

Technical Servicing Report

**eliot
sinclair**

Pegasus Hot Spring Resort




Prepared for Sports & Education Corporation Ltd

500718

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Quality Control Certificate

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Status:	Final		
Release date:	29.10.2020		
Reference no:	500718		
Distributed to:	Sports & Education Corporation Ltd Joseph and Associates Ltd		

Limitations

This report has been prepared for Sports & Education Corporation Ltd (SEC) according to their instructions and for the particular objectives described in this report, and for the benefit of other consultants engaged by SEC for this project, and Waimakariri District Council. The information contained in this report should not be used by anyone else or for any other purposes.

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Executive Summary

This report addresses the servicing requirements in respect of the Hot Springs Resort commercial development proposed to be developed by Sports and Education Corporation (SEC) on land currently used for the Pegasus Golf Course.

Wastewater

There is an existing Septic Tank Effluent Pumping (STEP) wastewater system that serves the Mapleham development. However, this does not have sufficient capacity to accept additional wastewater from the proposed development.

WDC has advised that 2 options are available for discharge of wastewater from the site; either pumping to the Pegasus Main Street Pump Station or directly to the Woodend WWTP. The developer would need to undertake a capacity assessment of the Pegasus Main Street Pump Station (if that option is selected), and Council will undertake an assessment of the WWTP. Upgrades identified by the assessments would be constructed at the developer's cost. Detailed analysis and determination of upgrades required can occur at the time of concept design to support a resource consent application.

Wastewater from the site could be collected and pumped to the Pegasus Main Street PS or Woodend WWTP either by a gravity sewer network and centralised pump station, or by a local pressure sewer (LPS) network of distributed pump stations and small pressure pipes.

Water Supply

WDC technical staff have advised that a financial contribution of approximately \$500,000 will be required from the developer to upgrade the Pegasus Water Treatment Plant headworks, filtration, and surface pump to serve the development. Further work with WDC will be required to confirm the value of upgrades required. Council staff have also confirmed that there is sufficient capacity in the existing water supply reticulation to serve the development at the estimated demand.

An extension from the existing Waimakariri District Council water reticulation network would be required to provide potable water supply to the Site. The size of new water supply reticulation would be dependent on site layout and particularly on fire-fighting water demands on the existing network, but we consider that mains of between 200mm and 300mm diameter would be required.

Stormwater

We have confirmed with ECan technical staff that the existing stormwater discharge consents for the existing Mapleham development (including the Golf Course) are complex, and that modification to existing infrastructure to accept additional stormwater from the proposed development would likely require variations to these consents. The approach to stormwater treatment with the lowest risk to the project is to retain the function of the existing stormwater management areas, and to create new additional stormwater management areas to accommodate changes in runoff generated by the development. Changes to existing infrastructure could be made, but the function would need to be retained.

Discharge of treated stormwater to surface water has been considered the 'base-case' for sizing of the stormwater management areas, as the land area requirements are generally larger than for discharge to ground. Infiltration rates should be tested during the design process to confirm that discharge to ground is not feasible, despite generally being the preferred discharge pathway.

Two options for stormwater treatment have been considered;

- a) First flush basins and wetlands; or,

- b) Swales for road runoff, and raingardens for runoff from hardstand (and roofs, if required), then attenuation basins.

Either option would be designed to convey the 20% AEP flowrate within the primary system. The development roading would convey the 2% AEP secondary flow to the Stormwater Management Area/s. These would have detention capacity to ensure that the post development discharge to would not exceed the pre-development peak for all rainfall events up to and including the 2% annual exceedance probability storm of critical duration. This is to match the existing resource consents requirements for the discharges from Taerutu Gully to Taranaki Stream.

In extreme rainfall events above the 2% AEP critical duration storms, water would overflow into Taerutu Gully via formed and stabilised spillways.

The proposed development is not located within a 50 or 200 yr flood zone.

Utility Services

Power reticulation would be provided to service all sites in accordance with utility company and industry standards. All cables would be placed underground.

There is an existing 11kV underground electrical network along Pegasus Boulevard. One or more connections to the existing network would need to be made and cables laid from the 11kV cable to supply the development.

Detailed electrical design would be required to determine the scope of on-site electrical reticulation, including the number and position of electrical transformers/kiosks.

While Mainpower has advised it has the capacity in its network to support the development, it has not determined if any off-site network upgrades would be required. We are satisfied that the development can be serviced for electrical supply, but note that further work will be required through the design process to determine the scope of off-site upgrades and connections required.

Vector OnGas has confirmed that the existing Ø110mm reticulated network in Pegasus Boulevard is supplied by a 100 tonne gas storage facility, and that it has the capacity to provide up to approximately 3 tonne/hour of LPG to the site.

While we do not have the expertise to confirm if this capacity would be sufficient to meet the gas demands of the development, Vector OnGas has advised that in their experience the stated capacity should be sufficient. We suggest that further advice is sought from suitably qualified practitioners to confirm this.

Telecommunications would be provided to service all sites in accordance with utility company and industry standards. All cables and ducts would be placed underground.

Chorus has advised that they would be able to provide air-blown fibre (ABF) communications reticulation for the development. The approximate cost for the associated network design, supply and installation would be in the order of \$ 253,000.

Enable cannot service the development, while Vodafone had not responded by the time this report was written.

1. Introduction

Eliot Sinclair and Partners (ESP) Limited has been engaged by Sports & Education Corporation (SEC Group) to produce a technical services report in support of the Waimakariri District Plan Change Application for the proposal to develop a part of the Pegasus Golf Course into a Hot Springs Resort.

This report addresses the servicing requirements in respect of the proposed Hot Springs Resort commercial development.

SEC Group propose to develop approximately 14ha of land within the Pegasus Golf Course as a Special Purpose Zone (Pegasus Resort) (SPZ-PR), within a wider ODP area of 79ha. This report only considers proposed development of the 14ha SPZ-PR on the basis that no further development is currently proposed for the 65ha balance area of golf-course.

2. Proposed Development

The proposal is to establish a Hot Spring Resort Village within the Pegasus Golf Course owned by SEC. The development would be referred to as "Pegasus Hot Springs Resort" and would comprise of a hotel complex including one main hotel building and two secondary hotel buildings, tourist accommodation apartments, a Spa/Hot Pool complex with numerous spa treatment facilities, a golf academy building and a new Pegasus County Club building. The hotel complex would feature facilities including restaurants, cafés, bars, entertainment and retail opportunities.

Bulk earthworks would be carried out on the site to form building platforms, road carriageways, amenity landscaping, and for stormwater management areas.

New roads would be formed and sealed to service the development and would generally be designed and constructed to the requirements of the Waimakariri District Plan and Waimakariri Code of Practice. These would form overland flow paths for conveyance of stormwater runoff in excess of the critical design storm event.

Refer to Figure 1 for an indicative masterplan of the SPZ-PR. An Outline Development Plan (ODP) is also attached in Appendix A.



Figure 1 - Proposed Development Indicative Masterplan (source JLU Architects)

3. Site Description

3.1. Location and Surrounds

The proposed development site is owned by the Pegasus Golf and Sports Club and is located within the Pegasus Golf Course at 8 Mapleham Drive, Pegasus.

The site comprises of approximately 14ha and is currently zoned 'Rural Pegasus' and 'Rural 4b' in the Waimakariri District Plan.

The site is currently used as a golf course and includes the Pegasus Country Golf Club building with associated carparking, two stormwater treatment wetlands and a golf-course lake.

The Site is located to the west of the Pegasus Township and has frontage to Pegasus Boulevard. The land to the north and east is also used as golf course. The land to the south comprises of residential lots within the Mapleham development. Immediately to the east of the site is the Taranaki Stream. A site location plan is included in Figure 2.

Figure 2 shows the Hot Springs Resort Development extents and surrounding land areas. Refer to the ODP in Appendix A for further details.



Figure 2 - Proposed Hot Springs Resort Development Location and surrounding land areas (source Canterbury Maps 2018)

Figure 3 gives the property title details for the properties within the site.

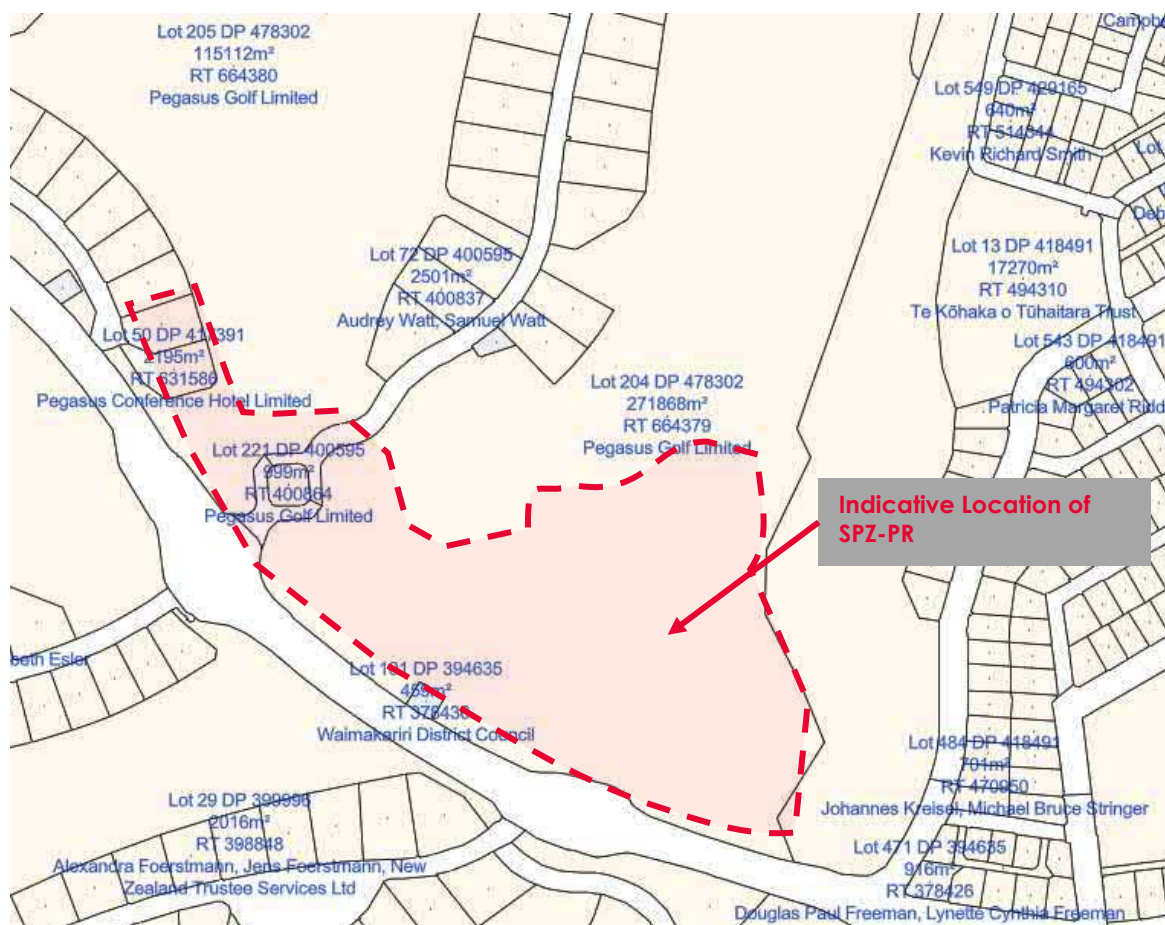


Figure 3 - Property title details (source Canterbury Maps)

3.2. Topography

A topographic survey of the site provided to us indicates the levels across the site vary between 3m and 9.6 m RL, with notable terrain features including golf-course fairway and green areas, golf-course lakes (as part of the Maplesham stormwater system), and overland flow paths from these areas. The lowest part of the site is within the Taranaki Stream, along the east boundary of the Site.

3.3. Site soils and geology

A geotechnical investigation has not been carried out for the site. However, a search of the NZ Geotechnical Database indicates that two CPT tests have been carried out within the development site (CPT 109533 & CPT 109534). The test results indicate that the underlying soils generally comprise of topsoil to 0.3m below ground level, which overlies in-situ silty sands and sandy silts that extend to 2.8m below ground level and overlie sands and silty sands which continue down to 10m where the CPT tests were terminated. Appendix B includes the CPT test results.



Figure 4 - CPT tests locations (source Geotechnical Database)

3.4. Surface Waters and Existing Stormwater Network

The stormwater system from the Mapleham residential development and the golf course is shown in Figure 5 and Figure 6. Stormwater runoff from residential sites, associated roading, and the golf course discharges into Mapleham Lakes before flowing to Taerutu Gully. Water from Taerutu Gully discharges via an orifice weir to Old Taranaki Stream which then flows along the channel to discharge into Taranaki Stream. When capacities of the golf course lakes are exceeded additional flow is discharged to Taerutu Gully located along Mapleham eastern boundary. The gully has been modified during construction of the golf course and Mapleham development to form a wetland environment. Existing regional resource consents CRC061217 and CRC061218 authorise the discharges from Taerutu Gully to Taranaki Stream. Copies of these consents are attached as Appendix H.

The stormwater runoff from the existing Golf Club building and the associated carpark is discharged to Lake 10 located to the south of the Sports Club building, prior to discharging to the Taranaki stream via a swale.

The stormwater runoff from the golf course area within the proposed Hot Springs Development site, discharges directly to Taranaki stream.

There are two areas located within the Site that are indicated as wetlands in the Pegasus & Maplesham Stormwater Management – Operations and Maintenance Manual. However, we have been provided with an ecological report from 4Sight Consulting that concludes the wetlands are constructed features added as amenity features of the golf course and the ecological value of the constructed wetlands is considered to be low. The 4Sight report is attached in Appendix C.



Figure 5 – Surface Waters and Existing Maplesham Stormwater Network (source Canterbury Maps)

3.5. Contamination

The site is listed on the Environment Canterbury Listed Land Use Register (LLUR) and the Hazardous Activities and Industries List (HAIL) activity indicated on this site is the “Persistent pesticide bulk storage and use”. Appendix D provides the property statement from the Listed Land Use Register. Further advice from a suitably qualified and experienced practitioner will be required to confirm what, if any, further reporting and subsequent physical works would be required to comply with the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS).

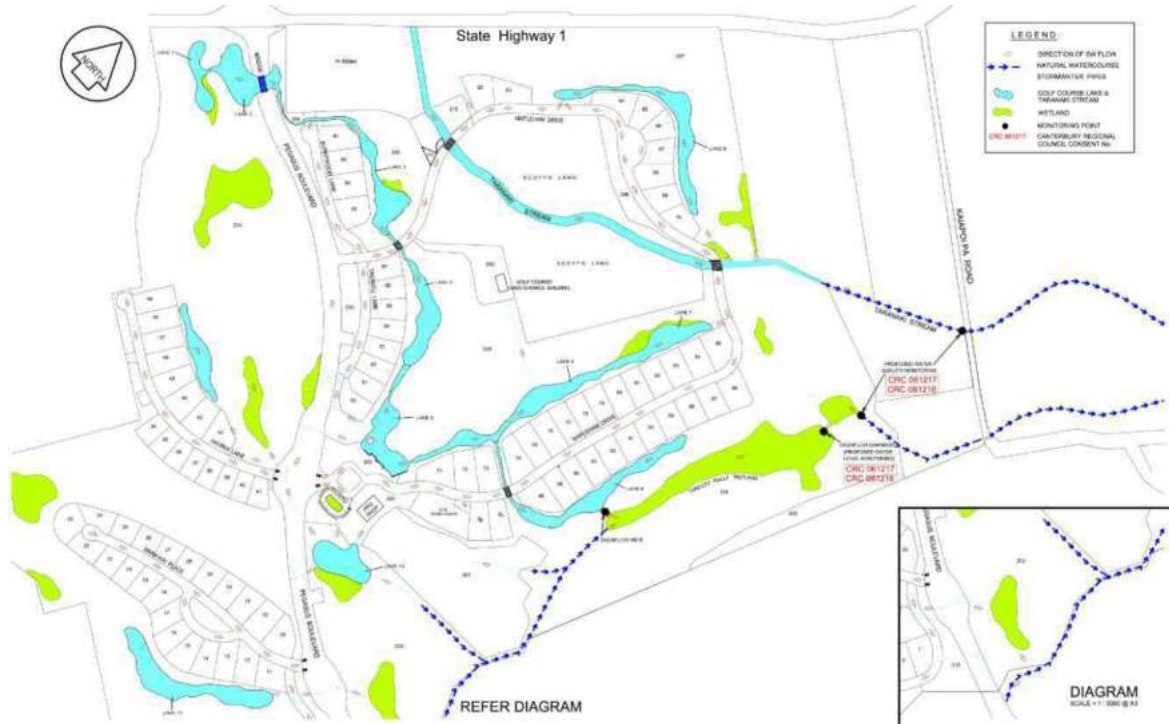


Figure 6 - Existing Mapleham Stormwater Network (source Pegasus & Mapleham Stormwater Management – Operations and Maintenance Manual)

3.6. Groundwater

A search of the Environment Canterbury Well Search database has identified ground water monitoring well M35/10909, which indicates that the ground water level near the proposed development site varies between 2.9m to 4.6m below ground level, which is between 2.48 - 4.78m RL.



Figure 7 - Water well location (source Canterbury Aerial Maps 2018)

4. Wastewater

There is an existing STEP (Septic Tank Effluent Pumping) wastewater network within the Mapleham development. Privately owned septic tanks on each property pump primary-treated effluent into a pressure pipe network that discharges to a buffer storage tank located adjacent to the water treatment plant at Atkinsons Lane. The storage tank then discharges to the Pegasus gravity sewer network. The Pegasus Main St Pump Station is located further downstream and pumps wastewater to the Woodend Wastewater Treatment Plant at Gladstone Road. The Mapleham wastewater network is shown as the green highlighted branch of the WDC Pegasus Wastewater Scheme in Figure 8. Figure 9 shows the location of these facilities.

