a site in the Residential, Institutional, Recreation or Conservation and Amenity Zones, or front arterial roads, have sufficient on-site parking to meet the needs of employees and customers so that overspill parking does not adversely affect surrounding land use activities.

**Explanation**

The City’s industrial areas have, for various reasons, developed in close proximity to established and developing residential areas and in places also border recreation areas. In some situations residential and industrial activities directly about each other or are only separated by a road, right-of-way, access strip or shared access strip.

The environments envisaged within the City’s residential, rural, and recreational areas differ markedly from that which is provided for within the Industrial Zone. By comparison these areas are very sensitive to the effects of industrial noise and buildings and it is therefore essential to ensure that adequate safeguards are put in place to manage the effects of industrial activities and avoid, remedy or mitigate any adverse effects that these may have on residential and recreational amenity values.

The historical pattern of industrial development within the city has resulted in a significant number of industries locating adjacent to either a Major Arterial or Minor Arterial road. These roads are also used by a large volume of residential, rural and recreational users. Industrial activities located on arterial roads are more visible than those located elsewhere in industrial areas, and tend to rely more on passing traffic for their commercial success. The maintenance of visual amenity on arterial roads therefore contributes to the viability and vitality of these industrial areas.

The amenity of industrial sites is dependent on a number of factors, including: the architectural quality of the building or buildings; frontage landscaping; fencing; signage; and carparking. Where industrial sites are adjacent to or opposite residential or recreational areas, or front an arterial road, each of these factors is even more important. Simple, utilitarian building and landscaping treatments may be acceptable within the heart of the Industrial Zone, but less acceptable in more visible parts of the Industrial Zone.

Security fencing or fencing at the front of industrial sites can adversely affect amenity, particularly when this fencing is poorly maintained or contains elements such as barbed wire or razor wire. While fencing may be required for some activities, it should be assessed on a case-by-case basis to ensure that it does not detract from the amenity and streetscape of opposite or adjoining sites.

The Napier-Road Industrial Precinct is located in close proximity to existing rural and residential dwellings. To assist Plan Users, development in the Napier-Road Industrial Precinct is to be managed by reference to Structure Plan 12.1. The provisions relating to the development of the Napier-Road Industrial Precinct seek to maintain the amenity values of existing dwellings located in close proximity to the Napier Road Industrial Precinct whilst also enhancing the visual appearance and the landscape character of Napier Road as a key entrance into the City.

The safe and efficient operation of the road network depends in part on the availability of convenient and safe parking, loading and manoeuvring facilities and access points. Land use activities are required to provide parking and loading facilities on site to meet the reasonable requirements for staff, customers and visitors.

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**12.4 Rules: Permitted Activities**

**R12.4.1 PERMITTED ACTIVITIES**

Any Activity Except For:

- Those specified as Restricted Discretionary Activities, Discretionary Activities or Non-Complying Activities

Is a Permitted Activity, provided that the following performance standards are complied with:
NOTE TO PLAN USERS

Permitted Activities shall also comply with the requirements of R12.9.1 Noise. Any industrial activity that is not a dairy related industrial activity or is not ancillary to a dairy related industrial activity in the Braeburn Industrial Area is a non-complying activity under R12.8.1(v).

Performance Standards

(a) Lighting

Compliance with R11.6.1.1(a)(vi).

Explanation

The illumination of industrial sites, particularly at the residential interface, can affect residential amenity where excessive light spill occurs. The Plan seeks to manage the negative effects of exterior lighting on residential activities at the interface with the Industrial Zone by avoiding light spill, glare and other potentially abrasive effects of exterior lighting.

(b) Parking, Loading and Access

i. Compliance with the following performance standards of R20.4.2:

- 20.4.2(a) Vehicle Access;
- 20.4.2(b)(i) Parking Spaces for People with Disabilities;
- 20.4.2(b)(ii) Parking provision for all Zones except for the Inner Business Zone;
- 20.4.2(d) Formation of Parking Spaces;
- 20.4.2(e) and (f) Loading Space Provision and Design;
- 20.4.2(g) Cycle Parking Provision and Design;
- 20.4.2(h) Cycle Parking End of trip Facilities.

ii. R20.4.2(b)(ii) shall not apply to the Longburn Dairy Manufacturing Site or the Braeburn Industrial Area.

iii. All parking areas and loading facilities associated with activities at the Longburn Dairy Manufacturing Site or the Braeburn Industrial Area must be provided for within site boundaries, but may be met on each site separately, or combined

iv. Compliance with R20.4.2(c) Car Park Landscape Design, provided that for sites that do not front an arterial road or adjoin a site in the Residential, Institutional, Recreation or Conservation and Amenity Zones, the minimum width of the planting area may be reduced to 1 metre and the total area per tree may be reduced to 1m².

(c) Outdoor Storage

i. Any outdoor storage area, excluding motor vehicle sales yards, situated on a site which:

- adjoins or directly faces across a road, right-of-way, access strip or service lane a site in the Residential, Institutional, Recreation or Conservation and Amenity Zones; or
- fronts an arterial road

shall comply with landscape amenity street frontage requirements in R11.9.1.2(i).

ii. The outdoor storage of free-standing products, goods or materials, excluding motor vehicles within motor vehicle sales yards, shall comply with R12.4.3(a) and (b).

iii. Nothing in (j) shall limit the provision of a gate or entry point to a site.

Explanation

The outdoor storage of products, goods or materials on industrial sites adjoining or facing residential areas can have an adverse visual effect on the amenity of residential areas. Controls on the outdoor storage of products, goods and materials will help maintain the visual amenity of residential areas by ensuring that adequate screening landscaping is
(d) **Fencing**
   
i. Any fence facing the road frontage must be located behind the landscaping strip.

ii. Any front fence on a site fronting an arterial road, or adjacent to or fronting a site in the Residential, Institutional, Recreation or Conservation and Amenity Zones must not contain barbed wire, razor wire or fabric netting.

iii. All fences must be maintained at all times.

(e) **Signs**

Compliance with R6.1.5.

(f) **Hazardous Facilities**

Compliance with the provisions of Section 14 Hazardous Substances.

(g) **Ancillary Retail and Office Activity**

**NOTE TO PLAN USERS**

For non-ancillary retail and office activities refer to Non-Complying R12.8.1.

i. Ancillary Retail Activity

   • No more than 200m² or 15%, whichever is the smaller, of the gross floor area of the premises used by any activity shall be used as merchandising area for ancillary retailing purposes.

ii. Ancillary Office Activity

   • No more than 20% of the gross floor area of the premises used by any activity shall be used for an ancillary office activity.

Except where -

• The activity predominantly utilises open yard space rather than enclosed premises, in which case sole use of a building is for ancillary office purposes, the gross floor area of ancillary office activity shall not exceed 5% site coverage.

Noise Insulation and Ventilation

• Compliance with R12.98.1(b) and (c).

• This Rule does not apply to:

  • Site offices such as separate prefabricated portable buildings;
  • Offices that are ancillary to the main industrial activity provided they occupy less than 10% of the gross floor area of the building; and
  • Site offices associated with temporary construction works.

iii. **Interpretation**

   For the purpose of sub-rules (i) - (ii):

   • “Ancillary retailing” means the retailing only of goods substantially manufactured, assembled, repaired, renovated or restored on the site or premises.

   • “Ancillary office activity” means office activity directly related to the operation of the predominant activity in the premises and includes the gross floor area of office work space, office equipment and office storage space.

   • “The premises” means the enclosed gross floor area (excluding yard and parking space) occupied by the predominant activity, including any space devoted to ancillary office or
ITEM 13 - ATTACHMENT 1

121

arcillary retailing activities, whether in one building, part of a building, or in more than one building.

iv. The following activities are provided for as Permitted Activities, subject to compliance with relevant Performance Standards, except that Performance Standards (i) - (ii) do not apply to:

- Hire Centres;
- Prepared Food and Beverage Outlets, including licensed bars and restaurants, and dairies of less than 100m² total gross floor area;
- Licensed taverns of less than 200m² total gross floor area;
- Automotive & Marine Suppliers;
- Service Stations;
- Floor Covering Showrooms;
- Building Suppliers;
- Auction Rooms;
- Farming & Agricultural Supplier;
- Garden & Patio Suppliers; or
- Office Product Suppliers.

**Explanation**

The above provisions recognise the role of retail and office activities as integral arcillary activities in the operation of some industries (such as factory shops) and those retail activities which have a legitimate place, either by community expectation or function (for example Building Improvement Centres), within the Industrial Zone. It also remains consistent with the Plan's objectives of efficiently utilising existing industrial resources for industrial purposes; containing retail and office activity within identified business areas; and efficiently using and developing existing business resources, by restricting the size of retail and office activity which can establish within the Industrial Zone as arcillary activities.

Acoustic insulation is required for noise sensitive activities in buildings within the Industrial Zone to mitigate the potential adverse effects on such uses and to avoid potential for constraint that such uses can place on typical industrial activities. The ventilation requirement for offices is to ensure noise attenuation is not compromised if compliance with the requirements of the Building Code (64) for natural ventilation is achieved by installing operable windows. The required airflow level is based on the minimum standard for habitable spaces set out in NZS 4303.

(h) Servicing and Loading Hours

Compliance with R11.9.1.1(g).

This rule does not apply to the Toyota New Zealand National Customer Service Centre located at Roberts Line, being Lot 1 DP 42126 or the Longburn Dairy Manufacturing Site on SH56, being Lot 1 DP 85957, Lot 2 DP 426930 and Lot 1 DP 426930.

Nothing in this rule shall exempt any activity from the requirements of Performance Standard 12.4.1(b) and Noise R12.96.1.

**Explanation**

Where residentially zoned properties come into close contact with industrial areas these properties can be adversely affected by night-time delivery, distribution and loading activities, for example, from idling vehicles or the opening and closing of doors.

By controlling operating hours at the direct residential interface, it should be possible to reduce the disturbance to close residential neighbours.

(i) Midhurst Street Industrial Area

The following additional performance standards apply in the Midhurst Street Industrial Area and replace other performance standards where they directly conflict.
i. Maximum Lot Area
   The maximum site area of each lot shall be 7500m² except for access, utilities, reserves, or a balance lot.

ii. Access
   All access other than for temporary construction activities shall be from Kelvin Grove Road.

iii. Lighting
   Any artificial lighting shall be shielded from the approach and take off paths to and from Palmerston North Airport.

   **NOTE TO PLAN USERS**
   Lighting shall not be installed which may cause confusion with lights for navigation purposes associated with the safe operation of aircraft utilising Palmerston North Airport. Upward facing lighting must be carefully placed and designed, particularly in relation to those sites located within the Airport Take-Off and Approach Surfaces identified in figures 20.7 and 20.8.

iv. Outdoor Storage
   There shall be no outdoor storage of organic products or organic waste. For the purpose of this rule, “organic products or organic waste” means any uncovered perishable material that is likely to attract birdlife.

Also refer to Section 5 regarding Earthworks Rules for the Midhurst Street Industrial Area.

   **NOTE TO PLAN USERS**
   Also refer to:
   R23.7.1(i) – Radiofrequency Field Exposure
   R20.5.2 – Restricted Discretionary Activities – Drive Through Facilities.

(i) Napier Road Industrial Precinct:
   The following additional performance standards apply in the Napier Road Industrial Precinct and replace other performance standards where they directly conflict:

   i. Lighting
      Compliance with R11.6.1.1(a)(vi).
   ii. Outdoor Storage
      Any outdoor storage area, excluding motor vehicle sales yards, situated on a site which adjoins or directly faces across a road, right-of-way, access strip or service lane, any part of a residential or rural zoned site or public area and which is visible from that residential or rural zoned site or public area, shall be screened from view by sense planting of vegetation capable of growing to and being maintained at not less than 1.8 metres in height.

(k) Railway Road Industrial Enclave
   The following additional performance standards apply in the Railway Road Industrial Enclave and replace other performance standards where they directly conflict:

   i. Lighting
      Any artificial lighting in the Railway Road Industrial Enclave shall be shielded from the approach and take off paths to and from Palmerston North Airport.
   ii. Outdoor Storage
      There shall be no outdoor storage of organic products or organic waste in the Railway Road Industrial Enclave. For the purpose of this rule, “organic product or organic waste” means any uncovered perishable material that is likely to attract birdlife.
i. Frontage Planting

Any site fronting Railway Road shall provide a 5m wide planting strip located at the street frontage, this will include one specimen tree for every 7m of site frontage and is to be implemented in accordance with R11.9.1.2(ii) Trees, Suitable Landscape Works and Process.

NOTE TO PLAN USERS

Lighting shall not be installed which may cause confusion with lights for navigation purposes associated with the safe operation of aircraft utilising Palmerston North Airport. Upward facing lighting must be carefully placed and designed, particularly in relation to those sites located within the Airport Take-Off and Approach Surfaces identified in Figures 13.1 and 13.2.

Also refer to Section 6 regarding Earthworks Rules for the Railway Road Industrial Enclave.

R12.4.3 CONSTRUCTION, ALTERATION OF, AND ADDITION TO BUILDINGS AND STRUCTURES

The construction, external alteration of, and addition to buildings and structures is a Permitted Activity provided that the following Performance Standards are complied with:

(a) Maximum Building Height

Any buildings or structures shall comply, in terms of maximum height with R13.4.7.1.

(b) Height of any building on a site which adjoins a site in a Residential Zone

Any building or structure on a site adjoining a site in a Residential Zone must comply with R10.6.1.1(a) and (b) except that the 9m maximum height limit does not apply beyond 20 metres from all residential boundaries.

Explanation

The Industrial Zone performance standards set a maximum height for any buildings or structures within the Zone to prevent penetration of the Airport Protection Surfaces as set out in R13.4.7.1. The standards also establish the size and height at which a building may have adverse visual effects which, in accordance with the design objectives and policies for the Zone, should be assessed as a restricted discretionary activity.

The purpose of the recession plane provision is to ensure that the standard of amenity on the boundary is sufficient to ensure the protection of neighbouring residential amenity. The recession plane will ensure the dimensions, setback and spacing of industrial buildings adjoining residential zoned sites relate positively to the building forms typical of a residential neighbourhood.

(c) Road Setback

i. On sites fronting onto any Major Arterial or Minor Arterial Road, any building or structure, excluding signs, shall be set back no less than 8 metres from the road frontage.

ii. On all other sites any building or structure, excluding signs, shall be set back no less than 3 metres from any road frontage.

Explanation

The road setback standard ensures that more uniform site presentation occurs along roadways where the industrial/residential interface is broken by sporadic industrial development.

Within established or developing industrial areas the road set back standard will also maintain consistency in existing building development patterns and provide an area for visual amenity planting.

(d) Landscape Amenity

i. Any site fronting onto any arterial road, or visible from a site in the Residential, Institutional, Recreation or Conservation and Amenity Zones, must comply with R11.9.1.2(i)(i).

ii. Any site fronting a Collector or Local Road not visible from a site in the Residential, Institutional, Recreation or Conservation and Amenity Zones must comply with R11.9.1.2(i)(i), except that:

• the width of the planting strip may be reduced to 1m width; and
the total area of landscape works will not be less than the frontage length multiplied by 1 metre and will be located at the street frontage,

iii. Any site adjoining a site in the Residential Zone must comply with R11.9.1.2(i)(i) and (ii).

iv. Any outdoor storage area or development in the Longburn Dairy Manufacturing Site adjoining a site in the Residential Zone must be screened from view by either a closed boarded fence of not less than 1.8 metres in height, or dense planting of vegetation capable of providing a screen of at least 1.8m in height.

(e) Loading
Compliance with R20.4.2(e) and (f) Loading Space Provision and Design.

(f) Access
Compliance with R20.4.2(a) Vehicle Access.

(g) Parking
i. Compliance with Rules:
   20.4.2(b)(l) Parking Spaces for People with Disabilities;
   20.4.2(d) Formation of Parking Spaces;
   20.4.2(g) Cycle Parking Provision and Design
   20.4.2(h) Cycle Parking End of Trip Facilities

ii. Compliance with the R12.4.1(b)(ii).

**Explanation**
The industrial area attracts a wide range of vehicles, including large articulated lorries which require large areas in which to turn and to manoeuvre. It is important that sufficient area is provided on site to meet access, loading and parking requirements to avoid adverse effects being experienced in the Zone itself, or in adjacent residential areas.

(h) Midhurst Street Industrial Area
The following additional performance standards apply in the Midhurst Street Industrial Area and replace other performance standards where they directly conflict:

i. Structure Plan
   The provision of services shall be in accordance with the Midhurst Street Industrial Area Structure Plan or shall be located in a public road vested in the Council.

ii. Maximum Lot Area
   The maximum site area of the lot on which a building is to be constructed shall be 7500m².

iii. Access
   Access to the lot (other than for temporary construction activities) must be by formed public road connecting directly on to Kelvin Grove Road. The access road must be existing and formed in accordance with a subdivision consent granted by the Palmerston North City Council. Midhurst Street shall not be used for any form of access other than temporary construction activities.

iv. Airport Protection
   The application does not involve a site or sites that incorporate in whole or in part land within the 65Ldn contour unless the activity, building or structure, other than fencing, is expressly authorised by a resource consent under R12.8.1.

v. Glare
   The roofs of buildings within the 60 Ldn contour shown on the Plan Maps shall have a painted matt finish and shall not have roof glazing.
vi. Landscape Amenity

R11.9.1.2(i) and R20.4.2(c) do not apply within the Midhurst Street Industrial Area. Any streetfrontage planting shall provide at least one tree per every 7 metres of site frontage. Landscaping works shall not include species capable of growing in excess of 5 metres in height. Any tree planting on the frontage shall be planted in an area with a minimum width of 2 metres and with a total area of not less than 4m².

**NOTE TO PLAN USERS**

Please check with the Regional Council for any additional requirements contained in the One Plan, in particular the rules that relate to discharges to air and effects on the Palmerston North Airport.

Also refer to Section 6 regarding Earthworks Rules for the Midhurst Industrial Area.

(i) **Napier Road Industrial Precinct**

The following additional performance standard applies in the Napier Road Industrial Precinct and replaces other performance standards where they directly conflict:

i. **Maximum Building Height**

The maximum height of any building in the Napier Road Industrial Precinct shall be 9 metres.

**Explanation**

The Napier Road Industrial Precinct fronts Napier Road, which is one of the four main entrances into the City. Given the sensitive location of the site, a maximum building height of 9 metres has been established to mitigate the visual effects of industrial development in this location.

(j) **Railway Road Industrial Enclave**

The following additional performance standards apply in the Railway Road Industrial Enclave and replace other performance standards where they directly conflict:

i. **Glare**

The roofs of buildings shall have a matt finish and shall not have roof glazing.

**NOTE TO PLAN USERS**

Please check with the Regional Council for any additional requirements contained in the One Plan, in particular the rules that relate to discharges to air and effects on the Palmerston North Airport.

Also refer to Section 6 regarding Earthworks Rules for the Railway Road Industrial Enclave.

(k) **Braeburn Industrial Area: Minor Alterations and Additions to Buildings and Structures**

(i) Alterations and additions to existing buildings and structures approved under R12.6.5 within the Braeburn Industrial Area:

   (a) Must not exceed 500m² gross floor area or footprint, or a height of 12 metres.

   (b) The alteration or addition must comply with all performance standards in R12.4.1 and R12.4.3.

(ii) Alterations and additions to existing buildings and structures in the neighbouring Industrial Zone that extend into the Braeburn Industrial Area:

   (a) Must not, for that part of the alteration or addition located within the Braeburn Industrial Area, exceed 500m² gross floor area or footprint, or a height of 12 metres.

   (b) That part of the alteration or addition located within the Braeburn Industrial Area must comply with all performance standards in R12.4.1 and R12.4.3.

**Explanation**

It is not considered an efficient or effective resource management approach to trigger land use consent for minor
12.5 Rules: Controlled Activities

R12.5.1 Napier Road Industrial Precinct – Activities Fronting Napier Road or Adjoining a Specific Site Boundary

Any activity within the Napier Road Industrial Precinct (as shown on Structure Plan 12.1) on a site that fronts or adjoins Napier Road, Lot 5 DP 74205 or Lot 4 DP 74205 which complies with the following Performance Standards is a Controlled Activity in respect of the matters specified below.

Matters of Control

• The planting and maintenance of a site boundary planted buffer area between Napier Road, Lot 5 DP 74205 and the section of road fronting Lot 4 DP 74205 and the site of the activity (as shown on Structure Plan 12.1)

Performance Standards

(a) Activities under this rule shall comply with all relevant Permitted Activity Performance Standards prescribed in R12.4.1 and R12.4.3

(b) Planted Buffer Area

i. Buildings and structures, including the stormwater detention pond, shall be set back 5 metres from the boundary of Napier Road and 5 metres from the boundary of Lot 5 DP 74205 and the section of road fronting Lot 4 DP 74205 (as shown on Structure Plan 12.1). A Planted Buffer Area shall be provided in the setback area from the boundary of the site with Napier Road, Lot 5 DP 74205 and the section of road fronting Lot 4 DP 74205 to the setback distance specified.

ii. Planted Buffer Areas shall be designed in accordance with the following standards:

   Planted Buffer Area Standards:
   - Height: Trees to reach a minimum height at maturity of 9 metres; shrubs to reach a minimum height at maturity of 4 metres
   - Width: Napier Road: minimum width of 6 metres; Lot 5 DP 74205 and the section of road fronting Lot 4 DP 74205: minimum width of 4 metres.

   NOTES TO PLAN USERS
   - Species selection is to comprise both fast-growing species for initial screening, and suitable longer-lasting species.
   - A landscaping plan prepared by a qualified landscaping expert shall be provided in accordance with Section 5.4.3.

Assessment Criteria

In determining whether to grant consent and what conditions to impose, if any, Council reserves its discretion to an assessment of the extent to which the application meets the objectives and policies of the Industrial Zone.
12.65 Rules: Restricted Discretionary Activities

R12.65.2 THE CONSTRUCTION, EXTERNAL ALTERATION OR ADDITION TO A BUILDING WHICH DOES NOT COMPLY WITH THE PERFORMANCE STANDARDS FOR PERMITTED OR CONTROLLED ACTIVITIES

The construction, external alteration or addition to a building which does not comply with the Performance Standards for Permitted or Controlled Activities in relation to:

(a) Height of any building which fronts to or adjoins a site in the Residential Zone, or maximum building height within the Napier Road Industrial Precinct (those activities that do not comply with R12.4.3(i)(ii)) and road setback

(b) Landscape amenity (other than in the Midhurst Street Industrial Area)

(c) Parking, Loading and Access (other than in the Midhurst Street Industrial Area)

are Restricted Discretionary Activities with regard to:

- Scale relation to existing smaller neighbours
- Landscape amenity
- Design and appearance
- Effects on adjoining residential areas
- The safe and efficient operation of the roading network
- Provision of opportunities for people to use active and non-vehicular modes of transport
- Visual amenity
- Effects on existing dwellings located in close proximity to the Napier Road Industrial Precinct and Napier Road as a key entrance into the City.
In determining whether to grant consent and what conditions to impose, if any, Council will, in addition to the City View objectives in Section 2 and the Industrial Zone objectives and policies, assess any application in terms of the following assessment criteria:

**Assessment Criteria**

(a) **Building Height and Road Setback**

i. Whether the design and appearance of any building or structure is in character with and complementary to the character of the area and the ambience and amenity values of any adjoining residential zone land.

ii. To ensure a coherent architectural treatment of the frontages of large buildings that front arterial roads.

iii. The extent to which the modulation of building form helps to achieve a scale transition to immediately adjacent residential buildings.

iv. The extent to which any topographic, or other physical feature of the site makes compliance impracticable or inappropriate.

v. The extent to which sunlight and daylight is maintained over neighbourhood dwellings and important outdoor areas related to these.

vi. Whether effects associated with overlooking lead to an actual or perceived loss of privacy for outdoor areas or dwellings on adjoining sites.

vii. To ensure the design and appearance of any building or structure in the Napier Road Industrial Precinct that adjoins Napier Road or the lots specified in R12.5.1 is complementary to the visual appearance of the landscape character of Napier Road and the amenity values of existing dwellings located in close proximity to the Napier Road Industrial Precinct.

**Explanation**

Building height and siting standards reasonably provide for the intensive use of most industrial sites. However, Council recognises that there are instances where these standards may not adequately provide for some activities and is therefore prepared to consider such circumstances where it is satisfied that neighbours and nearby residential, rural and recreational areas and roadside amenity will not be adversely affected.

Coherent architectural treatment of frontages means that the frontage is designed as a whole. Coherence will depend on the underlying composition, theme and/or visual order of the façade and relate to attributes including:

- The alignments of building forms and façade elements;
- Placement and proportions of windows and other openings;
- Selection and combinations of materials and colours; and
- The form and materials used to give appropriate visual interest and/or depth to the façade.

(b) **Landscape Amenity**

i. The extent to which any existing topographic or other physical feature of the site makes compliance impracticable.

ii. The extent to which landscaping within the boundary setback is necessary to maintain residential amenity or to reduce the visual impact of the building.

iii. The extent to which alternative provision of on-site amenity and landscaping maintains and enhances the amenity of the wider streetscape and residential areas.

iv. The extent to which growing conditions are provided that will ensure the successful establishment, growth and on-going viability of landscaping.

**Explanation**

Landscaping provisions within the Plan are intended to protect residential and recreational area amenity and enhance roadside amenity within industrial areas. Council recognises that there may be other means of achieving similar amenity.
Parking, Loading and Access

The assessment criteria contained in R12.45.1(b) and (c).

**12.76 Rules: Discretionary Activities**

**R12.7.1 THE CONSTRUCTION OF A BUILDING OR STRUCTURE IN THE NAPIER ROAD INDUSTRIAL PRECINCT IN THE ABSENCE OF SUBDIVISION**

The Construction of a Building or Structure in the Napier Road Industrial Precinct prior to the 5224 Resource Management Act 1991 approval of a complete subdivision designed in accordance with Structure Plan 12.1 is a Discretionary Activity.

For the purposes of this rule ‘complete subdivision’ means:

In respect of any building or structure on Lot 1-2 DP. 74205, Lot 2 DP. 74205 and Lot 3 DP. 74205 a comprehensive subdivision approved by the Palmerston North City Council involving all land within the lots collectively and in such a way that the allotments (whether existing or new) collectively assessed would meet the performance standards in rule 7.9.2.5(b) relating to lot size and arrangement.

In determining whether to grant consent and what conditions to impose, if any, Council will, in addition to the City View objectives in Section 2 and the Industrial Zone objectives and policies, assess any application in terms of the following assessment criteria:

**Assessment Criteria**

i. The extent to which the design and appearance of any building or structure is complementary to the visual appearance of the landscape character of Napier Road and the amenity values of existing dwellings located in close proximity to the Napier Road Industrial Precinct.

ii. The extent to which the Napier Road Industrial Precinct develops in accordance with Structure Plan 12.1, in particular through the provision of Planted Buffer Areas and the identified local road network.

iii. The extent to which the Planted Buffer Areas provide effective visual screening to the occupants of Lots 4 and 5 DP. 74205 and visual enhancement of the landscape character and amenity values of Napier Road and residentially zoned land.

iv. The extent to which the development will result in adverse effects on the safe and efficient operation of the road network, including Napier Road.

v. The degree to which the efficient and effective provision of infrastructure and essential services are adversely affected through the absence of subdivision.

vi. The extent to which the Napier Road Industrial Precinct develops as an integrated industrial precinct that specifically provides for small to medium sized industrial activities.

vii. Whether the establishment of office or retail activity would undermine the integrity of the Business Zones or to lead to a dispersal of retail and office activity.

viii. The ability of the site to accommodate the additional traffic that will be generated by the development through efficient and effective parking, access and loading provisions.

ix. Whether a stormwater system is designed and installed sufficient to manage stormwater generated by the future industrial development of the entire Napier Road Industrial Precinct and total catchment area that drains to the west and northwest corner of the Napier Road Industrial Precinct.

x. Whether the stormwater detention pond to be constructed as part of the development of the Napier Road Industrial Precinct whose general location is indicated on Napier Road Industrial Precinct Structure Plan 12.1.
ITEM 13 - ATTACHMENT 1

12.87 Rules: Non-Complying Activities

R12.8.3 THE FOLLOWING ACTIVITIES ARE NON-COMPLYING ACTIVITIES WITHIN THE NAPIER ROAD INDUSTRIAL PRECINCT:

(a) Any activities that do not comply with R12.5.1(b) - Planted Buffer Areas

With respect to R12.8.3(a), in determining whether to grant consent and what conditions to impose, if any, the Council will, in addition to the City View objectives in Section 2 and the Industrial Zone objectives and policies, assess any application in terms of the following assessment criteria:

Assessment Criteria

i. The extent to which the Planted Buffer Areas provide effective visual screening to the occupiers of Lots 1 to 5 DP 24205 and visual enhancement of the landscape character and amenity values of Napier Road and any residentially zoned land.

(b) Any activities that encroach into the Planted Buffer Areas and Setbacks prescribed in R12.5.1(b).

Explanation

Development within the Napier Road Industrial Precinct is managed by reference to Structure Plan 12.1 which includes an identified local road network and the planted buffer areas required under R12.5.1(b).

The planted buffer areas and associated setbacks have been prescribed in the District Plan for the purposes of providing a visual amenity buffer between the Napier Road Industrial Precinct and existing dwellings located in close proximity to the Napier Road Industrial Precinct. The planted buffer area will also ensure that development within the Napier Road Industrial Precinct contributes towards the visual enhancement of the landscape character of Napier Road as a key entrance into the City.

Activities that are proposed to encroach into the planted buffer areas and/or do not provide the required planting will be required to demonstrate that the adverse effects on the Napier Road entrance to the City and existing dwellings located in close proximity to the Napier Road Industrial Precinct.

R12.8.4 ACTIVITIES IN THE RUNWAY END PROTECTION AREAS
ITEM 13 - ATTACHMENT 1

The activities listed in R13.4.4.3 are Non-Complying Activities in the Runway End Protection Areas

**Explanation**

Runway End Protection Areas (REPA) are provided at the end of each runway strip. These areas are required to be free of obstructions or activities which could interfere with aeronautical navigational aids. They are also areas in which statistically there are greater chances of aircraft related accidents. It is therefore desirable that the public’s exposure to such risks be reduced by limiting the range of activities permitted in the REPA.

The rule regulates the total number of people who may assemble on each site (including all buildings on each site) within the REPA – the rule controls only the assembly of people within the part of a building that is within the boundaries of the REPA.

Site and building design, combined with other measures (such as clear and well enforced signage) within the REPA are available methods to prevent the assembly of ten or more people.

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**12.98 Rules: Noise**

**R12.98.1 NOISE**

(a) Noise from any activity shall not exceed the following limits at any point within any residential, institutional, fringe business or rural zoned land:

<table>
<thead>
<tr>
<th>Time</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00am – 7:00pm</td>
<td>55 dB L_{Aeq}(15 min)</td>
</tr>
<tr>
<td>7:00pm – 10:00pm</td>
<td>50 dB L_{Aeq}(15 min)</td>
</tr>
<tr>
<td>10:00pm – 7:00am</td>
<td>45 dB L_{Aeq}(15 min)</td>
</tr>
<tr>
<td>Night-time L_{max} 10:00pm – 7:00am</td>
<td>75 dBA L_{max}</td>
</tr>
</tbody>
</table>

For further information refer to Section 6 Noise.

**Explanation**

Industrial activities can adversely affect other adjacent activities through the emission of sound from machinery, engineering processes and site servicing and loading activities. The Industrial Zone is intended to accommodate these ‘noisier’ activities with little restriction on sound emission. However, a large portion of the city’s industrial area is in close proximity to noise sensitive residential and rural areas, and to a lesser extent business areas and could adversely affect these areas in the absence of appropriate sound emission controls.

This performance standard is intended to protect institutional, fringe business, rural and residential areas. The limits are equal to those envisaged by the guidelines in New Zealand NZ9802:2008 as being the “Guideline residential upper noise limits.”

This performance standard will afford a degree of protection to both industrial operators and residential, institutional and rural property owners by:

i. establishing a tolerated noise environment within residential, rural and institutional areas; and

ii. providing certainty for industrial operators by establishing a noise environment both within and outside of the industrial areas that generally accommodates existing activities and provides for their redevelopment and the establishment of similar activities.

(a) **R12.8.1 shall not apply to land on the upper terrace within the Napier Road Residential Extension Area**

(b) **Noise Insulation**

Any habitable room used by a noise sensitive activity and or any office activity in a building within the Industrial Zone shall be protected from noise arising from outside the building by ensuring the external sound insulation level achieves the following minimum performance standard:

\[ D_{ext} + C_2 > 35 \text{ dB} \]

Compliance with this performance standard shall be achieved by ensuring habitable rooms and or offices are designed and constructed in a manner that accords with an acoustic design certificate signed by a
suitably qualified acoustic engineer stating the design as proposed will achieve compliance with the above performance standard.

(c) Ventilation

Where bedrooms and sleeping areas with openable windows are proposed, a positive supplementary source of fresh air ducted from outside is required at the time of fit-out. For the purposes of this requirement, a bedroom is any room intended to be used for sleeping. The supplementary source of air is to achieve a minimum of 7.5 litres per second per person.

Office activities shall be provided with mechanical ventilation to comply with the Building Code (G4) at the same time as achieving the required external sound insulation level.

Explanation

Acoustic insulation is required for noise sensitive activities in buildings within the Industrial Zone to mitigate the potential adverse effects on such uses and to avoid potential for constraint that such uses can place on typical industrial activities. The ventilation requirement for bedrooms is to ensure noise attenuation is not compromised if compliance with the requirements of the Building Code (G4) for natural ventilation is achieved by installing openable windows. The required airflow level is based on the minimum standard for habitable spaces set out in NZS 4903.
ITEM 13 - ATTACHMENT 1

Map 12.1  Napier Road Industrial Precinct Structure Plan
Appendix 2 – Transportation Assessment
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Contents

Executive Summary ........................................................................................................... 1

1 Introduction .................................................................................................................. 2
   11 Report Purpose ....................................................................................................... 2
   12 Site Location .......................................................................................................... 2
   13 Assumptions / Limitations ...................................................................................... 4

2 The Proposal ................................................................................................................ 5
   2.1 Structure Plan Development .................................................................................. 5
   2.2 Proposed Access Strategy .................................................................................... 6
   2.3 Alternative Options Considered ............................................................................ 6

3 Existing Environment .................................................................................................. 8
   3.1 Road Hierarchy ..................................................................................................... 8
   3.2 Road Description .................................................................................................. 9
   3.3 Other Transport Modes ....................................................................................... 12
   3.4 Crash History ....................................................................................................... 13
   3.5 Strategic Network Direction ............................................................................... 14

4 Assessment of Effects ............................................................................................... 17
   4.1 Trip Generation .................................................................................................... 17
   4.2 Traffic Distribution .............................................................................................. 18
   4.3 Transport Assessment ......................................................................................... 18
   4.4 Internal Road Arrangement .................................................................................. 23
   4.5 Active Modes Provisions ..................................................................................... 25

5 Conclusions .................................................................................................................. 27

Appendix A: Crash History (CAS) .................................................................................. 28

Appendix B: Trip Generation Rates ................................................................................ 29

Appendix C: Future Posted Speed Assessment ............................................................... 31

Appendix D: Alternative Access Options ......................................................................... 35

Appendix E: Intersection Assessment Criteria ............................................................... 38

Appendix F: NZTA Napier Road (SH3) Detailed Business Case - Consultation Options .... 42
List of Figures

Figure 1-1: Napier Road Residential Extension Area (PDPCB) Site Location ........................................... 2
Figure 1-2: Proposal Site Location and Local Surroundings ............................................................. 3
Figure 1-3: Land-Use Zoning within the NRREA Site – PNCC District Plan ........................................ 4
Figure 2-1: Proposed NRREA Structure Plan Layout ............................................................................... 5
Figure 3-1: Excerpt from Road Hierarchy – Palmerston North (District Plan Table 20A.2) .......... 8
Figure 3-2: Excerpt from NZTA One Network Road Classification ...................................................... 9
Figure 3-3: View Southbound - Roberts Line Approach to Napier Road (SH3) ...................................... 10
Figure 3-4: Eastbound View (Left) and Westbound View (Right) from Roberts Line (South) on approach to Napier Road (SH3) Intersection ................................................................. 10
Figure 3-5: View of Napier Road (SH3) West of BUPA Access Road ..................................................... 11
Figure 3-6: Recorded Daily Traffic Volumes on Napier Road (SH3) from 2013 to 2017 ........... 12
Figure 3-7: Service 31 / 32 Bus Route and Nearest Bus Stops ............................................................ 12
Figure 3-8: Crash Map – NRREA Surroundings (2012-2017) ................................................................. 14
Figure 3-9: Proposed Future Road Hierarchy (3TS) ............................................................................... 15
Figure 4-1: NRREA Structure Plan – Sight Distances ........................................................................... 20
Figure 4-2: NRREA Structure Plan – Intersection Spacing’s ............................................................... 20
Figure 4-3: Warrants for Turning Treatments on Major Roads at Unsignalised Intersections ........ 23
Figure 4-4: Indicative Cross Section – Internal Road Network ............................................................ 24

List of Tables

Table 2-1: Alternative Access Options Considered ............................................................................... 6
Table 3-1: NZTA ONRC Classification Description ............................................................................. 9
Table 3-2: Traffic Volumes on Napier Road (SH3) ................................................................................. 11
Table 4-1: NRREA - Trip Generation Assessment ................................................................................. 17
Table 4-2: Indicative Access Volumes at Accesses into the NRREA Site .............................................. 17
Table 4-3: Estimated Additional Peak Hour Traffic Distribution (Vehicles per Hour) ................. 18
Table 4-4: Estimated Changes in Peak Hour (Two-Way) Traffic Volumes (Vehicles per Day) .... 18
Table 4-5: Intersection Sight and Spacing Requirements - Austroads .............................................. 21
Table 4-6: Intersection Sight and Spacing Requirements (PNCC District Plan – Figure 20.3) .... 22
### List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ASD</td>
<td>Approach Sight Distance</td>
</tr>
<tr>
<td>CAS</td>
<td>Crash Analysis Study</td>
</tr>
<tr>
<td>CPTED</td>
<td>Crime Prevention through Environmental Design</td>
</tr>
<tr>
<td>DBC</td>
<td>Detailed Business Case</td>
</tr>
<tr>
<td>ECM</td>
<td>Equivalent Car Movements</td>
</tr>
<tr>
<td>JTS</td>
<td>Joint Transport Strategy</td>
</tr>
<tr>
<td>KM/HR</td>
<td>Kilometres per Hour</td>
</tr>
<tr>
<td>NRREA</td>
<td>Napier Road Residential Extension Area</td>
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<td>NZTA</td>
<td>New Zealand Transport Agency</td>
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<tr>
<td>ONRC</td>
<td>One Road Network Classification</td>
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<tr>
<td>PDPCT</td>
<td>Proposed District Plan Change B</td>
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<tr>
<td>PNCC</td>
<td>Palmerston North City Council</td>
</tr>
<tr>
<td>SH#</td>
<td>State Highway #</td>
</tr>
<tr>
<td>SISD</td>
<td>Safe Intersection Sight Distance</td>
</tr>
<tr>
<td>SSD</td>
<td>Safe Stopping Distance</td>
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<tr>
<td>TAIP</td>
<td>Transport Agency Investment Proposal</td>
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<tr>
<td>VPD</td>
<td>Vehicles Per Day</td>
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Document History and Status

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<th>Author</th>
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<td>A Harris</td>
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<td>M Evis</td>
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| Version A| For client review.
Executive Summary

Background
WSP Opus have been commissioned by Palmerston North City Council (PNCC) to undertake a Transport Assessment of the proposed rezoning and accompanying Structure Plan developed for the Napier Road Residential Extension Area (NRREA), located in Palmerston North.

The Structure Plan will be used to support the Proposed District Plan Change B (PDPCEB), which seeks to re-zone approximately 15.6ha of existing rural and industrial land on the northern side of Napier Road SH3 (between Roberts Line and the Napier Road Drain) to residential zoning. The proposed site is expected to result in the creation of around 40-45 residential lots.

The purpose of the Transport Assessment is to:
- Assess the effects of the proposed development on transportation network operations; and
- Assess the suitability of the proposed Structure Plan arrangements from a transport perspective.

Structure Plan Proposals
The Structure Plan proposes the removal of four existing uncontrolled vehicle accesses onto the external road network (three on Napier Road (SH3) and one on Roberts Line (South)) and replaced with two new priority controlled T-intersections onto Napier Road (SH3).

The Structure Plan also proposes the development of a new internal road network running along the southern boundary of the NRREA servicing the site, and new walking and cycling routes that connect with the existing and future proposed network.

Assessment Assumptions
The Transport Assessment has assessed the suitability of the proposed rezoning and provisions within the Structure Plan based on the following assumptions:
- The roadside environment on Napier Road (SH3) will change to reflect the surrounding urbanised environment, including a reduced speed environment (60km/hr or less) and modifications to existing controls at the Roberts Line (South) and Napier Road (SH3) intersection.1
- This Transport Assessment has not assessed suitability or effects of non-residential activities within the NRREA, for which the effects of development could be significant and varying.

Key Findings
The findings of the Transport Assessment have concluded that:
- The NRREA site is well positioned to the arterial road network, public transport network and proposed future walking and cycling connections, which provides strong accessibility and connectivity to key local and regional destinations;
- The NRREA could generate an additional 360-450 vehicle movements per day, with 40-45 vehicle movements during peak periods. In comparison to existing traffic volumes on Napier Road (SH3), the percentage increase in traffic volumes are expected to be marginal and would have a less than minor impact on the day-to-day operations of the road network;
- Assuming posted traffic speeds on Napier Road (SH3) are reduced to safe and appropriate speeds for urban development (60km/hr), the proposed accesses can meet both NZ Transport Agency and PNCC requirements for intersection spacings and sight visibility;

1 These assumptions align with the indicated strategic direction outlined within the Napier Road (SH3) Detailed Business Case which is currently under development by the NZ Transport Agency.
The proposed internal roading provisions outlined within the proposed Structure Plan provides a connected and cohesive network that would support the volume and type of vehicles that could reasonably be expected to use the site;

Buffer planting should be provided on the southern edge of the internal roading network to provide sufficient screening of headlight glare from the internal road onto the state highway network;

The internal road layout would not provide direct residential access onto the state highway network, and would allow all vehicles to manoeuvre in such a way that vehicles are able to access or egress the NREEA site onto Napier Road (SH3) in a forward motion;

Intersection designs for each of the proposed accesses have not been developed as part of the Structure Plan, and would be submitted as part of the subdivision resource consent. The Transport Assessment has identified several considerations at a design stage to support the efficient and safe operation of the intersections, including provision of suitable stacking capacity, consideration of turning bay requirements and internal network controls; and

The proposed development would enable the provision of high standard walking and cycling facilities on Napier Road (SH3) that would connect the site with existing and future proposed facilities for activities modes within the area.

In conclusion, considering the traffic generating potential of the development and the status of the proposed future road network operations on Napier Road (SH3), it is concluded that the proposed site and associated Structure Plan is considered suitable for residential development.

Wider Recommendations

This Transport Assessment has not assessed suitability or effects of non-residential activities within the NRREA, should these be proposed. It is recommended that the Plan Change makes suitable provisions to ensure that the effects of such a development is assessed through a Traffic Impact Assessment by a suitably qualified Traffic Engineer to ensure that the proposed development would have a minimal impact on the safe and efficient operation of the arterial road network.
1 Introduction

WSP Opus have been commissioned by Palmerston North City Council (PNCC) to undertake a Transport Assessment of the proposed rezoning and accompanying Structure Plan for the Napier Road Residential Extension Area (NRREA).

The Structure Plan will be used to support the Proposed District Plan Change B (PDPCB), which seeks to re-zone approximately 15.6ha of existing rural and industrial zoned land on the northern side of Napier Road (SH3) between the Napier Road Drain and Roberts Line (South) to a residential zoning. The expected residential yield is 40-45 residential lots.

In summary, the Transport Assessment concludes that the site is well positioned to the arterial road network, public transport network and proposed future walking and cycling connections, which provides strong accessibility and connectivity to key local and regional destinations. Hence, the site is suitable for residential development.

1.1 Report Purpose

The primary purpose of this Transport Assessment is to provide a high-level assessment of the transport related effects of the potential rezoning of the site from rural/industrial to residential. The Transport Assessment also reviews the suitability of the developed Structure Plan from a transportation perspective.

This report is not a formal Transport Impact Assessment and only provides some high-level commentary relating to the intentions of the Structure Plan in relation to the internal road network and its connection(s) to the adjacent road network. Detailed designs for both the internal road network and its intersections with Napier Road (SH3) would be developed at a subdivision consent stage.

1.2 Site Location

The NRREA site is located within the suburb of Kelvin Grove on the eastern extent of the Palmerston North urban area, and is approximately 4km north-east of Palmerston North city centre. The location of the NRREA site in relation to Palmerston North city is shown in Figure 1-1.

![Figure 1-1: Napier Road Residential Extension Area (PDPCB) Site Location](image-url)
As shown in Figure 1-2, there are two land parcels located north of Napier Road (SH3) that are not currently developed as part of the Palmerston North urban area. These two parcels are Napier Road Residential area (recently rezoned to residential and currently under development) and the NRREA, which is the focus of this Transport Assessment.

![Figure 1-2: Proposal Site Location and Local Surroundings](image)

The NRREA site is bounded by Roberts Line on its eastern extent and Napier Road (SH3) on its southern extent. The northern edge of the site is bounded by an oxbow lake and escarpment. Most of the NRREA site is currently zoned ‘rural’ within the Palmerston North District Plan (see Figure 1-3), with the care home facility zoned as part of the “Napier Road Industrial Precinct” (Zone 20). Land-use to the north and east are of the NRREA is currently zoned ‘residential’, whilst land further to the west is zoned industrial.

The NRREA site is divided into two distinct areas as defined by Horizons Regional Council stop-bank which forms part of the Palmerston North flood defences (designation #B5).

Land to the west of the stop bank is occupied by an Elderly Care Centre, Garden Centre and single residential property which both are accessed from MacPherson Grove which forms a Priority Controlled T-Intersection intersection with Napier Road (SH3). This area forms part of the PDPCB area, although much of the existing infrastructure supporting this area is well developed and considered fit for purpose.

Land to the east of the stop bank is occupied by three residential properties, a tree services commercial operator and the Leafland Tree Nursery. This area forms the primary focus of the Structure Plan. The western most residential property (273 Napier Road) has a direct access onto Napier Road (SH3), whilst 291 Napier Road shares a direct access with the tree services facility onto Napier Road (SH3). The Leafland Tree Nursery has its own access primary entrance from Roberts Line (South), as well as a shared rear access located on its western extent (shared with 315 Napier Road).
Figure 1.3: Land-Use Zoning within the NRREA Site – PNCC District Plan

1.3 Assumptions / Limitations

1.3.1 Future Network Conditions

The Transport Assessment has assessed the suitability of the proposed rezoning and provisions within the Structure Plan based on the following assumptions:

- The posted speed on Napier Road (SH3) will be reduced from 80km/h to an appropriate urban speed limit (i.e. 60km/hr or less);
- The Roberts Line / Napier Road (SH3) intersection will be upgraded to either a roundabout or signal controlled intersection in the short-term, with suitable capacity to support future growth as indicated within consultation options developed for the Napier Road (SH3) Detailed Business Case and the draft NZ Transport Agency Investment Proposal (TAIP); and
- Napier Road will ultimately be reclassified as an Urban Arterial once the proposed Palmerston North strategic ring-route is completed.

These assumptions also align with the indicated strategic direction outlined within the Napier Road (SH3) Detailed Business Case which is currently under development by the NZ Transport Agency.

1.3.2 Development of Non-Residential Land Use

This Transport Assessment has not assessed suitability or effects of non-residential activities within the NRREA, for which the effects of development could be significant and varying.

It is recommended that the Proposed District Plan Change B makes suitable provisions to ensure that the effects of such a development is assessed through a Traffic Impact Assessment by a suitably qualified Traffic Engineer to ensure that the proposed development would have a minimal impact on the safe and efficient operation of the arterial road network.
2 The Proposal

The proposal is the rezone approximately 15.6ha of rural and industrial land to residential. The expected residential yield is 40-45 residential lots. The rezone is supported by a recently developed Structure Plan.

2.1 Structure Plan Development

Several potential site layout options have been considered in the development of the Structure Plan which have included various internal and external roading iterations. The current preferred arrangement for the internal road network and transportation connections to the external road network is shown within Figure 2-1. The Structure Plan layout has formed the basis of the assessment of effects (outlined within Section 4).

Figure 2-1: Proposed NRREA Structure Plan Layout

Key elements of the proposed Structure Plan layout considered pertinent to the Transport Assessment include:

- The site has a potential yield of up to 45 residential dwellings, as well as the provision of a new green space reserve and conservation/amenity zones along the northern boundary.
- The provision of a coherent and connected internal roading, including the provision of a new east-west local road connection running in parallel to Napier Road (SH3) with access to rear residential lots provided through cul-de-sacs or shared driveways;
- The removal of one existing vehicle crossings from Roberts Line (South) and three existing vehicle crossings from Napier Road (SH3);
- Access to the proposed NRREA being facilitated through the provision of two new priority controlled intersections fronting directly onto Napier Road (SH3) to the south of the proposed development, and

2 The preferred Structure Plan layout has considered several factors including balancing minimum lot sizes, internal roading requirements, noise setbacks and public reserve requirements.
• The provision of a new shared path along the northern side of Napier Road (SH3), providing connections to existing and proposed future walking and cycling routes.

2.2 Proposed Access Strategy

The preferred Structure Plan arrangement outlines the provision of two new priority controlled intersections, connecting the internal local road network within NRREA development to Napier Road (SH3) to the south. The Napier Road (SH3) approaches would form the major approach arm at both intersections.

Priority controlled intersections are considered the most appropriate form of intersection control given the relatively low access demands from the proposed development, and the minimum impact priority controlled intersections would have on Napier Road (SH3) through flows.

The proposed Structure Plan indicates these accesses would be located as follows:

• **Access 1** - This access would form the western access road and would be located approximately 200m east of the retirement village access road (MacPherson Grove), roughly aligning with the existing residential driveway servicing 291 Napier Road.

• **Access 2** - This access would form the eastern access road and would be located approximately 210m west of the Roberts Line (South) intersection. The proposed location provides clearance from the existing left-turn auxiliary slip lane from Napier Road (SH3) onto Roberts Line (South).

The provision of two access points from the proposed development aims to support efficient, safe and effective distribution of traffic onto the arterial road network. Furthermore, the provision of additional street edge activity reinforces the urbanised nature of its surroundings and supports the implementation of a lower speed environment on the arterial road network.

The proposed Structure Plan continues to promote the corridor as a limited direct access route and does not support the provision of direct access from residential dwellings onto Napier Road (SH3). Access from existing driveways onto both Roberts Line (South) and Napier Road (SH3) would be removed, with all access provided through formalised intersections.

2.3 Alternative Options Considered

When considering the provision of accesses on the State Highway network, NZTA requires that suitable consideration is given to the provision of connections to alternative existing local road accesses prior to accepting new connections. In developing the preferred access strategy, the proposed Structure Plan also considered potential alternative access options including connections with Roberts Line (South) and MacPherson Grove.

The key constraints associated with each of these options is summarised in Table 2-1, and discussed in further detail within Appendix D. Considering the desired planning outcomes from the Structure Plan, and accounting for the constraints associated with alternative access options, the provision of accesses onto Napier Road (SH3) as proposed within the Structure Plan is considered appropriate.

<table>
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<th>OPTIONS</th>
<th>CONSTRAINTS</th>
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<tr>
<td>Connection to MacPherson Grove</td>
<td>• Requires an east-west connection to be provided over the Horizons stop bank.</td>
</tr>
<tr>
<td></td>
<td>• Reduced yield from providing suitable gradients and batters over the stopbank.</td>
</tr>
<tr>
<td></td>
<td>• Increased traffic volumes within the vicinity of the retirement home area. This could be further exacerbated by additional rat-running traffic if provided in co-ordination with a new connection on Roberts Line (South).</td>
</tr>
<tr>
<td>Intersection with Roberts Line (South)</td>
<td>• Existing Leaflands Nursery driveway access does not achieve minimum sight visibility requirements southbound.</td>
</tr>
<tr>
<td></td>
<td>• Upgrading existing driveway could create potential conflicts with high turning movements at Freedom Drive.</td>
</tr>
<tr>
<td></td>
<td>• Locating access further north of existing driveway would require significant earthworks and batters to achieve acceptable approach.</td>
</tr>
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Table 2-1: Alternative Access Options Considered
<table>
<thead>
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<th>OPTIONS</th>
<th>CONSTRAINTS</th>
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<td></td>
<td>Increased access demands at the Roberts Line (South) and Napier Road (SH5) intersection.</td>
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3 Existing Environment

3.1 Road Hierarchy

The existing road hierarchy as defined within Palmerston North City Council District Plan is shown in Figure 3-1. Roberts Line and Napier Road form part of the Primary Road network, and are classified as Major Arterial Roads. Major Arterial Roads are defined within the PNCC District Plan as follows:

*Major Arterial Roads are of strategic importance to the Region. They provide interconnections between areas within the City and distribute traffic from major intercity links. Access is generally at grade but may be limited*.

The NZ Transport Agency One Network Road Classification (ONRC) identifies Roberts Line as an arterial route, and Napier Road (SH3) as a regional route (see Figure 3-2). The ONRC definition for each road classification is described within Table 3-1.

*Figure 3-1. Excerpt from Road Hierarchy – Palmerston North (District Plan Table 20A.2)*
Figure 3-2: Excerpt from NZTA One Network Road Classification

Table 3-1: NZTA O'NRC Classification Description

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>DESCRIPTION</th>
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<tr>
<td>Regional</td>
<td>These roads make a major contribution to the social and economic wellbeing of a region and connect to regionally significant places, industries, ports and airports. They are also major connectors between regions, and in urban areas may have substantial passenger transport movements.</td>
</tr>
<tr>
<td>Arterial</td>
<td>These roads make a significant contribution to the social and economic wellbeing, link regionally significant places, industries, ports or airports and may be the only route available to some places within the region (i.e. they may perform a significant lifeline function). In urban areas, they may have significant passenger transport movements and numbers of cyclists and pedestrians using the road.</td>
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3.2 Road Description

3.2.1 Roberts Line

Roberts Line is formed of two general traffic lanes (one in each direction) (see Figure 3-3). The alignment of Roberts Line is straight; however, between Royal Oak Road and Napier Road (SH3) the carriageway has a southward incline of approximately 5%. Roberts Line (South) has a posted speed limit of 50km/hr, until approximately 60m north of its stop line at the Roberts Line/Napier Road where the road transitions into an 80km/hr posted speed limit. On-street parking on Roberts Line (South) is restricted on both sides of the road within the vicinity of the NRREA site.

