Waikato DISTRICT COUNCIL
Te Kaunihera aa Takiwaa o Waikato

Open Meeting

To	Ngaruawahia Community Board
From	James Whetu Chairperson
Date	9 February 2017
Prepared by	Wanda Wright Committee Secretary
Chief Executive Approved	Y
Reference #	GOV0508
Report Title	Multipurpose Facilities Project

1. EXECUTIVE SUMMARY

Members of the Steering Group will provide further information on the attached Progress Report.

2. RECOMMENDATION

THAT the report from the Chairperson be received.

3. ATTACHMENTS

Progress Report

NGARUAWAHIA COMMUNITY FACILITIES PROJECT

A Position Paper of the Working Group

December 2016

1. Mihi

E nga mana e nga reo e rau rangatira ma.

Teenaa Koutou, Teenaa Koutou, Teenaa Koutou katoa.

2. Introduction:

This paper is to inform and support the Report by Council Staff to Counsellors of Waikato District Council on the proposed Ngaruawahia Community Facilities Project.

It is structured on the format of the Terms of Reference of the Group. It should be noted that the Group can only make recommendations and has no greater authority under the Local Government Act 2002.

3. Background:

The first meeting of the steering group was held 3 August 2016, at the Ngaruawahia Community House were:

Steering Group: Trina Koroheke, Maria Hamill, Glenda Raumati, Anne Ramsay, Shane Solomon, Jane Stevens, Wendy Diamond, Charlene Olsen, Eugene Patterson and Tracy Osborne, Jack Ayers

Also: Tim Harty (WDC), Sue Duignan (WDC), Helen Ritchie (Facilitator), Gavin Donald (GMD Consultants).

Council staff set the scene and explained the purpose of the project. In general terms there was a need for a permanent location for the Twin Rivers Arts Centre and that there is an opportunity to develop a community facility for Ngaruawahia. A Terms of Reference and Code of Conduct were discussed and subsequently agreed. (See attachment A)

There was also discussion and reference to work already done by WDC and GMD, in particular discussions with community groups and a mapping exercise. (See attachment B)

Over the course of the next few months' membership of the steering group changed, for example Eugene Patterson resigned when he was elected to Council and Maria Hamill withdrew because of work commitments, but the group continued on the mandate that this was a community driven initiative.

4. Terms of Reference:

- Create a vision for a community facility in Ngaruawahia.

  After discussion and consideration of a Vision for the project the group agreed the Vision would be;

"Connecting our community through creativity and knowledge – a legacy for the future – uniquely Ngaruawahia"

- Review existing information - needs assessment and map of location options.

The steering group did a needs assessment of the survey undertaken by WDC and GMD and considered that aspects of the needs of those groups surveyed fell outside the brief of this project and should be considered separately by WDC.

WDC gave a wide ambit to site selection, noting that Council owned property or private property can be considered. The majority view of the group was that the preference should be for Council owned land to mitigate cost, but alternative sites could be considered if costs were favourable and it met the brief of the project. It should be noted that a fuller cost analysis would be done at the next phase of the project. The group considered a number of locations, including all Council owned lands as well as privately owned lands.

Central also to site selection was location, visibility and accessibility of a community facility. There was consensus agreement that the location should be a central hub within the Town's main commercial precinct from Market Street, Main Road and Galileo Street. The map provided by WDC indicated 3 locations;

a. The current site of the Library and the old Farmers Building.
b. The existing Plunkett site and adjoining car park.
c. The War Memorial Hall and the old Town Hall site.

Option (a) included the possibility of purchasing private land on which the Waipa Tavern is located and reconfiguring the Library and the old Farmers land where the Twin Rivers Arts Centre first occupied.

Option (b) included consideration of purchasing privately owned property beside and behind the Plunkett building. It was noted that this site had an endowment caveat as lands gifted for a specific purpose.

Option (c) also has an endowment caveat and consideration was given to linking the vacant ASB site.

All options posed issues around reconfiguring a foot print that met all of the criteria of an optimal location, for example purchasing the Waipa Tavern for option (a). Purchasing private lands for option (b) and (c) and how to repurpose existing council owned buildings.

(Again, to note there has been no analysis of costs, compliance or legal considerations on the options).

- Confirm needs.

  The group caucused the needs of the community and how the proposed facility could service and deliver on these needs.

  Involved in the discussion was Ange ? from the Ngaruawahia Library. She indicated that the Library was very keen to be involved in the project and that the current Library facility was no longer fit for purpose. She outlined the thinking from a Library perspective of what the needs of the Library would be and how they would fit into a multipurpose venue as follows;

  I. An interactive learning space, similar to the upgraded Huntly Library.
  II. "Stations" that tell the history of the town.
  III. Multimedia e.g. QR codes and mobile phone apps.
  IV. Living story telling facilities.
  V. Agree with the hub concept.
  VI. Looking to move past books as the only medium of knowledge repository.
  VII. An opportunity for shared services with other tenants of the facility.

  (She indicated the refurbishment of Huntly Library was approx $300 000.)

  Twin Rivers Arts Centre gave an indication of their needs;

  I. Covers creativity, knowledge, youth, multimedia platforms.
  II. Goes right across the spectrum of arts from musical, visual and performance.
  III. A good fit with the Library and youth.
  IV. Indoor-outdoor flow to encourage a bigger range of activities and events.
  V. Multipurpose furniture.
  VI. Enough space (including a wet space) and storage.
  VII. Good accessibility.
  VIII. Income generating potential, e.g. hireage and rental studios.
  IX. Shared services with Library.
  X. Staging development of facility to allow for expansion and future proofing.

  Two key factors were identified:

1. How will operating costs be funded and sustained.
2. The vision is for a multi-purpose and future proofed facility.

- Explore and refine options for appropriate locations, including co-location of community services.

  The group refined the options for an appropriate location through a process of elimination. The Princess Street site (private lands) would be too expensive. The Old Bakery (private lands) was not practical and the Grants Building (private lands) was not practical. Existing Plunkett site required purchase of an existing business.

The options left for consideration were:

A. Waipa Hotel/Library/Old Farmers Building location; or
B. The War Memorial/Old Town Hall site.

Questions from the group in determination of a preferred site to WDC are;

- How much will each option cost?
- What has the LTP committed to the Library?
- How much does WDC have available for the project?

- Help design and conduct consultation with the wider community, incorporating their feedback into the planning process

Critical and essential to the process being community owned and mandated is consultation and feedback with the Ngaruawahia community was a requirement from the group and WDC. An open day was run on 4th December during the Ngaruawahia Christmas Parade seeking views and comments from the public and a collation and summary of written feedback is attached. (See attachment C.)

In summary, the key themes from the feedback are;

Repurpose an existing WDC owned site
Central location
Future proof design
Culture
Creativity
Youth space/ programmes

A delegation from the group also gave a verbal update on progress to the Ngaruawahia Community Board December meeting.

- Develop a recommendation to WDC.

From the groups final meeting the following recommendations to WDC were agreed;

1. Waipa site including Library.
2. War Memorial and Old Town Hall site.
3. Continue Group as part of the next phase.
4. Re house Twin Rivers Arts Centre into the War Memorial Hall on a pepper corn rental as an interim measure.

5. Next Steps:

Present recommendation to Waikato District Council in February 2017.

6. Acknowledgements

The Steering Group acknowledge the initiative and support of Waikato District Council in establishing a Steering Group from the Ngaruawahia community *"who can identify with the community and bring their needs through to a shortlist of activities that need to be accommodated within a community facility in Ngaruawahia."* (Ref: email from GMD Consultants 27/6/2016).

The Facilitation of the Group by Helen Ritchie who kept a focus on the task at hand etc.

GMD Consultants and Council Staff....etc.

Waikato DISTRICT COUNCIL
Te Kaunihera aa Takiwaa o Waikato

Open Meeting

To	Ngaruawahia Community Board
From	Tim Harty General Manager Service Delivery
Date	7 February 2017
Prepared by	Elton Parata Acting Parks & Facilities Manager
Chief Executive Approved	Y
Reference #	NCB2017 – 14/02/2017
Report Title	Development of Te Mana o Te Rangi Reserve

EXECUTIVE SUMMARY

At its meeting on 8 November 2016, the Ngaruawahia Community Board resolved to "partner with Council to develop an agreed process for collaborating with the community for the development of Te Mana o Te Rangi Reserve."

This report outlines some considerations relating to the reserve and seeks direction from the Board as to the preferred approach for partnering with Council to meet the deadlines of the 2017/20 Long Term Plan

RECOMMENDATION

THAT the report from the General Manager Service Delivery *-Development of the Te Mana o Te Rangi Reserve-* be received;

AND THAT the Ngaruawahia Community Board determine which is the preferred option for the Board to engage with Council on.

BACKGROUND

3.1 TE MANA O TE RANGI RESERVE

Te Mana o Te Rangi Reserve was named last year after a long period of being informally referred to as 'the old dump site'. The reserve forms part of Council's approved and operative Neighbourhoods Reserve Management Plan 2016.

The Ngaruawahia Community Board expressed an interest in this site as a key gateway into Ngaruawahia and considers it worthy of beautification.

3.2 LANDFILL AFTERCARE MANAGEMENT PLAN (DRAFT)

As part of the operation of the old landfill site, Council has developed a Landfill Aftercare Management Plan (LAMP). The LAMP identifies a number of issues that need to be considered when developing the site. As the full LAMP document contains approximately 60 pages of information (attached) the key parts have been summarised below:

- Landfilling ceased in approximately 1990 when the landfill was full.
- The landfill is reported to have been covered with a soil cap to a depth of 1-2 metres after landfilling was completed. Remedial works to level the landfill surface and/or improve the cap were carried out in 1995, 2005, 2006 and 2007.
- In addition to standard planning, community, safety and building control considerations, any proposed use of the Ngaruawahia closed landfill should be assessed in terms of the matters discussed in the LAMP, with particular emphasis on:
    - The sensitivity of the proposed use to landfill conditions (primarily landfill gas and land stability);
    - Whether the proposed development has the potential to adversely impact upon landfill management, damage the cap or surface drainage system, or result in increased generation/release of leachate of landfill gas;
    - Whether increased monitoring or additional mitigation measures may be required if the proposed development proceeds;
    - Effect of landfill gas on land use. For example, it is noted that any structures to be built on the site would require specific design to ensure that landfill gas migration into the building does not occur, that the landfill cap is not adversely affected (in particular by inappropriate foundation design, or due to the load of the building itself), and that the ground at the proposed building location is geotechnically suitable for construction.
- There is also a Closed Landfill Guide which includes recommendations regarding vegetation on closed landfills. In summary, it recommends and contains:
    - Appropriate soil management to prevent issues such as compaction of topsoil;
    - Use of grass for landfill cover in the early period after landfill closure, with the choice of grass species to be based on site-specific factors and on advice from pastoral experts;
    - Use of fertiliser, soil analysis and irrigation as required to manage the nutrient and water requirements of the vegetation;
    - Gradual establishment of any larger vegetation, which should generally begin no fewer than 20 years after the landfill is closed, with a minimum of 150mm of topsoil required to establish vegetation other than grass;
    - Use of low planting to allow plants to establish. Plants on landfills are commonly adversely affected by carbon dioxide from the landfill gas and may be hard to establish;
    - A suggested progression for establishment of larger vegetation (up to and including trees), and a list of recommended native plant species are also included in the Closed Landfill Guide;
    - Other studies suggest that plants with shallow root systems should be selected for planting on landfills where possible, and that wind tolerance should also be considered.
- The Landfill vents were removed from the site in 2016 following confirmation that they were no longer venting gas to atmosphere.

- Waikato District Council adopted a Neighbourhood Parks Management Plan which was prepared in accordance with the Reserves Act 1977 and following public consultation. This document includes a Management plan specific to Te Mana o Te Rangi Reserve. It includes a policy that a landscape plan shall be produced and implemented.

3.3 MAPLE TREES

In 2016 a number of Maple trees were planted along the edge of the reserve. Council's Arborist has provided an update regarding the condition of these trees (as at late January 2017). Approximately 14 trees have died, and 13 are still in good health. Relocation of the living trees will need to occur when they are dormant during the May to August period. An alternative location has not been confirmed but a nearby location is preferred to minimise cost. The trees that have died will be removed within the coming weeks.

The Community Board and Council staff have a desire to work together to develop the reserve.

4. DISCUSSION AND ANALYSIS OF OPTIONS

4.1 DISCUSSION

This report seeks to understand the way the Community Board would like to proceed with the development of the reserve, taking into account the challenges for this particular site.

The challenges include:

- Considerations identified and outlined within the LAMP
- Limited funding (this is not currently a funded project - there may be an opportunity to work together to prepare a proposal for LTP funding)
- Agreeing the best approach for collaborating with the community.

4.2 OPTIONS

There are two options**:**

Option 1: Form a working group of Council staff and nominated Board representatives tasked to develop a roadmap for the site. This might include collaborating with the Board and the community to consider factors such as the required timeframes, implications of the LAMP and financial challenges.

Option 2: The full Community Board be involved with Council staff and run workshops to develop a plan for the site.

5. CONSIDERATION

5.1 FINANCIAL

No budget currently exists for the physical development of Te Mana o Te Rangi Reserve.

To ensure that the timeframes of the upcoming LTP process are met, any outcome of this work will need to be completed by July 2017.

6. CONCLUSION

This report discusses some of the considerations associated with developing Te Mana o Te Rangi reserve.

The Community Board and Council staff have a desire to work together to develop the reserve. Direction is sought from the Board as to a preferred approach, noting the site and funding and timing constraints.

7. ATTACHMENTS

- Neighbourhood Reserves Management Plan 2016
- LAMP

Ngaruawahia Closed Landfill

Landfill Aftercare Management Plan

Date of Issue: Jan 2017

Revision: Draft for Consent Hearing

2	19 January 2017		Draft for Consent Hearing	Babbage/WDC	Aecom
1	November 2016		Final Draft	Babbage/WDC	Aecom
Issue	**Date**	**ECM Ref.**	**Status**	**Prepared By**	**Reviewed By**

Waikato DISTRICT COUNCIL
Te Kaunihera aa Takiwaa o Waikato

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APPENDICES

1.0 INTRODUCTION AND SCOPE

1.1 BACKGROUND

Babbage Consultants Ltd (Babbage) was engaged by Waikato District Council (WDC – see Glossary in Appendix A) to prepare this *Landfill Aftercare Management Plan* (LAMP) for the closed landfill located on Great South Rd, Ngaruawahia. The landfill location is shown in Drawing 50784/GE01 in Appendix B. The effects of landfill gas and leachate discharges from the closed landfill have been investigated by Beca, MWH, and Babbage, as detailed in the following reports:

- *Ngaruawahia Landfill Gas Monitoring – 2007* (Beca 2007, included in Appendix C) and *Ngaruawahia Landfill Gas Testing* (Beca 2008, included in Appendix C), prepared by Beca Infrastructure Ltd for WDC, May 2007 and February 2008, respectively.
- *Ngaruawahia Closed Landfill Assessment of Effects of Leachate and Landfill Gas Discharges* (MWH 2010, attached as Appendix C) prepared by MWH for WDC, September 2010. Note that the above Beca reports are attached to the MWH 2010 report as Appendices D and E.
- *Ngaruawahia Closed Landfill: Atmospheric Methane Monitoring Report*, (Babbage 2015, attached as Appendix D) prepared by Babbage for WDC, June 2015. This report also includes results of previous ground and ground gas investigations carried out by Babbage in Appendix C.

The findings of these investigations were used to quantify the effects of and risks arising from the discharges of landfill gas and leachate into the ground on nearby land use, and ground and surface water quality respectively.

This LAMP has been prepared to inform the on-going management of the closed landfill by WDC, and to support resource consent applications made to Waikato Regional Council (WRC) for on-going discharges of landfill gas and leachate into the ground from the closed landfill. Once granted, the consent is to be attached to this LAMP as Appendix E

This version of the LAMP (Final draft) has been amended to reflect the fact that some of the consultation and other work required has already been completed, and to incorporate additional monitoring requirements proposed by WRC and their consultants.

1.2 SCOPE

This LAMP includes and relies upon the findings of the above-mentioned investigations at and around the closed landfill, summarises the adverse environmental effects of the on-going discharges from the closed landfill and outlines the remedial and management measures considered necessary to ensure that the effects of discharges from the landfill are no more than minor.

This report covers the following aspects of management and monitoring for that part of the closed landfill located on WDC-owned land, as described in Section 2.1:

- Details of the site (Section 2.0);
- Discharges of contaminants (landfill gas and leachate) known to be occurring (Section 3.0);
- Management responsibilities (Section 4.0);
- Risk management (Section 5.0);
- Monitoring programmes for the landfill surface and landfill gas and leachate discharges, including reporting and review requirements (Section 6.0);
- Contingency procedures to be implemented if trigger levels are exceeded (Section 7.0);
- General site maintenance and future uses (Section 8.0).

1.3 NOTES ON GEOGRAPHICAL REFERENCES AND UNITS

To simplify geographical references, in this report 'north' means the direction perpendicular to Great South Rd (specifically, the section of Great South Rd between Belt St and North St), towards the Waikato River.

A number of different units are used to report gas concentrations. The most common units are **parts per million (ppm)** and **percentage concentration (%)**, both of which are based on volume ratios (v/v). Additionally, methane concentrations are frequently reported in relation to the minimum concentration at which methane may be flammable (percent of the lower flammable limit or **% LFL**). An example unit conversion for methane is below:

100% of LFL = 5% (v/v) = 50,000 ppm

2.0 THE SITE

2.1 LOCATION AND DESCRIPTION

The closed Ngaruawahia landfill is located south of Great South Rd (formerly State Highway 1), between Great South Rd and the North Island Main Trunk (NIMT) railway line. As shown on Drawing 50784/GE01 (Appendix B), the closed landfill extends from near North St in the east to 159 Great South Rd (the current fuel station) in the west. However, only the part of the former landfill east of Ellery St, which is owned by WDC, is considered in this report. This approximately 5.2 ha of land is vested as a Recreation Reserve and is legally described as Section 1, SO 305281.

This report also considers the area to the north of the landfill which is considered to be potentially affected by landfill gas ("LFG-affected area"). This area is marked in red on Drawing 50784/GE01 in Appendix G. In general, a property was considered to be "affected" if methane was detected or inferred to be present at 1% or more at 1.5 m depth or shallower within that property. A detailed explanation of this issue is given in the letter in Appendix G. LFG-affected area is also defined in the Glossary in Appendix A.

2.2 HISTORY

Historical aerial photographs (see Figure 1 and drawings/photographs in Appendix B)[1] show the site was a gravel/sand extraction pit, which was progressively filled beginning in or about 1955. Filling began at the western end of the pit (near 159 Great South Rd) and progressed towards the east. The landfill is unlined and received municipal and commercial refuse from the general area, including Hamilton and nearby towns. Landfilling ceased in approximately 1990 when the landfill was full.

The landfill is reported to have been covered with a soil cap to a depth of 1-2 m after landfilling was completed (Beca 2007). Remedial works to level the landfill surface and/or improve the cap were carried out in 1995, 2005, 2006 and 2007 (MWH 2010, Section 2.2.2.6). An example of these works can apparently be seen in the 2006 aerial photograph in Appendix B.

[1] Aerial photographs taken from the National Library's *Timeframes* database. (Available online at timeframes.natlib.govt.nz) and the WDC geographic information system (GIS) viewer (available online at https://www.waikatodistrict.govt.nz/Online-Services/Maps-online.aspx)

Ten gas vents were installed along the centreline of the landfill (running east-west) to allow gas to vent directly to the atmosphere. However, no gas drainage system was installed under the landfill cap to the vents (MWH 2010, Section 3.1), significantly limiting the effectiveness of these vents. The vents were removed in late 2015.

The landfill has been completely closed for 25 years and the earlier-filled western part of the landfill has been closed for some 40+ years. Landfill gas production is expected to have peaked some 25+ years ago during active landfilling and is now expected to be very low and continuing to decline (see Section 3.1).

Figure 1 – 2009 aerial photo. The area now owned by WDC (rectangular) which this application is related to and 159 Great South Rd (triangular, outside of the scope of this Resource Consent) are marked.

2.3 LAND USE

The Waikato District Plan[2] (Map 20.6) shows that the part of the former landfill to which this report relates is zoned as Living. However, a designation "Landfill/Proposed Recreation Reserve" applies to the site.

[2] Available online at https://www.waikatodistrict.govt.nz/district-plan.aspx

At the time of LAMP preparation, the site was vacant and the landfill cap surface was being maintained as mown grass. A number of trees are present in the western (older) part of the former landfill which is used as an off-leash dog exercise area.

Land surrounding the landfill is largely zoned as Living, although a small number of properties have various other zonings, and the NIMT railway line has a designation relating to this use.

Land-uses surrounding the part of the closed landfill owned by WDC are generally as follows:

- **North**: the Great South Rd carriageway. Most of the properties on the northern side of Great South Rd are residential. However:
    - a Catholic church and school are located at the corner of Belt St and Great South Rd;
    - 142 Great South Rd is a former motor vehicle workshop, now used as a boxing club gym; and
    - The ground floor of the buildings at 150 Great South Rd is occupied by a small supermarket, with a dwelling upstairs.
- **East**: vacant land (in grass) which is not owned by WDC. This land is zoned as Light Industrial.
- **South**: the NIMT railway line, beyond which are:
    - Near the western part of the former landfill, a small number of residential properties on Whatawhata Ave and Struve St;
    - Near the central part of the landfill, sports grounds, including the clubrooms near Uenuku St (rugby league club);
    - Near the eastern part of the landfill (east of Uenuku St), a large property which contains only 3-4 buildings. The use of these buildings is not known as access to this property was not granted during site investigations, and the buildings are not clearly visible from the boundary.
- **West**: the Ellery St carriageway, beyond which is a fuel station.