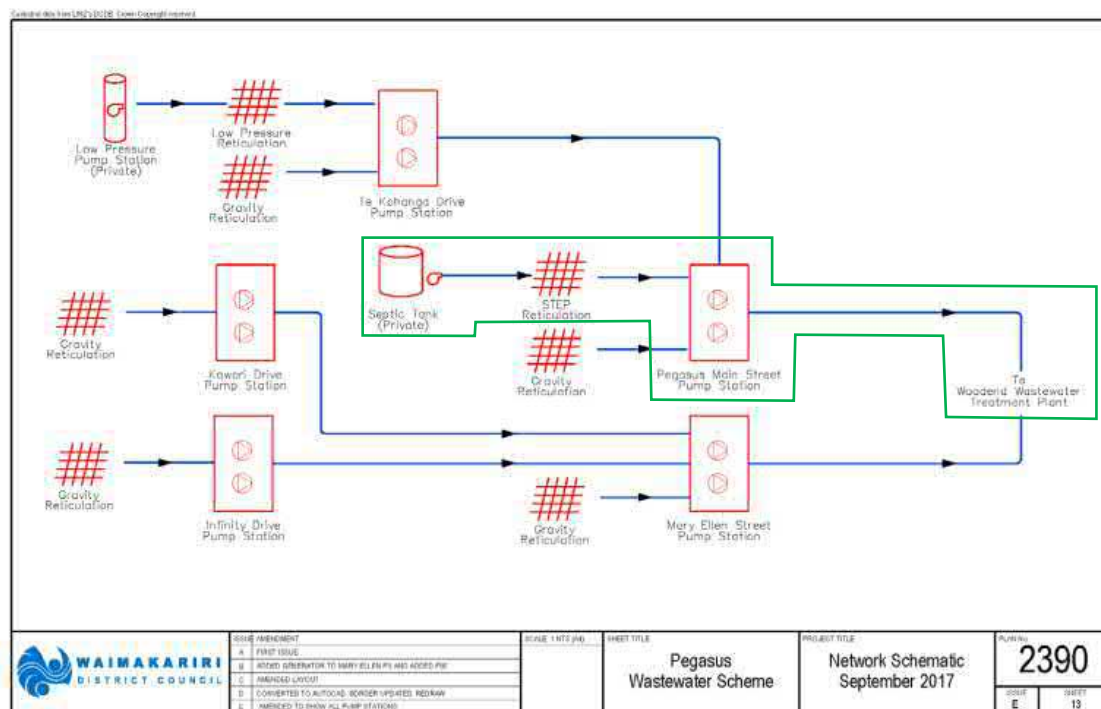


Figure 8 – WDC Pegasus Wastewater Scheme

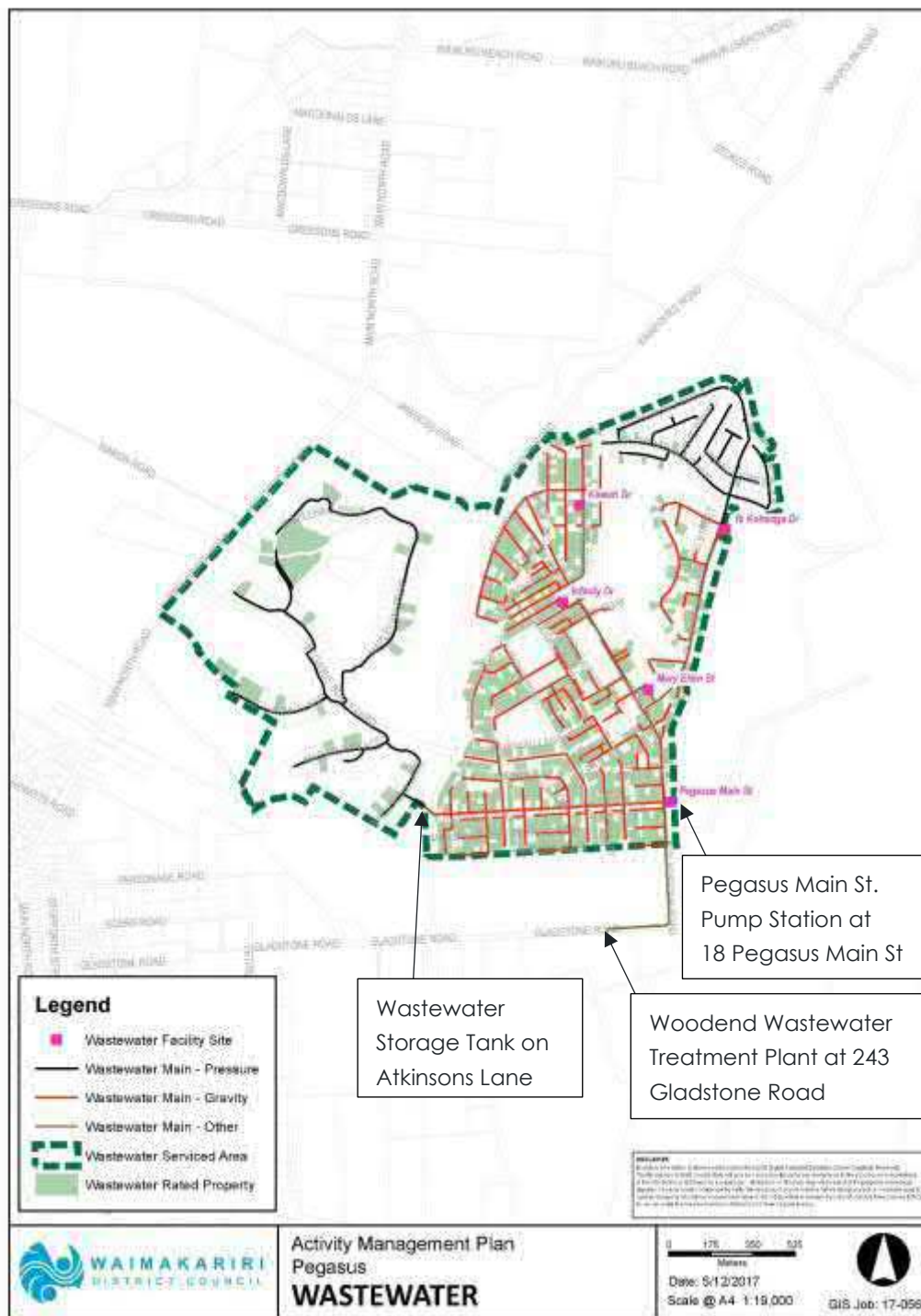


Figure 9 – WDC Wastewater Activity Management Plan

We have previously established with WDC (through consent RC195127 granted in Jan 2020 for a 50 room hotel located at 11, 13, & 15 Taerutu Lane) that the existing STEP system pipe network only has limited capacity to accept additional discharges. WDC has subsequently confirmed this rationale by advising that there are two options for servicing the proposed Pegasus Hot Springs Resort development for sewer:

- i) Installation of a dedicated pressure main to the Pegasus Main Street Pump Station at 18 Pegasus Main Street, or;
- ii) Installation of a pressure main to the Woodend WWTP at 243 Gladstone Road.

Council has advised that if Option 1 is selected then specific assessment of the Pegasus Main Street Pump Station will need to be undertaken by the developer of the Site to confirm it has capacity to accept the discharge from the development and cater for future growth. Regardless of which option is selected, Council would need to undertake an assessment of the WWTP to confirm capacity and any impact of sewer discharge from the development on the treatment plant.

Upgrades identified by the assessments would be constructed at the developer's cost, and could include replacement of pumps and/or control equipment, construction of additional pump station storage volume, construction or upgrading of odour control devices, and/or up-sizing of the pressure pipework downstream of the pump station. Detailed analysis and determination of upgrades required can occur at the time of concept design to support a resource consent application.

Neither of the options acceptable to Council specifically address how wastewater would be collected and pumped through the new pressure pipework. We consider that there are two options;

- iii) Construction of a new sewer pump station within or immediately adjacent to the Site. The pump station would be vested in WDC. Wastewater discharge from the site could be discharged to the new pump station via gravity sewer, although small localised pump stations or lift stations could be used to service parts of the site if required; or,
- iv) Construction of a Local Pressure Sewer (LPS) sewer network. Each site would have its own pump station and discharge into a common pressure sewer main owned by SDC, similar to the existing STEP network. Further consultation with WDC would be required to establish if inclusion of septic tanks for some or all parts of the development would be required, although we note that the expected peak discharge flowrates and potentially infrequent discharge may adversely affect the ability for septic tanks to be sized and operate efficiently.

While it may simplify the pumping & controls for wastewater discharge from the Site, construction of a centralised sewer pump station and gravity sewer network on the Site may be difficult if elevated groundwater levels are present. While this technical challenge would not be insurmountable, it could significantly increase the required capital (construction) cost for the sewer system to serve the site.

We have calculated a peak wastewater discharge rate from the Site of approximately 30L/s, based on information provided to us regarding the proposed development make-up. Refer to preliminary wastewater generation calculations attached in Appendix E. The peak flowrate discharged to the existing WDC network will be different than this, depending on which pumping option is selected. However, for the purposes of undertaking preliminary design and analysis of effects on the existing network we consider that a 30L/s peak wastewater discharge rate could be used.

The sewer system, including any pump stations or lift stations, would be designed and constructed in accordance with the Waimakariri District Council Engineering Code of Practice and would be vested in Council. All public sewer infrastructure within private land would be covered by appropriate easements in favour of Council.

5. Water Supply

The WDC reticulated water for Pegasus and Maplehams is sourced from three secure groundwater wells east of Woodend named Equestrian 1,2 and 3 (EQ1, EQ2 and EQ3) and PW1 bore in Pegasus Town. An additional well, EQ 4, is proposed by WDC to accommodate the ongoing growth in the town. The Pegasus Water Treatment Plant (WTP) is located on Atkinsons Lane. Figure 10 below shows the location of the wells and treatment plant.



Figure 10 – Water Supply Activity Management Plan

There are several existing water supply pipes within Pegasus Boulevard, including trunk and distribution mains, and a raw water main to convey water from PW1 to the WTP.

We have calculated a peak hourly potable water demand for the Site of approximately 13L/s, and a peak day demand of approximately 820,000L, based on information provided to us regarding the proposed development make-up. The estimated water demand excludes fire-fighting water demand. Refer to preliminary water supply calculations attached in Appendix E.

The existing water supply reticulation adjacent to the site has fire hydrants placed at max. 135m spacing in accordance with a fire fighting water supply category of FW2 within SNZ PAS 4509:2008. Therefore, FW2 fire water category can be considered a 'baseline' supply available from the reticulated network.

If a site has a fire-hazard category that demands a water supply classification in excess of FW2, then there are a number of options available;

- a) Confirm with WDC that a fire water supply in excess of FW2 is available from the reticulated network;
- b) Install an approved automatic fire sprinkler system, which drops the FW classification to FW2;
- c) Divide the building into smaller fire-cells; or,
- d) Install on site (with the approval of the Fire Region Manager) the shortfall of firefighting water as determined by the difference between FW2 and the applicable fire water category.

We have also been provided with a copy of the Fire Master Plan Report prepared by Powell Fenwick that details the estimated water storage volumes and on-demand flowrates required to meet the calculated fire fighting demand. Hydrant flow testing and/or further correspondence with WDC can be carried out at any time to confirm if fire fighting water in excess of an FW2 category is available from the reticulated supply. However, it is our experience that fire fighting water supply in excess of FW4 is generally not available from the reticulated network unless specifically designed. The Fire Master Plan Report is attached as Appendix F.

We note that Option d) was approved and consented for the 50-room hotel at 11, 13, & 15 Taerutu Lane under RC195127, where the required fire-fighting water shortfall was to be sourced from the adjacent golf-course lake. We consider that a similar concept could also be applied to the Hot Springs Resort site if the lake/s are suitably situated.

Waimakariri District Council technical staff have advised that in order to service the development, upgrades would need to be made to the Pegasus Water Treatment Plant headworks filtration and surface pump which would require a financial contribution in the order of \$500,000 excl GST as an approximate value. Further work with Council would be required as the time of concept design and through detailed design to ascertain the value of the upgrades.

Council has also confirmed that there is sufficient capacity in the existing water supply reticulation to serve the development at the estimated demand.

An extension from the existing Waimakariri District Council water reticulation network would be required to provide potable water supply to the Site. The size of new water supply reticulation would be dependent on site layout and particularly on fire-fighting water demands on the existing network, but we consider that mains of between 200mm and 300mm diameter would be required.

Where water mains to vest in Council pass through private property, easements would be provided in favour of Waimakariri District Council to protect its access for operations and maintenance.

The potable water supply network would be designed in accordance with Waimakariri District Council Engineering Code of Practice and SNZ PAS 4509:2008 New Zealand Fire Service Fire Fighting Water Supplies Code of Practice.

6. Stormwater

6.1. Proposed stormwater system

6.1.1. Integration with existing infrastructure

We have reviewed the available documentation relating to the existing regional stormwater discharge consents, and have met briefly with Environment Canterbury to discuss stormwater treatment options for the proposed development. ECan technical staff confirmed our opinion that obtaining stormwater discharge consent/s for the original Mapleham development was complex, and that modification of the existing infrastructure would likely require variations to the existing consent/s. Therefore, we consider that the approach to stormwater treatment with the least risk to the project would be to retain the function of the existing stormwater management areas on and adjacent to the site.

The proposed stormwater strategy for the development would be to retain the existing stormwater ponds and wetlands on the site. Any modifications required to be made to the existing stormwater ponds, to accommodate the new development, would be offset by providing a replacement pond or wetland of the equivalent volume and area in another location on site. All associated pipe work would be re-directed to the new location.

6.1.2. Stormwater treatment options considered

Wetlands

Wetlands are often preferred as a means of water treatment because of their robust effectiveness over a wide range of hydrological conditions. Wetlands are considered as being the most preferred stormwater mechanism by CCC. Surface Flow wetlands are constructed to more or less mimic natural wetlands. The CCC prefers Free Water Surface Wetlands; these are designed to have a permanent surface water and they have the advantage of a long retention time of water which maximises the efficiency of contaminant removal process and allows for some sediment retention by settling.

Sub-surface wetlands (SSF) tolerate frequent wet-dry cycles by having a permeable gravel stratum however the substrate becomes blocked with plant roots and require high levels of maintenance. Therefore, SSF wetlands are not as well suited to the treatment of urban stormwater for which minimal maintenance is an important requirement.

First flush basins

First flush basins are often placed upstream of wetlands to capture the first flush volume and to control the flow into the wetland and remove coarse sediment which is effective for total contaminant control.

Detention basins

Detention basins can be used to provide temporary water storage to attenuate flood flows, remove coarse sediment and gradually discharge flood waters through an outlet control to receiving waters downstream.

Raingardens

Raingardens can be used to remove pollutants and slow down stormwater flows. Rain gardens work by ponding stormwater in the planted area, which is then filtered through the soil mix and by plant roots. These absorb and filter contaminants before stormwater flows into surrounding ground, pipes, drains and streams. A regular maintenance regime is very important to achieve good treatment outcomes in the long term. The cost of maintenance for rain gardens is likely to be higher than for basins and wetlands.

Wet ponds

Wet ponds have been considered as an option for stormwater treatment. However, wet ponds can only provide limited removal for soluble pollutants. The inclusion of a detention basin upstream of wet ponds are more effective at total contaminant control. CCC advises that wet ponds should only be considered for contributing urban sub-catchments greater than 10 hectares per facility. Small wet ponds in many cases become stagnant and unpleasant during summer months. We consider that wet ponds are not a suitable option for stormwater treatment for this development.

6.1.3. Discharge options

Stormwater discharge to ground has been considered as an option for the proposed development. While the stormwater system within the Pegasus development (to the east of the site) has soakage swales that discharge stormwater to ground, the Pegasus Stormwater Operations and Maintenance Manual indicates that the infiltration rates are in the order of 100mm/hr, but in cases reducing to 50mm/hr in winter conditions.

However, on the basis that the stormwater management system for the Maplesham development immediately surrounding the site undertakes to treat and discharge stormwater to surface water, we have considered this as a 'base-case' for development of the site, ie. the proportion of a site required for stormwater treatment is typically larger for discharge to surface water than discharge to ground. We have not carried out site-specific infiltration testing to confirm our assumptions, but this should be carried out at detailed design to confirmation if stormwater discharge to ground is a feasible option.

The seasonally fluctuating groundwater levels at approximately 2.9m to 4.6m below ground level will effectively place a lower bound on the invert of new stormwater basins and wetlands etc to ensure a minimum 1m separation from the highest seasonal groundwater level.

6.1.4. Proposed stormwater system strategies

Ensuing from the above considerations, two strategy options are proposed for the stormwater system to service the development, as follows:

Strategy 1

There would be a number of catchments across the development site in line with the proposed staging plan. The catchments would discharge to one of two Stormwater Management Areas, as indicated in Figure 11.

Stormwater runoff from roofs, hardstand areas and roads would be conveyed via sumps, pipe reticulation and roadside swales which would be designed to convey the 20% AEP critical duration rainfall runoff.

The primary stormwater treatment would be provided by first flush basins designed to treat the first 25mm of rainfall depth. The first flush basins would slowly discharge into one of two downstream

wetlands. When the first flush basins capacity is exceeded stormwater runoff would be diverted to a wetland.

The wetlands would discharge via a controlled outlet to Taerutu Gully and would have extended detention capacity to ensure that the post development discharge would not exceed the pre-development peak for all rainfall events up to and including the 2% annual exceedance probability storm of critical duration. This is to match the existing resource consents requirements for the discharges from Taerutu Gully to Taranaki Stream.

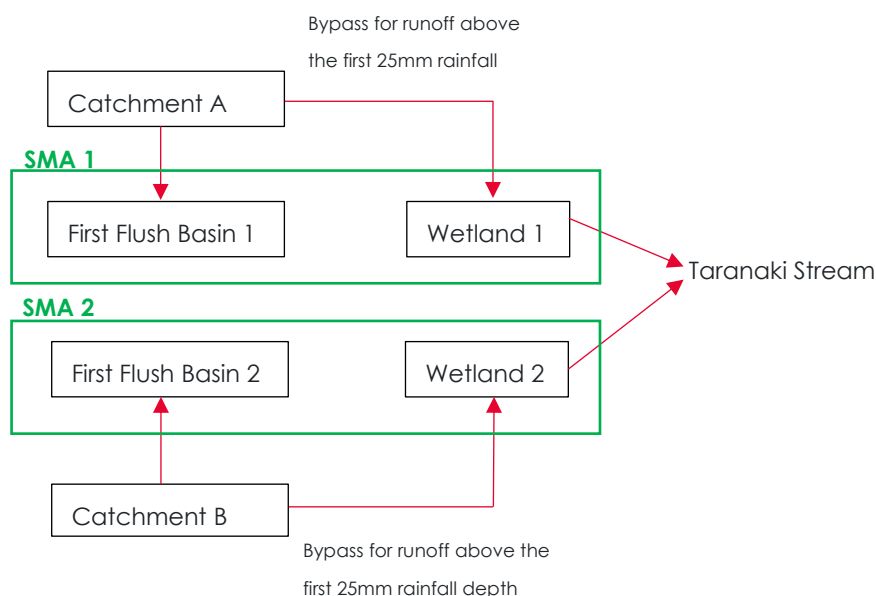


Figure 11 - Stormwater System Treatment Train - Strategy 1

Strategy 2

Stormwater runoff from roofs, hardstand areas and roads would be conveyed via sumps, pipe reticulation and roadside swales which would be designed to convey the 20% AEP critical duration rainfall runoff.

The stormwater runoff from roads would be treated via roadside swales and the runoff from hardstand areas (and roofs if required) would be treated via raingardens, as show in Figure 12.

Treated stormwater would be discharged to one of the two attenuation basins.

The attenuation basins would discharge via a controlled outlet to Taerutu Gully and would have detention capacity to ensure that the post development discharge to would not exceed the pre-development peak for all rainfall events up to and including the 2% annual exceedance probability storm of critical duration. This is to match the existing resource consents requirements for the discharges from Taerutu Gully to Taranaki Stream.

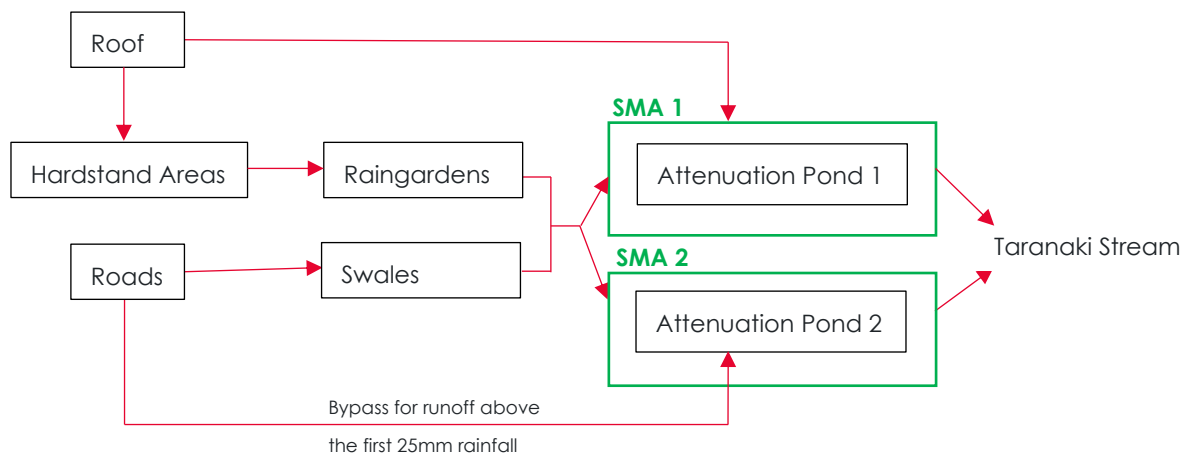


Figure 12 - Stormwater System Treatment Train - Strategy 2

6.2. Flood Management

The development roading would convey the 2% AEP secondary flow to the Stormwater Management Area which is to have capacity to detain and discharge the 2% AEP storm critical duration event.

In extreme rainfall events above the 2% AEP critical duration storms, water would overflow into Taerutu Gully via formed and stabilised spillways.

The proposed development is not located within a 50 or 200 yr flood zone.

The existing Mapleham development has an integrated lake and wetland system which stores and conveys overland stormwater runoff eventually to the Taranaki Stream, as shown in Figure 13.

The ponding shown on the Waimakariri Hazard Maps in Figure 15 and Figure 14, is associated with the existing lakes located within the Mapleham Development. We have confirmed by discussion with ECan that the site is not considered to be subject to flooding.