3 https://nzta.maps.arcgis.com/apps/webappviewer/index.html?id=95fad5204ad24c39d84c37708f614b0
The Napier Road Residential Area is currently under development and will be accessed via Freedom Drive, a new local road located approximately 120m north of the Roberts Line/Napier Road intersection. A right-turn bay has recently been installed to support vehicle access into the western extent of the Napier Road Residential Area development. There is an existing vehicle crossing on the western side of Roberts Line (South), located approximately 90m north of the Napier Road (SH3) intersection, which services the Leafland Tree Nursery.

At its southern extent, Roberts Line forms a four-arm priority controlled intersection with Napier Road (SH3) and Te Matai Road. Roberts Line and Te Matai Road form the minor intersection approach arms, and both are subject to “stop” controls. Turning movements into Roberts Line (South) from Napier Road (SH3) are supported by dedicated turning bays, with the left-turn movements from Napier Road (SH3) giving way to other northbound movements. On approaching the intersection from Roberts Line (South), visibility is limited by surrounding vegetation and roadside signage (see Figure 3-4).

Napier Road (SH3) operates as the primary roading connection from Palmerston North city centre and the Hawkes Bay (via the former Manawatu Gorge / Saddle Road connection). Within the vicinity of the site, the road is formed of one general traffic lane in each direction, with sealed shoulders and grassed verges (see Figure 3-5). There is no median separation between traffic lanes on this section of Napier Road (SH3) although right-turn bays are provided to facilitate turning movements at key intersections on the corridor (i.e. Roberts Line, BUPA Access Road, Sutton Place).
Access onto Napier Road (SH3) is generally limited to arterial road connections and localised property accesses, becoming more frequent west of Roberts Line on approach to the main urbanised area. The existing posted speed on the corridor currently comprises a posted speed limit of 80km/hr. The speed limit transitions to 50km/hr at the Sutton Place intersection (approximately 1km west of the Roberts Line intersection). East of the Roberts Line (South) intersection the posted speed limit increases to 100km/hr.

3.2.3 Traffic Volumes

Traffic volumes for Napier Road (SH3) have been extracted from the NZ Transport Agency’s State Highway Traffic Count booklet for the 2013-2017 period (see Table 3-2). The most recent count for 2017 indicates that immediately adjacent to the NRREA site, Napier Road (SH3) has a daily ADT of 11,700 vehicles per day (vpd), of which approximately 2.5% are heavy vehicles. It should be noted that heavy vehicle traffic volumes increase significantly east of the Roberts Line (South) intersection, indicating a large volume of heavy vehicle traffic uses Roberts Line (South) to access industrial areas to the north.

<table>
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<tr>
<th>TRAFFIC COUNT LOCATION</th>
<th>AVERAGE DAILY TRAFFIC</th>
<th>% HV (2017)</th>
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<tr>
<td></td>
<td>2013</td>
<td>2014</td>
</tr>
<tr>
<td>Between Sutton Place and Roberts Line</td>
<td>11,037</td>
<td>11,071</td>
</tr>
<tr>
<td>Between Roberts Line and James Line</td>
<td>9,769</td>
<td>9,818</td>
</tr>
<tr>
<td>Between James Line and Stoney Creek Rd</td>
<td>8,794</td>
<td>9,509</td>
</tr>
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</table>

The trend in traffic volume growth on the Sutton Place to Roberts Line section of Napier Road (SH3) is shown in Figure 3-6. This indicates that linear traffic growth on the corridor over this period has been approximately 2% per annum. The traffic counts indicate a slight decline in average daily traffic volumes between 2016 and 2017, which is likely to the closure of the Manawatu Gorge route in April 2017.

* https://www.nzta.govt.nz/resources/state-highway-traffic-volumes/
Metro-count data supplied by PNCC from November 2016 indicates existing weekday traffic volumes on Roberts Line (South) within the vicinity of the proposed development (adjacent to Leafland Nursery) is 5,700 vpd (with approx. 7% heavy vehicles). The weekday AM peak hour (08.00-09.00hrs) traffic volume is approximately 470 vph, with a PM peak hour (17.00-18.00hrs) of 540 vph.

3.3 Other Transport Modes

3.3.1 Public Transport

The immediate surrounds are serviced by the Fernlea / Heights Services (Route 31 / 32) route. These services provide bus connections between residential Kelvin Grove suburbs and Palmerston North city centre (see Figure 3-7). The nearest bus stop pairing to the NRREA site are located at 26 and 29 Roberts Line, approximately 300m and 540m north of the Roberts Line / Napier Road (SH3) intersection respectively. Services operate at 40 minute frequencies during peak periods, reducing to 80 minute frequencies during inter-peak periods.

Figure 3-7: Service 31 / 32 Bus Route and Nearest Bus Stops
3.3.2 Walking and Cycling

Pedestrian footpaths are provided on the eastern side of Roberts Line, servicing the Napier Road residential development currently under construction, however, there are currently no footpaths provided on the western side of Roberts Line between Napier Road and Royal Oak Drive (adjacent to the proposed development).

There are currently no footpaths provided on Napier Road (SH3) east of the Sutton Place / Napier Road intersection, reflecting the current low density of development on the corridor edge at present. A pedestrian crossing facility is provided 70m west of Sutton Place, although no formal crossing facilities are provided within the vicinity of the NRREA site.

Formal cycle lanes are not provided along Napier Road (SH3) east of Sutton Crescent; however, cycle lanes are provided at intersections and cyclists are encouraged to use the sealed shoulders.

3.4 Crash History

A search of the New Zealand Transport Agency Crash Analysis System (CAS) database has been carried out to identify all reported crashes on Napier Road (SH3) and Roberts Line within the vicinity of the NRREA during the five-year period from 2012 to 2017 (see Figure 3-8). The results are presented in Appendix A.

The CAS report identifies a total of 18 crashes at the Roberts Line / Napier Road intersection over this period, resulting in 11 minor injuries and 1 fatality. The fatality involved a pedestrian crossing Napier Road (SH3) heedless of traffic in the early hours (2am) whilst under the influence of alcohol.

Of the crashes at the Napier Road / Roberts Line intersection:

- 12 crashes involved vehicles failing to give way to on-coming traffic;
- 1 involved a truck that lost control when turning;
- 1 involved a vehicle striking a pedestrian crossing Napier Road; and
- 4 involved vehicles failing to notice another vehicle slowing down/misjudged another user’s intentions.

The review indicates that no crashes have occurred on Roberts Line (South) between Royal Oak Road and Napier Road over this period. Six crashes have occurred on Napier Road (SH3) between Sutton Place and Roberts Line intersection, resulting in five minor and one serious injury. Five of these recorded crashes were the result of loss of control, with the remaining crash involving vehicles entering/exiting commercial property.
3.5 Strategic Network Direction

Several transportation strategies have been developed within the Palmerston North region that signal a future change in the form and function of Napier Road (SH3) within the vicinity of the NRREA site. These are discussed further below.

3.5.1 Joint Transport Study

The Palmerston North - Manawatu Strategic Transport Study (JTS)\(^5\) was developed in 2010 to inform the Horizons Land Transport Strategy. The JTS identified a desired road hierarchy in and around Palmerston North and identified a series of roading improvements to give effect to the hierarchy over a 30-year horizon (see Figure 3-9).

A key initiative within the JTS is the provision of a new inter-regional State Highway route between Mt Stewart and the Manawatu Gorge instead of the existing State Highway 3 route (including Napier Road) through Palmerston North. On completion of the proposed route, the existing Napier Road (SH3) connection would be revoked from its current state highway status to a "major arterial" route and be vested to PNCC as the local road controlling authority.

None of the improvements outlined within the JTS have been progressed through to implementation. A working group review of the JTS (2016) confirmed that the strategy remains fit for purpose and the intended direction of the strategy would support existing industry and future economic growth within the region\(^6\).

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\(^6\) Joint Transport Study Working Group – Investigations into the Validity and Progress of the Joint Transport Study (July 2016).
3.5.2 NZTA Business Cases

The NZ Transport Agency have developed the “Accessing Central New Zealand” Strategic Case (completed by NZTA in 2016). The Strategic Case notes that changing travel demands resulting from residential growth to the north of Napier Road (SH3) is a key issue for safety and access on the corridor, with concern given to the effects of growth on the intersection with Napier Road (SH3) and Roberts Line (South).

The NZ Transport Agency is currently in the process of developing the Napier Road (SH3) Detailed Business Case (DBC) covering Napier Road (SH3) between Keith Street and Stoney Creek Road. The objective of the DBC is to develop a package of improvements that will support changing land use and long-term vision for the Palmerston North transport network.

The NZ Transport Agency released options for public consultation in August 2018, with a preferred DBC option expected to be released in the coming months (see Appendix F). Key improvements proposed within all outlined DBC options include:

- Changes in the form of key intersections, including the Napier Road (SH3)/Roberts Line (South) intersection;
- Provision of a median strip between Keith Street and Stoney Creek Road;
- Implementation of an urban speed limit environment on Napier Road (SH3) west of Roberts Line (South) intersection; and
- Development of enhanced walking and cycling facilities on Napier Road.

The draft Transport Agency Investment Proposal 2018-27 (TAIP) indicates funding for intersection improvements at the Roberts Line / Napier Road intersection are indicatively proposed within the short-term (2018-21).

3.5.3 Walking and Cycling

PNCC is investigating options for providing cycling facilities on Roberts Line as part of the Eastern Link connection. Facilities are also being considered on the Te Matai Road corridor, providing connections between Roberts Line, Riverside Drive and the Manawatu River Cycleway.
3.5.4 Implications

The strategic direction outlined within these strategies and plans provides confidence that the existing roadside form and function will be altered to better reflect the needs of the changing surrounding land-use environment. As such, it is considered prudent that the Structure Plan developed for the NRREA and provisions outlined within the PDPCB are developed reflecting these likely future outcomes, under the assumption that these changes will occur in the short-term.
4 Assessment of Effects

This section of the report provides a high-level assessment of the transportation impacts of additional traffic generated from the rezoning on the surrounding road network. It also provides an outline of the suitability proposed access locations and internal roading provisions outlined within the preferred NRREA Structure Plan.

4.1 Trip Generation

Trip generation associated with the residential activities within the proposed NRREA site have been determined on a per dwelling basis. The exact lot yield for the development will not be known until subdivision consent stage; however, the Structure Plan estimates the site may provide an upper yield of 40 to 45 dwellings.

For the basis of this assessment, the following trip generation rates have been used:
- Peak period trip generation rate of 1 vehicle trip per dwelling; and
- All-day trip generation rate of 9-10 vehicle trips per dwelling are used.

The adopted trip generation rates have been determined from industry recognised guidelines (see Appendix B). Based on the trip generation assumptions outlined above, a total of 40-45 vehicle movements are expected to be generated by the site during the peak hours, with an all-day trip generation rate of 360-450 vehicle movements (see Table 4-1).

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>RATES</th>
<th>TRIP GENERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DWELLINGS</td>
<td>40-45 Dwellings</td>
<td></td>
</tr>
<tr>
<td>AM PEAK HOUR - TRIP RATE</td>
<td>Total (1 per dwelling)</td>
<td>40 - 45 Trips</td>
</tr>
<tr>
<td></td>
<td>Trips In (25%)</td>
<td>10 - 11 Trips</td>
</tr>
<tr>
<td></td>
<td>Trips Out (75%)</td>
<td>30 - 34 Trips</td>
</tr>
<tr>
<td>PM PEAK HOUR - TRIP RATE</td>
<td>Total (1 per dwelling)</td>
<td>40 - 45 Trips</td>
</tr>
<tr>
<td></td>
<td>Trips In (63%)</td>
<td>25 - 28 Trips</td>
</tr>
<tr>
<td></td>
<td>Trips Out (37%)</td>
<td>15 - 17 Trips</td>
</tr>
<tr>
<td>ALL DAY TRIP GENERATION RATE</td>
<td>9-10 vehicle trips per dwelling</td>
<td>360 - 450 Trips</td>
</tr>
<tr>
<td></td>
<td>Trips In (50%)</td>
<td>180 - 225 Trips</td>
</tr>
<tr>
<td></td>
<td>Trips Out (50%)</td>
<td>180 - 225 Trips</td>
</tr>
</tbody>
</table>

The ITE Trip Generation Manual (Ninth Edition) has been used to determine the proportion of trips generated that are inbound and outbound with respect to peak periods and all-day traffic volumes generated by the proposed development.

Using the trip generation rates and direction splits outlined within Table 4-1, trips have been distributed across each of the proposed access connection to the existing State Highway. Based on the likely catchment areas within the NRREA, it has been assumed that 70% of traffic would use Access 1 and 30% would use Access 2. The distribution for each road is shown within Table 4-2.

<table>
<thead>
<tr>
<th>ACCESS</th>
<th>AM PEAK (IN)</th>
<th>AM PEAK (OUT)</th>
<th>PM PEAK (IN)</th>
<th>PM PEAK (OUT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access 1</td>
<td>8</td>
<td>24</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Access 2</td>
<td>20</td>
<td>12</td>
<td>9</td>
<td>5</td>
</tr>
</tbody>
</table>

The assessment indicates that peak period access demands across both intersections would be relatively low, and provision of multiple accesses would distribute access demands into the site.
across two locations further minimising the potential for queueing or delays for turning vehicles on the Napier Road (SH3) corridor.

### 4.2 Traffic Distribution

The site is located within Palmerston North's eastern growth suburb of Kelvin Grove. Existing commuter travel patterns within the Kelvin Grove census area have been analysed using 2013 New Zealand Census data.

Analysis of the census data indicates:

- The majority of peak period traffic movements (80%) travel to destinations to the west of the site, including Palmerston North city centre, and suburbs to the west and south of the city;
- Approximately 15% of commuter traffic flows are to destinations to the north (i.e. Feilding or Palmerston North’s northern suburbs such as Milson); and
- The remaining 5% of commuters travelling eastbound on Napier Road (SH3) towards Ashhurst or destinations beyond.

Traffic generated by residential developments are expected to have the most significant impact on network operations during the weekday morning and evening peak periods. Assuming commuter traffic generated by the proposed site would follow similar trip patterns, the estimated peak hour traffic volumes generated by the proposed development on the local road network is shown within Table 4-3.

#### Table 4-3: Estimated Additional Peak Hour Traffic Distribution (Vehicles per Hour)

<table>
<thead>
<tr>
<th>ROAD</th>
<th>% TRIPS</th>
<th>NRREA PEAK HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAPIER ROAD (SH3) WESTBOUND</td>
<td>80%</td>
<td>36 VPH</td>
</tr>
<tr>
<td>NAPIER ROAD (SH3) EASTBOUND</td>
<td>5%</td>
<td>2 VPH</td>
</tr>
<tr>
<td>ROBERTS LINE (SOUTH)</td>
<td>15%</td>
<td>7 VPH</td>
</tr>
</tbody>
</table>

Based on the traffic distribution assumptions noted above, the forecast increase in traffic volumes on the main roads within the vicinity of the proposed development are shown within Table 4-4. Existing two-way peak hour traffic volumes on Napier Road (SH3) have been estimated based on a conservative assumption that peak period traffic equates to 10% of the recorded traffic volumes.

#### Table 4-4: Estimated Changes in Peak Hour (Two-Way) Traffic Volumes (Vehicles per Day)

<table>
<thead>
<tr>
<th>ROAD</th>
<th>TIME PERIOD</th>
<th>ESTIMATED PEAK HOUR TRIPS</th>
<th>WITH DEVELOPMENT</th>
<th>CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Napier Road (SH3) Eastbound</td>
<td>AM</td>
<td>1,130</td>
<td>1,132 vph</td>
<td>+2 vph</td>
</tr>
<tr>
<td>Napier Road (SH3) Eastbound</td>
<td>PM</td>
<td>1,130</td>
<td>1,132 vph</td>
<td>+2 vph</td>
</tr>
<tr>
<td>Roberts Line (South)</td>
<td>AM</td>
<td>540</td>
<td>547 vph</td>
<td>+7 vph</td>
</tr>
<tr>
<td>Roberts Line (South)</td>
<td>PM</td>
<td>470</td>
<td>477 vph</td>
<td>+7 vph</td>
</tr>
<tr>
<td>Napier Road (SH3) Westbound</td>
<td>AM</td>
<td>1,230</td>
<td>1,266 vph</td>
<td>+36 vph</td>
</tr>
<tr>
<td>Napier Road (SH3) Westbound</td>
<td>PM</td>
<td>1,230</td>
<td>1,266 vph</td>
<td>+36 vph</td>
</tr>
</tbody>
</table>

The assessment indicates that trips generated by the proposed development will result in a negligible increase in traffic volumes on Napier Road (SH3) east of the Roberts Line intersection. The greatest increase in peak hour traffic volumes are westbound on Napier Road (SH3) into the city centre of between 2% to 3%. As such, it is concluded that the network has sufficient capacity to cope with traffic generated by the proposed NRREA site.

### 4.3 Transport Assessment

As noted within Section 3.5, it is reasonably foreseeable that the existing operating speed and roadside environment on Napier Road (SH3) will be altered to reflect a more urbanised environment.
Furthermore, on completion of the Palmerston North ring-route, Napier Road (SH3) is likely to be revoked to a local road within the vicinity of the proposed NRREA site.

Therefore, the Transport Assessment reviews suitability of proposed access arrangements outlined within the Structure Plan against desired intersection access requirements provided by both NZTA and PNCC.

4.3.1 Future Posted Speed Limits

Napier Road (SH3) currently operates with an 80km/hr posted speed limit between Sutton Place to approximately 200m east of the Roberts Line intersection. A change in the speed limit regime on this section of Napier Road (SH3) would be considered appropriate to support a safe and appropriate roadside environment given:

- The changing roadside environment and traffic activity resulting from the intensification of residential development on the northern side of Napier Road (SH3), including the proposed NRREA site and the current Napier Road Residential Area;
- Potential changes to intersection control at the Napier Road (SH3) / Roberts Line intersection as indicated within NZTA’s Statement of Intent (2018-2021); and
- Increasing pedestrian and cycling demands along the corridor resulting from the provision of new walking and cycling infrastructure (including the Eastern Cycle Link and Te Matai Road connections) and increased intensification of adjacent land-use.

This has been recognised by the NZ Transport Agency within the Napier Road (SH3) DBC consultation material, which has identified the need to reduce the speed limit to reflect an urbanised environment although the proposed speed limit has not been defined.

An assessment of safe and appropriate speeds for Napier Road (SH3) under both existing and future roadside conditions has been undertaken following the NZTA Speed Management Guide (see Appendix C). Within the context of the future urban roadside environment, the Speed Management Guidelines indicate that a posted speed limit of 60 km/hr or less on Napier Road (SH3) could be considered a safe and appropriate posted speed on the corridor.

For the purposes of good planning, the proposed NRREA Structure Plan arrangements and associated access location assessment have been assessed with a conservative assumption that the road will operate with a posted speed limit of 60km/hr7.

4.3.2 Suitability of Access Locations

As noted previously, the Structure Plan proposes that existing vehicle crossings (three on Napier Road (SH3) and one Roberts Line (South)) would be removed, and two new priority controlled intersections would be provided on Napier Road (SH3).

The available sight distances and intersection spacing from each of the proposed new accesses outlined within the NRREA Structure Plan is shown within Figure 4-1 and Figure 4-2.

For the purposes of assessing the suitability of proposed access locations, the following reference documents have been used:

- The PNCC District Plan (Section 20);
- The NZTA’s Accessway Standards and Guidelines (Transit Planning Policy Manual VI, 2007), and
- Austroads Guide to Road Design (Various).

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7 On this basis, should access arrangements adhere to the requirements of a 60km/hr road they will continue to exceed requirements should the posted speed be lower (i.e. 50km/hr).
NZTA Intersection Assessment Criteria

The proposed access demands at both intersections are expected to exceed the 100 equivalent car movements (ECM) per day. The NZ Transport Agency Access Standards and Guidelines (2007) indicates that accessways that generate more than 100 ECM per day, or more than 20 ECM during peak periods should be treated as intersections.

As such, the NZTA Guidance refers to the Austroads Guide to Road Design Part 4 (Intersections and crossings) which determines that the suitability of spacing of unsignalised access can be assessed by considering:

- Safe Intersection Sight Distance;
- Stopping Sight Distance;
- Left Turn Conflict Overlap; and
- Egress Capacity.
Further detail on each of these assessment criteria is outlined within Appendix E. A summary table detailing the proposed access strategy’s compliance with Austroads assessment criteria is provided in Table 4-5 below.

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>MIN. REQUIREMENTS</th>
<th>COMPLIES</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe Intersection Sight Distance</td>
<td>140m (AUSTROADS)</td>
<td>Y</td>
<td>Complies with minimum sight distances at 60km/hr</td>
</tr>
<tr>
<td>Approach Sight Distance</td>
<td>73m</td>
<td></td>
<td>Complies with minimum sight distances at 60km/hr</td>
</tr>
<tr>
<td>Left-Turn Conflict Overlap</td>
<td>40m</td>
<td></td>
<td>Spacings between intersections exceed 40m.</td>
</tr>
<tr>
<td>Egress Capacity</td>
<td>170m</td>
<td></td>
<td>Spacings between intersections exceed 170m.</td>
</tr>
</tbody>
</table>

Operating at a reduced speed environment (i.e. a 60km/hr posted speed limit), all the proposed intersections accesses outlined within the NRREA Structure Plan would satisfy both the recommended separation and sight-distance criteria as outlined within Austroads.

**PNCC Intersection Assessment Criteria**

The PNCC criteria outlining access standards for vehicles and crossing are outlined within Section 20.3.9 of Section 20 of the PNCC District Plan. The District Plan states any activity on a major arterial road must be provided in accordance with the following standards:

i. Vehicles cannot reverse onto or off that road from any access to a loading or parking area, except where access is to a residential dwelling and the posted speed limit is less than 100 km/h;

ii. Site access shall be formed to a maximum of 6 metres in width. This rule does not apply to Collector Roads in the Residential and Industrial Zones;

iii. The minimum sight distances at intersections and accesses shall be as recorded in Table 20.3 (Illustrated and measured in accordance with Figure 20.6);

iv. The minimum spacing between successive site accesses and intersections and the minimum distance between any access crossing and any intersection shall be as recorded in Table 20.3 and measured in accordance with Figure 20.4.

The proposed internal road network (discussed within Section 4.4 of this report) and proposed intersection strategy indicates that the NRREA will be developed in such a way that vehicles will not be required to perform a reverse manoeuvre onto Napier Road (SH3).

A summary table detailing the proposed access strategy’s compliance with PNCC’s minimum sight distance requirements and intersection spacing requirements as defined within Figure 20.3 is provided in Table 4-6 below.
Table 4.6: Intersection Sight and Spacing Requirements (PNCC District Plan - Figure 20.3)

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>MIN. REQUIREMENTS</th>
<th>COMPLIES</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersection Sight Distance</td>
<td>160m (PNCC)</td>
<td>Y</td>
<td>Complies with minimum sight distances at 60km/hr</td>
</tr>
<tr>
<td>Intersection Spacings⁶</td>
<td>200m (PNCC)</td>
<td>Y</td>
<td>Spacings between intersections meet or exceed 200m</td>
</tr>
</tbody>
</table>

Access Location Summary

Operating at a reduced urban speed environment (i.e. a 60km/hr or lower posted speed limit), the location of proposed intersections outlined within the NRREA Structure Plan would satisfy both the recommended separation and sight-distance criteria for both NZ Transport Agency and PNCC.

4.3.3 Intersection Design

Concept designs for the proposed accesses have not been developed as part of the Structure Plan, and would be confirmed at a sub-division resource consent stage, however, this assessment provides the following commentary on design considerations to support the efficient and safe operation of the proposed intersections:

- NZTA Accessway Standards [SP/M/001 - Table AppSB/3] states where the major road has a posted speed limit of 60km/hr or less, a minimum distance of 20m should be provided between the local road accessway (internal road network) and the intersections with Napier Road (SH3).
- Intersection controls should be considered within the internal road network to minimise the risk of queues from the internal road network onto Napier Road (SH3). Traffic engineering solutions that could be considered include installing priority controls on the internal road network approaches to provide priority for traffic (thus providing free-flow movement) exiting Napier Road (SH3).
- At present, the topography of the NRREA site on the southern edge of the development forms a steep gradient that falls steeply away from Napier Road (SH3). During the design phase, the road level will also need to be raised to such a level that suitable approach gradients can be provided onto Napier Road (SH3).
- Traffic demands for right-turn movements from Napier Road (SH3) are expected to form a relatively minor percentage of access demands (approximately 20% of inward peak movements); however, peak hour traffic volumes on Napier Road (SH3) exceed 1,000 vehicles per hour (two-way).

Based on Austroads guidelines for the provision of turning bay treatments (see Figure 4-3), right-turn bays may be required to support safe and efficient movements into the site. This could potentially be incorporated into future NZ Transport Agency proposals to provide a flush median on Napier Road (SH3) as part of the DBC.

⁶ PNCC District Plan - Section 20 Transportation - Figure 20.3
4.3.4 Wider Considerations – Roberts Line (South) / Napier Road (SH3) Intersection

Analysis of crash history on the corridor indicates that the Roberts Line / Napier Road (SH3) priority controlled intersection has experienced 18 recorded crashes since 2012. The proposed NRREA development is not expected to significantly increase the risk of additional crashes occurring at this intersection, as most of the traffic generated by the proposed NRREA development is expected to travel westbound towards the city centre thus avoiding the intersection.

The draft NZTA Statement of Intent (2018-2027) indicates that safety improvements to the intersection could be implemented by 2021. It is expected that any proposed upgrade would be designed in a safe and efficient manner that would provide sufficient network capacity to support increased traffic volumes and local access demands (including the Napier Road Residential Area) associated with the wider strategic growth areas.

4.4 Internal Road Arrangement

Section 20A of the Palmerston North District Plan defines the road hierarchy for the city. As a low trafficked road, the primary function of the proposed development and the arterial road network (Roberts Line and Napier Road SH3), the internal road network would best align with PNCC's definition of a “local road”.

Based on the estimated peak hour and all-day trip generation potential of the proposed development, the internal road network is expected to have sufficient capacity to easily accommodate the expected levels of traffic generated by the site.

To maximise potential lot yield, the proposed internal road network would run parallel to Napier Road (SH3) on the southern edge of the NRREA development. A concept design for the internal road network is shown below in Figure 4-4.

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8 Austroads Guide to Traffic Management Part 6 - Section 2.5.6. Figure 4.9(c) is considered appropriate for urban roads (including those on the urban fringe and lower speed rural roads) with a speed limit below 70km/hr.
The proposed cross section indicates the internal road network would be separated from Napier Road (SH3) with a wide planted grassed berm and a 3m wide shared path facility which would run along the full extent of the NRREA site. The internal road network would provide for two-way traffic movements, consisting of 3m wide lanes. On-street parking and 1.6m wide pedestrian footpaths would be provided on the northern side of the internal road network, adjacent to developed frontages.

The PNCC Engineering Standards for Land Development (2016) outlines the minimum road reserve, carriageway and berm widths for roads serving defined number of residential dwellings (Table 3-1, Page 34). The standards outline the minimum requirements for 17.2m wide carriageways for local roads servicing 20-200 EDUCII10. This includes the provision of two trafficable lanes, footpaths on both sides of the road and sufficient space for on-street parking on both sides of the road.

The intention of the minimum requirements is to provide sufficient network capacity to support local road activities where development is proposed on both sides of the corridor. As the proposed primary local road only intends to have active frontages on its northern edge, the road network is not required to support the intended on-street parking demands that could reasonably be expected within the design standards.

Furthermore, the provision of a shared use path on the southern side of the development would not require additional provisions for pedestrians on the southern edge of the local road. As such, the carriageway widths for the internal road network could be lower than those outlined within the relevant PNCC Engineering Standards for Land Development.

Buffer planting is required to provide sufficient visual breaks to avoid confusion for opposing vehicle movements (i.e. eastbound vehicles on Napier Road and westbound vehicles on the internal road network). The finalised set back from the edge of Napier Road (SH3) should be designed to be sufficient enough to support the provision of shared path facilities and to provide suitable buffer planting.

10 EDUC - Estimated dwelling units in catchment
It is not expected that local bus services will travel through the internal road network following completion of the proposed site, and it is likely that services will continue to operate on the arterial road network (Roberts Line and Napier Road).

4.5 Active Modes Provisions

The proposed Structure Plan provides for network permeability and connectivity for active modes (pedestrians and cycling) that will support uptake of non-car based travel.

4.5.1 Internal Provisions

The uptake of walking and cycling is reliant on the development of safe and convenient connections with the existing and proposed network within the adjoining urban areas.

Proposed provisions for active mode users include footpaths within the internal road network, the development of leisure and recreational walkways through reserves and the provision of suitable set-backs from the access road adjacent to the surrounding external road network to provide new shared path facilities.

The internal road network is expected to be developed in such a way that the design will reflect a low volume / low speed environment. General design principles that could be applied to support safe and attractive environment for pedestrians include:

- Pedestrian footpaths (min. 1.6m wide) should be provided adjacent to all active frontages (at a minimum), with suitable connections made to external footpaths provided on the arterial road network or leisure routes;
- Intersections within the local road network should provide maximum radii (4-6m) to support a low speed environment;
- Ensuring that Crime Prevention Through Environmental Design (CPTED) principles are developed and applied to increase perceived and actual safety for pedestrians and cyclists;
- Suitable pram crossing facilities should be provided on key desire lines at intersections to support pedestrian movements for all ages and abilities; and
- Supporting pedestrian connectivity between the internal roading network and the lagoon reserve through the provision of appropriate pedestrian walkways and bridging facilities.

Based on the low volume of traffic and posted speed limit, dedicated on-road cycling facilities are not expected to be required within the internal road network.\(^{(1)}\)

4.5.2 External Provisions

There are currently no provisions for pedestrians or cyclists on Napier Road (SH3) within the vicinity of the development. The proposed Structure Plan arrangement would provide suitable berm space to the north of Napier Road (SH3) to support the provision of a 3m wide shared path cycleway facility from Roberts Line (South) adjacent to the southern edge of the development.

The provision of a new shared path on Napier Road (SH3) would provide connections to existing cycling facilities west of Sutton Crescent and proposed future facilities on Roberts Line (South). NZ Transport Agency are also considering opportunities for extending shared path facilities on Napier Road (SH3) east of the Roberts Line (South) as well as improved crossing opportunities on Napier Road (SH3) within the vicinity of the site as part of the Napier Road (SH3) DBC.

Providing this link would provide continuous and connected cycling facilities from the proposed District Plan Change B site (and local surrounds) to key leisure and employment zones within Palmerston North city centre and surrounding business zones.

\(^{(1)}\) Based on Austroads Guide to Traffic Engineering Practice Part 1\(\text{I}\) (inc. NZ Supplements)
It should be noted that no on street pedestrian or cycling provisions are currently provided for along the southern edge of the BUPA Retirement Village. Providing a facility along this section of Napier Road (SH3) will require further engagement and negotiation with local landowners and potential modifications to the existing intersection arrangement servicing the facility.
5 Conclusions

WSP Opus have been commissioned by Palmerston North City Council (PNCC) to undertake a Transport Assessment of the proposed rezoning and accompanying Structure Plan developed for the Napier Road Residential Extension Area (NRREA), located in Palmerston North.

The Structure Plan will be used to support the Proposed District Plan Change B (PDPCB), which seeks to re-zone approximately 15.6ha of existing rural land on the northern side of Napier Road SH3 (between Roberts Line and the Napier Road Drain) to a residential zoning. The proposed site is expected to result in the creation of around 40-45 residential lots.

The Structure Plan proposes the removal of four existing uncontrolled vehicle accesses onto the external road network (three on Napier Road (SH3) and one on Roberts Line (South)) and replaced with two new priority controlled T-intersections.

The findings of the Transport Assessment area:

- Peak period access demands across both intersections would be relatively low and distributed across two accesses, minimising the potential for queueing or delays for turning vehicles on the Napier Road (SH3) corridor;
- Traffic generated by the proposed development is expected to have a marginal impact on State Highway demands, resulting in less than 3% increase in current peak hour operational demands;
- With the implementation of an appropriate urban speed limit (60km/hr or less) on Napier Road (SH3), the location of proposed intersections outlined within the Structure Plan adhere to the sight line and intersection separation distances required by both the NZ Transport Agency and PNCC;
- Intersection designs will be developed at a subdivision resource consent stage and therefore the Transport Assessment does not make comment on these arrangements. It is expected that the design would make suitable provisions to support the efficient and safe operation of the network (i.e. stacking capacity, turning bays and internal network controls);
- The proposed concept designs for the internal road network would provide good connectivity through the site and support maximum developable yield from the site;
- Suitable buffer planting will be required on the southern edge of the site to minimise safety risks associated with opposing traffic movements on the state highway network;
- Although the internal road cross sections do not adhere to the PNCC Subdivision Standards, the design is considered fit-for-purpose and relevant within the site context given likely development yields; and
- The Structure Plan would provide good linkages with the active mode and public transport network providing alternative options to private car use.

Overall, considering the traffic generating potential of the development and the status of the proposed future road network operations on Napier Road (SH3), it is concluded that the proposed site and associated Structure Plan is considered suitable for residential development.
Appendix A: Crash History (CAS)
## Overall Crash Statistics

<table>
<thead>
<tr>
<th>Crash Severity</th>
<th>Number</th>
<th>%</th>
<th>Social cost ($m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal</td>
<td>1</td>
<td>2</td>
<td>5.03</td>
</tr>
<tr>
<td>Serious</td>
<td>1</td>
<td>2</td>
<td>0.81</td>
</tr>
<tr>
<td>Minor Injury</td>
<td>16</td>
<td>31</td>
<td>1.7</td>
</tr>
<tr>
<td>Non-injury</td>
<td>33</td>
<td>65</td>
<td>1.12</td>
</tr>
</tbody>
</table>

### Crash Numbers

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal</th>
<th>Serious</th>
<th>Minor</th>
<th>Non-inj</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>2014</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>2015</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2016</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>2017</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

### TOTAL

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal</th>
<th>Serious</th>
<th>Minor</th>
<th>Non-inj</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>12</td>
<td>27</td>
</tr>
</tbody>
</table>

Percent: 2 | 2 | 29 | 66

Note: Last 5 years of crashes shown

## Overall Casualty Statistics

<table>
<thead>
<tr>
<th>Injury Severity</th>
<th>Number</th>
<th>% all casualties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Serious Injury</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Minor Injury</td>
<td>22</td>
<td>92</td>
</tr>
</tbody>
</table>

### Casualty Numbers

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal</th>
<th>Serious</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2014</td>
<td>0</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2015</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2016</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2017</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

### TOTAL

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal</th>
<th>Serious</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>15</td>
</tr>
</tbody>
</table>

Percent: 6 | 6 | 68 | 88

Note: Last 5 years of casualties shown

## Crash Type and Cause Statistics

### Crash Type

- All crashes | % All crashes
- Overtaking Crashes: 0 | 0
- Straight Road Lost Control/Head On: 11 | 22
- Bend - Lost Control/Head On: 7 | 14
- Rear End/Obstruction: 12 | 24
- Crossing/Turning: 19 | 37
- Pedestrian Crashes: 1 | 2
- Miscellaneous Crashes: 1 | 2

### Crash factors (*)

- All crashes | % All crashes
- Alcohol: 3 | 6
- Too fast: 3 | 6
- Failed Give Way/Stop: 19 | 37
- Failed Keep Left: 3 | 6
- Overtaking: 1 | 2
- Incorrect Lane/position: 6 | 12
- Poor handling: 10 | 20
- Poor Observation: 22 | 43
- Poor judgement: 8 | 16
- Fatigue: 4 | 8
- Disabled/old/ill: 2 | 4
- Pedestrian factors: 1 | 2
- Vehicle factors: 2 | 4
- Road factors: 7 | 14
- Weather: 3 | 6
- Other: 8 | 16

TOTAL: 102 | 202

(*) factors are counted once against a crash, i.e. two fatigue drivers count as one fatigue crash factor.

### Number of parties in crash

- All crashes | % All crashes
- Single party: 19 | 37
- Multiple party: 32 | 63

TOTAL: 51 | 100

## Driver and Vehicle Statistics

### Drivers at fault or part fault in injury crashes

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>20-24</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>25-29</td>
<td>1</td>
<td>1</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>30-39</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>30-49</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>40-49</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>50-59</td>
<td>1</td>
<td>0</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>60-69</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>70+</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>

TOTAL: 11 | 100 | 17 | 100 | 18 | 100

### Drivers at fault or part fault in injury crashes

<table>
<thead>
<tr>
<th>Licence</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault</td>
<td>5</td>
<td>13</td>
<td>18</td>
<td>72</td>
</tr>
<tr>
<td>Learner</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Restricted</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Never licensed</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Disqualified</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Overseas</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Expired</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL: 11 | 7 | 18 | 100

### Vehicles involved in injury crashes

<table>
<thead>
<tr>
<th>No of vehicles</th>
<th>% Injury crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUV</td>
<td>2</td>
</tr>
<tr>
<td>Car</td>
<td>19</td>
</tr>
<tr>
<td>Motor Cycle</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
</tr>
<tr>
<td>Moped</td>
<td>1</td>
</tr>
<tr>
<td>Bicycle</td>
<td>2</td>
</tr>
<tr>
<td>Truck</td>
<td>4</td>
</tr>
<tr>
<td>Van or Utility</td>
<td>34</td>
</tr>
</tbody>
</table>

TOTAL: 34 | 162

Note: % represents the % of injury crashes in which the vehicle appears

Note: Driver information is not computerised for non-injury crashes

Page 1 of 2

Combined Crash List Detail report - Run on: 8 Feb 2018

Injury and non-injury crashes

Note: Last 5 years of crashes shown

PALMERSTON NORTH CITY COUNCIL

ITEM 13 - ATTACHMENT 1

P a g e | 177
<table>
<thead>
<tr>
<th>Item 13</th>
<th>ATTACHMENT J</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>First Street</th>
<th>3/47/4/4.451</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ROBERTS LINE SOUTH</td>
<td>2017065277</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/3.907</td>
<td>701 JAMES LINE</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/2.806</td>
<td>401 LIMBERICK ST</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/2.75</td>
<td>KEITH ST</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/3.333</td>
<td>2406 Bottom Place</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/5.139</td>
<td>1 JAMES LINE</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/5.903</td>
<td>1 TE MATUZ ROAD</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/5.791</td>
<td>3006 TE MATUZ ROAD</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/5.157</td>
<td>1 JAMES LINE</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/2.47</td>
<td>150 LIMBERICK ST</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/4.41</td>
<td>ROBERTS LINE SOUTH</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/4.401</td>
<td>4000 ROBERTS LINE SOUTH</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/4.39</td>
<td>5005 JAMES LINE</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/5.112</td>
<td>1 DUTTON PLACE</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/4.61</td>
<td>5500 ROBERTS LINE SOUTH</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/4.531</td>
<td>5006 ROBERTS LINE SOUTH</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/5.457</td>
<td>601 JAMES LINE</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/4.70</td>
<td>601 JAMES LINE</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/4.684</td>
<td>450 JAMES LINE</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3/47/4/4.11</td>
<td>ROBERTS LINE SOUTH</td>
</tr>
<tr>
<td>First Street</td>
<td>Second Street</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------</td>
</tr>
<tr>
<td>KEITH ST</td>
<td>10W NAIFEY ROAD</td>
</tr>
<tr>
<td>3/4/4/3.141 NAIFEY ROAD</td>
<td>02/02/2013 12:14</td>
</tr>
<tr>
<td>3/4/4/4.139 I JAMES LINE</td>
<td>09/09/2013 10:14</td>
</tr>
<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>05/05/2013 15:05</td>
</tr>
<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>05/05/2013 17:05</td>
</tr>
<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>09/09/2013 10:09</td>
</tr>
<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>12/12/2012 17:12</td>
</tr>
<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>25/05/2012 10:25</td>
</tr>
<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>27/04/2012 10:27</td>
</tr>
<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>18/02/2012 09:18</td>
</tr>
<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>27/11/2012 15:27</td>
</tr>
<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>16/06/2012 15:16</td>
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<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>02/02/2012 08:02</td>
</tr>
<tr>
<td>3/4/4/4.451 NAIFEY ROAD</td>
<td>03/03/2012 13:03</td>
</tr>
</tbody>
</table>
## Road Environment Statistics

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Local %</th>
<th>State %</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>4</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Open Road</td>
<td>1</td>
<td>2</td>
<td>38</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5</td>
<td>10</td>
<td>46</td>
</tr>
</tbody>
</table>

## Conditions

<table>
<thead>
<tr>
<th></th>
<th>Injury</th>
<th>Non-injury</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light/Overcast</td>
<td>11</td>
<td>22</td>
<td>33</td>
<td>65</td>
</tr>
<tr>
<td>Dark/Twilight</td>
<td>7</td>
<td>11</td>
<td>18</td>
<td>35</td>
</tr>
<tr>
<td>TOTAL</td>
<td>18</td>
<td>33</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

## Intersection/Mid-block

<table>
<thead>
<tr>
<th></th>
<th>All crashes</th>
<th>% All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersection</td>
<td>32</td>
<td>63</td>
</tr>
<tr>
<td>Midblock</td>
<td>19</td>
<td>37</td>
</tr>
<tr>
<td>TOTAL</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

## Objects Struck

<table>
<thead>
<tr>
<th></th>
<th>Injury %</th>
<th>Non-injury %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crashes w/obj struck</td>
<td>5</td>
<td>28</td>
</tr>
</tbody>
</table>

## Object Struck

<table>
<thead>
<tr>
<th></th>
<th>Injury %</th>
<th>Non-injury %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fence</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>Traffic Island</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kerb</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Parked Vehicle</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Post Or Pole</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Tree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ditch</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Stray Animal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8</td>
<td>19</td>
</tr>
</tbody>
</table>

Note: % represents the % of crashes in which the object is struck.

## Time Period Statistics

### Day/Period

<table>
<thead>
<tr>
<th></th>
<th>All crashes</th>
<th>% All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekday</td>
<td>44</td>
<td>86</td>
</tr>
<tr>
<td>Weekend</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>TOTAL</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

### Day/Period - 0000-0300 - 0600-0900 - 1200-1500 - 1800-2100

<table>
<thead>
<tr>
<th></th>
<th>All crashes</th>
<th>% All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekday</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Weekend</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: Weekend runs from 6 pm on Friday to 6 am on Monday.

### Day/Period - 0259 0559 0859 1159 1459 1759 2059 2400

<table>
<thead>
<tr>
<th></th>
<th>All crashes</th>
<th>% All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tue</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wed</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Thu</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Fri</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sat</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sun</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

### Month

<table>
<thead>
<tr>
<th></th>
<th>Injury</th>
<th>% Non-injury</th>
<th>%</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Feb</td>
<td>2</td>
<td>11</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Mar</td>
<td>2</td>
<td>11</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Apr</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>May</td>
<td>2</td>
<td>11</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>Jun</td>
<td>3</td>
<td>17</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Jul</td>
<td>2</td>
<td>11</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>Aug</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Sep</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Oct</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Nov</td>
<td>2</td>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dec</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>18</td>
<td>100</td>
<td>33</td>
<td>100</td>
</tr>
</tbody>
</table>
Appendix B: Trip Generation Rates
Comparison of Trip Generation Rate Literature

To identify the potential trip generation rates for residential developments, reference has been made to available data within the following industry recognised guidelines:

- The New Zealand Trips and Parking Database (NZTPD);
- New South Wales and Traffic Authority publication - “Guide to Traffic Generating Developments” (RTA), and
- Institute of Transportation Engineers (ITE) - Trip Generation Manual (Ninth Edition).

The trip generation rates for residential dwellings are shown within Table B1. The trip generation rates are based on “dwelling housing” rates.

Table B1: Average Trip Generation Rates for Residential Dwellings (Various Sources as Named)

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>AM PEAK TRIPS</th>
<th>PM PEAK TRIPS</th>
<th>ALL DAY TRIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW ZEALAND TRIPS AND PARKING</td>
<td>0.99 / Dwelling</td>
<td>1.13 / Dwelling</td>
<td>9.3 / Dwelling</td>
</tr>
<tr>
<td>DATABASE (AVERAGE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTA - GUIDE TO TRAFFIC GENERATING</td>
<td>0.85 / Dwelling</td>
<td>0.85 / Dwelling</td>
<td>9.0 / Dwelling</td>
</tr>
<tr>
<td>DEVELOPMENTS (AVERAGE)</td>
<td></td>
<td></td>
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<tr>
<td>ITE - TRIP GENERATION MANUAL</td>
<td>0.75 / Dwelling</td>
<td>1.01 / Dwelling</td>
<td>9.57 / Dwelling</td>
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<tr>
<td>(AVERAGE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADOPTED RATE</td>
<td>1.0 / Dwelling</td>
<td>1.0 / Dwelling</td>
<td>9-10 / Dwelling</td>
</tr>
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</table>

Analysis of trip generation rates indicate that both peak period trip generation rates outlined within the RTA and ITE trip generation handbooks are generally lower than those within the NZ Trips and Parking Database. The adopted rate of 1 vehicle trip per dwelling in the peak periods and 9 - 10 all day vehicle trips aligns with the identified trip generation rates within all sources.
Appendix C: Future Posted Speed Assessment
Future Posted Speed Limit – Assessment Methodology

The NZ Transport Agency are proposing to reduce the existing roadside speed environment on Napier Road (SH3) within the vicinity of the NRREA as part of the ongoing DBC to better reflect its urbanising surrounding, however, a preferred posted speed has not yet been confirmed. The Speed Management Guide has been used to determine the likely posted speed environment under future network conditions as a basis of the Structure Plan assessment.

Assumptions

- The road is currently identified as a Regional route within NZTA’s One Network Road Classification. The road could potentially be reclassified as an arterial road following its revocation to local road. In both instances, the road would be classified as a “Class 2” road.
- The “Infrastructure Risk Rating” tool (see Figure C1) has been used to assess road safety risk on Napier Road (SH3). The tool indicates that under future network conditions, the road has an IRR rating of Low-Medium as a high-volume road located within an urban environment.
- The assessment has assumed Napier Road (SH3) has a personal risk rating of ‘medium’ as determined from the KiwiRAP15 assessment (see Figure C2).

The results of the assessment indicate that under future network conditions the safe and appropriate speed on Napier Road (SH3) would be 60km/hr or less (see Figure C3).

*Figure C1 - Infrastructure Risk Rating Tool Outcomes*

15 [https://roadsafetyrisk.co.nz/maps/personal-risk#Manawatu-Wanganui](https://roadsafetyrisk.co.nz/maps/personal-risk#Manawatu-Wanganui)
Figure C2 – Personal Risk Rating on Napier Road (SH3) and wider surroundings
Table 2.1: Proposed Safe and Appropriate Speeds classification method – Urban Roads

<table>
<thead>
<tr>
<th>Function / Feature</th>
<th>Road safety metric</th>
<th>Infrastructure Risk Rating</th>
<th>Safe and Appropriate Speed (km/h)</th>
</tr>
</thead>
</table>
| • ONRC is Class 1 or 2  
  • Identified as a Freight Priority Route in a Network Operating Framework  
  • Limited Access Road controls  
  • Median Divided | ▪ Personal Risk ≤ Low-Medium. | ▪ ‘Low’ or ‘Low-Medium’ | ▪ 80 |
| • ONRC is Class 1 or 2  
  • Non-commercial adjacent land use | ▪ Personal Risk ≤ Medium; | ▪ ‘Low’ or ‘Low-Medium’ | ▪ 60 |
| • ONRC is Class 1 or 2  
  • Non-commercial adjacent land use | No road safety metric used in the assessment | Any IRR | 50 |
| • ONRC is Primary Collector  
  • Residential adjacent land use | ▪ Personal Risk ≤ Medium-High | ▪ Low to Medium | ▪ 50 |
| • Any ONRC  
  • Non-commercial and non-residential adjacent land use | ▪ Personal Risk ≤ Medium-High | ▪ ‘Low’ to ‘Medium’ | ▪ 50 |
| • Any ONRC  
  • CBD/town centre  
  • Residential neighbourhoods | No road safety metric used in the assessment | ▪ ‘Low’ to ‘Medium–High’ | ▪ 40 |
| • Any ONRC  
  • CBDs or town centres with high place function and concentration of active road users | No road safety metric used in the assessment | ‘High’ | ▪ 30 |
| • Parks | No road safety metric used in the assessment | Any rating | ▪ 20 |
| • Shared spaces with high place function and concentration of active road users  
  • Car parks | No road safety metric used in the assessment | Any rating | ▪ 10 |

Note 2: Commercial land use excludes industrial land use activities.
Note 3: No road safety metrics are used in the assessment of roads with a safe and appropriate speed of 40km/h or less, but the corridor’s look and feel should be conducive to achieving the safe and appropriate speeds.
Appendix D: Alternative Access Options
Connections to MacPherson Grove to the west of the site

The option of providing a new link to the MacPherson Grove / Napier Road (SH3) intersection was considered. The option would require a roading connection to be provided over the existing Horizons Regional Council stop-bank that aligns the eastern edge of the MacPhersons Garden Centre site. This connection could be achieved in principle, although the road alignment would require significant earthworks to achieve acceptable approach gradients and minimise impacts on the stop banks function.

Providing suitable approach gradients may limit the ability to provide direct access to adjoining properties and may need additional access roads to service local properties. This would result in reduced potential lot yield on both sides of the stop-bank.

Providing connections to MacPherson Grove would also increase through traffic through a sensitive land-use area (BUPA Retirement Village), and could encourage local road rat running to avoid potential congestion at the Roberts Line (South) / Napier Road (SH3) intersection if provided in co-ordination with a new connection on Roberts Line (South)

Provision of a new intersection access onto Roberts Line.

Providing a new intersection access onto Roberts Line is considered achievable, although less desirable than the preferred Structure Plan access arrangements. At a strategic level, the link to Roberts Line (South) in co-ordination with a connection from Napier Road (SH3) may also encourage rat-running through the NRREA site to avoid delays at the Roberts Line (South) / Napier Road (SH3) intersection.

Furthermore, the majority of travel demands generated by the site are expected to be westwards on Napier Road (SH3) into Palmerston North city centre. Therefore, this option would generate increased traffic demands from Roberts Line (South) onto Napier Road (SH3) via the Roberts Line (South) and Napier Road (SH3) intersection.

The existing at-grade access driveway from the Leaflands Tree Nursery onto Roberts Line (South) is located approximately 80m north of the Napier Road (SH3) intersection and 40m south of Freedom Road intersection (as shown within Figure D1 and Figure D2). The provision of a new intersection at this location is considered less desirable as:

- The location does not achieve minimum sight visibility requirements southwards towards Napier Road (SH3), which is further hampered by existing roadside vegetation; and
- There is the potential for additional conflicts between vehicles accessing the Residential Extension Area and increasing traffic access demands at the Freedom Drive as the Napier Road Residential development progresses.

An access could potentially be provided further north of the existing site, in a position that could achieve both suitable sight visibility distances and separation of right-turn movements with Freedom Drive, however, the existing ground levels drop significantly to the west of the existing road reserve.

Providing an access at this location would require significant earthworks and earthworks to achieve suitable approach gradients which would reduce development yield. Roberts Line (South) is also a relatively constrained corridor and localised road widening may also be required to the north to support the provision of a right-turn bay into the development (should it be required).
Figure D1: Northbound View from Leafland Tree Nursery Access

Figure D2: Southbound View from Leafland Tree Nursery Access
Appendix E: Intersection Assessment Criteria
Intersection Spacing and Sight Distance Requirements - Assessment Criteria

The following criteria have been used to assess the suitability of proposed access locations within the NRREA Structure Plan. The distances are based on an anticipated future posted speed limit of 60km/hr or less. The criteria outlined below have been extracted from relevant sources within the Section 20 (Transportation Section) of the Palmerston North District Plan and Austroads Guide to Road Design Parts 4 and 4A.

Safe Intersection Sight Distance

The Safe Intersection Sight Distance (SISD) is the minimum sight distance which should be provided on the major road at any intersection.

Figure 20.3 within Section 20 of the PNCC District Plan requires a minimum sight distance of 160m on minor approaches to intersections with Major Arterial roads with a 60km/hr posted speed limit.

The minimum Safe Intersection Sight Distance (SISD) outlined in Austroads Guide to Road Design Part 4A (based on a 2 second reaction time) is identified as 151m. This assumes the 85th percentile operating speed is 10km/hr above the posted speed (i.e. 70km/hr design speed).

It should be noted that the minimum sight distances recommended within the PNCC District Plan exceed the recommended SISD within Austroads; therefore, should access arrangements into the proposed Structure Plan adhere to PNCC's minimum access requirements, this should be considered acceptable to NZ Transport Agency.

Stopping Sight Distance

Desirably, a driver can clear the intersection or access connection and have at least stopping sight distance available to react to a potential conflict and come to a stop. The Austroads Guide to Road Design (Part 4) notes that the Stopping Sight Distance (SSD) is equal to the to Approach Sight Distance (ASD) that is described in ACRD Part 4A (Austroads 2017a).

Table 3.1: Approach sight distance (ASD) and corresponding minimum crest vertical curve size for sealed roads ($S < L$)

<table>
<thead>
<tr>
<th>Design speed (km/h)</th>
<th>Based on approach sight distance for a car$^{(1)}$</th>
<th>Based on approach sight distance for a truck$^{(4)}$</th>
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<tr>
<td></td>
<td>$R_f = 1.5$ sec$^{(3)}$</td>
<td>$R_f = 2.0$ sec</td>
</tr>
<tr>
<td></td>
<td>ASD (m)</td>
<td>K</td>
</tr>
<tr>
<td>40</td>
<td>34</td>
<td>5.3</td>
</tr>
<tr>
<td>50</td>
<td>48</td>
<td>10.5</td>
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<td>60</td>
<td>64</td>
<td>18.8</td>
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<td>70</td>
<td>83</td>
<td>31.1</td>
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<td>80</td>
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<td>48.5</td>
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<td>151</td>
<td>104</td>
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<td>110</td>
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<td>-</td>
</tr>
<tr>
<td>130</td>
<td>-</td>
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</tbody>
</table>

Truck stopping capability provided by the minimum crest curve size$^{(4)}$: $h_1 = 2.4$ m, $h_2 = 0$ m, $d = 0.22$
Left-Turn Conflict Overlap

A left-turn overlap occurs when the through driver must monitor more than one access at a time. Whilst providing at least the stopping sight distance between access points will allow a through vehicle to avoid a collision with an entering vehicle, this can be considered conservative as the entering vehicle will be accelerating away.