2.4 GEOLOGY AND UNDERGROUND SERVICES

The closed landfill is located between and near the confluence of the Waikato and Waipa Rivers. The alluvial deposits (predominantly sands, silts and gravels) that form the soils near the landfill are expected to be horizontally bedded, laterally discontinuous and of variable permeability. Horizontal bedding of these alluvial deposits is expected to result in the vertical gas permeability of these soils being substantially less than horizontal gas permeability, impeding landfill gas migration to the ground surface near the landfill.

The observation of wet soil layers and perched groundwater close to the ground surface to the north of the landfill during late summer (see Babbage 2015, in particular Appendix D) confirms the presence of shallow confining (low permeability) layer(s) that would impede the vertical migration of methane to the ground surface near the landfill.

Regional groundwater is approximately 11 m below ground level and below the base of the closed landfill, which is estimated to be approximately 6 m below ground level. Due to its depth the regional groundwater is not a barrier to the movement of landfill gas in soil near the closed landfill.

Permeable backfill material around underground services can act as a preferential pathway for landfill gas migration. The locations of underground services known to be present to the north of the landfill are shown in Drawings 50784/GE02 and GE03 in Appendix B. Note that some of the plans provided by utility owners[3] appear to be incomplete, and **hence the attached Drawings should not be used for excavation or construction**. The Drawings show:

- The main **sewer** line runs approximately east-west, and is typically 50-80 m north of Great South Rd.
- The **water supply** network runs east-west along the northern side of Great South Rd, as well as along the alignments of Belt St, North St, and Waikato Esplanade.
- The **stormwater** network runs east-west along the southern side of Great South Rd. A line runs north to south near 144 Great South Rd, presumably connecting catchpits along the northern side of the road to the line on the

[3] Chorus, FX Networks, WDC and WEL Networks.

southern side. The stormwater system location along the northern side of Great South Rd is not recorded in the WDC geographic information system (GIS). However, based on the location of manholes and catchpits, it appears likely that this also follows an east-west alignment along the road. Stormwater assets are also shown along North St and part of Waikato Esplanade.

- The **telecommunications** network generally runs along the same alignment as the water supply network, with an additional FX Networks communications line running along the southern side of Great South Rd, near the northern edge of the former landfill. All underground telecoms cables are laid within ducts linked to pits.
- The **electricity** network also follows a similar alignment to that of the water supply network. However, underground electricity lines run on both sides of Great South Rd, with lines beneath the road near 134, 150 and 166 Great South Rd. Both underground and overhead power lines are present within the area north of the landfill. Cables beneath the road are likely to have been laid within ducts.

It is understood that no reticulated **gas** system is present in Ngaruawahia.

2.5 TANGATA WHENUA VALUES

Ngaruawahia is within the Waikato-Tainui rohe, and is of particular significance to the iwi, given the town's longstanding association with the Kingitanga movement.[4] Waikato-Tainui also has a co-manager role of the Waikato River under the *Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010*.

Waikato-Tainui have been consulted on the proposed monitoring and management measures, and have received a copy of an earlier version of this report. It is understood that Waikato-Tainui have now confirmed that they approve of the measures detailed in this LAMP.

[4] "Rohe": *boundary, district, region, territory, area, border (of land).* "Iwi": *extended kinship group, tribe, nation, people, nationality, race - often refers to a large group of people descended from a common ancestor and associated with a distinct territory.* Source: www.maoridictionary.co.nz/

Waikato-Tainui's position on environmental management within their rohe is set out in the *Waikato-Tainui Environmental Plan*.[5] This plan aims "*to ensure that the needs of present and future generations are provided for in a manner that goes beyond sustainability towards an approach that enhances the environment.*"[6] The plan contains objectives and policies relating to a large number of environmental issues. The elements of the plan considered potentially relevant to the management of the Ngaruawahia closed landfill are summarised in Table 2-1.

The management measures contained in this LAMP are designed to monitor the impacts and manage adverse effects of discharges from the closed landfill. Therefore it is considered that the measures proposed are consistent with the objectives and policies of the Waikato-Tainui Environmental Plan, as summarised below.

Table 2-1: Relevant Objectives and Policies of the Waikato-Tainui Environmental Plan

Objective/policy	Assessment
Policy 11.7.1.1 "*To ensure that Te Ture Whaimana prevails in any resource management, use and activity within the Waikato River catchment in the Waikato-Tainui rohe*". Te Ture Whaimana is a list of strategies for the River (see **Section 11.4**), of which **Strategies 2-4** are considered most relevant. These include establishing "*the current health status of the Waikato River… by utilising maatauranga Maaori and latest available scientific methods*" and developing and implementing targets and action programmes to improve the River's health.	Landfill leachate is not considered to be adversely affecting water quality in the Waikato or Waipa Rivers (see Section 3.2.3). Groundwater monitoring is being used to identify if and when landfill cap maintenance is required to maintain groundwater quality.
Objective 19.4.2 *"Water quality is such that fresh waters within the rohe of Waikato-Tainui are drinkable, swimmable and fishable in all places (with water quality to the level that Kiingi Taawhiao could have expected in his time)."* [Kingi Taawhiao lived from c. 1825 to 1894] **Policy 19.4.2.1** *"Regulators to set clearer and higher water quality targets, and to develop and incentivise methods to achieve these targets."*	See above.

[5] Waikato-Tainui Te Kauhanganui Incorporated, August 2013. Available online at http://www.wrrt.co.nz/wp-content/uploads/EBook_FINAL_EP_Plan_sp.pdf

[6] Section 7.1.1

Objective 21.3.3 *"Effectively manage the impact of contaminated land on the surrounding environment."* **Policy 21.3.3.1** "*To ensure that the impact of contaminated land is effectively managed and, where possible and practicable, mitigate and restore the contaminated land.*" Methods to achieve this include: • "*Manage the effect of the contaminated sites on surrounding properties, air, and waterways.*" (**Method b**) • "*Plans to contain, manage, mitigate and restore the contaminated sites are in place and implemented.*" (**Method c**)	This plan (in particular Sections 4.0 to 8.0) sets out management measures to minimise the impacts of the closed landfill on surrounding properties, air and waterways (Method b), and to enable the future beneficial use of the site.
Objective 23.3.1 *"The quality and amenity of discharge to air is such that the life supporting capacity and quality of air within the rohe is retained at a level that does not compromise human health, amenity values, or property."* **Policy 23.3.1.1** "*To ensure that the quality of any discharge to air is retained at a level such that it does not compromise human health, amenity values, or property.*" This is to be implemented using a number of methods, including that "*discharges to air shall manage any adverse effect beyond the property boundary that is objectionable or offensive as a result of… gas, or other airborne contaminants.*"	Potential impacts of LFG discharge from the landfill are to be managed in accordance with Sections 4.0 to 8.0 of this plan. These management measures can be relied upon to meet Objective 23.3.1.
Objective 26.3.3 *"Liquid, solid and hazardous waste management is best practice and manages social, cultural, spiritual, economic and environmental effects."* **Policy 26.3.3.1** – "*To ensure that liquid, solid and hazardous waste management is best practice and manages social, cultural, spiritual, economic and environmental effects.*" The methods proposed to achieve this include: • An expectation that "*[o]ld municipal landfills [be] monitored and rehabilitated to ensure any adverse effects are managed.*" (**Method c(i)**). "*All waste management facilities shall be sited, designed, constructed, operated, and managed to best avoid adverse environmental impacts. Facilities shall be designed and constructed according to best environmental practice and shall be sited away from water bodies, estuaries, or the coast.*" (**Method g**).	The closest body of water to the former Ngaruawahia landfill is the Waikato River, approx. 200 m to the north at its closest point. Management measures contained in this LAMP are intended to ensure that landfill aftercare is in accordance with current best practice, and adverse effects are adequately managed (Method c(i)).

3.0 DISCHARGES OF CONTAMINANTS

3.1 LANDFILL GAS DISCHARGES

3.1.1 Landfill Gas Generation and Migration

Landfill gas (LFG) generation processes are discussed in detail in Sections 3.4-3.6 of *A Guide for the Management for Closing and Closed Landfills in New Zealand* (*Closed Landfill Guide*).[7] In summary, LFG is a mixture of methane, carbon dioxide, and other gases generated as a result of biological and chemical processes occurring in a landfill (primarily waste decomposition). The typical composition of LFG is shown in Table 3-1 (reproduced from Table 3.3 of the *Closed Landfill Guide*).

Table 3-1 – Typical constituents in landfill gas (from *Closed Landfill Guide*)

Compound	Percent (dry volume basis)	
	Minimum	Maximum
Methane (CH_4)	45	60
Carbon dioxide (CO_2)	40	60
Nitrogen (N_2)	2	5
Oxygen (O_2)	0.1	1.0
Sulphides, disulphides, mercaptans etc.	0	1.0
Hydrogen (H_2)	0	0.2
Carbon monoxide (CO)	0	0.2
Trace constituents	0.01	0.6

The Gas Screening Value (GSV) gives a good indication of the gas production/migration as it is calculated by multiplying the maximum concentrations of the gases in LFG by the maximum borehole flow rate during the sampling event. The CIRIA C665 *Assessing risks posed by hazardous ground gases to buildings approach* is used for assessing other landfill sites in New Zealand and is considered to be appropriate for the assessment of gas protection requirements for proposed buildings. The CIRIA C665 sets threshold levels for GSV data of 0.07L/h (Litres per hour) above which additional protection measures or investigations are triggered.

Due to chemical and biological processes and mixing with atmospheric air and/or soil gas, the composition of LFG changes as it moves through the landfill/soil. In moist,

[7] Ministry for the Environment (MfE), May 2001. Available online at https://www.mfe.govt.nz/sites/default/files/closed-landfills-guide-may01_0.pdf

permeable loam soils, microbiological methane oxidation is expected to effect a substantial reduction in methane concentration.[8]

The composition, quantity and rate of LFG generated in a landfill depends on the amount and nature of waste deposited, and conditions inside the landfill (such as waste density, temperature, moisture content, and chemical parameters such as pH) and the age of the landfill. LFG generation typically peaks at around the time of landfill closure, and then declines substantially over time.

Migration of LFG is mainly driven by the gas pressure within the landfill. Where a positive pressure differential exists between gas within the landfill and the surrounding soil or the atmosphere, migration will occur along flow paths which are determined by:

- the presence/absence and quality of landfill management infrastructure such as liners, caps, and ventilation;
- local geology and groundwater;
- the presence/absence of preferential flow paths such as loosely packed fill around underground services and cracks in the landfill cap.

For a closed landfill where the LFG production rate is expected to be very low (such as Ngaruawahia, which has been closed for 25 years) LFG migration into the ground and atmosphere is likely to be episodic and occurring primarily during periods of falling barometric pressure.

3.1.2 Potential Effects of Landfill Gas Discharges

The potential adverse effects of LFG are discussed in detail in Section 3.6.2 of the *Closed Landfill Guide*. The possible effects considered relevant to the resource consent application are:

- **Flammability**, **methane can be flammable at a concentration** of **5-15%** by volume in air[9].

[8] See, for example, proceedings of *Sardinia 2009, Twelfth International Waste Management and Landfill Symposium*, 'Role of Soil Gas Diffusivity for the Microbial Oxidation of Methane in Landfill Covers', Gebert and Groengroeft, 2009.

[9] *Closed Landfill Guide*, Section 3.6.2, p23. Note that other potentially flammable gases (including carbon monoxide, hydrogen sulphide and hydrogen) can be present in LFG, but not typically at concentrations within their respective flammable ranges.

- **Asphyxiation**, which can occur when the total concentration of oxygen is reduced below 19.5% by displacement by other gases (**methane or other simple asphyxiants)**. Note that asphyxiation is typically only of concern in enclosed spaces such as manholes and other service fixtures[10].
- **Toxicity**. A number of the individual gases in LFG are toxic. Concentrations considered safe for extended occupational exposure (8 hours TWA) are:
    - **Carbon dioxide: 0.5% by volume (5,000 ppm),**
    - **Carbon monoxide: 25 ppm by volume**,
    - **Sulphur dioxide: 2 ppm by volume**,
    - **Hydrogen sulphide: 10 ppm by volume**.[11]
- **Odour**. Carbon dioxide and methane are essentially odourless, but a number of minor LFG constituents have offensive odours. The most odorous compounds (including ketones, esters, volatile fatty acids, hydrogen sulphide and mercaptans) are generated primarily during the early phases of anaerobic landfill waste decomposition.

3.1.3 Landfill Gas Discharge from the Ngaruawahia Closed Landfill

The LFG discharge from the former Ngaruawahia landfill has been investigated by Babbage and others since at least 2007. The results of these investigations are discussed in detail in the reports referred to in Section 1.1 (in particular, see MWH 2010, Section 3; and Babbage 2015, Sections 3 and 5). In summary, these investigations have shown that:

- **The closed landfill is still generating LFG**.
    - LFG was able to discharge from ten (10 No.) gas vents prior to their removal. Concentrations of methane and carbon dioxide (measured in 2007) were generally higher near the eastern (more recently-filled) end of the landfill.[12]
    - Surveys of LFG concentrations in the ground north of the closed landfill (permanent and temporary monitoring wells, spike surveys, and

[10] *Risk Assessment for methane and other gases from the ground*, Construction Industry Research and Information Association (CIRIA) Report 152, 1995, p15. See also *Closed Landfill Guide*, Section 3.6.2.

[11] *Workplace Exposure Standards and Biological Exposure Indices, 7th edition*, 2013, Ministry of Business, Innovation and Employment. Available online at www.business.govt.nz/worksafe/information-guidance/all-guidance-items/workplace-exposure-standards-and-biological-exposure-indices/workplace-exposure-standards-and-biological-indices-2013.pdf

[12] See Beca 2007 (in particular Table 6).

ground vapour probe monitoring) have detected LFG at depth (typically 1.5 mbgl or deeper – see Babbage 2015) in the ground in an area to the north and near the eastern end of the landfill.

- The highest concentrations of methane identified in the ground have typically been detected between approximately 142 and 162 Great South Road, with **the maximum methane concentration detected in the ground being 46%v/v** at 144 Great South Road (see Beca 2007 - measured in a well screened from 0-2 mbgl).
- Carbon monoxide and hydrogen sulphide have typically not been detected in the ground. Where detected, concentrations of these compounds have typically been in the range 1-30 ppm. Toxicity associated with carbon monoxide or hydrogen sulphide is not expected to be a limiting hazard within the LFG-affected area. That is, monitoring and management for methane-related effects is expected to ensure that carbon monoxide and hydrogen sulphide concentrations remain at acceptable levels.

- **None of the studies listed above have detected methane in the ground to the south of the landfill**.
  - Based on the investigation data, LFG is considered not to pose a risk to properties to the south of the landfill. This conclusion should be reassessed in the event of any significant changes in landfill management (other than the recent removal of the gas vents) or installation of underground services.
  - Further ground gas investigations to the south and east of the landfill may be warranted if sensitive developments are proposed close to the landfill in these areas. It is anticipated that this would be dealt with as part of the building consent/resource consent process, if required.
- **LFG has been detected at depth in the ground immediately to the north of the landfill between 136 Great South Rd and 166 Great South Rd** (see Babbage 2015, Section 3.0 and Appendix C). **Methane was not however detected at 0.5-3.0 m depth 80-90 m north of Great South Rd between these properties** (see Babbage 2015, Section 3.0), indicating that the LFG either does not extend this far from the landfill, or increases in depth with distance from the landfill due to the orientation of low-permeability strata in the soil.

- **Methane concentrations in the ground between 136 Great South Rd and 166 Great South Rd were typically greatest at 1.5 mbgl or deeper, and methane was generally not detected at 0.5 or 1.0 mbgl** (Babbage 2015, Section 3 and Appendix C). Topsoil and other fine-grained near-surface soils are apparently impeding vertical migration and/or providing a medium in which methane oxidation is occurring. Consequently, within the LFG-affected area, **methane has not been found to be reaching the ground surface at detectable concentrations (>50 ppm), except where surface soils had been disturbed and/or preferential paths existed.**
- **Methane was detected at the ground surface in the following situations**:
    - **In some former auger/gas vapour probe holes**,
    - **In some cracks in the bitumen carpark at 150 Great South Rd,** and
    - **In some roadside services fixtures**.
    - Where detected, methane was typically present in the tens to thousands of ppm. **Methane concentrations at or greater than 10,000 ppm** (the instrument's upper limit of detection) were detected at:
        - **142 Great South Rd** (in a water meter box and a guard rail for a cable box),
        - **146A Great South Rd** (above a former probe hole at the road end of the right-of-way),
        - **146 Great South Rd** (in cracks at the north-western corner of the carpark for the neighbouring supermarket at 150 Great South Rd), and
    - Methane was also detected at **greater than the instrument upper detection limit (10,000 ppm = 20% of LFL)** above a conspicuous bare patch of soil **within the landfill, near the north-eastern corner**.
- The presence of elevated concentrations of methane (refer to definition of elevated concentrations of LFG in the Glossary in Appendix A) in underground service fixtures is potentially of concern, particularly for spaces people may enter (e.g. manholes) or services associated with electricity (e.g. power and light poles). Methane was not detected in any manhole during the Babbage atmospheric methane survey (although a number of manholes could not be opened). Methane was detected at between 500 and 1,000 ppm (1 – 2% LFL) in 4 hollow light or power poles during the Babbage survey. Higher

concentrations were detected in the **light pole at 150 Great South Rd (3,000 ppm or 6% LFL)** and inside a **hollow steel guard rail protecting a cable box at 142 Great South Rd (>10,000 ppm i.e. > 20% LFL)**. Measures to manage the risks associated with methane near electrical fixtures are discussed in Sections 5.1 and 5.6.

- Methane was not detected in the sub-floor cavity under residential houses, or at service entry points to houses within the LFG-affected area during atmospheric methane surveys carried out by MWH (19 properties, in August 2010 – see MWH 2010, Section 3.4.2) and more recently by Babbage (25 properties on two occasions in April 2015 – see Babbage 2015, Sections 4-5).[13] At all houses within the LFG-affected area having a ventilated the sub-floor cavity, ventilation of the sub-floor cavity may be adequate as methane was not detected under these buildings or at the underground service entry points to these buildings – a flammable concentration of methane sourced from the landfill is less likely to be present within a building where such a methane concentration is not present with the sub-floor cavity below the building, provided there is no potential for landfill gas to track through services ducts.
- Two non-residential properties, each with concrete-slab-on-grade floors are present within the LFG-affected area:
    - The commercial buildings at **150 Great South Rd**[14] are relatively modern, concrete slab-on-grade buildings with a polythene vapour barrier under the building slabs.[15] The ground floor of these buildings is used as a supermarket and the upper story is a 3-bedroom residence. **Methane was not detected** inside the supermarket building during the interior atmospheric methane surveys carried out by both MWH (2010) and Babbage (2015). High concentrations (i.e. greater than 200 ppm in the air, refer Glossary in Appendix A) of

[13] Details on methodology and which properties were included are available in the reports referenced (Appendices C and D). In summary, the detection limit for the Babbage survey was 50 ppm methane by volume, while MWH's detection limit is understood to have been 500 ppm. The MWH survey also included the interiors of 14 dwellings, and the Babbage surveys also included yard/lawn areas and outbuildings.

[14] Listed as 148 Great South Rd by MWH. It is understood that the titles of 148 and 150 Great South Rd have since been amalgamated.

[15] Based on the following documents from the property file, which were provided by WDC and are available on request:

- "Proposed Dairy, Grocery and Coffee Lounge", Ref: P936 (May 1982).
- Drawing 06.138 (April 2006).

methane were however detected in some (but not all) cracks in the surface of the bitumen car park outside the supermarket building in 2015.

- The commercial building at **142 Great South Rd** is a former motor vehicle workshop, now used as a boxing gym**.** This building was apparently built **prior to 1951** (the date of the earliest aerial photograph in Appendix B) and has a concrete slab-on-grade floor and concrete block/masonry walls with large, poorly-sealed door openings associated with its original use**.** Given the building's age and original use, a vapour barrier is unlikely to be present under the floor. Methane was detected in 4 cracks in the concrete floor, at a maximum concentration of **3,500 ppm (7% LFL)**. However, the methane appeared to be localised to the cracks, and **methane was not detected in the ambient indoor air**.[16]

Appendix H provides a summary of all LFG monitoring data (2009-2015) in the ground to date at the site. Appendix I provides GSV data calculated for LFG concentrations measured in February 2015 at the site.

3.2 LEACHATE

3.2.1 Generation and Migration of Leachate

Leachate is generated when water percolates through a landfill (either from rainfall, surface water, or groundwater) and chemicals in the waste and/or generated from waste decomposition are either dissolved or suspended in the percolating water. In landfills where the liner and/or cap are inadequate or non-existent, leachate may discharge into surrounding ground or surface water.

Landfill leachate composition is primarily determined by the type of waste buried and the age of the landfill. Typically, leachate contaminant concentrations decrease once a landfill is closed, however elevated concentrations of some contaminants (such as ammoniacal nitrogen and organic compounds) may persist in leachate for several decades after landfill closure.

[16] In this report, "ambient indoor air" refers to the general air quality in a building or space, as distinct from areas immediately surrounding sources of gas (e.g. cracks or pipes), where elevated concentrations of LFG may be detectable (prior to reasonable mixing).

Capping and maintaining the integrity of a landfill cap, in order to minimise rainfall infiltration, is recognised as the most cost-effective means of minimising leachate production in a closed landfill. [17] Where a landfill is unlined, this is the only management option available to minimise leachate production and discharge.

3.2.2 Potential Effects of Leachate

Landfill leachate discharged into groundwater or surface water, has the potential to:

- degrade water quality, either through the introduction of contaminants or through deoxygenation;
- affect the health of organisms in any nearby receiving water body;
- reduce the aesthetic value of the receiving water body through discolouration, odour release, or the production of scum or detritus;
- Necessitate reclassification of the water by local authorities (e.g. as unsuitable for recreation) or iwi (e.g. as wai kino/'waters of limited use' or wai mate/'waters that have exceeded the ability to properly sustain life'), where the effects of a landfill leachate discharge are more than minor. [18]

Typically, the discharge of leachate into surface water is of greater concern than discharges into groundwater. However, leachate in groundwater may be of concern where drinking water wells are present down-gradient of the landfill, or where the affected groundwater discharges into surface water without sufficient dilution.