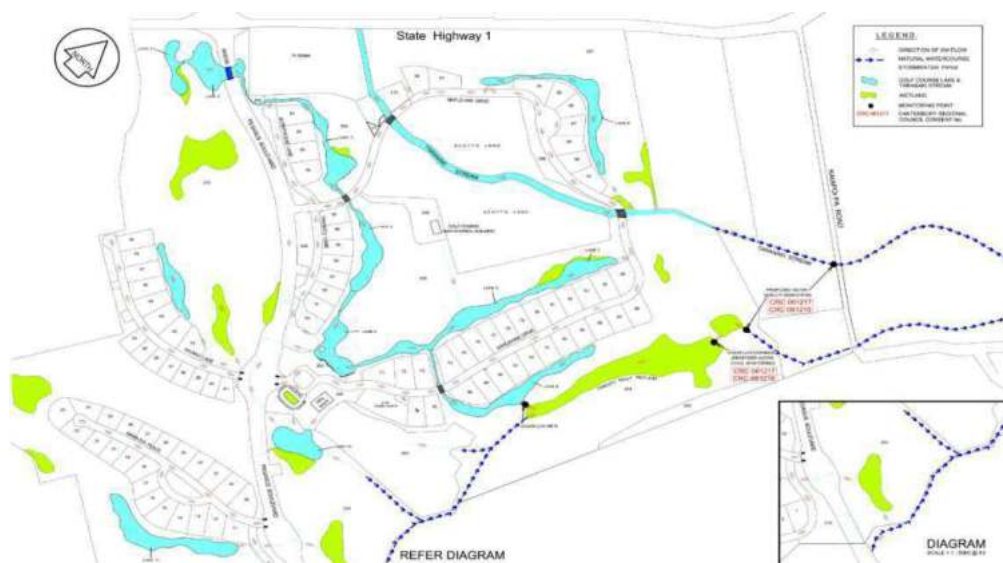


Figure 13- Mapleham Stormwater Drainage System

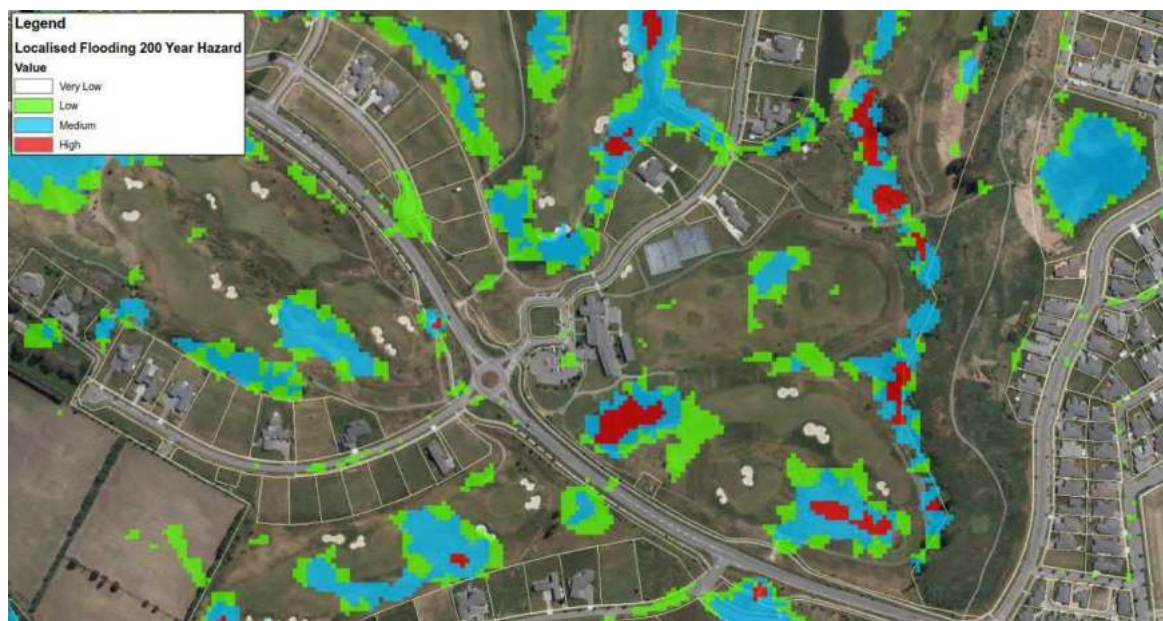


Figure 15 - 200 yr Waimakariri Flood Hazard Map

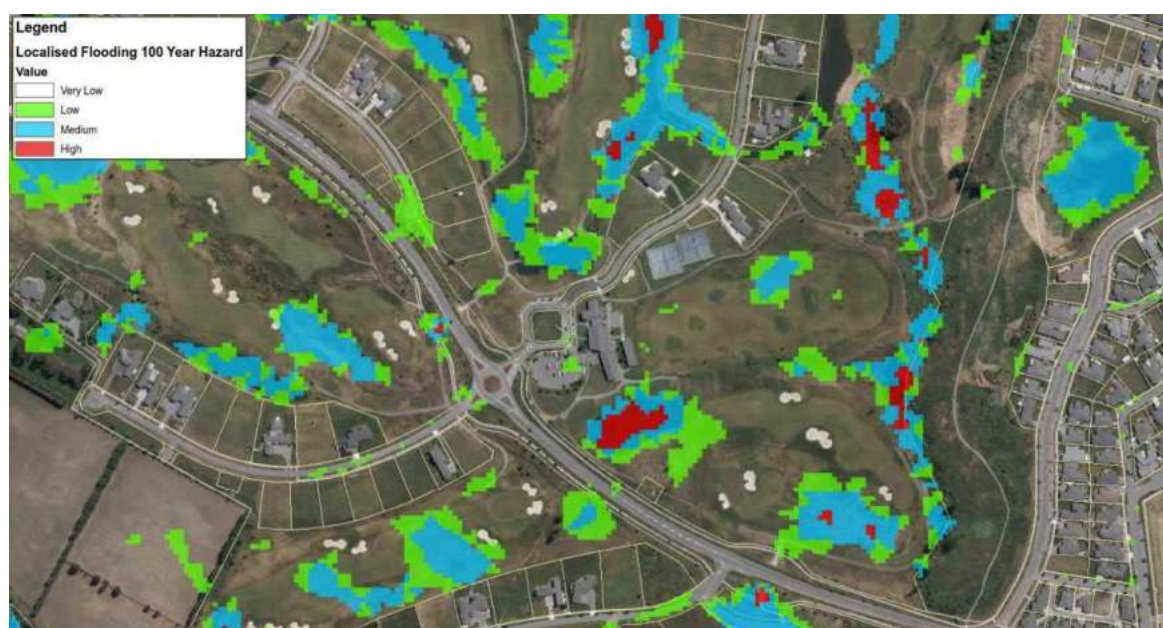


Figure 14 - 100 yr Waimakariri Flood Hazard Map

7. Utility services

7.1. Electricity

There is an existing 11kV underground electrical network along Pegasus Boulevard. One or more connections to the existing network would need to be made and cables laid from the 11kV cable to supply the development.

Detailed electrical design would be required to determine the scope of on-site electrical reticulation, including the number and position of electrical transformers/kiosks.

A confirmation letter has been obtained from Mainpower confirming that the MainPower network has sufficient capacity to supply the proposed development. While Mainpower has advised it has the capacity in its network to support the development, it has not determined if any off-site network upgrades would be required. Mainpower does not provide high-level advice regarding the scope of any off-site upgrades, and routinely undertakes this work as part of detailed design.

Power reticulation would be provided to service all sites in accordance with utility company and industry standards. All cables would be placed underground.

We are satisfied that the development can be serviced for electrical supply, but note that further work will be required through the design process to determine the scope of off-site upgrades and connections required.

Appendix G provides the confirmation letter from Mainpower.

7.2. Gas

There is an existing Ø110mm gas pipeline along Pegasus Boulevard. A connection and extension of the reticulated gas network would be required to provide reticulated gas into the Site.

Vector OnGas has confirmed that the existing reticulated network is supplied by a 100 tonne gas storage facility, and that the existing Ø110mm pipeline has the capacity to provide up to approximately 3 tonne/hour of LPG to the site.

While we do not have the expertise to confirm if this capacity would be sufficient to meet the gas demands of the development, Vector OnGas has advised that in their experience the stated capacity should be sufficient. We suggest that further advice is sought from suitably qualified practitioners to confirm if the available gas supply capacity would be sufficient.

Appendix G provides the confirmation letter from Vector OnGas.

7.3. Telecommunications

Telecommunications would be provided to service all sites in accordance with utility company and industry standards. All cables and ducts would be placed underground.

Chorus has been consulted with regards to telecommunication services and advised that they would be able to provide air-blown fibre (ABF) communications reticulation for the development. The approximate cost for the associated network design, supply and installation would be in the order of \$ 253,000. Appendix G provides the confirmation letter from Chorus.

Enable and Vodafone have also been contacted with regard to provision of telecommunications services. Enable has confirmed it cannot service the development. Vodafone has not responded prior to writing this report.

8. Recommendations

While we note that further assessment and design work will be required as a matter of course to support the proposed development through the development process, we make the following specific recommendations with regard to further work we consider will be required in advance of granting any future resource consents;

Further advice will be required from a fire engineer to determine the quantum of water supply required for fire-fighting. Further discussion with WDC will be required to assess if any water in excess of the potable and FW2 fire water demands can be provided by the WDC reticulated supply for fire-fighting, or if an alternative solution is required.

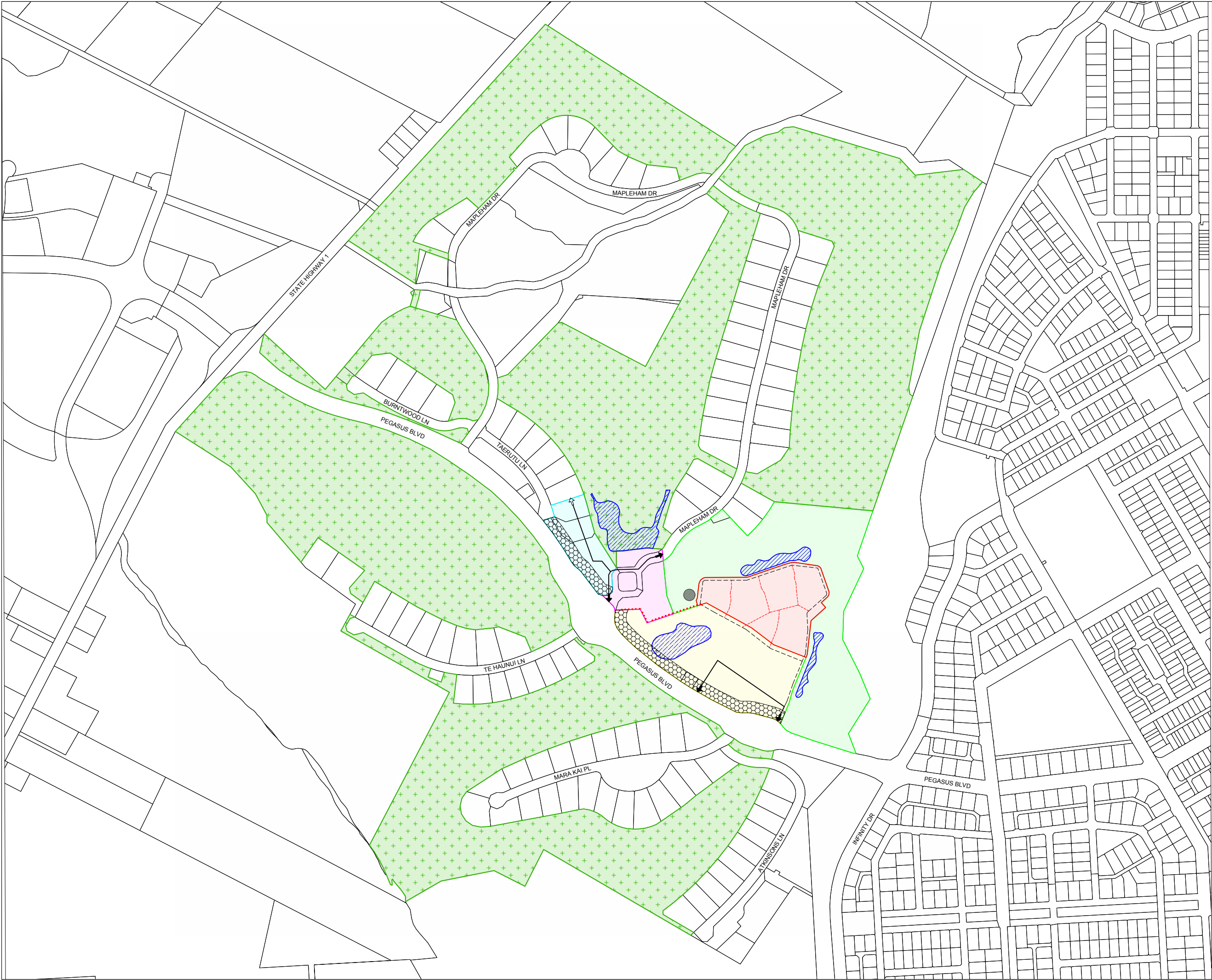
Confirm the scope of infrastructure upgrades and associated financial contributions required for water supply and sewer reticulation with WDC by undertaking identified analyses of existing WDC infrastructure.

Undertake detailed design and analysis of the selected stormwater management option. This may require modelling of the effects of increased quantity of stormwater discharge on the downstream receiving environment.

Establish the electrical demands for the proposed development. Liaise with Mainpower to confirm the scope of any off-site upgrades required.

Establish if reticulated gas supply is required for the development, and the demands for any supply. Liaise with Vector OnGas to confirm availability of supply from the existing network, and if any upgrades to existing infrastructure are required to service the development.

Appendix A. Outline Development Plan



LIMITATIONS:	
1. THIS DRAWING IS LIMITED TO 4SIGHT CONSULTING'S WORKS AS CONTRACTED UNDER THE SIGNED OFFER OF SERVICE:	
PROJECT NO.:	AA7138
DATE:	28 October 2020
A3 SCALE:	1:6000
A1 SCALE:	1:3000
DESIGN:	JL, ZA
DRAWN:	SH
CHECKED:	ZA
APPROVED:	JL

KEY:	
	Activity Area 1: Spa (Hotels, Spa and hot pools)
	Activity Area 2: Spa Village (VA + Mixed uses)
	Activity Area 3: Golf Square (Golf Club, Country club + Mixed uses)
	Activity Area 4: Golf Village (Tourism, Education + Hotel)
	Activity Area 5: Village Fringe (Golf Course, Holes 1 - 2)
	Activity Area 6: Golf Course (Golf Course, Holes 3 - 18)
	Existing Ponds
	Proposed Ponds
	Landscaped Setback
	Private Road
	Indicative Roads
	Indicative Shared Space
	Indicative Pedestrian Link
	Landscaped Swale
	Road Access point (Fixed location)
	Road Access point (Indicative location)
	Relocated Helipad

v2.0	28.10.20	FINAL ISSUE
v0.4	08.10.20	FINAL DRAFT FOR APPROVAL
v0.3	14.09.20	FINAL DRAFT FOR APPROVAL
v0.2	28.08.20	FINAL DRAFT FOR APPROVAL
v0.1	14.08.2020	DRAFT FOR COMMENT
REVISION	DATE	DESCRIPTION

FINAL ISSUE

4SIGHT

CONSULTING

201 Victoria Street
West
Auckland Central
PO Box 911310
Victoria Street West
Auckland 1142
www.4sight.consulting

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PROJECT:
PEGASUS GOLF COURSE

CLIENT: SPORTS AND EDUCATION CORPORATION
C/- JOSEPH AND ASSOCIATED LTD

ADDRESS: MAPLEHAM DRIVE, PEGASUS 7648

DRAWING TITLE: DRAFT OUTLINE DEVELOPMENT PLAN	DRAWING NO.: ODP-01
--	---------------------------

SIGNED FOR RELEASE:	NORTH:
------------------------	------------

Appendix B. CPT test results (NZGD)

<div>McMILLANDrilling</div>		CONE PENETRATION TEST			Job: 17265								
					CPT No.: CPTu001-2								
Name: Pegasus Golf & Sports Club Client: Eliot Sinclair and Partners Ltd Location: Pegasus Boulevard, Pegasus					Hole Depth (m): 9.90 Elevation (m): 0.00 Datum: Ground		North (m): 5204215.95 East (m): 1574361.66 Grid: NZTM						
RAW DATA					SOIL BEHAVIOUR TYPE (NON-NORMALISED)		ESTIMATED PARAMETERS						
Predrill	Tip Resistance (MPa)	Friction Ratio (%)	Pore Pressure (kPa)	Inclination (Degrees)	Scale	SBT	SBT Description (filtered)	Dr (%)	Su (kPa)	N ₆₀			
	10 20 30 40 50 60	1 2 3 4 5 6 7 8 9	0 200 400 600 800	5 10 15		1 2 3 4 5 6 7 8 9 10		20 40 60 80	50 100 150 200 250 300 350	10 20 30 40			
							Sand mixtures: silty sand to sandy silt						
						1	Clays: clay to silty clay						
						2	Sand mixtures: silty sand to sandy silt						
						3	Sands: clean sands to silty sands						
						4	Sands: clean sands to silty sands						
						5	Sand mixtures: silty sand to sandy silt						
						6	Sands: clean sands to silty sands						
						7							
						8							
						9							
EOH: 9.9m						10							
Operator: R. Wyllie Rig: Geomil Panther 100 Cone Reference: 170302 Cone Area Ratio: 0.75 Cone Type: I-CFYXP20-15 Tip Resistance (MPa) Initial: 1.1344 Local Friction (MPa) Initial: -0.014 Pore Pressure (KPa) Initial: 0.0265					Date: 27/03/2018 Predrill: 0.30 Water Level: - Collapse: 3.00 Final: 1.0533 Final: -0.0127 Final: 0.0149					Effective Refusal Tip: ✓ Gauge: Inclinometer: ✓ Other: Target Depth:		Soil Behaviour Type (SBT) - Robertson et al. 1986	
										0 Undefined		5 Sand mixtures: silty sand to sandy silt	
										1 Sensitive fine-grained		6 Sands: clean sands to silty sands	
										2 Clay - organic soil		7 Dense sand to gravelly sand	
										3 Clays: clay to silty clay		8 Stiff sand to clayey sand	
										4 Silt mixtures: clayey silt & silty clay		9 Stiff fine-grained	
Notes & Limitations										Remarks			
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P. K. Robertson and K.L. Cabal (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use, and should be carefully reviewed by the user. Both McMillan Drilling Ltd & Geroc Solutions Ltd do not warranty the correctness or the applicability of any of the geotechnical soil and design parameters shown and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used to derive data shown in this report.										Hole Depth (m): 9.90			
										Sheet 1 of 1			

<div>McMILLANDrilling</div>		<div>CONE PENETRATION TEST</div>			<div>Job: 17265</div>														
					<div>CPT No.: CPTu002</div>														
<div>Name: Pegasus Golf & Sports Club</div> <div>Client: Eliot Sinclair and Partners Ltd</div> <div>Location: Pegasus Boulevard, Pegasus</div>					<div>Hole Depth (m): 9.97</div> <div>Elevation (m): 0.00</div> <div>Datum: Ground</div>														
					<div>North (m): 5204195.61</div> <div>East (m): 1574370.72</div> <div>Grid: NZTM</div>														
<div>RAW DATA</div>					<div>SOIL BEHAVIOUR TYPE (NON-NORMALISED)</div>														
					<div>ESTIMATED PARAMETERS</div>														
<div>Predrill</div> <div>▼</div>	<div>Tip Resistance (MPa)</div> <div>10 20 30 40 50 60</div>	<div>Friction Ratio (%)</div> <div>1 2 3 4 5 6 7 8 9</div>	<div>Pore Pressure (kPa)</div> <div>0 200 400 600 800</div>	<div>Inclination (Degrees)</div> <div>5 10 15</div>	<div>Scale</div> <div>1 2 3 4 5 6 7 8 9 10</div>	<div>SBT</div> <div>1 2 3 4 5 6 7 8 9 10</div>	<div>SBT Description (filtered)</div>	<div>Dr (%)</div> <div>20 40 60 80</div>	<div>Su (kPa)</div> <div>50 100 150 200 250 300 350</div>	<div>N₆₀</div> <div>10 20 30 40</div>									
							Sand mixtures: silty sand to sandy silt												
					1		Silt mixtures: clayey silt & silty clay												
					2		Sand mixtures: silty sand to sandy silt												
					3														
					4														
					5														
					6		Sands: clean sands to silty sands												
					7														
					8		Dense sand to gravelly sand												
					9		Dense sand to gravelly sand												
	EOH: 9.97m					10													
<div>Operator: R. Wyllie</div> <div>Rig: Geomil Panther 100</div> <div>Cone Reference: 170302</div> <div>Cone Area Ratio: 0.75</div> <div>Cone Type: I-CFXYP20-15</div> <div>Tip Resistance (MPa) Initial: 1.0721</div> <div>Local Friction (MPa) Initial: -0.0077</div> <div>Pore Pressure (KPa) Initial: -0.0033</div>					<div>Date: 27/03/2018</div> <div>Predrill: 0.30</div> <div>Water Level: -</div> <div>Collapse: 3.40</div> <div>Final: 1.1034</div> <div>Final: -0.0087</div> <div>Final: -0.0088</div>					<div>Effective Refusal</div> <div>Tip: ✓</div> <div>Gauge:</div> <div>Inclinometer:</div> <div>Other:</div> <div>Target Depth:</div>					<div>Soil Behaviour Type (SBT) - Robertson et al. 1986</div> <div>0 Undefined</div> <div>1 Sensitive fine-grained</div> <div>2 Clay - organic soil</div> <div>3 Clays: clay to silty clay</div> <div>4 Silt mixtures: clayey silt & silty clay</div> <div>5 Sand mixtures: silty sand to sandy silt</div> <div>6 Sands: clean sands to silty sands</div> <div>7 Dense sand to gravelly sand</div> <div>8 Stiff sand to clayey sand</div> <div>9 Stiff fine-grained</div>				
<div>Notes & Limitations</div> <div>Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P. K. Robertson and K.L. Cabal (2010), Guide to Cone Penetration Testing for Geotechnical Engineering, 4th Edition. The interpretations are presented only as a guide for geotechnical use, and should be carefully reviewed by the user. Both McMillan Drilling Ltd & Geroc Solutions Ltd do not warranty the correctness or the applicability of any of the geotechnical soil and design parameters shown and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used to derive data shown in this report.</div>										<div>Remarks</div>									
<div>Hole Depth (m): 9.97</div>																			
<div>Sheet 1 of 1</div>																			

Appendix C. 4Sight Ecological Report

1 October 2020

Sports and Education Corporation
c/- Tony Joseph
PO Box 6724
Upper Riccarton
Christchurch 8442

By e-mail: tony@josephs.co.nz

Dear Tony,

RE: PEGASUS GOLF RESORT ZONE – DESKTOP ECOLOGICAL REVIEW

This report details a desktop review of available ecological information in the vicinity of the proposed Pegasus Golf Resort Zone (PGRZ), encompassing the Pegasus Golf and Sports Club at Mapleham Drive, Pegasus. The proposed development (referred to as 'the site') will include hotel buildings, conference facilities, country club, spa treatment spaces and hot pools.