Austroads uses deceleration rates from 2.5 m/sec (comfortable) to 3.5 m/sec (maximum) and implied acceleration rates for developing acceleration lanes from about 1.0 m/sec² to 14 m/sec² (Section 5 of AGRD Part 4A (Austroads 2017a)).

Table E 2: Minimum distance to reduce collision potential due to overlapping left turns

<table>
<thead>
<tr>
<th>Speed (km/h)</th>
<th>Minimum spacing (m)</th>
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<tbody>
<tr>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>70</td>
<td>105</td>
</tr>
</tbody>
</table>

Notes:
The minimum spacing is measured centre to centre of the access connections.
A vehicle entering the traffic stream from a driveway completes a 90° left-turn and accelerates from a stop at 0.6 m/sec². The vehicle in the through lane does not change lanes and decelerates at 1.8 m/sec² after a perception reaction time of 2.0 secs. No clearance is provided between the through vehicle and the vehicle entering from the driveway. This results in a significant speed differential between the two vehicles depending on the operating speed of the through road (30 km/h to 50 km/h).
Source: Adapted from Transportation Research Board (2003).

Egress Capacity

Egress capacity refers to the ability of vehicles to exit from an access into the traffic stream. Transportation Research Board (2003) quotes research from Australia (Major & Buckley 1962) to derive a spacing based on the capacity to exit from an access. This research showed that the capacity increases with increasing spacing of the access points until the spacing is 1.5 times the distance to accelerate from a stop to the average speed of the through traffic.

Table E 5: Distances to maximise the ability of cars to re-enter the through traffic stream from an unsignalised driveway

<table>
<thead>
<tr>
<th>Speed (km/h)</th>
<th>Minimum access spacing (m)</th>
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<td>30</td>
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<td>60</td>
<td>170</td>
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<tr>
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Intersection Spacing (PNCC)

The required minimum intersection separation distances outlined within the PNCC District Plan are outlined within Figure 20.3 of Section 20 (Transportation).
**FIGURE 20.3:** MINIMUM DISTANCES FOR MAJOR ARTERIAL, MINOR ARTERIAL AND COLLECTOR ROADS.

<table>
<thead>
<tr>
<th>Posted Speed (km/h) on Major Arterial, Minor Arterial, Collector Roads.</th>
<th>Minimum distance (m) from access to intersection on:</th>
<th>Minimum distance (m) Between successive intersections</th>
<th>Minimum sight distance (m) at:</th>
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<tr>
<td></td>
<td>Major Arterial, Minor Arterial, Collector Roads (a)</td>
<td>Other Roads (b)</td>
<td>Access Crossings (c)</td>
</tr>
<tr>
<td>100</td>
<td>200</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>80</td>
<td>120</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>70</td>
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</tr>
<tr>
<td>50</td>
<td>20</td>
<td>20</td>
<td>15</td>
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Appendix F: NZTA Napier Road (SH3) Detailed Business Case – Consultation Options
‘SH3 Napier Road Improvements’ is a New Zealand Transport Agency project to identify a package of improvements along a 3.4 km section of State Highway 3 (SH3) Napier Road in Palmerston North. The project area encompasses the section of SH3 between the intersections with Keith Street and Stoney Creek Road. The purpose of this project is to develop a recommended package of improvements to address concerns about safety and access along this section of SH3 to take forward for further development.

What is this project about?

The 3.4 km section of SH3 Napier Road between Keith Street and Stoney Creek Road is a key regional route located south of the suburb of Kelvin Grove. Growth and changing land use along this section of SH3 is putting pressure on the existing road corridor’s form and function.

The key problems identified in the project area include:
- Increasing traffic volumes are impacting accessibility to and from the SH3 corridor, at times resulting in delays and queues
- A poor intersection safety record
- Inappropriate vehicle speeds for the changing road corridor environment
- Limited facilities for pedestrians and cyclists along and across the SH3 road corridor
- Poor connectivity with surrounding areas
- The existing road corridor does not support changing land use types from rural to urban

The objective of this project is to improve safety and accessibility for road users along this section of SH3 Napier Road whilst supporting the changing land use and long-term vision for the Palmerston North transport network.

The key project steps are:

1. Identify and confirm the problems and opportunities
2. Develop and assess improvements to arrive at a recommended option, incorporating community feedback and aspirations
3. Demonstrate that the recommended option achieves the project objectives for the Transport Agency and their partner organisations

The project team, along with stakeholder representatives, have short-listed five options, which are described in this flyer. Options 1 – 3 consider an urban gateway at Roberts Line, while Options 4 - 5 move the gateway to Stoney Creek Road. Each option has differing intersection types - roundabouts or traffic signals.

Let us know what you think

We would like to hear from you on each of these options. We have included a form, which you can use to provide your feedback. Members of the project team are available to answer any questions you may have.
Option 1 Summary

Urban Gateway at Roberts Line (Roundabout)

Key features include:
- Roundabout at the SH3 Napier Road and Roberts Line intersection to transition from a rural road environment to an urban environment
- Urban speed limit west of Roberts Line
- School variable speed limit for Whakarongo School during school start and finish times
- Improved walking and cycling facilities between Keith Street and James Line
- Painted central median strip between Keith Street and Stoney Creek Road
- Pedestrian refuge islands

Option 2 Summary

Urban Gateway at Roberts Line (Roundabout) and Traffic Signals at Keith Street

This option is similar to Option 1, with the addition of traffic signals at Keith Street and Limbrick Street.

Key features include:
- Roundabout at the SH3 Napier Road and Roberts Line intersection to transition from a rural road environment to an urban environment
- Urban speed limit west of Roberts Line
- School variable speed limit for Whakarongo School during school start and finish times
- Improved walking and cycling facilities between Keith Street and James Line
- Painted central median strip between Keith Street and Stoney Creek Road
- Pedestrian refuge islands
Option 3 Summary

Urban Gateway at Roberts Line (Traffic Signals)
This option is also similar to Option 1, with traffic signals at Roberts Line, rather than a roundabout.

Key features include:
- Traffic signals at the SH3 Napier Road and Roberts Line intersection
- Urban speed limit on approach to Roberts Line
- School variable speed limit for Whakarongo School during school start and finish times
- Improved walking and cycling facilities between Keith Street and James Line
- Painted central median strip between Keith Street and Stoney Creek Road
- Pedestrian refuge islands

Option 4 Summary

Urban Gateway at Stoney Creek Road (Roundabout at Roberts Line)
This varies from Options 1 - 3, with the transition from rural to urban at Stoney Creek Road.

Key features include:
- Roundabout at the SH3 Napier Road and Stoney Creek Road intersection to transition from a rural road environment in an urban environment
- Reduced speed limit west of Stoney Creek Bridge
- Pedestrian refuge islands
- Improved walking and cycling facilities between Keith Street and Whakarongo School
- Traffic signals at Keith and Limbrick Street
- Painted central median strip between Keith Street and Stoney Creek Road

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SH3 Napier Road Improvements

Option 5 Summary

Urban Gateway at Stoney Creek Road (Traffic Signals at Roberts Line)
This option is similar to Option 4, with traffic signals at Roberts Line, rather than a roundabout.

Key features include:
- Roundabout at the SH3 Napier Road and Stoney Creek Road intersection to transition from a rural road environment in an urban environment
- Reduced speed limit west of Stoney Creek Bridge
- Traffic signals at the Roberts Line intersection with SH3 Napier Road
- Pedestrian refuge islands
- Improved walking and cycling facilities between Keith Street and Whakarongo School
- Traffic signals at Keith and Limbrick Street
- Painted central median strip between Keith Street and Stoney Creek Road

Indicative Project Timeline

Public Open Day to seek feedback on the short list.

Contact us

Website: nzta.govt.nz
Email: PNIITI@nzta.govt.nz
Phone: 0800 44 44 49

Post: C/- Michelle Cunningham
New Zealand Transport Agency
Private Bag 11777
Palmerston North 4442
Tell Us What You Think

We are asking for public feedback on these options. Your feedback will help us choose, refine and develop the options for improvements to State Highway 3 at Napier Road, and choose an option to move forward with.

What is your preferred option, and why?

Tell us what you liked about your favoured option, and what you disliked about the others:

Is there anything else we should know?

If you have any other feedback on these proposed options, or the project generally, let us know here:

You can also provide this feedback by emailing PNITI@nzta.govt.nz
Appendix 3 – Stormwater Infrastructure Assessment
This document was prepared by Palmerston North City Council, City Networks, Water and Waste Services Division.

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<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
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<tr>
<td>Prepared by:</td>
<td>Reiko Baughan - Consultant Engineer</td>
<td>October 2018</td>
</tr>
<tr>
<td>Reviewed by:</td>
<td>Robert van Bentum - Water &amp; Waste Services Manager</td>
<td>October 2018</td>
</tr>
<tr>
<td>Approved for Issue by:</td>
<td>Robert van Bentum - Water &amp; Waste Services Manager</td>
<td>October 2018</td>
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PNCC Reference No: OASIS: 11669480
Contents

1 Introduction ................................................................................................................. 2

2 Stormwater Services Assessment .................................................................................. 3
  2.1 Existing Stormwater Services ................................................................................... 3
  2.1.1 Existing Stormwater Treatment .............................................................................. 5
  2.2 Stormwater Runoff Assessment .................................................................................. 5
  2.2.1 Horizons Flooding Assessment .............................................................................. 6
  2.2.2 Existing Flood Risk ............................................................................................... 6
  2.2.3 Fully Developed Flood Risk ................................................................................... 7
  2.2.4 Catchment Rerouting ............................................................................................ 8
  2.2.5 Oxbow Modifications .............................................................................................. 8
  2.3 Stormwater Management .......................................................................................... 9
  2.3.1 Overview ............................................................................................................... 9
  2.3.2 Stormwater Quality Management ......................................................................... 10
  2.3.3 Stormwater Quantity Management ......................................................................... 17
  2.3.4 Stormwater Management Plan ............................................................................. 18

3 Summary ..................................................................................................................... 19

Appendix A Cruden’s Lagoon Flood Assessment (Mitch Hydro Limited, 18 August 2017)

Appendix B Proposed Napier Road Development Hydrological and Downstream Pipe Capacity Assessment
(Tonkin and Taylor, 12 October 2018)

Figures

Figure 1: Napier Road Residential Extension Area ............................................................... 2
Figure 2: Existing Stormwater Network ............................................................................. 3
Figure 3: Indicative Flow Paths (GHD, August 2018) .......................................................... 4
Figure 4: 2018 topography of urban stopbank ................................................................. Error! Bookmark not defined.
Figure 5: Napier Road Stormwater Catchment (Tonkin and Taylor, October 2018) .......... 7
Figure 6: Proposed Oxbow Modification ........................................................................... 9
Figure 7: Schematic of Street with WSD elements (Auckland Design Manual, Long Bay) .... 17
Figure 8: Schematic of Street with WSD elements ............................................................. 18

Tables

Table 1: Residential Stormwater Treatment Options ....................................................... 11
Table 2: Road Corridor Stormwater Treatment Options .................................................. 13
1 Introduction

This report summarises the assessment of the stormwater servicing requirements for Napier Road Residential Extension, Plan Change B. Specifically, this assessment involved site investigation and hydraulic modelling of the proposed subdivision to determine its likely impact on the surrounding environment and the measures required to mitigate any adverse impacts from the development. The assessment has been undertaken using the preliminary development plan information provided by the Planners in the context of the Palmerston North City Council’s proposed Napier Road Residential Growth Area.

The proposed Plan Change area is roughly an 8 hectare block of land located to the east of the city centre. The area is bounded by an old river ox-box and terrace escarpment to the north, Roberts Line to the east, Napier Road to the south and the Napier Road / Sutton drain to the west. The proposed growth area includes the “oxbow” that ultimately discharges to the Napier Road open drain. For the purposes of this assessment, the Napier Road Residential Extension Area is broken up into two sections: the area discharging directly to the oxbow and the BUPA site located between the oxbow and Napier Road drain.

Figure 1 provides an overview of the Napier Road residential growth extension extents.
2 Stormwater Services Assessment

2.1 Existing Stormwater Services

The proposed residential area is currently serviced by a series of open drains and culverts discharging to the oxbow and then ultimately to the Napier Road drain to the west. Stormwater on Roberts Line discharges to a drain along Napier Road, which ultimately discharges to the oxbow. The level in the oxbow is controlled by a 450 mm diameter outlet. This connects to an existing 600 mm diameter stormwater network, which is proposed to be upgraded as part of the BUPA development.

As part of the residential development plan east of Roberts Line, the catchment to the east of Roberts Line was adjusted such that runoff generated in this area would be confined and secondary flow would no longer cross Roberts Line and discharge to the oxbow. Specifically, the runoff generated from Serenity Crescent and Freedom Drive now discharges to the oxbow to the east. A high-level overflow (or flow split) still exists at Serenity Crescent such that stormwater west of this road drains to Roberts Line.

The existing Council reticulated stormwater network in the vicinity of the Napier Road Residential Extension Area is detailed in Figure 2 below.

![Figure 2: Existing Stormwater Network](image)

A site investigation was carried out by consultants GHD Limited (GHD) in August 2018 (Oasis #11351591) to identify the stormwater infrastructure within this area and confirm the catchment boundaries. An additional survey of the Napier Road drain was also carried out by PNCC on 9 July 2019. The investigations found that the area south of Napier Road also discharges to the oxbow via a series of NZTA culverts. Only a portion of the southern catchment actually discharges to the oxbow due to a high point within the drain that splits the flow. It is understood that the nursery south of Napier Road pumps to the open drain that connects to the oxbow.

Figure 3 below provides an overview of the drainage network and indicative stormwater flow paths.
The oxbow water level is dependent on the capacity of the downstream network, which runs through the BUPA site, and the water level in the Napier Road open drain. When the water level in the Napier Road drain is elevated, stormwater is unable to discharge from the oxbow system. Flap valves on the outfall to the open drain and at the oxbow connection to the piped network prevent backflow from the Napier Road drain into the system occurring.

As previously mentioned, there is an existing 450 mm diameter culvert that drains the lagoon, which includes a bar screen to prevent debris from entering the stormwater network. The bar screen and culvert are owned and maintained by Horizons. The bar screen was recently modified with the bar spacing widened to help prevent blockage from occurring. Previous site visits\(^1\) identified that the grill on the upstream culvert exiting the Cruden section of Oxbow or lagoon was susceptible to blockage due to excessive weed growth in the lagoon itself. Effective maintenance of the bar screens therefore has a significant impact on the level in the oxbow.

### 2.1.1 Existing Stormwater Treatment

Based on the site investigation carried out by GHD, the area south of Napier Road discharges to the oxbow via existing NZTA culverts. This area is currently farmed with both livestock and crop production. The land north of Napier Road adjacent to the oxbow comprises tree and plant nurseries, with no stormwater treatment being provided. Road runoff from Napier Road itself also discharges directly to the oxbow without any treatment.

The oxbow is identified as a “threatened” habitat according to Schedule F of the One Plan. This is interpreted by Horizons Regional Council (Horizons) as justification for requiring treatment of all stormwater discharging to the oxbow. Currently stormwater discharging to the oxbow is untreated.

### 2.2 Stormwater Runoff Assessment

The stormwater effects of development and implications for flood risk are of particular concern in this area due to the area having suffered significant flooding in recent history. Several assessments have been carried out to determine the risk of flooding both pre- and post-development for different sized rain events and constraints.

- **Rainfall events:**
  - 10% AEP (1 in 10 year ARI) – primary stormwater network level of service
  - 2% AEP (1 in 50 year ARI) – minimum floor level requirement as per NZ Building Code
  - 1% AEP (1 in 100 year ARI) – overland flow path as per NZS 4404 design standards
  - 0.5% AEP (1 in 200 year ARI) – Horizons design event, also used for the Manawatu River level
  - 0.2% AEP (1 in 500 year ARI) – extreme rainfall event

- **Downstream constraints:**
  - Status quo
  - Napier Road drain outlet fully blocked
  - BUPA site blocked

---

\(^1\) Email from JP McCartin to Lynette Cruden, Tuesday 25 July 2017.
It should be noted that the assessments included an adjustment for climate change based on NIWA’s rainfall intensity database, HIRDS v3. NIWA has now released version 4 with different climate models used to determine the peak rainfall intensity. PNCC has adopted the RCP 6.0 model for 2081-2100, which is less conservative than the version 3 data. Therefore the assessments presented below are likely conservative.

2.2.1 Horizons Flooding Assessment

Based on flood modelling carried out by Horizons Regional Council, a minimum floor level of RL 37.8m has been recommended for this area due to risk of inundation from the 0.5% AEP Manawatu River flood level, as the majority of the area is outside the zone of protection from the urban stopbanks. Achieving this flood level will require the area to be raised by approximately 2m across most of the site.

Napier Road is higher than the development area, and the minimum floor level would put the development at or above the existing road level. Raising the land by this amount will have three effects:

1. The storage in the oxbow would be increased;
2. The existing drainage network from the road corridor would need to be revised to enable stormwater runoff to continue to discharge to the oxbow; and
3. The existing properties would be at risk of inundation because the dwellings are below the minimum recommended floor level.

Development of this area and subsequent raising of the land will need to allow for drainage of stormwater from the existing network. This is further discussed in Section 2.3.4.

The Macpherson property is located within the stopbank with a 450mm diameter culvert linking the oxbows. Because this property is technically outside of the Manawatu River flood zone, the minimum floor level would not apply. However, the linking of the oxbows still makes the property subject to inundation due to localised flooding. This is further discussed in Section 2.2.3.

2.2.2 Existing Flood Risk

In August 2017 Mitch Hydro Limited (refer Appendix A) was engaged by PNCC to assess the likelihood of flooding at the Crudgen residence (291 Napier Road), located within the proposed zone, as the property is vulnerable to downstream development. The Crudgen residence is located adjacent to the oxbow and has a first-floor level of RL 36.37m. In 2015 the residence was inundated due to overflows from Stoney Creek and drainage constraints within the local stormwater network. Changes to the catchment made during the subdivision planning east of Roberts Line have reduced the likelihood of this occurring again. Mitch Hydro was engaged to assess the existing risk of flooding following the changes to the catchment and development to the east of Roberts Line.

The study found that the oxbow within the Crudgen property would reach a peak water level of RL 36.0m during the 1% AEP 48-hour rainfall event (including climate change). This assumed the oxbow outlet to the neighbouring property to be fully blocked (i.e., no discharge to the Napier Road drain), and the entire residential development to the east of Roberts Line to be discharging to the oxbow. The results also showed a freeboard of 140mm in the 0.2% AEP rainfall event.

Since the oxbow outlet was assumed blocked, the above results are independent of the downstream development of BUPA.

It is important to note that this study included the 4.5 ha of catchment east of Roberts Line, however excluded any runoff south of Napier Road, as this study predated the site investigation carried about by GHD.
2.2.3 Fully Developed Flood Risk

In October 2018 Tonkin and Taylor (T+T) were engaged to carry out a hydrological assessment to determine the effects of development in the Napier Road Residential Extension Area (refer Appendix B), as well as evaluate the downstream pipe capacity within the existing network through the BUPA site. The catchment included the areas to the south and east of Napier Road and Roberts Line respectively, following the site investigation carried out by GHD. Figure 4 presents the catchments included in the assessment. Note: As a result of the BUPA development the existing wetland has been filled in. This has been captured in both the Mitch Hydro report and BUPA subdivision application, and has no impact on the conclusions of the study.

The inclusion of the South and Southeast Catchments increase the total catchment area by 15 ha. The northeast catchment was modelled as 5.7 ha, slightly larger than the catchment size used in the previous Mitch Hydro study. It should be noted that the catchment size is considered conservative as the entirety of the northeast catchment would not discharge to the oxbow following the development of the subdivision to the east of Roberts Line. Furthermore, the study predates the FNCC survey, which showed the Southeast Catchment is not connected to the oxbow.

The oxbow was modelled using a storage-elevation curve, with the invert level of the lagoon at the invert of the outlet pipe. The LIDAR data used in the model is from 2006 and therefore does not include the earthworks undertaken at the BUPA site. As a conservative measure, the model assumed that the oxbow would not be allowed to overtop, and therefore the maximum water level in the oxbow is considered to be a “worst case” scenario. In all scenarios the maximum water level is below the top of the stopbank.

Assuming maximum probable development within the Napier Road Residential Extension Area, key findings from the assessment are as follows:

- The oxbow has capacity to mitigate increases in runoff due to development through storage routing.
- The maximum predicted water level in the oxbow is RL 37.55m in the 1% AEP 24-hour duration rainfall event.
The existing network within the BUPA development does not have sufficient capacity to convey the 10-year ARI discharge from the oxbow.

Based on the assessment, the following conclusions can be made in respect to future development of the area:

- The existing residences are susceptible to inundation in the 1% AEP 24-hour rainfall event.
- A separate 900mm diameter pipe (and outfall) will be required to discharge the runoff from the oxbow to the Napier Road drain. This will require an easement through the BUPA property.
- A minimum floor level of RL 37.8m will provide sufficient freeboard in the 50-year and 100-year rainfall events.

Based on the assumptions adopted in this study, additional work is recommended to give greater confidence around the conclusions and to confirm the available storage of the oxbow:

- Oxbow bathymetry be updated when better topographical information becomes available.
- Additional scenarios be modelled simulating different downstream conditions (i.e., Napier Road open drain full with no outflow from the lagoon).

An additional assessment can be undertaken to determine the minimum floor level for the area within the stopbank. Since the connecting culvert will be submerged in each scenario, the peak level on the downstream end will likely be less than the upstream end.

Because the proposed development is outside of the stopbank and requires a higher floor level than existing development within the stopbank, a secondary overland flow path is required to convey flow to the Napier drain without adversely impacting any downstream properties.

2.2.4 Catchment Rerouting

The main difference between the Mitch Hydro and Tonkin and Taylor (T+T) studies is the inclusion of the southern catchments and development of the Napier Road Residential Extension Area. Although the T+T study is conservative in terms of the catchment area, this likely contributes to the higher predicted water level within the oxbow. Based on both the flooding concerns to existing properties and stormwater quality aspects of the oxbow, re-directing the southern catchments (approximately 40% of the total catchment area in the T+T study) and the Napier Road roadside drain is a potential option which should be considered in future work. Further investigation is also warranted given the assumptions made in the T+T assessment are based on 2006 LiDAR data and free outfall conditions. New LiDAR information is now available and an update to the modelling assessment using the 2018 LiDAR data could be undertaken if required.

The roadside drains and culverts are owned by NZTA. It is recommended that Horizons engage with NZTA and the landowners south of Napier Road to investigate the possibility of redirecting their stormwater runoff. This assessment has not looked into the feasibility of this alternative. NZTA are currently working through the final stages of detailed business case for traffic improvements to the Napier Road corridor and Robert’s Line and James Line intersections. This will provide an opportunity for considering improvements to stormwater drainage and treatment.

2.2.5 Oxbow Modifications

Raising the land to meet the required minimum floor level set by Horizons will effectively create more storage within the oxbow, assuming the overall footprint of the oxbow is not significantly reduced. A detention pond in
the BUPA development has been filled in, thereby reducing depression storage within the site. However, a flap valve separates the BUPA development and the upstream catchment (oxbow catchment), and based on the studies undertaken it is not believed that the BUPA stormwater discharge can have any significant impact on the level in the oxbow.

The existing oxbow is essentially divided into two, as shown in the aerial image below. Previous discussions with the landowners at 261 Napier Road have revealed that they wish to fill the portion of the oxbow on their property to eliminate surface flooding on the property. Filling in the oxbow will have the following implications:

- Storage is essentially removed, thereby increasing the water level in the oxbow on the upstream site.
- A proper engineering assessment and design is required to size the culvert and provide a suitable overland flow path that will not impact the upstream and downstream catchments.
- It is our understanding that a consent would be required from Horizons to undertake this work.

![Image of proposed oxbow modification]

Figure 5: Proposed Oxbow Modification

Although the pond is located within the stopbank, filling it in will still have a significant impact on the total available oxbow storage and will change the results of the previous T+T study.

2.3 Stormwater Management

2.3.1 Overview

Council stormwater activities are governed by a range of statutory planning instruments which have been used to develop and define PNCC performance standards. These include the Resource Management Act, National Policy Statements and Regional Plans such as Horizons Regional Council One Plan. Council is required to
manage the effects of any development on stormwater, so the effects of development are less than minor and do not exacerbate existing flood and quality effects. Historically, Councils Levels of Service for Stormwater management have been relaxed in the absence of the application of strict standards in the Manawatu Region. Horizons Regional Council has signalled its intention to require in the future resource consents for all current and future urban stormwater runoff, so it is incumbent on Council to ensure stormwater effects from any development are effectively managed in anticipation of future qualitative and quantitative standards being applied.

Land development increases stormwater runoff volumes due to the increases in impervious area, particularly during the early period of a rain event, but also increases contaminant discharges due to the contaminants generated by the residential, commercial and transport activities which take place. The additional runoff volumes, flows and contaminant discharges can have significant negative impacts on receiving environments. To mitigate and where possible avoid potential adverse effects, Council will require implementation of stormwater management solutions. The application of stormwater volume and quality mitigation practices is typically referred to as water sensitive design (WSD).

The mitigation solutions are designed to limit effects through retarding initial rainfall loss by promoting infiltration via pervious surfaces, increasing the time of concentration to reduce peak runoff volumes and flow velocities and providing treatment to remove some contaminants at source or prior to discharge. Council will require design to incorporate a treatment train (series of treatment stages between the source and outfall) to remove a range of contaminants including gross pollutants as well as sediments, metals and hydrocarbons.

2.3.2 Stormwater Quality Management

For this specific development area, Horizons has provided comment on the proposed plan change. The oxbow within the Napier Road Residential Extension area is identified as an oxbow lake which is a “threatened” habitat according to Schedule F of the One Plan. Therefore One Plan Rules regarding discharges of contaminants will be applicable for this site.

To ensure that the discharge of contaminants via stormwater is minimised, Council has determined the following minimum requirements for lots and road reserve areas within the re-zone area.

- Each lot must incorporate rain gardens or other biofiltration device to treat roof and hard stand runoff prior to discharge to the stormwater network.
- The surface runoff resulting from the first 10mm of any rain event from the road carriageway and property hardstand areas draining to the road shall be treated prior to entering the piped stormwater network. This will require the design and inclusion of treatment devices such as swales and/or rain gardens within the road reserve to capture and treat the majority of the initial runoff volume.

Bioretention devices filter stormwater through a vegetated filter bed made of natural soil or engineered media. Depending on its design, bioretention may also perform a hydrological detention function by reducing runoff volumes and detaining runoff flows. Specific devices include rain gardens, tree pits, stormwater planters and bioretention swales.

Examples of acceptable stormwater treatment devices at the lot level and in the road corridor are presented in Table 1 and Table 2 below. Design guidelines for bioretention devices can be found in Auckland Council Guideline Document CD2017/001, Stormwater Management Devices, Section C3.
### Table 1: Residential Stormwater Treatment Options

<table>
<thead>
<tr>
<th>Planter box</th>
<th>Rain gardens</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Roof leaders discharge directly to the planter box.</td>
<td>- Provides treatment of overland flow.</td>
</tr>
<tr>
<td>- Subsoil drain and overflow connect to stormwater network.</td>
<td>- Subsoil drain and overflow connect to stormwater network.</td>
</tr>
</tbody>
</table>
Permeable paving

- Allows infiltration of runoff.
### Table 2: Road Corridor Stormwater Treatment Options

<table>
<thead>
<tr>
<th>Kerb outstand</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provides treatment of overland flow.</td>
</tr>
<tr>
<td>• Subsoil and overflow connected to stormwater network.</td>
</tr>
<tr>
<td>• Provides traffic control.</td>
</tr>
<tr>
<td>Vegetated / bioretention swales</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>Provides treatment of overland flow.</td>
</tr>
<tr>
<td>Subsoil and overflow connected to stormwater network.</td>
</tr>
<tr>
<td>Uses the area reserved for berm.</td>
</tr>
<tr>
<td>Corner rain garden</td>
</tr>
</tbody>
</table>
Tree pits

- Provides treatment of overland flow.
- Subsoil and overflow connected to stormwater network.
- Uses the area reserved for berm.
2.3.3 Stormwater Quantity Management

To ensure that stormwater discharge volume increases are minimised and runoff peak flows and velocities are managed, Council has determined the following minimum requirements for individual lot and road reserve areas within the re-zone area:

- Permeable area shall comprise at least 30% of the net lot area excluding road reserve.
- Road corridors shall be designed to provide areas for pervious pavements and/or grassed / planted swales to reduce total runoff and peak flows.

Examples of typical solutions for road corridor treatments are provided in Figure 6 and Figure 7 below. In addition to reducing stormwater runoff volume through soakage and evapotranspiration, road swales, rain gardens and tree pits will also provide treatment of stormwater runoff (refer Section 2.3.2).

Figure 6: Schematic of Street with WSD elements (Auckland Design Manual, Long Bay)
2.3.4 Stormwater Management Plan

A Stormwater Management Plan (SMP) will be required for any development which results in a significant change of land cover affecting stormwater runoff characteristics (i.e., peak flows, volumes, and/or frequency of runoff). The SMP must be prepared by a suitably qualified stormwater design consultant with experience in Water Sensitive Design (WSD) concepts and elements.

Based on the assessments already undertaken for this development, the focus of the SMP will be on both the treatment of stormwater and management of the increased runoff volume given the downstream constraints and risk posed to existing dwellings. The SMP must identify any changes in runoff characteristics generated from the development or change in land use and propose measures to mitigate the effects.

The SMP must address the following:

a) Scoping of all internal stormwater infrastructure and how it will interact with the existing drainage system (including connection to the existing stormwater network, discharge to the oxbow, discharge to the Napier Road open drain and layout of treatment devices);

b) Treatment of all stormwater runoff prior to discharge to the primary network and/or direct discharge to the oxbow;

c) Protection of treatment devices and treatment of runoff during all phases of construction;

d) Outline how the development will hydraulically relate to its surrounding environs, including assessment of overland flow paths and potential flood impacts of proposed and existing development;

e) Outline how the stormwater management system will ensure that any changes in runoff from the site will be addressed;

f) Confirm the proposed stormwater mitigation will provide sufficient freeboard to the habitable dwellings under the scenario where there is no outflow from the oxbow in a 2% AEP rainfall event (including the adjustments for climate change);

g) Identify methods to avoid, remedy or mitigate potential stormwater related effects on existing dwellings as a result of the land being raised and development occurring.
Council will be looking to ensure changes in stormwater runoff will be addressed through the use of WSD components focused on the following parameters:

- Reduction in stormwater runoff by infiltration
- Reduction in peak flow discharges by flow attenuation
- “First flush” stormwater treatment

3 Summary

Land development increases the volume, velocity and peak flow of stormwater runoff, and has the potential to degrade stormwater water quality by generating additional contaminants. The Napier Road oxbow within the Napier Road Residential Extension area is labelled as a “threatened” habitat, and therefore stormwater management is essential to mitigate the effects of proposed development and ensure development does not adversely impact the receiving system.

Several assessments were undertaken for this area to evaluate the potential effects of development. To address the increase in stormwater runoff and the additional contaminants from the development, Council has determined the following is required:

- Water sensitive design elements must be incorporated in the development at lot and road corridor levels to mitigate both stormwater quantity and quality impacts.
- A stormwater treatment train comprising multiple treatment steps from source to outlet must be incorporated to effectively treat all stormwater runoff.
- The development must promote stormwater infiltration by limiting lot imperviousness area to no more than 70% of the gross area.
- A Stormwater Management Plan is required for any development within the re-zone area that addresses both stormwater quality and quantity, as outlined in this assessment, especially as it relates to the existing dwellings.

Additional items that must be addressed as part of the specific development design are as follows:

- Existing properties with floor levels below RL 37.55m are susceptible to inundation in the 1% AEP rainfall event assuming full development of the Napier Road Extension Area, BUPA site and subdivision east of Roberts Line, and the southern catchments continuing to drain to the oxbow.
- Hydrologic modelling must be undertaken using updated oxbow bathymetry and footprint based on the proposed subdivision plan, and include assessment for different downstream discharge conditions. This should include filling in of the pond at 261 Napier Road.
- A separate 900mm diameter pipe (and outfall) will be required to discharge runoff from the oxbow to the Napier Road drain. This requires an easement through the BUPA property and designated overland flow path.
- A minimum floor level of RL 37.8m is required for all properties.
- The stormwater design must incorporate the Napier roadside drain and treatment of stormwater. Alternatively, an assessment on the feasibility of re-directing the Napier roadside drain and contributing catchments to reduce the inflow to the oxbow could be undertaken.
218

PNCC can undertake additional modelling of the existing development and worst-case future development using updated LiDAR data if required, however it would not be suitable for determining storage capacity within the oxbow as this is dependent on the future subdivision layout and earthworks extent.
Appendix A

Cruden’s Lagoon Flood Assessment (Mitch Hydro Limited, 18 August 2017)
Memo

Mitch Hydro Limited
10 Scoresby Grove, Whitby, Porirua 5024, New Zealand

From: Paul Mitchell
To: JP McCartin (PNCC)
CC: Robert van Bentum (PNCC)
Date: 18 August 2017
Subject: Cruden’s Lagoon – Flood Assessment

Dear JP

Please find included below our assessment of the perceived flood risk at Cruden’s Lagoon, Palmerston North.

1 Scope

The scope has included the assessment of the probable flood levels in the lagoon during an extreme flood event assuming the following:

1. Two scenarios to be assessed:
   1. Worst Case – Total catchment of 13.5ha including 4.5 ha from Marriot’s;
   2. Best Case – Local catchment of 9.0 ha only.
2. Review the critical rainfall – runoff duration event from the local catchment;
3. Route these inflows through the lagoon assuming:
   1. An approximate level – storage relationship derived from Palmerston North City Council (PNCC) 0.5m contour data (2006);
   2. Starting lagoon level of RL 34.9m (i.e. culvert outlet invert);
   3. No outflow - the outlet from the lagoon is most likely blocked (for at least 8 hours) by high tail-water conditions in the Napier Road drain;
   4. Cruden residence finished floor level of RL 36.37m.
4. Comment on the probable effect of the Bupa development on flood levels in Cruden’s Lagoon.
2 Catchment Characteristics

2.1 Previous Studies

There have been a significant number of studies completed in the vicinity of Cruden’s Lagoon. Namely these relate to the 2007 / 8 Plan Change and recent consenting associated with the respective developments draining to the adjacent Marriot’s Lagoon. These studies are referred to in this assessment as appropriate.

The consenting included the assessment of 4.5ha of additional land at the intersection of Napier Road and Roberts Line, which had previously drained to Cruden’s Lagoon (refer blue area on bottom left of Figure 1). The 4.5ha area would now be piped to the east to Marriot’s Lagoon.

This area has now been built up, and along with proposed improvements to the Napier Road outlet, would prevent any secondary flow from Marriot’s Lagoon flowing to Cruden’s Lagoon.

![Figure 1: Marriot’s Lagoon Fully Developed Catchments (Source: Opus, 2016)]
The critical duration event (i.e. which gives the highest flood level in the lagoon) for the larger combined catchment (142ha) draining to the Marriot’s Lagoon was 48 hours. The critical duration for the much smaller (13.5ha) catchment draining to Cruden’s Lagoon would therefore be expected to be less than this.

2.2 Geology

Opus (2015) references the geology of the local catchments as “Marton silt loam…abundant gleying with fine concretions … and in higher clay content…The differences are consistent with the more frequent waterlogging of the Manawatu yellow-grey earths”. This description is consistent with poorly draining (Class C) soils for these “Marton silt loam” soils.

2.3 Rainfall

24-hour and 48-hour rainfall depths were derived using HIRDSv3 for the local catchment. The events considered in this study are the 100-year, 200-year and 500-year Average Recurrence Interval (ARI) events i.e. ‘extreme’ rainfall events.

The HIRDS V3 rainfall depths are considered to be very conservative. They are significantly greater (~30% on average)\(^1\) than indicated by the long-term (1991-2016) rainfall records held at Palmerston North Airport.

Projected changes in climate\(^2\) indicate a 3.4% increase in storm precipitation (to 2120) for the Manawatu, which has been applied in this study. Design rainfalls are listed in Table 1.

<table>
<thead>
<tr>
<th>ARI (Years)</th>
<th>Annual Exceedance Probability (AEP) %</th>
<th>24-hour rainfall depth (mm)</th>
<th>48-hour rainfall depth (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1.0</td>
<td>127</td>
<td>156</td>
</tr>
<tr>
<td>200</td>
<td>0.5</td>
<td>145</td>
<td>177</td>
</tr>
<tr>
<td>500</td>
<td>0.2</td>
<td>171</td>
<td>209</td>
</tr>
</tbody>
</table>

2.4 Topography

Prior to the developments at Marriot’s Lagoon, an additional 4.5ha at the intersection of Napier Road and Roberts Line drained to Cruden’s Lagoon. Two scenarios have been assessed i.e.

1. Worst Case – including the additional Marriot’s ‘fully developed’ catchment (13.5ha in total); and
2. Best Case – excluding the Marriot’s catchment (9.0ha in total).

The ‘with Marriot’s’ catchment draining to Cruden’s Lagoon is approximately 13.5ha in area. It is relatively flat at approximately 0.005m/m (1 in 200). The land use within the catchment is mixed, and includes relatively equal areas of bush (CN70), cropping (CN85), and lawn / pasture (CN74). In addition, approximately 20 percent of the catchment is impervious (CN98), which includes Napier Road, Roberts Line, and

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\(^1\) Section 3.3, Opus (2016)

\(^2\) MIE, 2016
habitable and non-habitable buildings. The Marriot’s (4.5ha) component is assumed to be fully developed (CN85). Opus (2016) indicated that secondary flow from this development is unlikely due to the oversizing of the primary stormwater system discharging to Marriot’s Lagoon.

The ‘without Marriot’s’ catchment is slightly flatter at approximately 0.004m/m (1 in 250). The time of concentration for both catchment scenarios is in the order of 30 minutes.

3 HEC-HMS Rainfall – Runoff Modelling

3.1 Model Build

The model is a lumped or simplified catchment model discharging into Cruden’s Lagoon (Figure 2).

The level – storage relationship has been derived from images of the lagoon on Google Maps, PNCC 0.5m contour data\(^3\) and previous estimates of the Lagoon storage\(^4\). The level – storage relationship (Figure 3) is considered to be approximate only, and warrants further verification by PNCC.

![Diagram](image)

**Figure 2: HEC-HMS Model of catchment draining to Cruden's Lagoon**

3.2 Temporal Rainfall Pattern

Two different approaches have been adopted to assess the effect of the rainfall temporal pattern on flood levels in the lagoon. A Soil Conservation Service (SCS) 24-hour rainfall hyetograph, which contains a large central peak has been applied in the first instance. Secondly, a typical North Island 24-hour temporal rainfall pattern has been applied to see if the distribution of rainfall has an influence on flood levels in the lagoon (Figure 4). A 48-hour rainfall hyetograph has also been applied to assess a longer duration flood event.

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\(^{3}\) PNCC Geo-Guide (2006)

\(^{4}\) KOA, Plan of Ponding Area, 2014
Figure 3: Cruden's Lagoon Level - Storage Curve (Estimate Only)

Figure 4: 24-hour cumulative rainfall patterns
3.3 PNCC Estimate of 100-year ARI catchment inflow

PNCC provided an estimate for the 100-year ARI event of 1.2m³/s. The weighted curve number has been increased to CN89 to match this peak flow in the 'With Marriot’s' 100-year ARI 24-hour event (Figure 5). The estimated catchment characteristics are provided in Table 2.

Table 2: Catchment Characteristics – Cruden’s Lagoon

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Area (ha)</th>
<th>Length (km)</th>
<th>Equal Areas slope (m/m)</th>
<th>Initial losses (mm)</th>
<th>Time of concentration (Tc, hours)</th>
<th>Storage (hours)</th>
<th>SCS Curve Number (CN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Marriot’s</td>
<td>13.5</td>
<td>0.8</td>
<td>0.005</td>
<td>4.0</td>
<td>0.57</td>
<td>0.5</td>
<td>83.9¹</td>
</tr>
<tr>
<td>Without Marriot’s</td>
<td>9.0</td>
<td>0.7</td>
<td>0.004</td>
<td>3.5</td>
<td>0.57</td>
<td>0.5</td>
<td>83.4¹</td>
</tr>
</tbody>
</table>

Note: ¹Scaled up to CN89 in modelling to match PNCC 100-year ARI flood peak estimate of 1.2m³/s

Figure 5: SCS 24-hour inflow hydrographs
4 Model Results

4.1 Worst Case (with Marriot’s)

The flood modelling of the 24-hour event indicates that flood levels do not vary between the two temporal events modelled i.e. they both produce the same flood levels in the 100-year, 200-year and 500-year events (Figure 6). This indicates that flood volume (duration of flooding) is the key determinant, rather than the flood shape or peak.

![Graph showing flood levels](image)

**Figure 6: ‘With Marriot’s’ Flood Levels**

The Worst Case ‘with Marriot’s’ flood data (Table 3) indicates that:

- The highest flood levels occur in the 48-hour event;
- The Cruden floor level (RL 36.37m) is not flooded in any of the events modelled, with a minimum freeboard of:
  - 0.37m in the 100-year event;
  - 0.28m in the 200-year event; and
  - 0.14m in the 500-year event.

4.2 Best Case (without Marriot’s)

The Best Case ‘without Marriot’s’ flood data (Table 4) indicates that:

- The highest flood levels occur in the 48-hour event;
- The Cruden floor level (RL 36.37m) is not flooded in any of the events modelled, with a minimum freeboard of:
  - 0.60m in the 100-year event;
  - 0.52m in the 200-year event; and
  - 0.41m in the 500-year event.
### Table 3: Worst Case (with Marriot's) HEC-HMS Flood Results

<table>
<thead>
<tr>
<th>Flood Event</th>
<th>Rainfall / Duration</th>
<th>100-year ARI</th>
<th>200-year ARI</th>
<th>500-year ARI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting Flood Level at Culvert Invert (RL 34.9m)</td>
<td>SCS 24-hour</td>
<td>34.90</td>
<td>34.90</td>
<td>34.90</td>
</tr>
<tr>
<td></td>
<td>Temporal 24-hour</td>
<td>34.90</td>
<td>34.90</td>
<td>34.90</td>
</tr>
<tr>
<td></td>
<td>Temporal 48-hour</td>
<td>34.90</td>
<td>34.90</td>
<td>34.90</td>
</tr>
<tr>
<td>Peak Inflow</td>
<td>SCS 24-hour</td>
<td>1.22</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Temporal 24-hour</td>
<td>0.26</td>
<td>0.31</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>Temporal 48-hour</td>
<td>0.17</td>
<td>0.19</td>
<td>0.23</td>
</tr>
<tr>
<td>Peak Outflow</td>
<td>SCS 24-hour</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Temporal 24-hour</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Temporal 48-hour</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Peak Flood Level</td>
<td>SCS 24-hour</td>
<td>35.84</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Temporal 24-hour</td>
<td>35.84</td>
<td>35.93</td>
<td>36.06</td>
</tr>
<tr>
<td></td>
<td>Temporal 48-hour</td>
<td>36.00</td>
<td>36.09</td>
<td>36.23</td>
</tr>
<tr>
<td>Freeboard to Cruden residence floor level (RL 36.37m)</td>
<td>SCS 24-hour</td>
<td>0.53</td>
<td>36.37</td>
<td>36.37</td>
</tr>
<tr>
<td></td>
<td>Temporal 24-hour</td>
<td>0.53</td>
<td>0.44</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>Temporal 48-hour</td>
<td>0.37</td>
<td>0.28</td>
<td>0.14</td>
</tr>
</tbody>
</table>

### Table 4: Best Case (without Marriot's) HEC-HMS Flood Results

<table>
<thead>
<tr>
<th>Flood Event</th>
<th>Rainfall / Duration</th>
<th>100-year ARI</th>
<th>200-year ARI</th>
<th>500-year ARI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting Flood Level at Culvert Invert (RL 34.9m)</td>
<td>SCS 24-hour</td>
<td>34.90</td>
<td>34.90</td>
<td>34.90</td>
</tr>
<tr>
<td></td>
<td>Temporal 24-hour</td>
<td>34.90</td>
<td>34.90</td>
<td>34.90</td>
</tr>
<tr>
<td></td>
<td>Temporal 48-hour</td>
<td>34.90</td>
<td>34.90</td>
<td>34.90</td>
</tr>
<tr>
<td>Peak Inflow</td>
<td>SCS 24-hour</td>
<td>0.82</td>
<td>0.95</td>
<td>1.16</td>
</tr>
<tr>
<td></td>
<td>Temporal 24-hour</td>
<td>0.18</td>
<td>0.20</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Temporal 48-hour</td>
<td>0.11</td>
<td>0.13</td>
<td>0.16</td>
</tr>
<tr>
<td>Peak Outflow</td>
<td>SCS 24-hour</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Temporal 24-hour</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Temporal 48-hour</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Peak Flood Level</td>
<td>SCS 24-hour</td>
<td>35.67</td>
<td>35.73</td>
<td>35.82</td>
</tr>
<tr>
<td></td>
<td>Temporal 24-hour</td>
<td>35.66</td>
<td>35.73</td>
<td>35.82</td>
</tr>
<tr>
<td></td>
<td>Temporal 48-hour</td>
<td>35.77</td>
<td>35.85</td>
<td>35.96</td>
</tr>
<tr>
<td>Freeboard to Cruden residence floor level (RL 36.37m)</td>
<td>SCS 24-hour</td>
<td>0.70</td>
<td>0.64</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Temporal 24-hour</td>
<td>0.71</td>
<td>0.64</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Temporal 48-hour</td>
<td>0.60</td>
<td>0.52</td>
<td>0.41</td>
</tr>
</tbody>
</table>
5 Conclusions

5.1 Assumptions

The modelling indicates that the Cruden floor level (RL 36.37m) is not flooded in any of the extreme flood events modelled. This is despite the modelling being undertaken with very conservative assumptions i.e.

1. Marriott’s additional developed area of 4.5ha continues to drain to Cruden’s Lagoon (even though primary runoff from the development is now piped back to Marriott’s Lagoon);
2. The HIRDS V3 rainfalls:
   a. are significantly greater (~30% on average) than indicated by the long-term (1991-2016) recorded rainfalls at Palmerston North Airport.
   b. have been climate adjusted to 2120.
3. The weighted curve number (CN) for the local catchment was scaled up from approximately CN84 to CN89 to match the PNCC estimate of the 100-year ARI flood peak;
4. Cruden’s Lagoon culvert has no outflow over the entire 24-hour and 48-hour flood events modelled.

5.2 Bupa Development Effects

As a result of the development at the Bupa site, during rainfall events, the effects of the increased imperviousness would be to slightly increase the:

- Frequency and magnitude of flood peaks; and to increase the
- Total runoff volume.

Continuous modelling of the stormwater network would be required to assess the effects on the Cruden’s Lagoon discharge under a range of conditions. Modelling of the piped stormwater network is beyond the scope of this study.

During times of extreme flood events, however, such as those modelled in this study, it is likely that the Bupa development will have little effect on the discharge from Cruden’s Lagoon. This is because of the existing high flood flows from the much larger upper terrace catchment causing high flood levels in the downstream Napier Road drain.

High flood levels in the Napier Road drain are likely to significantly reduce or shut-off the discharge from Cruden’s Lagoon and the Bupa site due to both the limited or negative hydraulic gradient, and the effect of the flap gate outlet (Figure 7).
6 Recommendations

6.1 Level – Storage Relationship
PNCC should review the approximate level – storage relationship derived in this study for Cruden’s Lagoon.

6.2 Pumped Solution / Contingency Measures
The modelling assumes that no secondary flow from outside the catchment enters Cruden’s Lagoon. The new development area to the east of Marriot’s lagoon has now been built up, and along with proposed improvements to the Napier Road outlet, would prevent any secondary flow from Marriot’s Lagoon entering Cruden’s Lagoon.

Regardless, PNCC may wish to consider the application of a pumped solution which would be triggered by high water levels in Cruden’s lagoon. It would also provide contingency for occasions when the gradient between the Cruden’s Lagoon outlet and the downstream Napier Road drain is very limited or negative.

This is particularly relevant during extended, long-duration rainfall events which are likely to coincide with high flood levels in the Napier Road drain and limited available storage in Cruden’s Lagoon.

Figure 7: Flap gate outlet to Napier Road drain
7 Limitation
This report has been prepared solely for the benefit of Palmerston North City Council (PNCC) as our client with respect to the brief. The reliance by other parties on the information or opinions contained in this report shall, without our prior review and agreement in writing, be at such parties’ sole risk.

The opinions, conclusions and recommendations in this report are based on our interpretation of the available data. Should further information become available then these should be reviewed.

8 References
KOA, 2014  ‘Plan of Ponding Area, Proposed Sub-Division of 291 Napier Road, Kevin O’Connor and Associates Limited, June 2014.’
MFE, 2016  ‘Climate Change Projections for New Zealand – Atmospheric projections based on simulations undertaken for the IPCC 5th Assessment, Ministry for the Environment, June 2016.’

Please contact the undersigned if you have any questions relating to this assessment.

Your sincerely

Paul Mitchell
Director, Hydrologist (CPEng, MIPENZ)
Mob 027 655 4620
Appendix B

*Proposed Napier Road Development Hydrological and Downstream Pipe Capacity Assessment* (Tonkin and Taylor, 12 October 2018)
Dear Robert and Reiko

Proposed Napier Road Development
Hydrological and Downstream Pipe Capacity Assessment

T+T was engaged (Letter of Engagement dated 5 July 2018) to carry out a hydrological assessment and pipe capacity assessment for the proposed Napier Road Development for Palmerston North City Council (PNCC).

This letter presents a summary of the methodology and the results of the assessment.

1 Introduction

The proposed Napier Road Development is located between Roberts Line and Macpherson Grove in Palmerston North.

The significant features of the catchment layout from a runoff assessment perspective are described in the bullet points below with reference to Figure 1-1.

- The proposed Napier Road development will discharge runoff into the adjacent lagoon. The lagoon discharges towards the west through a 450mm diameter pipe.
- From this lagoon, the proposed Napier Road Development area currently discharges to the Napier Road open drain to the west via an existing detention pond and 600mm diameter stormwater pipe.
- There is an area between the proposed Napier Road Development, and the open drain that is being developed for residential land use. PNCC has referred to this residential area as "BUPA".
- The developer has proposed to keep the existing 600mm diameter stormwater main, fill in the existing detention pond and connect the existing 450mm outlet from the lagoon to the BUPA pipe network, which then flows into the open drain (called the Napier Road Drain). A swale along the northern boundary of the BUPA development will convey secondary flow.
- Initially PNCC proposed that the Napier Road catchment would be isolated from flows beyond Napier Road and Roberts Line. This was adjusted following the GHD site walk over memo (Appendix A), and the hydrological assessment which included areas beyond Napier Road and Roberts Line.
- PNCC had not determined if there is sufficient capacity to convey both the BUPA residential development and the proposed Napier Road Development in the Napier Road drain, or if
there is sufficient capacity in the BUPA network to convey the proposed Napier Road Development runoff. Determination of these is part of the scope of this engagement.

- PNCC require assessment of three key elements of the site stormwater arrangement which is the purpose of this work. These include:

1. Determining if the 600mm diameter stormwater main in the BUPA development’s stormwater network has capacity to accommodate the Napier Road Development runoff.
2. Determine what size pipe is required if upgrading the 600mm BUPA development’s main is required.
3. Determine if installing a new stormwater main underneath the proposed swale, that enables the Napier Road Development to bypass the BUPA pipe and discharge directly into the Napier Road open drain, is necessary and what size pipe is required.

Figure 1-1: Proposed Napier Road Development, existing stormwater network and proposed changes.

2 Hydrological Assessment

The hydrological analyses and generation of runoff hydrographs comprised the following tasks:

- Delineation of catchments
- Estimation of storm rainfall for the study area for present day with allowance for climate change projected to 2090 and preparation of rainfall input for the rainfall-runoff model
- Determination of catchment characteristics
- Determination of suitable rainfall-runoff model parameters for each catchment, and
- Generation of runoff hydrographs and pond water levels.
2.1 Catchment characteristics

Proposed development will take place in the four areas shown as catchments 1 to 4 in Figure 2-1. In addition to these catchments the Northeast Catchment (already developed) and the South and Southeast catchments will also drain to the pond that discharges into the wetland.

![Figure 2-1: Study area catchments and features](image)

The catchments were delineated based on a watershed analysis carried out in Global Mapper software using the Palmerston North City Council (PNCC) 2006 LiDAR data.

GHD conducted a site walk over of the site, reported in a memo (Appendix A) in which flow paths to the catchment were identified. This confirmed that the catchment delineation carried out using Global Mapper was reasonable.

The longest water course and equal area slope for each catchment was estimated using the LiDAR elevation surface. Present day land use in each catchment was measured from the World Imagery coverage available on-line. The land use was adjusted based on the more recent Google Earth imagery. For the road catchments, the slope was not calculated due to it being intuitive that the lag time would be the minimum adopted of 7 minutes.

The Landcare Research Permeability Map shows the soils in the area have moderate permeability, which indicates hydrological soil Group B.

SCS curve numbers (CN) were estimated for each catchment based on the land use and hydrological soil Group B and adjusted so that the simulated present day 100 year ARI peak discharge corresponds reasonably with estimates calculated using the Rational Method. Care was taken to ensure that the runoff coefficients used in the Rational Method and the CN values could be justified based on land use and soil group. This approach was followed because there are no observed data that could be used to determine model parameters by calibration.

The characteristics of the catchments together with CN and related values for both current and projected future land use are summarised in Table 2-1.
### Table 2-1: Catchment characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value for catchment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Catchment area (km²)</td>
<td>0.020</td>
</tr>
<tr>
<td>Longest water course (km)</td>
<td>0.162</td>
</tr>
<tr>
<td>Equal area slope (m/m)</td>
<td>0.043</td>
</tr>
</tbody>
</table>

#### Current land use

<table>
<thead>
<tr>
<th>SCS Curve Number (CN)</th>
<th>74</th>
<th>72</th>
<th>73</th>
<th>76</th>
<th>73</th>
<th>76</th>
<th>76</th>
<th>88</th>
<th>92</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial loss (0.2 Soil storage) (mm)</td>
<td>18</td>
<td>20</td>
<td>19</td>
<td>16</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Catchment lag (minutes)</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>17</td>
<td>16</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

#### Projected maximum potential development land use

<table>
<thead>
<tr>
<th>SCS Curve Number (CN)</th>
<th>88</th>
<th>88</th>
<th>88</th>
<th>88</th>
<th>88</th>
<th>76</th>
<th>76</th>
<th>88</th>
<th>92</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial loss (0.2 Soil storage) (mm)</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>16</td>
<td>16</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Catchment lag (minutes)</td>
<td>7</td>
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<td>7</td>
<td>7</td>
<td>9</td>
<td>17</td>
<td>16</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

### 2.2 Storm Rainfall

Storm rainfall for the area was sourced from the HIRDS V3 database for present day and for a 2.1 °C projected increase in temperature to 2090 due to climate change. Storm depths were calculated using the relationships in the HIRDS V3 methodology, the percentage increase per °C table from “Tools for estimating the effects of climate change on flood flow”, (MFE 2010) and the coefficients included in the HIRDS data for input to the frequency storm rainfall input to HEC-HMS. The 10 and 100 year storm rainfalls with and without allowance for climate change are listed in Table 2-2.