3.2.3 Leachate from the Ngaruawahia Closed Landfill

Groundwater quality has been monitored by WDC since 1990 at four monitoring wells near the closed landfill (boreholes BH1-BH4, as shown on Figure 2 and Appendix B). Note that this Figure is reproduced from the MWH 2010 report, and compass points are relative to true north.

[17] *Closed Landfill Guide*, Section 3.1, p14-15.
[18] *Closed Landfill Guide*, Section 3.3.2. Definitions of wai kino and wai mate taken from *Waikato-Tainui Environment Plan*, Section 19.1.2, p148.

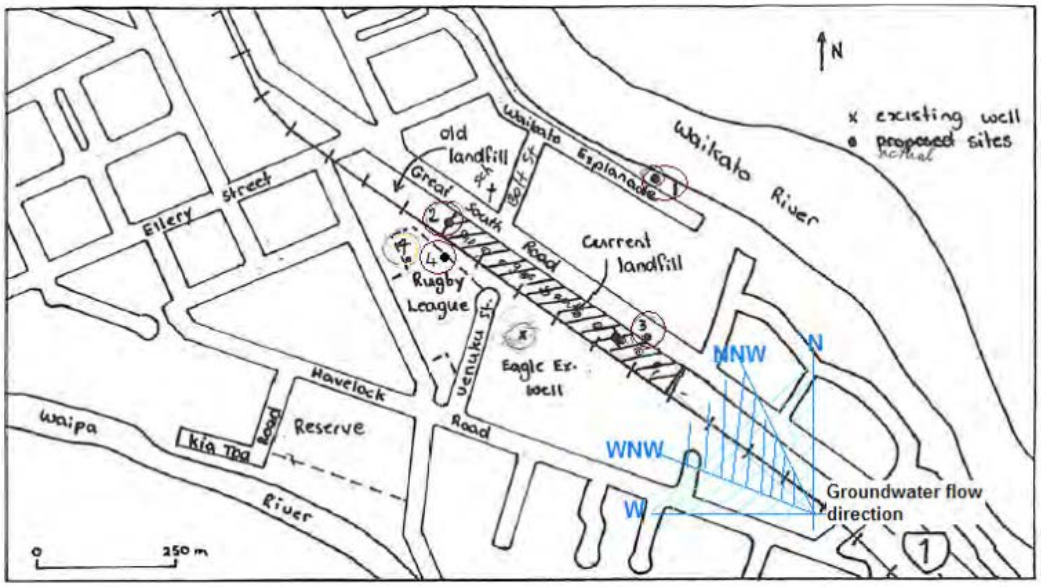

Figure 2 – Locations of BH1-BH4 (reproduced from MWH 2010, Figure 2-2)

A review of these monitoring data to March 2009 (MWH 2010, Section 2.2) concluded that:

- **Groundwater flow beneath and surrounding the landfill is generally towards the west-north-west**.[19] On this basis, BH2 is the only one of the four monitoring wells located down-gradient from the landfill.
- Based on electrical conductivity (EC) and other groundwater monitoring data, **landfill leachate was considered to be present at significant concentrations in one monitoring well (BH2)**. BH2 is located within the old part of the landfill and immediately down-gradient from the more recently filled area. This monitoring well is understood not to be sealed below 2 mbgl and could be conveying leachate from the landfill directly to groundwater. Data from BH2 is therefore considered to provide a very conservative indication of the effects of leachate on groundwater surrounding and beneath the landfill.
- **Leachate was generally considered not to be present at significant concentrations in the 3 further wells** located to the north (BH1 and BH3) and west-south-west (BH4) of the landfill. However, minor leachate impacts on water quality at BH3 and BH4 have occasionally been observed.
- **Concentrations of contaminants typically associated with landfill leachate generally did not exceed the *ANZECC[20] Guidelines* for the**

[19] Note that MWH discuss the groundwater flow direction with respect to true north, and hence describe the groundwater flow direction as approximately north-west in their report.

protection of freshwater ecosystems at BH2. In the case of boron, which did exceed the ANZECC guideline for the protection of 95% of freshwater species (with concentrations ranging from 0.2-1.7 g m^{-3} in the ~5 years before MWH's report),[21] MWH considered that the dilution available in the aquifer and immediately after discharge into the Waikato River system would reduce boron concentrations to acceptable levels.

- Similarly, **ammoniacal nitrogen** concentrations at BH2 were found to be **above background levels** (approximately 4-5 g m^{-3}), but **were not considered of concern**, once dilution in the aquifer and immediately after discharge into the river were taken into account.
- **Chemical oxygen demand (COD) concentrations were generally at background levels in all four monitoring wells, except at BH2 in 2003-2006 (when concentrations of up to 1,700 g m^{-3} were detected)**. During this period, MWH report that stormwater was, as a consequence of localised landfill surface subsidence, ponding on and infiltrating through the landfill surface. WDC has subsequently carried out work to re-grade the landfill surface and improve the landfill cap to prevent stormwater ponding on the landfill. This resulted in the COD concentrations at BH2 returning to background levels from 2006 onwards, indicating that these cap maintenance works were effective.
- **Electrical conductivity (EC) measurements are a good indicator of the presence of leachate** in groundwater, and a more comprehensive monitoring suite should not be necessary if on-going EC monitoring results are stable or decreasing.
- **There would be no benefit to continued groundwater monitoring** at or surrounding the landfill.

Limited groundwater monitoring has continued since mid-2009. The results are plotted in Appendix F and are summarised below:

- **EC at BH2 since mid-2009** (range 190 to 860 µS/cm) has been **consistently within or slightly lower than the pre-2009 range** reported by MWH (250-1,000 µS/cm). **EC at BH1, BH3 and BH4 has remained at background levels** (post 2009 maximum: 249 µS/cm).

[20] *Australian and New Zealand Guidelines for Fresh and Marine Water Quality,* Australian and New Zealand Environment and Conservation Council (ANZECC), 2000.
[21] Note that slightly higher concentrations were detected on 2 occasions in the early 1990s.

- **At all 4 wells, pH remains stable** at between pH 5.3 and pH 6.9, and **chloride concentrations remain stable** and within the reported background range.
- **A downwards trend** has been observed in the concentrations of **iron, boron, and COD at BH2**.
- **Seasonal peaks in COD and boron concentrations** in the period between 2009 and 2012 (when monitoring for these parameters ended) typically occurred in mid-to-late winter, the timing of these peaks **coinciding with seasonal EC peak values**.

The post-2009 groundwater monitoring results are therefore considered to support the conclusions drawn earlier by MWH.

Information provided by WRC indicates that seven groundwater production wells are located within 1 km of the former landfill.[22] These wells are located approximately 500 m or more to the south (i.e. not down-gradient) of the landfill. In a down-gradient direction (to the north and west), the land between the landfill and the River is occupied by Ngaruawahia township. In this area, WDC provides piped potable water, and it is considered unlikely that groundwater will be extracted for potable use in the foreseeable future.

3.3 FINAL COVER DETAILS

Modern, well-managed landfills typically have some, or all of the following features, to minimise the effects of leachate and LFG on the environment:

- A **liner** underlying the waste, to minimise uncontrolled leachate discharges;
- **Sub-surface drainage** above the liner to collect and convey leachate to treatment/storage/disposal facilities;
- A low permeability and suitably-graded **cap** to securely cover the waste and to reduce leachate production and the uncontrolled discharge of LFG to the atmosphere;
- **Surface drainage** to prevent the entry of stormwater from other sites onto the landfill;
- **Ventilation** to collect LFG so that it can safely discharged, flared, or burned to generate energy.

[22] Bore report provided by email, 24th August 2015.

In the case of the former Ngaruawahia landfill, it is understood that:

- No **liner** or sub-surface **drainage** were installed;
- A **cap** approximately 1-2 m thick was progressively installed after the closure of the landfill (MWH 2010, Sections 2.2.2.6 and 3.1), and has subsequently been built up and re-graded to form the present cap. A small (<50 cm diameter) patch of bare soil was observed on the northern edge of the landfill surface in April 2015, through which methane was venting (Babbage 2015). Based on this and the observation of localised surface water ponding, particularly near Great South Rd, other areas of cap failure may also exist and surface water intrusion may be contributing to leachate production. However, after reviewing the available information, there have been no reports of refuse being exposed at the landfill surface.
- **Surface drainage** does not enter the site from adjoining land. Runoff from the cap moves by overland flow to the northern boundary where it is intercepted by a series of catchpits at the northern (down-gradient) edge of the landfill that discharge to the WDC stormwater system.
- **10 vents,** without any underlying gas collection system, were installed along the centreline of the landfill. Although some of these vents were venting LFG (see Beca 2007), the vents were considered to be only marginally effective at mitigating gas accumulation and migration and have been removed (see Section 8.3).

4.0 MANAGEMENT ROLES AND REQUIREMENTS

4.1 WAIKATO DISTRICT COUNCIL RESPONSIBILITIES

WDC is responsible for managing the closed landfill in accordance with this LAMP to ensure that any adverse effects of landfill discharges are maintained at acceptable levels and that resource consent conditions are complied with. Responsibility for the implementation of and on-going compliance with this LAMP lies with the Community Assets and Building Control divisions of WDC, as described in the following sub-sections.

4.1.1 Building Control

The Building Control division of WDC is responsible for reviewing building consent applications for development on or near the landfill to ensure that:

- Development will not adversely affect landfill processes (e.g. buildings or structures or activities within the landfill site that may impact upon the cap integrity);
- Development within the area where LFG is present below the ground surface is designed and constructed in such a way that preferential flow paths to the surface are not created, and buildings have appropriate LFG mitigation measures installed, where required.

The information in Section 4.2 may assist in making these assessments.

Note that Drawing 50784/GE01 (Appendix B) shows the area outside the landfill where LFG is known to be currently present in the subsurface, and therefore some assessment and/or mitigation measures may be required for proposed developments outside, but close to, the area marked.

4.1.2 Community Assets

The Community Assets Team at WDC has primary responsibility for the management of the landfill, and is responsible for all aspects of landfill management which are not within the Building Control division's scope of responsibility (see Section 4.1.1). This includes annual review and reporting (see Section 6.4).

Within the Community Assets division:

- The **Open Spaces** team is responsible for mowing and landscaping work within the landfill area;
- WDC is the **Road Controlling Authority** and is responsible for reviewing Road Opening Notice applications for roadworks in Ngaruawahia. Applications for roadworks within or neighbouring the area marked as affected by landfill gas on Drawing 50784/GE01 (see Appendix B) need to be assessed in accordance with Section 4.2, in consultation with the Water Section.
- The **Water Section** is responsible for the remaining aspects of landfill management specified in Sections 6.0 and 7.0, including the short-term mitigation measures, regular surveys and maintenance of the landfill cap and stormwater drainage, monitoring of groundwater, ground and atmospheric methane (in section 6.0), reviewing monitoring data and initiating any contingency measures that may be required.

4.2 PROCEDURES FOR WORKING ON AND AROUND THE CLOSED LANDFILL

Anyone intending to carry out soil disturbance, construction work, or installation, maintenance or removal of underground services on or near the landfill should contact the Community Assets Team to discuss the proposed activity. The Community Assets Team will ensure that the staff/contractor carrying out the works is familiar with the information in this document, and will make an assessment regarding:

- Whether the proposal may increase the risks associated with the landfill (see Section 5.1),
- Whether the intended activity may proceed, either with or without additional restrictions or modifications.
- Whether the intended activity meets current regulations (e.g. Building Act and electrical regulations).

Contractors intending to carry out work on or near the closed landfill (refer to standards for electrical hazards and safety) must undergo training and vetting for working in such an environment. Unless a specific exemption is granted by the Community Assets Team (for instance, for very low risk work), they will be required to have completed WDC's contractor pre-approval process.

The staff member/contractor shall then prepare a brief Project Management Plan (PMP), outlining the works to be carried out, and any measures required to avoid increasing landfill-related risks. If activities that may increase risks are necessary, then appropriate measures to prevent adverse effects should be implemented. In particular:

- A gas monitor capable of measuring at least oxygen, methane and carbon dioxide shall be used by a competent person to measure the concentrations of these gases in the underground atmosphere and to determine whether it is safe to proceed with any work involving:
    - Entering a manhole or other confined space in or near the area beneath which LFG is present (see Drawing 50784/GE01 in Appendix B), or
    - Naked flames, or work with the potential to generate flames or sparks within a service fixture or other confined space in/near the area beneath which LFG is present (see Drawing 50784/GE01 in Appendix B).
- No smoking shall be permitted within the work area during excavations or services maintenance within or near the LFG-affected area.
- Excavation and other soil disturbance within the closed landfill area and the LFG-affected area should be kept to a minimum, particularly where the surface layer of topsoil and other fine-grained soils may be penetrated or removed.
- Any maintenance of the existing buried services (stormwater, telecommunications and electrical assets) and the installation of new underground services along the southern side of Great South Rd adjacent to the closed landfill should be considered as a high-risk activity. Maintenance of the underground electrical cables may have the potential to generate sparks, and particular caution would be required during such work. Additionally, the FX Networks telecommunications line runs along the southern side of Great South Rd at approx. 1.2-2 mbgl. The FX Networks cable pulling pits, if not backfilled, could contain LFG. Depending on the specific work proposed, it is likely that continuous gas monitoring and active ventilation of excavations may be required, as well as careful reinstatement of backfill and soil as described below.

- If any soil-disturbing activity is carried out on the closed landfill cap, a smoothly-contoured and compacted surface is to be reinstated at the end of the works, so that areas in which water may pond and soak into the landfill or LFG may escape are not created.

  Care shall be taken when backfilling any excavations within the landfill or the LFG-affected area, to ensure that the cap is not breached and preferential flow-paths are not created (either for LFG to reach the surface, for LFG to move offsite, or for water to infiltrate through the cap). Material removed from excavations should be replaced in approximately the order it was removed, and a surface covering of fine-grained soils (silt, clay, topsoil and/or other low permeability material) shall be placed to a minimum depth of 600 mm, or the depth of the excavation, whichever is shallower.
- In the case of significant excavations within the landfill cap, controlled backfilling with compacted low-permeability material (e.g. clay and/or bentonite) is required to maintain a cap soil profile generally in accordance with Section 5.2 of the *Closed Landfill Guidelines*.
- Imported fill should comply with WRC's definition of cleanfill.[23] The volume of fill imported should be no more than is required to maintain the surface grade of the landfill cap, to prevent unnecessary filling and compaction of the landfill contents. Any extensive filling or sealing of the cap would need to fully address risks associated with increasing LFG migration off-site.
- Design of any future development within the former landfill area (including planting of vegetation) should consider the potential for the cap to be penetrated or otherwise damaged (e.g. by foundations, fence-posts or tree roots).
- Appropriate gas mitigation measures should also be installed during construction of any new structures within the landfill and LFG-affected area. As a minimum (depending on the sensitivity of use of the proposed structure), an appropriately vented sub-floor cavity and/or a gas-tight under-floor membrane is expected to be required. For concrete slab-on-grade construction, an engineer-designed active or passive gas ventilation system may be required underneath the gas-tight membrane.

[23] Available online at http://www.waikatoregion.govt.nz/Council/Policy-and-plans/Rules-and-regulation/Regional-Plan/Waikato-Regional-Plan/Glossary-of-Terms/

- Any penetrations in building slabs within the closed landfill and the area LFG-affected area should be securely sealed and subject to the building consent process.
- Discharges of large quantities of water onto the surface of the closed landfill should be avoided unless absolutely necessary (e.g. to extinguish a fire).
- Any works on underground services entering 142, 146, 146A, 148, 150 or 154 Great South Rd (the Category A LFG-affected properties as defined in Appendix G) will need to be controlled to ensure that a preferential gas pathway into any building is not created. This will require atmospheric methane testing by a suitably qualified and experienced person at the completion of such works.

The Waters Manager shall review the PMP and confirm whether any risks associated with the proposed works are acceptable and can be mitigated if required. The Waters Manager shall then confirm approval to proceed with the work, or advise why approval has not been granted.

Note that the measures specified above are to be implemented **in addition to, not instead of**:

- The standard health and safety procedures used by the company/organisation carrying out the work, and
- Obtaining any resource consents or other legal approvals required for the work proposed.

5.0 RISK MANAGEMENT

5.1 RISKS ARISING FROM LFG DISCHARGE FROM THE CLOSED NGARUAWAHIA LANDFILL

Investigation and monitoring data around the closed landfill confirm that the discharge of LFG into the ground from the closed landfill has resulted in LFG being present at depth in the ground in the properties between 136 and 166 Great South Road and in the road between these properties and the closed landfill (LFG-affected area – see Drawing 50784/GE01 in Appendix B). Some LFG has also been detected in near surface structures and in cracks offsite.

Ground gas pressures measured in the LFG-affected area appeared to be very low. Within the residential land, methane is generally not detectable within 1.0 m of the ground surface, unless a preferential flow path has been created though soil disturbance.

It is concluded that LFG movement through the ground from the closed landfill and to the ground surface within the LFG-affected area is slow and that the primary risks arising from present day and anticipated future discharges of LFG into the ground from the closed landfill are:

- The generation of explosion risk and/or a health hazard within the building at 142 Great South Rd through the accumulation of methane and/or carbon dioxide respectively within the building as a result of LFG ingress to the building through cracks in the concrete floor.
- The generation of explosion risk and/or a health hazard within the supermarket building at 150 Great South Road through the accumulation of methane and/or carbon dioxide respectively within the building air. This could occur as a result of LFG ingress to the building through the concrete floor as a consequence of any future building or plumbing or drainage works or the failure of the under-floor vapour barrier for any other reason.
- The generation of a fire or explosion hazard in underground service fixtures (such as cable boxes, power and light poles etc.) within the LFG-affected area along Great South Rd through the accumulation of methane in these fixtures from the surrounding ground.
- The generation of fire/explosion and/or health hazards in underground stormwater lines or sewers within the LFG-affected area along Great South

Rd as a consequence of the ingress and accumulation of LFG from the surrounding ground.

- The potential for increasing the incidence or intensity of the above-mentioned hazards as a result of the creation of LFG migration pathways to the ground surface or into buildings or in-ground service fixtures through ground-disturbing activities, such as trenching excavations for building foundations, in-ground swimming pools, tree planting, or hangi pits; or by other events such as earthquakes or subsidence.

In addition to the above, the potential also exists for changes (both natural or man-induced) within the closed landfill and in LFG movement in the ground to cause increased LFG emissions under residential buildings within the LFG-affected area, and for such increased emissions to result in the accumulation of methane and/or carbon dioxide in the buildings within the LFG-affected area.

5.1.1 LFG Risk Management

The present day and anticipated future risks arising from the discharge of LFG into the ground from the closed Ngaruawahia landfill can be maintained at an acceptable level through the following risk management measures:

- Effective communication and management of risk within council, and with land owners within the LFG-affected area, contractors working in the LFG-affected area, and service providers with services located within the LFG-affected area. Use of the Resource Consent, Health and Safety, LIM, building consent and Road Opening Notice processes should all form part of this process; and
- Provision of signage and/or additional ventilation (as required) at service fixtures along Great South Road that are located within the LFG-affected area to prevent the accumulation of hazardous concentrations of methane (refer Glossary in Appendix A) in these fixtures; and
- Sealing the cracks in the building floor at 142 Great South Road to as far as is reasonably practical to eliminate LFG entry into the building through cracks in the floor; and
- Regular inspection and maintenance of the closed landfill cap in order to minimise both leachate and LFG production and the discharge of LFG from the landfill surface; and

- Regular monitoring of ground gas monitoring at boundary bores on Great South Road within the LFG-affected area;
- Regular monitoring of atmospheric methane and carbon dioxide concentrations within the sub-floor cavity under houses, at underground service entry points to houses, and in roadside service fixtures within the LFG-affected area;
- On-going monitoring of methane and carbon dioxide concentrations in the indoor building air, service entry points and confined spaces at nos. 142 and 150 Great South Road. This is to assess the indoor air quality in these buildings, and the effectiveness of the works carried out to seal cracks in the floor of 142 Great South Rd; and
- Using the trigger values contained in Table 6-1 to guide responses to any abnormally high ambient methane and/or carbon dioxide concentrations detected during routine indoor and outdoor air monitoring.

LFG risk management measures are discussed in detail below in Sections 5.2- 5.7 of this report. Monitoring objectives and methodologies are discussed in Section 6.0.

5.2 COMMUNICATION OF RISKS

5.2.1 Health and safety

WDC need to ensure that staff and contractors are aware of the risks associated with the closed landfill (in particular those related to LFG and leachate) if they carry out some or all of the following work, either on the landfill site, or within the LFG-affected area (see Drawing 50784/GE01 in Appendix B):

- Inspection or maintenance of roadside services;
- Soil disturbance or service installation;
- Monitoring work associated with the landfill (including groundwater and air monitoring, as described in Section 6.0);
- Any other work with the potential to affect landfill management (e.g. landscaping, fencing, tree planting or removal, moving etc.);
- Work on buildings in the LFG-affected area.

Staff/contractors involved should be familiar with and understand the risk management requirements of this LAMP relevant to their work (including, but not limited to, the measures detailed in Section 4.2), and, where appropriate, should

incorporate the matters discussed in this report in standard operating procedures, health and safety plans, and other relevant working documents.

WDC has advised WEL Networks, Vocus/FX Networks and Chorus (who operate electricity and telecommunications services near the closed landfill) of the issues within the LFG-affected area. WDC has formally recommended in writing that these companies pass on this information to all staff and contractors responsible for work in this area.

In addition, land owners and occupants within the LFG-affected area who have manholes or other in-ground/underground enclosed spaces on their properties have been advised of the risks associated with potential accumulation of LFG in those spaces. Land owners within the LFG-affected area have also been advised of risks associated with works on service connections and a requirement for consent for any building, works that involve construction of a concrete-floored building, or a potential reduction in sub-floor ventilation of an existing building or for plumbing or drainage works.