It is anticipated that the proposed resort development would relocate and reposition several golf course holes to allow for development of a hotel, a hotel village, serviced apartments, heated pools and spa facilities. Associated earthworks would allow for the formation of building platforms, internal roadways and stormwater management areas.

Desktop Assessment of Site

Site and surrounding features

The proposed resort zone comprises part of the Pegasus golf course to the east of the existing Pegasus Golf and Sports Club buildings and car park. The area is a roughly triangular shaped site bounded to the west/northwest by Mapleham Drive, to the south by Pegasus Boulevard and to the east by a shallow gully system, known as 'Taerutu Gully'¹. A wetland ('Taerutu Gully wetland') is located within the gully to the north of the site, artificially formed for stormwater management within the ephemeral stream gully bed following modification of the gully during development of the golf course and Mapleham residential area². The Taerutu Gully east of the site drains north to discharge to the Old Taranaki / Taranaki Stream system, to converge with the lower Ashley River near its outlet to the sea, north of Waiuku Beach.

A large, constructed pond is located to the south of the Sports Club buildings, with the remainder of the site in managed golf course greens, bunkers and areas of rough. A series of connected, constructed lakes that also form part of the wider Mapleham area stormwater system are scattered through the wider golf course and residential development that surrounds the site³.

A section of the narrow Taerutu Gully system and adjacent ridgeline to the east of the resort zone is identified in the Waimakariri District Plan maps as the 'Western Ridge Conservation Area' (WRCA). This, and the larger 'Eastern Conservation Management Area', located to the east of the Pegasus township, have been owned by Te Kōhaka o Tūhaitara Trust since 2018⁴ and are part of the larger Tūhaitara Coastal Park managed by the Trust. Native revegetation planting and pest control are ongoing through the WRCA with assistance from the community⁵.

¹ See Figure 2 in: Eliot Sinclair (2020) Technical Servicing Report, Pegasus Hot Spring Resort. Draft report prepared for Sports and Education Corporation Ltd. 30 September 2020.

² Eliot Sinclair (2020)

³ Eliot Sinclair (2020)

⁴ Pegasus Residents Group Inc (2018) Pegasus Town a 10th anniversary celebration. Powerpoint presentation.

⁵ <https://tkot92.wixsite.com/tuhaitara>

The proposed development plan illustrates that all buildings and structures will be offset from the gully watercourse edge by at least 40m, and the design offers opportunity to extend the gully planting as part of wider amenity and landscape planting plans for the site

A 1.7ha area including a small, ponded wetland located to the east of the WRCA, near the corner of Infinity Drive and Solander Road, is identified in the Waimakariri District Plan maps as a 'Mudfish Conservation Area' (MCA). This area is home to Canterbury mudfish (*Neochanna burrowsius*), a native fish species listed as 'Threatened: Nationally Critical', predominantly due to intensive agricultural development throughout Canterbury, including wetland drainage, abstraction for irrigation and removal of streamside vegetation⁶. The MCA is not contiguous with the resort zone and will not be impacted by the development proposed.

A search of the New Zealand Freshwater Fish Database (NZFFD) returned no records for the watercourse within the WRCA and the golf course area to the north. However, a small range of native fish species have been recorded from the wider connected stream and wetland system to the north and northeast of the site, including the 'nationally critical' Canterbury mudfish, and the 'at risk' longfin eel, giant bully, inanga and Canterbury galaxias (Table 1).

Table 1: Fish species recorded from the Pegasus area streams and wetlands (source NZFFD)

Scientific name	Common name	Threat classification
<i>Anguilla</i> sp.	Unidentified eel	n/a
<i>Anguilla australis</i>	Shortfin eel	Not threatened
<i>Anguilla dieffenbachii</i>	Longfin eel	At risk: declining
<i>Galaxias</i> sp.	Unidentified galaxiid	n/a
<i>Galaxias maculatus</i>	Inanga	At risk: declining
<i>Galaxias vulgaris</i>	Canterbury galaxias	At risk: declining
<i>Gobiomorphus</i> sp.	Unidentified bullies	n/a
<i>Gobiomorphus cotidianus</i>	Common bully	Not threatened
<i>Gobiomorphus gobioides</i>	Giant bully	At risk: naturally uncommon
<i>Neochanna burrowsius</i>	Canterbury mudfish	Threatened: nationally critical

Golf course 'wetland'

One area of interest that will be affected by the proposed redevelopment of the site is a vegetated area within the golf course, near the junction of Pegasus Boulevard and the WRCA. This area was identified as a potential wetland habitat.

Recent photographs of the location were provided, indicating the presence of low growing grass and sedge species, however large areas of vegetation appeared to have died off. No standing water was identified from the area (in early July) following regular rain in the previous week (J. Lundy, pers. comm.). A review of historic aerial

⁶ Dunn, N.R.; Allibone, R.M.; Closs, G.P.; Crow, S.K.; David, B.O.; Goodman, J.M.; Griffiths, M.; Jack, D.C.; Ling, N.; Waters, J.M.; Rolfe, J.R. 2018: Conservation status of New Zealand freshwater fishes, 2017. New Zealand Threat Classification Series 24. Department of Conservation, Wellington. 11 p.

photography was therefore undertaken to provide confirmation as to whether the habitat was a natural or constructed feature of the site.

Aerial photography from 2005 through to 2019, available through Google Earth, was reviewed. A subset of the aerial imagery, with the approximate outline of the area of interest overlaid, is provided in Attachment A. Aerial photographs indicate that prior to the golf course development the area was in grazed pasture, and was excavated as a water trap/rough in conjunction with the wider golf course development. It is unclear from available information if the wetland was subject to stormwater discharge or relied on overland runoff from the surrounding golf course for water recharge. The aerals indicate that over time, the two areas of ponded open water have reduced and become overgrown, until they are no longer evident in the 2019 aerial. Plant species utilised in the area are therefore likely to be common native wetland and marginal streamside species added for amenity values.

On that basis, the ecological value of the constructed wetland is considered to be very low, and the area is unlikely to warrant special retention.



Figure 1: Overviews of constructed wetland area

Overland flowpath

A revegetated area north of the artificial wetland can be seen as a somewhat defined overland flowpath in the same series of aerial photographs (see the first image in Attachment A). The aerals demonstrate that this area has been revegetated and then partially cleared since the golf course was developed and modified over time. While it comprises a component of the natural flowpath towards the adjacent Taerutu gully and at times receives overflows from the constructed pond, based on the catchment size it is unlikely to function as stream, even

intermittently. Any values it currently provides is likely in the form of filtration of overland stormwater flows before it enters the WRCA/Taerutu watercourse, aided by the replanted vegetation.

On that basis, there would be value in retaining the native vegetation of the lower flowpath, to the extent practicable.

Golf course lake (Lake 10)

The lake to the southeast of the Golf Club buildings is a landscape feature constructed as a component of the golf course development. The lake ('Lake 10') collects stormwater runoff from the Golf Club building and associated car park, with any high-level overflows discharging via a swale towards the overland flowpath (discussed above) towards the Taerutu Gully⁷. The lake appears to comprise predominantly mown grass to the edge, with small areas of apparent native grass and sedge vegetation to the east, comprising a 'rough', with small stands of emergent wetland vegetation, predominantly raupo, scattered at locations around the pond edge.



Figure 2: View of constructed amenity pond (image care of Google Streetview, captured August 2019)

No visible open watercourse or piped connection to the nearby stream gully is evident, so fish passage to the constructed pond is unlikely. Nonetheless, it is possible that native eels, that are known to leave the water and travel overland at times, may be present in the pond. The pond likely provides habitat for a range of common freshwater invertebrate species which prefer slow flowing or ponded habitats. Common wetland birds, such as heron, ducks and pukeko can be expected to visit the pond on occasion, however the open nature, limited vegetation cover and close proximity to human activities means the pond is unlikely to provide habitat for more secretive native wetland birds.

The proposed design plan for the resort development includes the retention of the pond as a feature of the site.

Effects of proposed rezoning and redevelopment

The Pegasus Golf Resort Zone encompasses a highly modified area currently in use as a golf course, comprising the golf club buildings and several course holes. No established vegetation of note is present through the development area and the vegetation present almost entirely comprises managed grasslands. A constructed and increasingly limited wetland feature would be removed because of the development, however the removal of this constructed wetland and associated vegetation would not be ecologically significant. The constructed pond feature within the site is expected to be retained and incorporated into the wider resort design, so any ecological values the pond provides will be retained and could be enhanced through marginal planting. Two additional amenity water features are to be incorporated into the design, and are likely to comprise a component of the stormwater detention and treatment system for the site, and offer an opportunity to incorporate native wetland and stream side vegetation into the resort area.

⁷ Eliot Sinclair (2020)

The zones that will contain the built form of the resort have been purposefully offset from the Taerutu Gully at the east of the zone. Therefore, providing appropriate sediment and erosion controls are put in place during earthworks and stormwater from the site is managed appropriately, there is little risk of adverse effects of the development of the nearby stream system or downstream receiving environments.

Discussion

Due to its highly modified nature as a golf course, this desktop assessment has determined that the site proposed for development as a resort has retained few notable ecological features of value. An area identified as a potential wetland is a constructed feature, added as an amenity feature for the golf course. The wetland degraded and become increasingly limited over time, and no longer appears to retain standing water or frequently wet areas. The constructed pond feature has been added as an amenity and for stormwater management and is intended to be retained within the resort design proposed.

The most notable feature of the site is the adjacent WRCA/Taerutu Gully. This area forms part of the stormwater network, but is an area undergoing ongoing enhancement planting and links to a series of ponds and wetlands before discharging to the Taranaki Stream. The spatial layout plan indicates that the Activity Areas that will comprise the resort development areas are offset from the gully, by a minimum of 40m. Provided care is taken to ensure earthworks and construction avoids encroachment into the WRCA and wider gully system, and stormwater discharge is managed to avoid adverse effects on the receiving gully stream system (water quality, sediment discharge and erosion), no notable adverse ecological impacts on downstream receiving environments are anticipated.

I can be contacted on 027 373 4405 or via kerenb@4sight.co.nz if you require any further comment.

Kind regards,

A handwritten signature in black ink that reads 'Keren Bennett'.

Keren Bennett
Principal Ecology Consultant
4Sight Consulting Ltd

Attachment A: Google Earth imagery of potential wetland area and flowpath

The approximate area of interest is outlined in red. The overland flowpath is circled (in blue) in the first image only.

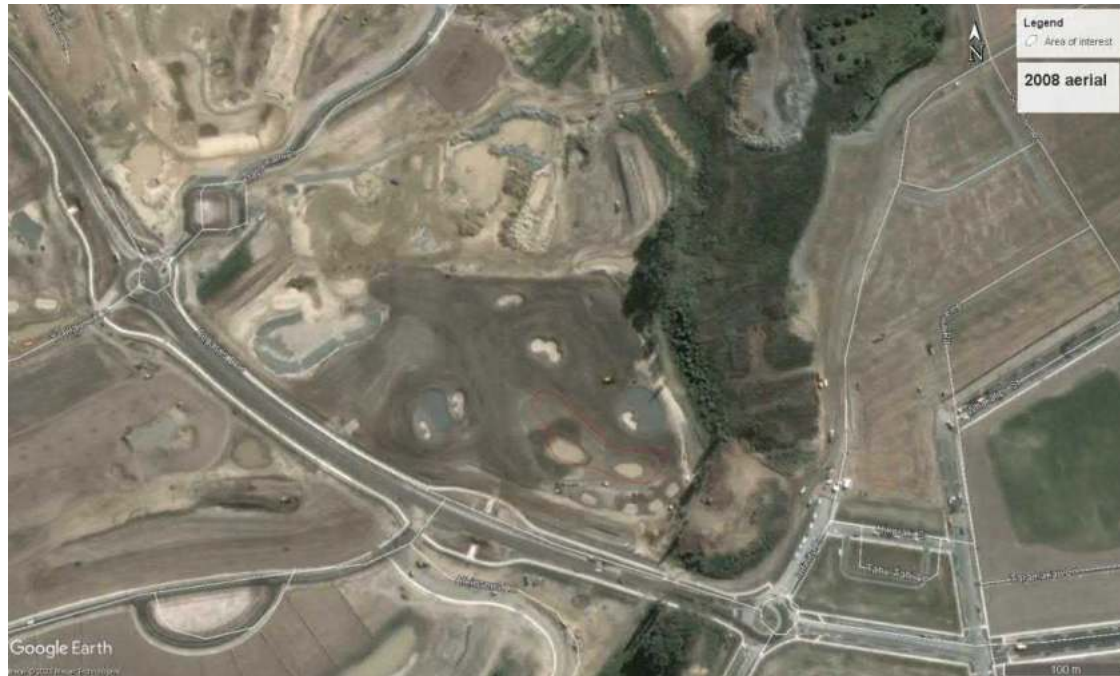
April 2005



January 2006



May 2008



November 2010



March 2014



September 2016



2019



Appendix D. LLUR Statement

Dear Sir/Madam

Thank you for submitting your property enquiry in regards to our Listed Land Use Register (LLUR) which holds information about sites that have been used, or are currently used for activities which have the potential to have caused contamination.

The LLUR statement provided indicates the location of the land parcel(s) you enquired about and provides information regarding any LLUR sites within a radius specified in the statement of this land.

Please note that if a property is not currently entered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; other information relevant to potential contamination may be held in other files (for example consent and enforcement files).

If your enquiry relates to a farm property, please note that many current and past activities undertaken on farms may not be listed on the LLUR. Activities such as the storage, formulation and disposal of pesticides, offal pits, foot rot troughs, animal dips and underground or above ground fuel tanks have the potential to cause contamination.

Please contact and Environment Canterbury Contaminated Sites Officer if you wish to discuss the contents of the LLUR statement, or if you require additional information. For any other information regarding this land please contact Environment Canterbury Customer Services.

Yours sincerely

Contaminated Sites Team

Property Statement from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Date:	25 August 2020	
Land Parcels:	Lot 204 DP 478302	Valuation No(s): 2163100500



Area of Enquiry

Sites intersecting area of enquiry

Investigations intersecting area of enquiry



Legal Description(s): Drain Reserve Red Map 58, Lot 204 DP 478302

Site Category: Not Investigated

Definition: Verified HAIL has not been investigated.

Land Uses (from HAIL):	Period From	Period To	HAIL land use
	Unknown	Present	Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds

Notes:

14 Dec 2016 This record was created as part of the Waimakariri District Council 2016 HAIL identification project.

7 Jul 2017 Area defined from Unknown to Present aerial photographs. A10 - Horticultural activities, a poultry farm or sports turf were noted in aerial photographs reviewed.

Investigations:

There are no investigations associated with this site.

Site 169857: Lot 204 DP 478302, Pegasus (Intersects enquiry area.)

Site Address: Lot 204 DP 478302, Pegasus

Legal Description(s): Lot 204 DP 478302

Site Category: Not Investigated

Definition: Verified HAIL has not been investigated.

Land Uses (from HAIL):	Period From	Period To	HAIL land use
	Unknown	Present	Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds

Notes:

14 Dec 2016 This record was created as part of the Waimakariri District Council 2016 HAIL identification project.

7 Jul 2017 Area defined from Unknown to Present aerial photographs. A10 - Horticultural activities, a poultry farm or sports turf were noted in aerial photographs reviewed.

Investigations:

There are no investigations associated with this site.

Information held about other investigations on the Listed Land Use Register

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ262066.

Disclaimer: *The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987 and Environment Canterbury's Contaminated Land Information Management Strategy (ECAN 2009).*

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Property Statement from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Date:	27 October 2020	
Land Parcels:	Lot 14 DP 418491	Valuation No(s): 2163130200



Area of Enquiry

Sites intersecting area of enquiry

Investigations intersecting area of enquiry



Disclaimer: *The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987 and Environment Canterbury's Contaminated Land Information Management Strategy (ECan 2009).*

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Property Statement from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.

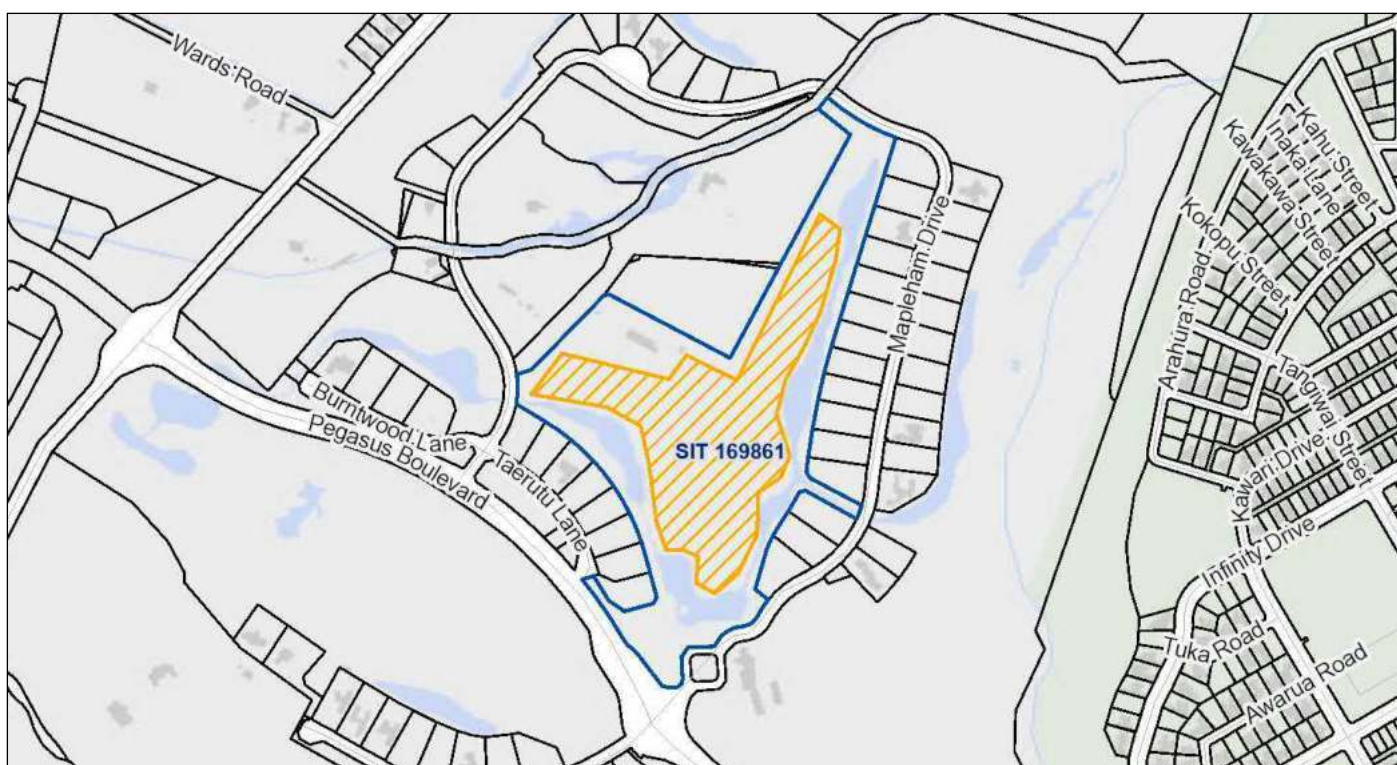
Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Date:	27 October 2020	
Land Parcels:	Lot 205 DP 478302	Valuation No(s): 2163100500



Area of Enquiry

Sites intersecting area of enquiry

Investigations intersecting area of enquiry



Site Category:	Not Investigated
Definition:	Verified HAIL has not been investigated.