#### Table 2-2: HIRDS V3 storm rainfall

<table>
<thead>
<tr>
<th>ARI (years)</th>
<th>Storm duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 min</td>
</tr>
<tr>
<td>Present day storm depths (mm) (no allowance for climate change)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8.4</td>
</tr>
<tr>
<td>100</td>
<td>15.4</td>
</tr>
<tr>
<td>Climate change projected to 2090 storm depths (mm)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>9.9</td>
</tr>
<tr>
<td>100</td>
<td>17.9</td>
</tr>
</tbody>
</table>

The peak rainfall intensity for each duration storm was limited to between three and five times the average rainfall intensity by only entering the storm rainfall depths for the four longest durations. For example, rainfall input for a 12 hour storm would be limited to the 12 hour, 6 hour, 3 hour and 2 hour depths. The peak rainfall intensity was limited because the storm mechanism for producing
prolonged rainfall is generally different to the weather systems causing short bursts of very high intensity rainfall so their inclusion in a long duration storm would be inappropriate.

2.3 Routing of runoff through ‘Lagoon’

The HEC HMS model included a storage-elevation relationship to model the routing effect of the pond or lagoon.

Due to the relatively coarse topographical information available, a storage-elevation relationship was derived that assumed that the pond level was equal to the outlet invert level at the start of the storm event, and the area of the pond surface was estimated from the aerial photography. This assumption was necessary as it appears that the 2006 LiDAR topographic data available does not represent present day levels. There is uncertainty at what level the lagoon might overtop. For the purposes of this assessment we assumed that the lagoon would not overtop into the adjacent BUPA network.

2.4 Hydrological model results

A HEC-HMS model was set up to simulate runoff from each catchment that drains to the pond. In addition, the model was used to estimate the peak outflows from the lagoon and BUPA catchment for a range of storm durations with 10 year and 100 year average recurrence interval (ARI). For these the storm rainfall projected to 2090 for both Existing Development and maximum potential development scenarios was used.

The simulation model assumed that catchments 1-4, plus the Northeast, Southeast and South catchments, shown in Figure 2-1, drain directly into the pond with no attenuation at road crossings or lags due to distance from the pond applied. This assumption was made due to limited information being available on the connectivity between these catchments and the pond, such as pipe sizes, inverts, and relatively old LiDAR data. This assumption will result in a shorter runoff response time increasing peak discharges. This assumption is likely conservative, as there would be more catchment storage than modelled in the individual sub catchments.

Due to the increase in impervious surface area, catchment response times reduce significantly, and peak runoff into the lagoon increases for the Maximum Probable Development cases. The lagoon does have capacity to mitigate these increases in runoff through storage routing to a large extent. For example peak inflows into the lagoon were calculated to be on the order of 50% larger in the Maximum Probable Development case, and are on the order of 10% larger at the outlet of the lagoon.

An example output from the model showing the routing through the lagoon is shown in Figure 2-2. The lagoon provides a significant degree of peak flood attenuation. Therefore for future detailed studies it is recommended that the storage-elevation data used for describing the pond be updated once better topographic data becomes available.

The maximum water levels in the lagoon, as predicted using model runs, are summarised in Table 2-3. Peak discharge from the lagoon is summarised in Table 2-4, and from the BUPA development in Table 2-5.

A summary of sub catchment peak outflows is shown in Appendix B.

Slightly higher flows than those identified as the critical flows in the table may occur at longer unassessed longer storm durations.
Figure 2-2: 100 year ARI including climate change ‘lagoon’ volume, water level, inflow and outflow plot from HEC HMS model output
Table 2-3: Summary of maximum simulated water level from the lagoon

<table>
<thead>
<tr>
<th>Duration (hours)</th>
<th>10 year Existing Development (Climate change 2090)</th>
<th>100 year Existing Development (Climate change 2090)</th>
<th>10 year Maximum Probable Development (Climate change 2090)</th>
<th>100 year Maximum Probable Development (Climate change 2090)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35.13</td>
<td>35.68</td>
<td>35.24</td>
<td>35.91</td>
</tr>
<tr>
<td>2</td>
<td>35.27</td>
<td>36.01</td>
<td>35.41</td>
<td>36.29</td>
</tr>
<tr>
<td>3</td>
<td>35.37</td>
<td>36.21</td>
<td>35.52</td>
<td>36.51</td>
</tr>
<tr>
<td>6</td>
<td>35.52</td>
<td>36.51</td>
<td>35.69</td>
<td>36.83</td>
</tr>
<tr>
<td>12</td>
<td>35.69</td>
<td>36.84</td>
<td>35.89</td>
<td>37.18</td>
</tr>
<tr>
<td>24</td>
<td>35.90</td>
<td>37.21</td>
<td>36.13</td>
<td>37.55</td>
</tr>
</tbody>
</table>

Table 2-4: Outflow from Lagoon (m³/s) – critical duration discharges shown in red

<table>
<thead>
<tr>
<th>Duration (hours)</th>
<th>10 year Present Development (Climate change 2090)</th>
<th>100 year Existing Development (Climate change 2090)</th>
<th>10 year Maximum Probable Development (Climate change 2090)</th>
<th>100 year Maximum Probable Development (Climate change 2090)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.03</td>
<td>0.26</td>
<td>0.07</td>
<td>0.32</td>
</tr>
<tr>
<td>2</td>
<td>0.09</td>
<td>0.34</td>
<td>0.16</td>
<td>0.41</td>
</tr>
<tr>
<td>3</td>
<td>0.14</td>
<td>0.39</td>
<td>0.21</td>
<td>0.45</td>
</tr>
<tr>
<td>6</td>
<td>0.21</td>
<td>0.45</td>
<td>0.26</td>
<td>0.51</td>
</tr>
<tr>
<td>12</td>
<td>0.26</td>
<td>0.51</td>
<td>0.31</td>
<td>0.57</td>
</tr>
<tr>
<td>24</td>
<td>0.32</td>
<td>0.57</td>
<td>0.37</td>
<td>0.62</td>
</tr>
</tbody>
</table>
### Table 2-5: Outflow from BUPA catchment (m³/s) – critical duration discharges shown in red

<table>
<thead>
<tr>
<th>Duration (hours)</th>
<th>10 year Existing Development (Climate change 2090)</th>
<th>100 year Existing Development (Climate change 2090)</th>
<th>10 year Maximum Probable Development (Climate change 2090)</th>
<th>100 year Maximum Probable Development (Climate change 2090)</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>0.026</td>
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</tr>
<tr>
<td>2</td>
<td>0.043</td>
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<td>0.27</td>
<td>0.74</td>
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<tr>
<td>3</td>
<td>0.065</td>
<td>0.33</td>
<td>0.28</td>
<td>0.71</td>
</tr>
<tr>
<td>6</td>
<td>0.086</td>
<td>0.28</td>
<td>0.20</td>
<td>0.44</td>
</tr>
<tr>
<td>12</td>
<td>0.079</td>
<td>0.21</td>
<td>0.14</td>
<td>0.28</td>
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<tr>
<td>24</td>
<td>0.074</td>
<td>0.17</td>
<td>0.12</td>
<td>0.22</td>
</tr>
</tbody>
</table>

### Table 2-6: Combined outflow from Lagoon and BUPA development (m³/s) – critical duration discharges shown in red

<table>
<thead>
<tr>
<th>Duration (hours)</th>
<th>10 year Existing Development (Climate change 2090)</th>
<th>100 year Existing Development (Climate change 2090)</th>
<th>10 year Maximum Probable Development (Climate change 2090)</th>
<th>100 year Maximum Probable Development (Climate change 2090)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>0.75</td>
</tr>
<tr>
<td>2</td>
<td>0.11</td>
<td>0.44</td>
<td>0.29</td>
<td>0.91</td>
</tr>
<tr>
<td>3</td>
<td>0.15</td>
<td>0.52</td>
<td>0.33</td>
<td>0.94</td>
</tr>
<tr>
<td>6</td>
<td>0.22</td>
<td>0.63</td>
<td>0.38</td>
<td>0.84</td>
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<td>0.81</td>
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<tr>
<td>24</td>
<td>0.38</td>
<td>0.72</td>
<td>0.47</td>
<td>0.82</td>
</tr>
</tbody>
</table>
3 Pipe Capacity Assessment

A pipe capacity assessment on the BUPA development pipe network, with a proposed additional pipe connecting node 5 to node 4 (shown in Figure 3.1) was carried out using the Colebrook-White pipe capacity equation. The assessment was based on an assumption of a free outfall at the downstream end of the pipe system, and fully developed catchment state with an adjustment for future climate change as the basis for the runoff assessment.

The purpose of the assessment is to determine if the existing BUPA development network has sufficient capacity to convey design flood events with the addition of a pipe connecting node 5 to node 4. Note that node 5 at present discharges into an attenuation pond which is proposed to be infilled in Maximum Probable Development. The design flood events that the pipe size was assessed against include 10 year ARI, and 100 year ARI climate change events with Maximum Probable Development catchment land cover.

The gradient and levels used in this assessment are also shown on the pipe network long section in Figure 3.2.

A surcharge bypass channel (location shown in Figure 3.3) was also sized using a Manning’s equation approach (assuming free outfall at the downstream end), and 0.3m of freeboard to the 100 year adjusted for climate change flood level. The slope of the channel was assumed to be the same as the pipe network, as the 2006 LiDAR data in the area did not appear recent enough to extract a long section of current ground levels.

Excel spreadsheet printouts of the calculations are attached in Appendix A for reference.

The following outcomes were noted from the assessment:

1. The existing system has a capacity of approximately 220l/s and is limited by the downstream pipe (node 1 to 0).
2. A 600mm diameter pipe from node 5 to 4 only provides approximately 150 l/s capacity, and produces velocities less than 0.6m/s, the minimum self-clearing velocity recommended by the building code Part E1.
3. A 750mm diameter pipe would match the capacity of the downstream system, and meet the minimum velocity requirements.
4. The existing system does not have sufficient capacity to accommodate the 10 year climate change flood event with present or Maximum Probable Development conditions (220 l/s capacity versus 470l/s required) for the combined BUPA and Lagoon outflow.
5. A channel of side slopes 2.5h:1v, with a 1m bottom width, 0.88m deep is required to convey the 100 year adjusted for climate change flood event for Maximum Probable Development with a 600mm diameter pipe.
6. A marginally smaller channel (0.95m deep) is required to convey the same flow with a 750mm pipe.
7. The BUPA catchment network would not have sufficient capacity to convey the 10 year ARI climate change discharge for Maximum Probable Development (220l/s versus 370 l/s).
8. For the Napier Road development, excluding the BUPA development runoff, a new pipe of 900mm diameter would be required to convey the 10 year ARI climate change runoff for Maximum Probable Development.
9. The level at which the lagoon overtops is unknown due to the age of the available LIDAR data. The channel sizing and routing calculations should be reassessed, in order to make sure sufficient capacity is available once better data is available.
Figure 3-2: Pipe long section plot showing pipe nodes, invert levels

Figure 3-3: Figure showing position of proposed bypass channel
4 Conclusions

A runoff assessment for the Napier Road development has been carried out, with some high level assumptions. The LiDAR derived DEM data provided is dated from 2006 and some features of the catchment are not clear. Improved LiDAR data sets would provide increased confidence in catchment extent.

In particular the lagoon bathymetry was not well defined, and fairly coarse assumptions regarding its storage-elevation relationship were inferred. These could have relatively large impacts on predicted flood outflows.

The analysis carried out indicates that the existing BUPA pipe network does not have sufficient capacity to convey Maximum Probable Development 10 year ARI discharge adjusted for climate change. An upgrade will be required to meet this level of service if the development were to proceed.

An open channel will be able to provide flood relief to the pipe network and convey surcharge runoff. Both the assessment of pipe capacity, and open channel sizing assumed a free outfall to the downstream open drain, which is an optimistic assumption. Predicted flood levels in coincident flood events could be factored into future calculations, to check that downstream flood levels do not have a significant impact on pipe network or open channel capacity.

The sizing of this channel in this assessment assumed the same gradient as the pipe network, due to the relatively old LiDAR data from 2006. Improved topographic data would result in more certainty in outputs.

5 Applicability

This report has been prepared for the exclusive use of our client Palmerston North City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by: Authorised for Tonkin & Taylor Ltd by:

.......................................................... ..........................................................
Hamish Smith Hugh Cherrill
Water Resources Engineer Project Director
Appendix A: GHD Site Walkover Memorandum
23 August 2018

To  Robert van Bentum

Copy to  Allison Reiko Baugham

From  Nicholas Barker  Tel  06 353 1846

Subject  Stormwater Site Investigation  Job no. /12503087/

Attachments  12503087-00-C001
  Napier Road – Existing 3 Water Services
  12503087-REP_Napier Road Re-zoning Photo Report

Palmerston North City Council have engaged GHD to carry out a site investigation to identify stormwater infrastructure in and around Napier Road’s Leafland Tree Nursery as part of the Napier Road residential re-zoning.

During our investigation many of the culverts were poorly maintained with significant debris build-up observed. The drains were typically poorly graded with stagnant water in parts. Of the infrastructure that is known (as per PNCC geo-guide) it generally resembled what was documented with the exception being a culvert which crosses Napier Road.

Attached with this document is a sketch which indicates the overland flow paths for stormwater runoff. The paths are colour coded to indicate PNCC culverts, NZTA culverts, open drains and private/undocumented culverts. Further to this the sketch includes bodies of water, manholes and roadside drains. Please note some inline culverts have been omitted for clarity.

Key observations from the site investigation are as follows and visualised in the attached photo report;

1. Grate inlet East of Roberts Line indicates the stormwater is draining towards Palmerston North. The road side drain along Napier Road is poorly graded with little evidence indicating where the water should ultimately drain to.

2. Blocked culvert inlet on the West side of Roberts Line. Potential to cause overland flow into the Nursery’s open drain.

3. The NZTA culvert that crosses Napier Road drains towards the nursery. Again, there is little evidence indicating where the water should ultimately drain too.

4. The stormwater within the nursery drains to the oxbow at the rear of the property. The overall condition of the oxbow is poor with debris and waste having been dumped.

5. Connectivity of the two culverts on the nursery is unclear. The landowner advised that these are likely connected and discharge to the oxbow.
6. A culvert crossing Te Mata Road was observed that was not documented on PNCC’s geo-guide. The culvert discharges to the roadside drain on the southern side of Napier Road before crossing Napier Road through the NZTA culvert in to the nursery.

7. Stormwater on Roberts Line near Napier Road was observed and matched what was documented on PNCC’s geo-guide (see attached aerial).

In summary, the oxbow is fed by stormwater runoff from Roberts Line, Freedom Drive, Te Matai Road & Napier Road. The stormwater primarily flows from Roberts Line, Freedom Drive and Te Matai Road into Napier Road and then across the tree nursery into the oxbow. It is unclear if this was the intended flow path for this catchment as the area is particularly flat with several areas of stagnant water observed. The assets appear to have had little to no maintenance carried out recently.

Regards

Nicholas Barker
Graduate Civil/Structural Engineer
248

Napier Road Re-Zoning – Photo Report

Grate inlet East of Roberts Line

Roberts Line Blocked Culvert Inlet
Napier Road Re-Zoning – Photo Report

NZTA Culvert Crossing Napier Road

Nursery Pond in Poor Condition
Napier Road Re-Zoning – Photo Report

Nursery Culverts with Unclear Ends

Undocumented Culvert on Te Matai Road
Appendix B: Hydrological Model Additional Outputs
Table 5-1: Summary of simulated peak discharge from catchments and into pond (Existing Development)

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100 year Existing Development (Climate change 2090)

| Peak discharge (m³/s) for storm duration (hours) |
|--------------------------------------------------|-----------------------------------------------|
|                                                  | 1    | 2    | 3    | 6    | 12   | 24   |
| Catchment 1                                      | 0.1  | 0.2  | 0.2  | 0.1  | 0.1  | 0.11 |
|                                                     | 5    | 1    | 3    | 8    | 3    |      |
| Catchment 2                                      | 0.1  | 0.1  | 0.1  | 0.1  | 0.1  | 0.10 |
|                                                     | 2    | 7    | 9    | 6    | 2    |      |
| Catchment 3                                      | 0.2  | 0.3  | 0.3  | 0.2  | 0.1  | 0.16 |
|                                                     | 1    | 0    | 3    | 6    | 9    |      |
| Catchment 4                                      | 0.2  | 0.3  | 0.4  | 0.4  | 0.2  | 0.19 |
|                                                     | 9    | 9    | 2    | 2    | 3    |      |
| South Catchment                                  | 0.5  | 0.7  | 0.8  | 0.8  | 0.6  | 0.52 |
|                                                     | 5    | 8    | 6    | 1    | 2    |      |
| Southeast Catchment                              | 0.3  | 0.4  | 0.5  | 0.4  | 0.3  | 0.29 |
|                                                     | 3    | 3    | 0    | 6    | 5    |      |
| Northeast Catchment                              | 1.1  | 1.3  | 1.2  | 0.7  | 0.4  | 0.38 |
|                                                     | 8    | 5    | 6    | 5    | 9    |      |
| Road                                             | 0.8  | 0.8  | 0.7  | 0.4  | 0.2  | 0.20 |
|                                                     | 0    | 7    | 5    | 0    | 6    |      |
| Pond inflow                                      | 3.0  | 3.7  | 4.0  | 3.3  | 2.3  | 1.93 |
|                                                     | 4    | 9    | 6    | 0    | 7    |      |
| Pond outflow                                     | 0.2  | 0.3  | 0.3  | 0.4  | 0.5  | 0.57 |
|                                                     | 6    | 4    | 9    | 5    | 1    |      |
| BUPA                                             | 0.2  | 0.2  | 0.3  | 0.2  | 0.2  | 0.17 |
|                                                     | 8    | 3    | 8    | 1    |     |      |
Table 5-2: Summary of simulated peak discharge from catchments and into pond (Maximum Probable Development)

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Appendix C: Pipe and Channel Capacity Calculations
Appendix 4 – Wastewater and Water Supply Infrastructure Assessment
263

This document was prepared by Palmerston North City Council, City Networks, Water and Waste Services Division.

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<td>July 2018</td>
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PNCC Reference No: OASIS: 11063502
Contents

1 Scope ...................................................................................................................................... 2

2 Wastewater Services Assessment .................................................................................................. 3
  2.1 Existing Wastewater Services ................................................................................................. 3
  2.2 Proposed Wastewater Servicing .............................................................................................. 3
  2.3 Proposed Wastewater Network ............................................................................................... 4
  2.4 Funding .................................................................................................................................. 5

3 Water Supply Services Assessment .................................................................................................. 6
  3.1 Existing Water Supply ............................................................................................................. 6
  3.2 Water Supply Servicing Assessment ......................................................................................... 6
  3.3 Future Water Supply Requirements .......................................................................................... 8
  3.4 Funding .................................................................................................................................. 8

4 Summary ....................................................................................................................................... 9

Figures

Figure 1: Extent of Proposed Napier Road Plan Change................................................................. 2
Figure 2: Preliminary Napier Road Structure Plan Concept ........................................................... 2
Figure 3: Existing Wastewater Network and contour information in the Vicinity of Napier Road ...... 3
Figure 4: Proposed Alignment and Connection for the Low Pressure Sewer Trunk Mains .............. 5
Figure 5: Existing Water Network around Napier Road ................................................................. 6
Figure 6: Indicative Minimum Water Infrastructure for Napier Road Plan Change Area ............... 7

Tables

Table 1: Programme 246 – 2018-28 LTP Funding ............................................................................ 8
1 Scope

This brief report sets out the findings of an assessment of water supply and wastewater servicing requirements for the proposed Napier Road Residential Plan Change as outlined in red in Figure 1. The area comprises both rural land and the BUPA Care Services NZ Limited site which is currently zoned industrial.

Figure 1: Extent of Proposed Napier Road Plan Change

BUPA Care Services NZ Limited is already fully serviced by the city reticulated water and wastewater services. Hence water and wastewater assessment for this block is not required and therefore not considered in this report. However it should be noted that the water supply and wastewater network including the sewer pump station located within this property is privately owned.

The assessment has been undertaken based on the preliminary concept Napier Road Structure Plan provided by City Future as shown in Figure 2.

Figure 2: Preliminary Napier Road Structure Plan Concept
2 Wastewater Services Assessment

2.1 Existing Wastewater Services

The existing wastewater network and the ground contour information in the vicinity of Napier Road Plan Change area is depicted in Figure 3 below. There are three sewer pump stations located close to the planned rezone area at:

- Freedom Drive
- Sutton Place
- BUPA Care Services Ltd (Private)

![Figure 3: Existing Wastewater Network and contour information in the Vicinity of Napier Road](image)

The plan change area is currently not serviced for wastewater, except for BUPA Care Services NZ Ltd. Pumping will be required for this catchment as there is insufficient gravity fall to convey wastewater from the area to the existing network.

2.2 Proposed Wastewater Servicing

Geotechnical investigations and assessments (Tonkin & Taylor, March 2017) completed as part of preliminary work to determine the suitability of the Napier Road site for development, identified the area to be moderately susceptible to earthquake liquefaction. Part of the area adjacent to the watercourse or oxbow at the rear of the area is also susceptible to lateral spreading.

Liquefaction and lateral spreading pose significant residence risks for traditional gravity and as a consequence Council officers propose that the plan change area be serviced by a Pressure Sewer System instead of the traditional gravity system with lift pump stations for the following reasons:
267

- Improved resilience to earthquake liquefaction and lateral spreading
- Reduced wet weather flow impact on the existing receiving network as
  - Stormwater inflow & infiltration is largely eliminated in a pressurised sewer system
  - Smart controllers to control pump operation at each property can be utilised to minimise discharges to the network during both dry and wet weather.
- Lower capital cost overall for developers as the pressure sewer systems are of lower overall capital cost compared to traditional gravity systems with a lift station.

In a typical pressure sewer system, each residential lot is fitted with a small pump chamber installed with a grinder pump that receives the wastewater from the property. Sewage is then macerated and pumped via a small diameter pipe into a common pressure sewer main in the street. This pressure sewer network then delivers the sewage to a suitable connection point in the existing wastewater network.

To ensure that the benefits of a pressure sewer network are achieved, Council will establish the Napier Road Plan Change Area as a pressure sewer area. This will require Council to develop and define the following as a minimum:

- Designation or determination of specific pressure sewer areas within the Wastewater Bylaw or District Plan (or both)
- Council adoption of a Pressure Sewer Policy which sets out obligations and responsibilities of property owners and Council
- Determination of whether a specific rating policy for pressure sewer system is required
- Adoption of a standard specification for pressure sewer systems including approval of a limited number of brands/models of pressure sewer pump installation

It is envisaged that Council will take responsibility for the on-going maintenance of the pressure sewer pump installations with the property owner signing up to a duty of care and being responsible for power costs.

Given the reasoning above, the proposal that the plan change area is served by a pressure sewer system would not be changed even if land in the area was raised and re-contoured to mitigate flooding risks. This would be regardless of the increased elevation suggesting that it possibly might be suitable for gravity sewer.

2.3 Proposed Wastewater Network

The developable land of the proposed Napier Road Plan Change Area, excluding BUPA Care Services NZ Ltd, has the potential to yield around 60 residential lots. In a low pressure sewer system only a small number of domestic pumps will be operating at any one time. Hence the impact of the pumped flow on the receiving network can be easily accommodated.

The most cost effective pipe alignment and connection for the low pressure sewer trunk main is assessed as following the proposed road layout and connecting to the existing gravity network at manhole MH 22169 at Freedom Drive, as shown in Figure 4 below.
The wastewater will be conveyed to the 450mm dia. gravity mains on Roberts Line by the existing Freedom Drive Pump Station. The required pipe size(s) will be determined during the detailed design phase of the pressure sewer system, but it is smaller than the standard 150mm gravity diameter. Smaller local collector pressure sewers will be laid within the internal road network of the sub-division development.

Ideally, infrastructure services corridors should be provided at the following locations for the low pressure sewer trunk mains:

- the cul de sac at the eastern end of the proposed road for access to Roberts Line
- the cul de sac at the western end of the proposed road for access to future low pressure sewer mains servicing Block C.

The logical staging for the low pressure sewer system will be Block A, followed by Block B and then Block C. If Block C is to be accessed from MacPherson Grove and no services corridor provided from the main internal road serving Blocks A and B, then a corridor as part of the shared path along the State Highway will be required to provide for low pressure sewer connectivity.

### 2.4 Funding

The developer will be expected to fund the entire low pressure sewer system including the connection to the gravity system at Freedom Drive as part of their subdivision development.
3 Water Supply Services Assessment

3.1 Existing Water Supply

Apart from BUPA Care Services NZ Limited site, the Napier Road Plan Change Area is currently not serviced by public water supply. The nearest connections are an existing 250/300mm diameter pipeline at Napier Road/ MacPherson Grove which supplies BUPA Care Services Ltd. and the 200mm diameter pipeline on Roberts Line as shown in Figure 5 below:

![Existing Water Network around Napier Road](image)

The existing Napier Road water supply is located in the City Main Pressure Zone, while Roberts Line water supply lies within a separate Kelvin Grove Pressure Zone.

3.2 Water Supply Servicing Assessment

Palmerston North City Council’s (PNCC) current level of service (LoS) for residential water supply comprises:

- A minimum service pressure of 350kPa or 35m of water pressure
- A minimum peak flow capacity of 25L/s for fire-fighting with a minimum residual pressure of 10m delivered from 2 hydrants within 135m of the specific property.

Hydraulic water network modelling was used to determine the most appropriate network required to deliver the LoS for the proposed residential plan change area at Napier Road. Modelling identified that the most cost effective option is to service the area as an extension of the City Main Pressure Zone.
from the Napier Road connection. This identified that the minimum water infrastructure required to service the area comprises:

- A 150mm diameter distribution mains connecting to the existing 250mm diameter mains at Napier Road/MacPherson Grove. This pipeline will be along the entire length of the proposed future road in the plan change area that is parallel to Napier Road.

- A connection to the existing 200mm diameter mains at Roberts Line will also be required. This connection will be normally closed as Roberts Line belongs to a separate Kelvin Grove pressure zone. However, in the event of water supply disruption from the City Main Pressure Zone to this area, this connection can be opened to provide an alternative source of supply from Roberts Line.

- Ideally, infrastructure services corridors should be provided at the following locations for the water distribution mains:
  - the cul de sac at the eastern end of proposed road for access to Roberts Line
  - along Napier Road from the 250mm dia water mains at MacPherson Grove to the cul de sac at the western end of the proposed road

Figure 6 below depicts the minimum water distribution network required for the proposed Plan Change.

![Figure 6: Indicative Minimum Water Infrastructure for Napier Road Plan Change Area](image)

Council expects the developer to fund 100% of this infrastructure to meet the requirements of the subdivision.
3.3 Future Water Supply Requirements

To cater for the full planned residential development of the lower terrace by Napier Road/ SH3 up to Stoney Creek Road, a future bore may be required, possibly in the Kelvin Grove/ Whakarongo area. The City Main Pressure Zone may also be extended to include the lower terrace between Roberts Line and James Line.

To ensure both the efficient delivery of this new bore supply to the city water network and to meet the water supply LoS requirements, Council has assessed the trunk network needs to provide for:

- A 225 mm diameter pipe from the existing 250mm diameter mains at Napier Road/ MacPherson Grove to the existing 200 mm diameter mains at Roberts Line.

Council will contribute to the developer(s) the extra cost of upsizing the mains from the 150mm mains required to service the Napier Road Plan Change development.

3.4 Funding

Council has approved programmes in the 2018-28 LTP for funding contributions to subdivision infrastructure development for increased capacity or identified future use that a developer would not be expected to fund. Programme 246 – City-wide – Water Subdivision Contributions has provided for the following levels of funding for water supply infrastructure.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$200,000</td>
<td>$205,000</td>
<td>$210,000</td>
<td>$215,000</td>
<td>$220,000</td>
<td>$225,000</td>
<td>$231,000</td>
<td>$237,000</td>
<td>$244,000</td>
<td>$251,000</td>
</tr>
</tbody>
</table>

The budget is based on historical data and the rate of development/subdivisions. The timing of funding requirements will be dependent on progress with any plan change. If required Council funding provisions may need to be brought forward.
4 Summary

An assessment of both water and wastewater servicing requirements for the proposed Napier Road Plan Change area has been completed. This has included a detailed assessment by way of network modelling for water supply and a desktop assessment for low pressure sewer servicing. The assessment has confirmed:

- For both water supply and wastewater, cost efficient servicing options for the Napier Road Plan Change area are available.
- The trunk infrastructure required to service the Napier Road Plan Change Area has been identified. It is Council’s expectation that this infrastructure will be funded by the developer.
- Council has funding in confirmed LTP programmes to fund the upsizing of the trunk water mains for future growth and network resilience.
- The preferred option for wastewater servicing is a low pressure sewer network with the trunk main located within proposed service road and connecting to the existing gravity system at Roberts Line.
- The Napier Road Plan Change Area, with the exception of the existing developed BUPA Care Services Ltd. will be required to be designated as a low pressure only wastewater servicing zone.
- Provision of infrastructure services corridors as part of the re-zone at the eastern and western end cul de sacs is a key requirement for cost effective connection to existing services at Roberts line and MacPherson Grove.
- The water network layout by providing connections to both Napier Road and Roberts Line provides resilience by way of two sources of supply.
Appendix 5 – Liquefaction Report
Napier Road Site
Geotechnical Investigation and Liquefaction Assessment

Prepared for
Palmerston North City Council

Prepared by
Tonkin & Taylor Ltd

Date
March 2017

Job Number
85442.004.v1

Exceptional thinking together

www.tonkintaylor.co.nz
Table of contents

1 Introduction 1
2 Site description 2
3 Ground and groundwater conditions 3
   3.1 Geology 3
   3.2 Geotechnical model 4
   3.3 Groundwater 4
   3.4 Site topography 4
4 Liquefaction assessment 6
   4.1 Assessment methodology 6
   4.2 Liquefaction categories 6
   4.3 Liquefaction assessment summary 6
      4.3.1 Lateral spreading assessment 7
   4.4 Additional investigations required 7
      4.4.1 Refinement of liquefaction categories 7
5 Site development considerations 8
   5.1 Overview 8
   5.2 Ground improvement and foundation options 8
   5.3 Lateral Spread mitigation options 10
   5.4 Infrastructure protection options 11
6 Residential foundation and ground improvement costs 12
7 Applicability 13

Appendix A : Figures
Appendix B : Site Investigation Summary
Appendix C : Machine Borehole logs and CPT Results
Appendix D: Liquefaction Assessment Methodology and Results
1 Introduction

Tonkin & Taylor Ltd (T+T) was engaged by Palmerston North City Council to conduct a geotechnical investigation and liquefaction assessment of the properties from 243 Napier Road to 1 Roberts Line, Palmerston North ("the site").

The work was undertaken in accordance with our proposal dated 20 May 2016.

Geotechnical investigations at the site were undertaken during July 2016 and included:

- Site walkover, visual assessment, and mark out of investigation locations.
- Twelve Cone Penetration Tests (CPTs).
- Two machine-drilled boreholes.
- Installation of six stand pipe piezometers.
- Installation of one nested stand pipe piezometer.

The locations of the investigations are presented on Figure 2 in Appendix A. A detailed summary of the site investigation is provided in Appendix B.

The liquefaction analysis and assessment included the following:

- Assess likelihood and consequences of liquefaction across the site.
- Assess liquefaction for 1/100 year and 1/500 year seismic events.
- Identify areas of low, medium and high liquefaction category.
- Identify appropriate ground improvement measures and foundations for developments in order to mitigate the liquefaction hazard.
- Assess lateral spreading hazard on the site.
Site Description

The site is located between 243 Napier Road/State Highway 3 and 1 Roberts Line Road, 3 km northeast of Palmerston North city centre. The site is approximately 920 m long and ranges in width from 75 m to 240 m, with a total area of approximately 15 Ha.

The legal description consists of twelve property titles: Lot 1 DP 74205, Lot 2 DP 74205, Lot 3 DP 74205, Lot 1 DP 456683, Lot 2 DP 456683, Lot 5 DP 74205, Pt Lot 1 DP 25691, Pt Lot 1 DP 16031, Lot 1 DP 41671, Pt Slbn 1 Sec 418 Town of Palmerston North, Pt Slbn 2 Sec 418 Town of Palmerston North, and Pt Slbn 3 Sec 418 Town of Palmerston North.

The topography of the site generally consists of flat to slightly undulating land that slopes gently down towards an oxbow lake near the northern edge of the site. There is a 13 m high moderately steep slope north of the oxbow lake which rises up to a flat terrace, the western portion of which is located within the site boundary. The oxbow lake is approximately 400m long by 25m wide and acts as a flood retention pond for the surrounding properties.

The lower portion of the site includes a residential lifestyle block, a garden centre, a tree nursery, and a flat levelled section in the western area of the site currently under development (Photos 5-8). The upper terrace comprises a small area of farmland, which borders residential properties and the Palmerston North Gisborne rail line.

Earthworks for a residential development to the east of Roberts Line Road are currently underway (not visible on the image).
3 Ground and groundwater conditions

3.1 Geology

The published geological map of the area indicates that the site is underlain by Holocene aged moderately to well sorted alluvial flood plain gravel with some sand and/or silt, minor clay and local peat. The location of the site in the context of the regional geology is presented in Figure 3.1 below.

Figure 3.1: Geological setting (approximate site location outlined in red)

3.2 Geotechnical model

Based on our investigation, the general soil profile of the site is inferred to be as summarised in Table 3.1.

Table 3.1: Geotechnical Model

<table>
<thead>
<tr>
<th>Layer no.</th>
<th>Geological unit</th>
<th>Description</th>
<th>Depth to top of layer (m)</th>
<th>Layer thickness (m)</th>
<th>Typical SPT ‘N’ Value</th>
<th>Typical CPT Tip Resistance, qc (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fill</td>
<td>Fine to coarse GRAVEL with trace silt, well graded.</td>
<td>0.0</td>
<td>0.4 to 0.6</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>Holocene Alluvial Deposits</td>
<td>Sandy SILT/SILT with minor sand, soft to firm, low to moderate plasticity.</td>
<td>0.4 to 0.6</td>
<td>0.5 to 2.4</td>
<td>N/A</td>
<td>0.5 to 8.0</td>
</tr>
<tr>
<td>3</td>
<td>Holocene Alluvial Deposits</td>
<td>Clayey SILT, firm, moderate plasticity.</td>
<td>1.0 to 1.8</td>
<td>0 to 1.8</td>
<td>N/A</td>
<td>0.5 to 2.5</td>
</tr>
<tr>
<td>4</td>
<td>Holocene Alluvial Deposits</td>
<td>Fine to coarse SAND with trace silt, loose to medium dense, poorly graded.</td>
<td>1.0 to 2.4</td>
<td>1.5 to 2.2</td>
<td>N/A</td>
<td>1 to 15</td>
</tr>
<tr>
<td>5</td>
<td>Alluvial Deposits</td>
<td>Fine to coarse GRAVEL with some sand and trace silt, medium dense to dense, well graded.</td>
<td>4.1 to 6.0</td>
<td>10+ (Unconfirmed)$^1$</td>
<td>26– 50+</td>
<td>15 to 50+</td>
</tr>
</tbody>
</table>

Note:
1. The maximum depth excavated during the investigation was BH2, 15m below ground level (RL 21.56m).

3.3 Groundwater

Based on our geotechnical investigation and subsequent groundwater readings, we expect the groundwater level to vary approximately between RL 32.0 m and RL 35.0 m. During our investigation we encountered groundwater perched on the Clayey Silt layer (Layer 3). Although the southwest portion of the site indicated a deeper groundwater table during monitoring the perched groundwater will contribute to the saturation of the shallower soil and ultimately its liquefaction potential. For liquefaction analysis we have assumed groundwater to be at RL 35.0 m across the site.

3.4 Site topography

T+T was supplied with LiDAR$^2$ data for the Palmerston North region by PNCC$^3$. LiDAR is a surveying method that measures ground survey elevations with a laser light. The LiDAR data is based on the

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$^2$ Light Detection and Ranging
$^3$ http://geoguide.palmerstonnorth.com/
1980 Geodetic Reference System (GRS80) Ellipsoid vertical datum. This data was referenced when determining the relative levels of each investigation location at the site.

The site is separated by two topographic areas, a higher terrace and lower lying area, separated by a slope greater than 1:1 (H:V). The majority of the lower lying area appears to be relatively flat with a 1m rise in elevation towards the south. An unnamed watercourse bisects the central portion of the site. Recent development on the western portion are not depicted on the survey. This area consist of an extension of the watercourse towards the southeast, the total depth of the watercourse is currently unknown. The water elevation within the watercourse was surveyed at approximately RL 35m. The northernmost portion of the site consist of a higher terrace with a relative rise in elevation of approximately 15m. Refer to Figure 3.2 for an illustration of the LiDAR information.

Figure 3.2: Topographic Survey (approximate site location outlined in red)
4 Liquefaction assessment

4.1 Assessment methodology

The calculations and analyses used in our liquefaction assessment focused on 11 out of the 12 Cone Penetration Tests (CPTs) from the 2016 investigation of the site. The remaining CPT12 is located at higher elevation and terminated at a shallow depth due to refusal. The near surface soils within the immediate area of CPT12 are considered to have a low potential to liquefy due to the elevated ground surface with respect to the design groundwater level for the overall Napier Road Site. Areas outside the limits of the Site Extent as shown on Figure 3, Appendix A, have not been included in this assessment.

The assessment included analyses of 100-year and 500-year levels of earthquake shaking. In qualitative terms, for Palmerston North these could be described respectively as ‘moderately strong’ and ‘very strong’ earthquakes.

Technical details regarding the methodology used to undertake the liquefaction analysis, and the calculated results, are provided in Appendix D.

4.2 Liquefaction categories

Each CPT location at the site has been categorised into one of the following liquefaction categories presented in Table 4.1, below, depending on the expected likelihood and consequences of liquefaction damage at the ground surface.

### Table 4.1 Liquefaction Category Summary

<table>
<thead>
<tr>
<th>Liquefaction category</th>
<th>Degree of damage expected on average across the area (some locations within an area may have more or less damage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Significant liquefaction-induced ground damage is unlikely.</td>
</tr>
<tr>
<td>Medium</td>
<td>Liquefaction-induced ground damage is possible. A large earthquake would be required to cause significant liquefaction damage, and the degree of ground damage is generally expected to be Moderate or less.</td>
</tr>
<tr>
<td>High</td>
<td>Liquefaction-induced ground damage is possible. Compared to the Medium category, significant liquefaction damage could occur in smaller earthquakes and/or the ground damage could be more severe and extensive.</td>
</tr>
</tbody>
</table>

4.3 Liquefaction assessment summary

The majority of the site is assigned a liquefaction category of Medium with the northernmost portion of the site greater than RL 42.0 assigned a liquefaction category of Low. The liquefaction categories assigned across the site are presented in Appendix A, Figure 3.
4.3.1 Lateral spreading assessment

A strip of land approximately 40 m wide along the southern limits of the existing watercourse is potentially susceptible to lateral spreading during large earthquake events (e.g. 500-year level shaking). This area is shown in Appendix A, Figure 3. The area susceptible to lateral spreading is located within the areas assigned a liquefaction category of Medium.

During a large earthquake event, the ground surface in this area could displace towards the lagoon. We have not assessed the likelihood or severity of lateral spreading in any detail at this stage – this should be considered as part of the design of any future development of the site. At this preliminary stage, we expect that during 500-year levels of earthquake shaking, lateral stretch is likely to be less than 100mm over a horizontal distance of 20m in the areas identified.

4.4 Additional investigations required

4.4.1 Refinement of liquefaction categories

The liquefaction categories shown in Appendix A, Figure 3, are based on widely-spaced investigations. For the level of accuracy required at subdivision consent, additional investigation at a spacing of 40 to 50 m, would be appropriate to identify whether there are any localised areas of poorer ground potentially categorised as High between previous CPT investigations. It is recommended that appropriate geotechnical assessments are carried out, and stand-alone geotechnical reports are prepared.

This work should be overseen by a Chartered Professional Engineer (CPEng) with current accreditation in the geotechnical practice field as administered by IPENZ and/or a Professional Engineering Geologist with current registration on the IPENZ PEngGeol register. The reports should include all relevant factual and interpretative geotechnical information, clearly distinguishing between fact and interpretation and providing a commentary on uncertainty (and potential consequences). The reports should address the pertinent geotechnical aspects of all natural hazards relevant to the site (including, but not limited to, liquefaction).

If areas are identified under the High Liquefaction Category, site-specific geotechnical assessment should be undertaken for each individual lot within the high liquefaction category. This is in order to confirm that the ground improvement and/or foundation design is appropriate for that site.

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4 Lateral spreading is generally defined as the horizontal displacement of surficial blocks of soil towards an open slope face as a result of liquefaction of the underlying soils. Generally for lateral spreading to occur a relatively continuous layer of liquefiable soils extending to an open slope face such as a river bank or open channel must be present.
Site development considerations

5.1 Overview

Foundations for dwellings on land with low liquefaction category can be designed and constructed according to typical residential development standards (e.g. NZS 3604) without the need for specific liquefaction-resistant design. However, if enhanced foundations and flexible service connections are used, then new development would be more resistant to non-liquefaction related earthquake damage, and would be more readily repairable after earthquakes.

For development of medium liquefaction category land, a number of options are available for liquefaction mitigation and lateral spread mitigation. These options are grouped into:

- Enhanced Foundations (e.g. a waffle slab, enhanced lightweight foundation on timber piles, timber piles on a reinforced concrete slab, or deep piles.)
- Ground Improvement (e.g. hardfill raft, soil-cement raft, stone columns, or columns of highly compacted aggregate)

Development of the site would be appropriate subject to the options provided. Site specific assessments required for design will provide greater clarity for foundation design and ground improvement requirements for individual lots. This assessment does not remove any requirements for site specific assessment for detailed design. All requirements for design as stated in NZS 3604 still apply.

5.2 Ground improvement and foundation options

Generally, liquefaction mitigation on medium liquefaction category land can be undertaken either on a house-by-house basis, or as part of area-wide ground improvement, depending on practicalities of subdivision preparation works and the level of resilience required from the development.

Development options which could be selected for medium category land, together with cost estimates for each option, are summarised in Table 5.1 below. Greater detail on costs is included in Section 6.

The descriptions of damage to services in Table 5.1 assume that no additional protection is provided to road networks or buried services. Additional resilience to roads and services could be provided by implementing localised ground improvement as described in Section 6.4.
Table 5.1: Expected performance of development options: away from lateral spreading areas

<table>
<thead>
<tr>
<th>Development option¹</th>
<th>Medium Liquefaction Category, 500-year earthquake shaking²</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Standard NZS 3604 foundation with no ground improvement ($15,000 to $20,000 per lot)</td>
<td>Moderate settlement of dwellings, could be expensive or not possible to repair. Significant damage to roads and public and private services.</td>
</tr>
<tr>
<td>(2) Enhanced foundation with no ground improvement ($30,000 to $40,000 per lot for Medium liquefaction category)</td>
<td>Minor to moderate settlement of dwellings, likely to be readily repairable. Significant damage to road and public and private services.</td>
</tr>
<tr>
<td>(3) Enhanced foundation with ground improvement beneath dwelling footprint only ($65,000 to $85,000 per lot)</td>
<td>Minor settlement of dwellings, likely to be readily repairable. Significant damage to roads and services apart from those adjacent to dwellings.</td>
</tr>
<tr>
<td>(4) Enhanced foundation with area-wide ground improvement ($110,000 to $140,000 per lot)</td>
<td>Minor settlement of dwellings, and minor damage to roads and services, all likely to be readily repairable.</td>
</tr>
</tbody>
</table>

Table Legend:
- Yellow shading: Unlikely to meet Building Code requirements
- White shading: Likely to meet Building Code requirements
- Blue shading: Provides additional community resilience beyond minimum Building Code requirements

¹ Cost of development options are estimated based on a building footprint of 146m² and lot size of 450m²
² No more than minor liquefaction damage expected at 100-year levels of earthquake shaking on medium category land.
5.3 Lateral Spread mitigation options

Table 5.2 below summarises the options available for development of land at risk of lateral spreading. Refer to Figure 3 in Appendix A to see the extent of land at risk of lateral spreading at the site.

Lateral spreading mitigation on a house-by-house basis is generally less effective and leaves a higher risk of disruption to the community in a large earthquake. Therefore consideration could be given to a ‘Perimeter Treatment’.

A perimeter treatment would involve ground improvement of a strip of land parallel to the edge of watercourse. Such ground improvement would need to be deep enough to create a break in the otherwise continuous liquefiable layer (i.e. 3 to 5 m deep stone columns or columns of highly compacted aggregate).

Table 5.2: Expected performance of development options: within lateral spreading areas

<table>
<thead>
<tr>
<th>Development option</th>
<th>Medium Liquefaction Category, 500-year earthquake shaking</th>
</tr>
</thead>
<tbody>
<tr>
<td>No specific mitigation; standard NZS 3604 foundations</td>
<td>Lateral spreading not reduced.</td>
</tr>
<tr>
<td>(see also Option 1 in Table 5.1)</td>
<td>Dwelling distorted due to ground stretching across dwelling footprint (possible collapse risk), which would be expensive or not feasible to repair.</td>
</tr>
<tr>
<td></td>
<td>Underground services stretched or disconnected at junctions.</td>
</tr>
<tr>
<td></td>
<td>Cracks up to 100 mm wide may form in roads and pavements.</td>
</tr>
<tr>
<td>Enhanced foundations with no ground improvement</td>
<td>Lateral spreading not reduced.</td>
</tr>
<tr>
<td>(similar to Option 2 in Table 5.1, but with specialised deformation-tolerant foundation options)</td>
<td>Dwelling foundations resist stretching, reducing building damage and simplifying repair.</td>
</tr>
<tr>
<td></td>
<td>Underground services stretched or disconnected at junctions.</td>
</tr>
<tr>
<td></td>
<td>Cracks up to 100 mm wide in roads and pavements.</td>
</tr>
<tr>
<td>Enhanced foundations with shallow ground improvement</td>
<td>Lateral spreading not reduced.</td>
</tr>
<tr>
<td>(see also Options 3 and 4 in Table 5.1)</td>
<td>Dwelling foundations resist stretching, reducing building damage and simplifying repair.</td>
</tr>
<tr>
<td></td>
<td>Underground services stretched or disconnected at junctions.</td>
</tr>
<tr>
<td></td>
<td>Cracks up to 100 mm wide around edges of improved areas.</td>
</tr>
<tr>
<td>‘Perimeter treatment’ with deep ground improvement (e.g. 10 to 15 m wide, 500 m long zone of 3 to 5 m deep stone columns, between watercourse and new development)</td>
<td>Lateral spreading reduced (but not eliminated).</td>
</tr>
<tr>
<td></td>
<td>Dwelling foundations, underground services, roads, and pavements subject to reduced stretching, but still subject to general liquefaction damage – refer to Table 5.1 for mitigation options.</td>
</tr>
</tbody>
</table>

**Table Legend:**

- **Yellow shading** - Unlikely to meet Building Code requirements
- **White shading** - Likely to meet Building Code requirements
- **Blue shading** - Provides additional community resilience beyond minimum Building Code requirements

---

2 Lateral spreading only expected during large earthquakes (i.e. 500-year levels of shaking). Lateral spreading not expected to occur during 100-year levels of shaking.
5.4 Infrastructure protection options

If area-wide ground improvement is not undertaken (e.g. for options with enhanced foundations or ground improvement under the dwelling footprint only), then buried services and pavements outside the treated areas would be susceptible to liquefaction- and lateral spreading-induced damage.

The resilience of infrastructure networks could be increased by:

- undertaking localised ground improvement along infrastructure corridors, and/or
- using flexible pipes, flexible connections, and pressurised (rather than gravity-driven) networks

Cost estimates for a selection of localised ground improvement options for infrastructure are shown in Table 5.3. These options are expected to reduce the risk of liquefaction-induced sand boils and localised differential settlement, improving the likelihood of infrastructure remaining functional after an earthquake. A targeted approach as outlined in Section 5.3, above, may be considered to manage the effects of lateral spreading. These options are not expected to completely protect infrastructure from liquefaction-and lateral spreading-induced damage. Pavements and buried services constructed using these options on medium and high risk land may still need significant repair or replacement after large earthquakes in order to meet their required levels of service.

Table 5.3: Cost of localised ground improvement around infrastructure

<table>
<thead>
<tr>
<th>Ground improvement option</th>
<th>Cost per metre length[^6]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services placed in 1.5m deep trench backfilled with compacted hardfill containing 5% cement</td>
<td>$60/m</td>
</tr>
<tr>
<td>1.0 m wide (one service)</td>
<td></td>
</tr>
<tr>
<td>1.5-2.0 m wide (two or more services)</td>
<td>$90-$120/m</td>
</tr>
<tr>
<td>Pavement constructed with additional 0.8 m thick improved layer beneath standard basecourse (improved layer comprising either soil-cement mixed ex-situ, or compacted hardfill with 4% cement). In addition, localised areas of backfill with hardfill containing 5% cement may be considered for additional resilience.</td>
<td>$1,000-$1,300/m (assuming 10m wide treatment zone)</td>
</tr>
</tbody>
</table>

[^6]: Costs presented in Table 6.3 are additional to costs associated with typical services/pavements on non-improved land.

TJN 01/23

Rapier Road Site - Geotechnical Investigation and Liquefaction Assessment

Geotechnical Investigation and Liquefaction Assessment

Palmerston North City Council

Page | 307
6 Residential foundation and ground improvement costs

Table 6.1 and Table 6.2 (below) summarise the costs of foundation options and ground improvement methods that could be used on medium or high liquefaction category residential land. The costs presented in Table 6.1 are total costs (i.e., not the additional cost over and above a standard foundation). For comparison, the total cost of standard NZS 3604 type foundations is typically about $15,000 to $20,000 per dwelling.

NOTE: All cost estimates presented in this report are based on limited information, primarily from quantity surveyor estimates and construction trials in Canterbury. These estimates are intended to provide a preliminary order of magnitude indication of costs involved, and to understand the relative costs of different options. These estimates should not be relied upon for other purposes.

Table 6.1: Cost of selected foundation options

<table>
<thead>
<tr>
<th>Foundation Option</th>
<th>Approximate cost estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>per m$^2$</td>
</tr>
<tr>
<td>NZS 3604 type foundation</td>
<td>$100-$140/m$^2$</td>
</tr>
<tr>
<td>Waffle Slab</td>
<td>$180-$220/m$^2$</td>
</tr>
<tr>
<td>Enhanced lightweight platform on timber piles</td>
<td>$225-$275/m$^2$</td>
</tr>
<tr>
<td>Timber piles on concrete slab (relevable foundation)</td>
<td>$275-$315/m$^2$</td>
</tr>
<tr>
<td>Driven timber pile foundations (not compatible with ground improvements in Table 6.2)</td>
<td>Insufficient data for cost summary (where used, cost is dependent on depth to bearing layer).</td>
</tr>
</tbody>
</table>

Table 6.2: Cost of selected ground improvement options

<table>
<thead>
<tr>
<th>Ground Improvement Method</th>
<th>Approximate cost estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>per m$^2$</td>
</tr>
<tr>
<td>1.2 m thick Hardfill Raft</td>
<td>$176-$225/m$^2$</td>
</tr>
<tr>
<td>1.2 m thick Hardfill Raft above or mostly above ground level</td>
<td>$150-$200/m$^2$</td>
</tr>
<tr>
<td>1.2 m thick Soil-Cement Raft</td>
<td>$180-$230/m$^2$</td>
</tr>
<tr>
<td>Stone columns or Columns of highly compacted aggregate</td>
<td>$145-$250/m$^2$</td>
</tr>
</tbody>
</table>

The suitability, performance, and constructability of each of the above options are specific to the conditions encountered at each individual site. Good general information on each option can be found in the technical guidance document for Canterbury published by the Ministry of Business, Innovation, and Employment.$^{12}$

---

$^a$ Assumes a building footprint of 146 m$^2$

$^{10}$ Assumes a building footprint of 146 m$^2$, and includes a width of treatment beyond the building footprint appropriate to each method.

$^{11}$ Assumes a lot size of 450 m$^2$

7 Applicability

This report has been prepared for the exclusive use of our client Palmerston North City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions in this report are based on data from boreholes and CPTs. The nature and continuity of subsoil away from the borehole and CPT locations are inferred, and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Report prepared by: Authorised for Tonkin & Taylor Ltd by:

Christopher Sandoval Mike Jacka
Geotechnical Engineer Senior Geotechnical Engineer

Sections 2, 3, and Appendix B contributed by Stefan Cook (Engineering Geologist)
Appendix A: Figures

- Figure 2 – Site Plan
- Figure 3 – Liquefaction Assessment Results
Appendix B: Site Investigation Summary

B.1 Investigation summary

Site-specific geotechnical investigations were carried out at the project site between the 18th and 28th of July 2016. The investigations comprised:

- Twelve (12) cone penetrometer tests (CPTs): CPT-N-01 to CPT-N-12
- Two (2) machine boreholes: BH-N-01 and BH-N-02
- Groundwater monitoring using seven standpipe piezometers
- Laboratory testing of selected samples recovered from the machine boreholes

The locations of the investigations were surveyed by hand held GPS, and are presented on Figure 2 in Appendix A.

B.2 Cone Penetration Tests

The pushing of twelve (12) Cone Penetrometer Tests (CPTs) was undertaken by Geotech Drilling Ltd between 18 July and 20 July 2016. In all cases, the CPTs were targeting a depth of 12 m, however ‘refusal’ occurred at shallower depths in all locations due to the cone terminating on or within a hard, impenetrable strata such as dense gravel.

The CPT locations are presented on Figure 2, Appendix A. A summary of the CPT locations and termination depths is presented in Table B.1 below.