Residents within and near the LFG-affected area are to be encouraged to report to WDC any areas where grass or vegetation has died or reports of odour. The Waters Manager is responsible for investigating any such reports and determining what (if any) action is required by WDC. When making such a determination, reliance shall be placed on LFG measurement(s) undertaken at the area of concern and how these vary from historical monitoring data.

It is recommended that durable warning signs are installed on underground service access covers within the LFG-affected area (subject to agreement from the relevant non-Council service owners). This is of particular importance for manholes and any other access points to confined spaces which people could potentially enter. The text on the signs should be similar to the wording below:

CAUTION:

CONFINED SPACE - NO UNAUTHORISED ENTRY.

OXYGEN-DEFICIENT OR FLAMMABLE ATMOSPHERE MAY BE PRESENT.

These warning signs shall be designed and placed to ensure that the ventilation of underground service fixtures (see Section 5.6) is not impaired. It is understood that WEL Networks (the electrical utility company) have already installed such signs on their assets.

5.2.2 Resource Consent - Consultation

WDC has undertaken consultation with affected landowners and residents (as defined in the letter and drawing in Appendix G) as part of the resource consent application process. This consultation included advising residents of the reasons for and the effects of the LFG discharge from the landfill, and any resultant restrictions on land use or activity within their property.

5.2.3 LIM notifications

WDC has placed notes on the land information memorandum (LIM) on the property file for all of the properties identified as Category A and B (see Appendix G).

These notices summarise the issues relevant to each property and potential gas presence. The intent is to ensure that future development and/or soil disturbance on the landfill and LFG-affected area is appropriate and that LFG mitigation measures are installed where necessary.

5.2.4 Building Consents

The building consent process for all building and ancillary works within the LFG-affected area and the closed landfill is to be used to ensure that:

1. Sub-floor cavity ventilation under new buildings complies as a minimum with the requirements of NZS:3604,
2. For new slab-on-grade buildings an engineer-designed gas proof membrane is installed under the building and that all service penetrations through this membrane are securely sealed. For slab-on-grade buildings on the closed landfill passive ventilation may be required under the floor.

3. Earthworks, building and drainage works on the landfill do not cause compaction of the landfill contents and that preferential flow paths that would allow LFG escape to the ground surface or out of the landfill are not created.
4. Adequate supervision and testing of works is carried out during earthworks and building works within the LFG-affected area including the closed landfill.

5.2.5 Road Opening Notices

The Road Opening Notice process shall be used to ensure that all contractors working in the road within the LFG-affected area are made aware of the risks associated with working in the area. Care must be taken so that no preferential gas flow pathways are created by those works that could convey or increase the rate at which LFG may migrate in the ground from the landfill into the nearby residential land.

5.3 VENTILATION OF UNDERGROUND SERVICES

Additional passive ventilation should be considered for service fixtures associated with electricity or confined spaces (including manholes, power and light poles and electrical and telephone boxes) within the LFG-affected area. Subject to asset owner approval, this should include at least the 6 service fixtures (4 light poles, 1 power pole, and 1 guard rail to a cable box) in which methane concentrations exceeding 500 ppm have been detected (see aerial photograph marked up 18/5/2015 in Appendix B).[24] It is recommended that ventilation be added (if not already sufficient) to all of the above-listed services within the LFG-affected area.

Ventilation may be achieved by:

- Replacing existing covers with vented covers, or
- Retrofitting purpose designed vents into existing services, or
- Creating a 200 – 250 mm air gap at the base of power/light poles, or
- Drilling holes in the existing covers/sides of the services.

If the method of installing ventilation has the potential to generate sparks (e.g. drilling or cutting through metal), additional mitigation measures shall be taken to mitigate the potential to ignite any methane which may already be present within the pole/box (e.g. by removing the relevant part for drilling elsewhere, measuring gas

[24] Note that, in the case of the guard rail and any other unnecessary hollow spaces in which landfill gas may accumulate, filling the space with foam to prevent gas entry would be a suitable alternative.

concentrations before and during drilling, using water for spark prevention and/or mechanically ventilating the enclosure while carrying out the works).

5.4 COMMERCIAL PROPERTIES WITHIN LFG-AFFECTED AREA

5.4.1 Sealing Cracks in the Concrete Floor at 142 Great South Rd

Methane has been detected in cracks in the floor within the building at 142 Great South Rd. Although methane was not detected (<50 ppm i.e. < 0.1% LFL) in ambient indoor air, LFG entry into an occupied space is nonetheless of concern and should be mitigated.

Subject to the approval of the owner and occupier of 142 Great South Rd, the cracks in the building floor that are allowing methane to enter the building should be sealed by cutting out and sealing the cracks and applying an appropriate gas-tight sealant / membrane.

5.4.2 Indoor Air Monitoring at 142 and 150 Great South Rd

Quarterly indoor air methane and carbon dioxide monitoring is to be undertaken at both 142 and 150 Great South Rd for a period of 24 months following the consent being granted.

Responses to any elevated indoor methane or carbon dioxide concentrations encountered during this monitoring are contained in Table 6-1.

In the event of any renovations or damage to the buildings on these sites with the potential to create a pathway for gas migration from the subsurface, particular attention shall be paid to the potentially affected areas during subsequent monitoring rounds.

5.5 RESIDENTIAL HOUSES WITHIN LFG-AFFECTED AREA

5.5.1 Routine Sub-Floor Cavity Air Monitoring

Quarterly methane and carbon dioxide monitoring is to be undertaken for a period of 24 months following the consent being granted.

These gas concentration measurements shall be undertaken at the ground surface at the point of emergence of underground services before they enter each of the

dwellings within the LFG-affected area and at least one location under the building along each accessible wall of the houses.

Responses to any elevated outdoor methane or carbon dioxide concentrations encountered during this monitoring are contained in Table 6-1.

5.6 GROUND GAS MONITORING

Within 3 months after the date consent has been granted, 10 gas monitoring wells shall be drilled within the Great South Rd verge in/near the LFG-affected area, i.e. at an approximate maximum spacing of 40m. The exact locations and construction of these wells will be agreed with WRC prior to installation (refer to Appendix H), but is envisaged to be generally as follows:

- At or near locations 134, 136, 138, 142, 146, 150, 154, 162, 164 Great South Road and 1 North Street (i.e. in the vicinity of HA4, HA6, HA7, HA8, HA9, S, HA1, HA10, HA11 and HA13) subject to access restrictions, underground services etc.;
- Screened from approx. 2.5-3.0 mbgl, with a bentonite seal formed from the ground surface to 1 mbgl;
- Fitted with a sealed cap with an outlet suitable for gas sampling and protected by a lockable toby box.

Ground gas monitoring shall be carried out in these wells on a quarterly basis, during a period of falling barometric pressure. The instrument used shall be capable of measuring methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide concentrations, as well as pressure and flow rate.

The results of this monitoring will inform if any supplementary monitoring (refer definition of supplementary monitoring in Section 6.2.2.4 in the air is required and specific trigger levels in the ground at low and higher depths are proposed in . The data obtained from ground gas monitoring shall be compared with the existing ground gas data, in particular with the Gas Screening Value (GSV) calculation based on February 2015 monitoring (refer Appendix I). The data shall be used to inform the conceptual site model used in assessing the atmospheric/indoor methane monitoring results.

5.7 LANDFILL CAP INSPECTION AND MAINTENANCE

Annual inspections of the landfill surface are to be undertaken to identify:

1. Areas of subsidence that may cause ponding and infiltration of stormwater into the landfill. These areas are to be identified for re-grading/surfacing. Re-grading works should preferably be undertaken before but must be undertaken immediately upon the observation of an increase in groundwater electrical conductivity in any of the monitoring bores immediately adjacent to the closed landfill.
2. Any areas where cracking of the cap is resulting in vegetation death or odour or vapour are to be repaired, reworked or re-surfaced with a 150 to 200 mm layer of topsoil to prevent LFG discharge.

6.0 MONITORING PROGRAMME

The following on-going monitoring is required at the landfill and within the LFG-affected area to the north of the landfill to inform the management of risks associated with the present day and likely future discharges of LFG and leachate from the closed landfill:

1. Visual inspection of the landfill surface and atmospheric monitoring of methane at the landfill surface;
2. Atmospheric methane and carbon dioxide monitoring in the sub-floor cavities of residential buildings and in roadside service fixtures within the LFG-affected area to the north of the closed landfill;
3. Indoor air methane and carbon-dioxide monitoring at the commercial buildings at 142 and 150 Great South Road;
4. Ground gas monitoring in the 10 wells to be installed along Great South Rd; and
5. Groundwater monitoring.

The Waters Manager is responsible for ensuring that the monitoring is carried out, that the results of the survey are recorded, and that any remedial works required are undertaken in a timely manner.

6.1 LANDFILL SURFACE

6.1.1 Objectives

The landfill surface and the surface drainage system are to be regularly inspected to identify any areas where the cap and surface drainage system may not be performing adequately.

The results of these inspections are to be used to schedule any remedial works to the landfill cap or stormwater system to minimise the ingress of stormwater into the landfill, the increased production of LFG and leachate that may result from stormwater ingress, and to minimise fugitive emissions of LFG from the landfill surface.

6.1.2 Programme

A visual inspection of the landfill surface and the surface drainage system is to be carried out every 12 months.

6.1.3 Methodology

The environmental specialist carrying out the inspection(s) should walk over the surface of the landfill in a systematic pattern using a methane detector capable of reading to 50 ppm sampling air at a height of 5 to 10 cm above the ground surface, looking for any evidence that the integrity of the cap or surface drainage system may be impaired. Signs that may be a cause for concern include:

- Refuse visible on the surface;
- Areas of distressed or dead vegetation;
- Evidence of cap cracking or unauthorised soil disturbance;
- Discernible odours;
- Significant settlement;
- Significant water ponding;
- Gas bubbling in ponded water;
- Any evidence that stormwater catchpits may be blocked or damaged, or that drainage towards the catchpits may be impeded;
- Atmospheric methane measurements of >500 ppm at the landfill (200ppm as the trigger level for atmospheric methane measurement outside of the landfill).

If any of the above are noted, the affected area is to be photographed, and the location and the issue of concern is to be recorded. The contingency measures described in Section 7.2 should be implemented if the issue identified is considered to be a significant deficiency in the cap and/or the surface drainage system.

The *CAE Landfill Guidelines* (Section 6.7) recommend that for monitoring of a landfill's surface, "site conditions should be dry and wind velocities less than 15 km/hr", and the tip of the monitoring wand should have a funnelled inlet and be held 50-100 mm above the ground surface. Any monitoring of open areas (including the closed landfill's surface) should comply with these recommendations, as far as is practicable.

Where elevated methane concentrations are detected an attempt should be made to locate and document the source.

Reporting of the inspection is detailed in the Resource Consent Conditions (refer Appendix E).

6.2 LANDFILL GAS (LFG) MONITORING

LFG Monitoring objectives, programme and methodology are provided in the following sections 6.2.1 to 6.2.3. Section 6.2.4 provides a summary of the trigger levels and contingency actions and definition of the terms such as affected parties and supplementary monitoring.

6.2.1 Ground Gas Monitoring

6.2.1.1 Objectives

The ground gas monitoring programme is intended to provide data to further refine the conceptual site model and assist in interpreting the surface gas monitoring data.

6.2.1.2 Programme

Ground gas monitoring is to be carried out at 3-monthly intervals at minimum ten (10) additional purpose designed landfill gas monitoring bores (boundary bores) at a depth of at least 2.5 metres below ground level (mbgl) and not more than 3.0 mbgl along Great South Road (GSR). The need for on-going monitoring is to be reviewed after the completion of two (2) years of routine monitoring. Monitoring shall be carried out during a period of falling barometric pressure (or at least during low barometric pressure conditions).

6.2.1.3 Methodology

The instrument used should be capable of measuring pressure and gas flow rate, as well as the following gases:

- Methane (detection limit approx. 0.1% v/v)
- Carbon dioxide (detection limit approx. 0.1% v/v)
- Oxygen (detection limit approx. 0.1% v/v)
- Carbon monoxide (detection limit approx. 1 ppm)
- Hydrogen sulphide (detection limit approx. 1 ppm)

After being calibrated, purged, and warmed up as required, the gas monitoring instrument shall be connected to the gas tap of the well in accordance with the manufacturer's instructions. Ground gas pressure and flow rate shall be measured first, before the pressure is released by pumping any gas from the well.

The sampling pump shall then be started and the gas concentration readings monitored until readings stabilise. All values measured shall be recorded. The well cap should then be securely closed, and the toby box locked. The instrument shall be

purged in air between sample locations to return levels to zero and oxygen to approximately 21% v/v.

6.2.1.4 Trigger Levels

The ground gas monitoring trigger levels and contingency actions are provided in Table 6-1 in section 6.2.4

6.2.2 Off-Site Outdoor Atmospheric Methane Monitoring Outside Buildings And Within Roadside Service Fixtures

6.2.2.1 Objectives

Atmospheric methane monitoring is to be carried out under dwellings and at service entry points adjacent to dwellings that have a sub-floor cavity located within the LFG-affected area. Methane concentrations are also to be monitored in roadside service fixtures. The purpose of this monitoring is to:

- Confirm that any LFG-related risk to residents in these dwellings and to utility assets remains at an acceptably low level, and
- To provide an early warning and the ability to respond appropriately should there be a potentially increased LFG-related risk to the occupants of these dwellings.

The rationale for this monitoring approach is that, if elevated concentrations of methane from the landfill cannot be detected at service entry points and under dwellings, then unacceptable concentrations of methane are unlikely to be present within the buildings.

6.2.2.2 Programme

Monitoring is to be carried out every 3 months for the first two years after the consent is granted.

Where possible, atmospheric methane monitoring is to be carried out during a period of falling barometric pressure. One of the monitoring rounds is to be carried out in March/April, when perching of groundwater is least likely to impede the vertical migration of LFG (see Appendix D of Babbage 2015).

6.2.2.3 **Methodology**

The atmospheric outdoor methane survey should be carried out using a flame ionisation detector (FID) or similar, with a minimum detection limit of no more than 50 ppm methane.

The survey is to be undertaken during dry calm conditions (not raining and a wind speed less than 15 km/hr) and under falling (or at least low) barometric pressure conditions. This will require wind speed to be monitored and recorded during the survey.

Barometric pressure and weather conditions are to be recorded for several days before, during and after each survey.

Subject to the approval of landowners and occupiers, the outdoor air atmospheric methane survey shall include:

- The measurement of ground level methane concentrations at the underground service entry points to all residential buildings within the LFG-affected area;
- The measurement of bulk air (0.3 m above the ground) methane within the sub-floor cavity of all residential buildings. At least one reading shall be taken alongside each accessible wall of each dwelling within the LFG-affected area.
- The measurement of methane concentrations in roadside services along both sides of Great South Rd between North St and Belt St, with particular attention to electrical services (light and power poles, and ground-level power boxes) and manholes.
- The measurement of methane concentrations in air at any other areas on private land identified as areas of concern by residents.

Where elevated methane concentrations are detected, attempts should be made to find the source(s) of the methane.

6.2.2.4 **Trigger Levels**

Trigger levels and required responses for atmospheric methane monitoring (both outdoor and indoor) are shown in Table 6-1 in section 6.2.4. These have been adapted from trigger levels recommended by The United Kingdom's Environmental

Agency (EA)[25] and those applied at the Rototuna Landfill. The trigger level for carbon dioxide is the upper limit of the acceptable long term exposure range for residential indoor air quality, as recommended by Health Canada.[26] Definitions of the terms in **bold** in are explained in section 6.2.4.

6.2.3 Indoor Air Methane and Carbon Dioxide Monitoring

6.2.3.1 Objectives

Indoor methane monitoring is to be carried out within the commercial buildings at 142 (boxing gym) and 150 (supermarket) Great South Road at three monthly intervals.

If methane in the air outside properties is detected at concentrations exceeding the trigger levels in Table 6-1, indoor methane and carbon dioxide monitoring is to be carried out within the commercial buildings at 142 Great South Rd (boxing gym) and 150 Great South Rd (supermarket) and residential buildings of the (supplementary monitoring). This is to confirm that LFG is not entering the buildings (in particular following repairs to the floor at 142 Great South Rd) and creating a hazard to the property or occupiers of the buildings.

6.2.3.2 Programme

Indoor air monitoring is be carried out at 3-monthly intervals.

6.2.3.3 Methodology

The atmospheric indoor methane surveys should be carried out using a flame ionisation detector (FID) or similar suitable instruments, with a minimum detection limit of no more than 50 ppm methane.

The atmospheric indoor carbon dioxide surveys shall be carried out using a detector with a minimum detection level of not greater than 300 ppm.

Surveys of the interior of buildings should ideally be carried out when the doors and windows have been closed for several hours (e.g. early in the morning). Surveys of buildings shall pay particular attention to:

[25] *Guidance on the management of landfill gas*, Environment Agency, 2004, p103. Accessed August 2015 from http://www.sepa.org.uk/media/28986/guidance-on-the-management-of-landfill-gas.pdf

[26] *Exposure Guidelines for Residential Indoor Air Quality*, Health Canada, 1989, p8.

- Confined or partially-confined spaces such as cupboards (especially hot water cupboards and those under sinks);
- Areas where potential sources of ignition exist (e.g. near ovens and power meter boxes);
- Any points of entry such as cracks in the floor, or service entry points through the floor;
- After the cracks have been sealed at 142 Great South Rd (see Section 5.4.1), around the areas sealed.
- Areas where recent alterations to the building have been made, including new internal walls or penetrations into the floor slab.

Where possible, the methane concentrations within spaces shall be measured before the space is ventilated (e.g. testing under doors before opening them, or testing service fixtures by placing the monitoring probe through the vent).

6.2.3.4 Trigger Levels

Trigger levels and required actions in response to any elevated indoor atmospheric methane levels detected within the commercial buildings at 142 and 150 Great South Road are provided in Table 6-1 in in section 6.2.4.

6.2.4 Summary of LFG Trigger Levels and contingency actions

Table 6-1 provides a summary of LFG trigger levels and contingency actions in the ground and in the air. The terms shown in **bold** are explained further below.

Affected parties include WDC, WRC and contractors/consultants responsible for overseeing landfill gas monitoring and mitigation (if any). Additionally, the house owner and occupier (in the case of buildings) and the utility company (in the case of services) should be informed.

Supplementary monitoring (refer) should take place during a period of declining atmospheric pressure (in accordance with the methods in Section 6.2.1.3 for monitoring in the ground, Section 6.2.2.3 for air monitoring outside buildings and Section 6.2.3.3 for monitoring inside buildings), and as soon as is practicable after the elevated methane or carbon dioxide concentration was originally detected. Supplementary monitoring is to include methane and carbon dioxide. Supplementary

monitoring for services should include other roadside service fixtures within 20 m from the location where elevated methane concentrations were originally detected.

Frequency of supplementary monitoring will vary depending on the concentrations of LFG found at the sampling locations. If methane is detected at 5,000 ppm or greater within a service fixture, the supplementary monitoring is to be extended (during the same sampling visit, if possible) to include the exterior of the immediately neighbouring property or properties. If methane is detected outside the landfill at 200 ppm or greater (i.e. greater than or equal to 0.02% by volume in air) beneath or surrounding any house, permission is to be sought to survey the interior of the house. If permission is not granted, properties owners and tenants (if any) are to be advised in writing.

Whenever supplementary monitoring is carried out, a letter report shall be provided to WRC within 2 weeks of the supplementary monitoring round, advising:

- The reason for the supplementary monitoring;
- The results of the supplementary monitoring;
- Any other contingency measures implemented (e.g. ventilation, continuous monitoring), and, if known, the effectiveness of those measures;
- Whether any further monitoring and/or mitigation measures are required.

Improving ventilation may involve installing more or larger vents in the relevant services fixtures, or working with land owners/occupiers to install/upgrade ventilation systems in buildings. Mechanical ventilation of services is only expected to be required (if at all) in short-term, extreme scenarios.

Continuous monitoring involves installing fixed methane monitoring device(s). The monitoring data should be automatically recorded in such a way that it can be reviewed remotely. An alarm system should be installed, with a system in place to alert the property owner and occupier (buildings), the utility owner (services) and WDC if methane concentrations exceed 10% of the LFL. Automatic alerts to the local Fire Department should also be considered.

Table 6-1 Site-specific trigger levels for methane and carbon dioxide monitoring and contingency measures for ground and air monitoring at buildings (inside/outside) and roadside services at the Ngaruawahia closed landfill

Monitoring in the ground at the site boundary			
Monitoring Bore Depths (metres below ground level – mbgl)	**Concentrations of LFG:** Methane and Carbon Dioxide in percent by volume in air (% v/v)	**Gas Screening Value GSV[27,28] (L/h)** for Methane and Carbon Dioxide in Litres per hour (L/h)	**Contingency Action**
0 – 1.5 mbgl	5 % v/v	N/A	Carry out LFG monitoring in the air outside buildings and road service fixtures. Consider whether **supplementary monitoring** is required.
1.5 mbgl – 3.0 mbgl	N/A	0.07 L/h	
Monitoring in the air at LFG-affected area and roadside service fixtures			
Monitoring Location	**Methane Concentrations**	**Contingency Action**	
Quarterly and Supplementary monitoring – Methane Monitoring in roadside service fixtures			
Monitoring in the air within roadside services fixtures (i.e. cable box, water meters, light pole, etc.)	0.01% by volume in air (i.e. 100 ppm)	Discuss result in annual monitoring report.	
	0.25% by volume in air (i.e. 2,500 ppm)	Inform **affected parties** within 24 hours. **Improve ventilation** (electricity-related services). Consider whether additional monitoring or mitigation measures are required.	
	0.5% by volume in air (i.e. 5,000 ppm)	Improve ventilation (all services). Carry out supplementary monitoring (including other roadside service fixtures within 20m from the location where elevated methane concentrations were originally detected). Carry out monitoring of exterior of neighbouring building(s).	
Quarterly and Supplementary monitoring – Methane Monitoring in the Air (outside residential and commercial buildings)			
Monitoring in the air within LFG-affected area	0.02% by volume in air (i.e. 200 ppm)	Initiate further investigations (carry out supplementary monitoring) at the source and confirm that the gas is not present within buildings.	
Quarterly and Supplementary monitoring – Methane Monitoring in the Air (inside residential buildings)			
Monitoring in the air within LFG-affected area Indoors/inside all residential buildings and commercial buildings i.e. 142 and 150 Great South Road	0.1% by volume in air (i.e. 1,000 ppm)	Begin investigation to determine source of ingress of methane. Discuss result in annual monitoring report. Consider whether additional monitoring is required.	
	0.25% by volume in air (i.e. 2,500 ppm)	Evacuate building until **continuous monitors** are installed. Investigate improvements to building ventilation.	
	0.5% by volume in air (i.e. 5,000 ppm)	Evacuate building until an additional gas control measure is installed and the gas hazard has reduced to an acceptable level.	