Land Uses (from HAIL):	Period From	Period To	HAIL land use
	Unknown	Present	Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds

Notes:

14 Dec 2016	This record was created as part of the Waimakariri District Council 2016 HAIL identification project.
7 Jul 2017	Area defined from Unknown to Present aerial photographs. A10 - Horticultural activities, a poultry farm or sports turf were noted in aerial photographs reviewed.

Investigations:

There are no investigations associated with this site.

Information held about other investigations on the Listed Land Use Register

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ266524.

Disclaimer: *The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987 and Environment Canterbury's Contaminated Land Information Management Strategy (ECan 2009).*

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Property Statement from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.

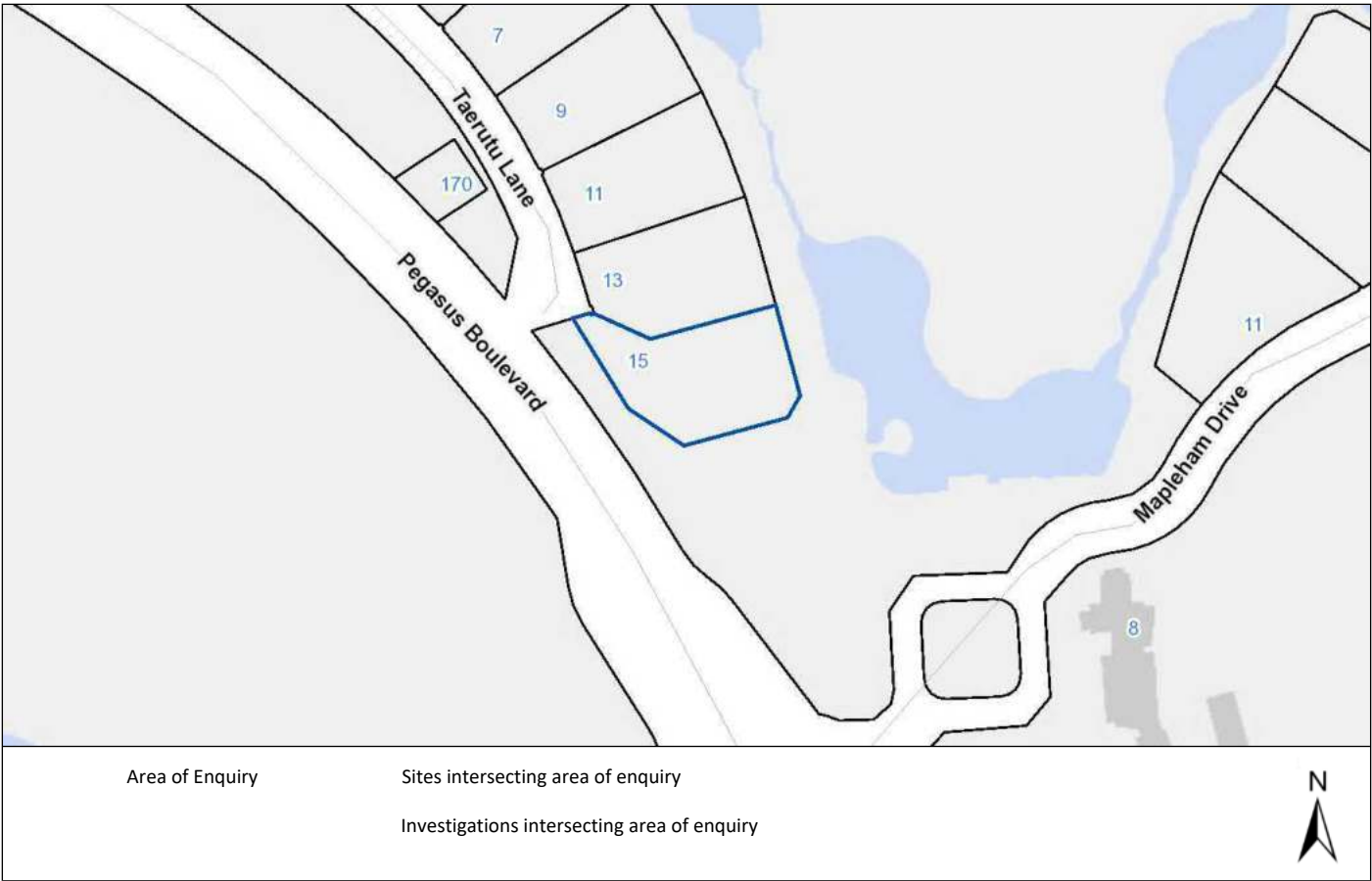
Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Date:	27 October 2020	
Land Parcels:	Lot 50 DP 417391	Valuation No(s): 2163100510



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The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Property Statement from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.

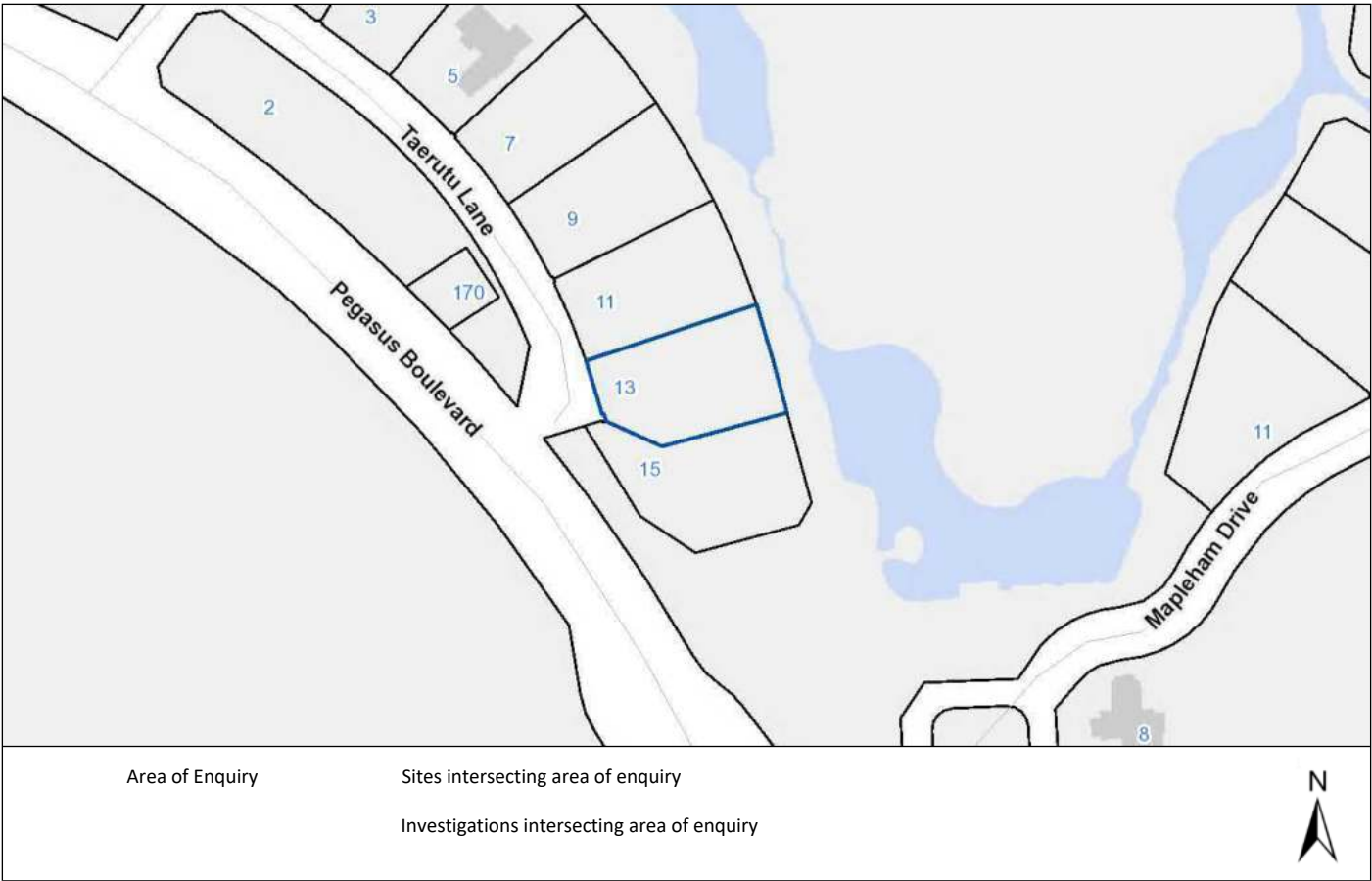
Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Date:	27 October 2020	
Land Parcels:	Lot 51 DP 417391	Valuation No(s): 2163100511



Disclaimer: *The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987 and Environment Canterbury's Contaminated Land Information Management Strategy (ECan 2009).*

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Listed Land Use Register

What you need to know

What is the Listed Land Use Register (LLUR)?

The LLUR is a database that Environment Canterbury uses to manage information about land that is, or has been, associated with the use, storage or disposal of hazardous substances.

Why do we need the LLUR?

Some activities and industries are hazardous and can potentially contaminate land or water. We need the LLUR to help us manage information about land which could pose a risk to your health and the environment because of its current or former land use.

Section 30 of the Resource Management Act (RMA, 1991) requires Environment Canterbury to investigate, identify and monitor contaminated land. To do this we follow national guidelines and use the LLUR to help us manage the information.

The information we collect also helps your local district or city council to fulfil its functions under the RMA. One of these is implementing the National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil, which came into effect on 1 January 2012.

For information on the NES, contact your city or district council.

How does Environment Canterbury identify sites to be included on the LLUR?

We identify sites to be included on the LLUR based on a list of land uses produced by the Ministry for the Environment (MfE). This is called the Hazardous Activities and Industries List (HAIL)¹. The HAIL has 53 different activities, and includes land uses such as fuel storage sites, orchards, timber treatment yards, landfills, sheep dips and any other activities where hazardous substances could cause land and water contamination.

We have two main ways of identifying HAIL sites:

- We are actively identifying sites in each district using historic records and aerial photographs. This project started in 2008 and is ongoing.
- We also receive information from other sources, such as environmental site investigation reports submitted to us as a requirement of the Regional Plan, and in resource consent applications.

¹ The Hazardous Activities and Industries List (HAIL) can be downloaded from MfE's website www.mfe.govt.nz, keyword search HAIL

How does Environment Canterbury classify sites on the LLUR?

Where we have identified a HAIL land use, we review all the available information, which may include investigation reports if we have them. We then assign the site a category on the LLUR. The category is intended to best describe what we know about the land use and potential contamination at the site and is signed off by a senior staff member.

Please refer to the Site Categories and Definitions factsheet for further information.

What does Environment Canterbury do with the information on the LLUR?

The LLUR is available online at www.llur.ecan.govt.nz. We mainly receive enquiries from potential property buyers and environmental consultants or engineers working on sites. An inquirer would typically receive a summary of any information we hold, including the category assigned to the site and a list of any investigation reports.

We may also use the information to prioritise sites for further investigation, remediation and management, to aid with planning, and to help assess resource consent applications. These are some of our other responsibilities under the RMA.

If you are conducting an environmental investigation or removing an underground storage tank at your property, you will need to comply with the rules in the Regional Plan and send us a copy of the report. This means we can keep our records accurate and up-to-date, and we can assign your property an appropriate category on the LLUR. To find out more, visit www.ecan.govt.nz/HAIL.



My land is on the LLUR – what should I do now?

IMPORTANT! Just because your property has a land use that is deemed hazardous or is on the LLUR, it doesn't necessarily mean it's contaminated. The only way to know if land is contaminated is by carrying out a detailed site investigation, which involves collecting and testing soil samples.

You do not need to do anything if your land is on the LLUR and you have no plans to alter it in any way. It is important that you let a tenant or buyer know your land is on the Listed Land Use Register if you intend to rent or sell your property. If you are not sure what you need to tell the other party, you should seek legal advice.

You may choose to have your property further investigated for your own peace of mind, or because you want to do one of the activities covered by the National Environmental Standard for Assessing and Managing Contaminants in Soil. Your district or city council will provide further information.

If you wish to engage a suitably qualified experienced practitioner to undertake a detailed site investigation, there are criteria for choosing a practitioner on www.ecan.govt.nz/HAIL.



I think my site category is incorrect – how can I change it?

If you have an environmental investigation undertaken at your site, you must send us the report and we will review the LLUR category based on the information you provide. Similarly, if you have information that clearly shows your site has not been associated with HAIL activities (eg. a preliminary site investigation), or if other HAIL activities have occurred which we have not listed, we need to know about it so that our records are accurate.

If we have incorrectly identified that a HAIL activity has occurred at a site, it will be not be removed from the LLUR but categorised as Verified Non-HAIL. This helps us to ensure that the same site is not re-identified in the future.

IMPORTANT!

The LLUR is an online database which we are continually updating. A property may not currently be registered on the LLUR, but this does not necessarily mean that it hasn't had a HAIL use in the past.



Sheep dipping (ABOVE) and gas works (TOP) are among the former land uses that have been identified as potentially hazardous. (Photo above by Wheeler & Son in 1987, courtesy of Canterbury Museum.)

Contact us

Property owners have the right to look at all the information Environment Canterbury holds about their properties.

It is free to check the information on the LLUR, online at www.llur.ecan.govt.nz.

If you don't have access to the internet, you can enquire about a specific site by phoning us on (03) 353 9007 or toll free on 0800 EC INFO (32 4636) during business hours.

Contact Environment Canterbury:

Email: ecinfo@ecan.govt.nz

Phone:

Calling from Christchurch: (03) 353 9007

Calling from any other area: 0800 EC INFO (32 4636)



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E13/101

Listed Land Use Register

Site categories and definitions

When Environment Canterbury identifies a Hazardous Activities and Industries List (HAIL) land use, we review the available information and assign the site a category on the Listed Land Use Register. The category is intended to best describe what we know about the land use.

If a site is categorised as **Unverified** it means it has been reported or identified as one that appears on the HAIL, but the land use has not been confirmed with the property owner.

If the land use has been confirmed but analytical information from the collection of samples is not available, and the presence or absence of contamination has therefore not been determined, the site is registered as:

Not investigated:

- A site whose past or present use has been reported and verified as one that appears on the HAIL.
- The site has not been investigated, which might typically include sampling and analysis of site soil, water and/or ambient air, and assessment of the associated analytical data.
- There is insufficient information to characterise any risks to human health or the environment from those activities undertaken on the site. Contamination may have occurred, but should not be assumed to have occurred.

If analytical information from the collection of samples is available, the site can be registered in one of six ways:

At or below background concentrations:

The site has been investigated or remediated. The investigation or post remediation validation results confirm there are no hazardous substances above local background concentrations other than those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed to characterise the site.

Below guideline values for:

The site has been investigated. Results show that there are hazardous substances present at the site but indicate that any adverse effects or risks to people and/or the environment are considered to be so low as to be acceptable. The site may have been remediated to reduce contamination to this level, and samples taken after remediation confirm this.

Managed for:

The site has been investigated. Results show that there are hazardous substances present at the site in concentrations that have the potential to cause adverse effects or risks to people and/or the environment. However, those risks are considered managed because:

- the nature of the use of the site prevents human and/or ecological exposure to the risks; and/or
- the land has been altered in some way and/or restrictions have been placed on the way it is used which prevent human and/or ecological exposure to the risks.

Partially investigated:

The site has been partially investigated. Results:

- demonstrate there are hazardous substances present at the site; however, there is insufficient information to quantify any adverse effects or risks to people or the environment; or
- do not adequately verify the presence or absence of contamination associated with all HAIL activities that are and/or have been undertaken on the site.

Significant adverse environmental effects:

The site has been investigated. Results show that sediment, groundwater or surface water contains hazardous substances that:

- have significant adverse effects on the environment; or
- are reasonably likely to have significant adverse effects on the environment.

Contaminated:

The site has been investigated. Results show that the land has a hazardous substance in or on it that:

- has significant adverse effects on human health and/or the environment; and/or
- is reasonably likely to have significant adverse effects on human health and/or the environment.

If a site has been included incorrectly on the Listed Land Use Register as having a HAIL, it will not be removed but will be registered as:

Verified non-HAIL:

Information shows that this site has never been associated with any of the specific activities or industries on the HAIL.

Please contact Environment Canterbury for further information:

(03) 353 9007 or toll free
on 0800 EC INFO (32 4636)
email ecinfo@ecan.govt.nz

Appendix E. Calculations

[illegible]

[illegible]

Appendix F. Powell Fenwick Fire Report



Master Planning Report

Pegasus Golf Resort

Fire Safety & Protection

Job Ref: 200264/F

Date: 28 October 2020

Issue: C



Issue Authorisation

ISSUE	DESCRIPTION	DATE
A	Master Planning	28 July 2020
B	Master Planning	28 October 2020
C	Master Planning	28 October 2020

Written By:

David James

BE (Hons), CMEngNZ

Director, Fire Engineer

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The report has been prepared solely for the benefit of our client. No liability is accepted by this firm or by any principal, or director, or any servant or agent of this firm, in respect of its use by any other person. Any other person who relies upon any matter contained in this report does so entirely at their own risk.

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1. Introduction

This report has been prepared for Sports and Education Corporation Ltd to advise of the main Fire Safety & Protection issues that will be required in the new **Pegasus Golf Resort** on Pegasus Boulevard, Pegasus.

The following proposed new buildings are addressed in this report:

- Pegasus Country Club
- Spa & Hot Pools buildings,
- Golf Village,
- Hotel & Conference buildings, and
- Spa Village Tourist Accommodation buildings.

The methodology used to determine compliance with the NZBC Clauses C1-C6 Protection from Fire is the *Acceptable Solutions for Buildings other than Risk Group SH C/AS2 (first edition, June 2019)*. No assessment based on the *Verification Method C/VM2 (Amendment 5)* or an Alternative Solution is included.

The aims of this report are to define:

1. the required minimum Fire Safety systems for each building, and
2. the high level Fire Fighting water supply requirements for the site.

This Fire Design advice addresses the requirements of the Building Act 2004 only and does not address protection of the owner's property.



2. Pegasus Country Club

The **Pegasus Country Club** is proposed to be a single level 400m² 'crowd use' building and is expected to comprise a single firecell.

The building is not required under the Fire Code to be sprinkler protected. However, the building will require the following Fire Safety features:

Means of Escape from Fire

- Type 4 automatic smoke detection and manual alarm system throughout.
- Emergency lighting where egress lengths exceed 20m and on changes in level.
- Illuminated exit signage above egress doors and along egress routes.
- Fire extinguishers
- Sufficient number of egress routes and door widths for the required design occupancy. A minimum of two escape routes will be required, separated by 8m.
- Internal surface finish requirements of walls, ceilings, flooring, suspended flexible fabrics needed to meet the requirements of the Acceptable Solution C/AS2 for a crowd use building.

External Fire Spread:

The required distance to boundaries can be determined using one of several design methodologies. The Acceptable Solutions require at least 16m to any property boundary, and 17m to any sleeping accommodation building.

Provided the building height does not exceed 10m and property boundaries are at least 1m from the building, no restrictions on external cladding apply.

Fire & Emergency New Zealand

- A Fire & Emergency NZ (FENZ) attendance point for their vehicles is required as the building is located remote from the street boundary. This shall be within 20m of the main entrance of the building.
- Access to the attendance point shall meet the following requirements:
 - be able to withstand a laden weight of up to 25 tonnes with an axle load of 8.2 tonnes or, have a load bearing capacity of no less than the public roadway serving the property, whichever is the lower,
 - be trafficable in all weathers,
 - have a minimum width of 4.0 m,
 - provide a clear passageway of no less than 3.5 m in width and 4.0 m in height at site entrances, internal entrances and between buildings.
- It is expected that all areas of the building can be reached within a 75m hose run distance of the attendance point and therefore an internal hydrant system is not required.
- As per Table 1 of PAS 4509:2008, a fire water classification of **FW2** is required for fire fighting water supplies if the building is sprinklered and **FW4** if the building is not sprinklered.