Table B.1: Cone penetration test (CPT) summary

<table>
<thead>
<tr>
<th>CPT ID</th>
<th>Location (NZTM)</th>
<th>Ground Surface Elevation (GRS80)(^2)</th>
<th>Termination depth (m)</th>
<th>Reason for termination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Easting (m)</td>
<td>Northing (m)</td>
<td>RL (m)</td>
<td></td>
</tr>
<tr>
<td>CPT-N-01</td>
<td>1825623.1</td>
<td>5531470.2</td>
<td>36.5</td>
<td>4.7</td>
</tr>
<tr>
<td>CPT-N-02</td>
<td>1825614.3</td>
<td>5531547.1</td>
<td>35.4</td>
<td>4.1</td>
</tr>
<tr>
<td>CPT-N-03</td>
<td>1825495.6</td>
<td>5531423.0</td>
<td>35.3</td>
<td>3.6</td>
</tr>
<tr>
<td>CPT-N-04</td>
<td>1825269.8</td>
<td>5531457.4</td>
<td>33.7</td>
<td>4.3</td>
</tr>
<tr>
<td>CPT-N-05</td>
<td>1825293.2</td>
<td>5531408.2</td>
<td>36.0</td>
<td>1.2</td>
</tr>
<tr>
<td>CPT-N-06</td>
<td>1825114.1</td>
<td>5531434.1</td>
<td>36.0</td>
<td>4.0</td>
</tr>
<tr>
<td>CPT-N-07</td>
<td>1825134.9</td>
<td>5531321.1</td>
<td>36.2</td>
<td>2.6</td>
</tr>
<tr>
<td>CPT-N-08</td>
<td>1825016.7</td>
<td>5531365.4</td>
<td>35.6</td>
<td>4.1</td>
</tr>
<tr>
<td>CPT-N-09</td>
<td>1825038.6</td>
<td>5531274.7</td>
<td>35.4</td>
<td>2.5</td>
</tr>
<tr>
<td>CPT-N-10</td>
<td>1824860.8</td>
<td>5531366.0</td>
<td>34.3</td>
<td>6.0</td>
</tr>
<tr>
<td>CPT-N-11</td>
<td>1824842.0</td>
<td>5531182.7</td>
<td>35.8</td>
<td>4.8</td>
</tr>
<tr>
<td>CPT-N-12</td>
<td>1825042.3</td>
<td>5531478.0</td>
<td>49.1</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Note 1. Co-ordinates are from hand-held GPS and elevations are based on supplied Lidar data.
B.3 Machine boreholes

The machine boring of two (2) vertical boreholes was undertaken during 25 and 26 July 2016. BH-N-01 was undertaken adjacent to CPT-N-10; BH-N-02 was undertaken adjacent to CPT-N-01. The boreholes were undertaken using a High Frequency Sonic (HFS) drilling rig, supplied and operated by Geotech Drilling Ltd. The boreholes were advanced from ground level with PQ3 tube down to the base of the hole.

In situ Standard Penetration Testing (SPT) was undertaken in BH-N-02 at 1.5 m intervals once gravels were encountered. SPTs were not undertaken in BH-N-01.

All drilling works were completed under the full time supervision of an engineering geologist from T+T. The recovered drill core was photographed and logged to NZGS ‘Field Description of Soil and Rock’ guidelines. The core was transported to Palmerston North City Council for storage.

Summary borehole logs and core photographs are presented in Appendix C. Summary borehole details are presented in Table B.2 below.

Table B.2: Borehole summary

<table>
<thead>
<tr>
<th>BH ID</th>
<th>Location (NZTM)</th>
<th>Ground Surface Elevation (GRS80)¹</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Easting (m)</td>
<td>Northing (m)</td>
<td>RL (m)</td>
</tr>
<tr>
<td>BH-N-01</td>
<td>1824859.5</td>
<td>5531363.0</td>
<td>35.4</td>
</tr>
<tr>
<td>BH-N-02</td>
<td>1825624.3</td>
<td>5531472.8</td>
<td>36.3</td>
</tr>
</tbody>
</table>

Note 1. Co-ordinates are from hand-held GPS and elevations are based on supplied Lidar data.

B.4 Groundwater monitoring

Standpipe piezometers were installed in one of the machine boreholes and six of the CPT holes for groundwater level monitoring. Summary details of the piezometer installations are presented in Table B.3 below. Installation records are attached in Appendix C.

Groundwater levels within the piezometers were recorded using an electronic dip meter. Monitoring of groundwater levels was undertaken in the piezometers detailed above during 26 July 2016 and 28 February 2017. The recorded groundwater levels are presented below in Table B.3.
Table B.3: Standpipe piezometer details and monitoring summary

<table>
<thead>
<tr>
<th>Piezometer ID</th>
<th>RL of ground at piezo (m)</th>
<th>Screen depth (m)</th>
<th>Installation depth (m)</th>
<th>Water level, below ground level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25/07/2016</td>
</tr>
<tr>
<td>CPT-N-02</td>
<td>35.4</td>
<td>2.7</td>
<td>2.7</td>
<td>1.75</td>
</tr>
<tr>
<td>CPT-N-04</td>
<td>33.7</td>
<td>4.3</td>
<td>4.29</td>
<td>Dry</td>
</tr>
<tr>
<td>CPT-N-06</td>
<td>36.0</td>
<td>3.85</td>
<td>3.85</td>
<td>-</td>
</tr>
<tr>
<td>CPT-N-08</td>
<td>35.6</td>
<td>4.1</td>
<td>4.10</td>
<td>4.00</td>
</tr>
<tr>
<td>CPT-N-11</td>
<td>35.8</td>
<td>4.2</td>
<td>4.20</td>
<td>4.00</td>
</tr>
<tr>
<td>CPT-N-12</td>
<td>49.1</td>
<td>3.85</td>
<td>3.85</td>
<td>-</td>
</tr>
<tr>
<td>BH-N-01 (Shallow)</td>
<td>35.4</td>
<td>2</td>
<td>1.00 – 2.00</td>
<td>-</td>
</tr>
<tr>
<td>BH-N-01 (Deep)</td>
<td>35.4</td>
<td>6</td>
<td>5.00 - 6.00</td>
<td>-</td>
</tr>
</tbody>
</table>

B.5 Laboratory Testing

Laboratory testing was undertaken by Geotechnics Ltd on selected samples recovered from the two machine boreholes. Testing included atterberg limits, fines content, and water content tests. Refer to Appendix C for standards used for each test method.

Summary details of the samples and laboratory test results are presented in Table B.4 below.

Table B.4: Laboratory testing summary

<table>
<thead>
<tr>
<th>Borehole No.</th>
<th>Sample Depth (m)</th>
<th>Atterberg Limits</th>
<th>Fines Content 75μm</th>
<th>Fines Content 63μm</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Liquid Limit</td>
<td>Plastic Limit</td>
<td>Plasticity Index</td>
<td></td>
</tr>
<tr>
<td>BH-N-01</td>
<td>2.2</td>
<td>37</td>
<td>19</td>
<td>18</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>3.5</td>
<td>46</td>
<td>25</td>
<td>21</td>
<td>-</td>
</tr>
<tr>
<td>BH-N-02</td>
<td>2.7</td>
<td>31</td>
<td>21</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td>39</td>
<td>31</td>
<td>8</td>
<td>76.0%</td>
</tr>
</tbody>
</table>
296

Appendix C: Machine Borehole logs and CPT Results
Soil and rock descriptions follow the “Guidelines for the field classification and description of soil and rock for engineering purposes” by the New Zealand Geotechnical Society (2005). Refer to this document for methods of field determination.

### Soil description

#### Moisture content

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Dry, looks and feels dry</td>
</tr>
<tr>
<td>M</td>
<td>Moist, no free water on hand when remoulding</td>
</tr>
<tr>
<td>W</td>
<td>Wet, free water on hand when remoulding</td>
</tr>
<tr>
<td>S</td>
<td>Saturated, free water present on sample</td>
</tr>
</tbody>
</table>

#### Consistency/Undrained shear strength

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Consistency</th>
<th>Undrained shear strength (kPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>Very soft</td>
<td>S&lt;sub&gt;v&lt;/sub&gt; &lt; 12</td>
</tr>
<tr>
<td>S</td>
<td>Soft</td>
<td>12 to 25</td>
</tr>
<tr>
<td>F</td>
<td>Firm</td>
<td>25 to 50</td>
</tr>
<tr>
<td>St</td>
<td>Stiff</td>
<td>50 to 100</td>
</tr>
<tr>
<td>VSt</td>
<td>Very stiff</td>
<td>100 to 200</td>
</tr>
<tr>
<td>H</td>
<td>Hard</td>
<td>&gt; 200</td>
</tr>
</tbody>
</table>

#### Density index

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL</td>
<td>Very loose</td>
</tr>
<tr>
<td>L</td>
<td>Loose</td>
</tr>
<tr>
<td>MD</td>
<td>Medium dense</td>
</tr>
<tr>
<td>D</td>
<td>Dense</td>
</tr>
<tr>
<td>VD</td>
<td>Very dense</td>
</tr>
</tbody>
</table>

### Proportional terms definition (Coarse soils)

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Term (lower case)</th>
<th>% of soil mass</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>(UPPER CASE)</td>
<td>Major constituent</td>
<td>GRAVEL</td>
</tr>
<tr>
<td>Subordinate</td>
<td></td>
<td>Sandy</td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>with some...</td>
<td>12 - 20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with minor...</td>
<td>5 - 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with trace...</td>
<td>&lt; 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(or slightly)...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Grain size criteria

#### Type

<table>
<thead>
<tr>
<th>Size range (mm)</th>
<th>Coarse</th>
<th>Medium</th>
<th>Fine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td>200</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>Cobbles</td>
<td>60</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Gravel</td>
<td>2</td>
<td>0.6</td>
<td>0.06</td>
</tr>
<tr>
<td>Sand</td>
<td>0.2</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Silt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clay</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Significant defects

| B  | Bedding |
| J  | Joint   |
| Sc | Schistosity |
| Cl | Cleavage |
| BZ | Broken zone/crushed zone |
| F  | Fault   |
| Fg | Fault with gouge |
| SZ | Shear zone |
| Iz | Infilled seam |
| XD | Extremely weathered seam |
| DD | Drilling – induced defect |

## Weathering

| UW | Unweathered |
| SW | Slightly weathered |
| MW | Moderately weathered |
| HW | Highly weathered |
| CW | Completely weathered |
| RS | Residual soil |

## Defect shape

| ST | Stepped |
| UN | Undulating |
| PL | Planar |

## Roughness of defect surface

| R  | Rough |
| SM | Smooth |
| SL | Slickensided |

## Field strength

<table>
<thead>
<tr>
<th>Type</th>
<th>UCS (MPa)</th>
<th>f_{50,95} (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EW</td>
<td>Extremely weak</td>
<td>&lt;1</td>
</tr>
<tr>
<td>VW</td>
<td>Very weak</td>
<td>1 - 5</td>
</tr>
<tr>
<td>W</td>
<td>Weak</td>
<td>5 - 20</td>
</tr>
<tr>
<td>MS</td>
<td>Moderately strong</td>
<td>20 - 50</td>
</tr>
<tr>
<td>S</td>
<td>Strong</td>
<td>50 - 100</td>
</tr>
<tr>
<td>VS</td>
<td>Very strong</td>
<td>100 - 250</td>
</tr>
<tr>
<td>ES</td>
<td>Extremely strong</td>
<td>&gt; 250</td>
</tr>
</tbody>
</table>

## Defect coding

- **Type**: Angle (perpendicular to core axis)
- **Infilling description (as per soil description)**

## Aperture

<table>
<thead>
<tr>
<th>Type</th>
<th>Aperture (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>Tight</td>
</tr>
<tr>
<td>VN</td>
<td>Very narrow</td>
</tr>
<tr>
<td>N</td>
<td>Narrow</td>
</tr>
<tr>
<td>MN</td>
<td>Moderately narrow</td>
</tr>
<tr>
<td>MW</td>
<td>Moderately wide</td>
</tr>
<tr>
<td>W</td>
<td>Wide</td>
</tr>
<tr>
<td>VW</td>
<td>Very wide</td>
</tr>
</tbody>
</table>

## Spacing

<table>
<thead>
<tr>
<th>Type</th>
<th>Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very wide</td>
<td>&gt; 2 m</td>
</tr>
<tr>
<td>Wide</td>
<td>0.6 – 2 m</td>
</tr>
<tr>
<td>Moderately wide</td>
<td>200 – 600 mm</td>
</tr>
<tr>
<td>Close</td>
<td>60 – 200 mm</td>
</tr>
<tr>
<td>Very close</td>
<td>20 – 60 mm</td>
</tr>
<tr>
<td>Extremely close</td>
<td>&gt; 20 mm</td>
</tr>
</tbody>
</table>

## Excavator penetration

- Easy: 1
- Moderate: 2
- Difficult: 3

RQD: Rock Quality Designation - percentage of core run consisting of sound rock longer than 10 cm.
ITEM 13 - ATTACHMENT 1

BOREHOLE No.: BH-N-01

Hole Location: 243-253 Napier Rd, Serate
CPT No: 16

BOREHOLE LOG

PROJECT: HOKEWHU-NAP-PNCC
LOCATION: Hokewhu + Napier Road
JOB No.: 82442.004

CO-ORDINATES:
NZTM (2000)
6531362.98 mN
1824689.48 mE

R.L.:
35.7m

DATUM:
GRS80 Ellipsoid

DRILL TYPE:
SAMP DRILL

HOLE FINISHED:
25/01/2016

DRILL METHOD:
H F E

LOGGED BY:
SSXC

DRILL FLUID:
NA

CHECKED:
NC P

GEOLOGICAL

Description and
Additional Observations

Fill

Gravelly fine to coarse SAND with trace silt, dark brown. Loosely packed, wet, well graded, non distal. Greywacke gravels are fine to medium unweathered, sub angular to sub rounded.

1.5m: Changes to some silt.

Holocene Alluvial
Deposits

Clayey, SLT, greyish brown with minor orange mottling. Firm, moist, moderate plasticity.

2.0m: Changes to some orange mottling.

2.6m: Changes to brown with some orange mottling.

3.0m: Changes to moderate to high plasticity.

Fine to coarse SAND with trace silt, dark brown.

COMMENTS: No SPT data.
## BOREHOLE LOG

**PROJECT:** HOKOWHITU-NAP-PNCC  
**LOCATION:** Hokowhitu + Napier Road  
**JOB No.:** 80442.004

<table>
<thead>
<tr>
<th>CO-ORDINATES:</th>
<th>DRILL TYPE:</th>
<th>HOLE STARTED:</th>
<th>DRILL METHOD:</th>
<th>HOLE FINISHED:</th>
<th>DRILLED BY:</th>
<th>LOGGED BY:</th>
<th>CHECKED:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZTM 2000</td>
<td>SAMP DRILL</td>
<td>25/07/2016</td>
<td>HFS</td>
<td>25/01/2016</td>
<td>Geotech Drilling Ltd</td>
<td>SSXC</td>
<td>NC P</td>
</tr>
<tr>
<td>R.L.: 35.7m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DATUM: GRS80 Ellipsoid</td>
<td>DRILL FLUID:</td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### GEOLOGICAL

#### Ho-loene Alluvial Deposits

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description and Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loosely packed, moist, well graded, non distant.</td>
</tr>
<tr>
<td>3.4m</td>
<td>Changes to minor silt.</td>
</tr>
</tbody>
</table>

Sandy, silty fine to coarse GRAVEL with minor cobbles; grey, Tightly packed, wet, well graded, slow dilatancy. Greywacke gravels are unweathered, sub angular to sub rounded.

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description and Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1m</td>
<td>Changes to greyish brown with orange slickens specs.</td>
</tr>
</tbody>
</table>

Silty fine to medium GRAVEL with some sand and minor cobbles; orange brown. Tightly packed, wet, well graded. Greywacke gravels are unweathered, sub angular to sub rounded. Matrix is moderate plasticity.

### COMMENTS:

No SPT data.
ITEM 13 - ATTACHMENT 1

BOREHOLE No.: BH-N-01
Hole Location: 243-253 Napier Rd, Silverdale
CPT No. 10
Sheet: 3 of 3

PALMERSTON NORTH CITY COUNCIL

BOREHOLE LOG

PROJECT: HOKOWHITU-NAP-PNCC
LOCATION: Hokowhitu + Napier Road
JOB No.: 80442.004

CO-ORDINATES:
NZTM 2000
6551362.98 mN
1824868.48 mE
R.L.: 35.7m
DATUM: GRS80 Ellipsoid

DRILL TYPE: SAMP DRILL
DRILL METHOD: HFE
DRILL FLUID: NA

HOLES STARTED: 25/07/2016
HOLES FINISHED: 25/01/2016
DRILLED BY: Geotech Drilling Ltd
LOGGED BY: SSXC
CHECKED: NC P

GEOLOGICAL

ENGINEERING DESCRIPTION

Description and
Additional Observations

[CONT] Silty fine to medium GRAVEL with some sand
and minor cobble; orange brown. Tightly packed, wet,
well graded. Greywacke gravels are unweathered, sub
angular to sub rounded. Matrix is moderate plasticity.

Sandy silt or fine to coarse GRAVEL with minor cobble;
grey. Tightly packed, wet, well graded, slight dilatancy.
Greywacke gravels are unweathered, sub angular to
sub rounded.

12m: END OF BOREHOLE

12m: Target depth reached due to competent gravel >3m thick.

No water table measured whilst drilling.

Note for water level measurements:
1) Shallow screen interval between 1.8m to 2m
depth.
2) Deep screen interval between 5m to 7m.

Flash test requires 5min heat to open.

NB1: Standpipe pressure sensor also installed in CPT N-11 (shut-off 4.03m below ground level on 26-27 June 2016).
NB2: Refer to CPT N-10, located 2m towards the east, for
tension-stiffness classification.

COMMENTS: No SPT data.

Sheet Scale: 1:20
Notes Scale: 1:20
ITEM 13 - ATTACHMENT 1

BOREHOLE LOG

PROJECT: HOKOWHITU-NAP-PNCC
LOCATION: Hokitika + Napier Road
JOB No.: 20442.004

CO-ORDINATES: 653147.79 mN 1629624.57 mE
R.L.: 35.56m
DATUM: GRS80 Ellipsoid

DRILL TYPE: SAMP DRILL
DRILL METHOD: H F E
DRILL FLUID: NA

BOREHOLE No.: BH-N-02
HOLE Location: 1 Roberts Lane Rd, Beridea, CPT No: 16
HOLE STARTED: 26/07/2016
HOLE FINISHED: 26/01/2016
DRILLED BY: Geotech Drilling Ltd
LOGGED BY: SSXC CHECKED: DTG

GEOLOGICAL DESCRIPTION

**Fill**
- Sandy fine to coarse GRAVEL with some sand, minor silt, trace rootlets and pisolites: brown. Loosely packed, saturated, well graded. Greywacke gravels are unweathered, sub angular to sub rounded.

- SILT with minor sand and trace rootlets: greyish brown with minor orange mottling. Firm, moist, moderate plasticity, non dilatant.
  - 0.7m: Changes to some orange mottling.

- 1.5m: Changes to saturated.

- 1.7m: Changes to moderate to high plasticity.

**Holocene Alluvial Deposits**
- Fine to medium SAND with minor silt and trace rootlets: grey. Loosely packed, wet to saturated, slow dilatancy.
  - 3.5 - 4.0m: Changes to some silt, low plasticity.

- 4.5m: Changes to saturated, rapid dilatancy.

**Alluvial Deposits**
- Sandy fine to coarse GRAVEL with trace silt, grey.
BOREHOLE LOG

PROJECT: HOKOWHITU-NAP-PNCC
LOCATION: Hokowhitu + Napier Road
JOB No.: 80442.004

CO-ORDINATES:
6531472.79 mN
1625654.27 mE
R.L.: 35.56 m
DATUM: GRS80 Ellipsoid

DRILL TYPE: SAMP DRILL
DRILL METHOD: HF E
DRILL FLUID: NA

BOREHOLE No.: BH-N-02
HOLE Location: 1 Roberts Lane Rd Serendie CPT No. 91
HOLE STARTED: 26/07/2016
HOLE FINISHED: 26/01/2016
DRILLED BY: Geotech Drilling Ltd
LOGGED BY: S5XC CHECKED: NC P

GEOLOGICAL

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description and Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>Impravia, firm, non plastic, greybrown.</td>
</tr>
<tr>
<td>1-3</td>
<td>Medium dense, saturated, well graded, sub angular to sub rounded.</td>
</tr>
<tr>
<td>3-8</td>
<td>Medium to coarse GRAVEL, with minor cobble and trace sand, brownish orange. Dense, saturated, well graded, non plastic. Greywacke gravels are unweathered to slightly weathered, sub angular to sub rounded.</td>
</tr>
<tr>
<td>8-10</td>
<td>Sandy fine to coarse GRAVEL, with minor silt, greybrown. Dense, saturated, well graded. Greywacke gravels are unweathered to slightly weathered, sub angular to sub rounded.</td>
</tr>
<tr>
<td>10-99</td>
<td>9.9 - 10 m: Bed of cobbles, unweathered, sub angular to sub rounded.</td>
</tr>
</tbody>
</table>

COMMENTS:
ITEM 13 - ATTACHMENT 1

BOREHOLE LOG

**PROJECT:** HOKOWHITU-NAP-PNCC  
**LOCATION:** Hokowhitu + Napier Road  
**JOB No.:** 02442.004

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>CO-ORDINATES</th>
<th>R.L.</th>
<th>DRILL TYPE</th>
<th>DRILL METHOD</th>
<th>HOLE STARTED</th>
<th>HOLE FINISHED</th>
<th>DRILLED BY</th>
<th>LOGGED BY</th>
<th>CHECKED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NZTM 2010</td>
<td>36.56m</td>
<td>SAMP DRILL</td>
<td>H F E</td>
<td>26/07/2016</td>
<td>26/01/2016</td>
<td>Geotech Drilling Ltd</td>
<td>SSXC</td>
<td>NC P</td>
</tr>
</tbody>
</table>

**GEOLOGICAL**

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>DESCRIPTION</th>
<th>DENSIFICATION</th>
<th>LOAD</th>
<th>PREDICTED PLASTICITY</th>
<th>SPT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>Alluvial Deposits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.00</td>
<td>Silty fine to medium GRAVEL with some sand, brown. Dense, wet to saturated, well graded. Greywacke gravels are unweathered, sub angular to sub rounded. Sands are medium to coarse. Matrix is low plasticity.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.9</td>
<td>15.0m: Changes to very dense.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.9</td>
<td>13.5m: Gravels are slightly weathered.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.5</td>
<td>13.0m: Bed of cobbles.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td>13.0m: Changes to saturated. Matrix changes to moderate plasticity, slow deflection.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td>15m: END OF BOREHOLE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td>15m: Target depth reached.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:**

- NB1: No stand pipe installed. Refer to CPT N-63-02 peace for water table readings.
- NB2: Refer to CPT N-61-01, located 1m towards the west, for strength/enhancement classifications from 5.0m to 4.7m.
Drill Hole BH N 01

305
306

Drill Hole BH N 01
Drill Hole BH N 01
308

Drill Hole BH N 02

BH-N-02 (1)

BH-N-02 (2)

Tonkin + Taylor
309

Drill Hole BH N 02
Drill Hole BH N 02
Description: STAND PIPE INSTALLMENTS INTO CPT HOLES

Refusal depth of CPT. Refer to Table 3.4 for installation depths.

0.5m Bentonite

1m Slotted pipe

Flush toby

Tonkin+Taylor
Appendix D: Liquefaction Assessment Methodology and Results

Ground shaking hazard

The shaking hazard in terms of magnitude (M) and peak ground acceleration (PGA) for the site has been assessed based on the NZTA Bridge Manual (SP/M/022) Third edition, Amendment 2 (May 2016 (NZTABM). Table D1 presents the return periods for earthquakes with various ‘unweighted’ peak ground accelerations (PGA) with a corresponding earthquake magnitude.

<table>
<thead>
<tr>
<th>Return Period</th>
<th>100 years</th>
<th>500 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake Magnitude, M</td>
<td>6.1</td>
<td>6.9</td>
</tr>
<tr>
<td>Peak Ground Acceleration (PGA)</td>
<td>0.17 g</td>
<td>0.34 g</td>
</tr>
</tbody>
</table>

Liquefaction susceptibility

Liquefaction only occurs in some soils. Liquefaction susceptible soils are typically saturated, non-cohesive, and low to moderate permeability. Sands and low plasticity and non-plastic silts are most susceptible to liquefaction\(^{12}\). At the Napier road site, most of the shallow sands and silts encountered at the investigation locations fit this description, and the saturated portions of these soils are assumed to be non-susceptible to liquefaction.

Liquefaction trigger

Soils which are susceptible to liquefaction require a certain level of earthquake shaking (‘trigger’) to cause them to liquefy. Denser soils require more intense and/or longer duration of shaking (higher trigger) than less dense soil.

For each CPT, the trigger for each soil layer identified as being susceptible to liquefaction has been assessed by the method proposed by Boulanger and Idriss (2014)\(^{13}\). This method is based on an empirical relationship with the CPT tip resistance “qc” and fines content.

The trigger magnitude and PGA was then compared with the site’s assessed ground shaking hazard for each of the earthquake scenarios included in Table D1.

---


\(^{13}\) Boulanger, R.W and Idriss, I.M., 2014. CPT and SPT based liquefaction triggering procedures.” Report No. UCD/CGM-14/01, Center for Geotechnical Modeling, Department of Civil and Environmental Engineering, University of California, Davis, CA, 134 pp.
Liquefaction vulnerability

The vulnerability of the site to liquefaction has been assessed by applying the techniques in Table D2 below to the results of the susceptibility and trigger analyses.

Table D2: Liquefaction vulnerability assessment techniques

<table>
<thead>
<tr>
<th>Method</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crust Thickness (m) (1)</td>
<td>Crust thickness is the depth below the ground surface to liquefied soils. Observations from Christchurch and other earthquakes generally indicate that the greater the crust thickness, the less damage is reflected at the ground surface. Sand boils and damaging differential settlement are common for sites with a crust thickness less than 2.0 m, and rare for sites with a crust thickness greater than 3.5 m.</td>
</tr>
<tr>
<td>Calculated Free Field Settlements (mm) (2)</td>
<td>Free-field settlement is simple to analyse and interpret, and can be used as an indicator of liquefaction vulnerability. However, it does not always capture all of the important aspects of land performance. In Christchurch, land for residential subdivision is delineated into technical categories (TC1 to TC3) depending on calculated free field settlement.</td>
</tr>
<tr>
<td>Liquefaction Severity Number (LSN) (3)</td>
<td>LSN is a parameter calculated on the basis of investigation data, and considers the potential for liquefaction and the depth at which liquefaction occurs. I.e. a site with a shallow liquefiable layer is more vulnerable than a site with a deep liquefiable layer. This parameter has been correlated with evidence of surface ground damage in Christchurch. The calculated LSN values generally indicate the following:</td>
</tr>
<tr>
<td>LSN Range</td>
<td>Predominant performance</td>
</tr>
<tr>
<td>0-10</td>
<td>Little to no expression of liquefaction, minor effects.</td>
</tr>
<tr>
<td>10-20</td>
<td>Minor expression of liquefaction, some sand boils.</td>
</tr>
<tr>
<td>20-30</td>
<td>Moderate expression of liquefaction, sand boils and minor damage to ground surface; minor differential settlement of structures</td>
</tr>
<tr>
<td>30-40</td>
<td>Moderate to major expression of liquefaction, with undulations of the ground surface; moderate differential settlement of structures</td>
</tr>
<tr>
<td>40+</td>
<td>Extensive expression of liquefaction, major damage to ground surface, severe total and differential settlement of structures.</td>
</tr>
</tbody>
</table>

(2) Ministry of Business, Innovation & Employment Guidance - Repairing and rebuilding houses affected by the Canterbury earthquakes, Version 3 (December 2012)
### Results Summary

#### Table D3: Summary of the pre-improvement liquefaction assessment results

<table>
<thead>
<tr>
<th>Analysis Purpose and Method</th>
<th>Investigation Location</th>
<th>1/100 year Seismic Event (M=6.1, PGA=0.17g)</th>
<th>1/500 year Seismic Event (M=6.9, PGA=0.34g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settlement</td>
<td>CPT-N-1</td>
<td>15mm</td>
<td>42mm</td>
</tr>
<tr>
<td>(Zhang 2001(^{15}) and Ishihara, 1992(^{16}))</td>
<td>CPT-N-2</td>
<td>10mm</td>
<td>19mm</td>
</tr>
<tr>
<td></td>
<td>CPT-N-3</td>
<td>36mm</td>
<td>41mm</td>
</tr>
<tr>
<td></td>
<td>CPT-N-4</td>
<td>6mm</td>
<td>15mm</td>
</tr>
<tr>
<td></td>
<td>CPT-N-5</td>
<td>0mm</td>
<td>0mm</td>
</tr>
<tr>
<td></td>
<td>CPT-N-6</td>
<td>15mm</td>
<td>27mm</td>
</tr>
<tr>
<td></td>
<td>CPT-N-7</td>
<td>8mm</td>
<td>29mm</td>
</tr>
<tr>
<td></td>
<td>CPT-N-8</td>
<td>12mm</td>
<td>34mm</td>
</tr>
<tr>
<td></td>
<td>CPT-N-9</td>
<td>19mm</td>
<td>19mm</td>
</tr>
<tr>
<td></td>
<td>CPT-N-10</td>
<td>7mm</td>
<td>17mm</td>
</tr>
<tr>
<td></td>
<td>CPT-N-11</td>
<td>19mm</td>
<td>30mm</td>
</tr>
<tr>
<td>Liquefaction Severity Number (T&amp;T, 2013)(^{1})</td>
<td>CPT-N-1</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>CPT-N-2</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>CPT-N-3</td>
<td>21</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>CPT-N-4</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>CPT-N-5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>CPT-N-6</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>CPT-N-7</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>CPT-N-8</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>CPT-N-9</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>CPT-N-10</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>CPT-N-11</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Crust Thickness (T&amp;T, 2013)(^{1})</td>
<td>CPT-N-1</td>
<td>3.2m</td>
<td>1.6m</td>
</tr>
<tr>
<td></td>
<td>CPT-N-2</td>
<td>3.0m</td>
<td>1.1m</td>
</tr>
<tr>
<td></td>
<td>CPT-N-3</td>
<td>0.7m</td>
<td>0.6m</td>
</tr>
<tr>
<td></td>
<td>CPT-N-4</td>
<td>2.4m</td>
<td>2.4m</td>
</tr>
<tr>
<td></td>
<td>CPT-N-5</td>
<td>1.2m</td>
<td>1.2m</td>
</tr>
<tr>
<td></td>
<td>CPT-N-6</td>
<td>1.4m</td>
<td>1.4m</td>
</tr>
<tr>
<td></td>
<td>CPT-N-7</td>
<td>2.6m</td>
<td>1.3m</td>
</tr>
<tr>
<td></td>
<td>CPT-N-8</td>
<td>2.0m</td>
<td>0.9m</td>
</tr>
<tr>
<td></td>
<td>CPT-N-9</td>
<td>1.4m</td>
<td>1.4m</td>
</tr>
<tr>
<td></td>
<td>CPT-N-10</td>
<td>3.2m</td>
<td>2.1m</td>
</tr>
<tr>
<td></td>
<td>CPT-N-11</td>
<td>3.4m</td>
<td>1.0m</td>
</tr>
</tbody>
</table>

Note 1: Refer to Table D2 for details of the seismic land performance which is expected to correlate with the calculated LSN and crust thickness.

---


Appendix 6 – Noise Report
PROPOSED PLAN CHANGE B

NAPIER ROAD RESIDENTIAL REZONING

For

PALMERSTON NORTH CITY COUNCIL

N1447PPCB – Final V1
19th July 2019

ACOUSA FE CONSULTING & ENGINEERING LTD

Nigel Lloyd
Director of Acoustic Services

Mobile: 0274 480 262
E-mail: nigel@acousafe.co.nz
331

1. Introduction ............................................................................................................. 1
2. The Proposed Plan Change .................................................................................. 1
3. District Plan – Noise Rules .................................................................................. 2
4. Other Zone Interfaces .......................................................................................... 3
5. Reverse Sensitivity ............................................................................................... 3
6. Roading .................................................................................................................. 4
7. Rail ......................................................................................................................... 5
8. Conclusions ........................................................................................................... 5
1. Introduction

Proposed Plan Change B (PPC B) seeks to rezone land at Napier Road for Residential development. The land is currently zoned Rural.

The Council has asked that Acousafe considers noise implications of the proposed plan change and in particular to advise on the following:

- What noise rules would apply.
- What are the implications of traffic noise if Napier Road is to:
  - Remain as State Highway
  - Become a local road

Nigel Lloyd toured the site and surroundings with Council officers on 5 March 2018.

2. The Proposed Plan Change

The proposal is to rezone land to the north of Napier Road and between (and including) the BUPA Retirement Village and up to Roberts Line. The northern boundary will be with the residential zone at the top of the river terrace (Royal Oak Drive and Rosebank Avenue).

![Napier Road Potential Rezoning](image)

Figure 1. Extent of the Proposed Napier Road Residential Zone.
The new Residential Zone boundary north of the BUPA retirement village and the MacPherson land bounds with the railway line and industrial land to the north.

The rezoned land is mostly the Leafland Tree Nursery at its eastern end but there is also another tree services business and a garden centre along with existing rural residential development and the retirement village.

3. District Plan – Noise Rules

The site is currently zoned Rural for which the noise rules are found in 9.11.1 as follows:

Sound emissions from any activity in the Rural Zone … when measured at or within the boundary of any land in the Rural Zone (other than land from which the noise is emitted or a road) shall not exceed the following:

<table>
<thead>
<tr>
<th>Time</th>
<th>Noise Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.00 am to 7.00 pm</td>
<td>50 dB LAeq (15 mins)</td>
</tr>
<tr>
<td>7.00 pm to 10.00 pm</td>
<td>45 dB LAeq (15 mins)</td>
</tr>
<tr>
<td>10.00 pm to 7.00 am</td>
<td>40 dB LAeq (15 mins)</td>
</tr>
<tr>
<td>Night-time Lmax</td>
<td>70 dBA Lmax</td>
</tr>
</tbody>
</table>

For as long as the existing (rural) activities continue then they would enjoy existing use rights and be able to operate in a manner that contravenes the noise rules in the district plan if both:

- the use was lawfully established before the rule became operative or the proposed plan was notified,
- the effects of the use are the same or similar in character, intensity and scale.

The case law on existing use rights is extensive and it should be referred to in some detail in deciding whether existing use rights apply. In any event, from an aural perspective, we consider that it is likely that the existing rural activities will not be incompatible with new dwellings that might establish nearby.

There are, inevitably, some complexities when transitioning between zones. The need is to ultimately provide for protection of residential amenity on sites within the zone and the only reasonable way of achieving that outcome is to establish the Residential Zone noise limits immediately.

The noise rules for the Residential Zone were reviewed as part of PC20 and are set out in R10.9.6.1 as follows:

Sound emissions from any fixed mechanical plant, or from any non-residential activity, and from all mechanical plant, such as heating and ventilating plant and generators of a residential activity, when measured at or within the boundary of any other site (other than land from which the noise is emitted or a road) shall not exceed the following:

---

7.00 am to 10.00 pm 45 dB $L_{Aeq(15mins)}$
10:00 pm to 7:00 am 40 dB $L_{Aeq(15mins)}$
Night-time $L_{max}$ 10:00 pm to 7:00 am 65 dBA $L_{max}$

The noise limits in the Residential Zone have been updated as part of Plan Change 20 in accordance with the latest version of NZS 6802:2008 Acoustics - Environmental Noise including changing to $L_{Aeq}$ rather than the $L_{10}$ standard in the Operative Plan.

Methods for monitoring and assessing noise are set out in Section 6.2 of the District Plan.

We consider that the noise limits and the activity statuses that are generally applied throughout the Residential Zone can be applied to Napier Road once it becomes rezoned to Residential as part of PPC B.

4. Other Zone Interfaces

The Residential Zone also borders many other Zones in the District. For this particular tract of land there will be a number of new zone boundary interfaces (Rural (across Napier Road), Residential, and Industrial) and it is not proposed to provide for protection at these interfaces i.e. from the Residential Zone to Industrial Zone, given the lesser need for noise protection outside of the Residential Zone.

5. Reverse Sensitivity

There is a need to establish compatible land use planning controls to appropriately protect the health and wellbeing of people living near to noise generators and to protect those generators against reverse sensitivity issues associated with people and communities coming to the noise and then complaining.

The rezoning of the land in the northwest corner will bring a new interface to industrial transport depots on Mahaere Drive (and Makomako Road). It is recommended that the Residential Zone noise limits not apply at the top of the escarpment.

Council has considered making residential development a discretionary activity for dwellings at the top of the terrace but have decided that this is unnecessary because the permitted standards would likely rule out any development as of right, and that any proposal to develop at the top of the terrace would require a consent.

Council does not consider that the rezoning to residential necessarily determines that the upper terrace is suitable for housing. In fact, the permitted performance standards send a strong signal that it is not. This is a similar to other parts of the city, such as Aokautere, where gullies have been zoned residential but have not been able to be developed.

Exempting industrial activities from needing to comply with the residential noise standards at the upper terrace provides a buffer to those activities and reduces the reverse sensitivity impact. The bottom of the escarpment is where residential development has/will occur and where the noise limits should apply.

The proposal is to rezone the balance of the BUPA Retirement Village from Industrial to Residential. This also has reverse sensitivity implications for the nearby Industrial
Zoned activities to the west. However, this is a reasonable approach given that consent has been granted to the Retirement Village (which has now been constructed). The industrial land is separate from the BUPA land by the width of a drain and this provides some buffering.

The industrial activities can rely on existing use rights while these apply.

6. Roading

The flat PPC B land is sandwiched between the river terrace and SH3. The NZTA recommended buffer area width\(^2\) for SH3 with speed limits of 100 km/hr is 40 metres (>3,750 AADT).

Rule 10.7.1.5(e)(i) requires that:

Any building (other than accessory buildings) containing a noise sensitive activity constructed within 80 metres of the nearest carriageway edge of State Highway 3 shall be designed, constructed and maintained in accordance with a design report prepared by a suitably qualified and experienced acoustical engineer stating that the design as proposed will achieve compliance with an internal noise level of 40dB \(LA_{eq}(24hr)\) in habitable rooms. Provided that no such building is to be located within 40 metres of the nearest carriageway edge of State Highway 3.

This recommended 40 metre buffer area would occupy the lion’s share of the available land.

Council has been in contact with NZTA\(^3\) explaining the need for new households in the City and discussing the strategic work completed over the last decade on the Joint Transport Study and other studies which all signal that it is unlikely that the affected portions of SH3 will remain State highway in the medium term. The most likely scenario is that SH3 will be urbanised with lower speed limits.

NZTA released a consultation document late in 2018 which proposed upgrades to Napier Road, out to Stoney Creek Road. NZTA’s intention is to urbanise the route and reducing the speed limit to 60km. A decision on the proposal is imminent (at the time of writing this report).

A Council officer (Mr Duindam) recently met with NZTA as part of clause 3 consultation. They indicated support, noting that, in the long-term, Napier Road will become urbanised.

---


\(^3\) Letter from David Murphy to Ross l’Anson dated 9 April 2018
336

There is nothing in the District Plan that controls development in relation to local roads. Work undertaken by Matthew Evis of Opus estimates that traffic count between Sutton Place and Roberts Line was approximately 12,300 vpd in 2016 with 2.8% heavy vehicles. This could possibly increase to (slightly less than) 15,000 vehicles per day by 2028. Even should the speed limit decrease to 60 km/hr as a local road, then it would be sensible to provide a set-back to mitigate the traffic noise. A draft structure plan I have seen uses a 20 metre set-back from Napier Road. This set-back includes a local access road. I consider that this is a sensible approach to take.

The BUPA retirement village was developed with no buffer from Napier Road (with the consent of NZTA) and this would continue for this part of the new zone.

7. Rail

There is a small portion of land that is next to the Palmerston North to Gisborne railway line. This scenario of new residential development near to the railway line was considered for Whakarongo Urban Growth Area.

The District Plan has a policy (Policy 7A3.2.6) for managing (road) and rail noise and District Plan Rule 10.6.1.5(e)(ii) states:

Any building (other than an accessory building) containing a noise sensitive activity constructed within 70 metres of the nearest edge of the railway corridor track shall be designed, constructed and maintained in accordance with a design report prepared by a suitably qualified and experienced acoustical engineer stating that the design as proposed will achieve compliance with an internal noise level of 40dB $L_{A_{eq}}(1h)$ in living rooms and 35dB $L_{A_{eq}}(1h)$ in bedrooms. Provided that no such building is to be located within 25 metres of the nearest edge of the Palmerston North – Gisborne railway track.

If land that is within 70 metres of the railway is to be rezoned to residential then it is recommended that this rule be cross referenced.

There is no similar rule for Royal Oak Drive where dwellings are constructed within metres of the railway line.

8. Conclusions

The Council seeks to rezone land on the northern side of Napier Road from Rural to Residential. It is recommended that the noise provisions of the Residential Zone be referenced (with the exception described below for the north of the BUPA/MacPherson land). This provides for the establishment of residential activity and protection of residential amenity during the transition stage.

The rezoned land includes the BUPA retirement village which is fully consented and substantially constructed. It is appropriate to rezone the BUPA village land to Residential even though this may have reverse sensitivity issues for the adjacent industrial land. The industrial activities will need to rely on existing use rights until they increase their character, intensity or scale, at which time the new noise limits will apply. It is recommended that the residential noise limits not apply for the upper terrace north of the BUPA/MacPherson land. This reduces the reverse sensitivity
impacts on the industrial land and applies the limits below the escarpment where the residential amenity protection is required. The permitted standards actively discourage residential development at the top of the terrace where residential amenity will be adversely impacted by industrial noise and the railway.

Napier Road is currently State Highway 3 and the application of the planning controls that NZTA recommend for a State highway would be difficult to accommodate within the rezoned area of land because of the topographical limitations. Consultation with NZTA indicates that this part of Napier Road will become urbanised with lower speed limits. Should that occur then a 20 metres set-back for development would be appropriate (as shown in draft structure plans) with that area accommodating an access road.

Rezoning land adjacent to the railway to residential has reverse sensitivity implications for KiwiRail. The Whakarongo Urban Growth Area section of the District Plan contains land use management rules for railway noise that should be cross referenced here. For the reasons discussed above, because the railway is on the upper terrace then any nearby residential development would require resource consent.
Appendix 7 – Land Contamination Report
Napier Road Re-zoning, Palmerston North

Preliminary Site Investigation Report
Palmerston North City Council
Contact Details

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Approved for Release by:
Rob Bond | Wýrk Group Manager – Geotechnical and Environmental
Report Checklist

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**Key:**
- **PSI** - preliminary site investigation report
- **SIR** - detailed site investigation report
- **RAP** - site remedial action plan
- **SVR** - site validation report
- **MMP** - ongoing monitoring and management plan
- **A** - Readily available information should be included
- **S** - A summary of this section’s details will be adequate if detailed information has been included in an available referenced report
- **N** - Include only if no further site investigation is to be undertaken
- **X** - Not applicable and can be omitted.

(MIE. Contaminated Land management guidelines No. 1. 2011a)
Contents

Executive Summary ................................................................. 5

1  Introduction ............................................................................. 6
   1.1  Background ................................................................. 6
   1.2  Objective ...................................................................... 7
   1.3  Scope of Work ............................................................ 7

2  Site Identification ............................................................... 9

3  Site Description .................................................................. 12
   3.1  Site History ................................................................. 12
   3.2  Council Records .......................................................... 18
   3.3  Certificates of Title ...................................................... 18
   3.4  Geology ................................................................. 18
   3.5  Hydrology and Hydrogeology ....................................... 20

4  Review of EAM Environmental Consultants DSI Report – 291 Napier Road ... 21

5  Walkover Survey ................................................................ 24
   5.1  Site Condition and Surrounding Environment ............... 24
   5.2  Fieldland Nursery Site Inspection Notes ......................... 24
   5.3  257 and 261 Napier Road Site Inspection Notes .............. 32

6  Development Proposals ...................................................... 41

7  Conceptual Site Model ....................................................... 41
   7.1  Potential Sources of Contamination ............................. 41
   7.2  Potential Pathways ....................................................... 41
   7.3  Potential Receptors ...................................................... 41

8  Statutory Provisions ........................................................... 45
   8.1  National Environmental Standard .................................. 45

9  Preliminary Sampling and Analysis Programme .................... 47
   9.2  Field Quality Assurance and Quality Control (QA/QC) .... 47
   9.3  Laboratory QA/QC ....................................................... 47
   9.4  QA/QC Data Evaluation .............................................. 48

10 Basis for Guideline Values ............................................... 49
    10.1  Waste Disposal of Soils ............................................ 50

11 Summary of Analytical Results .......................................... 52
    11.1  Soils Assessment (Human health effects) ...................... 52
    11.2  Waste Disposal of Soils ............................................ 56

12 Site Characterisation ......................................................... 57

13 Conclusions and Recommendations .................................. 58
    13.2  Safety in Design ...................................................... 58
ITEM 13 - ATTACHMENT 1

PSI REPORT | NAPIER ROAD RE-ZONING AREA, PALMERSTON NORTH

344

13.3 Recommendations ........................................................................................................... 59
14 Applicability and Limitations ........................................................................................... 60

List of Figures
Figure 1: Proposed re-zoning area plan .................................................................................... 6
Figure 2: Quickmap extract for site and surrounds ................................................................. 7
Figure 3: Site Location Plan .................................................................................................... 10
Figure 4: GNS Geological Extract ........................................................................................... 19
Figure 5: Extract from GNS Active Faults Database ............................................................... 19
Figure 6: Site Boundary Plan .................................................................................................. 21
Figure 7: Conceptual Site Model (Leafland on eastern side of site) .......................................... 43
Figure 8: Conceptual Site Model (257 - 261 Napier Road on western side of site) ................... 44
Figure 8: NES flow chart ........................................................................................................ 46

List of Tables
Table 1: Site Identification ..................................................................................................... 9
Table 2: Site History, (approximate site location is outlined in red) ........................................ 12
Table 3: Summary of hydrological and hydrogeological data .................................................. 20
Table 4: QA/QC Data Evaluation ............................................................................................ 48
Table 5: Land Use Scenario .................................................................................................... 49
Table 6: NES Soil Contaminants Standards for health (SCS(health)) for organic compounds .................................................................................................................. 50
Table 7: Extract of Appendix A of the Hazardous Waste Guidelines - Landfill Waste Acceptance Criteria for Class A and B Landfills (Refer to full document for footnotes) .................................................................................................................. 51
Table 9: Summary of Pesticides Detected .................................................................................. 52
Table 10: Summary of Analytical results (Part 1) ..................................................................... 54
Table 11: Summary of Analytical results (Part 2) ..................................................................... 55

Appendices
A Site Layout Plan
B Historical Information and Site Searches
C EAM DSI 291 Napier Road, Palmerston North
D Sample Location Plan & Site Records
E Site Photographs
F Hill Laboratories CoC & Results
Executive Summary

A Preliminary Site Investigation (PSI) has been undertaken on behalf of Palmerston North City Council (PNCC) for six parcels of land located along Napier Road, Palmerston North. This PSI report has been prepared in order to assess the potential for ground contamination across the site. It is understood that parts of the site have historically been used as a garden centre and market garden. As such the site is designated as having undergone activities on the Hazardous Activities and Industries List (HAIL) as part of the National Environmental Standards (NES).

On the basis of a review of information currently available, as well as observations made during the site inspection, and through the compilation of a conceptual site model and chemical analysis of soil samples, our assessment of the site is as follows:

- A previous Detailed Site Investigation report for the area within the centre of the rezoning site indicates that this area is considered highly unlikely to pose adverse effects to human health from investigated contaminants of concern.
- It is understood that the site is to undergo re-zoning for a more sensitive residential end use;
- The underlying geology comprises alluvial deposits; and
- No obvious signs of vegetation dieback were noted in any location across the site.

Leafland site (Eastern section)

- The eastern side of the site is utilised by a market garden where plants are grown within pots for resale;
- Results of chemical analytical testing on the eastern (Leafland) part of the site indicate that contaminants of concern are below their relevant SCS/health values or relevant pesticide SGV.

257 Napier Rd and McPherson Garden Centre (Western section)

- The western side is occupied by a garden centre and residential dwelling;
- Anecdotal evidence indicated that a gasworks site was located adjacent to the western boundary of this part of the site which had undergone remediation.
- No remediation report for the gasworks was available at the time of writing;
- PAHs were encountered within a sample of soil and coke taken on the western side of the site. These were below BaP PEF values for a residential end use.

Taking into consideration the nature and composition of the soil on the eastern side of the site, it is considered that the risk to human health associated with potential soil contamination derived from the Leafland (eastern) site is LOW.

On the basis of the limited information available from the western side of the site it is that PAHs may be present within fill materials encountered here. However these materials are likely to be confined to areas where roadways have been constructed. The risk to human health from PAH is LOW based on the results of limited sampling and analysis of this area of the site.

Based on the results of this investigation, WSP Opus recommends that:

- The eastern part of the site is suitable for a residential land use as part of the rezoning of the area as soil contamination does not exceed the relevant stated applicable standards;
- On the basis of the screening sample taken from the western side of the site, the risk to human health is considered to be low and the site is suitable for a residential land use as part of the rezoning of the area as soil contamination does not exceed the relevant stated applicable standards;
- This Preliminary Site Investigation identifies that the soil contamination does not exceed the stated NES SCS for a residential end use across the investigated areas and it is highly unlikely that there is a risk to human health should the proposed rezoning activity be undertaken, therefore any subdivision and land use change would be considered a permitted activity under the NES;
- This Preliminary Site Investigation report is submitted to the regional authority in to facilitate updating the HAIL database; and
- Further assessment for waste disposal purposes should be undertaken on areas where coke is encountered at the time of earthworks.
1 Introduction

1.1 Background

An area of land along Napier Road, Palmerston North has been earmarked for re-zoning. This area comprises the following parcels of land:

- Lot 1 DP 74205
- Lot 2 DP 74205
- Lot 3 DP 74205
- Lot 5 DP 74205
- Lot 1 DP 456688
- Lot 2 DP 456688
- Lot 10 DP 499783
- Pt Lot 1 DP 25691
- Pt Subdivision 2 TN OF Palmerston North SECT 418 and
- Pt Subdivision 3 TN OF Palmerston North SECT 418

The subdivision Lots 1 – 3 DP 74205 are believed to have previously been investigation and remediated on behalf of BUPA Care Services NZ Ltd and a previous DSI has been undertaken on Pt Lot 1 DP 25691. However, no investigation report was available for this area of the site at the time of writing. These previously investigated areas of the site are not included within this investigation. It is understood that the area identified is proposed for re-zoning as residential with any associated development being undertaken at a later stage. This site is zoned rural within the existing District Plan. The area proposed for re-zoning is shown in Figure 1.

![Proposed re-zoning area plan]

Figure 1: Proposed re-zoning area plan

A Preliminary Site Investigation (PSI) has been undertaken on behalf of Palmerston North City Council (PNCC) for six of these parcels of land as detailed below (in the order of west to east):

- Lot 1 deposited Plan 456688
- Lot 2 Deposited Plan 456688
- Lot 5 deposited Plan 74205
- Lot 10 deposited Plan 499783
- Pt Subdivision 2 TN OF Palmerston North SECT 418
- Pt Subdivision 3 TN OF Palmerston North SECT 418
These parcels of land are located at 257, 259 and 261 Napier Road and the junction with Roberts Line, Palmerston North (herein referred to as ‘the site’). The site area for the purposes of this investigation is delineated within Figure 2.

Figure 2: Quickmap extract for site and surrounds

1.2 Objective

This PSI report has been prepared in order to assess the potential for ground contamination across the site. It is understood that parts of the site have historically been used as a garden centre and market garden. As such the site is designated as having undergone activities on the Hazardous Activities and Industries List (HAIL) as part of the National Environmental Standards (NES).

The following objectives have therefore been identified:

- Undertake a review of the history of the site and surroundings, including any previous investigations undertaken on or near the site;
- Determine the potential chemical characteristics of the soils, particularly in areas of fill or where potentially hazardous activities have been identified by way of preliminary sampling and analysis;
- Assess the risk associated with these potential contaminants to affect human health or the environment;
- Determine the likely impact upon sensitive receptors including site users, occupiers and construction workers on the piece of land; and
- Give recommendations regarding further assessment work, should they be required.

1.3 Scope of Work

In order to achieve the objectives, set out above, the following scope of works has been undertaken:

- A detailed site walkover to assess the current site conditions, activities which have or are being undertaken and its surrounding environment;
- An assessment of historical information relating to the site and its surroundings (this may be from documented or anecdotal evidence) including a review of historical aerial photographs;
- A review of information relating to resource consents, geological conditions and hydrogeology of the site;
- A review of existing investigation reports for parts of the site;
ITEM 13 - ATTACHMENT 1

### PSI Report: Napier Road Re-Zoning Area, Palmerston North

**348**

- Preliminary sampling and analysis with respect to the testing of 20 analytical samples for heavy metals, organic pesticides and polycyclic aromatic hydrocarbons (PAH);
- A review of information held by PNCC and HRC with respect to the site and its HAIL status; and
- A site characterisation indicating the potential environmental risk associated with the proposed land use change of the site in the form of a conceptual site model and recommendations for further assessment works to fully characterise the environmental risk if necessary.
## 2 Site Identification

The site is located at 234 Napier Road and the junction with Roberts Line, Palmerston North, approximately 3.8km north north-east of Palmerston North town centre as shown on Figure 3 below. Site details are provided in Table 1.

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<tr>
<th>Approximate total plot area</th>
<th>3.693m²</th>
<th>0.3693ha</th>
</tr>
</thead>
</table>

**NES Permitted Activity threshold volumes:**
1. disturbance, and
2. yearly off-site movement of soil based on the approximate plot area

| 1) 184.65m³ | 2) 36.93m³ |

**Legal Description**

Lot 1 Deposited Plan 456688

**Title**

590680

**Owner**

Colin Peter MacPherson

<table>
<thead>
<tr>
<th>Approximate total plot area</th>
<th>11,335m²</th>
<th>1.1335ha</th>
</tr>
</thead>
</table>

**NES Permitted Activity threshold volumes:**
1. disturbance, and
2. yearly off-site movement of soil based on the approximate plot area

| 1) 566.75m³ | 2) 113.35m³ |

| Approximate total site area | 73,933m² | 7.3933ha |

**NES Permitted Activity threshold volumes:**
1. disturbance, and
2. yearly off-site movement of soil based on the approximate site area

| 1) 3,696.65m³ | 2) 739.33m³ |

A Quickmap diagram detailing the current legal site boundaries, and appellations of properties nearby are shown in Error! Reference source not found. along with the approximate location of the site under investigation.