[27] Gas Screening Value (GSV) is GSV is calculated by multiplying the maximum gas concentration (% v/v) by the maximum measured borehole flow rate (L/h), refer CIRIA C665 (footnote 28 below) for methane and carbon dioxide.

[28] CIRIA (Construction Industry Research and Information Association) C665: Refer Modified Wilson and Card Classification, Table 8.5 (p.88) Errata 2007, CIRIA C665 *Assessing risks posed by hazardous ground gases to buildings*

Monitoring Location	Carbon Dioxide Concentrations in the air	Action
Quarterly and Supplementary monitoring – Carbon Dioxide Monitoring in the Air inside residential buildings		
Monitoring in the air within LFG-affected area indoors/inside all residential buildings	0.35 % by volume in air (i.e. 3,500 ppm)	Attempt to identify and seal source. Consider need for supplementary monitoring and (if elevated concentrations persist) improved ventilation. Discuss result in annual monitoring report. Evacuate building if exceedance continues.
Quarterly and Supplementary monitoring – Carbon Dioxide Monitoring in the Air inside commercial buildings		
Monitoring in the air indoors/inside commercial buildings within LFG-affected area, i.e. at the specific 142 and 150 GSR	In accordance with WES standards TWA: 0.5% by volume in air (i.e. 5,000 ppm) STEL: 3% by volume in air (i.e. 30,000 ppm)	Attempt to identify and seal source. Consider need for supplementary monitoring and (if elevated concentrations persist) improved ventilation. Discuss result in annual monitoring report. Evacuate building if exceedance continues.

6.3 GROUNDWATER MONITORING

6.3.1 Objectives

The adverse effects of the leachate discharge from the Ngaruawahia closed landfill on the water quality of the nearby Waipa and Waikato Rivers are, based on a review of historical groundwater monitoring data, considered to be less than minor (see Section 3.2).

The only means of minimising leachate discharge from this unlined landfill is to minimise leachate production, which entails minimising the ingress of stormwater into the landfill.

The objectives of on-going groundwater monitoring at/near the landfill are to:

- Identify when maintenance of the landfill cap is required to reduce leachate production and ensure that effects on ground/surface water remain less than minor;
- Confirm that any cap maintenance which has been carried out has been effective.

6.3.2 Programme

Groundwater monitoring is to continue at 3-monthly intervals and is to involve the measurement of the electrical conductivity and pH at BH2 (the down-gradient bore – see Drawing 50784/GE01 in Appendix B).

If these primary groundwater monitoring parameters exceed the trigger levels in Table 6-2, water samples for laboratory analysis shall be collected from both BH2 and BH3 (including monitoring of conductivity and pH at BH3), which is adjacent to the eastern part of the landfill).

Where the pH and EC measurements from the monitoring bores exceed the trigger values on 3 successive occasions, the need for maintenance of the cap is to be investigated and implemented if required.

6.3.3 Methodology

All equipment used for groundwater monitoring should be appropriately rinsed and/or decontaminated before each monitoring round and between wells. To prevent contamination of samples, the area beside each well in which sampling is carried out shall be maintained in as clean a state as is practically achievable.

At each well to be monitored, the groundwater level should be recorded before any water is pumped from the well. If no groundwater is present, this should be recorded, and no further action is required. If groundwater is present, stagnant water shall then be purged from the well by pumping out 3 times the volume of standing water in the well.[29]

In the absence of any evidence of contamination (such as odour, discolouration or separate phase contaminants), groundwater purged from the wells may be discharged on to the ground in a location where it will soak into the soil. If evidence of contamination is noted, the purged water is to be collected for discharge into the WDC sewerage system.

Once the groundwater level has recovered to approximately the pre-purging level, water should be pumped from near the water surface at a low and steady flow rate to minimise drawdown, while temperature, pH and electrical conductivity are monitored

[29] Note that the purging requirements may be relaxed if the monitoring data indicates that representative values can be obtained with less purging.

at regular intervals (approx. every 2-5 min).[30] Once these parameters stabilise (≤ 5% difference between two readings ≥ 3 minutes apart), the readings should be recorded.

When the field readings for pH and electrical conductivity are within the trigger levels stated in Table 6-2, no collection of water samples for further testing is required.

When the field readings for pH and/or electrical conductivity exceed the trigger levels, water samples are be collected into appropriately preserved sample containers (with field filtration, where required) and submitted to an IANZ-accredited analytical laboratory for testing for:

- Electrical conductivity (to confirm the accuracy of the field results),
- Boron,
- Ammoniacal nitrogen,
- Chemical oxygen demand (COD),
- Dissolved heavy metals,
- Dissolved iron,
- Chloride.[31]

Detection limits for each parameter should be approximately 10% of the relevant trigger level or less. If this is not practicable, detection limits should not exceed the trigger level.

The samples should be kept cool in a chilly bin with ice from when the sample is collected to reception at the laboratory.

6.3.4 Groundwater Monitoring Trigger Levels

The groundwater monitoring data is to be used in conjunction with the surface inspection and LFG monitoring data to determine when cap maintenance is required. As part of this assessment, groundwater monitoring results are to be compared against the trigger values shown in Table 6-2.

[30] As discussed in Section 3.2.3, groundwater parameters which can be readily monitored in the field (in particular, electrical conductivity) provide an accurate indication of leachate concentrations in groundwater.

[31] Analytical parameters adapted from the list on page 70 of the *CAE Landfill Guidelines*, with consideration given to the historical monitoring data for the site.

Trigger levels for conductivity and pH represent values that would be considered outside the range of recent (post 2009) monitoring data for BH2 if observed. Values outside these levels may therefore indicate a change in leachate composition or discharge rate. The monitoring data on which these values are based are shown in Appendix F and discussed in Section 3.2.3.

Trigger levels for laboratory parameters are based on either:

- The *ANZECC Guidelines* (Table 3.4.1) for the protection of 95% of freshwater species (in the case of boron, using a guideline value recalculated by Golder Associates Ltd), or
- Where no *ANZECC Guideline* is available, groundwater monitoring data from wells up-gradient of the nearby Horotiu landfill. These trigger values are the highest of the average concentrations for 4 up-gradient wells not considered to be affected by leachate.[32]

To derive the trigger levels for laboratory parameters, the above source values were **multiplied by a factor of 10 to allow for dilution occurring as part of reasonable mixing**. This dilution factor is considered to be a conservative representation of the actual dilution likely to be available between the monitoring wells and the potential receiving environments in the Waipa or Waikato Rivers (particularly in the case of BH2-BH4, which are distant from the Rivers). Therefore, groundwater contaminant concentrations which exceed these trigger levels do not necessarily indicate that leachate from the landfill will adversely affect water quality in the Waipa or Waikato Rivers, but indicate that further assessment is required.

[32] *The characteristics and impacts of landfill leachate from Horotiu, New Zealand and Maseru, Lesotho: A comparative* study, Masters Thesis by Thabiso Mohobane, University of Waikato, 2008. Accessed August 2015 from http://researchcommons.waikato.ac.nz/handle/10289/2421 Trigger values taken from Appendix 3, p199, which gives the average concentrations for a number of parameters for each of 7 up-gradient monitoring wells. However, data from wells GW9, GW10 and GW17 were omitted as some evidence of leachate impacts was noted within these wells (see Section 5.4, p115). Note that COD data was available for only 2 wells.

Table 6-2: Site specific Groundwater monitoring trigger values

Parameter	Trigger value[33]	Source
Required Parameters measured in the field		
Electrical conductivity (field and lab)	900 µS/cm	Historical monitoring data
pH	7.0 (upper limit) 5.5 (lower limit)	Historical monitoring data
Parameters analysed in the laboratory (contingency measure if pH and electrical conductivity exceed trigger levels above)		
Boron	39 g/m^3	Golder 2009[34]
Ammoniacal nitrogen[35]	9.0 g/m^3	*ANZECC Guidelines (95% level of protection for freshwater)*
COD	990 g/m^3	Horotiu background data
Zinc	0.08 g/m^3	*ANZECC Guidelines (95% level of protection for freshwater)*
Iron	100 g/m^3	Horotiu background data
Chloride	220 g/m^3	Horotiu background data

Section 7.3 describes contingency measures to be implemented if elevated groundwater contaminant concentrations are detected.

6.4 REPORTING AND REVIEW

Quarterly gas reports, incident exceedance / trigger levels reports as well as annual monitoring report are to be prepared and submitted to WRC for review (refer to Resource Consent Conditions in Appendix E). The annual monitoring report shall include the following information for the monitoring period (approximately the year preceding the date of the report):

- Any relevant development, physical works, or incidents which have occurred on or near the landfill, and the (possible or actual) effects of these;
- Any work intended to be completed during the monitoring period, but was delayed or did not proceed;

[33] To obtain the trigger values for laboratory parameters, the relevant source value was multiplied by 10 to account for reasonable mixing.
[34] *Recalculation of the ANZECC Water Quality Criteria for Boron*, Golder Associates, June 2009.
[35] Trigger value is temperature and pH dependent. See Table 8.3.6 of the *ANZECC Guidelines* (Volume 2)

- Any complaints received by WDC relating to the landfill;
- Any deviations from the sampling programmes or methods specified above;
- Monitoring results for groundwater (including all historical monitoring data), landfill gas, and surface inspections, including a discussion of any results which exceed the relevant trigger levels;
- Any maintenance or contingency measures implemented in response to monitoring results;
- Recommended changes to the monitoring programme or other aspects of landfill management (if any);
- A statement that management of the closed landfill is (or is not) being carried out generally in accordance with the consent conditions and this LAMP.

The Waters Manager is responsible for ensuring that this report is prepared, and that on-going monitoring requirements are reviewed as appropriate.

6.5 ACCESS REQUIREMENTS

WDC shall ensure that safe access is available to all staff, contractors and consultants who need to visit the former landfill site to complete work required by this LAMP or the consent.

WDC shall endeavour to obtain permission to access private properties near the landfill, where this is required for the purposes of closed landfill management/monitoring. If owners/occupiers of private property have been informed of the risks associated with the landfill, and the reason that access has been requested, but refuse WDC staff/contractors the right to enter their property, WDC shall attempt to make alternative arrangements (such as carrying out monitoring on a neighbouring property or within WDC-owned land). If alternative arrangements cannot be made, or would be inappropriate (e.g. if access is denied to a specific property on which mitigation is required), WDC shall be released from its obligation to carry out the relevant work and shall advise the land owner/occupier of their assumption of risk.

7.0 CONTINGENCY PROCEDURES

7.1 LANDFILL SURFACE AND STORMWATER

The potential effects associated with deficiencies in the cap or drainage system are:

- Exposure to refuse at/near the surface (considered unlikely, given that the cap is understood to be 1-2 m deep, as discussed in Section 2.2);
- Uncontrolled release of landfill gas;
- Water ingress leading to increased production of leachate and LFG.

If any visual inspection described in Section 6.1 identifies any evidence that the efficacy of the cap and/or surface drainage system may be significantly impaired (for instance, a large number of wide cracks or widespread water ponding):

1. WRC is to be notified of the result in writing within two (2) weeks of the date of the inspection unless there is a safety issue.
2. WDC is to organise for appropriate repairs or maintenance works to be undertaken.
3. If the issue identified relates to the integrity of the cap with respect to vertical gas migration, methane concentrations in the affected area shall be monitored during the next atmospheric methane monitoring round.
4. The results are to be discussed in the next annual monitoring report.

The results of visual inspections should be interpreted in conjunction with the results of groundwater and LFG monitoring, when determining if cap maintenance or other measures are required.

Depending on the nature of the issue identified, repairs or maintenance would be expected to involve some or all of:

- Re-grading/re-compacting existing capping material,
- Importing additional low-permeability capping soil,
- Filling large cracks with bentonite slurry,
- Repair or clearing of drainage lines,
- Sowing/planting grass or other vegetation in the area affected by the work;
- Measures to prevent lateral gas migration.

Should the repair/maintenance work fail to adequately address the issue identified, the monitoring programme as detailed in Section 6.0 is intended to detect any on-

going issues with LFG, leachate, or exposure of refuse. If this situation occurs, further repairs or maintenance would be carried out, until monitoring results demonstrate that the issue has been fully addressed.

7.2 LANDFILL GAS

Trigger levels and required responses for LFG monitoring in the ground, in the air (inside/outside residential and commercial buildings) and within roadside service fixtures are summarised in Table 6-1. These trigger levels and required responses are adapted from those recommended by The United Kingdom's Environmental Agency (EA),[36] and the trigger levels applied at the Rototuna landfill.

The EA guidelines are intended to apply to ambient indoor air, and the air within enclosed spaces such as cupboards and service fixtures. The elevated concentrations of methane detected in very small areas surrounding cracks in the floor at 142 Great South Rd require further immediate investigation as any methane ingress is a concern.

Note that the responses for each concentration range are intended to be applied in addition to those for lower concentration ranges. For instance, if methane was detected at > 1,000 ppm in ambient indoor air in a residential building and > 2,000 ppm in a commercial building, WDC or their contractor/consultant would be expected to inform affected parties within 24 hours, attempt to identify and seal the source, and implement continuous monitoring, as well as discussing the result in the annual monitoring report.

[36] *Guidance on the management of landfill gas*, Environment Agency, 2004, p103. Accessed August 2015 from http://www.sepa.org.uk/media/28986/guidance-on-the-management-of-landfill-gas.pdf

7.3 GROUNDWATER QUALITY

If a groundwater sample is tested for the laboratory parameters listed in Section 7.3, and the concentrations of one or more of those contaminants exceeds the relevant trigger value:

1. WRC is to be notified of the result in writing within two (2) weeks of the receipt of laboratory results. The notification shall include an interpretation of the result, and information regarding any mitigation measures considered necessary.
2. A supplementary sample is to be collected from the same well within one (1) month of the original sample, to confirm that the result was representative.[37]
3. The results shall be assessed in detail to determine whether repairs or maintenance to the cap/surface drainage system are required.
4. The results are to be discussed in the next annual monitoring report.

As no liner or sub-surface leachate drainage system exists, the only practical means of controlling leachate generation is through cap maintenance and improvement work. Therefore, if groundwater monitoring indicates an elevated level of leachate discharge and there is physical evidence of cap failure, the appropriate response would be to:

- carry out maintenance/repairs on the cap and/or surface drainage system in accordance with Section 7.1.
- continue groundwater monitoring in accordance with Section6.3,
- in the event that groundwater monitoring indicates that the maintenance/repairs were inadequate, carry out further work until groundwater monitoring results return to acceptable levels.

[37] A further additional sample is not required if one or more parameters exceed the relevant trigger level in the supplementary sample.

8.0 FUTURE SITE USE

8.1 POTENTIAL FUTURE DEVELOPMENT

Section 1.1.2 of the *Closed Landfill Guide* discusses typical land uses on closed landfills in New Zealand. Open space use of closed landfills is recommended.

In addition to standard planning, community, safety and building control considerations, any proposed use of the Ngaruawahia closed landfill should be assessed in terms of the matters discussed in this report, with particular emphasis on:

- The sensitivity of the proposed use to landfill conditions (primarily LFG and land stability);
- Whether the proposed development has the potential to adversely impact upon landfill management, damage the cap or surface drainage system, or result in increased generation/release of leachate of LFG;
- Whether increased monitoring or additional mitigation measures may be required if the proposed development proceeds;
- Any other factors that may make the proposed activity unsuitable on the closed landfill site (see, for example, the risk factors and requirements for working on the landfill summarised in Sections 5.1 and 4.2, respectively).
- Effect of LFG on landuse.

For example, it is noted that:

- Any **structures** to be built on the site would require specific design to ensure that LFG migration into the building does not occur, that the landfill cap is not adversely affected (in particular by inappropriate foundation design, or due to the load of the building itself), and that the ground at the proposed building location is geotechnically suitable for construction. Developments involving many buildings, large or heavy buildings, basements, or slab-on-grade floors are unlikely to be appropriate on the closed landfill in the medium term.
- The matters discussed in Section 8.2 should be considered before any further **planting or landscaping** is carried out at the site.

These issues should be considered for all aspects of a proposed development, not just the primary land use. For instance, use of the site for sports fields is likely to be acceptable, given appropriate design and adequate and regular capping maintenance

to control sharps (broken glass, metal, needles). However, any changing rooms/club rooms, light poles or possibly carparks would require careful design to prevent:

- LFG migration into buildings, or
- Creating preferential flow paths to/from the surface by removing impermeable materials, or organic topsoil in which methane oxidation may occur, or
- Increased LFG or leachate discharge as a consequence of any compaction of the landfill contents.

8.2 VEGETATION ESTABLISHMENT

Section 5.4 of the *Closed Landfill Guide* discusses vegetation on closed landfills. In summary, that section recommends:

- Appropriate soil management to prevent issues such as compaction of topsoil;
- Use of grass for landfill cover in the early period after landfill closure, with the choice of grass species to be based on site-specific factors and based on advice from pastoral experts;
- Use of fertiliser, soil analysis and irrigation as required to manage the nutrient and water requirements of the vegetation;
- Gradual establishment of any larger vegetation, which should generally begin no fewer than 20 years after the landfill is closed, with a minimum of 150 mm of topsoil required to establish vegetation other than grass.
- Use of low planting to allow plants to establish. Plants on landfills are commonly adversely affected by carbon dioxide from the LFG and may be hard to establish.

A suggested progression for establishment of larger vegetation (up to and including trees), and a list of recommended native plant species are also included in the *Closed Landfill Guide* (in Section 5.4 and Appendix D, respectively).

Other studies suggest that plants with shallow root systems should be selected for planting on landfills where possible, and that wind tolerance should also be considered.[38]

[38] See, for example:
- Flower, Gilman and Leone, "Landfill gas, what it does to trees and how its injurious effects may be prevented", *Journal of Arboriculture, 7*, 2, February 1981.
- Ussher and Hillman, "Successful Revegetation of Landfills", conference presentation at *WasteMINZ* 2010.

8.3 VENT REMOVAL

The landfill gas vents were removed in late 2015 by contractors engaged by WDC. WDC have advised that the methodology employed was to combine the excavations with the reinstatement as follows:

1. Excavate down to expose the concrete pad (an area of approx. 2 m x 2 m). Remove concrete pad and outer steel pipe and cut off the inner vent.
2. Plug the inner vent with a bentonite cement mix with a ratio of 2.5 Water:1 Portland Cement:0.3 bentonite
3. Backfill the area excavated with sand mixed with bentonite powder (25%) to just below ground surface and then place 0.3 m topsoil at the surface and grass.
4. Dispose of all material removed at an appropriate disposal facility.

9.0 REFERENCES AND OTHER RELEVANT DOCUMENTS

This Landfill Aftercare Management Plan relies heavily upon and should be read in conjunction with the following documents:

- *A Guide to the Management of Closing and Closed Landfills in New Zealand (Closed Landfill Guide)*, Ministry for the Environment, 2001.
- *Landfill Guidelines: Towards Sustainable Waste Management in New Zealand (CAE Landfill Guidelines)*, Centre for Advanced Engineering (CAE), University of Canterbury, 2000.
- *Ngaruawahia Closed Landfill Assessment of Effects of Leachate and Landfill Gas Discharges* (MWH 2010, attached as Appendix C), prepared by MWH for Waikato District Council, 2010.
- *Ngaruawahia Closed Landfill: Atmospheric Methane Monitoring Report*, (Babbage 2015, attached as Appendix D) prepared by Babbage for WDC, 2015.

Additional citations are given in the footnotes.

Appendix A Glossary

Abbreviations

ANZECC	Australian and New Zealand Environment and Conservation Council
BH	Borehole
COD	Chemical oxygen demand
EA	(United Kingdom) Environment Agency
EC	Electrical conductivity
FID	Flame ionisation detector
GIS	Geographic information system
GSV	Gas Screening Value
LAMP	*Landfill Aftercare Management Plan*
LFG	Landfill gas
LFL	Lower flammable limit (for methane, approx. 50,000 ppm)
LIM	Land Information Memorandum
mbgl	metres below ground level
MfE	Ministry for the Environment
NIMT	North Island Main Trunk railway line
PMP	Project Management Plan
ppm	parts per million
WDC	Waikato District Council
WRC	Waikato Regional Council

Definitions

Ambient indoor air - refers to the general air quality in a building or space, as distinct from areas immediately surrounding sources of gas (e.g. cracks or pipes), where elevated concentrations of gas may be detectable (prior to reasonable mixing).

LFG-affected area – the area in which LFG is known to be present in the ground. This term is further defined in Section 2.1 and Appendix G, and the area considered to be potentially affected is shown on Drawing 50784/GE01.

Elevated concentrations of LFG – refers in this report to concentrations of methane (CH_4) and/or concentrations of carbon dioxide (CO_2) exceeding the trigger levels specified in Table 6-1.
Hazardous concentrations of methane mean concentrations in air over 5% v/v for flammability.