3. Spa & Hot Pools Buildings

The main Spa & Hot Pools building is proposed to be 2-storey and include double height spaces. It is to be 1,800m², a 'crowd use' building and is expected to comprise a single firecell.

Five single storey 'domes' are also included, joined together with interconnecting tunnels. The total area of these is 4,725m². It is assumed that each is fire separated from the other. The largest dome is 1,257m².

Fifteen 'honeymoon cottages' are to be located along the access road, each 50m² single level.

Sprinklers:

The main Spa & Hot Pools building will likely need sprinkler protection because of the double height spaces.

The domes may need sprinkler protection depending on the construction type.

The honeymoon cottages will not require sprinkler protection.

Means of Escape from Fire

In addition, the buildings will require the following Fire Safety features:

- Type 4 automatic smoke detection and manual alarm system throughout the main building and domes. The honeymoon cottages will require only domestic smoke alarms.
- Possible smoke extract to the main building's double height spaces
- Emergency lighting where egress lengths exceed 20m and on changes in level.
- Illuminated exit signage above egress doors and along egress routes.
- Fire extinguishers
- Sufficient number of egress routes and door widths, for the required design occupancy. A minimum of two escape routes will be required, separated by 8m.
- Internal surface finish requirements of walls, ceilings, flooring, suspended flexible fabrics needed to meet the requirements of the Acceptable Solution C/AS2 for a crowd and accommodation use buildings
- Fire separations including firedoors between each dome.

External Fire Spread:

The required distance to boundaries can be determined using one of several design methodologies. The Acceptable Solutions require at least 16m to any property boundary, and 17m to any sleeping accommodation building.

Provided the building height does not exceed 10m and property boundaries are at least 1m from the building, no restrictions on external cladding apply.

Fire & Emergency New Zealand

- A Fire & Emergency NZ (FENZ) attendance point for their vehicles is required as the buildings are located remote from the street boundary. This shall be within 20m of the main entrance of the building.
- Access to the attendance point shall meet the following requirements:
 - be able to withstand a laden weight of up to 25 tonnes with an axle load of 8.2 tonnes or, have a load bearing capacity of no less than the public roadway serving the property, whichever is the lower,

- be trafficable in all weathers,
 - have a minimum width of 4.0 m,
 - provide a clear passageway of no less than 3.5 m in width and 4.0 m in height at site entrances, internal entrances and between buildings.
- It is expected that all areas of the buildings can be reached within a 75m hose run distance of the attendance point and therefore an internal hydrant system is not required.
 - As per Table 1 of PAS 4509:2008, a fire water classification of **FW2** is required for fire fighting water supplies if the buildings are sprinklered and **FW6**, **FW6** and **FW3** respectively if the buildings are not sprinklered.

4. Golf Village

The **Golf Village** comprises:

- a) a 3-storey hotel with 1,000m² per level,
- b) a 3-storey secondary building with 400m² per level, and
- c) a 3-storey golf academy building with 550 m² per level.

Sprinklers:

None of these buildings will necessarily require sprinkler protection.

Means of Escape from Fire

The buildings will require the following Fire Safety features:

- Type 5 automatic smoke & heat detection and manual alarm system throughout the accommodation building(s).
- Type 4 automatic smoke detection and manual alarm system throughout the non-accommodation building(s).
- Emergency lighting where egress lengths exceed 20m and on changes in level.
- Illuminated exit signage above egress doors and along egress routes.
- Fire extinguishers
- Sufficient number of egress routes and door widths, for the required design occupancy. A minimum of two escape routes will be required, separated by 8m.
- Fire separations around each bedroom suite, separating the suites from adjacent suites and from the corridor.
- Fire protected accommodation corridors and separately fire protected stairs.
- Fire separations between sleeping and non-sleeping firecells.
- Fire rated doors to all fire separations.
- Internal surface finish requirements of walls, ceilings, flooring, suspended flexible fabrics needed to meet the requirements of the Acceptable Solution C/AS2 for an accommodation use building.

External Fire Spread:

The required distance to boundaries can be determined using one of several design methodologies. The Acceptable Solutions require at least 16m to any property boundary, and 17m to any sleeping accommodation building.

Vertical fire spread via external windows needs to be prevented by including fire rated aprons/decks and/or fire rated vertical spandrels. Alternatively sprinklers could be included.

Given the building height will exceed 10m, restrictions on external cladding will apply.

Fire & Emergency New Zealand

- A Fire & Emergency NZ (FENZ) attendance point for their vehicles is required as the buildings are located remote from the street boundary. This shall be within 20m of the main entrance of the building.
- Access to the attendance point shall meet the following requirements:
 - be able to withstand a laden weight of up to 25 tonnes with an axle load of 8.2 tonnes or, have a load bearing capacity of no less than the public roadway serving the property, whichever is the lower,
 - be trafficable in all weathers,
 - have a minimum width of 4.0 m,
 - provide a clear passageway of no less than 3.5 m in width and 4.0 m in height at site entrances, internal entrances and between buildings.
- It is expected that all areas of the buildings can be reached within a 75m hose run distance of the attendance point and therefore an internal hydrant system is not required.
- As per Table 1 of PAS 4509:2008, a fire water classification of **FW2** is required for fire fighting water supplies if the buildings are sprinklered and **FW5**, **FW3** and **FW4** respectively if the buildings are not sprinklered.

5. Hotel & Conference Buildings

The **Hotel & Conference** building is proposed to comprise up to 3 floors, 5,00m² per floor, and contain a combination of cafés, restaurants, bars, conference facilities and temporarily sleeping accommodation. The building will contain a number of different firecells.

The building is not required under the Fire Code to be sprinkler protected. However, the building will require the following fire safety features:

Means of Escape from Fire

- Type 4 smoke detection and manual alarm system throughout all non-sleeping spaces and a Type 5 smoke/heat detection and manual alarm system throughout all sleeping spaces.
- Emergency lighting where egress lengths exceed 20m, all exit ways (stairs/corridors in the sleeping spaces), all areas where the occupant load exceeds 250 people and on changes in level.
- Illuminated exit signage above egress door and along egress routes.
- Fire extinguishers
- Sufficient number of egress routes and door widths for the required design occupancy. Any space containing more than 50 people must include at least two means of escape.

- Fire separations around each bedroom suite, separating the suites from adjacent suites and from the corridor.
- Fire protected accommodation corridors and separately fire protected stairs.
- Fire separations between sleeping and non-sleeping firecells.
- Fire rated doors to all fire separations.
- Stairs shall egress direct to outside without combining with the ground floor space.
- Internal surface finish requirements of walls, ceilings, flooring, suspended flexible fabrics needed to meet the requirements of the Acceptable Solution C/AS2 for a crowd use and accommodation building. Further details can be provided if required.
- Fire rated upper floors
- Fire protected liftshafts
- Fire stopping to all service penetrations through fire rated elements.

External Fire Spread:

The required distance to boundaries can be determined using one of several design methodologies. The Acceptable Solutions require at least 16m from any non-sleeping firecell to any property boundary, and 6m from any sleeping firecell to any property boundary.

Vertical fire spread via external windows needs to be prevented by including fire rated aprons/decks and/or fire rated vertical spandrels. Alternatively sprinklers could be included.

Given the building height will exceed 10m, restrictions on external cladding will apply.

Fire & Emergency New Zealand

- A Fire & Emergency NZ (FENZ) attendance point for their vehicles is required as the building is located remote from the street boundary. This shall be within 20m of the main entrance of the building.
- Access to the attendance point shall meet the following requirements:
 - be able to withstand a laden weight of up to 25 tonnes with an axle load of 8.2 tonnes or, have a load bearing capacity of no less than the public roadway serving the property, whichever is the lower,
 - be trafficable in all weathers,
 - have a minimum width of 4.0 m,
 - provide a clear passageway of no less than 3.5 m in width and 4.0 m in height at site entrances, internal entrances and between buildings.
- It is expected that all areas of the building can be reached within a 75m hose run distance of the attendance point and therefore an internal hydrant system is not required.
- As per Table 1 of PAS 4509:2008, a fire water classification of **FW2** is required for fire fighting water supplies if the building is sprinklered and **FW7** if the building is not sprinklered.

6. Spa Village Tourist Accommodation Buildings

The Spa Village Tourist Accommodation buildings are proposed to be:

- a) 3 level mixed use units, and
- b) 1 or 2 level accommodation suites.

The buildings are not required under the Fire Code to be sprinkler protected. However, the buildings will require the following Fire Safety features:

Means of Escape from Fire

- Type 5 smoke/heat detection and manual alarm system in the mixed use buildings. The accommodation suites will require only domestic smoke alarms.
- Emergency lighting where egress lengths exceed 20m, all exit ways (stairs/corridors)
- Illuminated exit signage above egress door and along egress routes.
- Sufficient number of egress routes and door widths for the required design occupancy. Any space containing more than 50 people must include at least two means of escape.
- Fire separations around each bedroom suite, separating the suites from adjacent suites and from the corridor.
- Fire protected accommodation corridors and separately fire protected stairs.
- Fire separations between sleeping and non-sleeping firecells.
- Fire rated doors to all fire separations.
- Stairs shall egress direct to outside without combining with the ground floor space.
- Internal surface finish requirements of walls, ceilings, flooring, suspended flexible fabrics needed to meet the requirements of the Acceptable Solution C/AS2 for an accommodation use building. Further details can be provided if required.
- Fire rated upper floors
- Fire stopping to all service penetrations through fire rated elements.

External Fire Spread:

The required distance to boundaries can be determined using one of several design methodologies. The Acceptable Solutions require at least 6m to any property boundary and 7m between buildings.

Cladding to external walls which are higher than 10m must comply with the Fire Code's Peak Heat Release rates etc.

Vertical fire spread via external windows needs to be prevented by including fire rated aprons/decks and/or fire rated vertical spandrels. Alternatively sprinklers could be included.

Fire & Emergency New Zealand

- A Fire & Emergency NZ (FENZ) attendance point for their vehicles is required as the building is located remote from the street boundary. This shall be within 20m of the main entrance of the building.
- Access to the attendance point shall meet the following requirements:
 - be able to withstand a laden weight of up to 25 tonnes with an axle load of 8.2 tonnes or, have a load bearing capacity of no less than the public roadway serving the property, whichever is the lower,

- be trafficable in all weathers,
 - have a minimum width of 4.0 m,
 - provide a clear passageway of no less than 3.5 m in width and 4.0 m in height at site entrances, internal entrances and between buildings.
- It is expected that all areas of the building can be reached within a 75m hose run distance of the attendance point and therefore an internal hydrant system is not required.
 - As per Table 1 of PAS 4509:2008, a fire water classification of **FW2** is required for fire fighting water supplies if the building is sprinklered and **FW3** if the building is not sprinklered.

7. Sprinkler Protection

Some of the new proposed buildings must be sprinkler protected. While not mandatory, the owner may choose of course to sprinkler protect any number of the other buildings.

A sprinkler system will require a:

- water supply,
- booster pump (depends on the water supply)
- control valves, and
- fire service inlet.

The water supply may be from the townsmain (with or without a booster pump) or a water storage with pump.

A townsmain water supply presently exists in Pegasus Boulevard. A booster pump may be needed if this townsmain does not provide sufficient water pressure.

8. Fire Fighting Access

FENZ must be able to drive their vehicles to within 20m of the main entrance to each of the buildings.

9. Fire Fighting Water Supply

On site hydrants may be needed to ensure FENZ has sufficient fire fighting water. PAS 4509:2008 gives guidance as to the volume and rate of the fire fighting water supply for various types and uses of buildings.

Table 1 gives the Hazard Classification for various types and uses of buildings and their firecell floor area. This also depends on whether or not the building is sprinkler protected.

Table 2 gives the volumetric flow rate of a townsmain supply and the equivalent water storage volume for the various Hazard Classifications. FENZ may however allow a smaller volume. Any proposed deviation must be discussed with FENZ.

A summary of Table 1 & 2 for water storage volumes for each of the proposed new buildings is as follows:

Building	Assumed Largest Firecell floor area (m2)	Fire Hazard Category	Sprinklers	Hazard Classification	Water Storage (m3)
Pegasus Country Club	400	2	Yes	FW2	45
			No	FW4	540
Spa & Hot Pools - main building	1800	2	Yes	FW2	45
			No	FW6	2160
Spa & Hot Pools - domes	1257 (largest)	2	Yes	FW2	45
			No	FW6	2160
Spa & Hot Pools - honeymoon cottages	50 per cottage	1	Yes	FW2	45
			No	FW3	180
Golf Village - hotel	1000	2	Yes	FW2	45
			No	FW5	1080
Golf Village - secondary building	400	2	Yes	FW2	45
			No	FW3	180
Gold Village - golf academy	550	2	Yes	FW2	45
			No	FW4	540
Hotel & Conference building	5000	2	Yes	FW2	45
			No	FW7	To be calculated
Spa Village Tourist Accommodation buildings	50 (assumed)	1	Yes	FW2	45
			No	FW3	180

As can be seen from the table above, the required water storage volume for the most demanding building, the Hotel & Conference building, is enormous, unless the building is sprinklered.

A summary of Table 1 & 2 for townsmain hydrant demand for each of the proposed new buildings is as follows:

Building	Sprinklers	Hazard Classification	Required water flow within 135m (l/min)	Additional water flow within 270m (l/min)	Maximum number of hydrants supply flow to the
Pegasus Country Club	Yes	FW2	750	750	2
	No	FW4	3000	3000	4
Spa & Hot Pools - main building	Yes	FW2	750	750	2
	No	FW6	6000	6000	8
Spa & Hot Pools - domes	Yes	FW2	750	750	2
	No	FW6	6000	6000	8
Spa & Hot Pools - honeymoon cottages	Yes	FW2	750	750	2
	No	FW3	1500	1500	3
Golf Village - hotel	Yes	FW2	750	750	2
	No	FW5	4500	4500	6
Golf Village - secondary building	Yes	FW2	750	750	2
	No	FW3	1500	1500	3
Gold Village - golf academy	Yes	FW2	750	750	2
	No	FW4	3000	3000	4
Hotel & Conference building	Yes	FW2	750	750	2
	No	FW7	To be calculated		
Spa Village Tourist Accommodation buildings	Yes	FW2	750	750	2
	No	FW3	1500	1500	3

As can be seen from the table above, the required water flow rates for the most demanding building, the Hotel & Conference building, is significant, unless the building is sprinklered.

The 3-waters consultant can advise on the capacity of the existing townsmain to supply Fire Fighting water to the site.

To enable the required water flows within the distances given above, additional on-site hydrants may be needed.

10. Appendix A - PAS 4509:2008

Table 1:

Table 1 – Method for determining required water supply classification

Sprinklered structures															
Category	Water supply classification (see table 2)														
Single family homes with a sprinkler system installed to an approved Standard	FW1														
All other structures (apart from single family homes) with a sprinkler system installed to an approved Standard	FW2														
Non-sprinklered structures															
Category	Water supply classification (see table 2)														
Housing; includes single family dwellings, multi-unit dwellings, but excludes multi-storey apartment blocks	FW2														
All other structures (characterised by fire hazard category ⁽¹⁾), examples of which are given below	Water supply classification (see table 2)														
	Floor area of largest firecell of the building (m ²)														
	0-199 ⁽¹⁰⁾	200-399	400-599	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599	2600-2799	> 2800
FHC 1 ⁽²⁾	FW3	FW3	FW3	FW4	FW4	FW4	FW5	FW5	FW5	FW5	FW5	FW5	FW5	FW5	FW6
FHC 2 ⁽³⁾	FW3	FW3	FW4	FW5	FW5	FW5	FW6	FW6	FW6	FW7	FW7	FW7	FW7	FW7	FW7
FHC 3 ⁽⁴⁾	FW3	FW4	FW5	FW5	FW6	FW6	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7
FHC 4 ⁽⁵⁾	FW4	FW6	FW6	FW6	FW6	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7
For special or isolated hazards not covered in above categories ⁽⁹⁾	FW7														
NOTE –															
(1) Fire hazard category as defined in the compliance documents for the New Zealand Building Code, Acceptable Solution C/AS1.															
(2) FHC 1 is sleeping activities including care facilities, motels, hotels, hostels; crowd activities of <100 people including cinemas, art galleries, community halls, lecture halls, churches; working/business/storage activities processing non-combustible materials such as wineries, cattle yards, horticultural products; multistorey apartment blocks.															
(3) FHC 2 is crowd activities of >100 people, libraries, book storage, night clubs, restaurants; working/business/storage activities with low fire load such as hairdressers, banks, medical consulting rooms, offices.															
(4) FHC 3 is working/business/storage activities with medium fire load such as manufacturing, processing, bulk storage up to 3 metres.															
(5) FHC 4 is working/business/storage activities with high fire load such as chemical manufacturing, feed mills, plastics manufacturing, supermarkets or other stores with bulk display over 3 metres.															
(6) For special or isolated fire hazards in an area with a lower water supply classification, an assessment should be carried out to determine measures to mitigate the hazard or increase the water supply (see 4.4).															
(7) The values in the table were determined by heat release rate modelling for fully developed fires.															
(8) All non-sprinkler protected structures, except houses, have an entry level of FW3.															
(9) Examples of special or isolated hazards may include bulk fuel installations, timber yards, tyre dumps, wood chip stock piles, recycle depots, and marinas.															
(10) For non-sprinkler protected fire hazard category 1 structures less than 50 m ² in floor area, the FW3 requirement may be reduced by up to 50% with the agreement of the Fire Region Manager. Examples of the sorts of structures intended to be covered by this comment are predominantly garages, sheds, and outbuildings.															

SNZ PAS 4509:2008

Table 2:

Table 2 – Method for determining firefighting water supply

Reticulated water supply				Non-reticulated water supply	
Fire water classification	Required water flow within a distance of 135 m	Additional water flow within a distance of 270 m	Maximum number of fire hydrants to provide flow	Minimum water storage within a distance of 90 m (see Note 8)	
				Time (firefighting) (min)	Volume (m ³)
FW1	450 L/min (7.5 L/s) (See Note 3)	–	1	15	7
FW2	750 L/min (12.5 L/s)	750 L/min (12.5 L/s)	2	30	45
FW3	1500 L/min (25 L/s)	1500 L/min (25 L/s)	3	60	180
FW4	3000 L/min (50 L/s)	3000 L/min (50 L/s)	4	90	540
FW5	4500 L/min (75 L/s)	4500 L/min (75 L/s)	6	120	1080
FW6	6000 L/min (100 L/s)	6000 L/min (100 L/s)	8	180	2160
FW7	As calculated (see Note 7)				

NOTE –

(1) Table 1 lists the minimum requirements for firefighting water supplies. In developing towns' main reticulation systems, a water supply authority needs to cater for domestic/industrial water usage in addition to the above. This procedure is outlined in Appendix K.

(2) Special or isolated fire hazards which have higher requirements in an area of lower water supply classification must determine measures to mitigate the hazard or increase the water supply (see 4.4).

(3) Where houses have a sprinkler system installed to an approved Standard, the distance to a fire hydrant or alternative water supply may be negotiated by agreement with the Fire Region Manager.

(4) The water requirements for fire protection systems must be considered in addition to the firefighting water supplies, as detailed in table 1 (FW2), the fire protection system demand plus 1500 L/min (25 L/s) at 1 bar residual pressure.

(5) The minimum flow from a single hydrant must exceed 750 L/min (12.5 L/s), except for those cases where a home sprinkler is installed, in which case the minimum is 450 L/min (7.5 L/s) while the maximum design flow, for safety reasons, is limited to 2100 L/min (35 L/s).

(6) If the minimum water storage requirement as listed in the above table is not available from the reticulated system (reservoir), water can be sourced from an 'alternative supply' as approved by the Fire Region Manager. This water supply must always be within 90 m of the fire risk.

(7) FW7 is for either special or isolated hazards or where the fire hazard due to the size of the largest firecell and its fire hazard category make specific fire engineering assessment necessary. Appendix H and J must be used as the basis for calculating this required firefighting water supply.

(8) See Appendix B.



383 Colombo St, Sydenham,
Christchurch
PO Box 7110, Sydenham 8240
Christchurch

P (03) 366 1777
E engineering@pfc.co.nz
W www.pfc.co.nz

 **Success engineered**

Powell Fenwick Consultants trading as Powell Fenwick

Appendix G. Correspondence

Network Reference: Mack00021051

4 August 2020

Eliot Sinclair and Partners
Attn; Stephany Pandrea

Dear Stephany Pandrea,

Re. Power Connection for Proposed Pegasus Hot Spring Resort Development.

MainPower confirms that the MainPower Network has the capacity to supply the proposed Pegasus Hot Spring Resort Development.

Please Note that this letter is to advise you that the MainPower NZ Ltd.'s Network has the Capacity for the Proposed subdivision.