A current site and surroundings layout plan is attached as Appendix A, with photographs taken during the site investigation presented in Appendix E.

![Figure 3: Site Location Plan](image-url)
3 Site Description

3.1 Site History

Details of the site history have been gained from a review of sources including historical aerial photographs from Google Earth, historical topographical maps from Maps Past, a review of Opus’s Quickmap ArcGIS database and a search of council records.

There were no Retrolens historical aerial photos available within the vicinity of the site.

The conditions on the site over the timeframe searched are summarised in Table 2.

Table 2: Site History, (approximate site location is outlined in red)

<table>
<thead>
<tr>
<th>Photograph Year and Source</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1929 Maps Past</td>
<td>The site lies within a number of existing sections. Roberts Line to the east and Napier Road to the south are also present. A railway, running east-west, is noted north of the site.</td>
</tr>
<tr>
<td>1949 Maps Past</td>
<td>The there does not appear to be any changes to the site at this time.</td>
</tr>
<tr>
<td>Photograph Year and Source</td>
<td>Observations</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>1959</strong> Maps Past</td>
<td>Sections are no longer visible in the vicinity of the site. A pond/lagoon can now be seen to the west of the site area. An industrial area is now identified on the mapping to the north comprising concrete pipe manufacturers and oil processing or storage.</td>
</tr>
<tr>
<td><strong>1969</strong> Maps Past</td>
<td>There are no apparent changes to the site. However, to the east of Roberts Line a metal pit is now identified.</td>
</tr>
<tr>
<td>Photograph Year and Source</td>
<td>Observations</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>1954 NZ Aerial Mapping (courtesy of Manawatu Heritage)</td>
<td>The site appears to be made up of farm land at this time.</td>
</tr>
<tr>
<td>1979 NZ Aerial Mapping (courtesy of Manawatu Heritage)</td>
<td>The site area shows the eastern side of the site as pasture land. Buildings are located on the eastern side of Roberts Line, beyond the site boundary. The western side of the site also appears to be farm land which seems to have been cultivated.</td>
</tr>
<tr>
<td>Photograph Year and Source</td>
<td>Observations</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>1989 Maps Past</td>
<td>There are now new sections visible within the site boundaries. The pond/lagoon has also disappeared however the site still appears to be undeveloped.</td>
</tr>
<tr>
<td>2005 Google Earth</td>
<td>The site is well developed at this time with market gardening activities on the eastern side of the site and in the western portion of the site there are a large number of what appear to be industrial buildings. On the northern section of the site there are a line of ponds or lagoons potentially connected to the market gardening activities in the eastern portion of the site.</td>
</tr>
<tr>
<td>Photograph Year and Source</td>
<td>Observations</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>2007 Google Earth</td>
<td>There do not appear to be any changes to the site or surrounding area at this time.</td>
</tr>
<tr>
<td></td>
<td>The market garden area on the eastern side of the site remains unchanged, however, some parts of the garden centre on the western side of the site have undergone minor changes to the layout. To the west of the site the fields have undergone what appears to be subdivision and infrastructure development with the construction of an access road.</td>
</tr>
</tbody>
</table>
Anecdotal evidence suggests that there was a gas works in the vicinity of the western portion of the site, which had undergone remediation prior to the availability of historical aerial photos. However, at the time of writing this report there was no information available to WSP Opus associated with the gas works or its investigation or remediation.

### 3.1.1 Heritage

The Heritage New Zealand Pouhere Taonga Act 2014 makes it unlawful for any person to modify or destroy, or cause to be modified or destroyed, the whole or any part of an archaeological site without the prior authority of Heritage New Zealand.

In order to establish the heritage status of the site the Heritage New Zealand database was consulted. The site was not found on the database.¹

On the basis of this information no further archaeological work was recommended, unless there was an unexpected discovery during the investigation.

¹ [http://www.heritage.org.nz/the-list](http://www.heritage.org.nz/the-list)
3.2 Council Records

A review of PNCC’s District Plan Maps indicates that the piece of land lies in an area which is currently zoned as a rural.

Information gained from PNCC gives information for two sections of the site as detailed below. No information of particular relevance was found in the property files that suggested potential contamination activities occurring on both properties.

261 Napier Road has been used as a Garden Centre by Colin MacPherson since early 1990s. Prior to this time the site was used as pastoral land for grazing animals. We confirmed this by looking at aerial photography of the site dating back to 1950.

There have been previous subdivision consents related to the site but none has assessed the site as a potential contamination land under the NES. Nothing else in the property files suggested any hazardous activity undertaken on site.

1 Roberts Line has been used as a plant nursery since 1979. In the 1950s the site was used as farm land for grazing animals.

Building consents are issued for the following:

- A storage facility intended to be used for storing fertilisers and nursery goods in April 2000.
- A septic tank in 2005.

WSP Opus also spoke with one of the PNCC staff members who used to work at the nursery back in the late 1980s. He mentioned they used to spray chemicals on-site without any controlling measures in place.

A review of the HAIL database held by Horizons Regional Council has revealed that the site does not currently appear on the database. The absence of available information does not necessarily mean that the property is uncontaminated, rather no information exists on the database.

3.3 Certificates of Title

A search for relevant certificates of title was undertaken for the site along with any associated survey plans in order to help determine the historical ownership and layout of the site. These details may give an indication as to past uses on the site and the potential for HAIL activities. Relevant certificates of title and survey plans are also presented within Appendix B.

3.4 Geology

The geology of the site is shown on the 1:250,000 scale GNS Geology Web Map extract (accessed March 2018) as shown in Figure 4.

This map indicates the site to be underlain by Holocene Alluvium Deposits generally alluvial gravel, sand, silt, mud and clay with local peat; includes modern river beds².

² http://data.gns.cri.nz/geoology/
A review of the GNS Active Faults Database indicates that the nearest active fault, NW Cardrona Fault (#1565), lies approximately 1km east south-east of the site, as shown in Figure 4. This is a reverse fault; however no other information is known about this fault.

Figure 5: Extract from GNS Active Faults Database
3.5 Hydrology and Hydrogeology

Details of the site hydrology and hydrogeology have been gained from a review of sources including Google Earth, a general internet search and a search of council records.

<table>
<thead>
<tr>
<th>Table 3: Summary of hydrological and hydrogeological data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest Surface Water Body</td>
</tr>
<tr>
<td>General Flow Direction</td>
</tr>
<tr>
<td>Groundwater Status</td>
</tr>
<tr>
<td>Anticipated depth to groundwater</td>
</tr>
<tr>
<td>Annual Median Rainfall</td>
</tr>
</tbody>
</table>

3.5.1 Groundwater Sensitivity Assessment

The Ministry for the Environment’s Petroleum Hydrocarbon Guidelines (ME 2011) describe a sensitive aquifer as an aquifer that might be contaminated by a leak or spill of petroleum hydrocarbons (including leaching from contaminated soil resulting from a leak or spill) and which is subject to current or potential use (including consideration of aquatic ecosystem support). A sensitive aquifer is defined here as an aquifer that is:

Not artesian (in practice true artesian or confined aquifers are unlikely to be encountered as part of the shallow groundwater systems normally of interest at petroleum contaminated sites); and

Less than 10 metres below the source or suspected source of contamination (or greater depth below ground surface where the geology suggests contamination may readily migrate to greater depth, e.g. clean sands or gravels, fractured basalt); and

Is of a quality appropriate for use, can yield water at a useful rate and is in an area where extraction and use of groundwater may be reasonably foreseen;

Or

Where the source of contamination is less than 100 metres from a sensitive surface water body (i.e. a surface water body where limited dilution is available to mitigate the impact of contaminated groundwater discharging into the surface water body).

The it is not known whether the site is located near to any known ground water takes therefore the area is considered to potentially be in a sensitive ground water catchment.

A wide range of factors may affect the migration of contaminants from soil to groundwater, including the presence of low permeability zones which may limit migration, or preferential pathways which may result in much more rapid migration of contaminants. Therefore, the Tier 1 soil acceptance criteria for the protection of groundwater quality should not be rigidly applied; rather, judgement should be applied when they are used, accounting for site-specific conditions.

Should contaminant concentrations exceed the soil acceptance criteria, consideration should be given to a more detailed evaluation of the possible fate and transport of contaminants and the beneficial uses for which the aquifer is to be protected.

Based on the criteria outlined above the ground water is not considered to be a sensitive aquifer.

⁵ Approximate regional 30-year average (http://palmweath.co.nz/trendshistoric)
4 Review of EAM Environmental Consultants DSI Report – 291 Napier Road

EAM Environmental Consultants Ltd produced a DSI report pertaining to 291 Napier Road in December 2014 (ref: EAM436-REP-01). This report has been reviewed as a part of this PSI with the location of 291 Napier Road being part of the larger area that is under consideration for rezoning, as highlighted in Figure 5.

![Figure 6: Site Boundary Plan](image.png)

The EAM DSI report states that the EAM site contained a residential dwelling in addition to buildings and storage areas associated with the owner’s garden composting/mulch business. The business utilises natural material with no added chemicals. It is also noted that one of the current buildings appears to be associated with the dairy farm that was historically present on the site.

The report states that December 2014 council records for the EAM site confirm that 20 years prior to the current ownership, the property was utilised as a dairy farm, and 25 years prior to that the site was part of a market garden.

Historical aerial photographs (sourced from Palmerston North Public Library) were also included within the report. These photos confirm that the site was, for the majority, bare pastoral land up until at least 1975.

Based on the evidence collected, the EAM DSI report identified Markey Gardens as a HAIL activity under the NES guidance.
Approximate Re-zoning area

(1961 Aerial Photograph)
On the basis of these findings EAM undertook soil sampling across 31 locations on their site by hand, which were composited at the laboratory to reduce costs and analysed for arsenic, lead and organochlorine pesticides.

Based on the outcomes of the DSI, the following pertinent conclusions were made by EAM:

- Contaminants within the shallow soils were identified at levels well below NES guideline values for NES identified scenario for rural residential (25% produce) land use;
- No contaminant source was identified and therefore risk to human health is low;
- Adverse effects on human health as a result of the development proposed for this site are considered highly unlikely;
- This site is compliant with NES and no further site investigation or remediation works are required.
5 Walkover Survey

5.1 Site Condition and Surrounding Environment

A site walkover was undertaken as part of the PSI works on 13\textsuperscript{th} March 2018 by a WSP Opus SQEP. Details of the inspection are outlined below with a selection of site photographs. Reference is made to the sample location numbers presented in Appendix D.

5.2 Leafland Nursery Site Inspection Notes

5.2.1 Site Layout

The site is typically covered in around 150mm of gravel. All nursery plants grow in bags/pots.

There are two entrances – the main entrance off Roberts line and a second entrance off Napier Road at the western end of the site (closest pin is #19).

Photos above show main entrance and Roberts Line looking south towards SH3 Napier Road.

Photos above and right show gated entrance to site off Napier Road and driveway to neighbouring house. 3\textsuperscript{rd} photo shows Napier Road looking East from driveway entrance. Hedge shown is nursery.
There are two sets of buildings – the main office and shed (near pin #20) and a second smaller set of buildings (near pin #10).

Main buildings viewed from ridge to north. Buildings comprise large storage building (with green roof and green canvas awning to North side) and single level office/tea room to southern side.

Secondary building- near Pin #10. Above ground diesel storage tank out of picture to left.
Rear view of secondary building and above ground Diesel tank.

At the second building there is an above ground diesel storage tank. There is significant staining of the ground around it.

Access around the site is via a network of gravel tracks. The main track goes all the way around the site, with secondary tracks running in a general north south alignment.

There is a ridge/ cliff along the northern boundary of the site. It is possible to climb to the top of the ridge via a track near to the main building complex. The strip of land at the top of the ridge along to around Pin #9 is understood to be part of the site and can be accessed by walking up the track. The houses at the top of the ridge (Rosebank Ave) have access to this strip which currently has various items on it (trampolines, sheds, building plant and materials) – see photos below:
Photos of strip of land at top of the ridge – Rosebank houses to left of picture, nursery at bottom of cliff to right.

There is a lagoon to the north of the site from the western end (Pin #18) through to the narrow part of the site (around Pin 12). It is not possible to directly access the lagoon due to a fence and thick vegetation. But photos below show that it is fed by the drainage system.
Parts of the track closest to the lagoon i.e. along the northern border from say Pin 18 to Pin 12 were very waterlogged.

At the western end of the site, the site is bordered by what appears to be a disused house.

### 5.2.2 Underground Services

Irrigation water is sourced from a bore located near site entrance off Roberts Line. Water is distributed across the site via a series of shallow (150mm deep) water pipes. The bore is reportedly 45m deep. The cap of bore was noted to be in very poor condition:
Water for the office/tea room comes from one of the houses to the north of the site on Rosebank Ave.

Electricity is overhead to site boundary then underground from Roberts line to the main building. For the second garage, the electricity comes underground from the overhead lines on Napier Road.

No gas, stormwater or wastewater pipes are understood to be present.

5.2.3 Historical Uses of Adjacent Land

The adjacent site is understood to be a dairy farm, although further to west is located the former gasworks. The site owner indicated that previous tracks across the site were problematic for the previous owner where hedges would die where planted over the old tracks. It is understood that these tracks were made using waste materials from the gasworks following remediation works.

The current site owner has not had any issues with die back and all hedges looked healthy.

5.2.4 Anecdotal Evidence

Discussions on site with Ben indicate that he bought the site from the previous owner in 2001 (as a functioning nursery).

The previous owner had bought the land from the railways in or around 1976. At this time the site apparently had been earmarked for use as a sidings but this had never actually happened.

A neighbour (Wendy) reported that all the properties along this area were dairy farmed originally.

The previous owner is reported to have installed the drainage around the site and the gravel cover that is present across the nursery.

5.2.5 Materials and Waste Products Description

5.2.5.1 On Site Storage and Disposal

There is a Waste Management Skip that is reportedly collected routinely. Clippings and green waste is transported across the road (south side of SH3) and burned in a pit.

Various old plastic pots and machinery in various states of disrepair were noted to be left around the site.
5.2.6 Underground / Above Ground Storage Tanks

An above ground diesel tank was installed between 5 and 10 years ago. Significant staining was noted around the tank with no formal bunding present and only very limited hardstanding in the vicinity of the tank.

Sprays are routinely used on site – Glyphosate for weed control and a variety of insecticides used (Robal, Captan and Attack).

5.2.7 Product Spill History

None known – staining around diesel tank.

5.2.8 Discharges to Land / Air / Water

Cap of bore is in appalling condition. Stagnant water is pooled near the surface around the bore.

Surface water from site drains into lagoons.

5.2.9 Contaminant Source Areas / Pathways Noted on Site

Current Operations:

– Workers direct contact with soils where pesticides sprays have occurred
– Workers direct contact with diesel and/or diesel impacted soils around tank.
– Anecdotal evidence of former tracks constructed from gasworks waste products – leaching of contaminants into drainage system and into lagoon or direct contact with soils/coke
– Lagoons – wildlife?

Future

– Diesel contamination – construction workers/ future residents direct contact
– Gasworks products – construction workers/residents direct contact

5.2.10 Condition of buildings/roadways

All tracks around site in passable condition for the vehicles used by the nursery – some areas near lagoon are waterlogged, but otherwise in good condition
Buildings all relatively new – did not look like any buildings from 40+ years ago. All in relatively good condition.

5.2.11 Presence of drums/wastes/fill materials

Lots of waste plastic (containers for nursery plants).
Wooden pallets.
No drums or waste.

5.2.12 Odours

No odours were noted on site.

5.2.13 Surface water

Issues of concern include:
- Pooling of water around well head
- Drainage into lagoons (ecological receptors)
- Areas of poor drainage in vicinity of lagoon.

5.2.14 Conditions at Site Boundary

Drains are cut around the site along Roberts Line, Napier Road and part of the northern side. Along the northern side of the site the boundary is partly on top of a cliff/ridge and partly the lagoon.
5.3 257 and 261 Napier Road Site Inspection Notes

5.3.1 Site Layout

This property is occupied by a garden centre to the south (identified in this report as McPhersons) and a residential property to the north (identified in this report as the dwelling).

The McPhersons property on the southern side of the western part of the site is a large garden centre with a car park located at the front of a large retail complex (centre) and various sheds and open areas to rear or north:

The dwelling at this location is set back from Napier Road on the northern section of the western part of the site and consists of a driveway (that borders a paddock to the east and the Bupa development to the west), a house and garage and a series of paddocks to the north – both are at the same level as the house and also at the crest of the ridge). A large lagoon is also located on this area of the site.
Paddock at the top of the hill

Paddock at bottom of the hill with Garage building viewable, over wooden fence, house to top left of screen and Bupa development over iron fence.
Lagoon at Wendy’s property.

5.3.2 Underground Services

McPhersons (Garden Centre):
Water is via a borehole. No town supply.
Electricity comes in from overhead cables on Napier Road.
They have a septic tank out back of property.
Drainage comprises a stormwater pipe along Napier Road.

Wendy ( Dwelling):
Likewise water is from a borehole. Borehole located in the adjacent Bupa development – which appears to not be well protected.
Borehole for Wendy water supply – within the concrete surround on Bupa

5.3.3 Historical Uses of Adjacent Land

A former gasworks is located to the West of this part of the site. The gasworks site has been remediated and is currently being developed by Bupa. The development consists of the placement of a significant thickness of fill material across the site. For the construction of low level retirement dwellings:

Wendy reports that all land to east (as far as Roberts Line) was dairy farms.

5.3.4 History of Site Ownership and Land Use

McPhersons advised they have owned the section for 26 years.
Wendy advised that prior to her ownership of the dwelling, approximately 26 years ago, this area of the site and surrounds were all dairy related.

5.3.5 On Site Storage and Disposal

Various bits and pieces of old machinery are stored around the McPhersons site, however nothing of obvious significant risk was noted at the time of the site inspection.

The dwelling is a typical rural household with all waste disposed by taking to tip.

5.3.6 Underground / Above Ground Storage Tanks

None.

5.3.7 Product Spill History

None reported.

5.3.8 Discharges to Land / Air / Water

Wendy McPherson suspects that there is an issue with coke from the former gasworks at her site. Particularly along her driveway which she understands is a former ‘track’ formed using coke and limestone from the gasworks.

5.3.9 Potential Contaminant Source Areas / Pathways

Gasworks contaminants may have historically migrated through groundwater.

Coke and/or other gasworks by products are anecdotally reported to have been used on site to construct tracks.

5.3.10 Condition of Buildings / Roadways

Buildings on both sites for the most part looked in good condition as did roads and car parks etc.

Some new fill recently was placed in part of MacPhersons yard.
5.3.11 Presence of Drums / Wastes / Fill Materials

Three Castrol drums are present in the paddock at Wendy MacPhersons dwelling. It is unsure what they are used for.

5.3.12 Surface Water

The Lagoon appears to be in a satisfactory condition with no obvious sign of vegetation or wildlife die-off.

It is understood that the lagoon is fed by stormwater.

The site reportedly flooded badly in 2004(?) during a storm event. “Coke and “coke” material floated during the flood.
5.3.13 Conditions at Site Boundary

Western side is Bupa construction site.

Entrance to Macphersons contains steel fence and gate:

![Image of entrance to Macphersons]

The entrance to Wendy’s is a gate at end of her drive (gate open in photo below; closed gate is a back entrance to the rear of Macpherson’s garden centre).
Along eastern side is a stop bank:

5.3.14 Evidence of Contamination / Plant Stress

None seen. But Wendy advised that trees along her border with the Bupa land get to a "certain height" and then die. She assumes due to contamination from the former gasworks at depths that the roots reach.
6 Development Proposals

It is our understanding that the site is proposed for re-zoning as residential with potential associated development being undertaken at a later stage.

7 Conceptual Site Model

This section of the report relates to the assessment of contamination arising from the previous and current land uses, both on and off the site that may impact on the proposed development. This is achieved by detailing the nature and extent of contamination, the potential migration pathways and to identify potential receptors to the extent possible based on information gathered from the desk study and site visit. Data gaps and uncertainties are identified during the preparation of the conceptual model, which assists in designing a more detailed investigation.

The following conceptual site model been identified based on the construction of a residential dwelling building for rural residential end use:

7.1 Potential Sources of Contamination

A review of all data sources and anecdotal evidence indicates that the eastern area of the site has been subject to market garden activities:

A10: Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds

Potential sources of contamination typically associated with market gardens may include:

- Heavy metals;
- Organochlorine pesticides; and
- Petroleum hydrocarbons associated with fuel storage.

In addition the western side of the site is located adjacent to a site where gasworks were located.

A7: Gasworks including the manufacture of gas from coal or oil feedstocks

Although remediation is reported anecdotally to have occurred residual contamination associated with these activities may include:

- Heavy metals;
- Polycyclic Aromatic Hydrocarbons (PAHs);

7.2 Potential Pathways

Plausible pathways such as inhalation, dermal contact, ingestion, leaching, and migration of contaminated groundwater, migration of ground gases and hazardous vapours as well as aggressive attack on construction materials have all be considered as part of the development of the conceptual site model for this site.

The most plausible migration pathways are dependent upon the type of contaminants and are considered to be:

- Inhalation of contaminated dust;
- Dermal Contact with contaminated soils/water;
- Ingestion of contaminated material or food; and
- Leaching of contaminants into the ponds/lagoons on site or the groundwater.

7.3 Potential Receptors

Given the proposed development on the site in addition to potential contaminants associated with historic market gardening, then the most sensitive receptors identified are as follows:

- Residents and visitors (end-users) to the site;
- Construction workers during earthworks and construction; and
- Environmental receptors including groundwater and the ponds/lagoons in the north of the site.
Using the data obtained from various sources and brought together within this report, a conceptual site model (CSM) has been derived for the site and is presented in Figures 6 and 7.

The term **possible pollutant linkage** as used above is defined as one that has the potential to represent unacceptable risks to human health or the environment but has not been identified through risk assessment. Where a possible pollutant linkage has been identified above, these should be subjected to investigation and risk assessment during a PSI in order to establish whether a **significant pollutant linkage** exists.
Figure 7: Conceptual Site Model (Leafland on eastern side of site)
Figure 8: Conceptual Site Model (257 - 261 Napier Road on western side of site)
8 Statutory Provisions

8.1 National Environmental Standard

Regulation 8(3) of the NES makes provision for disturbing the soil as a permitted activity subject to meeting the following standards:

a. controls to minimise the exposure of humans to mobilised contaminants must:
   i. be in place when the activity begins;
   ii. be effective while the activity is done;
   iii. be effective until the soil is reinstated to an erosion-resistant state;

b. the soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done:

c. the volume of the disturbance of the soil of the piece of land must be no more than 25 m³ per 500 m²:

d. soil must not be taken away in the course of the activity, except that:
   i. for the purpose of laboratory analysis, any amount of soil may be taken away as samples:
   ii. for all other purposes combined, a maximum of 5 m³ per 500 m² of soil may be taken away per year:

e. soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:

f. the duration of the activity must be no longer than 2 months:

g. the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

If the proposed re-zoning and potential later development is to proceed as indicated, the NES regulations apply because:

The site accommodates former HAIL activities.

As previously discussed, this PSI has been conducted to address NES requirements.

The sampling of soil for this investigation is an activity described in Regulation 8 of the NES. The activity was permitted because all of the conditions associated with this regulation were complied with during the investigation.

The NES flow chart shown as Figure 8 demonstrates the various ways the NES could apply to sites and activities performed on those sites.
ITEM 13 - ATTACHMENT 1

Figure 9: NES flow chart
9 Preliminary Sampling and Analysis Programme

The sampling of the near surface soils was undertaken by a WSP Opus engineer on 13th March 2018 as a screening exercise to assess any potential contamination across the eastern part of the site. The location of samples taken was determined prior to the site visit by a WSP Opus SQEP based on a stratified approach. Amendments to this stratified approach were made if necessary on site once access and inspection had taken place. A plan showing the soil sampling locations is presented in Appendix D along with the site records and logs of soils encountered.

In addition to sampling across the eastern side of the site an additional screening sample was taken from the access driveway to 257 Napier Road where it was considered likely that coke waste from the historic gasworks site had been left in-situ.

Photographs taken at the time of the inspection are presented in Appendix E.

9.1.1 Encountered Geology

Ground conditions encountered within the test holes on the site generally comprised a grey sandy gravel to 0.1m blg overlying a sandy silt.

No visual or olfactory evidence of contamination was noted within any of the test holes on the eastern side of the site.

Coke was evident in the sample taken on the western side of the site.

9.2 Field Quality Assurance and Quality Control (QA/QC)

Sampling of near surface soils was completed on 13th March 2018. Weather conditions were hot and sunny during the sampling visit.

Sampling of the soils was undertaken using industry standard methods and protocols to avoid cross contamination of the samples, including but not restricted to the use of clean gloves for each sample taken, decontamination of the stainless-steel trowel using appropriate wash down and drying between samples and the use of appropriate sample containers supplied by Hill Laboratories, individually labelled and cross referenced using chain of custody documentation.

Soils were stored in a chilled cool box prior to dispatch via courier to the laboratories the next day. pH readings were also taken of the soils during the sampling process.

A total of twenty-one soil samples were collected from the eastern part of the site and scheduled for laboratory analysis under the direction of the SQEP with the following contaminants of concern analysed:

- Heavy metals; and
- Organochlorine pesticides.

In addition a further near surface sample was taken from the driveway located along Wendy McPhersons property in an area where it is believed that coke waste was used as fill material.

This sample was analysed for:

- Heavy metals; and
- Organochlorine pesticides and
- PAH Screen

A chain of custody (CoC) form from Hill Laboratories was requested for receipt of the samples and is provided in Appendix F.

9.3 Laboratory QA/AC

The Hill Laboratory Analysis report has been appended for perusal in Appendix F. This includes the analytical methods used by the laboratory and the laboratory accreditation for analytical methods used. The field duplicate sample returned an acceptable relative percentage difference for the analyte tested.

All Laboratory Analysis was completed through Hill Laboratories. Hill Laboratories are accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
### 9.4 QA/QC Data Evaluation

Table 4: QA/QC Data Evaluation

<table>
<thead>
<tr>
<th>Evaluation of all Field and Laboratory QA/QC Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation and data completeness</td>
</tr>
<tr>
<td>Data representativeness</td>
</tr>
<tr>
<td>Precision and accuracy of sampling and analysis for each analyte in each environmental matrix informing data users of the reliability, unreliability or qualitative value of the data.</td>
</tr>
</tbody>
</table>

#### Data comparability checks

<table>
<thead>
<tr>
<th>Collection and analysis of samples by different personnel</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection and analysis by the same personnel using the same methods but at different times</td>
<td>N/A</td>
</tr>
<tr>
<td>Use of different sampling or analytical methodologies from those stipulated in the guideline documents</td>
<td>N/A</td>
</tr>
<tr>
<td>Spatial and temporal changes</td>
<td>N/A</td>
</tr>
<tr>
<td>Relative percent differences for inter and intra laboratory duplicates</td>
<td>No duplicates were taken as part of this investigation due to the homogeneity of the soils encountered</td>
</tr>
</tbody>
</table>
10 Basis for Guideline Values

For contaminated site assessments, the hierarchy of reference documents containing guidelines for soils and waters, the MIE Contaminated Land Management Guidelines No 2 (November 2003) is referred to.

The proposed development comprises re-zoning as residential with potential associated development being undertaken at a later stage; as such the residential with 10% produce end use scenario is proposed for assessment purposes to be conservative in the first instance. The primary human health receptors have been determined to be construction workers and the end users of the site. The land use scenario is highlighted in table 6.

Table 5:  Land Use Scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural / lifestyle block</td>
<td>Rural residential land use, including home-grown produce consumption (25 per cent). Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land. Note: Consumption of eggs, milk and meat from animals raised on site is excluded. Produce consumption is limited to home-grown vegetables. Sites for which consumption of home-grown eggs, milk or meat is important will need to be evaluated on a site-specific basis.</td>
</tr>
<tr>
<td>Residential</td>
<td>Standard residential lot, for single dwelling sites with gardens, including home-grown produce consumption (10 per cent).</td>
</tr>
<tr>
<td>High-density residential</td>
<td>Urban residential with limited soil contact, including small ornamental gardens but no vegetable garden (no home-grown produce consumption); applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens, but not high-rise apartments.</td>
</tr>
<tr>
<td>Parks / recreational</td>
<td>Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.</td>
</tr>
<tr>
<td>Commercial / industrial outdoor worker (unpaved)</td>
<td>Commercial / industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near-surface soil during routine maintenance and gardening activities with occasional excavation as part of maintaining subsurface utilities (ie, a caretaker or site maintenance personnel). Also conservatively applicable to outdoor workers on a largely unpaved site.</td>
</tr>
</tbody>
</table>

Results from these screening analyses have initially been compared against soil contaminant standards (SCSs) from the National Environmental Standards (NES) Appendix B: Soil Contaminant Standards. Where no New Zealand Standards were available or more detailed guideline values were required contaminants, concentrations have been assessed using the appropriate guidelines within the MIE Environmental Guideline Value Database and are specified in the assessment results. SCSs for inorganic substances used in this assessment are outlined in Table 7 whereas organic compounds are outlined in Table 8.
Table 6: NES Soil Contaminants Standards for health (SCS/health) for inorganic substances

<table>
<thead>
<tr>
<th>Arsenic</th>
<th>Boron</th>
<th>Cadmium (pH 5)</th>
<th>Chromium</th>
<th>Copper</th>
<th>Inorganic lead</th>
<th>Inorganic mercury</th>
</tr>
</thead>
<tbody>
<tr>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
</tr>
<tr>
<td>Rural residential / lifestyle block 25% produce</td>
<td>17</td>
<td>&gt;10,000</td>
<td>0.8</td>
<td>&gt;10,000</td>
<td>290</td>
<td>&gt;10,000</td>
</tr>
<tr>
<td>Residential 10% produce</td>
<td>20</td>
<td>&gt;10,000</td>
<td>3</td>
<td>&gt;10,000</td>
<td>460</td>
<td>&gt;10,000</td>
</tr>
<tr>
<td>High-density residential</td>
<td>45</td>
<td>&gt;10,000</td>
<td>230</td>
<td>&gt;10,000</td>
<td>1,500</td>
<td>&gt;10,000</td>
</tr>
<tr>
<td>Recreation</td>
<td>80</td>
<td>&gt;10,000</td>
<td>400</td>
<td>&gt;10,000</td>
<td>2,700</td>
<td>&gt;10,000</td>
</tr>
<tr>
<td>Commercial / industrial outdoor worker (unpaved)</td>
<td>70</td>
<td>&gt;10,000</td>
<td>1,300</td>
<td>&gt;10,000</td>
<td>6,300</td>
<td>&gt;10,000</td>
</tr>
</tbody>
</table>

Notes: All concentrations refer to dry weight (ie, mg/kg dry weight).
1 Default value is for soil that is ph 5. Concentrations increase with increasing pH (see Methodology).

Table 7: NES Soil Contaminants Standards for health (SCS/health) for organic compounds

<table>
<thead>
<tr>
<th>Scenario</th>
<th>BaP</th>
<th>DDT</th>
<th>Dieldrin</th>
<th>PCP</th>
<th>Dioxin TCDD</th>
<th>Dioxin-like PCBs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/kg TEQ</td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>µg/kg TEQ</td>
<td>µg/kg TEQ</td>
</tr>
<tr>
<td>Rural residential / lifestyle block 25% produce</td>
<td>6</td>
<td>45</td>
<td>1.1</td>
<td>55</td>
<td>0.12</td>
<td>0.09</td>
</tr>
<tr>
<td>Residential 10% produce</td>
<td>10</td>
<td>70</td>
<td>2.6</td>
<td>55</td>
<td>0.15</td>
<td>0.12</td>
</tr>
<tr>
<td>High-density residential</td>
<td>24</td>
<td>240</td>
<td>45</td>
<td>110</td>
<td>0.35</td>
<td>0.33</td>
</tr>
<tr>
<td>Recreation</td>
<td>40</td>
<td>400</td>
<td>70</td>
<td>150</td>
<td>0.6</td>
<td>0.52</td>
</tr>
<tr>
<td>Commercial / industrial outdoor worker (unpaved)</td>
<td>35</td>
<td>1,000</td>
<td>160</td>
<td>300</td>
<td>1.4</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Notes: All concentrations refer to dry weight (ie, mg/kg dry weight or µg/kg dry weight).
1 For benzo[a]pyrene, the equivalent BaP concentration is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene and indeno(1,2,3-cd)pyrene), multiplied by their respective potency equivalence factors (see table 40 of the Methodology).
2 The SCS is applicable to either dieldrin or aldrin separately, or to the sum of aldrin and dieldrin if both are involved.
TEQ = Toxic equivalency, an indicator of the toxicity of a mixture of compounds.

Although not a requirement of the NES environmental receptors have also been considered and as such environmental soil contaminants standards have also been considered as part of this assessment.

10.1 Waste Disposal of Soils

In addition to assessing the human health risks associated with potential future development, an initial assessment of off-site disposal options for any excess spoil generated during site possible redevelopment works has been conducted. Depending upon the contamination condition of the spoil, offsite disposal options range from disposal to "clean-fill" sites (lowest cost) through managed fill sites to licensed hazardous waste landfills (highest cost).

As disposal to a "clean-fill" site represents the most cost effective off-site disposal option, the soil results have been compared to MfE definition of "clean-fill". The publication "A Guide to the Management of Clean Fills" (MfE, 2002) defines clean-fill as:
Material that when buried will have no adverse effect on people or the environment. Clean-fill material includes virgin natural materials such as clay, soil and rock, and other inert materials such as concrete or brick that are free of:

- Combustible, putrescible, degradable or leachable components.
- Hazardous substances.
- Products or materials derived from hazardous waste treatment, hazardous waste stabilisation or hazardous waste disposal practices.
- Materials that may present a risk to human or animal health such as medical and veterinary waste, asbestos or radioactive substances.
- Liquid waste.”

The requirement for the material to be “free” of “hazardous substances” effectively requires the concentrations of non-naturally occurring compounds to be below the level of analytical detection. In terms of naturally occurring compounds it is generally recognised that clean-fill acceptance criteria are defined by the background concentrations of these compounds in the relevant local or regional environment.

10.1.1 Background Concentrations

No background concentrations specific to Palmerston North are currently available for cleanfill assessment purposes. However, reference can be made to the LRIS Portal which gives information on Predicted Background Soil Concentrations for New Zealand. These background concentrations are intended to provide an initial assessment of background soil concentrations based on the underlying geological unit.

For the purpose of comparison with background concentrations, as per NES Regulation 5(9), background concentrations of Polycyclic Aromatic Hydrocarbons (PAH) above the laboratory’s limit of detection were determined as being above background concentrations.

10.1.2 Class A and B Landfill Acceptance Criteria

To provide an indication of disposal options, the results have also been compared to the Class A and Class B Landfill Acceptance Criteria prescribed in the MIE (2004) ‘Module 2: Hazardous Waste Guidelines – Landfill Acceptance Criteria’.

Table 8: Extract of Appendix A of the Hazardous Waste Guidelines - Landfill Waste Acceptance Criteria for Class A and B Landfills (Refer to full document for footnotes)

<table>
<thead>
<tr>
<th></th>
<th>CLASS A LANDFILLS</th>
<th>CLASS B LANDFILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Screening</td>
<td>Concentration</td>
</tr>
<tr>
<td></td>
<td>Criteria (mg/kg)</td>
<td>in Leachate (mg/L)</td>
</tr>
<tr>
<td>Arsenic</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Cadmium</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>Chromium (VI)</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Copper</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Lead</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Mercury</td>
<td>4</td>
<td>0.2</td>
</tr>
<tr>
<td>Nickel</td>
<td>200</td>
<td>10</td>
</tr>
<tr>
<td>Zinc</td>
<td>200</td>
<td>10</td>
</tr>
</tbody>
</table>
11 Summary of Analytical Results

The results of the chemical laboratory analyses were compared against the NES Soil Contaminant Standards for Health (SCS\textsubscript{Health}) and are summarised in Tables 10 and 11. The proposed land use within the redevelopment area was assessed as being a residential end use with 10% produce grown in gardens. This is considered to be the most sensitive end use with residential development for the site more likely than not less sensitive. This assessment was undertaken in order to give an indication of the potential human health effects during and following site development works.

11.1 Soils Assessment (Human health effects)

11.1.1 NES Heavy Metals

Laboratory results indicate that determinands analysed were within their relevant NES SCS\textsubscript{Health} for a residential (10% produce) end use.

11.1.2 Multi-residue Pesticides

Laboratory results indicate that Total DDT and Dieldrin concentrations for all samples were within their relevant NES SCS\textsubscript{Health} for a residential (10% produce) end use. Pesticides detected are summarised in Table 9.

Table 9: Summary of Pesticides Detected

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Pesticide Name</th>
<th>Concentration (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Oxyfluorfen</td>
<td>0.010</td>
</tr>
<tr>
<td>3</td>
<td>Terbutylazine</td>
<td>0.008</td>
</tr>
<tr>
<td></td>
<td>Terbutryn</td>
<td>0.027</td>
</tr>
<tr>
<td>9</td>
<td>Terbutryn</td>
<td>0.13</td>
</tr>
<tr>
<td>13</td>
<td>Terbutryn</td>
<td>0.033</td>
</tr>
<tr>
<td>15</td>
<td>Oxyfluorfen</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>Terbutylazine</td>
<td>0.01</td>
</tr>
<tr>
<td>16</td>
<td>Oxyfluorfen</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>Terbutylazine</td>
<td>0.008</td>
</tr>
<tr>
<td>18</td>
<td>Terbutryn</td>
<td>0.018</td>
</tr>
<tr>
<td>19</td>
<td>Oxyfluorfen</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>Terbutylazine</td>
<td>0.016</td>
</tr>
<tr>
<td>20</td>
<td>Terbutylazine</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>Terbutryn</td>
<td>0.014</td>
</tr>
</tbody>
</table>
11.1.3 PAH’s

Polycyclic Aromatic Hydrocarbons were screened in one soil sample collected from soil that was identified during the walkover to potentially contain coke that may originate from the adjacent historic gasworks on the western side of the site. The results returned results above laboratory detection limits for nineteen PAHs. A summary of their Benzo(a)pyrene potency equivalency factor (BaP PEF) determined by the laboratory indicates a BaP PEF of 0.42mg/kg for the NES PAHs. This is below the NES SCS<sub>health</sub> for a residential end use.
### Table 10: Summary of Analytical results (Part 1)

**Title:** Surface Road Re-surfacing  
**Project No:** 0.9265.00  
**Sample media:** Soil  
**Analysis:** Total Recoverable Concentrations  
**End-Use:** Residential 30% Produce  
**Date:** Ver 3.0  
**Revision:** 1 (Part 1 of 2)

<table>
<thead>
<tr>
<th>Sample Name</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Depth (in kg)</td>
<td>0.9</td>
<td>0.2</td>
<td>0.2</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.2</td>
<td>0.25</td>
<td>0.1</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Natural / FAI?</td>
<td>6.8</td>
<td>6.6</td>
<td>6.8</td>
<td>6.7</td>
<td>6.7</td>
<td>6.6</td>
<td>6.8</td>
<td>6.5</td>
<td>6.7</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>Soil Type</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td></td>
</tr>
<tr>
<td>Metals (mg/kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>0.13</td>
<td>&lt;0.10</td>
<td>0.13</td>
<td>0.15</td>
<td>0.15</td>
<td>0.3</td>
<td>0.13</td>
<td>0.16</td>
<td>&lt;0.10</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Chromium</td>
<td>31</td>
<td>14</td>
<td>18</td>
<td>18</td>
<td>17</td>
<td>16</td>
<td>19</td>
<td>18</td>
<td>10</td>
<td>17</td>
<td>600</td>
</tr>
<tr>
<td>Copper</td>
<td>12</td>
<td>13</td>
<td>18</td>
<td>10</td>
<td>12</td>
<td>11</td>
<td>12</td>
<td>32</td>
<td>36</td>
<td>9</td>
<td>&gt;10,000</td>
</tr>
<tr>
<td>Lead</td>
<td>13.9</td>
<td>19.9</td>
<td>25</td>
<td>16.7</td>
<td>21</td>
<td>16.8</td>
<td>17.3</td>
<td>23</td>
<td>24</td>
<td>11.9</td>
<td>330</td>
</tr>
<tr>
<td>Mercury</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>310</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.8</td>
<td>1.4</td>
<td>1.4</td>
<td>1.5</td>
<td>1.4</td>
<td>1.6</td>
<td>1.7</td>
<td>1.5</td>
<td>1.0</td>
<td>1.4</td>
<td>400</td>
</tr>
<tr>
<td>Zinc</td>
<td>62</td>
<td>71</td>
<td>88</td>
<td>73</td>
<td>87</td>
<td>76</td>
<td>80</td>
<td>80</td>
<td>105</td>
<td>55</td>
<td>7,400</td>
</tr>
<tr>
<td>Polycyclics (mg/kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDT</td>
<td>&lt;0.09</td>
<td>&lt;0.09</td>
<td>&lt;0.08</td>
<td>&lt;0.08</td>
<td>&lt;0.09</td>
<td>&lt;0.08</td>
<td>&lt;0.08</td>
<td>&lt;0.10</td>
<td>&lt;0.09</td>
<td>&lt;0.08</td>
<td>70</td>
</tr>
<tr>
<td>Dieldrin</td>
<td>&lt;0.015</td>
<td>&lt;0.014</td>
<td>&lt;0.016</td>
<td>&lt;0.016</td>
<td>&lt;0.014</td>
<td>&lt;0.014</td>
<td>&lt;0.015</td>
<td>&lt;0.015</td>
<td>&lt;0.013</td>
<td></td>
<td>2.6</td>
</tr>
</tbody>
</table>

**Notes:**
1. Arsenic: SCS based on pH 5.5. Arsenic absorption (i.e. plant uptake of arsenic) increases with decreasing pH (see ME methodology document).
2. Chromium: SCS tabulated is for chromium VI. This is conservative as samples have been analysed for total chromium (i.e. III and VI).
3. Mercury: SCS calculated is for inorganic mercury. Samples have been analysed for total mercury and therefore this SCS is conservative.
4. DDT: SCS is based on a sum of DDT, DDD and DDE.
5. Dieldrin: SCS applicable to either dieldrin or aldrin separately, or to the sum of aldrin and dieldrin if both are involved.

**References:**
1. 1. CHROMIUM: SCS based on pH 5.5. Arsenic absorption (i.e. plant uptake of arsenic) increases with decreasing pH (see ME methodology document).
2. 2. CHROMIUM: SCS tabulated is for chromium VI. This is conservative as samples have been analysed for total chromium (i.e. III and VI).
3. 3. MERCURY: SCS calculated is for inorganic mercury. Samples have been analysed for total mercury and therefore this SCS is conservative.
4. 4. DDT: SCS is based on a sum of DDT, DDD and DDE.
5. 5. Dieldrin: SCS applicable to either dieldrin or aldrin separately, or to the sum of aldrin and dieldrin if both are involved.
6. 6. Sum of 12 dioxins, i.e. PCDDs + PCDFs calculated is for the sum of 12 dioxins, i.e. PCDDs + PCDFs.
9. 9. NIOSH 2003, p186. (d) Groundwater and soil concentrations.
10. 10. Supplemental Guidance for Developing Soil Screening Levels (human health) at Superfund Sites (US EPA, 2002) based on soil pH 1.8. Figures derived for protection of potable water supply, but are also used.
<table>
<thead>
<tr>
<th>Sample Name</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Depth (m BGL)</td>
<td>0.3</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.2</td>
<td>0.1</td>
<td>0.2</td>
<td>0.25</td>
<td>0.1</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>Natural (mg/l)</td>
<td>6.6</td>
<td>6.3</td>
<td>6.6</td>
<td>6.7</td>
<td>5.7</td>
<td>6.7</td>
<td>6.7</td>
<td>6.8</td>
<td>6.9</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>Soil Type</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
<td>Clayey Silt</td>
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<td>Protection of Groundwater for Potable Use</td>
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Bracketed are soil guideline limits, all others are regulatory limits.

* SG - Soil guideline
* * - Value exceeds 20000 mg/kg

* = 10000 mg/kg

---

### Notes

1. Cadmium - SCS based on pF5. Cadmium absorption (i.e., plant uptake of cadmium) increases with decreasing pF (i.e., SCS methodology document).
2. Chromium - SCS factored to be for chromium VI. This is conservative as samples have been analysed for total chromium (i.e., VI and VII).
3. Mercury - SCS tabulated is for inorganic mercury. Samples have been analysed for total mercury and therefore this SCS is conservative.
4. DDT - SCS is based on a sum of DDT, DDE and DDD.
5. Dieldrin - SCS applicable to either dieldrin or aldrin separately, or to the sum of aldrin and dieldrin if both are involved.

### Table 11: Summary of Analytical Results (Part 2)

**Table:**

1. Cadmium: SCS based on pF5. Cadmium absorption (i.e., plant uptake of cadmium) increases with decreasing pF (i.e., SCS methodology document).
2. Chromium: SCS factored to be for chromium VI. This is conservative as samples have been analysed for total chromium (i.e., VI and VII).
3. Mercury: SCS tabulated is for inorganic mercury. Samples have been analysed for total mercury and therefore this SCS is conservative.
4. DDT: SCS is based on a sum of DDT, DDE, and DDD.
5. Dieldrin: SCS applicable to either dieldrin or aldrin separately, or to the sum of aldrin and dieldrin if both are involved.

**Bracketed are soil guideline limits, all others are regulatory limits.**

---

4. The acceptance criteria that has been exceeded is also highlighted.

---

**Table:**

1. Cadmium - SCS based on pF5. Cadmium absorption (i.e., plant uptake of cadmium) increases with decreasing pF (i.e., SCS methodology document).
2. Chromium - SCS factored to be for chromium VI. This is conservative as samples have been analysed for total chromium (i.e., VI and VII).
3. Mercury - SCS tabulated is for inorganic mercury. Samples have been analysed for total mercury and therefore this SCS is conservative.
4. DDT - SCS is based on a sum of DDT, DDE, and DDD.
5. Dieldrin - SCS applicable to either dieldrin or aldrin separately, or to the sum of aldrin and dieldrin if both are involved.

---

1. Cadmium - SCS based on pF5. Cadmium absorption (i.e., plant uptake of cadmium) increases with decreasing pF (i.e., SCS methodology document).
2. Chromium - SCS factored to be for chromium VI. This is conservative as samples have been analysed for total chromium (i.e., VI and VII).
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5. Dieldrin - SCS applicable to either dieldrin or aldrin separately, or to the sum of aldrin and dieldrin if both are involved.

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**Table:**

1. Cadmium - SCS based on pF5. Cadmium absorption (i.e., plant uptake of cadmium) increases with decreasing pF (i.e., SCS methodology document).
2. Chromium - SCS factored to be for chromium VI. This is conservative as samples have been analysed for total chromium (i.e., VI and VII).
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5. Dieldrin - SCS applicable to either dieldrin or aldrin separately, or to the sum of aldrin and dieldrin if both are involved.

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**Table:**

1. Cadmium - SCS based on pF5. Cadmium absorption (i.e., plant uptake of cadmium) increases with decreasing pF (i.e., SCS methodology document).
2. Chromium - SCS factored to be for chromium VI. This is conservative as samples have been analysed for total chromium (i.e., VI and VII).
3. Mercury - SCS tabulated is for inorganic mercury. Samples have been analysed for total mercury and therefore this SCS is conservative.
4. DDT - SCS is based on a sum of DDT, DDE, and DDD.
5. Dieldrin - SCS applicable to either dieldrin or aldrin separately, or to the sum of aldrin and dieldrin if both are involved.
11.2 Waste Disposal of Soils

At this time it is envisaged that soil will not be disposed off-site. However a high level assessment of the results of preliminary sampling and analysis has been undertaken in order to give an indication of disposal options available for soils on the eastern section of the site.

No background concentrations specific to Palmerston North are currently available for cleanfill assessment purposes. However, reference can be made to the LRIS Portal which gives information on Predicted Background Soil Concentrations for New Zealand. These background concentrations are intended to provide an initial assessment of background soil concentrations based on the underlying geological unit.

Should any soils be considered for cleanfill disposal, consultation with PNCC or the relevant regulatory body should be made in the first instance referencing the analytical results provided herein to ensure their acceptability at the proposed facility.

On the basis of the preliminary sampling and analysis results, soils from the investigated Leaffland site area may be considered to be clean fill material.

As the soil sample was found to contain concentrations of PAHs above their detection limit, soil from the western side of the site cannot be considered as cleanfill without further more detailed investigations to determine localised ground conditions in this area.

Should soil be disposed off-site in the future, reference to the MIE Hazardous Waste Guidelines should be made. Initial testing results indicated that there were concentrations of heavy metals which were elevated above relevant Class B landfill acceptance criteria. Additional TCLP analysis of the soils should be undertaken if disposal to landfill is to be considered to determine the leaching potential of metals within the soils.

Any soils to be disposed to landfill would require acceptance at the chosen facility. Presentation of the appended chemical laboratory results to the facility operator should be undertaken in order to determine if the facility will accept the materials.

Further assessment of soils from the western side of the site, particularly in areas where coke is noted to be present would be required in order to determine disposal options for soils in this area.
12 Site Characterisation

The purpose of this Preliminary Site Investigation, in general accordance with CLMG No1 and the NES for Assessing and Managing Contaminants in the Soil to Protect Human Health (2011), is to provide an assessment of soil concentrations for identified contaminants of concern to determine whether or not HAIL activities have resulted in contamination of the soil that may be hazardous to human health.

On this basis and on the basis of a review of information currently available, as well as observations made during the site inspection, and through the compilation of a conceptual site model and chemical analysis of soil samples, our assessment of the site is as follows:

**General summary**

- A previous Detailed Site Investigation report for the area within the centre of the rezoning site indicates that this area is considered highly unlikely to pose adverse effects to human health from investigated contaminants of concern;
- It is understood that the site is to undergo re-zoning for a more sensitive residential end use;
- The underlying geology comprises alluvial deposits; and
- No obvious signs of vegetation dieback were noted in any location across the site.

**Leafland site (Eastern section)**

- The eastern side of the site is utilised by a market garden where plants are grown within pots for resale;
- Results of chemical analytical testing on the eastern (Leafland) part of the site indicate that contaminants of concern are below their relevant SCS<sub>mg/kg</sub> values or relevant pesticide SGV.

**257 Napier Rd and McPherson Garden Centre (Western section)**

- The western side is occupied by a garden centre and residential dwelling;
- Anecdotal evidence indicated that a gasworks site was located adjacent to the western boundary of this part of the site which had undergone remediation;
- No remediation report for the gasworks was available at the time of writing;
- PAHs were encountered within a sample of soil and coke taken on the western side of the site. These were below BaP PEF values for a residential end use.

Taking into consideration the nature and composition of the soil on the eastern side of the site, it is considered that the risk to human health associated with potential soil contamination derived from the Leafland (eastern) site is LOW.

On the basis of the limited information available from the western side of the site it is that PAHs may be present within fill materials encountered here. However, these materials are likely to be confined to areas where roadways have been constructed. The risk to human health from PAH is considered to be LOW based on the results of limited sampling and analysis of this area of the site.
13 Conclusions and Recommendations

The Preliminary Site Investigation of the site has revealed that historical uses of the site include market gardening, a garden centre and farm land with potential gasworks waste having been deposited on western parts of the site.

The conceptual site model and initial qualitative human health risk assessment presented herein is based upon information gained from a site inspection, anecdotal evidence, information gained from PNCC and other sources.

Leafland (eastern side of site)

Although HAIL activities are noted to have been undertaken on the eastern part of the site, analytical testing of soils within the top 0.3m across the site area have revealed that contaminants of concern are below soil contaminant standards for a residential end use.

This piece of land is therefore considered suitable for residential end use. As such, it is considered highly unlikely that there is a risk to human health should any proposed development be undertaken on this part of the site.

257 - 261 Napier Road (western side of site)

HAIL activities are also considered to have been undertaken on the western side of the site. Anecdotal evidence indicates that a gasworks was historically located adjacent to the western boundary of the site which had undergone remediation, however no investigation or remediation report was available from council at the time of writing.

A single sample of soil from this area has revealed that PAHs are present within coke waste on the access drive to the residential dwelling in the area. The full extent of the coke present on this part of the site could not be fully assessed within the scope of this report, however it is envisaged that it has been used as a base material for roadways. The source of the coke cannot be directly identified with the assumption that it is derived from the ‘gasworks’ site conjecture only.

The sample taken from this area was intended only as an indicative screen. The results indicate concentrations of potential contaminants of concern (namely PAH and heavy metals) are below soil contaminant standards for a residential end use.

13.1.1 NES Implications

This Preliminary Site Investigation identifies that the soil contamination does not exceed the stated NES SCS for a residential end use across the investigated areas and it is highly unlikely that there is a risk to human health should the proposed rezoning activity be undertaken, therefore any subdivision and land use change would be considered a permitted activity under the NES.

13.1.2 Disposal of Excess Spoil

Soil from the eastern side of the site is considered suitable for disposal as cleanfill, should any disposal of soils off site be required in the future.

As the soil sample from the driveway area of 257 Napier Road was found to contain concentrations of PAHs above their detection limit, soil from the western side of the site cannot be considered as cleanfill without further more detailed investigations to determine localised ground conditions in this area. This may be undertaken during development when more detailed proposals are available for earthworks on the site.

13.2 Safety in Design

Safety in Design (SID) considers the safety of those who are involved in the construction of, maintenance of, cleaning of, repair of and demolition of a structure, or anything that has been constructed.

As part of the assessment of this site we have taken reasonably practicable steps to assess the potential for hazards associated with potentially contaminated land to exist. We have, through the development of a conceptual site model and where necessary selected site sampling, assessed the qualitative level of risk posed to human health and have made various recommendations to address the plausible risks.
Where identified this report indicates hazards and risks to health and safety associated with contaminated land which must be communicated to the design team, the client and associated stakeholders as required by the Health and Safety at Work Act 2015.

13.3 Recommendations

Based on the results of this investigation, WSP Opus recommends that:

- The eastern part of the site is suitable for a residential land use as part of the rezoning of the area as soil contamination does not exceed the relevant stated applicable standards;
- On the basis of the screening sample taken from the western side of the site, the risk to human health is considered to be low and the site is suitable for a residential land use as part of the rezoning of the area as soil contamination does not exceed the relevant stated applicable standards;
- This Preliminary Site Investigation report is submitted to the regional authority in to facilitate updating the HAIL database; and
- Further assessment for waste disposal purposes should be undertaken on areas where coke is encountered at the time of earthworks.
14 Applicability and Limitations

This report has been produced on behalf of Palmerston North County Council and no responsibility is accepted to any third party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of WSP Opus. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill. This report should only be reproduced in full.