Appendix B Drawings and Aerial Photographs

Drawing 50784/GE01 Landfill Location Plan (Showing 2014 Aerial Photograph)

Drawing 50784/GE02 Existing Underground Services Plan – Sheet 1

Drawing 50784/GE03 Existing Underground Services Plan – Sheet 2

Marked up aerial photo showing locations where methane was detected at >500 ppm (Marked up 18/5/2015)

Historical aerial photos 1951, 1955, 1972, 2002 and 2006

Appendix C MWH 2010 report (to be included in final version of LAMP)

Appendix D Babbage 2015 report (to be included in final version of LAMP)

Appendix E Resource Consent (to be included in final version of LAMP)

Appendix F 2000-2015 Leachate monitoring data, WDC

Appendix G Babbage letter regarding potentially affected parties, June 2015

Appendix H: Summary of all LFG monitoring data in the ground (2009-2015)

Appendix I: GSV calculation based on February 2015 monitoring data.

Waikato District Neighbourhood Parks Reserve Management Plan

Waikato
DISTRICT COUNCIL
Te Kaunihera aa Takiwaa o Waikato

Adopted 8 August 2016

This Reserves Management Plan has been prepared by Waikato District Council (the Council) under the provisions of the Reserves Act 1977 Section 41.

Adopted on 8 August 2016

Process timeline

Call for suggestions	October 2015
Draft Management Plan released for submissions	20 April 2016
Submissions closed	24 June 2016
Hearing	21 July 2016
Management plan adopted	8 August 2016

Contents

1.0 Purpose of this plan

Reserve management plans provide direction for the day-to-day management of reserves.

Determining community preferences and establishing the best means to provide for them are essential ingredients of good management planning. A management plan provides the community with certainty about the function and management of each reserve that is managed by Council. It also helps ensure that management decisions are consistent with the principles of the Reserves Act 1977.

This plan will provide for consistent approach to the management of reserves in the Waikato district.

1.1 Reserve management plan requirements

The Waikato District Council (the Council) has a responsibility as an administering body under the Reserves Act 1977, Section 41, to prepare management plans for the reserves and parks that it manages.

These management plans should "... provide for and ensure the use, enjoyment, maintenance, protection, and preservation ... and, ... the development, as appropriate, of the reserve for the purpose for which it is classified".

Open space is recognised as an important component of the urban environment, providing opportunities for recreation and leisure. This management plan provides a framework within which managers can develop a balanced response to current opportunities and address future pressures.

The management plan identifies clear objectives and establishes directions for planning, resource management and maintenance of public open space. It clarifies and establishes policy and direction for both Council staff and the public.

When adopted, this management plan and the General Polices Management Plan 2015 will replace any previously prepared reserve management plan for reserves included in this plan.

This management plan will be kept under continuous review to ensure that the policies are appropriate and relevant for the communities within the Waikato district. It is intended that a comprehensive review will take place every five years.

1.2 Relationship with general policies

This management plan is to be read in conjunction with the General Policies Reserve Management Plan. The general policies will apply to all reserves within the Waikato district. Where there is a conflict between the specific polices contained within this plan and the general policies contained within the General Policies Reserve Management Plan, the specific policies in this plan will take precedence.

1.3 Relationship with strategies

Council has other strategies that impact neighbourhood parks, including the Playground Strategy, Signage Strategy and Toilet Strategy. Whereby these strategies have identified policies for neighbourhood parks it is the intention that these will be implemented. These policies may relate to issues such as maintaining and upgrading playgrounds, installing park signage and upgrading public toilets. To avoid repetition these policies have not been repeated in this document.

1.4 Waikato-Tainui Joint Management Agreement

Council and Waikato-Tainui have entered into a Joint Management Agreement in accordance with the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010. The agreement acknowledges that Council has rights and responsibilities with regard to management of reserves under Reserves Act 1977.

The agreement also acknowledges that Council has a requirement to consult to determine appropriate management of Crown land under Council control and to consider how management decisions that may impact on future return of the land to Waikato-Tainui.

In accordance with the Waikato Raupatu Claims Settlement Act 1995, Council has informed the Waikato Raupatu River Trust of its intention to prepare a reserve management plan and has discussed the scope of the reserve management plan. The Waikato Raupatu River Trust will provide Council with feedback on how the draft plan and submissions received may affect customary activities on the Waikato River.

The Council is the administrator of many reserves where the underlying ownership resides with the Crown. In accordance with the Waikato Raupatu Claims Settlement Act 1995, Waikato-Tainui will be offered first right of refusal where Crown land is to be disposed of. Where reserves are subject to first right of refusal provisions, this is identified in the property summary for each reserve.

Where the land was derived from the Crown, and therefore subject to the Waikato-Tainui Treaty Settlement, this is shown as a “Subject to WTTS”.

1.5 Structure of this plan

The reserves covered by this management plan are presented on a ward-by-ward basis. Each reserve is described with respect to its classification and legal description and the authority under which the Council manages it.

Council’s authority to administer the reserve may either come from:

1. Ownership (in such cases the land will have been “declared” reserve under Section 14 of the Reserves Act or “vested” on subdivision under the Resource management Act or Local Government Act)
2. A "vesting" from the Crown, or

3. "An appointment to control and manage" from the Crown

Where the land was derived from the Crown, and therefore subject to the Waikato-Tainui Treaty Settlement, this is shown as a "Subject to WTTS".

The current formal occupation and use of the reserve is described and the specific issues and polices that apply to the reserve are outlined. A plan showing the boundaries of the reserve is included and where required a more detailed concept plan is included showing future development.

A number of properties are not reserve or are not yet classified in accordance with the Reserves Act 1977. The treatment of these properties is described in Section 3.

1.6 Council and delegations

The Minister of Conservation has delegated a number of procedural and decision-making responsibilities to Council under the Reserves Act 1977. These delegations are made to "Council as a whole" and cannot be delegated to committees of Council or staff. Such decisions that must be made by a meeting of the full Council (Council as a whole) include adoption of reserve management plans, classification or reserves and granting of leases.

Other decisions, such as approval for events, removal of trees, issuing of permits etc. can be delegated from the Council to the Chief Executive and to the Parks and Facilities staff. As delegations change from time to time, the term Council is used throughout the document. Staff should refer to the Delegations Manual to determine if they have the authority to make decisions in accordance with the policies in this management plan.

1.7 Implementation

This management plan provides objectives and policies that determine the appropriate use, protection and development of the reserves administered by the Council. Decisions relating to the funding and priority for works described in this plan will be undertaken within Council's Long Term Plan and Annual Plan. Inclusion of any project within this management plan does not indicate Council funding will be available for such works as works may be funded and delivered by parties other than Council.

The requirements of the Heritage New Zealand Pouhere Taonga Act 2014, to obtain an archaeological authority to modify recorded and unrecorded archaeological sites may be applicable to works undertaken in reserves. The consideration of the potential for the presence of archaeological sites at an early stage enables avoiding modifying any sites through good project planning.

1.8 Public suggestions

Suggestions from members of the public have been incorporated in to the individual management plans within this document. However, in some cases suggestions have been made that relate to multiple neighbourhood parks. These suggestions are supported and are discussed below.

Whaingaroa Environment Centre – fruit trees

The Whaingaroa Environment Centre has been involved in assisting the Raglan community with their aspiration to see more free food available in public places. Having fruit trees in Raglan's neighbourhood reserves was an idea brought forward from the community, and supported by the community through the donation of fruit trees, compost and mulch and through the planting of the trees.

The Centre approached the Waikato District Council who has supported this community initiative, providing access to mulch and identifying suitable areas for fruit trees. The Centre would like to see the community aspiration for fruit trees in public spaces formally catered for in the Neighbourhood Parks Reserve Management Plan. This has also been allowed for in Council's Tree Policy.

Smoke free parks

There were a number of suggestions advocating smoke free parks. Council already has a policy within its General Policies Reserve Management Plan that all reserves shall be smoke free. Over time Council will undertake staged introduction of positive smoke free signage and consider initiatives such as communication plans.

Heritage studies

Heritage New Zealand advocates a historic heritage study of each reserve as a helpful way to achieve an understanding of the historic heritage values. Council has a policy within its General Policies Reserve Management Plan to recognise and retain heritage features.

Transpower National Grid transmission lines

Transpower seeks that the Management Plan recognises Transpower's existing assets within the reserves *and* enables the ongoing operation, maintenance, development and upgrade of the National Grid transmission lines within the proposed reserves. Council has a policy within its General Policies Reserve Management Plan to enable this.

2.0 The reserves

2.1 Awaroa ki Tuakau Ward

2.1.1 Centennial Park, Tuakau

Reserve Classification	Recreation Reserve	Area	1.1720 ha
Location	Bollard Road and Park Ave, Tuakau	Legal description	Part Lot 1 DP 13796, Lots 9-12 and Part Lot 13 DP 16549 and DP 25648
Authority	Declared	Subject to WTTS	No

Background
This large neighbourhood park includes a playground, established trees, picnic tables, park benches and a large grass area on a gradual slope. Bollards and chains surround the road entrances and the reserve is allocated as a dog exercise area. The Kairoa stream passes through the Eastern portion of the reserve. There are a variety of trees and gardens around the stream, as well as a walking path.

A bridge over the Kairoa stream at the Eastern edge of the reserve was officially opened by His Worship the Mayor Allan Sanson in 2014 and sponsored by the Graham family.

There are plaques by the Western entrance that state: "1840 – 1940 Erected by the people of Tuakau and the surrounding district and in honour dedicated to the memory of those pioneer men and women who having endured dangers and great hardship won for us our heritage".

Access is given through the reserve for maintenance of the main network lines.

Reserve Issues

- Ensure that consideration is given to railway safety. This can occur with options such as the use of fencing and/or landscaping buffers, and locating buildings away from the rail boundary, as potential means of managing the risk associated with the rail network adjoining public open space.
- Ensure trees are kept away from railway line.
- Whilst there is signage by the carpark, it is not easily viewable.

Reserve Management Policy

1. Consider urban design principles to further buffer the railway line from the reserve.

Proposed Development

No specific development is anticipated.

Waikato District Council

Centennial Park

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2.1.2 Mark Ball Drive Reserve, Pokeno

Reserve Classification	Recreation Reserve	Area	0.1275 ha
Location	Mark Ball Drive, Pokeno	Legal description	Lot 804 Deposited Plan 446854
Authority	Vested	Subject to WTTS	No

Background
This recently developed neighbourhood park is located amongst a new development in Pokeno. It is accessible from Mark Ball Drive and McNeish Place. The reserve includes a children's playground which was installed in 2013, concrete path, park seats and a grassed area running down a slight slope. Young trees have been planted and gardens are located along the North and South boundaries.

Reserve Issues
- None identified.

Reserve Management Policy
1. None identified.

Proposed Development
No specific development is anticipated.

Waikato DISTRICT COUNCIL

Mark Ball Drive Reserve

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2.1.3 Martindale Lane Reserve, Tuakau

Reserve Classification	Recreation Reserve	Area	0.1495 ha
Location	9 Martindale Lane, Tuakau	Legal description	Lot 45 DP 416113
Authority	Vested	Subject to WTTS	No

Background
This neighbourhood park includes a children's playground and a grassed area for informal sporting activities. Gardens are located by the playground along with numerous ornamental rocks and park seats. There are also a small number of trees on the reserve.

Reserve Issues
- None identified.

Reserve Management Policy
- None identified.

Proposed Development
No specific development is anticipated.

Martindale Lane Reserve

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2.1.4 Mercer Playground, Mercer

Reserve Classification	Recreation Reserve	Area	0.1553 ha
Location	Koheroa Road, Mercer	Legal description	Section 40 Suburb of Mercer
Authority	Declared	Subject to WTTS	No

Background
This neighbourhood park has been converted from two former tennis courts. As a result the surface is mainly concrete. The reserve includes a playground with lighting, one basketball hoop, a picnic table, netting around the former tennis courts and gardens around the border of the reserve. Skate ramps were installed in 2016.

Reserve Issues
- Lack of signage to identify the reserve as a public asset.
- Concrete surface makes it unsuitable for some informal sports.
- Utilisation of reserve.

Reserve Management Policy
1. Additional skateboarding facilities should be investigated if there is future demand to utilise the concrete surface.
2. Improve landscaping/gardens.

Proposed Development
- Re-establish one tennis court if there is future demand.
- Provide additional skateboarding facilities.

Waikato DISTRICT COUNCIL

Mercer Playground

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2.1.5 Village Place Park, Tuakau

Reserve Classification	Recreation Reserve	Area	0.607 ha
Location	Village Place, Tuakau	Legal description	Lot 6 DP 147900
Authority	Vested	Subject to WTTS	No

Background

This small neighbourhood park is located on a gradual slope. It mainly consists of mown grass and includes a small selection of trees.

Reserve Issues

- Lack of signage to identify the reserve as a public asset.
- Utilisation of reserve.

Reserve Management Policy

1. Undertake landscaping to improve amenity value of reserve.

Proposed Development

- Consider reserve as a venue for a playground.

Waikato DISTRICT COUNCIL

Village Place Park

SCALE	1:300	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 14/12/2015	A4

2.2 Eureka Ward

2.2.1 Good Street Reserve, Matangi

Reserve Classification	Recreation Reserve	Area	0.1226 ha
Location	9 Good Street, Matangi	Legal description	Lot 25 DPS 50562
Authority	Vested	Subject to WTTS	No

Background
This neighbourhood park is primarily comprised of a children's playground and a flat grass area suitable for informal sporting activity. In addition there is a park seat, picnic table and a small selection of trees. Signage has recently been installed. There is also a pump station on the reserve.

Reserve Issues
- Visual amenity of reserve.

Reserve Management Policy
1. Undertake landscaping to improve amenity value of reserve.

Proposed Development
Consider disposal of the reserve and relocation of the playground to Jack Foster Park. This is subject to a surplus land assessment.

Waikato DISTRICT COUNCIL

Good Street Reserve

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2.3 Huntly Ward

2.3.1 Bailey Street Reserve, Huntly

Reserve Classification	Recreation Reserve	Area	0.1383 ha
Location	Rosser Street and Bailey Street, Huntly	Legal description	Lot 324 DPS 25983
Authority	Vested in the Crown, Administered by Council	Subject to WTTS	Yes

Background
Bailey Street Reserve contains a children's playground and a concrete pedestrian linkage between Bailey Street and Rosser Street. Both entrances are bollarded to prevent vehicle access.

Reserve Issues
- None identified.

Reserve Management Policy
1. Undertake landscaping to improve visual amenity.

Proposed Development
Install seating near playground.

Waikato DISTRICT COUNCIL

Bailey Street Reserve

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2.3.2 Bond/Hall Street Reserve, Huntly

Reserve Classification	Recreation Reserve	Area	0.4740 ha
Location	Caesar Roose Place and O'Leary Place, Huntly	Legal description	Lot 258 DPS26056
Authority	Vested	Subject to WTTS	No

Background
This reserve has established trees, boundary bollarding and a concrete path providing a linkage between the three access points.

The land parcel adjoining Bond Street is not owned by Council (it is owned by Her Majesty the Queen) and therefore excluded from this management plan; however it is also grassed with a concrete path and has been incorporated in to the Council owned reserve.

Reserve Issues
- Lack of signage to identify the reserve as a public asset.
- Vehicles accessing the reserve.
- Land not owned by Council has been incorporated in to the reserve.

Reserve Management Policy
1. Investigate purchase of the neighbouring land parcel that has been incorporated in to the reserve.

Proposed Development
Improvements to bollarding and reserve access.

Waikato DISTRICT COUNCIL

Bond/Hall Street Reserve

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2.3.3 Brownlie Crescent Reserve, Huntly

Reserve Classification	Recreation Reserve	Area	0.3860 ha
Location	Brownlie Crescent, Huntly	Legal description	Lot 287 DPS 24504
Authority	Vested	Subject to WTTS	No

Background

This flat reserve is located at the end of Brownlie Crescent and is bordered on all sides by the road. It contains a small number of large trees as well as a basketball hoop and small concrete pad.

Reserve Issues

- Proximity to road (safety).
- Rubbish on the reserve.
- Visual amenity of reserve.

Reserve Management Policy

1. Undertake landscaping to improve visual amenity.
2. Allow the site to be utilised for a community garden.

Proposed Development

- Install seating near the basketball hoop.
- Extend the concrete pad under the basketball hoop.

Brownlie Crescent Reserve

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2.3.4 Caesar Roose Reserve, Huntly

Reserve Classification	Recreation Reserve	Area	1.2863 Hectares
Location	Hall Street, Huntly	Legal description	Lot 257 DPS 27892, Lot 273 DPS 27894
Authority	Vested	Subject to WTTS	No

Background
This large reserve serves as a pedestrian linkage network, with entrances from five different streets and numerous concrete paths. There is bollarding at the entrance points and a selection of established trees. The topography is generally flat with a couple of built up areas, and the visibility is generally good.

Reserve Issues
- Dumping of rubbish in the reserve.
- Vehicles accessing reserve.
- A large number of fences in poor condition adjoining private properties.
- Transpower's Hamilton - Meremere B (HAM-MER B) 110 kV transmission line traverses the centre of the Reserve. No structures are located in the Reserve.

Reserve Management Policy
1. Permit vehicle access associated with the ongoing operation, maintenance, development and upgrade of the National Grid transmission lines.

Proposed Development
- Improve bollarding and reserve access.
- Create a fitness trail within the reserve.

Waikato DISTRICT COUNCIL

Caesar Roose Reserve

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2.3.5 Gavin Place Reserve, Huntly

Reserve Classification	Recreation Reserve	Area	0.3886 ha
Location	Gavin Place, Huntly	Legal description	Lot 60 DPS 24501
Authority	Vested	Subject to WTTS	No

Background

This is a flat park that provides a good open space for informal sporting activities as well as a linkage between three roads. It includes concrete paths for pedestrians and established trees.

Reserve Issues

- Vehicles accessing the reserve.
- Rubbish on reserve.

Reserve Management Policy

1. Undertake landscaping to improve amenity.

Proposed Development

- Install picnic tables and seating.
- Improve bollarding and reserve access.

Waikato DISTRICT COUNCIL

Gavin Place Reserve

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2.3.6 Huntly West Domain, Huntly

Reserve Classification	Recreation Reserve Except Lot 3 DPS19370 which is General Land	Area	2.1067 ha
Location	Semple Street and Fraser Street, Huntly	Legal description	Lot 40 DPS858, Lots 1 and 8 DPS316, Pt Lot 9 DPS316, Lot 3 DPS19370
Authority	Declared	Subject to WTTS	Yes Except lot 3 DPS19370

Background

This is a large neighbourhood park that has four access points and is located adjacent to the railway line. It contains a playground, picnic table and park seat, established trees and a basketball court. There is a Maori Wardens building and a bowling club's clubrooms on the reserve.

Reserve Issues

- Ensure that consideration is given to railway safety. This can occur with options such as the use of fencing and/or landscaping buffers, and locating buildings away from the rail boundary, as potential means of managing the risk associated with the rail network adjoining public open space.
- Vehicles accessing the reserve.
- Graffiti.
- Condition of basketball court and car park.
- Security of buildings.

Reserve Management Policy

1. Formalise lease arrangements for buildings for Bowling and Maori Wardens.

2. Allow additional community buildings to be established on the site.

Proposed Development

- Improving the condition of the basketball court.
- Upgrade bollarding and reserve access.
- Consider disposal of this reserve, subject to a surplus land assessment.

Waikato DISTRICT COUNCIL

Huntly West Domain

SCALE 1:1600	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

2.3.7 McDiarmid Crescent Reserve, Huntly

Reserve Classification	Recreation Reserve	Area	0.3659 ha
Location	McDiarmid Crescent, Huntly	Legal description	Lot 116 DPS 27896 and Lot 117 DPS 27895
Authority	Vested	Subject to WTTS	No

Background
This reserve has established trees, boundary bollarding and a concrete path providing a linkage between the two access points. There is good visibility across the reserve.

Reserve Issues
- Motorcycles accessing the reserve.
- Graffiti.
- Dumping of rubbish and lawn clippings.
- A large number of fences in poor condition adjoining private properties.

Reserve Management Policy
None identified.

Proposed Development
Improve bollarding and reserve access.

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McDiarmid Crescent Reserve

SCALE 1:700	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 17/12/2015	A4

2.3.8 Meadows Lane Reserve, Huntly

Reserve Classification	Recreation Reserve	Area	1.0514 ha
Location	Rosser Street and Meadows Lane, Huntly	Legal description	Lot 256 DPS 24502
Authority	Vested	Subject to WTTS	No

Background
This is a large park with an undulating surface and established trees along the boundary.

Reserve Issues
- Poor drainage.

Reserve Management Policy
1. Undertake landscaping to improve visual amenity.

Proposed Development
- Install seating.
- Consider disposal of this reserve, subject to a surplus land assessment.

Meadows Lane Reserve

SCALE 1:900	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 21/12/2015	A4

2.3.9 Parry Street Reserve, Huntly

Reserve Classification	Sanitary Purposes Reserve and Local Purpose (Recreation) Reserve	Area	0.8314 ha
Location	Parry Street, Huntly	Legal description	Lot 1 DPS 9787 and Lot 2 DPS 44246
Authority	Vested	Subject to WTTS	Yes – for Lot 1 DPS 9787

Background
This reserve extends from Parry Street through to the railway line. It has a grassed floodbank, a large undulating open space and established trees at the Southern end of the reserve.

Reserve Issues
- Ensure that consideration is given to railway safety. This can occur with options such as the use of fencing and/or landscaping buffers, and locating buildings away from the rail boundary, as potential means of managing the risk associated with the rail network adjoining public open space.
- Lack of signage to identify the reserve as a public asset.
- Control of weeds in undergrowth of large trees.
- The Eastern boundary of the ground isn't identifiable.

Reserve Management Policy
1. Define reserve boundaries and undertake access realignment.

Proposed Development
Protect and enhance existing tree planting on the reserve and seek to extend ecological linkages to neighbouring waterways.