This may not mean that there is an electrical supply to the boundary of the proposed lots.

Please do not hesitate to contact the MainPower NZ Ltd NSR Team on 03 311 8311 or NSR@mainPower.co.nz if you have any questions.

Yours faithfully

Network Services Representative

Stephany Pandrea

From: Darin Bedggood <Darin.Bedggood@ongas.co.nz>
Sent: Wednesday, 5 August 2020 9:36 a.m.
To: Stephany Pandrea
Subject: FW: [#500718] Gas for Pegasus Hot Spring Resort Development
Attachments: Pegasus Golf Club - Urban Concept 20 July 2020.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Stephany,

We have a 110mm gas pipeline running alongside the proposed development. This is supplied by a 100 tonne storage facility with the capacity to provide 3 tonne/hour of LPG. This should happily accommodate the needs of the site.

Would you be able to provide a breakdown of what facility's will be using LPG, pools etc and any specs you have, also the actual number of bars, cafes.

We need to get an idea of how many mj's are required so we can work out how to best meet your requirements.

Also do you have a start date in mind?

We would like to work in with the other services as they are laid where possible.

Any further questions please do get in touch with me.

Looking forward to hearing back soon,

Darin Bedggood | Business Development Manager - South Island
Vector OnGas | 15 Print Place | Middleton | Christchurch 8024
DDI: 03 335 5442 | Mob: 027 201 9659
Darin.Bedggood@ongas.co.nz | www.ongas.co.nz



connect with us



From: Enquiries OnGas <Enquiries@ongas.co.nz>
Sent: Tuesday, 4 August 2020 3:34 PM
To: Martyn West <Martyn.West@vector.co.nz>
Cc: Darin Bedggood <Darin.Bedggood@ongas.co.nz>
Subject: FW: [#500718] Gas for Pegasus Hot Spring Resort Development

Hi Martyn

Would this query be for you?

Thanks
Denice

From: Stephany Pandrea <sp@eliotsinclair.co.nz>
Sent: Tuesday, 4 August 2020 2:27 PM
To: Enquiries OnGas <Enquiries@ongas.co.nz>
Subject: [#500718] Gas for Pegasus Hot Spring Resort Development

Good afternoon,

We are carrying out due diligence for a Waimakariri District Plan Change Application for a proposed development at the Pegasus Golf and Sports Club located on Mapleham Drive, shown in the snip below.
The development is a Hot Spring Resort Village, as shown in the attached the layout plan and it consists of the following facilities:

- A 4 to 4.5 Star Hotel with facilities including cafes, bars, restaurants, entertainment and retail
- Spa/Hot Pool Complex with indoor and outdoor pools, spa treatment facilities
- Tourist Accommodation apartments
- A secondary hotel building
- A new golf academy building
- An additional new Pegasus Country Club building

Could you please provide us with your advice of existing capacity of the gas network in the area in order for us to determine if the development could be serviced?



Regards

Stephany Pandrea
3 WATERS ENGINEER
BE(Hons) Civil MEngNZ



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+64 27 591 2571 Queenstown | Hokitika | Nelson

eliotsinclair.co.nz



Caution: This email (including any attachments) may contain confidential and privileged information. If you have received it in error, please 1) notify the sender by return email (or telephone) and then delete this email, together with all attachments and your reply and 2) do not act on this email in any other way. Please visit eliotsinclair.co.nz/ email disclaimer for other important information concerning this message. Thank you.

Chorus Property Development Team

PO Box 9405
Waikato Mail Centre
Hamilton 3200
Telephone: 0800 782 386
Email: develop@chorus.co.nz

C H O R U S

12 August 2020

Chorus Ref #: WND59181

Your Ref #:

Sports & Education Corporation

Attention: **Stephany Pandrea**

Dear Sir / Madam

Property Development – WND: 8 Mapleham Drive, Pegasus. 5 Stages Hot Spring Resort Village

Thank you for your enquiry regarding the above subdivision.

Chorus is pleased to advise that, as at the date of this letter, we would be able to provide ABF telephone reticulation for this property development. In order to complete this reticulation, we require a contribution from you to Chorus' total costs of reticulating the development. Chorus' costs include the cost of network design, supply of telecommunications specific materials and supervising installation. At the date of this letter, our estimate of the contribution we would require from you is \$253,000.00 (including GST).

We note that (i) the contribution required from you towards reticulation of the development, and (ii) our ability to connect the subdivision to the Chorus network, may (in each case) change over time depending on the availability of Chorus network in the relevant area and other matters.

If you decide that you wish to undertake reticulation of this property development, you will need to contact Chorus (see the contact details for Chorus Property Development Team above). We would recommend that you contact us at least 3 months prior to the commencement of construction at the subdivision. At that stage, we will provide you with the following:

- confirmation of the amount of the contribution required from you, which may change from the estimate as set out above;
- a copy of the Contract for the Supply and Installation of Telecommunications Infrastructure, which will govern our relationship with you in relation to reticulation of this property development; and
- a number of other documents which have important information regarding reticulation of the property development, including - for example - Chorus' standard subdivision lay specification.

Yours faithfully



Geordie Rumbles
Property Development Coordinator

Appendix H. Existing Stormwater Consents

Environmental Consultants

PO Box 489, Dunedin 9054
New Zealand
Tel: +64 3 477 7884
Fax: +64 3 477 7691

07 September 2011

Our Ref: 6504-4
Your Ref: CRC061217 & CRC061218

Environment Canterbury
PO Box 345
CHRISTCHURCH 8140

Attention: Planning Department

Dear Sir/Madam

EC - DUNEDIN	
FILE REF: C060/25000	
DOCUMENT NO: 67551	
EC104725	-9 SEP 2011
	ACTION
	INFO

RE: CHANGES TO CONDITIONS OF CRC061217 AND CRC061218

Please find enclosed an application to vary conditions of resource consents CRC061217 and CRC061218, which authorise the discharge of water and contaminants and stormwater respectively at Mapleham, part of Pegasus. Please also find enclosed a deposit cheque in the amount of \$598 for processing this application.

The variations sought are due to the constructed and operational discharges from Taerutu Gully to a former channel of Taranaki Stream ("Old Taranaki Stream") differing from the design proposed in the original resource consent application for Mapleham lodged in 2005 (albeit in a minor way). In particular, a continuous discharge has been observed from Taerutu Gully to Old Taranaki Stream, which has been identified by Environment Canterbury's monitoring and enforcement team to breach conditions of resource consent which require the discharge to be consistent with that described in the resource consent application. The changes to conditions proposed seek to address this non-compliance.

Yours sincerely,

MITCHELL PARTNERSHIPS LIMITED

L Thurston

L THURSTON

Email: lorna.thurston@mitchellpartnerships.co.nz

Enc

cc: Stephen Douglass
Paul Armstrong

URS New Zealand Limited
Pegasus Town Limited

Also in Auckland
Level 1, 25 Anzac Street, PO Box 33 1642
Takapuna, Auckland, New Zealand
Tel: +64 9 486 5773
Fax: +64 9 486 6711

Pegasus Town Limited

Section 127 Application:
Variations to Mapleham Discharge Consents

Assessment of Environmental Effects

September 2011

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LIST OF APPENDICES

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APPENDIX B	Conditions of Resource Consents CRC061217 and CRC061218
APPENDIX C	Site Location Plan
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APPENDIX F	URS Report: Taerutu Gully – Discharge of Water, Contaminants, and Stormwater

EXECUTIVE SUMMARY

This application seeks variations to resource consents CRC061217 and CRC061218 due to the constructed and operational stormwater system at Mapleham differing (albeit in a minor way) from the design proposed in the original resource consent application and hence the consented design. This difference has been identified during Environment Canterbury's monitoring and enforcement process.

During construction at Mapleham the invert level of the orifice weir that discharges from the modified part of Taerutu Gully to Taranaki Stream was marginally reduced from the design level, and three PVC pipes were established in response to the natural groundwater conditions at the site. These changes enable the continuous low flow drainage of Taerutu Gully, which promotes groundwater throughflow and water quality. The flood carrying capacity of Taranaki Stream is considered unlikely to be affected by the changes to the orifice weir design.

Other than the changes to the design of the orifice weir described above, the principal non-compliances with conditions of CRC061217 and CRC061218 are associated with the observed continuous low flow discharge from the same orifice weir that discharges from Taerutu Gully to Taranaki Stream. Importantly, this continuous discharge has been found to be the result of natural groundwater throughflow, not the result of discharges from the Mapleham Lakes associated with the Mapleham stormwater system. The discharge of stormwater is still considered to be occurring infrequently as intended. The effects of the continuous low flow groundwater discharge have been assessed as having a minor effect on the water levels in Taranaki Stream, a negligible effect on flood risk and a positive effect on the health of the wetland system.

The effect of the continuous discharge from Taerutu Gully to Taranaki Stream on flow volumes during high flows was found to be more difficult to assess. Therefore, a more intensive monitoring regime is proposed over three years for the discharges from the orifice weir. This will enable a comprehensive assessment of the effects of the discharge during high flows.

The effects of the discharge from Taerutu Gully to Taranaki Stream on water quality have also been assessed. The continuous low flow discharge observed is considered to have a negligible effect on water quality and sedimentation depth in the Old Taranaki Stream. However, it is expected that during periods when the discharge from the orifice weir increases in response to rainfall events there will be a corresponding increase in turbidity, suspended solids, and potentially also in nutrient concentrations in the Old Taranaki Stream where the discharge occurs. The design features PTL has established, including a stilling basin, rock filter and fabric filter, mitigate these effects to the extent that the effects of high flow discharges on water quality in Taranaki Stream are considered to be minor.

The current water quality sampling locations, parameters required to be measured, the application of trigger thresholds and the intensity of monitoring are considered to be inappropriate as they do not reflect the nature of the discharge. Alternative sampling locations and a more intensive sampling regime over a three year period are proposed to comprehensively assess the effects of the discharge from Taerutu Gully to Taranaki Stream. In addition, it is proposed that water quality parameters required to be sampled should not include sediment depth, but should include turbidity, dissolved metals and nutrients, and should not be assessed against preset thresholds.

1. INTRODUCTION

Pegasus Town Limited (PTL) hereby applies, in accordance with Section 127 of the Resource Management Act 1991 ('the Act'), to change conditions with respect to approved Resource Consents CRC061217 and CRC061218 which authorise discharges from Taerutu Gully to Taranaki Stream at Mapleham.

Resource Consent CRC061217 specifically provides for the discharge of water and contaminants from new lakes associated with the golf course to an ephemeral watercourse, being Taerutu Gully, to Taranaki Stream. Resource Consent CRC061218 specifically provides for the discharge of stormwater to land and water, and to land in circumstances where it may enter water. Both resource consents commenced on the 15th of February 2006 and expire on the 31st of January 2041. The associated Certificates of Title and Conditions of Consent are attached as **Appendices A and B** respectively.

The changes to conditions of CRC061217 and CRC061218 proposed seek to address the non-compliances with conditions of consent PTL has been notified of by Environment Canterbury¹.

2. SITE AND LOCALITY

Mapleham

Mapleham is a comprehensive development located approximately 25 kilometres from the centre of Christchurch City to the north of the Woodend Township. It is immediately east of the Pegasus Township development, which is provided for in the Waimakariri District Plan via specific Pegasus zones. Please refer to the site location plan attached as **Appendix C**.

The site comprises a large area of rural parkland which is managed as a public golf course, with residential clusters and a Village Green. Please refer to the Master Plan attached as **Appendix D**. The stormwater system at Mapleham discharges into the Mapleham Lakes (also known as the golf course ponds) before flowing into Taerutu Gully and subsequently into Old Taranaki Stream (**Figure 1**).

The legal descriptions of land that comprises Mapleham Golf Course are contained in **Table 1**. Excluding the Brockenhurst (Scott) subdivision and adjacent strip of Crown Land, the Mapleham site has a total area of approximately 116ha.

The subdivision and land development activities at Mapleham are complete, and houses are currently being constructed. The Mapleham Golf Course is operational, including club house, driving range and restaurant.

¹ Environment Canterbury notified PTL of its non-compliance with Condition 3 of CRC061218 on the 16th of April 2010. PTL was subsequently notified of additional non-compliances with Conditions 11-14 of CRC061218 on the 16th of December 2010.



Figure 1: Plan showing Maplesham Lakes, Taerutu Gully, Old Taranaki Stream and Taranaki Stream at Maplesham (source URS, 2011).

Table 1: Maplesham Legal Descriptions

Legal Description	CT	Area (ha)
Lot 2, 4 Deposited Plan 407339	425883	8.5014
Lot 11 Deposited Plan 400595	403111	4.3827
Lot 34-39, 41-49, 210-211, 701 Deposited Plan 437099	537609	31.8582

Fluvial Geomorphology

The site and surrounding area is located on part of the Ashley River floodplain. The topography of the area is undulating with evidence of levees, remnant backswamp areas, streams and flood channels of the Ashley River.

Two very short sections of the Taranaki Stream (a highly modified waterway) flow west to east through the northern portion of the Mapleham site. The upper section of Taranaki Stream originally flowed south-eastward into Kawari Stream, but it has been diverted across paddocks via a drainage channel partly within the Mapleham site. The result is that the upper section of Taranaki Stream has been completely realigned over the last 100 years.

The sinuous landforms of the lower part of the Taranaki Stream appear to be natural and would have once formed wetland areas. However, these areas have been drained by the diversion of water away from this part of Taranaki Stream within the site. This occurred via a drainage channel across paddocks to the north of the site, adjacent to the Kaiapoi Pa site.

The Taranaki Stream bank is lined with willows. Its banks are affected by stock trampling, and a number of areas upstream and downstream of its confluence with a former channel of Taranaki Stream (which discharges from Taerutu Gully to Taranaki Stream) show signs of stock induced bank erosion. The bed of Taranaki Stream is characterised by a layer of unconsolidated fine silt/clays both upstream and downstream of this confluence.

Taerutu Gully links the constructed Mapleham Lakes (i.e. the golf course ponds) with the former channel of Taranaki Stream ("Old Taranaki Stream") and subsequently with Taranaki Stream itself. Prior to the construction of Mapleham, Taerutu Gully was characterised as an ephemeral stream/wetland environment dominated by willow trees. Resource consent CRC061214 provided for the restoration of an existing wetland within Taerutu Gully at or about map reference NZMS 260: m35 665-843. This wetland within Taerutu Gully has been modified during the construction phase to form an established wetland environment from which flows are discharged to Old Taranaki Stream. However, part of the Taerutu Gully wetland system remains unmodified.

Discharges

Please refer to **Appendix E** for an overview of the stormwater system that was provided as part of the original resource consent application for Mapleham. The stormwater system was detailed in the original resource consent application, and is summarised in the URS Report attached to this application as **Appendix F**.

Mapleham Lakes are the initial receiving environment for stormwater discharges at Mapleham. Mapleham Lakes discharge into Taerutu Gully and Taerutu Gully discharges into a former channel of Taranaki Stream and then into Taranaki Stream itself at Mapleham. Taranaki Stream flows in a northerly direction into the Ashley River, which discharges into the Pacific Ocean north of Waikuku Beach.

Flows from Mapleham Lakes to Taerutu Gully are controlled via a broad-crested weir structure which utilises rock filters to reduce flow velocity. Flows from Taerutu Gully to Taranaki Stream are controlled via an orifice weir. The invert level of the orifice weir is 2.76m RL and the invert levels of its three smaller (75mm diameter) PVC pipes installed throughout the vertical culvert are approximately 2.55m RL. A rock filter surrounds the weir and reduces the potential for debris to block the discharge.

The discharge from the orifice weir (including the piped intakes) has been measured on a monthly basis by PTL. The measured discharge varies from 3-5L/s during baseflow conditions to something significantly greater during storm flows. The orifice weir becomes submerged during significant rainfall events.

The orifice weir is connected to a horizontal culvert approximately 300mm in length. The culvert runs under the constructed earth bund which has formed the Taerutu Gully wetland over the length of approximately 20m. The culvert conveys water from Taerutu Gully to a receiving basin which has been formed in a former channel of Taranaki Stream ("Old Taranaki Stream"). A rock filter is used to limit the movement of debris resulting from the discharge into the receiving environment, and a secondary filter screen is used to capture any debris contained in the discharge.

The discharge flows along Old Taranaki Stream for approximately 130m before it leaves PTL's property. Old Taranaki Stream then flows into a wetland system before discharging into Taranaki Stream approximately 550m downstream of the PTL's property boundary. Taranaki Stream flows in a northerly direction for approximately 4.2km before entering the Ashley River near Waikuku.

In addition to flows received via the orifice weir, Taerutu Gully receives groundwater inflow as it flows towards Taranaki Stream. Taerutu Gully has a continuous natural baseflow measured at 3-5L/s, which guarantees a baseflow discharge in Taranaki Stream throughout the year. When the capacity of Mapleham Lakes is exceeded, they discharge into Taerutu Gully and elevate the natural baseflow. Flow in Taranaki Stream, therefore, increases following periods of rainfall due to both the Mapleham stormwater discharge (Mapleham Lakes – Taerutu Gully – Old Taranaki Stream - Taranaki Stream) and natural groundwater drainage.

The project engineers have monitored water levels in the Waikuku Beach culvert of Taranaki Stream since September 2010. The purpose of this monitoring has been to deduce the potential effects of Pegasus's Eastern Conservation Management Area ("ECMA") discharge on water levels in Taranaki Creek near Waikuku Beach (i.e. the monitoring was not targeted at the Mapleham Lakes discharge). The monitoring has determined that the stage height of the Waikuku Beach culvert stays within the average range of 30-60cm and does not show a seasonal trend or a response to tidal variations or the Ashley Rivers flows. A subtle response to large rainfall events is reported by the project engineers; however, no apparent response to the discharge from the ECMA is apparent.

Water Quality

The project engineers have collected water quality samples from Taranaki Stream, Old Taranaki Stream and the discharge from the Eastern Conservation Management Area ("ECMA") associated with the Pegasus Town development. Details of the sampling undertaken and associated results are contained in the URS Report attached as **Appendix F**, and summarised below.

June 2010

In-situ sampling of water quality parameters in Taranaki Stream upstream and downstream of its confluence with Old Taranaki Stream was undertaken in June 2010. The difference in pH complied with Condition 14 of CRC061218 and there was no difference in water clarity observed between the upstream and downstream sampling locations.

Site inspections of Taranaki Stream and Old Taranaki Stream in June 2010 and May 2011 found that both waterways have high suspended sediment concentrations resulting from erosion of the unconsolidated bed of the stream. There was also visible pugging from stock around the banks of Old Taranaki Stream. Both of these factors reduce water quality within Taerutu Gully and Old Taranaki Stream.

May 2011

The surface water of Mapleham Lakes at the main bridge into Pegasus, Old Taranaki Stream (immediately upstream of its confluence with Taranaki Stream) and Taranaki Stream (upstream and downstream of its confluence with Old Taranaki Stream) was sampled in-situ on the 26th of May 2011. Samples from the Mapleham sampling site and the Taranaki Stream sampling site downstream of the confluence with Taerutu Gully were sent to Hill Laboratories for analysis.

In general, the water quality parameters measured were similar between the sites, with the exception of the samples from Old Taranaki Stream which were significantly different. The pH at the Old Taranaki Stream site was measured as slightly acidic at 5.95 and there was very low dissolved oxygen indicating anoxic conditions. The differentiated water quality is considered by the project engineers to be associated with the influence of a wetland located on the northern side of Preece Road. The shallow groundwater at this site has a naturally elevated iron concentration, which is consumed by microorganisms in the Preece Road wetland. The sheen on the water observed by the project engineers at the sampling location provides evidence of this process. The consumption of dissolved iron by the microorganisms is suspected to have reduced the dissolved oxygen concentration in the water as observed in the monitoring results.

June 2011

The project engineers visited the site of the discharge from Taerutu Gully to Old Taranaki Stream on the 1st of June and on the 29th of June 2011. Their visit on the 1st of June followed a moderate 24hour rainfall of 23mm on the 26th of May. At the time of this visit, the discharge from the orifice weir to Taerutu Gully was approximately 10L/s and the water level at the orifice weir was measured as

0.54m. A grab sample of sediment was taken from the area immediately downstream of the bubble-up sump and rock filter and sent to Hills Laboratories for analysis.

On the 29th of June 2011 the discharge from the orifice weir was measured at approximately 1.5L/s and the water level at the orifice weir was measured as 0.46m. In-situ water quality sampling was undertaken (refer to **Appendix F** for the results) and another grab sample was also taken from the same location as on the 1st of June and sent to Hills Laboratories for analysis.