This investigation concentrates on contamination levels in the soil throughout the entire site. However, any earthworks, should be undertaken with due care and should ground conditions other than those anticipated be encountered work should cease and an SQEP consulted to further assess the risks to human health.

This report has been prepared for a specific purpose, as agreed between WSP Opus and the Client. A tailored scope of works has been used to achieve the objectives, and the report should therefore not be used for different objectives.

This report has been prepared by WSP Opus with all reasonable skill and care within the terms of the Contract with the Client, and taking account of the information made available by the Client, as well as the staff and resources devoted to it by agreement with the Client. The findings and opinions conveyed via this report are based on information obtained from a variety of sources, as detailed, which WSP Opus believes are reliable. Nevertheless, WSP Opus cannot and does not guarantee the authenticity or reliability of any information supplied by other parties.

The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry best practice. Due to the inherent variation in spatial and temporal patterns of contamination, the interpretation of site conditions at the specific locations investigated is not a complete description of all material at the site. Should further data be obtained that differs from that presented in this report, then conclusions and recommendations may no longer be valid.

The report is valid at the date of release. The condition of the site may change with time so that the results and interpretation are no longer valid. In addition, guidelines and legislation may change, making assessment of results and recommendations invalid.
Appendix A
Site Layout
Appendix B
Historical information and Site Searches
QuickMap Title Details

Information last updated at 12 Mar 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier: 747971
Land Registration District: Wellington
Date Issued: 03 October 2016

Prior Reference:
WN03D-601

Type: Fee Simple
Area: 5.5391 hectares more or less
Legal Description: Lot 10 Deposited Plan 499783 and Part Lot 2-3 Section 418 Town of Palmerston North

Proprietor:
Leiland Limited

5728885 Mortgage to (now) Westpac New Zealand Limited - 15.9.2003 at 9:00 am
Subject to a right (in gross) to convey electricity over part Part Lot 3 Section 415 Town of Palmerston North marked A on DP 178539 in favour of Powerco Limited created by Encumbrance Instrument 7164051 - 8.1.2007 at 9:00 am
10493178 6 Variation of Mortgage 5728885-3 - 19.4.2016 at 12:07 pm
Subject to Section 241(2) Resource Management Act 1991 (affected: DP 499783)

The information provided on this report forms a guideline only. As a result, Custom Software Limited cannot and does not provide any warranty or assurance of any kind in relation to the accuracy of the information provided through this report, the Site and Service. Custom Software Limited will not be liable for any claim in relation to the content of this report, the site and this service.
## QuickMap Title Details

**Historic Information**

Information last updated as at 12 Mar 2018

**COMPUTER FREEHOLD REGISTER**
**DERIVED FROM LAND INFORMATION NEW ZEALAND**

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**Historic Memorials**

- 5728852.2 Mortgage to (sorw) Wespac New Zealand Limited - 15.9.2003 at 9:00 am
- Subject to a right (in gross) to convey electricity over part Part Lot 3 Section 418 Town of Palmerston North marked A on DP 379519 in favour of Powerco Limited created by Easement Instrument 7184405.1 - 8.1.2007 at 9:00 am
- 10403178.6 Variation of Mortgage 5728852.2 - 19.4.2016 at 12:07 pm
- Subject to Section 241(2) Resource Management Act 1991 (affects DP 409783)
- 10963945.1 Departmental dealing correcting the registered proprietor to Leafland Limited - 25.10.2016 at 9:40 am
- 10633296.1 Departmental dealing correcting the area to 5.5391 Ha - 22.11.2016 at 3:30 pm

**Historic Owners**

LEAFLAND LIMITED

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COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Cancelled

Identifier: WN38D/601
Land Registration District: Wellington
Date Issued: 22 January 1991

Prior References:
WN07A/84

Type: Fee Simple
Area: 4.947 hectares, more or less
Legal Description: Part Lot 1-3 Section 418 Town of Palmerston North

Proprietor:
B737116.3 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by her Majesty the Queen - 3.8.1999 at 9.00 am
5102662.2 Discharge of Compensation Certificate B737716.3 - 6.11.2001 at 9:00 am
5083616.1 Compensation Certificate pursuant to Section 19 Public Works Act 1981 - 17.9.2001 at 9:00 am
5102662.2 Discharge of Compensation Certificate 5083616.1 - 6.11.2001 at 9:00 am
5102662.1 Gazette Notice (1/11/2001 No 149 p 3708) acquiring part (740m²) depicted as 'Section 1 on SO Plan 38219' for road and vested in the Crown and becomes road, limited access road and State Highway on 1.11.2001 - 6.11.2001 at 9:00 am
5728855.1 Transfer to Landmark Limited - 15.9.2003 at 9:00 am
5728855.2 Mortgage to Westpac Banking Corporation - 15.9.2003 at 9:00 am
705669.1 Application pursuant to Section 99A Land Transfer Act 1952 vesting Mortgage 5728855.2 in Westpac New Zealand Limited - 2.11.2006 at 9:00 am

Subject to a right (in gross) to convey electricity over part herein marked A on DP 379519 in favour of Powerco Limited owned by Envesta Investment 7184645.1 - 2.10.2006 at 9:00 am
10405176.6 Variation of Mortgage 5728855.2 - 14.4.2016 at 12:07 pm
10581259.3 Transfer of Lot 6 DP 499783 to John Cho - 3.10.2016 at 2:18 pm
10581259.4 Transfer of Lot 3 DP 499783 to Raus Chand Singh and Prachiha Poonam - 3.10.2016 at 2:18 pm
10581259.5 Transfer of Lot 2 DP 499783 to Albert Kevin Tania Hemensy, Karen Anne Hemensy and Suzanne Margaret Foydicy (1/2 Share) and Karen Anne Hemensy, Albert Kevin Tania Hemensy and Suzanne Margaret Foydicy (1/2 Share) - 3.10.2016 at 2:18 pm
10581259.6 Transfer of Lot 1 DP 499783 to Benjamin Gerald Currie and Lauette Patricia Currie - 3.10.2016 at 2:18 pm
10581259.7 Consent Notes pursuant to Section 221 Resource Management Act 1991 - 3.10.2016 at 2:18 pm
10581259.8 Lot 1 DP 499783 is vested as additional land under the Joint Family Homes Act 1964 on Benjamin Gerald Currie and Lauette Patricia Currie - 3.10.2016 at 2:18 pm (see Applications 6766971.2)
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<td>Lot 3 Deposited Plan 499783</td>
<td>747969</td>
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<td>Lot 6 Deposited Plan 499783</td>
<td>747970</td>
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<td>Lot 10 Deposited Plan 499783 and Part Lot 2-3 Section 418 Town of Palmerston North</td>
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**Historic Owners:**

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<th>John Cro</th>
<th>Benjamin Gerald Currie</th>
<th>Suzanne Margaret Fordyce</th>
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<tr>
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<td>Rachel Ellen Currie</td>
<td>Trevor Harry Currie</td>
<td>Shashikumar Poonam</td>
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<tr>
<td>Albert Kevin Tama Hennessy</td>
<td>Karen Anne Hennessy</td>
<td>Ram Chand Singh</td>
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**Issued Titles:**

| 747967 (Levy) Lot 1 Deposited Plan 499783 and Lot 10 Deposited Plan 303046 |
| 747968 (Levy) Lot 2 Deposited Plan 499783 and Lot 9 Deposited Plan 303046 |
| 747969 (Levy) Lot 3 Deposited Plan 499783 and Lot 12 Deposited Plan 303046 |
| 747970 (Levy) Lot 4 Deposited Plan 499783 and Lot 8 Deposited Plan 303046 |
| 747971 (Levy) Lot 10 Deposited Plan 499783 and Part Lot 2-3 Section 418 Town of Palmerston North |

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QuickMap Title Details

Information last updated as at 12 Mar 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Cancelled

Identifier: WN27A/84
Land Registration District: Wellington
Date Issued: 01 January 1870

Prior References:

Historic Owners

Issued Titles:
WN36D-601 (Cancelled) Part Lot 1-3 Section 418 Town of Palmerston North

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QuickMap Title Details

Information last updated as at 12 Mar 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier: WN13C/1486
Land Registration District: Wellington
Date Issued: 05 November 1974

Prior References:
WNC3/136

Type: Fee Simple
Area: 2.7673 hectares more or less
Legal Description: Part Lot 1 Deposited Plan 25691

Proprietor:
Mascom Trustee Limited and Vaughan Edward Cruden as to a 1/2 share
Mascom Trustee: 2011 Limited and Lynette Robyn Cruden as to a 1/2 share

772082 Gazette Notice declaring portion of State Highway No.3 to be limited access road
5755024.2 Mortgage to ASB Bank Limited - 6.10.2005 at 9:00 am
6402141.1 Variation of Mortgage 5755024.2 - 2.5.2005 at 9:00 am

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QuickMap Title Details

Historic Information

Information last updated as at 12 Mar 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND
INFORMATION NEW ZEALAND

Identifier: WN13C/1486
Land Registration District: Wellington
Date Issued: 05 November 1974

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<td>8558854.3 Transfer of a 1/2 share interest Lynette Robyn Crudin, Sandra Maree Crudin and Roger Michael Kennedy to Lynette Robyn Crudin and Manawatu Trustees Limited - 31.10.2011 at 11:17 am</td>
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<td></td>
<td>VAUGHAN EDWARD CRUDIN</td>
<td>ROGER MICHAEL KENNEDY</td>
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QuickMap Title Details

Computer Freehold Register
Derived from Land Information New Zealand

Cancelled

Identifier: WNC3/136
Land Registration District: Wellington
Date Issued: 01 January 1870

Prior References:

Historic Owners:

Issued Titles:
- WNI3C/1455 (Live) Lot 1 Deposited Plan 41671
- WNI3C/1456 (Live) Part Lot 1 Deposited Plan 25691

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Page 1 of 1
QuickMap Title Details

Information last updated as at 12 May 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier 590680
Land Registration District Wellington
Date Issued 13 June 2013

Prior References:
WN41B/843

Type Fee Simple
Area 1.1340 hectares more or less

Legal Description Lot 1 Deposited Plan 456688

Proprietors:
Colin Peter MacPherson

772082  Gazette Notice declaring portion of State Highway No. 3 to be a limited access road.
Appurtenant services are a right of way and rights to convey water, convey electric power, drain water, gas, electric power and telephone rights specified in Encumbrance Certificate B342599.7 - 10.7.1993 at 9.05 am.
The encumbrances specified in Encumbrance Certificate B342599.7 are subject to Section 309 (1) (a) Local Government Act 1974.
B370782.2 Mortgage to ANZ Banking Group (New Zealand) Limited - 14.7.1994 at 10.01 am.
Subject to a right (in gross) to a stopbank over part marked Y on DP 456688 in favour of Manawatu-Wanganui Regional Council created by Encumbrance Instrument 0829943.3 - 6.9.2011 at 1.54 pm.

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QuickMap Title Details

Historic Information

Information last updated as at 12 Mar 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND
INFORMATION NEW ZEALAND

Identifier 590680
Land Registration District Wellington
Date Issued 13 June 2013

Historic Memorial:

Article 2.02 - Certain land has been reserved for the purposes of the Public Works Act 1981. The land is located at the junction of State Highway No. 3 and the junction with Roberts Lane, PALMERSTON NORTH.

The reservation is for the purposes of providing a thoroughfare for the public, and for the purposes of traffic regulation.

Historic Owners:

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Appendix C
EAM DSI Report 291 Napier Road
DETAILED SITE ASSESSMENT
WITH NATIONAL ENVIRONMENTAL
STANDARD FOR ASSESSING AND
MANAGING CONTAMINANTS IN SOIL
TO PROTECT HUMAN HEALTH

291 NAPIER ROAD
PALMERSTON NORTH

PROJECT NO. EAM436-REP-01
PREPARED FOR
L & V CRUDEN
PREPARED BY
JASON STRONG
DECEMBER 2014
ITEM 13 - ATTACHMENT 1

416
NES DETAILED SITE ASSESSMENT, 291 NAPIER ROAD, PALMERSTON NORTH

Report prepared by:

Jason Strong (MSc), (PhD Candidate)
Principal Environmental Scientist
EAM NZ Limited

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© EAM NZ Limited

PROJECT: EAM436-01 REPORT STATUS: FINAL PAGE: 1
EXECUTIVE SUMMARY

EAM NZ Limited was engaged by L & V Cruden to undertake a detailed site assessment at a property located at 291 Napier Road, Palmerston North (Figure 1). The ‘piece of land’ applicable to this assessment is proposed to be developed into a residential subdivision (Figure 2). Previously this site has been utilised as a market garden.

The purpose of this assessment is to assess the site for the presence of potential contaminants in the soil, resulting from historical land use. The assessment was carried out in line with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES), effective 1 January 2012.

On the basis of the findings of this report:

- A review of the site history was carried out that indicated a requirement for site sampling;
- Appropriate site sampling and preliminary laboratory soil analysis was then carried out;
- Contaminants within the shallow soils were identified at levels well below NES guideline values for NES identified scenario for rural residential (25% produce) land use;
- No contaminant source was identified and therefore risk to human health is low;
- Adverse effects on human health as a result of the development proposed for this site are considered highly unlikely;
- This site is compliant with NES and no further site investigation or remediation works are required.
TABLE OF CONTENTS

Executive Summary .................................................................................................................. II
Table of Contents ................................................................................................................... III
1.0 Introduction ........................................................................................................................ 1
  1.1 Brief ............................................................................................................................... 1
  1.1.1 NES Requirements ................................................................................................. 1
  1.2 Site Description and Location ..................................................................................... 1
2.0 Review of Site History ..................................................................................................... 4
  2.1 Site walk over ............................................................................................................... 4
  2.2 Council records ........................................................................................................... 4
  2.3 Historic aerial mapping ................................................................................................ 7
3.0 NES Priority Contaminants ............................................................................................. 9
4.0 Site Sampling .................................................................................................................... 10
  4.1 Field Quality Assurance and Quality Control [QA/QC] ............................................. 10
  4.2 Sample composting .................................................................................................... 10
5.0 Results of Analysis - Discussion .................................................................................... 12
  5.1 Arsenic and lead .......................................................................................................... 12
  5.2 Organochlorine pesticides (OCPs) ............................................................................. 12
  5.3 Risk Assessment .......................................................................................................... 12
6.0 NES Compliance ............................................................................................................ 14
7.0 Conclusion ....................................................................................................................... 14
8.0 References ....................................................................................................................... 15

Figures
Figure 1: Site Location .............................................................................................................. 2
Figure 2: Indicative subdivision plan for 291 Napier Road ..................................................... 3
Figure 3: Area where compost/mulch is processed and stored ............................................. 5
Figure 4: Sheds associated with current compost/mulch operation ..................................... 5
Figure 5: Shed and concrete pad with water supply ............................................................ 6
Figure 6: Aerial showing lagoon at 291 Napier Road ............................................................ 6
Figure 7: Historic (1965) aerial photo of assessment site ..................................................... 7
Figure 8: Historic (1975) aerial photo of assessment site ..................................................... 8
Figure 9: Historic (1993) aerial photo of assessment site ..................................................... 8
Figure 10: Approximate locations of sample collection sites .............................................. 11

Tables
Table 1: Summary of Land Use Scenarios (MFE, 2012) ......................................................... 9
Table 2: Soil Arsenic and Lead Results ................................................................................ 12
Table 3: Soil OCP Results .................................................................................................... 14

Appendices
Appendix 1: Laboratory Report ............................................................................................ 16
Appendix 2: Report Limitations ............................................................................................. 20
1.0 INTRODUCTION

1.1 BRIEF

EAM NZ Limited was engaged by L & V Cruden to undertake a detailed site assessment at a property located at 291 Napier Road, Palmerston North (Figure 1). The ‘piece of land’ applicable to this assessment is proposed to be developed into a residential subdivision (Figure 2). Previously this site has been utilised as a market garden.

The purpose of this assessment is to assess the site for the presence of potential contaminants in the soil, resulting from historical land use. The assessment was carried out in line with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES), effective 1 January 2012. This report provides information including a preliminary and detailed site assessment pursuant to the new NES requirements and contains:

- Background information;
- Consideration of NES requirements;
- Review of site history;
- Details of site investigation;
- Laboratory results and evaluation;
- Conclusions.

1.1.1 NES REQUIREMENTS

The NES applies to any “piece of land” on which an activity or industry described in the current edition of the Hazardous Activities and Industries List (HAIL) is being undertaken, has been undertaken or is more likely than not to have been undertaken.

For an application to be considered as a controlled or a restricted discretionary activity, the consent authority must receive a detailed site investigation report on the land. The report must identify the applicable standard for soil contamination for the land (where the applicable standard is derived in accordance with the regulations). If the detailed investigation shows that the soil contamination does not exceed the applicable standard for the land, then the activity must be considered as a controlled activity.

1.2 SITE DESCRIPTION AND LOCATION

The site is located approximately 4.5 km to the southwest of the Palmerston North Central Business District. The property is approximately 2.7675 hectares in area with legal description being Pt Lot 1 DP 25691.

The topography of the site is predominantly low gradient flat land. A large pond/lagoon is present along the northern boundary. Land use in the immediate vicinity of the site is a mix of residential, industrial and horticulture/agriculture activities.
FIGURE 1: SITE LOCATION

Site location

PROJECT: EAM436-01 REPORT STATUS: FINAL PAGE: 2
2.0 REVIEW OF SITE HISTORY

The following resources were utilised to assess the likelihood of historic contaminants being present at the site:

- Site walk over
- A search of land database and historical records held at Palmerston North City Council (PNCC);
- A search of land database and historical records held at Horizons Regional Council (HRC);
- Review of historical photographs of the site.

2.1 SITE WALK OVER

The findings of a site walk-over survey (and soil sampling) at 291 Napier Road on 5 December 2014 is discussed below.

The site contains an existing dwelling as well as buildings and storage areas associated with the owners’ current garden composting/mulch business (Figures 3, 4 and 5). This business utilises natural materials and no chemicals are added.

One of the sheds next to the compost/mulch operation appears to be a remnant of the historic dairy farm operation at the site. This shed has a concrete pad and water supply associated with it.

The site contains a lagoon/pond along the northern boundary (Figure 6).

2.2 COUNCIL RECORDS

A request was made to the Palmerston North City Council (PNCC) and Horizons Regional Council to determine if they held any records with regards to actual or potential contamination at 291 Napier Road. Both councils indicated that they held no data of any incidents relating to the study site.

A search of property files held at PNCC provided little useful information with regards to this assessment. The only relevant information cited was the confirmation that the property has been utilised as a dairy farm for 20 years prior to the current owners and as a market garden for approximately 25 years prior to that.
ITEM 13 - ATTACHMENT 1

NES DETAILED SITE ASSESSMENT, 291 NAPIER ROAD, PALMERSTON NORTH

FIGURE 3: AREAS WHERE COMPOST/MULCH IS PROCESSED AND STORED

FIGURE 4: SHEDS ASSOCIATED WITH CURRENT COMPOST/MULCH OPERATION
ITEM 13 - ATTACHMENT 1

424

NES DETAILED SITE ASSESSMENT, 291 NAPIER ROAD, PALMERSTON NORTH

FIGURE 4: SHED AND CONCRETE PAD (WITH WATER SUPPLY) ASSOCIATED WITH CURRENT COMPOST/MULCH OPERATION

FIGURE 5: AERIAL SHOWING LAGOON AT 291 NAPIER ROAD
2.3 HISTORIC AERIAL MAPPING

Historic aerial photography at the time of writing this report was difficult to access due to the recent liquidation and closure of New Zealand Aerial Mapping.

However, it was possible to obtain some historic photographs from the Palmerston North Public Library resources. Three photographs from 1961, 1975 and 1993 are shown as Figures 7, 8 and 9 respectively.

The historic photographs illustrate that the site was largely bare pastoral land until at least 1975. This confirms what was recorded in PNCC property files and discussions with the previous land owners.

Based on the above evidence, a detailed site investigation pursuant to the NES is warranted due to previous activities (market gardens) carried out at the site being listed on the Hazardous Activities and Industries List (HAIL).

FIGURE 7: HISTORIC (1961) AERIAL PHOTOGRAPH OF THE ASSESSMENT SITE
FIGURE 8: HISTORIC (1975) AERIAL PHOTOGRAPH OF THE ASSESSMENT SITE

FIGURE 9: HISTORIC (1993) AERIAL PHOTOGRAPH OF THE ASSESSMENT SITE
3.0 NES PRIORITY CONTAMINANTS

The new NES legislation has identified a number of priority contaminants and provides standards for these contaminants within soil for the protection of human health under a series of potential land use scenarios. A number of these priority contaminants are inorganic substances and these include Arsenic, Barum, Cadmium, Chromium III & VI, Copper, Inorganic mercury and Inorganic lead. Others relate to organic compounds and include Benzo(a)pyrene (BaP), Dichlorodiphenyltrichloroethane (DDT), Dieldrin, Pentachlorophenol (PCP) and Dioxins.

It is not necessary to test for all of these contaminants if the history of the site suggests the past use is unlikely to have resulted in specific contamination with the identified priority contaminants.

On the basis of the site history the priority contaminants of concern are primarily heavy metals (lead and arsenic) as well as organo-chlorine pesticides. The results from this assessment are compared against the figures provided for the NES soil contaminant standards for health (SCS<sub>health</sub>) where possible. The NES considers various land use scenarios (Table 1) with differing guideline values attached to each.

The proposed development of this site is a new residential subdivision. Therefore in this instance due consideration of the NES identified land use scenario of Rural residential/lifestyle block 25% produce is the most appropriate.

<table>
<thead>
<tr>
<th>Land-Use Scenario</th>
<th>Description</th>
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<tbody>
<tr>
<td>Rural Residential /lifestyle block 25% Produce</td>
<td>Rural residential land use, including home-grown produce consumption (25%). Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land.</td>
</tr>
<tr>
<td>Residential 10% produce</td>
<td>Standard residential lot, for single dwelling sites with gardens, including home grown produce consumption (10 %).</td>
</tr>
<tr>
<td>High-Density Residential</td>
<td>Urban residential with limited soil contact, including small ornamental gardens but no vegetable garden (no home-grown produce consumption); applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens, but not high-rise apartments.</td>
</tr>
<tr>
<td>Park / Recreational</td>
<td>Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play often; it can also reasonably cover secondary school playing fields but not primary school playing fields.</td>
</tr>
<tr>
<td>Commercial/industrial outdoor worker (unpaved)</td>
<td>Commercial/industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near-surface soil during routine maintenance and gardening activities with occasional excavation of pipes and features. Also conservatively applicable to outdoor workers on a largely unpaved site.</td>
</tr>
</tbody>
</table>

TABLE 1: SUMMARY OF LAND USE SCENARIOS AND SCS<sub>HEALTH</sub> (MFE, 2012)
4.0 SITE SAMPLING

On 23 July 2014 EAM NZ Ltd collected soil samples from locations spaced evenly around the assessment land area (Figure 10).

The number of samples collected as part of this assessment was in keeping with the “Contaminated Land Guidelines No. 5” (MFE 2011). These guidelines set out the “minimum sampling points required for detection of circular hotspots using a systematic sampling pattern at 95% confidence level”.

In this instance the land area applicable to this assessment is approximately 2,7675 hectares. However once the area taken up by the residential dwelling and lagoon/pond are considered the assessment area is reduced to approximately 1.7 hectares. This requires a minimum of twenty eight samples with a grid size of approximately 25m to be collected.

Soil samples were collected using a 150mm hand auger and/or stainless steel travel and were handled using disposable gloves. Samples were collected in clean glass jars provided by Hill Laboratories Limited (Hills) and labelled with sample name, number, time and date collected.

4.1 FIELD QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

Quality Assurance and Quality Control procedures undertaken during sampling included the following:

- Decontaminating and rinsing of tools between each sample;
- Collection of soil samples in new, clean, appropriately labelled glass jars supplied by Hills;
- Storing samples in chilled conditions whilst on site and until delivery to the laboratory for analysis;
- Use of chain of custody procedures and forms;
- Use of IANZ accredited laboratories with in-house QA/QC procedures for the analyses requested; and
- Analysis of samples within recommended sample storage times.

4.2 SAMPLE COMPOSITING

To keep costs to a minimum some composite samples were analysed for OCPs. Sample compositing was conducted by the laboratory. Sample compositing techniques are typically utilised in investigations of land previously used for horticulture and broad scale contamination. This method is useful where low-concentration, uniform contamination is present and can be confirmed by site history (Contaminated Land Guidelines No. 5” (MFE 2011)).

Note: When comparing composite results against guideline values, the guideline value must be adjusted by dividing the value by the number of sub-samples in the composite.
 FIGURE 10: APPROXIMATE LOCATIONS OF SAMPLE COLLECTION SITES

Sample notes: Sample 30 = around shed near water supply
Sample 31 = around large shed with water supply/concrete pad
5.0 RESULTS OF ANALYSIS – DISCUSSION

5.1 ARSENIC AND LEAD

The laboratory results of analysis (Table 2) have been compared directly against appropriate determinants from the NES Priority contaminants list (MFE, 2012). See Appendix 1 for the full laboratory report.

Results of analysis show that arsenic and lead concentrations were well below the applicable NES Soil Contaminant Standard value of 17mg/kg and 160mg/kg respectively for the land use scenario of rural residential/lifestyle block (25% produce), the most applicable scenario for this site.

5.2 ORGANO-CHLORINE PESTICIDES (OCPS)

Sample 30 recorded a concentration of $\Sigma$Endosulfan at 25.6mg/kg.

Note: As there is no acceptance criteria included in the soil NES or in other New Zealand risk based acceptance criteria for $\Sigma$Endosulfan, for the purposes of this assessment the Australia NEPC (1999) criteria for land use scenario of Residential A was adopted. This standard is 300mg/kg for $\Sigma$Endosulfan. As such, the recorded level of $\Sigma$Endosulfan is below the NEPC value of 300mg/kg.

This standard is applicable residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake, (no poultry), includes children’s day care centres, preschools and primary schools and is considered to provide a reasonable assessment of risk for the current land use and associated risks to human health, in the context of this assessment.

Results for $\Sigma$DDT were only at trace concentrations and well below the NES soil standard of 45mg/kg for rural residential (25% produce) land use scenario.

5.3 RISK ASSESSMENT

A hazard – pathway – receptor pollution linkage is considered to aid assessment of risk associated with results of the site investigation.

For contaminated soils to pose a risk to a receptor, a complete pathway must exist between the contamination source and the identified receptor(s). If there is an incomplete pathway then there is no risk. In this instance the results show that a risk to human health at this site is low.
### TABLE 2: SOIL ARSENIC AND LEAD RESULTS (ALL mg/kg)

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**NES Rural Residential (25% produce)**

|             | 17 | 160 |
6.0 NES COMPLIANCE

From this review it is determined that due consideration was given to the full range of potential contaminants that might be expected to occur on land previously used for market gardening. This includes consideration of and sample laboratory analysis for the metals lead and arsenic as well as screening for organo-chlorine pesticide compounds.

Comparison of the samples analysed with the NES (and NEPC) standard guideline values showed that no contaminants are present at levels that may present a risk to human health with regard to the proposed activities at this site. This site is compliant with NES and no further site investigation or remediation works are required.

7.0 CONCLUSIONS

On the basis of the findings of this report:

- A review of the site history was carried out that indicated a requirement for site sampling;
- Appropriate site sampling and preliminary laboratory soil analysis was then carried out;
- Contaminants within the shallow soils were identified at levels well below NES guideline values for NES identified scenario for rural residential (25% produce) land use;
- No contaminant source was identified and therefore risk to human health is low;
- Adverse effects on human health as a result of the development proposed for this site are considered highly unlikely;
- This site is compliant with NES and no further site investigation or remediation works are required.
8.0 REFERENCES


APPENDIX 1

LABORATORY REPORT
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<th>Date Registered</th>
<th>Quote No.</th>
<th>Client Reference</th>
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<td>1361721.1</td>
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<td>Cruden #1</td>
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**Analysis Report**

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<th>Total Recoverable Lead</th>
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<table>
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<td>Amin</td>
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<tr>
<td>alpha-BHC</td>
<td></td>
</tr>
<tr>
<td>beta-BHC</td>
<td></td>
</tr>
<tr>
<td>gamma-BHC (Lindane)</td>
<td></td>
</tr>
<tr>
<td>cis-Chlorane</td>
<td></td>
</tr>
<tr>
<td>trans-Chlorane</td>
<td></td>
</tr>
</tbody>
</table>

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Multilab Recognition Arrangement (ILAC-MRA), this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.
## 436

**NES Detailed Site Assessment, 291 Napier Road, Palmerston North**

### Sample Types: Soil

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<tr>
<th>Sample Name</th>
<th>Lab Number</th>
<th>Crucen #26</th>
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<td>-</td>
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<td>2,4-D</td>
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<td>-</td>
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<td>-</td>
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### Individual Tests

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<th>Total Recoverable Lead</th>
<th>mg/kg dry wt</th>
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### Organochlorine Pesticides Screening in Soil

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<td>&lt; 0.010</td>
</tr>
<tr>
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<td>&lt; 0.010</td>
<td>&lt; 0.010</td>
</tr>
<tr>
<td>gamma-BHC (Lindane)</td>
<td>mg/kg dry wt</td>
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<td>&lt; 0.010</td>
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<td>&lt; 0.010</td>
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<td>&lt; 0.010</td>
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<td>&lt; 0.010</td>
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<td>mg/kg dry wt</td>
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<td>&lt; 0.010</td>
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<td>&lt; 0.010</td>
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**Lab No:** 1361721 v 1

**Hill Laboratories**

Page 2 of 3
### SUMMARY OF METHODS

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<th>Test</th>
<th>Method Description</th>
<th>Default Detection Limit</th>
<th>Sample No</th>
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<td>Environmental Solids Sample Preparation</td>
<td>Air dried at 35°C and sieved, &lt;2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%</td>
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<tr>
<td>Organochlorine Pesticides Screening in Soil</td>
<td>Soil extraction. SPE cleanup. Dual column GC/ECO analysis (modified US EPA 8082). Tested on oven sample.</td>
<td>0.010 - 0.04 mg/kg dry wt</td>
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<td>Nitro/hydrochloric acid digestion. US EPA 8082.</td>
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<td>Composite Environmental Solid Samples*</td>
<td>Individual sample fractions mixed together to form a composite fraction.</td>
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<td>Total Recoverable Arsenic</td>
<td>Dried sample, sieved as specified (if required). Nitro/hydrochloric acid digestion. ICP-MS, screen level. US EPA 8082.</td>
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<td>0.4 mg/kg dry wt</td>
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</tr>
</tbody>
</table>

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are destroyed unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

[Signature]

Aga Herron BSc (Tech)
Client Services Manager - Environmental Division

---

Lab No: 1301721 v 1
Hill Laboratories
Page 3 of 3
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Appendix D
Sample Location Plan & Site Records
## Calculation Sheet

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<th>%c</th>
<th>%s</th>
<th>%d</th>
<th>%v</th>
<th>%l</th>
<th>%m</th>
<th>%n</th>
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<tr>
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<td>Claysilt; gray</td>
<td>6.7</td>
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<tr>
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<td>6.8</td>
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<td>0.0</td>
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<tr>
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<td>Claysilt; gray</td>
<td>6.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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Completed: 1 / 1  
Checked: 1 / 1
### CALCULATION SHEET

**Project/Task/File No:** 6-3426-00  
**Sheet No:** 2 of 2

**Project Description:**  
**Computed:**  
**Check:**

#### Sample 13 - 13/03/18

<table>
<thead>
<tr>
<th>Sample No. 12 (1940)</th>
<th>Sample No. 13 (1145)</th>
<th>Sample No. 14 (1155)</th>
<th>Sample No. 15 (1215)</th>
<th>Sample No. 17 (1225)</th>
<th>Sample No. 18 (1220)</th>
<th>Sample No. 19 (1215)</th>
<th>Sample No. 20 (1215)</th>
<th>Sample No. 21 (1230)</th>
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</thead>
<tbody>
<tr>
<td>0.0 sandy, gravel; girty</td>
<td>0.0 sandy, gravel; girty</td>
<td>0.0 sandy, gravel; girty</td>
<td>0.0 sandy, gravel; girty</td>
<td>0.0 sandy, gravel; girty</td>
<td>0.0 sandy, gravel; girty</td>
<td>0.0 sandy, gravel; girty</td>
<td>0.0 sandy, gravel; girty</td>
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</tr>
<tr>
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<td>0.25 camphor silt; girty</td>
<td>0.25 camphor silt; girty</td>
<td>0.25 camphor silt; girty</td>
<td>0.25 camphor silt; girty</td>
<td>0.25 camphor silt; girty</td>
<td>0.25 camphor silt; girty</td>
<td>0.25 camphor silt; girty</td>
<td>0.25 camphor silt; girty</td>
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</table>

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**PSI REPORT | NAPIER ROAD RE-ZONING AREA, PALMERSTON NORTH**

---

**ITEM 13 - ATTACHMENT 1**
Appendix E
Site Photographs
Entrance to Leafland nursery from Napier Road

Storage Shed on Leafland nursery
Chemicals being used on Leafland site (Glyphosate and Oxyfluorfen)

Drainage ditch on Leafland leading to lagoon to north
Example of nursery planting (all within pots)
Garden centre on western part of the site

Storage area on garden centre
Garden Centre

Access to 257 Napier Road dwelling behind garden centre
Access to 257 Napier Road (Location of soil/coke sample taken)

Development platform to the west of the garden centre and 257 Napier Road
Appendix F
Hill Laboratories CoC and Results
**Analysis Request**

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand
T 0800 HILL LAB (44 555 22)
T +64 7 836 2900
E mail@hill-labs.co.nz
W www.hill-laboratories.com

**Chain of Custody Record**

<table>
<thead>
<tr>
<th>Date &amp; Time</th>
<th>Name</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/03/18 15:30</td>
<td>Sameday</td>
<td>[Signature]</td>
</tr>
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</table>

**Quoted Sample Types**

- Soil (Sub, Ground Water (GW), TCLP Extract (TCLP), Building Material (BM))

<table>
<thead>
<tr>
<th>No.</th>
<th>Sample Name</th>
<th>Sample Date/Time</th>
<th>Sample Type</th>
<th>Tests Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sample 1</td>
<td>13/03/18 15:00</td>
<td>Soil</td>
<td>Heavy metals + Hg Multi-residue Pesticide Screen</td>
</tr>
<tr>
<td>2</td>
<td>Sample 2</td>
<td></td>
<td>Soil</td>
<td>$PAHs$</td>
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Analysis Request

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3295
Hamilton 3240 New Zealand
T +64 7 858 3000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Received by: Kayley Stessell

Job No: 1943251
Date Rev: 14-Mar-18 08:03

CHAIN OF CUSTODY RECORD

Sent to
Hill Laboratories

Date & Time:

Name: 

Signature: 

Received at
Hill Laboratories

Date & Time:

Name: 

Signature: 

Condition

□ Room Temp  □ Closed  □ Frozen

Temp: 3.1

□ Sample & Analysis data checked

Signature: 

Priority □ Low  □ Normal  ✔ High

□ Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analytes specified on this quote is by 1200 hrs, 5 working days following day of receipt of the samples at the laboratory.

Requested Reporting Date: 

Quotated Sample Types

Soil (slurry), Ground Water (raw), TCLP Extract (TCPN), Building Material (raw)

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<th>No.</th>
<th>Sample Name</th>
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<th>Tests Required</th>
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<td>Heavy metals + Hg Multi-residue Pesticide Screen</td>
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<td>2</td>
<td>Sample 2</td>
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<tr>
<td>3</td>
<td>Sample 3</td>
<td>13/07/18 1040</td>
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</tr>
<tr>
<td>4</td>
<td>Sample 4</td>
<td>13/07/18 1045</td>
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<tr>
<td>5</td>
<td>Sample 5</td>
<td>13/07/18 1100</td>
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<td>6</td>
<td>Sample 6</td>
<td>13/07/18 1050</td>
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<td>13/07/18 1110</td>
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<td>8</td>
<td>Sample 8</td>
<td>13/07/18 1115</td>
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<td>Sample 10</td>
<td>13/07/18 1125</td>
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</table>
ANALYSIS REQUEST

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3295
Hamilton 3240 New Zealand
T: 09 608 HILL LAB (44 555 22)
T: +64 7 858 3200
E: mail@hill-labs.co.nz
W: www.hill-laboratories.com

Office use only
(Job No)

CHASE OF CUSTODY RECORD

Sent to
Hill Laboratories

Date & Time:

Tick if you require COC to be emailed back

Name:

Signature:

Received at
Hill Laboratories

Date & Time:

Name:

Signature:

Condition:

- Room Temp
- Chilled
- Frozen

Temp:

- Sample & Analysis details checked

Signature:

Priority

- Low
- Normal
- High

Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is 4-5 days, 5 working days following day of receipt of the samples at the laboratory.

Requested Reporting Date:

ADDITONAL INFORMATION

Quoted Sample Types

- Soil
- Ground Water (GW)
- TCLP Extract (TCLP)
- Building Material (BM)

<table>
<thead>
<tr>
<th>No.</th>
<th>Sample Name</th>
<th>Sample Date/Time</th>
<th>Sample Type</th>
<th>Tests Required</th>
<th>Heavy metals + Hg</th>
<th>Multi-residue Pesticide Screen</th>
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<td>1</td>
<td>Sample 11</td>
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<td>Multi-residue Pesticide Screen</td>
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<td>13/07/18 020</td>
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**Job Information Summary**

**Client Contact:**
Opus International Consultants Limited  
Lisa Bond  
C/- Opus International Consultants Limited  
PO Box 273  
Alexandra 8340

**Lab No:** 1943251  
**Date Registered:** 15-Mar-2018 9:42 am  
**Priority:** High  
**Quote No:** 82748  
**Order No:** 6-XZ2426.00 Napier Rd  
**Client Reference:**  
**Add. Client Ref:**  
**Submitted By:** Steve Darby  
**Charge To:** Opus International Consultants Limited  
**Target Date:** 21-Mar-2018 4:30 pm

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<td>Soil</td>
<td>GS00300</td>
<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
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<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
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</tr>
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</tr>
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<tr>
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<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
</tr>
<tr>
<td>8</td>
<td>Sample 8 13-Mar-2018 11:15 am</td>
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<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
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<tr>
<td>9</td>
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<td>Soil</td>
<td>GS00300</td>
<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
</tr>
<tr>
<td>10</td>
<td>Sample 10 13-Mar-2018 11:25 am</td>
<td>Soil</td>
<td>GS00300</td>
<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
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<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
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<tr>
<td>13</td>
<td>Sample 13 13-Mar-2018 11:45 am</td>
<td>Soil</td>
<td>GS00300</td>
<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
</tr>
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<td>Soil</td>
<td>GS00300</td>
<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
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<td>GS00300</td>
<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
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<td>Sample 18 13-Mar-2018 12:20 pm</td>
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<td>GS00300</td>
<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
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<tr>
<td>19</td>
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<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
</tr>
<tr>
<td>20</td>
<td>Sample 20 13-Mar-2018 10:20 am</td>
<td>Soil</td>
<td>GS00300</td>
<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS</td>
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<tr>
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<td>Sample 21 13-Mar-2018 1:00 pm</td>
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<td>Heavy Metals with Mercury; Screen Level; Multiresidue Pesticides in Soil samples by GCMS; Polycyclic Aromatic Hydrocarbons Screening in Soil</td>
</tr>
</tbody>
</table>
## SUMMARY OF METHODS

The following table(s) give a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples if insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

### Sample Type: Soil

<table>
<thead>
<tr>
<th>Test</th>
<th>Method Description</th>
<th>Default Detection Limit</th>
<th>Sample No</th>
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</thead>
<tbody>
<tr>
<td>Heavy Metals with Mercury, Screen Level</td>
<td>Dried sample, &lt; 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.</td>
<td>0.10 - 4 mg/kg dry wt</td>
<td>1-21</td>
</tr>
<tr>
<td>Multiresidue Pesticides in Soil samples by GCMS</td>
<td>Sonication extraction, GC-MS analysis. Tested on as received sample, then results corrected to a dry weight basis using the separate Dry Matter result.</td>
<td>0.003 - 0.06 mg/kg dry wt</td>
<td>1-21</td>
</tr>
<tr>
<td>Polycyclic Aromatic Hydrocarbons Screening in Soil</td>
<td>Sonication extraction, Dilution or SPE cleanup (if required). GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs 3786.2805.2695]</td>
<td>0.002 - 0.05 mg/kg dry wt</td>
<td>21</td>
</tr>
<tr>
<td>Dry Matter (Env)</td>
<td>Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.</td>
<td>0.10 g/100g as rcvd</td>
<td>1-21</td>
</tr>
<tr>
<td>Benzo(a)pyrene Potency Equivalency Factor (PEF) NES</td>
<td>BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment, 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.</td>
<td>0.002 mg/kg dry wt</td>
<td>21</td>
</tr>
<tr>
<td>Benzo(a)pyrene Toxic Equivalence (TEF)</td>
<td>BaP Toxic Equivalence calculated from Benz(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MIE, 1997).</td>
<td>0.002 mg/kg dry wt</td>
<td>21</td>
</tr>
</tbody>
</table>
## Certificate of Analysis

**Client:** Opus International Consultants Limited  
Lisa Bond  
C/- Opus International Consultants Limited  
PO Box 273  
Alexandra 9340

**Lab No:** 1943251  
**Date Received:** 14-Mar-2018  
**Date Reported:** 26-Mar-2018  
**Quote No:** 82748  
**Order No:**  
**Client Reference:** 6-XZ426.00 Napier Rd  
**Submitted By:** Steve Darby

<table>
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<tbody>
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<td>1943251.2</td>
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### Individual Tests

- **Dry Matter**  
g/100g as rcvd:  
69  72  63  73  74

- **Heavy Metals with Mercury, Screen Level**

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<tr>
<th>Element</th>
<th>Sample 1</th>
<th>Sample 2</th>
<th>Sample 3</th>
<th>Sample 4</th>
<th>Sample 5</th>
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<td>Total Recoverable Arsenic (mg/kg dry wt)</td>
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<td>Total Recoverable Copper (mg/kg dry wt)</td>
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### Multiresidue Pesticides in Soil samples by GCMS

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This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC MRA) this accreditation is internationally recognised.

The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.
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<td>Multiresidue Pesticides in Soil samples by GCMS</td>
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Lab No: 1943251 v 1

Hill Laboratories

Page 2 of 20
P a g e | 525

ITEM 13 - ATTACHMENT 1

PALMERSTON NORTH CITY COUNCIL


### Sample Type: Soil

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#### Item 13 - Attachment 1

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<th>Multi-residue Pesticides in Soil samples by GCMS</th>
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<td>Sample 5 13-Mar-2018 11:25 am</td>
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**Multiresidue Pesticides in Soil samples by GCMS**

**Cyperconazole** mg/kg dry wt: < 0.017, < 0.016, < 0.019, < 0.18, < 0.016

**Cyprodinil** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.006

**2,4-D** mg/kg dry wt: < 0.017, < 0.016, < 0.019, < 0.18, < 0.016

**4,4'-DDD** mg/kg dry wt: < 0.014, < 0.014, < 0.016, < 0.015, < 0.013

**2,4-DDE** mg/kg dry wt: < 0.014, < 0.014, < 0.016, < 0.015, < 0.013

**2,4-DDT** mg/kg dry wt: < 0.014, < 0.014, < 0.016, < 0.015, < 0.013

**4,4'-DDD** mg/kg dry wt: < 0.014, < 0.014, < 0.016, < 0.015, < 0.013

**Total DDT isomers** mg/kg dry wt: < 0.08, < 0.08, < 0.10, < 0.09, < 0.08

**Dimethoate (including Traionaltherin)** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Dimethomorph** mg/kg dry wt: < 0.017, < 0.016, < 0.019, < 0.18, < 0.016

**Diuron** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Dithiocarbamates** mg/kg dry wt: < 0.017, < 0.016, < 0.019, < 0.18, < 0.016

**Diofenylcarbochrome** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Endosulfan I** mg/kg dry wt: < 0.017, < 0.016, < 0.019, < 0.18, < 0.016

**Endosulfan II** mg/kg dry wt: < 0.017, < 0.016, < 0.019, < 0.18, < 0.016

**Endosulfan sulphate** mg/kg dry wt: < 0.017, < 0.016, < 0.019, < 0.18, < 0.016

**Endrin** mg/kg dry wt: < 0.017, < 0.016, < 0.019, < 0.18, < 0.016

**Endrin aldehyde** mg/kg dry wt: < 0.014, < 0.014, < 0.016, < 0.015, < 0.013

**Endrin ketone** mg/kg dry wt: < 0.014, < 0.014, < 0.016, < 0.015, < 0.013

**EPN** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Estersulfuron** mg/kg dry wt: < 0.012, < 0.012, < 0.014, < 0.13, < 0.011

**Ethion** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Ethenos** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Fenamiphos** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Fenamintol** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Fenoxycarb** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Fenpropathrin** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Fenpropirophon** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Fenpyrofos** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Fenthion** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Fenvanilat** mg/kg dry wt: < 0.012, < 0.012, < 0.014, < 0.13, < 0.011

**Fluazuron** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Fluometuron** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Furacetanil** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Methylmethoxy** mg/kg dry wt: < 0.009, < 0.008, < 0.010, < 0.09, < 0.008

**Haptotachl** mg/kg dry wt: < 0.014, < 0.014, < 0.016, < 0.015, < 0.013

**Haptotachlor epoxide** mg/kg dry wt: < 0.014, < 0.014, < 0.016, < 0.015, < 0.013

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**Lab No:** 1943251 v 1

**Hill Laboratories**

**Page 6 of 20**
### Sample Type: Soil

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<th>Sample Name</th>
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<td>&lt; 0.04</td>
<td>&lt; 0.05</td>
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<td>Indoxacarb mg/kg dry wt</td>
<td>&lt; 0.009</td>
<td>&lt; 0.008</td>
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<td>&lt; 0.004</td>
<td>&lt; 0.005</td>
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<td>&lt; 0.05</td>
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<td>Propazine mg/kg dry wt</td>
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<td>Propetamphos mg/kg dry wt</td>
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<td>Propiconazole mg/kg dry wt</td>
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**Lab No:** 1943251 V1
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**Sample Type:** Soil

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**Multiresidue Pesticides in Soil samples by GCMS**

- **Pyrimethanil** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.006 |
- **Pyriproxyfen** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Quintozone** mg/kg dry wt | < 0.017 | < 0.016 | < 0.019 | < 0.18 | < 0.016 |
- **Quinalfop-p-ethyl** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Simazine** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Simetryn** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Sulfentrazone** mg/kg dry wt | < 0.06 | < 0.04 | < 0.05 | < 0.17 | < 0.08 |
- **Sulfotep** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **TCMTB 2-(2-thiocyanoethylthio) benzothiazol,Butisan** mg/kg dry wt | < 0.017 | < 0.016 | < 0.019 | < 0.18 | < 0.016 |
- **Tebuconazole** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Tebufenpyrad** mg/kg dry wt | < 0.005 | < 0.004 | < 0.005 | < 0.005 | < 0.004 |
- **Terbacil** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Terbufos** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Terbutryn** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Tebuthiuron** mg/kg dry wt | < 0.005 | < 0.004 | < 0.005 | < 0.005 | < 0.004 |
- **Tebuthiuron-methyl** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Tebuchin** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Tebuzol** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Thiabendazole** mg/kg dry wt | < 0.06 | < 0.04 | < 0.05 | < 0.17 | < 0.08 |
- **Thiobencarb** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Thimet** mg/kg dry wt | < 0.017 | < 0.016 | < 0.019 | < 0.18 | < 0.016 |
- **Tolylfluanid** mg/kg dry wt | < 0.005 | < 0.004 | < 0.005 | < 0.005 | < 0.004 |
- **Triazinuron** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Triazophos** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Trifluralin** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |
- **Vinloozolin** mg/kg dry wt | < 0.009 | < 0.008 | < 0.010 | < 0.009 | < 0.008 |

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**Individual Tests**

- **Dry Matter:** g/100g as recvd
  - 67
  - 75
  - 66
  - 66
  - 69

- **Heavy Metals with Mercury, Screen Level**
  - **Total Recoverable Arsenic** mg/kg dry wt | 5 | 4 | 4 | 4 | 4 |
  - **Total Recoverable Cadmium** mg/kg dry wt | 0.18 | < 0.10 | 0.18 | 0.15 | 0.11 |
  - **Total Recoverable Chromium** mg/kg dry wt | 19 | 17 | 19 | 20 | 19 |
  - **Total Recoverable Copper** mg/kg dry wt | 14 | 10 | 15 | 12 | 12 |
  - **Total Recoverable Lead** mg/kg dry wt | 16.9 | 15.3 | 21 | 16.6 | 16.3 |
  - **Total Recoverable Mercury** mg/kg dry wt | < 0.10 | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
  - **Total Recoverable Nickel** mg/kg dry wt | 22 | 15 | 15 | 16 | 17 |
  - **Total Recoverable Zinc** mg/kg dry wt | 75 | 67 | 88 | 83 | 80 |

**Multiresidue Pesticides in Soil samples by GCMS**

- **Acetochlor** mg/kg dry wt | < 0.009 | < 0.008 | < 0.009 | < 0.009 | < 0.009 |
- **Alachlor** mg/kg dry wt | < 0.006 | < 0.006 | < 0.006 | < 0.006 | < 0.006 |
- **Aldrin** mg/kg dry wt | < 0.015 | < 0.013 | < 0.015 | < 0.015 | < 0.015 |
- **Atrazine** mg/kg dry wt | < 0.009 | < 0.008 | < 0.009 | < 0.009 | < 0.009 |
- **Atrazine-desethyl** mg/kg dry wt | < 0.009 | < 0.008 | < 0.009 | < 0.009 | < 0.009 |
- **Atrazine-desisopropyl** mg/kg dry wt | < 0.018 | < 0.016 | < 0.016 | < 0.018 | < 0.018 |
- **Azocyclonate** mg/kg dry wt | < 0.005 | < 0.004 | < 0.005 | < 0.005 | < 0.005 |
- **Azinphos-methyl** mg/kg dry wt | < 0.018 | < 0.016 | < 0.016 | < 0.018 | < 0.018 |
- **Benalaxyl** mg/kg dry wt | < 0.005 | < 0.004 | < 0.005 | < 0.005 | < 0.005 |
- **Bendiocarb** mg/kg dry wt | < 0.009 | < 0.008 | < 0.009 | < 0.009 | < 0.009 |
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<tr>
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<td></td>
<td>Dichlorlan</td>
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<td>Dichlorvos</td>
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<td>Multi-residue Pesticides in Soil samples by GCMS</td>
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<tr>
<td>Dieldrin mg/kg dry wt</td>
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<td>Endosulfan I mg/kg dry wt</td>
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<td>Hexazinone mg/kg dry wt</td>
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<td>Imazalil mg/kg dry wt</td>
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<td>Indoxacarb mg/kg dry wt</td>
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<td>Methamidophos mg/kg dry wt</td>
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<td>Methidathion mg/kg dry wt</td>
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<td>Methiocarb mg/kg dry wt</td>
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**Lab No:** 1943251 v 1 | **Hill Laboratories** | **Page 10 of 20**
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<td>Sample 14 13-Mar-2018 11:55 am</td>
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**Multiresidue Pesticides in Soil samples by GC/MS**

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## Item 13 - Attachment 1

### Multiresidue Pesticides in Soil samples by GCMS

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<td>1943251.11 1943251.12 1943251.13 1943251.14 1943251.15</td>
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<tr>
<td><strong>Sample Name:</strong></td>
<td>Sample 13-March-2018 11:30 am 11:30 am 11:45 am 11:55 am 12:15 pm</td>
</tr>
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<td><strong>Item 13</strong></td>
<td><strong>ATTACHMENT 1</strong></td>
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#### Thiofluzamide mg/kg dry wt
- 0.05
- 0.05
- 0.05
- 0.05
- 0.06

#### Thiofencarb mg/kg dry wt
- < 0.009
- < 0.009
- < 0.009
- < 0.009
- < 0.009

#### Thiram mg/kg dry wt
- < 0.009
- < 0.009
- < 0.009
- < 0.009
- < 0.009

#### Tolylfluanid mg/kg dry wt
- 0.005
- 0.005
- 0.005
- 0.005
- 0.005

#### Trichlofos mg/kg dry wt
- < 0.009
- < 0.009
- < 0.009
- < 0.009
- < 0.009

#### Trifluralin mg/kg dry wt
- < 0.009
- < 0.009
- < 0.009
- < 0.009
- < 0.009

#### Vinclozolin mg/kg dry wt
- < 0.009
- < 0.009
- < 0.009
- < 0.009
- < 0.009

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<td><strong>Lab Number:</strong></td>
<td>1943251.16 1943251.17 1943251.18 1943251.19 1943251.20</td>
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#### Individual Tests

- **Dry Matter**: g/100g as recvd
- **Heavy Metals with Mercury, Screen Level**
  - Total Recoverable Arsenic mg/kg dry wt: 4 4 4 4 4
  - Total Recoverable Cadmium mg/kg dry wt: 0.13 0.14 0.11 < 0.10 0.17
  - Total Recoverable Chromium mg/kg dry wt: 19 18 20 18 16
  - Total Recoverable Copper mg/kg dry wt: 12 15 12 10 20
  - Total Recoverable Lead mg/kg dry wt: 17.6 15.9 18.5 14.3 57
  - Total Recoverable Mercury mg/kg dry wt: < 0.10 < 0.10 < 0.10 < 0.10 0.22
  - Total Recoverable Nickel mg/kg dry wt: 16 13 16 15 12
  - Total Recoverable Zinc mg/kg dry wt: 84 74 79 64 107

#### Multiresidue Pesticides in Soil samples by GCMS

- **Acetochlor** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Alachlor** mg/kg dry wt: < 0.006 < 0.006 < 0.006 < 0.006 < 0.006
- **Aldrin** mg/kg dry wt: < 0.015 < 0.019 < 0.014 < 0.014 < 0.014
- **Atrazine** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Atrazine-desethyl** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Atrazine-desisopropyl** mg/kg dry wt: < 0.015 < 0.03 < 0.017 < 0.017 < 0.017
- **Aroclor** mg/kg dry wt: < 0.005 < 0.006 < 0.005 < 0.005 < 0.005
- **Asiphostus-methyl** mg/kg dry wt: < 0.018 < 0.03 < 0.017 < 0.017 < 0.017
- **Benzaldehyde** mg/kg dry wt: < 0.005 < 0.006 < 0.005 < 0.005 < 0.005
- **Bendiocarb** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Benomol** mg/kg dry wt: < 0.018 < 0.03 < 0.017 < 0.017 < 0.017
- **alpha-BHC** mg/kg dry wt: < 0.015 < 0.019 < 0.014 < 0.014 < 0.014
- **beta-BHC** mg/kg dry wt: < 0.015 < 0.019 < 0.014 < 0.014 < 0.014
- **delta-BHC** mg/kg dry wt: < 0.015 < 0.019 < 0.014 < 0.014 < 0.014
- **gamma-BHC (Lindane)** mg/kg dry wt: < 0.015 < 0.019 < 0.014 < 0.014 < 0.014
- **Bifenthrin** mg/kg dry wt: < 0.005 < 0.006 < 0.005 < 0.005 < 0.005
- **Bromacil** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Bromophos-ethyl** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Bromopropate** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Buprinopine** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Buprofezin** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Butachlor** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Captan** mg/kg dry wt: < 0.018 < 0.03 < 0.017 < 0.017 < 0.017
- **Carbaryl** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Carbofuran** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Carbofuran** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **Carbofuran** mg/kg dry wt: < 0.009 < 0.011 < 0.009 < 0.009 < 0.009
- **cis-Chlordane** mg/kg dry wt: < 0.015 < 0.019 < 0.014 < 0.014 < 0.014
- **trans-Chlordane** mg/kg dry wt: < 0.015 < 0.019 < 0.014 < 0.014 < 0.014

**Lab No:** 1943251 v 1

**Hill Laboratories**

**Page 12 of 20**
<table>
<thead>
<tr>
<th>Sample Type: Soil</th>
<th>Sample Name:</th>
<th>Sample 16</th>
<th>Sample 17</th>
<th>Sample 18</th>
<th>Sample 19</th>
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### Multiresidue Pesticides in Soil samples by GC/MS

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<th>Sample 17</th>
<th>Sample 18</th>
<th>Sample 19</th>
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<td>&lt; 0.04</td>
<td>&lt; 0.04</td>
<td>&lt; 0.04</td>
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<td>&lt; 0.012</td>
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**Lab No:** 1943251 v 1  **Hill Laboratories**  **Page 13 of 20**
## Sample Name: 469

### Sample Type: Soil

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### Item 13 - Attachment 1

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**Multi-residue Pesticides in Soil samples by GC/MS**

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**Sample Name:** Sample 21: 13-Mar-2018 1:00 pm

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**Individual Tests**

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### Item 13 - Attachment 1

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**Lab No:** 1943251 v 1  | **Hill Laboratories** | **Page 16 of 20**
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Lab No: 1943251 v 1  Hill Laboratories  Page 17 of 20
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<td>Multiresidue Pesticides in Soil samples by GCMS</td>
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### PALMERSTON NORTH CITY COUNCIL

**Sample Type:** Soil  
**Sample Name:**  
**Sample 21**  
**13-Mar-2018 1:00 pm**  
**Lab Number:** 1943251.21

#### Multiresidue Pesticides in Soil samples by GCMS

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#### Polycyclic Aromatic Hydrocarbons Screening in Soil

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#### Analyst’s Comments

It has been noted that the method performance for Paclobutrazol and Bilertanol for ONOP analysis is not acceptable therefore we are unable to report these compounds at this present time.
Summary of Methods

The following table(s) give(s) a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be submitted, or if the matrix requires that dilutions be performed during analysis.