Parry Street Reserve

SCALE 1:900	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 21/12/2015	A4

2.3.10 Pukemiro Domain, Pukemiro

Reserve Classification	Recreation Reserve	Area	1.4505 ha
Location	Bernard Street, John Avenue, Pukemiro	Legal description	Lot 56 DP 8585
Authority	Declared	Subject to WTTS	Yes

Background

This large reserve in Pukemiro is somewhat hidden away between Bernard Street and John Avenue. The park is separated in to two large fields with a row of established trees acting as a divider. The Northern portion is a lower height than the South.

Reserve Issues

- Lack of road frontage.
- Access and security.
- Illegal grazing.
- Utilisation of reserve.
- Lack of signage to identify it as a public asset.

Reserve Management Policy

1. Allow and encourage the site to be utilised as a community gathering zone.

Proposed Development

- Establish a walking/cycling linkage between the entrances, which can also act as a travel route to the neighbouring school.
- Open up the John Avenue entranceway by installing signage, removing vegetation and improving visibility across the reserve.

Pukemiro Domain

SCALE 1:900	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 21/12/2015	A4

2.3.11 Rosser Street Reserve, Huntly

Reserve Classification	Recreation Reserve	Area	4.0587 ha
Location	Rosser Street and James Henry Crescent, Huntly	Legal description	Lot 372 DPS 26576, Lot 373 DPS 26579, Lot 374 DPS 26580 and Lot 288 DPS 26581
Authority	Declared	Subject to WTTS	No

Background
This is a very large reserve which is largely undeveloped. There is a concrete footpath providing a pedestrian linkage between Rosser Street and James Henry Crescent.

Reserve Issues
- Very poor drainage.
- Limited road access at Southern end.
- Rubbish dumping.
- Graffiti.
- Utilisation of reserve.

Reserve Management Policy
None identified.

Proposed Development
- Install bollarding and improve reserve access.
- Retain the northern land parcel and consider disposal of the remainder of the reserve, subject to a surplus land assessment.

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Rosser Street Reserve

SCALE 1:2300	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 21/12/2015	A4

2.3.12 Russell Road Reserve, Huntly

Reserve Classification	Recreation Reserve	Area	0.3391 ha
Location	Russell Road and Burke Place, Huntly	Legal description	PT LOT 39 DP 23553 LOT 40 DPS 25279 REC RES
Authority	Vested	Subject to WTTS	No

Background

From the Russell Road entrance this is an attractive park that includes a playground, landscaping and established trees. A picnic table and a park bench are provided within the same area. The park runs down a slope towards the road.

Behind the playground the remainder of the reserve is disconnected, behind a row of trees and a fence line. This portion of the reserve is undeveloped with the exception of a concrete footpath that provides a linkage to Burke Place. There are good views overlooking Huntly from the top of the reserve.

Reserve Issues

- Lack of connectivity and integration throughout the reserve. The concrete paths do not connect and a fence splits the reserve.

Reserve Management Policy
None identified.

Proposed Development
Create walking access and connectivity between the two reserve entrances.

Waikato DISTRICT COUNCIL

Russell Reserve

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2.3.13 Smith Avenue Reserve, Huntly

Reserve Classification	Recreation Reserve	Area	0.0913 ha (Lot 98), 1.3830 ha (Part Lot 14)
Location	Smith Avenue, Webb Street and Armstrong Street, Huntly	Legal description	Part Lot 14 DPS 1010 and Lot 98 DPS 858
Authority	Declared	Subject to WTTS	Yes

Background
This reserve is undeveloped and provides a large area for informal sporting recreation. It has four entrance points.

Reserve Issues
- Vehicles accessing the reserve.
- Graffiti.
- Visual amenity of reserve.
- Rubbish dumping.
- Transpower's Hamilton - Meremere A (HAM-MER A) 110 kV transmission line traverses the western side of the reserve. Poles A227 and A228 are also located in the Reserve.

Reserve Management Policy
1. Permit vehicle access associated with the ongoing operation, maintenance, development and upgrade of the National Grid transmission lines.

Proposed Development
- Upgrade bollarding.
- Consider disposal of this reserve, subject to a surplus land assessment.

Smith Avenue Reserve

SCALE 1:1000	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 21/12/2015	A4

2.3.14 Tamihana Walkway, Huntly

Reserve Classification	Local Purpose Reserve (Accessway)	Area	0.0293 ha
Location	Tamihana Avenue, Huntly	Legal description	Lot 3 DPS 47698
Authority	Vested	Subject to WTTS	No

Background
This small reserve exists to provide an accessway from Tamihana Avenue to Rata Avenue. It contains a concrete path with a 7 wire fence at the edge of the neighbouring property.

Reserve Issues
- Encroachment from neighbouring property.
- Lack of signage to identify the reserve as a public asset.

Reserve Management Policy
1. Resolve the issue of encroachment by the neighbouring property.

Proposed Development
No specific development is anticipated.

Tamihana Walkway

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2.4 Ngaruawahia Ward

2.4.1 Barakat Walkway and Te Wiata Reserve, Ngaruawahia

Reserve Classification	Lots 45 and 49: Local Purpose (Amenity), Lot 27, 51 and 52: Local Purpose (Accessway)	Area	0.4659 ha
Location	Te Wiata Lane, Ngaruawahia	Legal description	Lots 45, 49, 51, 52 DP 372585, Lot 27 DPS 45775
Authority	Vested	Subject to WTTS	No

Background

This neighbourhood park has two open space areas with a creek running through the middle. There is plenty of space for informal recreational activity as well as a playground and picnic table. The creek is lined with a number of trees and shrubs and continues on the Southern side of Te Wiata Lane.

There are also pedestrian accessways on Te Wiata Lane that allow easy access to the reserve for an increased number of residents.

Reserve Issues

- Maintenance and enhancement of the watercourse through the reserve.
- Vehicles accessing the reserve.
- Graffiti on the fence surrounding the reserve.

Reserve Management Policy
None identified.

Proposed Development

- Install bollards and chain around reserve to prevent vehicles.
- Placement of a barked garden with trees or shrubs a few metres in from the footpath.
- Improve the appearance/amenity value, including piping the drain for improved safety and appearance.

Barakat Walkway and Te Wiata Reserve

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2.4.2 Duke Street Reserve, Ngaruawahia

Reserve Classification	Recreation Reserve	Area	2.0234 ha
Location	Duke Street, Ngaruawahia	Legal description	Sec 184 Nth Newcastle Subs Blk VII
Authority	Declared	Subject to WTTS	No

Background
This site is currently used for a community garden. There are buildings near the entrance and the majority of the land is in paddocks. It is also adjacent to a school.

Reserve Issues
- Lack of visible road frontage.
- Lack of signage to identify the reserve as a public asset.
- Lack of lease arrangements for buildings.
- Not currently utilised as a neighbourhood park.

Reserve Management Policy
1. Formalise lease arrangements for buildings.
2. Continue to allow the site to be used as a community garden.

Proposed Development
- Clear site of permanent buildings.
- Utilise the reserve for sporting purposes if there is a future demand.
- Remove roadside hedge to improve visibility.

Waikato DISTRICT COUNCIL

Duke Street Reserve

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2.4.3 North Street Reserve, Ngaruawahia

Reserve Classification	Reserve for public utility purposes	Area	0.0822 ha
Location	North Street, Ngaruawahia	Legal description	Lot 25 DPS 420
Authority	Declared	Subject to WTTS	No

Background
This small reserve is a flat grassed site with two entrances via narrow accessways. The wider accessway from North Street has bollards and a chain to prevent vehicle access.

Reserve Issues
- This reserve has very limited road frontage and is not well designed from a Crime Prevention through Environmental Design perspective. The accessway to the Waikato Esplanade is very narrow.
- Lack of signage to identify the reserve as a public asset.
- There is limited recreational potential, besides as a walking linkage between two streets.
- Utilisation of reserve.

Reserve Management Policy
None identified.

Proposed Development
Consider disposal of this reserve, subject to a surplus land assessment.

Waikato DISTRICT COUNCIL

North Street Reserve

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2.4.4 Waipa Esplanade Neighbourhood Reserve, Ngaruawahia

Reserve Classification	Local Purpose Reserve (Recreation)	Area	1.3682 ha
Location	Waipa Esplanade, Ngaruawahia	Legal description	Lot 60 DPS 48202
Authority	Vested	Subject to WTTS	No

Background
This is a large neighbourhood reserve that contains a playground, flat grassed area for informal sporting activities, one rugby goal post and established trees. There are bollards around the entire road exterior.

The adjoining land parcel (Section 663A Town of Newcastle South) is included in the Waikato District Sports Park Reserve Management Plan and is utilised by the Ngaruawahia Pony Club.

Reserve Issues
- This management plan should be considered in conjunction with the management plan for the neighbouring land parcel (see Sports Park Reserve Management Plans).
- The Playground Strategy recommends disposal of the playground due to the close proximity to the Te Wiata Lane Playground.

Reserve Management Policy
1. Consider disposal of playground, as identified in the Playground Strategy.

Proposed Development
Install picnic tables and park seating.

Waipa Esplanade Neighbourhood Reserve

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2.5 Onewhero-Te Akau Ward

2.5.1 Maraetai Bay Foreshore Reserve, Port Waikato

Reserve Classification	Foreshore Reserve	Area	4.148 ha
Location	Maunsell Road, Port Waikato	Legal description	Lot 13 DPS 1186
Authority	Vested	Subject to WTTS	No

Background
This large foreshore reserve has plenty of space for informal sporting activities and beach access as well as a children's playground, barbeque, public toilets and changing rooms, picnic tables and park benches (with views across the bay) and a scattering of established trees.

Reserve Issues
- Encroachment by a number of neighbouring properties.
- Coastal erosion.
- Motor cycles accessing the dunes through the reserve.
- Freedom camping.

Reserve Management Policy
1. Resolve the issue of encroachment by the neighbouring properties.
2. Any works involving digging will require an archaeological assessment to be undertaken and consultation with Heritage New Zealand prior.

Proposed Development
No specific development is anticipated.

Waikato DISTRICT COUNCIL

Maraetai Bay Foreshore Reserve

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2.6 Raglan Ward

2.6.1 Bay View Road Reserve, Raglan

Reserve Classification	Plantation Reserve	Area	0.4603 ha
Location	Bay View Road, Raglan	Legal description	Part Lot 1 Deeds Plan 982
Authority	Vested	Subject to WTTS	No

Background
This reserve contains a large number of trees and shrubs, a gravel driveway and wooden steps providing access to the waterfront. A drain (partially piped) runs through the reserve. There is also a pump station.

Reserve Issues
- Encroachment by neighbouring property.
- Limited recreational potential.
- Lack of signage to identify the reserve as a public asset.
- Summer time use of the beach is often high and rubbish is often left behind.

Reserve Management Policy
1. Investigate the potential for the site to serve a pedestrian linkage to the waterfront.
2. Resolve the issue of encroachment by the neighbouring property.
3. Assess ecological value of vegetation and improve visual amenity value.
4. Investigate the possibility to restore the piped drain to a more natural waterway.

Proposed Development
- Improve walking/cycling connection between the road and the waterfront.
- Provide seating and/or picnic tables with waterfront views.

Bay View Road Reserve

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2.6.2 Oram Park, Raglan

Reserve Classification	Recreation Reserve	Area	0.4855 ha
Location	Nihinihi Avenue and Taipari Avenue, Raglan	Legal description	Lot 19 DP 34392, Lot 28 DP 31560, Lot 1 DP 32533
Authority	Vested	Subject to WTTS	No

Background

This is a large neighbourhood park that contains a fenced playground, large open space for informal recreation, established trees and clusters of fruit trees located in 'no spray zones'.

Reserve Issues

- None identified.

Reserve Management Policy

1. Continue to utilise the reserve for growing fruit trees, in collaboration with the Whaingaroa Environment Centre.
2. Investigate removal of the pool fencing around the playground.

Proposed Development

- Additional playground equipment and landscaping as identified in the Waikato District Council Playground Strategy.
- Install bollards and chains to prevent vehicle access.
- Remove phoenix palms.

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Oram Park

SCALE 1:500	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 9/12/2015	A4

2.6.3 Warihi Park, Raglan

Reserve Classification	Recreation Reserve	Area	0.3364 ha
Location	Cliff Street and Wallis Street, Raglan	Legal description	Part Allotments 3 and 4 Town of Raglan
Authority	Declared	Subject to WTTS	Yes

Background

A sign is located at the Wallis Street entrance that states "Presented by Mr and Mrs W. Fletcher Wallis for a children's playground 1941". The initial playground was created by the Raglan Scouting movement. This reserve is separated in to two areas by a gate in the middle. The Wallis Street portion contains a playground, picnic table, seat, bin, established trees and a small number of fruit trees. There is also a grass area suitable for informal sporting activities. The Cliff Street entrance does not have signage and is not easily identifiable as reserve. It contains a number of buildings including a hall used as a scout den, a sandpit, swings and established trees. The scout den is rarely used for its original purpose as there has been no scout troop in Raglan for over a decade.

Reserve Issues

- Lack of signage and recreational opportunities on Cliff Street portion of the reserve.
- Maintenance of buildings.

Reserve Management Policy

1. Continue to utilise the reserve for growing fruit trees, in collaboration with the Whaingaroa Environment Centre.
2. Formalise lease arrangements for buildings.

Proposed Development

Undertaken an assessment at the end of the useful life of the swings as to whether they should be replaced.

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Warihi Park

SCALE 1:600	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum	Print Date: 9/12/2015	A4

2.6.4 Whale Bay Reserve, Raglan

Reserve Classification	Lot 39 and Lot 5: Local Purpose Reserve (Esplanade) Lot 38: Recreation Reserve Lot 41: Road Reserve	Area	0.9978 ha
Location	Calvert Road, Whale Bay	Legal description	Lot 39 DPS 7801, Lot 38 DPS 7801, Lot 41 DPS 7801, Lot 5 DPS 22469
Authority	Vested	Subject to WTTS	No

Background

This large neighbourhood park has entrances off Calvert Road and Tohora Close; it is easy to walk through the park along the mowed grass. There is existing signage, concreted walkways and rubbish bins at both entrances, public toilets, two swings, picnic tables, established trees and gardens, grassed areas (the lower lawn has a flat topography and is suitable for informal sports) and ocean views.

Reserve Issues

- Path improvements are required for safe access to public toilets.
- The reserve is muddy and slippery in places during winter and after rainfall.

Reserve Management Policy

1. Investigate opportunities to develop surf information signage in conjunction with the Point Boardriders Club.

Proposed Development

- Remove waterfront vegetation and relocate picnic tables to maximise ocean views.
- Metalled paths or alternative solutions to be investigated to address health and safety issues regarding slippery surfaces.

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Whale Bay Reserve

SCALE 1:1500	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 9/12/2015	A4

2.7 Tamahere Ward

2.7.1 Te Awa Reserve, Tamahere

Reserve Classification	Parts Allotment 10 Tamahere Parish and Lot 1 DPS 13314: Recreation Reserve Part Lot 8 DP 9747 and Closed Road adjoining Parts Allotment 10 Tamahere Parish: Esplanade Reserve	Area	1.3284 ha
Location	Te Awa Road, Tamahere	Legal description	Parts Allotment 10 Tamahere Parish, Part Lot 8 DP 9747, Lot 1 DPS 13314, Closed Road adjoining Parts Allotment 10 Tamahere Parish
Authority	Vested	Subject to WTTS	Yes (Pts Allotment 10 and Lot 1)

Background

This is a scenic and peaceful reserve with a large flat grass area, playground and established trees on the upper level. The reserve is well signed, has a gravel carpark and bollards to prevent cars accessing the grass. At the back of the reserve a walkway provides access down the river bank. The walkway extends along the river edge amongst established trees where a variety of birds can be heard.

Reserve Issues

- The use of motorcycles in this area is dangerous to both those using the area and the motor cyclists, as well as discouraging wild life.
- Antisocial behaviour.
- It is not easy to identify that there is a walking track down the river bank.

Reserve Management Policy

1. The walk along the river should be maintained as a beautiful “wilderness" walk.
2. The walkway could be extended and more trees planted to further encourage bird life.
3. Maintain playground in accordance with Playground Strategy.
4. Promote the walking track through signage or by extending it closer to the entrance.
5. Support the restoration of the riparian margin of the Waikato River.

Proposed Development

- Install chains to prevent access by motorcyclists.
- Install picnic tables and seating.
- Look to expand the walkway through acquiring additional land through future subdivisions.

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Te Awa Reserve

SCALE 1:1300	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 16/12/2015	A4

2.8 Whangamarino Ward

2.8.1 Blunt Road and Awanui Avenue Reserves, Te Kauwhata

Reserve Classification	Lot 113, 115: Local Purpose Drainage, Lot 119, 120, 59: Local Purpose Accessway	Area	0.6738 ha
Location	Blunt Road and Awanui Avenue, Te Kauwhata	Legal description	Lot 113 DP 391858, Lot 115 DP 474509, Lot 119 DP 391858, Lot 120 DP 391858, LOT 59 DP 474569
Authority	Vested	Subject to WTTS	No

Background
Lot 113 is an established reserve which features trees and shrubs, a path and a drainage pond.

Lot 115 has recently been planted with flaxes to assist with drainage as this site can become swampy in winter.

Lot 59 is currently undeveloped and is solely covered in grass.

Reserve Issues
- Drainage pond is stagnant at certain times of the year (smell, mosquitoes).
- Maintenance and enhancement of the watercourse through the reserve.

Reserve Management Policy
None identified.

Proposed Development

- Create a pedestrian/cycleway linkage across the reserves.
- Resolve issues regarding the stagnant drainage pond.
- Plan and construct a playground in the future within the reserve.

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Blunt Road and Awanui Avenue Reserves

SCALE 1:1350	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

2.8.2 Meremere Reserve, Meremere

Reserve Classification	Recreation Reserve	Area	1.6050 ha
Location	Te Wheoro Crescent, Meremere	Legal description	Lot 255 DPS 47627
Authority	Vested	Subject to WTTS	No

Background

This is a large neighbourhood park with limited road frontage. A skate park and a basketball hoop are located near the centre. The park has a number of established trees, picnic tables, park seats and a concrete path throughout it.

Reserve Issues

- Graffiti and rubbish.
- Lack of road frontage.
- Poor visibility in some areas due to trees and topography.
- Crime Prevention Though Environmental Design (CPTED) issues.

Reserve Management Policy

1. Undertake a CPTED study to identify opportunities to improve safety, visibility and general appearance of the reserve.
2. Maintain the neighbourhood skate park as identified in the Parks Strategy.

Proposed Development

- Undertake improvements to the skate park.
- Establish a BBQ area and picnic tables.
- Allow sculptures or Maori carving to be placed in the reserve.
- Establish fruit trees.
- Improve linkage to public library.

Meremere Reserve

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3.0 Land other than reserve

The following properties are managed for neighbourhood park purposes by the Council but have either not been declared reserve or have not been classified under the Reserves Act 1977.

The Reserves Act 1977 requires that an administering authority (the Council) classify all reserves prior to public notification of a reserve management plan.

As such the following properties do not form part of this reserve management plan. The Council has instead elected to include them outside of the reserve management plan for completeness. It is the Council's intention that it will apply the policies outlined below in its decision-making under the Local Government Act 2003 when considering the management and development of these properties.

It is the Council's intention that it will declare the following properties reserve and classify them in the future. They will then be included within the General Policies and Neighbourhood Reserves Management Plan in subsequent reviews of those management plans.

3.1 Awaroa ki Tuakau Ward

3.1.1 Central Park, Tuakau

Reserve Classification	Not Reserve	Area	0.2099 ha
Location	George Street, Tuakau	Legal description	Lot 10 and 11 DP 9268
Authority	Freehold	Subject to WTTS	No

Background
There is a plaque on a monument on the site that states: "This park was provided by the citizens of Tuakau to commemorate the existence of the Tuakau Borough Council formed from the Tuakau Town Board 1955 amalgamated with the Franklin District 1989".

There is also a Sir Edmund Hillary monument erected by Rotary Club of Tuakau. It notes he attended Tuakau Primary School from 1924 – 1931.

The site has seating, paths, gardens and established trees. It is a flat well maintained site in a central town location. Bollards and chains block vehicle access from the road.

Reserve Issues
- None identified.

Reserve Management Policy
- Retain as a passive reserve and do not allow a playground or public toilets to be built.

Proposed Development
No specific development is anticipated.

Central Park

SCALE 1:400	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 14/12/2015	A4

3.1.2 Kowhai Street Reserve, Tuakau

Reserve Classification	Lots 70 and 71 DP 78424: Recreation reserve , Lots 1, 2 and 4 DP 89067: Local Purpose (esplanade) reserve, Lot 5 DP 89067: Council freehold land Lot 2 DP 329355: Local Purpose (esplanade) reserve	Area	1.4158 ha
Location	Kowhai Street, Matipo Drive, and George Street, Tuakau	Legal description	Lots 70 and 71 DP 78424, Lots 1, 2, 4 and 5 DP 89067, Lot 2 DP 329355
Authority	Vested	Subject to WTTS	No

Background

The South-West end of this site is adjacent to a stream and is currently undeveloped. There is potential to create a track in the future past the established trees through to the North-East portion of the reserve which contains a larger grass area (mowed to a higher standard). The North-East portion is a capped landfill and includes a pump station.

The site can be accessed from three points.

Reserve Issues

- Lack of signage to identify the site as a public asset.
- Lack of access through the site.
- Maintenance and enhancement of the watercourse through the site.

Reserve Management Policy

1. Acquire additional land to support the development of a walkway through the site.

Proposed Development

- Develop a walkway/cycleway linkage through the site.
- Undertake Riparian plantings and ecological enhancement.