<table>
<thead>
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<th>Sample Type: Soil</th>
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<tr>
<td><strong>Heavy Metals with Mercury, Screen Level</strong></td>
<td>Dried sample, &lt; 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complete with NES Regulations. ICP-MS screen level, Interference removal by Kinetic Energy Discrimination if required.</td>
<td>0.10 - 4 mg/kg dry wt</td>
<td>1-21</td>
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<tr>
<td><strong>Multiresidue Pesticides in Soil samples by GC/MS</strong></td>
<td>Sonication extraction, GC-MS analysis. Tested on as received sample, then results corrected to a dry weight basis using the separate Dry Matter result.</td>
<td>0.003 - 0.06 mg/kg dry wt</td>
<td>1-21</td>
</tr>
<tr>
<td><strong>Polycyclic Aromatic Hydrocarbons Screening in Soil</strong></td>
<td>Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.</td>
<td>0.002 - 0.05 mg/kg dry wt</td>
<td>21</td>
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<tr>
<td><strong>Dry Matter (Env)</strong></td>
<td>Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3500.</td>
<td>0.10 g/100g as rcvd</td>
<td>1-21</td>
</tr>
<tr>
<td><strong>Benzo[a]pyrene Potency Equivalency Factor (PEF) NES</strong></td>
<td>BAP Potency Equivalence calculated from Benzo[a]anthracene x 0.1 + Benzo[b]fluoranthene x 0.1 + Benzo[k]fluoranthene x 0.1 + Benzo[a]pyrene x 1 + Chrysene x 0.01 + Dibenzo[a,h]anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011: Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.</td>
<td>0.002 mg/kg dry wt</td>
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<tr>
<td><strong>Benzo[a]pyrene Toxic Equivalents (TEF)</strong></td>
<td>BAP Toxic Equivalents calculated from Benzo[a]anthracene x 0.1 + BaP x 1 + Benzo[b]fluoranthene x 0.1 + Benzo[k]fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo[a,h]anthracene x 1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (ME, 1997).</td>
<td>0.002 mg/kg dry wt</td>
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</table>

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Carole Rodgers-Carroll, BA, NZCS
Client Services Manager - Environmental

Lab No: 1943251 v 1   Hill Laboratories   Page 20 of 20
Appendix 8 – Landscape and Urban Design Report
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Document Details:
Date: 17 July 2019
Reference: 5-P1086.00
Status: Final

Prepared By

Stefan Steyn
Senior Landscape Architect

Reviewed By

PP for Nick Aiken
Urban Designer
Sector Leader – Environment and Planning

Approved for Release

Andrea Harris
Planning Work Group Manager
Contents

1. Introduction .................................................................................................................................1

2. Context 1
   2.1. Location ...............................................................................................................................1
   2.2. Landscape and Vegetation ..................................................................................................3
   2.3. Landuse and Activity .........................................................................................................4
   2.4. Views and Outlooks ..........................................................................................................5

3. Design Philosophy ....................................................................................................................5
   3.1. Design Philosophy .............................................................................................................5
   3.2. Urban Design Principles and Features .............................................................................6

4. Design Response .......................................................................................................................6
   4.1. Integration - Landscape .....................................................................................................6
   4.2. Arrangement - Regular Allotments for Legibility, Sightlines and Solar Access ............7
   4.3. Connectivity - Connected and Legible Streets and Pathways .........................................8
   4.4. Streetscape - Green Interface with SH3 ..........................................................................10
   4.5. Streetscape - Gateway Thresholds ..................................................................................13
   4.6. Streetscape - Street Trees and Thresholds .......................................................................14
   4.7. Streetscape - On-street parking ......................................................................................15
   4.8. Green Connections – Avenues and Edges ......................................................................15
   4.9. Green Connections - Raingardens ...................................................................................15
   4.10. Green Connections – Front Boundary Treatments .......................................................16
   4.11. Open Space (Escarpment and Oxbow Wetland) ............................................................16
   4.12. Safety - CPTED Principles ............................................................................................21

5. Design Outcomes ......................................................................................................................22

6. Conclusion ..................................................................................................................................23
## Document History and Status

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<th>Date</th>
<th>Author</th>
<th>Reviewed by</th>
<th>Approved by</th>
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## Revision Details

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1. Introduction

WSP Opus has been engaged by Palmerston North City Council to provide an Urban Design Report (report) on the proposed Napier Road Residential Extension Area. The purpose of the report is to provide an attractive medium density residential subdivision (for the purposes of this report the section sizes will be approximately 500 m²) that will create a sense of arrival to Palmerston North at this key threshold into the city.

2. Context

2.1. Location

The proposed site is located on the eastern outskirts of Palmerston North, approx. 4 km to the east of the city centre on the corner of SH3 and Roberts Line. To the north the site is bounded by the old river escarpment and oxbow, with the new Bupa retirement village forming the western edge to the site.
State Highway 3 provides the city’s primary connection to the north and east (Hastings, Napier and Gisborne). It is the principal access to the city from Hawke’s Bay for tourists and domestic travellers, and is the principal connecting route for residential and commercial uses in Ashhurst, Woodville and other smaller settlements in the Manawatū. Apart from a footpath on the eastern side of Roberts Line which terminates at SH3, there are a lack of pedestrian connections to the escarpment, oxbow, Napier Road subdivision and along SH3.
Existing State Highway and local road network

The immediate proximity of the Napier Road subdivision development to the east, together with other parks, green open space, natural features and rural landscape further afield, provide a range of recreational opportunities. The escarpment defines the northern extent of the site and the vegetative cover provides visual amenity to the locality. A permanent oxbow lake hidden from the surrounding landscape is one of a few oxbow wetlands along the toe of the escarpment. These natural features present an opportunity for future development that will not only enhance the character and amenity of this area as a whole but also create a high-quality setting for residential development.

View looking east (left) and west (right) along the proposed structure plan road frontage

2.2. Landscape and Vegetation

The escarpment in the north of the site gives a strong visual and physical edge to the area. Roberts Line forms the eastern boundary and State Highway 3 the southern boundary of the site respectively. To the west of Bupa the Main Drain defines the site.
Buildings of various sizes and character are spread alongside this part of State Highway 3 and throughout the site. Existing boundary hedges, shrubs and trees effectively soften the edge of this environment, and provide a vertical element that screen various commercial and farming activities. The greenery of the escarpment and the oxbow at its foot also contributes to the overall open space network as a northern edge landscape feature that also has recreational value.

Together this conveys a well-defined space with a general sense of enclosure to the north, south and east; but more open to the west.

Within the site the landscape itself is generally flat and typically lower than the road level of State Highway 3, but the escarpment can be viewed from various locations within it, and from the state highway. The oxbow wetland however will only be visible from adjacent residential properties and mainly from future sections and public walkways.

2.3. Landuse and Activity

A mix of commercial, farming and residential land use activities are located alongside SH3, with a resultant and corresponding range of characters. There is no established pattern of street frontage setbacks.

Most buildings are scattered throughout the site and positioned various distances from the front boundary with no common theme other than hedges along the property boundary.

Napier Road Residential Area is a new subdivision development located to the east of the proposed site. The development extending between Roberts Line and James Line is a medium to high density subdivision. It is currently under development and contributes to the expanding urban fringe. The Napier Road Residential Area development will have 1.8m timber noise fences fronting residential properties. A shared pedestrian-cycle path or track is proposed between the timber fences and SH3 with a narrow planted landscape buffer to help screen the fence and residential properties from the corridor. It is anticipated that the Napier Road Residential Area and proposed site would result in a change in character along SH3 from rural to urban residential.
Diagram showing the spatial relationship between the site (left) and Napier Road Residential Area (right)

View of existing timber noise fence at Napier Road Residential Area (left) and a mixture of low and tall front fences (right)

2.4. Views and Outlooks

Expansive views of the rural landscape to the east, south and west are available from the site. Views across the site from the SH3 corridor are currently limited by vegetation, but will become expansive once this vegetation is removed and residential development occurs. Views across the site from the top of the escarpment and any walking access on the escarpment are also expansive. Access to these views would increase if additional walking track facilities are placed on the escarpment. The site, when viewed from the top of the escarpment will appear part of a wider new urban area that will include the new retirement village (Bupa) to the west and new Napier Road Residential Area to the east, framed by the SH3 corridor and rural farmland beyond to the south.

3. Design Philosophy

3.1. Design Philosophy

The desired outcome for the site is to achieve an attractive medium density residential subdivision. The new development needs to respond to its position nestled between a high escarpment and a state highway corridor, and connected to existing or projected residential development to the east and west.
Elements required within the resultant residential development include a buffer with the state highway corridor that gives residential amenity both to the corridor for road users and also for residents within the subdivision. It is desirable that as much as possible the interface between these uses is mutually positive.

It is important to respect existing drainage and landform patterns. The existing oxbow remnant within the site is an important part of the existing stormwater drainage network, and gives important elements to site uniqueness. Emphasising local space and identity, and securing areas of green open space for amenity and recreation are desirable outcomes.

Walking and cycling opportunities within a resultant development and connection to adjacent developments have been identified as important.

3.2. Urban Design Principles and Features

A series of key urban design based principles for the structure plan area are identified as follows:

- Character and identity,
- Sense of ‘Place’ established and reinforced throughout,
- Custodianship (encouraged passive surveillance, feelings of ownership),
- Environmental responsiveness (e.g. solar gain, habitat),
- Connectivity (pedestrian, bike and vehicle),
- Recreation (green open space), and
- Crime Prevention Through Environmental Design (passive surveillance, custodianship, line-of-site, legibility, concealment opportunities, defensible space).

In achieving the above principles, the following features were identified as being sought by the proposed Napier Road Residential Extension Area:

- Medium density development,
- Positive relationship between residential properties and the SH3 corridor,
- Positive contribution to the arrival into Palmerston North from Ashhurst (transitioning between rural and urban),
- A green buffer and walk-cycle friendly edge along the SH3 frontage,
- Protected and enhanced remnant oxbow ‘wetland’ and escarpment to become a strong positive feature,
- Visual amenity benefits through visual connection to green open space,
- Incorporate elements of design uniqueness to develop a sense of ‘place’ and aesthetic for the area,
- Outdoor activity space provided for a range of ages, recognising typically smaller lot size in the subdivision, both within the reserve (passive play) and connections to it (walk-cycle path connections as safe as possible for range of ages),
- Provide attractive, convenient and legible walking and cycling connections through and around the subdivision and escarpment,
- Incorporate CPTED themes into the design and layout, and in particular achieve strong sight-lines from adjacent street and residential property for passive surveillance throughout the subdivision and across the proposed eastern reserve area, and
- Create strong edge definition for the subdivision to give a sense of community and neighbourhood.

4. Design Response

4.1. Integration - Landscape

The structure plan responds to its primary design objective to create a medium density subdivision layout that will achieve a high standard of amenity. The design seeks to respond to its location nestled between the escarpment and SH3. It draws on these elements to provide a strongly defined residential neighbourhood within a green edge, drawing on the vegetated escarpment buffer to the north and extending it around the new neighbourhood. The softened green edges give a sense of definition and ‘place’ through a buffer effect.
These enable the residential activities to be set back from the escarpment and potential amenity impacts of SH3, while still allowing both to ‘front’ those activities without the need for high boundary walls or fences.

The escarpment and proposed eastern reserve will have an important passive recreational function. The escarpment provides opportunities to eradicate exotic species and to establish a range of native plant species to reinforce the existing vegetative patterns and enhancement planting around the oxbow lake. Enhancement of the escarpment through planting will provide visual amenity for the site and give a positive backdrop to the area. The proposed eastern reserve at the foot of the escarpment plays an important role in providing ready access to open space. As such the use of quality design, materials and planting is of great importance.

Diagram showing the relationship between key characteristics and features of the site and the surrounding environment which include the escarpment and oxbow, stopbank and roading network

4.2. Arrangement - Regular Allotments for Legibility, Sightlines and Solar Access

Rectilinear lots and orientation will enhance the alignment of properties relative to the escarpment and SH3, optimise sightlines through the subdivision, and optimise access from the sun. The road layout has been designed to ensure the rear of the sections are typically facing the sun. This shape and alignment also make the location and arrangement of streets and walkways within the subdivision more logical and optimises the achievement of medium density.

Achieving strong consistency of property boundaries through minimum yard setback requirements will achieve the required sightlines. These will give a sense of visual connection between green spaces at the northern escarpment and western SH3 locations.

Strong lineal lot alignments will also simplify the location and servicing of underground utilities and make the street network more legible for users.
4.2.1. **Onsite Arrangement of Housing**

Building setbacks can be addressed by the existing District Plan provisions under R10.6.1.4.

A 20 m shade setback from the toe of the escarpment generally ties in with the 10 m no-built setback. The overlapping setback will not only protect buildings against the risk of escarpment failure but will also help to achieve solar gain. Housing should be orientated to maximise solar gain.

All properties with boundaries to roadways and areas of reserve shall have low fences installed on the boundaries. Street and park trees should be of a medium sized species that avoids excessive shading on residential properties.

20 m Shade setback from toe of escarpment and 20 m noise setback from State Highway 3. The 10 m no-built setback generally aligns with the 20 m shade setback.

4.3. **Connectivity - Connected and Legible Streets and Pathways**

Safe access to properties fronting the SH3 corridor is provided by an access road running approximately parallel to the escarpment and SH3, reinforcing the dominant natural east-west orientation of both of these features.
and edges of the new residential area. This orientation will be reinforced through standard front yard setbacks and continuous use of building lines, fences, roading elements such as lights, street trees and shrub planting.

The access road will be the main east-west connection through the site and will have two connections to SH3. Due to the small scale of the site it is expected that traffic volumes will be low. As such, a narrow road reserve and building setback is proposed. The total road reserve is to be 13.7 m wide, and provision should be made for a 2.1 m wide on-street carparking lane and a 1.6 m wide footpath along the residential edge. Other provisions should include the introduction of different paving materials at pedestrian crossing points and on street carparks; and the use of traffic calming devices.

View showing the existing service lane at Summerhill Drive (left) and an example of a narrow road reserve, on street carparking and low to medium fences

These features along the linear access road corridor will help mitigate the lack of topographical street edge definition and establish a strong and legible residential edge. The proposed buffer between the residential properties and SH3 will thus be made up of a 13.7 m wide road reserve, and 8.9 m wide green planted buffer including shared pedestrian-cycle lane. This will make a positive contribution to amenity and a sense of consistent frontage treatment. A similar effect is recommended for the new road frontage along Roberts Line. It’s important that tree species and low growing shrubs that facilitate clear line-of-sight beneath canopies are selected.

Lying perpendicular to the access road a new cul-de-sacs is proposed between the escarpment and the access road. Whilst the cul-de-sac will not connect physically with the oxbow and escarpment, it will be orientated to create a vista with these natural features. The central cul-de-sac will have a footpath and shared path that will provide direct pedestrian access between the road, oxbow reserve, escarpment and future walking tracks around the area.
4.4. Streetscape - Green Interface with SH3

Running adjacent to SH3, an 8.9m wide green buffer and the shared path within it will provide a strong edge definition to the subdivision. This also provides an opportunity to develop an attractive parkland style amenity buffer along the southern edge and the potential to add a positive feature to the state highway corridor and the main entry into Palmerston North.

The absence of such a buffer would likely result in attempts by residential properties to ‘protect’ themselves from the business of the SH3 corridor, with unattractive ‘tunnel’ like effects arising from long lines of tall front fences. It is recommended that front fences above 1.1m in height are prevented from establishment along the front of properties that face SH3.

An access road offset approximately 10 m from the edge of the state highway corridor will service properties that would otherwise front SH3. The green buffer and shared path will encourage residential properties to face the access road; avoid owners building back fences along their boundaries and controlling the appearance of property abutting the SH3 corridor, thus achieving both safe access and attractive road frontage to SH3. The
green buffer will provide the added benefit of a mini ‘green belt loop’ that connects Roberts Line, the new street loop by the retirement village, escarpment and the Napier Road Residential Area to the east. It is suggested that landscape planting along the Napier Road Residential Area frontage and the new extension area ‘green buffer’ should be selected to create a ‘boulevard’ feel via consistent tree planting. This will not only provide a unifying treatment along the state highway corridor but also enhance the image of this entrance into the city.

Low front fences and identified access road crossing points will facilitate logical and legible connections between the residential activity and the pathway within the buffer, encouraging use. Maintaining open sightlines between these activities will promote greater interaction and provide safety benefits through increased passive surveillance and overlooking opportunities.

492

Diagram showing the linear consistency and extent of the shared path and green buffer along the SH3 road frontage
Plan and cross section of the proposed access road and SH3 green buffer

The three oblique diagrams below show different viewing angles of the proposed interface between SH3, green landscape buffer, access road and the residential properties.
4.5. Streetscape – Gateway Thresholds

Gateways thresholds and entrance routes create a sense of arrival, provides the first impressions and create a positive visual environment for the community, travelling public and tourists.

In order to contribute to the arrival and how visitors and the community ‘experience’ this particular entrance into Palmerston North, a combination of high quality landscape features, built form and artwork should be located at the SH3 and Roberts Line intersection. A ‘landmark’ art installation in this location could be designed as a prominent visual element. This will make a significant contribution to the area achieving two goals – enhance the main entrance to the city and enhance local identity. These design interventions, when combined
with the green buffer will draw together all of these elements into a distinct and coherent gateway threshold feature.

Similarly, the two entranceway thresholds to the site should be used to express the transition from SH3 to the new development and signify to the travelling public their arrival to the subdivision. A combination of amenity planting, smaller artwork installations and bespoke fencing could be used to highlight the two entranceway thresholds into the site.

Future boulevard ‘Gateway’ opportunity is desired through the introduction of a matching green buffer on the southern side of the SH3 corridor could result in a open green and tree-lined boulevard entrance way Palmerston North. Although not part of this project, this could be done as part of any later development of land on the southern side of the corridor, or specifically to create a boulevard effect. As this area will be one of the first developments to be seen of the city by arriving travellers it has the potential to offer a positive first impression of the city.

4.6. **Streetscape - Street Trees and Thresholds**

Street trees are positioned along street corridors to create a low avenue effect and break up the potential visual dominance of building facades in a medium density environment. Positioning of trees in an avenue effect also reinforces the legibility of movement corridors.

A different species of flowering street tree is suggested for each street to create variation and uniqueness, and to further assist legibility. Native species such as Kowhai, Hoheria, and Titoki are suggested to provide alternate colour and suit ground conditions and climate.

Threshold planting bays can be designed into street intersections within the site and at the two intersections with SH3 and the retirement village respectively. Using small kerb and channel build-outs will reinforce traffic calming and make the vertical landscape elements provided by the streets trees more effective. Planting in these bays should be generally no more than 0.3m in height but should contain a single mid-sized specimen tree with a canopy that can be limbed to above 3.0m in height and positioned to minimise impact on sight-lines for road and pathway users.

*Example of planting and decorative materials at street intersection and pedestrian crossing*

Using colour and plant foliage variation within the planting bays should be used to give additional visual interest and a unique blend to the street network, and to further reinforce uniqueness and sense of ‘place’.
4.7. Streetscape - On-street parking

On-street carparks is an important design consideration, especially where slightly higher densities are proposed. The number and location of carparks throughout the subdivision can influence not just the function, but also the accessibility, identity and visual amenity of the area.

The structure plan suggests a similar approach, with planting at street parking bay edges to help their integration into the surrounding landscape. Trees of an appropriate scale should be included to provide shade and soften the carparks. Consideration should also be given to the use of coloured paving materials such as brick pavers within carparks to improve their appearance and amenity of the streetscape and assist in demarcating the parking bays from the vehicle lane. This combination of intermittent kerb build outs and paved parking bay sections at regular intervals between intersections will give a clearly residential urban character and assist with traffic calming.

Examples of on-street carparks with kerb buildouts, planting in change in paving materials

4.8. Green Connections – Avenues and Edges

The design and layout of native street trees in a formal, structured layout also provides the opportunity to reflect the nursery land use of the site.

In keeping with his theme, the structure plan proposes a series of specimen street trees to create a formal ‘avenue’ effect along either side of the shared walkway cycleway within the green buffer. This will give a highly visible feature along the SH3 edge of the development, increase the effectiveness of the amenity buffer with SH3, enhance the shared walkway cycleway, and contribute towards a local sense of place and identity.

The proposed planting will introduce trees and low growing shrubs to achieve the following:

- Create a parkland setting,
- Enhance the road frontage and shared path,
- Define the path,
- Linear street tree planting referencing the surrounding horticultural/ rural shelterbelts,
- Assist in filtering headlight glare along the access road from SH3,
- Provide sufficient height and human scale to integrate residential buildings,
- Improve shade and shelter for users of the path,
- Safety for private residents and public users,
- Provide a strong element of visual continuity along the road frontage; and
- Contribute to the sense that the wider subdivision is part of a connected whole.

4.9. Green Connections - Raingardens

Typically, the use of raingardens and other water sensitive design features should be encouraged, particularly within the road reserve, though it is recognised that this may not be achievable due to the low-lying nature of the site and potential of flooding. Such features should be investigated during engineering design of the subdivision to test their appropriateness.
Streetscape quality is strongly influenced by the way buildings and boundary treatments (edges) relate to each other and to the street. Edges and the public realm (such as berms and pathways) can add to or detract from character and identity. These spaces play an important role in establishing appropriate interfaces between land uses and activities. In this instance, the new green buffer, adjacent to the access road and new building frontages will become a primary highly visible urban edge for people arriving in Palmerston North. The use of riparian species and native species throughout the escarpment will reinforce the natural identity of the Manawatū River floodplains escarpment areas respectively.

4.10. Green Connections – Front Boundary Treatments

Many new subdivisions prevent or restrict front fencing through mechanisms such as restrictive covenants to improve amenity. Tall front fencing is generally undesirable on front boundaries as it inhibits visual connections between residential properties (indoor and outdoor) and the street, and can result in a ‘fortress’ or ‘tunnel’ effect. Tall front fencing is generally incompatible with commonly understood principals of good urban design and CPTED. Negative impacts of tall front fencing or other boundary treatment can be greater in higher density developments and adjacent to busy areas of the public realm such as transport corridors or parklands.

View of existing access road with low front fencing. The planted buffer on the right obstructs views of the access road and residential properties. Landscape planting which blocks natural surveillance is undesirable from a CPTED perspective

Fencing should be restricted to be as low and as visually permeable as possible. This will optimise overlooking of public space, minimise opportunity for graffiti, define private and defensible space while avoiding the dominating ‘fortress’ effect usually created by high front fences.

Siting of dwellings should be such that a small secondary fence or planted screening can still screen the side and rear sections to secure outdoor privacy, but not encouraging any high fencing in front of the dwelling or within the front yard setback. Dwellings should be designed and orientated to allow habitable spaces (windows) to front the street. Where garages with solid or blank walls are fronting the streetscape, a low hedge should be established on the boundary to partially screen the blank façade.

4.11. Open Space (Escarpmont and Oxbow Wetland)

Higher density developments require better access to high quality outdoor space. This both offsets the demand unable to be met onsite and withstand a higher intensity of use. Where open space is provided it should be of high quality and high amenity value. Such spaces should be front by road and public pathways as much as possible and boundaries with adjacent residential properties should only use fencing that is low and/or visually permeable.

This design concept is intended to provide active and passive outdoor space to support adjacent residential activity, as well as to provide a high level of visual amenity supporting an attractive subdivision development. Specific design features support recreation opportunity for a range of ages. The design is unique to this specific
location and references through landscape amenity and play opportunity the heritage of the Manawatū River and its oxbows.

The escarpment can be used for informal recreation activities such as walking. A small reserve located between the new access road and the escarpment is also incorporated that can be used for more active recreation activities.

The open space network will be central to the site and its location ensures that is accessible to all the residential properties throughout the site and neighbouring areas. It should be designed to act as the hub for pedestrian activities and lower-speed cycle activities through the subdivision.

Diagram of proposed open space network

4.11.1. Open Space - Eastern Reserve

A small reserve at the eastern extent of the subdivision is approximately 870 m² and will feature formed pathways on all four sides that connects the reserve with the escarpment, oxbow reserve and rest of the site. Both the escarpment and oxbow lake recreational areas will be unsuitable for active recreation activities due to the narrow shape of the setback and steep topography of the escarpment. Having a small flat reserve area will expand the recreational opportunities and contribute to the openness and visual amenity of the subdivision.

The reserve area will also connect the existing residential area at the top of the escarpment and walking tracks with the subdivision. It is recommended that landscape planting be provided along the northern, eastern and western boundaries of the reserve, providing some screening of adjacent properties while still preserving overlooking and passive surveillance opportunities.
4.11.1. Central Cul-de-Sac Green Link

A smaller green link is identified by the structure plan at the end of the new central cul-de-sac. The green link would act as a convenient access point to the oxbow and other open space network for residents and users of the shared path. Visibility throughout the site and green buffer is essential for safety, legibility and permeability. For this reason, the green link should provide an envelope not less than the width of the road corridor with a slight flare to their northern extent. A wide pedestrian link will not only create a sense of spaciousness but also provide high visibility between the shared path/green buffer and the escarpment, improving safety by increasing informal surveillance from passing traffic and dwellings. This physical and visual connection will also take advantage of outlooks from surrounding properties and residents towards the escarpment that may otherwise have been lost by the development of a narrow link.

The green link should be grassed and feature a wide shared pathway at the end of the cul de sac. Gateways to connecting pathways to the pathway network within the reserve should be encouraged.

Further reinforcing the quality of these recreation areas should be the use of high-quality infrastructure such as park furniture. Where possible these should represent a consistent theme or character of relevance to the locality. The use of higher quality materials and furniture will reflect positively on the development and enable it to withstand the higher level of use typical of open space within higher density developments. For this environment, a lesser amount of higher quality furniture is likely to be of more value than a greater amount of lower quality furniture. Given the proximity to the retirement village greater provision of seating and rest facilities should be considered.
4.11.2  Footpaths and Shared Walkways (Sealed Paths)

Currently there are no formal connections between the subdivision, rural area, eastern suburbs and the CBD. Therefore, a logical hierarchy of pedestrian linkages is set out in the structure plan. These include walkways, shared paths including cycleways and informal tracks. The pedestrian and cycle network, in particular the formal shared paths will improve connectivity within this part of the city and destinations beyond.

Pedestrian access is to be provided throughout the site for shared and pedestrian use in the form of sealed walkways. Along streets provision should be made for a footpath or a shared path to one side of the street. Walkways should be direct (pedestrians prefer direct short routes) and trees should be located to the side of the link with vegetation above eye level so as to preserve line of sight. To ensure the highest level of connectivity and safety 1.6m wide footpaths and 3m wide shared paths should be provided. Typical materials and finishes should include standard concrete, exposed aggregate and broom finish concrete. The potential to create higher amenity treatments at entry, gateway, threshold and intersections could include decorative inlays (timber, brick or coloured concrete) and sandblasted patterns. Lighting should be directed to the pathway (avoiding dark spaces between light-poles from ground to 2.0m in height) and avoiding nuisance to adjacent properties. Fencing to the side of these linkages should retain as much visually permeable fencing as possible (as in the example below).
4.11.3. Walking Tracks (Unsealed Paths)
A network of informal unsealed tracks at the foot of the escarpment and along the top should be developed to provide walkers with a variety of loop options of varying lengths throughout the amenity area. These tracks should physically connect the upper escarpment, small eastern reserve area and both the eastern and western ends of the oxbow reserve. Attention to design detail such as drainage, materials and surface finishes, seating, views to water and the wider landscape and signage should ensure the design is appropriate to the character of the subdivision. Typical materials should include compacted crushed limestone or loose metal with timber edgings. These connecting tracks should not only add walking and recreational benefits to the subdivision but also visual interest.

4.11.4. Oxbow Margins
A provision should be made to restore and enhance the edges of the wetlands with a 3 m wide buffer of low growing native plants. The buffer planting will help to protect the wetland, act as a nutrient filter for runoff from the surrounding land, provide habitat, control weeds and reduce maintenance. Suggested low-level natives include:

- *Apodanisia similis*
502

- Corex spp (C. disita, C. virgata, C. secta)
- Cordyline australis
- Isolepis nadosa
- Juncus spp
- Phormium tenax and Phormium cookianum

Diagram of new walking tracks

Diagram of existing and proposed footpath network

4.12. Safety - CPTED Principles

The structure plan openly seeks to cater for pedestrians and cyclists, and therefore incorporates features to address potential personal safety issues. In particular the layout and design achieves:

- Increased proximity and convenience of uses (open space, linkages and adjacent residential),
5. Design Outcomes

In response to the brief this Report has been prepared to identify and achieve the overarching intent of the design brief. The resultant design concept within the structure plan is deliberately aspirational with particular respect to urban amenity, identity and access to open space. It recognises that higher densities result in a greater demand for higher quality design and materials in the public realm.

The structure plan achieves:

Logical Arrangement

- Development that respects and works within the landscape,
- Strong visual connection to green and open space through proximity and protecting and creating viewshafts,
- Amenity landscape buffer with the SH3 corridor,
- Comprehensive urban planning approach to achieve visual and physical access to amenity space, and
- Development guidelines to ensure high quality design outcomes in particular for the public realm.

Integrated Green Connections, Streetscape and Open Space

- Walk-cycle opportunities for commuters and recreational user within the street network and high amenity natural open space around the Oxbow,
- High quality public realm with a strong interface with residential lots and integral to the overall design of the development,
- Identity and sense of place that emphasises and celebrates the escarpment and oxbow landforms to create uniqueness and visual interest, and
- Minimise impacts on the heritage oxbow landform.

Connectivity and Legibility

- Street, walkway and cycleway connections with convenient and legible connections to adjacent developments, and
- Continuity of development patterns that ensures the development forms part of the wider urban fabric and is not isolated by landscape and landuse-activity elements such as the escarpment and road corridors.
6. Conclusion

The approach to develop the site as a medium density residential subdivision has considerable merit from an urban design perspective. Through the evaluation of different development options, a preferred site layout has been achieved. The proposed layout has the potential to produce positive urban design outcomes that will improve the visual amenity of the location and road corridor for residents and visitors alike.
505

Appendix 9 – Recreation Assessment Memorandum
MEMORANDUM

TO Michael Duindam – Senior Planner Strategy and Planning
CC Aaron Phillips – Senior Parks Planner
DATE 17 July 2019
SUBJECT NAPIER ROAD PROPOSED PLAN CHANGE

Thank you for the opportunity to comment on the proposed plan change.

Recreation provision and need

1. Council policy is to aim to have reserves that include an overall size of at least 2,500 sq m with at least 1,000 sq m of flat open space within 500 m walking distance of all residential areas.

2. Among other criteria the flat open space part of the reserve should be of sufficient quality to allow for open space play e.g. a very long thin reserve that does not allow for groups of children to kick a ball around is unacceptable.

3. The nearest open space reserve is Lakemba Reserve – situated within the residential area at the top of the terrace above the proposed plan change area.

4. Approximately 16% of the residential area of the plan change area is within 500 m walking distance of Lakemba Reserve and 84% is 500 m to 1.3 km from Lakemba Reserve.

5. Alternative routes, outside the plan change area, marked in purple and green in Figure One have been assessed in an effort to improve accessibility to Lakemba Reserve.
   - The purple route, which would require negotiation with Kiwirail and a private land owner, does not improve the accessibility distance.
   - The green route would bring around a further 10 – 20% of the proposed residential area within the desired 500 m walking distance. It would require either purchase of a house or negotiation to purchase a 3 m wide walkway strip through a property. There appears to be only one property that could accommodate such a strip with some ease meaning weak negotiating position and lack of options.
   - It would also require some steep steps with a 12 m elevation over a 17 m length. This would necessitate the steps traversing the slope in a zig zag fashion.

While no detailed assessment has been carried out it is suggested this would be an expensive solution, even if it proved feasible which may be a challenge.
6. Given the lack of accessible flat open space to around 80% of the area proposed to be rezoned it is recommended that a neighbourhood reserve be included that:
   - Has a minimum of 1,000 sq m in a fairly regular shape.
   - The balance of the minimum reserve size of 2,500 sqm can be met by having the neighbourhood reserve joined to the vested stormwater areas (the remnant oxbow) and the amenity and walking opportunities it provides.

Concept plan comments

Neighbourhood Reserve:

7. The neighbourhood reserve as proposed in the draft Structure Plan is well located to maximise the 500 m walking distance catchment. It covers all of the plan change site.

8. While overlapping by 100m with the Lakemba Reserve catchment, it also picks up an area of the residential development occurring to the north west on Freedom Drive that was slightly outside the catchment of the Rodeo Drive Reserve thus improving the overall accessibility out side the site too.

A neighbourhood reserve measuring at least 1000m² is required. The land for the neighbourhood reserve must be flat (less than 7 degrees slope and at least 20m wide) to allow for paths and play space.
Walkways:

9. The Active Community plan 2018 notes:
   - Walkways, shared paths, cycleways and green corridors link to the wider transportation (roads, footpaths) network (Page 8).
   - Extend the walking and cycling network, including completing and upgrading parts of the existing network (Page 10).

10. The draft Structure Plan delivers on the Active Community Plan direction for walkways well.
11. The nature of the terrace and oxbow environment suit providing walking opportunities that are rare in much of the urban environment and the connections to the shared path along Napier road integrate the transport and recreation opportunities.
12. Our observations and experiences are that people prefer for loop walking opportunities. The oxbow and shared path create an opportunity for a loop walking opportunity.
13. While not continuous there are also reasonable connections to a wider networks with the
   - Napier Road Drain to Manawatu River connection,
   - planned off-road paths on Te Matai Road/Riverside Drive, and
   - the similar oxbow environments walkways to the north west, across Roberts Line.
14. One possible further opportunity could be taken. There is a stopbank at the western end of the site. Council often coordinate its recreation aspirations and developments with the Horizons Regional Council flood management work. There is potential for walkway connection associated with the stop bank as per Figure 3.
15. Experience is that neighbouring residential privacy is impacted where walkway run along the top of stop banks, essentially looking over privacy fences. This could be avoided if the Horizons Regional Council are seeking to have the stopbanks vested as public land and include a service access/capacity future proofing strip along the toe of the stopbank. It could then be feasible to have a walkway that skirts the base of the stop bank or only traverses the top in limited locations.
Biodiversity enhancement:

16. The Biodiversity Plan 2018 includes the actions and aims:
   - More native-friendly species are planted within the city, providing year-round food sources for native wildlife (Page 4).
   - Plant native bird friendly trees in Council reserves and roadsides, where appropriate. (Page 4).
   - Enhance freshwater bodies such as wetlands and urban streams, and provide more opportunities for people to interact with these sites” (Page 5).

17. The oxbow and associated terrace environment present and opportunity to further the aims of the Biodiversity Plan 2018.

18. We assume the Horizons Regional Council will provide guidance or requirements for the ecological protection and enhancement of the remnant oxbow.

19. A plan for the removal of pest plants and vegetation enhancement of the area would be useful.

Acquisition and development

20. The area under consideration for rezoning is not currently captured in Councils forward planning. No budgets for reserve acquisition and development have been identified in the 10 Year Plan or covered in the Development Contributions Policy.

21. The Parks division preference is for Council to undertake the development of the reserve and walkways rather than have them vested in a developed state. This would allow Council to ensure integrated development. This could be achieved by incorporating the area into the
next review of the Development Contributions Policy/10 Year Plan if the timing of the rezoning and subdivision will allow. The alternative might be to negotiate a developer agreement.

Aaron Phillips
Senior Parks Planner
Appendix 10 – Cultural Impact Assessment
Rangitāne o Manawatū
Tanenuiarangi Manawatū Incorporated
Cultural Impact Assessment
To
Palmerston North City Council
Proposed District Plan Change B:
Napier Road Residential Extension Area

Nā Siobhan Lynch- Karaitiana
Environmental Planner
Te Ao Turoa
June 26, 2019
Mihi

Te Mauri o Rangitāne o Manawatū
E inoi nei ki ngā whakatipuranga a Tanemutaramg
Kia tū whakapakari me matekitetia mō ngā rō ka
Hekemai mō te oranga tinana, oranga wairua
Tettei Kahurangi.
Whakatuwheratia o hā, me tō hinengaro toro atu
O ringa kia awhitia rātau mā i urumai i waenganui i a mātou,
Manaakitia te katoa ahakoa tō rātou karangatanga maha
Me kaha te tiaki kia pai ai ngā wawata,
Ngā moemoea.
Kia ūi ki ngā whakaharotanga
A o mātou Matua Tupuna.
Kia noho tonu a rātou wairua ki runga ki tēnā
Ki tēnā mō ake tūnui atu.
Ma Ihoa tō tātou piringa me te kaiarahi i runga i to haerenga.
CONTENTS

Introduction.......................................................................................................................... 4
Part One.................................................................................................................................. 5
Rangitāne o Manawatū: Mana Whenua....................................................................................... 5
Te Whanonga Pono a te Taiāo a Rangitāne o Manawatū............................................................... 8
Relevant Planning Framework................................................................................................. 10
Part Two................................................................................................................................... 11
Significant Sites Connected with the PDPCB........................................................................ 11
Part Three............................................................................................................................... 15
Cultural Effects and Recommendations................................................................................. 15
Bibliography............................................................................................................................ 16
INTRODUCTION

The Proposed District Plan Change B (PDPCB) is looking to rezone a portion of land adjacent to Napier Road and Roberts Line, from Industrial and Rural to Residential (Figure 1). The escarpment and Whakapokapoka Lagoon will become a Conservation and Amenity Area. The rezoning involves approximately 10.6 ha of land, and the creation of around 45-50 residential lots. Amended provisions in the District Plan will be required to manage specific issues within this site, Palmerston North City Council have requested a Cultural Values Assessment from Rangitāne o Manawatū (RoM) to inform this process. Tanenuiarangi Manawatū Incorporated (TMI) have been commissioned to provide this assessment on behalf Rangitāne o Manawatū (RoM).

The document is presented in three parts:

- Part One details the framework and values TMI operate under and represent on behalf of RoM.
- Part Two documents significant features in the RoM landscape including reference to settlements, resource harvesting grounds, and taonga species.
- Part Three makes recommendations for managing effects of the Plan Change, including submission on ways to maintain and enhance the mauri of the project area.

Figure 1: Napier Road Residential Extension Area.
This report is the intellectual property of TMI. PNCC can use this report for the associated PDPCB purposes, and shall consult with TMI if this report is going to be used for any other intent.

**PART ONE**

**Rangitāne o Manawatū: Mana Whenua**

The concept of mana whenua is a key to understanding the environmental management philosophies of Māori. Mana whenua as defined by the Resource Management Act (1991) is the customary authority exercised by an iwi in an identified area. It is the authority to control and manage an area or resource in relation to prescribed customary and cultural practices. The authority is obtained through the relationship of the people and their ancestral connection to the land. Rangitāne have maintained their authority over the area associated with PCPCB for over five hundred years. Rangitāne are the only iwi that have this relationship with the PCPCB area based on the above definition.

Rangitāne defended a large area of the Manawatū and developed into whānau based hapū that were responsible for controlling certain geographical areas and natural resources. The hapū and rohe boundaries (Figure 2) are outlined below.

**Ngāti Mairehau (Also known as Ngai Tuahuriri)**

Occupied the east bank of the Manawatu River between Turitea and Tokomaru, including over the Tararua Ranges to Pahiatua.

**Ngāti Te Kapuarangi**

Occupied areas surrounding the current city of Palmerston North.

**Ngāti Hineaute**

Occupied the land from Te Apiti to the northern boundary of Palmerston North City.
Ngāti Rangitāne (Also known as Ngāti Rangi)

Were based on land from the southern boundary of the City to the confluence of the Oroua and Manawatū Rivers.

Ngāti Rangiaranaki

Shared the riverbank from Te Apiti to Palmerston North with Ngāti Hineaute.

Ngāti Mutuahi

Were based on the area south west of Te Apiti particularly Te Wi.

Ngāti Tauira

A Rangitāne – Ngāti Apa hapū located around the Oroua River above Mangawhata extending to the Rangitikei River.
Figure 2: Rangitāne o Manawatū Rohe
Te Whanonga Pono a te Talao ē Rangitāne o Manawatū

Te Ao Māori

A Māori worldview is based on the holistic principle that all elements are interrelated. Every part of the environment is understood to have a common genealogy, descending from a common ancestor. The principle ancestors being Ranginui and Papatūānuku (Sky Father and Earth Mother). This genealogy places Māori people as descendants of the land and the environment they inhabit. It reinforces cultural identity and a deep connection to the land.

Tino rangatiratanga

Tino rangatiratanga is absolute sovereignty and self-determination, having ownership, rights, control over, and possession of Māori lands, waters, and taonga. Article Two of the Treaty guarantees Māori tino rangatiratanga, which is fundamental to Māori wellbeing.

Kaitiakitanga

A kaitiaki is a guardian. The process and practices mana whenua take in protecting the environment for future generations is known as kaitiakitanga. Kaitiakitanga is refereed to throughout the Resource Management Act, regional and local Policies.

Manaakitanga

Manaakitanga is the ability to express hospitality to manuhiri (guests), the community and to your whānau. In resource management demonstrating manaakitanga ensures that there is a healthy environment for all living things.
Wairuatanga

Wairuatanga is a Māori framework that acknowledges the coexistence of the physical and spiritual dimensions. Wairuatanga is an energy force that connects all aspects of life including the environment. Mana whenua continue to support the essence of wairuatanga through karakia, rituals and cultural practices.

Mauri

Mauri is the life force of all living and non-living things. Mauri is the essential quality and vitality of a being or entity. Mauri is used in assessing ecosystems subject to human ‘development’, any damage or contamination to the environment will affect the mauri that it possesses.

Taonga

Taonga are tangible and intangible components of Te Ao Māori. Taonga is anything that is of value or treasured including places, people, language, objects, flora and fauna.

Ki uta ki tai

A whole-of-landscape approach, understanding and managing interconnected resources and ecosystems from the mountains to the sea.

Mātauranga Māori

Mātauranga Māori is the knowledge, comprehension, or understanding of everything visible and invisible existing in the universe. Pūrākau and maramataka, forms of mātauranga Māori, comprise knowledge generated using methods and techniques developed independently from other knowledge systems.

Taonga tuku iho

Taonga tuku iho is the intergenerational transmission of Mātairanga Māori. Taonga are handed down from generation to generation.
Ritenga

Ritenga are everyday rituals and practices that sustain the well-being of people, communities and natural resources. Everything is balanced between regulated and de-regulated states; tapu is to be restricted or sacred with specific associated tikanga; rahui is to temporarily restrict; and noa is relaxed or unrestricted. Appropriate protocols such as karakia (prayer) can shift the regulation of states from being tapu to noa in appropriate situations.

Relevant Planning Frameworks

<table>
<thead>
<tr>
<th>Resource Management Act (RMA), 1991</th>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>RMA (1991) Part 2 Section 6(e)</td>
<td>Recognise and provide for the relationship of Māori to their significant sites, taonga and water.</td>
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<tr>
<td>RMA (1991) Part 2 Section 7(a)</td>
<td>Have regard for Kaitiakitanga.</td>
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<td>RMA (1991) Part 2 Section 8</td>
<td>Take into account the principles of the Treaty of Waitangi.</td>
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<th>Horizons Regional Council One Plan</th>
<th>Chapter 2: Te Ao Māori</th>
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<tbody>
<tr>
<td></td>
<td>OBJECTIVE 2-1: Resource Management</td>
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<tr>
<td></td>
<td>A. To have regard to the mauri of natural and physical resources to enable hapū and iwi to provide for their social, economic and cultural wellbeing.</td>
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<td></td>
<td>B. Kaitiakitanga must be given particular regard and the relationship of hapū and iwi with their ancestral lands, water, sites, waahi tapu and other taonga (including wahi tupuna) must be recognised and provided for through the resource management process.</td>
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<tr>
<th>PNCC District Plan, Section 2: City View Objectives.</th>
<th>OBJECTIVE 15: Active engagement from tangata whenua within resource management decisions.</th>
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<td>OBJECTIVE 16: The historic heritage of the City is researched, identified and preserved within the context of sustainable management.</td>
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<td>OBJECTIVE 17: The natural and cultural heritage features of the City are preserved and enhanced, including the margins of the Manawatu River and sites of significance to tangata whenua.</td>
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<td></td>
<td>OBJECTIVE 18: The characteristics and values of outstanding natural features and landscapes are: a. protected from inappropriate subdivision, use and development; and b. managed in a manner where all subdivision, use and</td>
</tr>
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</table>
PART TWO

The PDPCB area is located within a significant Rangitāne landscape known as Whakarongo. Whakarongo was a fierce, independent woman with a turbulent life story, her legacy is recognised in the naming of the area. Significant sites and taonga within Whakarongo associated with the PDPCB area are outlined below (Figure 3), including identification of the original name of the lagoon within the plan change area and its recognition as a waahi tapu to Rangitāne.

1. Tarakamuku Peak

A Rangitāne peak that sits above Whakarongo. It once held a signal fire to warn Whakarongo residents of invaders crossing the Tararua Range. It sits above the large pine forest block on North Range Road, now occupied by windmills. ‘Tara’ denotes the reference to its location within the Tararua Ranges, named after the son of Whātonga first Rangitāne explorer of the Manawatū ‘Ka muku’ means ‘will wipe, scrub or delete’.
2. **Awahuri and Oroua Tracks**

The loess covered terraces that look over the Manawatū River were covered by dense forests and wetlands that were impenetrable and could only be accessed by tracks created and used by Rangitāne. Two such tracks led westward from Whakarongo and joint up with pā from Ngāti Tauira, shared hapū between Rangitāne and Ngāti Apa.

3. **Te Wi Reserve**

Te Wi was a 650-acre area that encompassed Whakarongo, it was set aside for Rangitāne by Te Hiriwanui Kaimokopuna during Crown acquisition of the Te Ahu a Turanga block in 1864. Te Wi was occupied by Rangitāne up until the late 1800s when the final vestiges of individualised land titles were acquired by settlers. Whakapakapoka Lagoon was located on the north-western boundary of Te Wi Reserve.

4. **Whakapakapoka Lagoon**

Whakapakapoka Lagoon contained a significant set of resources for the local Rangitāne population. It was valued for wild foods, rongoa, construction and weaving resources. The lagoon was an important part of complex coordinated systems of Ritenga practiced across the Upper Manawatū.

5. **Whakapakapoka Stream**

Te Wi Reserve was backed on by Whakapakapoka Stream. Whakapakapoka Stream should be considered for renaming of Gasworks Drain.

6. **Te Wi/Te Matai Pā**

Te Wi was a fortified pā located in the heart of Whakarongo, in the vicinity of Te Matai Road. It was named after Wirimu (Wi) Te Mataitua, a Rangitāne ancestor.
7. **Whakarongo Pā**

The fortified pā was named after Whakarongo, tupuna of Te Hiriwanui Kaimokpuna. The pā was located on what was once the edge of the Manawatū River. The river channel was shifted ~1960s because it was cutting into private land titles. A degraded oxbow lagoon now remains, that connects hydrologically with Whakapokapoka Lagoon in heavy rains. The owner of the adjacent garden centre claims to have found old foundations that were exposed during the 1960s river works that were washed away in a flood the subsequent year.

8. **Whakapohepohe kainga**

The home of a small whānau grouping, adjacent to Te Whakarongoiti Stream and another significant lagoon.

9. **Mahinga kai**

Rangitāne lived throughout the landscape in temporary shelters travelling dependant on ritenga around resources and also maintained fortified pā for times of inter-iwi tension. Food from the waterways within Whakarongo included tuna (Eel) in particular, but also kokopu, inanga (Galaxias sp.), koura (freshwater crayfish), kākahī (mussel), and pātiki (black flounder). “The deep sluggish creeks that wound through the forest, the river-side lagoons and flax-choked swamps swarmed with eels and waterfowl, the groves of karaka and hinau were in season laden with fruit, and the dense bush gave shelter to myriads of pigeons, kaka, tui, weka and kiwi which frequent the river margins” (Peterson 1973:25). Each of these species are recorded as present in the landscape and as important mahinga kai resources in Rangitāne oral history. Food was stored on terraces and ridges to carry whānau through the winter months.

10. **Accidental Archaeological Discoveries**

RoM have a number of significant sites and wahi tapu in and around the affected area that will be directly and indirectly impacted by the proposed activity. This indicates that the area has significant chance of finding physical evidence of occupation.
Figure 3: Historic Rangitāne landscape.

PART THREE
Cultural Effects and Recommendations

Whakapokapoka Lagoon has been completely cleared of original indigenous vegetation and has associated extreme loss of faunal biodiversity. The migration of the lagoon across the landscape has been choked by land use practices associated with farming, and more recently the eastern and western arms have been disconnected by industry and housing development infill allowed to take place in the centre of the lagoon. The western portion of Whakapokapoka is contained within PDPCB. The western arm of the lagoon has significant issues with eutrophication (both algal and macrophyte blooms) and water clarity. Cultural health has been incredibly degraded over the previous centuries and surrounding land use activities continue to impact on Whakapokapoka Lagoon.

The identified housing development has the potential to further degrade Whakapokapoka Lagoon and irreversibly impact values associated with the waahi tapu if inappropriately managed. RoM propose recommendations to be incorporated into appropriate policies and objectives to manage and mitigate the cultural effects relating to housing development as a result of the plan change.
1. It is imperative that housing development not contribute to further degradation of RoM values outlined in Part 1 and 2 of this report, and instead seeks to protect and enhance cultural values associated with the area, including kaitiakitanga, enhancement of taonga, taonga tuku iho, mauri, and wairuatanga. In practice this would see the lagoon protected from housing development infill, and instead planted and valued as a recreation area.

2. Runoff from urban areas commonly includes plastics, hydrocarbons, faecal contaminants and heavy metals. Storm-water discharges will further degrade the mauri of the lagoon. All water entering Whakapokapoka resulting from the new subdivision should be treated to a high standard by biological or physical filtration prior to being discharged.

3. Building set back of ten meters in front of the lagoon is provided for in the PDPCB structure plan, this area will be contained within private ownership with only three meters required for riparian planting. Rangitāne do not support riparian boundaries in private ownership and strongly suggest the buffer be extended to at least five meters of planting to provide a higher level of treatment of overland flow.

4. Housing construction in the immediate area will introduce cats and dogs, these introduced animals will likely impact the current levels of indigenous biodiversity and be sources of contamination through runoff. This will impede RoM aspirations for faunal biodiversity enhancement and protection of mauri. RoM recommend there be restriction on cat and dog ownership in housing directly bordering the riparian edge of the lagoon.

5. There is a significant chance that archaeological evidence of Rangitāne tupuna could be disturbed during earthworks. The management of archaeological sites and finds should be done in accordance with the Historic Places Act (1993), and managed in conjunction with RoM.

6. It is important recovery of biodiversity for amenity purposes is done in a culturally responsive and integrated manner along-side mana whenua. A landscape management plan for the Conservation and Amenity Zone should be undertaken, treating the lagoon as a whole unit, rather than the piecemeal of individual land titles. The landscape management plan should seek to include the following key outcomes.

i. Protection and enhancement of cultural values including kaitiakitanga, taonga, taonga tuku iho, wairuatanga, and mauri.

ii. Restoration and protection of aquatic and wetland communities.

iii. Indigenous revegetation of the scarp using eco-sourced seed from Ashurst Domain and small adjacent bush remnants.

iv. Restoration of the Conservation Zone, Amenity Zone, and riparian edges of the lagoon undertaken in a manner consistent with the restoration of the eastern arm of Whakapokapoka.
BIBLIOGRAPHY