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Kowhai Street Reserve

SCALE 1:1300	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 14/12/2015	A4

3.2 Eureka Ward

3.2.1 Jack Foster Park, Matangi

Reserve Classification	Not Reserve	Area	0.6952 ha
Location	Matangi Road, Matangi	Legal description	Section 1 SO 392694
Authority	No Crown Residual Interest. The Land was originally Private Land that was acquired by Waikato District Council in 2007 vide NZ Gazette 2007 p3567 for Community Purposes (Public Work.)	Subject to WTTS	No

Background
There is signage on the site acknowledging Jack Foster, after whom the site is named. It notes that Jack Foster epitomised the commitment the people of Matangi have to each other and the future. It also states that "Jack was born in Yorkshire, England and served in World War II in India and Burma with the Royal Army Veterinary Corps. He said that the war confirmed to him the value of community. Jack was Matangi's veterinarian for 45 years and he was a dedicated community man. He could be found helping at every community event, often with a tobacco pipe in hand".

Jack Foster Park has a flat topography and is mostly a grassed site. The site includes a selection of very established trees and also some more recent plantings.

A gravel accessway runs through a portion of the site and the exterior is fenced. It neighbours a local school and a church.

Reserve Issues

- High vehicle usage of the site to access school.

Reserve Management Policy

1. The Matangi Community Plan identified a desire to provide youth facilities and these could be considered at this site.

Proposed Development

- Install picnic tables.
- Relocate the Good Street Reserve playground to Jack Foster Park.
- Fence the reserve boundary around the church.

Jack Foster Park

SCALE 1:1000	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 16/12/2015	A4

3.3 Hukanui-Waerenga Ward

3.3.1 Hukanui Park and Hall Site, Gordonton

Hukanui Park

Reserve Classification	Sections 6,7 Block VI Kornakorau Survey District: Local Purpose Reserve (Community Use)	Area	Section 7: 0.7621 ha Section 6: 0.2077 ha
Location	1020 State Highway 1B, Gordonton	Legal description	Sections 6,7 Block VI Kornakorau Survey District
Authority	Declared	Subject to WTTS	Section 7: Yes Section 6: No

Hukanui Hall Site

Reserve Classification	Allotment 275: Not reserve Allotment 272: Not reserve Pt NZ Loan: Workmans Cottage Site Lots 7-10: Public Works Land	Area	Allotment 275: .0809 ha Allotment 272: .0397 ha Pt NZ Loan: 0.2028 ha Lots 7-10: 0.4047 ha
Location	State Highway 1B and Garfield Street, Gordonton	Legal description	LOTS 7-10 DP 284, ALLOT 272 275 Komakorau Parish, Pt NZ Loan & Mercantile Agency Company Ltd Land
Authority	Public Works Declared Reserve	Subject to WTTS	No

Background
This large site includes grassed areas and a number of buildings, including the Hukanui Hall, a house that is rented and an old school building currently used as a day care centre. The park also contains a swing set, a war memorial monument and flag pole, public toilets, picnic tables and open space. There is a carpark by the edge of the state highway and there are established trees across the whole site.

There is also a walking path through the site which links with a path to the nearby shops.

A market is held on the site on the second Saturday of every month and a street vendor has consent to operate from the car park.

Reserve Issues
- Lack of lease arrangements.
- Utilisation of site for private purposes.

Reserve Management Policy
1. Formalise lease arrangements for buildings.
2. Continue to allow the Market to operate on the reserve.

Proposed Development
Install additional play equipment on the site.

Waikato District Council

Hukanui Park and Hall

SCALE 1:1000	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 16/12/2015	A4

3.4 Huntly Ward

3.4.1 Blundell Place Reserve, Huntly

Reserve Classification	Not Reserve	Area	Approx. 0.0730 ha
Location	Blundell Place, Huntly	Legal description	Part of road
Authority	Unformed Legal Road	Subject to WTTS	No

Background
This small neighbourhood park is located on legal road. The playground takes up a large portion of the site and the reserve is not currently landscaped.

Reserve Issues
- Lack of landscaping/opportunity to improve amenity.
- Transpower's Hamilton - Meremere B (HAM-MER B) 110 kV transmission line traverses the north-eastern corner of the Reserve. No structures are located in the Reserve.

Reserve Management Policy
1. Permit vehicle access associated with the ongoing operation, maintenance, development and upgrade of the National Grid transmission lines.

Proposed Development
- Relocate playground and dispose park.

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Blundell Place Reserve

SCALE 1:250	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 17/12/2015	A4

3.4.2 Fairfield Park, Huntly

Reserve Classification	Sec 2 Land Act 1948	Area	4.3371 ha
Location	Fairfield Avenue, Huntly	Legal description	Part Allotments 43, 44 Pepepe Parish
Authority	Uncompleted Public Work Transaction – Appointment to Control and Manage	Subject to WTTS	Yes

Background

This well utilised site provides open space for a number of properties and is easily accessible with a large amount of road frontage. The surface is flat to undulating and the site is bordered by a number of established trees. There are footpath linkages crossing the site.

There is a playground, skate park, basketball hoop and fenced off dog exercise area at the Northern section of the site.

Reserve Issues

- Poor drainage.
- Vehicles accessing the site. Some of the boundary is bollarded, but other sections aren't.
- Graffiti at the skate park.
- High voltage overhead powerlines by skate park need to be considered during any developments.
- Hamilton - Meremere A (HAM-MER A) 110 kV transmission line traverses the western side of the Reserve. Poles A235, 236, 237 and 238 are located in the reserve.

Reserve Management Policy

1. Permit vehicle access associated with the ongoing operation, maintenance, development and upgrade of the National Grid transmission lines.

Proposed Development

- Extend bollarding around reserve.

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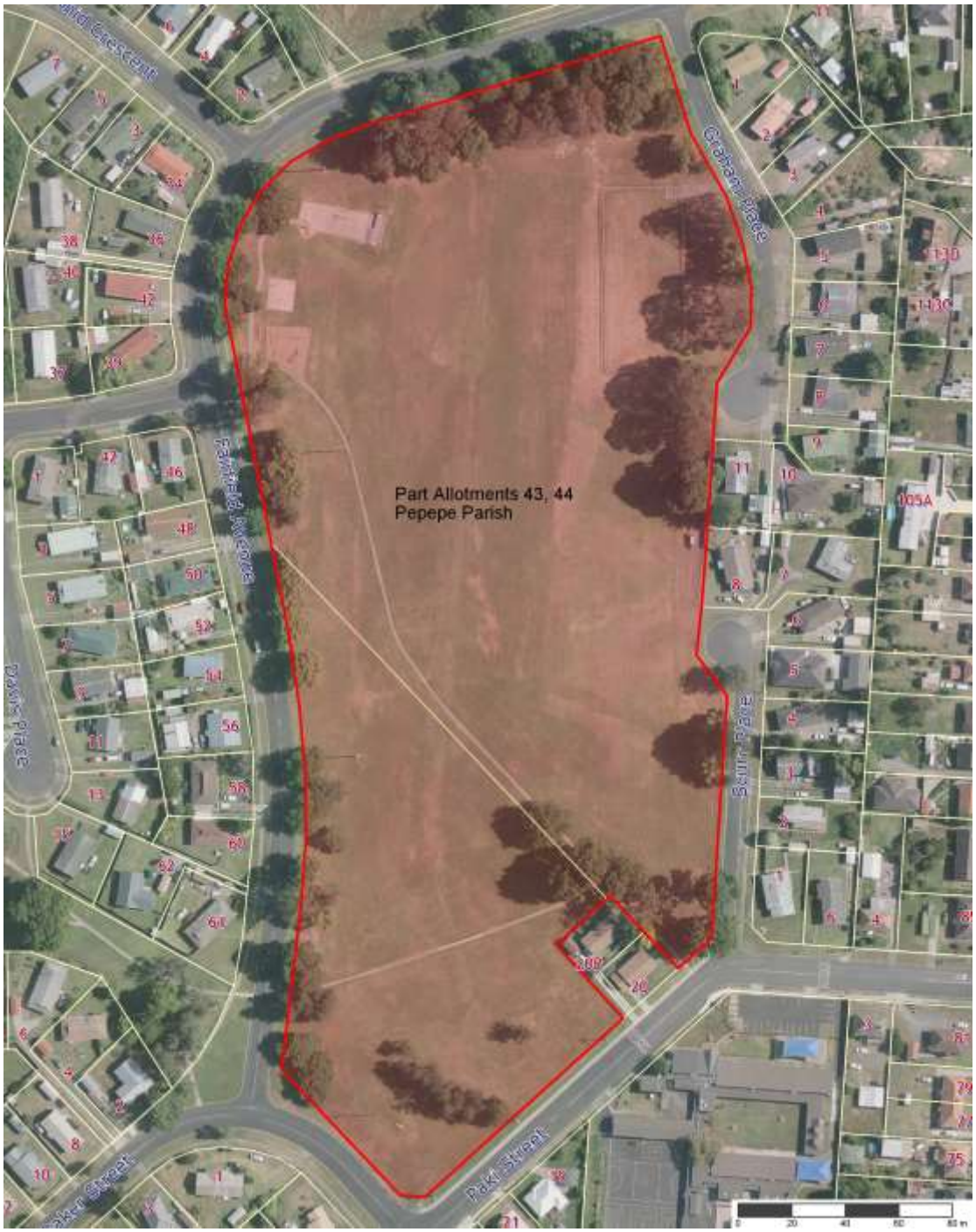
Fairfield Park



SCALE 1:1900	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 17/12/2015	A4

3.4.3 Rayner Road Reserve, Huntly

Reserve Classification	Not Reserve	Area	Approx. 0.2400 ha
Location	Rayner Road, Huntly	Legal description	Part of road
Authority	Unformed Legal Road	Subject to WTTS	Not Known

Background
This neighbourhood park is located on legal road. It includes a playground and the reserve is not currently landscaped. It is on a slope running downhill from East to West.

Reserve Issues
- Lack of landscaping/opportunity to improve amenity.
- Safety/proximity to road.
- Poor drainage.

Reserve Management Policy
None identified.

Proposed Development
1. Undertake landscaping.
2. Install seating.

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Rayner Road Reserve

SCALE	1:650	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

3.4.4 Riverview Road Reserve, Huntly

Reserve Classification	Not Reserve	Area	0.1609 ha
Location	64 Riverview Road, Huntly	Legal description	Lot 2 DP 28811
Authority	The Land was originally Freehold Land that was transferred to the Huntly Borough Council	Subject to WTTS	No

Background
This attractive park includes a children's playground and a picnic table. From within the site there are scenic views of the Waikato River.

Reserve Issues
- None identified.

Reserve Management Policy
- None identified.

Proposed Development
No specific development is anticipated.

Riverview Road Reserve

SCALE 1:300	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

3.4.5 Tainui Bridge Road Reserve, Huntly

Reserve Classification	Not Reserve	Area	0.1541 ha
Location	Tainui Bridge Road, Huntly	Legal description	Allotment 860 Taupiri Parish
Authority	Originally Private Land that was acquired by the Crown for Better Utilisation in 1965. Transferred to the Huntly Borough Council in 1984.	Subject to WTTS	No

Background
This undeveloped site is located in a central location and includes one large tree.

Reserve Issues
- Lack of signage to identify the site as a public asset.
- Lack of landscaping/opportunity to improve amenity.
- Dominance of advertising signs.
- Safety/proximity to road.

Reserve Management Policy
1. Undertake landscaping and improve amenity value of site.

Proposed Development
Consider disposal of this reserve, subject to a surplus land assessment.

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Tainui Bridge Road Reserve

SCALE	1:475	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

3.5 Ngaruawahia Ward

3.5.1 AFFCO Park, Horotiu

Reserve Classification	Not Reserve	Area	Reserve area is approx. 3.4250 ha
Location	State Highway 1 and Horotiu Road, Horotiu	Legal description	Lot 1 DP 422843
Authority	Leased	Subject to WTTS	N/A to Council – Leased

Background
This park is leased by Council off AFFCO Ltd. There is a gravel carpark with bollards off Horotiu Road. Adjacent to the carpark is a playground and a skateboard half pipe. A large dog exercise area is fenced off from the play area. There are a number of large established trees throughout the site.

Reserve Issues
- This is not a Council owned reserve – it is leased.
- Reserve signage is hidden from view under a tree and behind bushes.
- There is no signage to promote the dog exercise area.
- The Playground Strategy identifies a desire to relocate the playground to an alternative site closer to residents or a site of activity.

Reserve Management Policy
1. Consider relocation of playground in future decision making, as identified in the Waikato District Council Playground Strategy.
2. Consider opportunities to establish a new reserve nearby if the opportunity arises, rather than continuing to lease land.

Proposed Development

- Improve site signage.
- Install picnic tables.

AFFCO Park

SCALE 1:1500	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

3.5.2 Bob Byrne Memorial Park, Taupiri

Reserve Classification	Not reserve Legal Road (State Highway No1)	Area	Approx. 0.5080 ha
Location	Great South Road, Taupiri	Legal description	Part State Highway No 1
Authority	Land is Part of State Highway No1 Core Land that is unformed and a buffer between carriageway and river. Not Waikato District Council Land.	Subject to WTTS	No

Background
This attractive neighbourhood park is located between Great South Road and the Waikato River in Taupiri. It has a large number of established trees, bushes and gardens. A gravel driveway and carpark allows vehicle entry in to the site, with bollards around its edges. A public toilet is located on the reserve and there is also a basic playground and some picnic tables.

Reserve Issues
- Proximity to main road. Trees and shrubs are acting as a barrier to separate the site from the road.

Reserve Management Policy
None identified.

Proposed Development
- Disestablish the playground, in accordance with the Playground Strategy.

- Improve visibility of river and locate picnic tables and seating in locations with scenic views.

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Bob Byrne Memorial Park

SCALE 1:700	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

3.5.3 Durham Street Reserve, Ngaruawahia

Reserve Classification	Not Reserve (freehold)	Area	0.1309 ha
Location	Durham Street and Newton Street, Ngaruawahia	Legal description	Lot 46 DPS 29152
Authority	Vested	Subject to WTTS	No

Background

This land parcel runs down a gradual slope towards the road edge. The site is mostly a grassed area that also contains a small selection of trees. A gravel driveway encroaches the site and a skinny accessway provides a linkage to Prendergast Place.

Reserve Issues

- Site encroachment by a gravel driveway and a private property.
- Limited recreational potential.
- Property boundaries are not defined – difficult to identify public versus private land.
- Lack of signage to identify the reserve as a public asset.
- The accessway is poor from a Crime Prevention through Environmental Design perspective.

Reserve Management Policy

1. Address encroachment issues.
2. Consider disposal of this site subject to a surplus land assessment, but retain a walkway.

Proposed Development
No specific development is anticipated.

Durham Street Reserve

SCALE 1:450	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

3.5.4 Galileo Street Reserve, Ngaruawahia

Reserve Classification	Unknown	Area	Unknown
Location	Galileo Street and SH1, Ngaruawahia	Legal description	Part Allots 187 190 TN OF Newcastle
Authority	Unknown	Subject to WTTS	Unknown

Background
This site consists of a flat mowed grass site and a few trees between the main road and Galileo Street. As shown in the aerial photo the land parcel only incorporates a small portion of the grassed area, with the majority being unformed legal road. There is a metal fence acting as a safety barrier alongside the main road. There are footpaths across the site providing pedestrian linkages.

Reserve Issues
- Lack of signage to identify the site as a public asset.
- The majority of the site is located on an unformed legal road.
- Safety issues associated with proximity to busy roads, e.g. unsuitable for informal sporting activity.
- Limited recreational potential.

Reserve Management Policy
1. Stop the unformed legal road and incorporate it in to the reserve or declare the reserve to be road and maintain as a berm.

Proposed Development
No specific development is anticipated.

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Galileo Street Reserve

SCALE 1:275	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 18/12/2015	A4

3.5.5 Te Mana o Te Rangi Reserve, Ngaruawahia

Reserve Classification	Not Reserve Recreation Purposes (Public Work)	Area	5.1986 ha
Location	Great South Road, Ngaruawahia	Legal description	Section 1 SO 305281
Authority	Vested	Subject to WTTS	No

Background

This large site is located between Great South Road and the railway line within Ngaruawahia. It is a former dump site and vents were removed from the surface in late 2015. The site is relatively flat with some established trees at the North-West end of the site. A fenced off dog exercise area is also located in the North-West portion. In 2016 Council resolved to name the reserve 'Te Mana o Te Rangi Reserve'.

Reserve Issues

- Ensure that consideration is given to railway safety. This can occur with options such as the use of fencing and/or landscaping buffers, and locating buildings away from the rail boundary, as potential means of managing the risk associated with the rail network adjoining public open space.
- Development potential is impacted due to former use as a dump site.
- Lack of signage to identify the site as a public asset.

Reserve Management Policy

1. Consider urban design principles to further buffer the railway line from the site.
2. Allow this site to be used by the Dog Kennel Club as an alternative to The Point.
3. Produce a landscape plan for the site to be implemented.

Proposed Development

- No specific development is anticipated. Development potential is impacted due to former use as a dump site.

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Ngaruawahia Highway South Reserve

SCALE 1:3700	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

3.5.6 Penny Crescent Reserve, Hopuhopu

Reserve Classification	Not reserve Held for water supply purposes	Area	0.2857 ha
Location	Penny Crescent, Hopuhopu	Legal description	Section 1 SO 58672
Authority	Public Work	Subject to WTTS	Yes

Background
This site is located on a land parcel that also includes a water treatment plant. The site area includes a playground, grass area and some trees adjacent to the Waikato River.

Reserve Issues
- Opportunity to improve visual amenity.

Reserve Management Policy
None identified.

Proposed Development
- Improve the visual amenity overlooking the river and install seating.

Penny Crescent Reserve

SCALE 1:450	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

3.5.7 Taupiri War Memorial Hall Reserve, Taupiri

Reserve Classification	Not Reserve Fee Simple	Area	0.2034 ha
Location	Greenlane Road, Taupiri	Legal description	Lot 3 DP 31023 and Lot 4 DP 31023
Authority	Owned in Fee Simple	Subject to WTTS	No

Background
This is the site of the Taupiri War Memorial Hall. The remainder of the land is flat mown grass, with the portion behind the hall being fenced and gated off.

Reserve Issues
- The site is located next to a school, which provides more suitable space for informal sporting recreation and also includes a children's playground.
- Lack of signage to identify the site as a public asset.
- Limited recreational potential.
- Encroachment by neighbouring property.

Reserve Management Policy
1. Address encroachment issue.

Proposed Development
If the hall is identified as excess to requirements in the future then dispose of the property.

Taupiri War Memorial Hall Reserve

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3.5.8 Westgate Street Reserve, Ngaruawahia

Reserve Classification	Not Reserve	Area	0.0468 ha
Location	Westgate Street and Herschel Street, Ngaruawahia	Legal description	Allotment 694 Newcastle Township
Authority	Vested	Subject to WTTS	No

Background

This open space extends beyond the land parcel and also incorporates a portion of the legal road. The site is mown and has not been developed, with the exception of a public footpath and a couple of established trees.

Reserve Issues

- Lack of signage to identify the site as a public asset.
- Most of the site area is actually outside of the land parcel (on the legal road).

Reserve Management Policy

1. Consider amending property boundary if a need is identified in the future.

Proposed Development

Consider disposal of this reserve, subject to a surplus land assessment.

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Westgate Street Reserve

SCALE	1:300	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

3.6 Raglan Ward

3.6.1 Puriri Street Reserve, Raglan

Reserve Classification	Overwide unformed legal road	Area	0.1105 ha subject to survey
Location	Puriri Street, Raglan	Legal description	Unformed Legal Road
Authority	Unformed Legal Road	Subject to WTTS	Unknown

Background
This site is located on legal road. It contains play equipment, picnic tables, established trees and bollards by the road entrance. Public toilets are located at the edge of the site.

Reserve Issues
- Erosion and sea level rise.

Reserve Management Policy
1. Retain playground at present but note proximity to the Warihi Park Playground in future decision making, as identified in the Waikato District Council Playground Strategy.

Proposed Development
No specific development is anticipated.

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Puriri Street Reserve

SCALE 1:250	Cadastre sourced from Land Information New Zealand under CC-By. Copyright @ Waikato District Council	Projection: New Zealand Transverse Mercator Datum: New Zealand Geodetic Datum 2000	Print Date: 22/12/2015	A4

3.7 Whangamarino Ward

3.7.1 Te Kauwhata Railway Reserve and Village Green, Te Kauwhata

Reserve Classification	Lot 6 DPS 76080: General Land Section 1: Recreation Purposes (Public Works Act 1981)	Area	Lot 6: 0.8547 ha, Section 1 SO 306019: 0.0596 ha, Section 1 SO 305346: 0.5521 ha
Location	Te Kauwhata Road and Saleyard Road, Te Kauwhata	Legal description	Lot 6 DPS 76080, Section 1 SO 306019, Section 1 SO 305346
Authority	Lot 6: Transferred Section 1: Vested	Subject to WTTS	No

Reserve Classification	Local Purpose Community Use	Area	0.0843 ha
Location	14 Te Kauwhata Road, Te Kauwhata	Legal description	Section 1 SO 381034
Authority	Public Work	Subject to WTTS	Unknown

Background

These four land parcels are adjacent to the railway line in Te Kauwhata. Lot 6 DPS 76080 includes a soldiers memorial that was established in 2015 and a skate park. Section 1 SO 305346 includes a childrens playground, barbeque, picnic table and gravel carpark. There are also established trees, gardens and grass areas for informal sporting recreation within the site. The railway is largely separated from the site by plantings.

The smaller land parcels on the West of the railway line are grassed site, with a pedestrian linkage from the Northern one to the site on the other side of the railway.

Reserve Issues

- Ensure that consideration is given to railway safety. This can occur with options such as the use of fencing and/or landscaping buffers, and locating buildings away from the rail boundary, as potential means of managing the risk associated with the rail network adjoining public open space.
- Connectivity between land parcels.

Reserve Management Policy

None identified.

Proposed Development

- Establish adult exercising equipment alongside the children's play area and an assault course aimed towards teenagers.
- Consider urban design principles to further buffer the railway line from the site.
- Look to increase walkway opportunities by acquiring land to the North of the site.
- Improvements and expansion to skate park.

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Te Kauwhata Railway Reserve and Village Green

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