The June samples sent to Hills Laboratories were analysed for standard water quality parameters and the results were compared against the ANZECC New Zealand trigger level guidelines for lowland rivers ("guidelines for lowland rivers") and the ANZECC recreational guidelines ("recreational guidelines"). For both the 1st of June and 29th of June samples, all of the parameters measured were below the guideline levels except for Total Nitrogen, Total Phosphorus and Total Kjeldahl Nitrogen which were above the guidelines for lowland rivers.

Two additional samples were taken from the Mapleham overbridge at the southern end of Mapleham Lakes and from Taranaki Stream downstream of its confluence with Old Taranaki Stream on the 23rd of June 2011 and compared against the same guidelines. The water quality parameters sampled from the Mapleham overbridge complied with all the guideline values. However, the Taranaki Stream sample exceeded guideline values for Total Nitrogen, Nitrite N + Nitrate N and Total Kjeldahl Nitrogen. The samples indicated Nitrite N + Nitrate N was the predominant form of nitrogen at the sampling site, which shows that ammonia had nitrified.

3. CHANGES TO CONDITIONS

3.1 REASONS FOR THE PROPOSED CHANGES TO CONDITIONS OF RESOURCE CONSENT

Non-compliances with resource consents CRC061217 and CRC061218 have resulted from the operational stormwater system at Mapleham differing from the design proposed in the original resource consent application and hence the consented design. The two differences between the operational and consented system include the design of the orifice weir which was altered during construction and a continuous flow from Taerutu Gully to Old Taranaki Stream that has been observed for the operational system.

As mentioned above, flows from Taerutu Gully to Old Taranaki Stream are controlled via an orifice weir. The intended design of this structure was for it to be positioned directly above the normal level of the wetland. This would allow for the wetland water levels to interact naturally with groundwater, and when the water levels in the Mapleham Lakes flow into Taerutu Gully it would initially retain some of this water volume up to the invert level. However, the invert level and design of the orifice weir was changed during the development. The invert level of the wetland was lowered, as was the invert level of the orifice weir structure, which is at 2.76m RL (below the design level of 3.0m RL). In addition,

three PVC intake pipes were installed. The changes are understood to be in response to the natural groundwater conditions encountered at the site during the development.

In terms of the continuous discharge, at the time of preparing the stormwater and earthworks resource consent application for Mapleham (dated October 2005), stormwater discharges from Taerutu Gully into Old Taranaki Stream were only envisaged to occur a few times per year. However, a continuous flow from Taerutu Gully to Old Taranaki Stream has been observed which is considered by Council to breach the conditions of consents which require the discharge to be consistent with that described in the resource consent application.

PTL has determined that the most appropriate way to overcome the non-compliances described above is to apply for the current change of conditions to Resource Consents CRC061217 and CRC061218. This is supported by URS New Zealand Limited, who consider that the existing consent conditions are inappropriate and do not capture the nature of the discharge (**Appendix F**). Environment Canterbury has been previously notified of PTL's intentions to submit this change of conditions application.

3.2 CHANGES TO CONDITIONS OF RESOURCE CONSENT

The following changes to conditions of consent CRC061217 are sought:

- 5 ~~The consent holder shall ensure that an on-going record is kept of the number of times per year that water from the lakes is discharged into Taerutu Gully, including a record of the level that the wetland in Taerutu Gully rises to in situations of discharge. The consent holder shall undertake hourly monitoring of water levels at the orifice weir which discharges from Taerutu Gully to Old Taranaki Stream using a pressure transducer over a period of 36 months.~~ Copies of these records shall be provided to Canterbury Regional Council on request.
- 6 a) The consent holder shall ensure that the receiving environment immediately downstream of the wetland rock filters at Taerutu Gully is inspected ~~monthly~~ on an ongoing basis to identify if there is evidence of settled material or scour. Copies of these records shall be provided to Canterbury Regional Council on request.

b) In the 12 months following the approval of XXX, the consent holder shall undertake the inspections described in a) monthly. In the second 12 months sampling shall be undertaken quarterly and in the third 12 months sampling shall be undertaken biannually.
- 7 a) The consent holder shall undertake ~~sampling~~ in accordance with ~~b) annually during a discharge from the wetland to the Taranaki Stream, of the sediment depth, water clarity, dissolved oxygen, pH, and temperature, turbidity, dissolved metals and nutrients~~ in the Taranaki Stream. Sampling shall ~~include~~ occur at the sampling points

~~identified in Appendix E of XXX both up and downstream of Mapleham. These sampling points shall be easily identified and accessible, and the upstream sampling point shall be located no more than 200 metres upstream of Mapleham. A map showing the location of these sampling points shall be submitted to Canterbury Regional Council at least 10 working days prior to the first sampling period.~~

~~b) In the 12 months following the approval of XXX, the consent holder shall undertake the water quality sampling described in a) during a discharge from Taerutu Gully to Taranaki Stream monthly. In the second 12 months sampling shall be undertaken quarterly and in the third 12 months sampling shall be undertaken biannually.~~

~~8 The results of the sampling in condition 7 shall meet the following criteria:~~

~~a) The increase in the depth of sediment at the downstream site shall not be more than 10 percent higher than that which has occurred in the upstream site.~~

~~b) Water clarity shall not be reduced by more than 20 percent in the downstream sample from the upstream sample.~~

~~c) The dissolved oxygen concentration in the downstream sample shall not be lower than that in the upstream sample.~~

~~d) There shall not be more than a 0.5 unit difference in the pH in the downstream sample compared with the upstream sample.~~

~~e) The water temperature in the downstream sample shall not be more than three degrees Celsius higher than that in the upstream sample.~~

13 Discharge of treated stormwater from Taerutu Gully to Taranaki Stream shall only be as described in the application with the exception of the changes approved in XXX, and shall be located at or about NZMS 260 M35: 5766620 North-2484740 East.

The following changes to conditions of consent CRC061218 are sought:

3 Design, construction and management of the stormwater system including grassed swales and artificial waterbodies, shall be carried out in accordance with the design details and procedures provided in the Stormwater Management Report in the application with the exception of the changes approved in XXX.

11 ~~The consent holder shall ensure that an on-going record is kept of the number of times per year that water from the artificial waterbodies is discharged into Taerutu Gully, including a record of the level that the wetland in Taerutu Gully rises to in situations of discharge. The consent holder shall undertake hourly monitoring of water levels at the orifice weir which discharges from Taerutu Gully to Old Taranaki Stream using a pressure transducer over a period of 36 months.~~ Copies of these records shall be provided to Canterbury Regional Council on request.

- 12 a) The consent holder shall ensure that the receiving environment immediately downstream of the wetland rock filters at Taerutu Gully is inspected ~~monthly~~ on an ongoing basis to identify if there is evidence of settled material or scour. Copies of these records shall be provided to the Canterbury Regional Council on request.
- b) In the 12 months following the approval of XXX, the consent holder shall undertake the inspections described in a) monthly. In the second 12 months sampling shall be undertaken quarterly and in the third 12 months sampling shall be undertaken biannually.
- 13 a) The consent holder shall undertake ~~samplinge ofannually during a discharge from the wetland to the Taranaki Stream,~~ the ~~sediment depth,~~ water clarity, dissolved oxygen, pH, ~~and temperature,~~ turbidity, dissolved metals and nutrients in the Taranaki Stream in accordance with b). Sampling shall ~~include~~occur at the sampling points identified in Appendix E of XXX~~both up and downstream of Mapleham. These sampling points shall be easily identified and accessible. A map showing the location of these sampling points shall be submitted to Canterbury Regional Council at least 10 working days prior to the first sampling period.~~
- b) In the 12 months following the approval of XXX, the consent holder shall undertake the water quality sampling described in a) during a discharge from Taerutu Gully to Taranaki Stream monthly. In the second 12 months sampling shall be undertaken quarterly and in the third 12 months sampling shall be undertaken biannually.
- ~~14 The results of the sampling in condition 13 shall meet the following criteria:~~
- ~~a) The increase in the depth of sediment at the downstream site shall not be more than 10 percent higher than that which has occurred in the upstream site.~~
- ~~b) Water clarity shall not be reduced by more than 20 percent in the downstream sample from the upstream sample.~~
- ~~c) The dissolved oxygen concentration in the downstream sample shall not be lower than that in the upstream sample.~~
- ~~d) There shall not be more than a 0.5 unit difference in the pH in the downstream sample compared with the upstream sample.~~
- ~~e) The water temperature in the downstream sample shall not be more than three degrees Celsius higher than that in the upstream sample.~~
- 19 Discharge of treated stormwater from Taerutu Gully to Taranaki Stream shall only be as described in the application with the exception of the changes approved in XXX, and shall be located at or about NZMS 260 M35: 5766620 North -2484740 East.

4. ASSESSMENT OF RELEVANT SECTION 127 PROVISIONS

127 Change or cancellation of consent condition on application by consent holder

- (1) *The holder of a resource consent may apply to a consent authority for a change or cancellation of a condition of the consent, subject to the following:*
 - (a) *the holder of a subdivision consent must apply under this section for a change or cancellation of the consent before the deposit of the survey plan (and must apply under section 221 for a variation or cancellation of a consent notice after the deposit of the survey plan); and*
 - (b) *no holder of any consent may apply for a change or cancellation of a condition on the duration of the consent.*
- (2) *Repealed.*
- (3) *Sections 88 to 121 apply, with all necessary modifications, as if—*
 - (a) *the application were an application for a resource consent for a discretionary activity; and*
 - (b) *the references to a resource consent and to the activity were references only to the change or cancellation of a condition and the effects of the change or cancellation respectively.*
- (4) *For the purposes of determining who is adversely affected by the change or cancellation, the consent authority must consider, in particular, every person who—*
 - (a) *made a submission on the original application; and*
 - (b) *may be affected by the change or cancellation.*

Accordingly, an assessment of the actual and potential effects of the proposed changes is considered in the following section.

5. ACTUAL AND POTENTIAL EFFECTS FROM THE PROPOSED CHANGES

5.1 WATER QUANTITY EFFECTS

Low Flow Discharge

The consented stormwater system was designed so that the discharges from the orifice weir / rock filter (hereon referred to as the orifice weir) that discharges from Taerutu Gully to Old Taranaki Stream would occur infrequently and specifically "no stormwater flows would be passing through the rock filter for most of the year"². Despite the continuous discharge observed from the orifice weir, the project engineers have determined that stormwater flows do not pass through the orifice weir for most of the year. The continuous low flow discharges from the orifice weir are associated with groundwater baseflow discharge. The measured flows at the orifice weir in the range of 3-5L/s correspond with no or minimal discharge occurring from the Maplesham Lakes to

² Beca Infrastructure Limited (2005) Maplesham Block - Stormwater Management, pp. 28.

Taerutu Gully, and no significant rainfall occurring in the 72 hours prior to the measurement being taken.

The potential adverse effects associated with the continuous discharge of groundwater from Taerutu Gully to Old Taranaki Stream include a reduction in the flood carrying capacity of Taranaki Stream and the potential for flooding of properties. However, the continuous discharge is assessed by the project engineers as relatively minor in terms of flow volume, and the discharge has been assessed as having a very minimal impact on the receiving environment. In terms of flow volume, the continuous discharge in the order of 3-5L/s equates to approximately 1% of the flow in Taranaki Stream at the Waikuku Beach culvert.

The flows measured in December 2010 at the orifice weir and at the Waikuku Beach culvert in Taranaki Stream provide evidence of the minimal impact the continuous discharge has on the receiving environment. The flows from the orifice weir were measured in the range of 3-5L/s and throughout the same measurement period the water levels in Taranaki Stream measured at the Waikuku Beach culvert were very stable. At other times when the discharge has been measured in the range of 3-5L/s from Taerutu Gully, there has been minimal corresponding change in the water levels recorded in Taranaki Stream at the Waikuku Beach culvert that could be interpreted by the project engineers as a direct result of the low flow discharge.

Overall, the continuous low flow discharge from Taerutu Gully to Old Taranaki Stream is interpreted as the result of groundwater baseflow discharge, and is assessed as having a minor effect on the water levels in Taranaki Stream and a negligible effect on flood risk. Retaining groundwater baseflow discharge through Taerutu Gully ensures that resource consent CRC061214 is given effect to, which is a resource consent to restore an existing wetland within Taerutu Gully. The project engineers further consider that retaining a base surface water flow in Old Taranaki Stream by enabling the continuous groundwater discharge is beneficial to the health of the wetland system as it reduces the potential for stagnation. Therefore, it is proposed that the conditions of resource consents CRC061217 and CRC061218 be altered to provide for the continuous low flow discharge.

High Flow Discharge

During periods when rainfall preceded flow measurements at the orifice weir, the rainfall is observed to have increased the natural discharge as well as the stormwater discharge from the Mapleham Lakes.

The September 2010 rainfall event resulted in water levels in Taranaki Stream increasing to above the invert level of the orifice weir plate. Over the same period, water levels in Taranaki Stream at the Waikuku Beach culvert increased by approximately 0.2m. The project engineers state that it is difficult to determine the relative contribution from Taerutu Gully to the increase in water levels at Waikuku Beach without an accurate measurement of flow from Taerutu Gully or an accurate measurement of water level at the orifice weir.

This lack of information means that the changes to the design of the orifice weir are difficult for the project engineers to quantify.

The peak rainfall of the July 2010 event was 35mm of rain over a 24 hour period. A total rainfall of 60mm over three days was recorded. When measured approximately 48 hours after the peak rainfall this event showed an increase of more than 0.5m at the Waikuku Beach culvert over a period of three days. The measured discharge from the orifice weir in Old Taranaki Stream was approximately 10L/s on the day of the peak rainfall, and is likely to represent only a small proportion of the overall flow at the Waikuku Beach culvert. There is no information available on peak discharges for this event.

The project engineers record that at the time of inspection of Taerutu Gully there was no significant discharge from the Mapleham Lakes, which indicates that the stormwater system was operating as designed. However, as the inspection did not occur during peak rainfall it cannot be confirmed if there was an associated discharge from the Mapleham Lakes.

Changes to the regime for measuring discharges are proposed in Section 5.2 below to address issues with inadequate data for high flow discharges.

5.2 ORIFICE WEIR DESIGN AND MONITORING

Orifice Weir Design

As described above, the design of the orifice weir was altered during construction. The invert level of the wetland was lowered, as was the invert level of the orifice weir structure, which is at 2.76m RL (below the design level of 3.0m RL). In addition, three PVC intake pipes were installed. These changes have enabled the continuous low flow drainage of Taerutu Gully, which promotes groundwater throughflow and water quality. It is considered that the design scenario would not enable this outcome to be achieved. Ultimately the changes enabled a sustainable open wetland environment to be developed which was the intention of the development when it was presented to Environment Canterbury (and reflected in consent CRC061214 which provides for the restoration of the wetland in Taerutu Gully).

This lower operational invert level has the potential to reduce the storage capacity of Taerutu Gully and hence the residence time that was initially proposed for the wetland system. This would result in an increase in the frequency of discharges to Taranaki Stream that would have otherwise been retained in the Taerutu Gully wetland system. However, the project engineers do not consider that this potential adverse effect has resulted from the changed system. As explained in detail in **Appendix F**, the discharge that can occur via the pipes that would otherwise be stored is considered to be small and unlikely to result in adverse effects on the flood carrying capacity of Taranaki Stream.

Flow Monitoring

The resource consent conditions of CRC061217 and CRC061218 require that an on-going record is kept of the number of times per year that water is

discharged from Mapleham Lakes ("the artificial water bodies") into Taerutu Gully. These flows have been monitored on an ongoing basis and only occur infrequently. It is the flows from Taerutu Gully to Old Taranaki Stream via the orifice weir that have been observed to occur on a continuous basis and, therefore, it is considered that these flows also need to be monitored on an ongoing basis.

The current regime of keeping a record of the number of times per year that water from the Mapleham Lakes discharges into Taerutu Gully, required by Condition 5 of CRC061217 and Condition 11 of CRC061218, is considered to be too coarse. The project engineers propose that a water level transducer is installed in the wetland at the orifice weir, and the water levels are recorded on an hourly basis over a period of 36 months. The data from the transducer will show when discharges occur from the orifice weir and allow the discharge rate to be calculated. The results will be presented to Environment Canterbury in an annual monitoring report or on request. We consider that this will enable the stormwater discharges from Mapleham to be better monitored.

5.3 WATER QUALITY

Low Flow Discharges

Monitoring that has been undertaken demonstrates that the water quality in the Old Taranaki Stream is significantly altered between the PTL property boundary and its confluence with Taranaki Stream. However, this is interpreted to be the result of biological processes in a wetland located on the northern side of Preece Road. Therefore, the continuous low flow discharge observed is considered to have a negligible effect on water quality and sedimentation depth in Taranaki Stream.

High Flow Discharges

It is expected that during periods when the discharge from the orifice weir increases in response to rainfall events there will be a corresponding increase in turbidity, suspended solids, and potentially also in nutrient concentrations in the Old Taranaki Stream. This is due to the wetland's shallow profile and unconsolidated bed that is expected to be entrained as water levels increase.

PTL has installed a number of measures to reduce the potential effects of the discharge on water quality downstream of the discharge point and generally improve water quality from what would otherwise be observed. These include: the creation of a stilling basin at the discharge point which lowers flows and allows suspended sediment to settle; the use of a rock filter around the orifice weir which reduces the potential for larger material to be filtered; and the use of a fabric filter downstream of the discharge to assist with the removal of fine particles. Having taken account of the benefits of these design features, the potential adverse effects on the water quality of Taranaki Stream resulting from high flow discharges are assessed as minor.

Water Quality Monitoring

Resource consents CRC061217 and CRC061218 contain conditions that require annual sampling of sediment depth, water clarity, dissolved oxygen, pH, and temperature in Taranaki Stream upstream and downstream of its confluence with the Old Taranaki Stream channel during a discharge event. They also contain conditions requiring monthly inspections for settled material or scour immediately downstream of the wetland rock filters at Taerutu Gully.

Water Quality Parameters

The requirement to measure the sediment depth on the bed of Taranaki Stream is considered inappropriate by the project engineers. This is because the bed and banks of Taranaki Stream upstream and downstream of the confluence with Old Taranaki Stream are heavily affected by stock (downstream of the Mapleham/Pegasus site). The measurement of sediment depth is considered to be very coarse, and unlikely to provide any clarity on the potential effects of the Taerutu Gully discharge. Monitoring water clarity for both visual water clarity and turbidity at the discharge point is considered to be more appropriate by the project engineers. It is proposed that the sampling regime is amended so that it does not include sediment depth, but does include sampling for turbidity, dissolved metals and nutrients as these are important water quality parameters. The same time frame for sampling of these parameters as for the other parameters is proposed, with the specific location of the sampling being immediately downstream of the last treatment device.

Furthermore, it is not considered that trigger values for the above mentioned water quality parameters are necessary given the nature of the downstream environment. If sampling indicates a significant reduction in water quality, it is envisaged that Environment Canterbury would review the relevant consent to address the issue.

Sampling Locations and Periods

The project engineers consider that the sampling locations that are currently used to monitor the potential effects associated with the discharge from Taerutu Gully are also inappropriate. The reason the sampling locations are considered inappropriate is that Old Taranaki Stream exhibits differentiated water quality characteristics, which are interpreted to result from the effects of the wetland located on the northern side of Preece Road immediately upstream of the sampling site (and not within Mapleham or Pegasus). It is proposed that the sampling locations are changed to reflect the true nature of the discharge, as shown in Figure 3-4 of the URS Report attached as **Appendix F**. It is the intention of the project engineers that Site A would provide details of the quality of the water associated with the discharge from Taerutu Gully while Site B would provide information on the water quality associated with Taranaki Stream.

In terms of the sampling and inspection periods, PTL proposes to undertake water quality sampling and inspections for settled material and scour monthly for the first 12 months following the approval of this application. Subsequently quarterly monitoring is proposed in the second 12 months and biannual monitoring is proposed in the third 12 months following the approval of this

application. This provides for more intensive monitoring over a three year period than the annual monitoring currently required by condition 7 of CRC061217 and condition 13 of CRC061218. The alternative monitoring regime is considered by the project engineers to be more appropriate than the existing regime for the effects of the continuous discharge to be recorded and comprehensively assessed.

6. AFFECTED PARTIES

The adverse effects associated with the proposed changes to conditions have been assessed above as less than minor. The deviations of the operational discharge from Taerutu Gully to Old Taranaki Stream from the original resource consent application and the consented design have been assessed in terms of their effects on water quantity and quality. Overall, adverse effects, including effects on flood risk, are assessed as less than minor, and positive effects relating to the health of the Taerutu Gully and Old Taranaki Stream wetland system have been identified. Where effects are less certain or existing monitoring regimes are considered ineffective, changes have been proposed to enable the appropriate ongoing assessment of the effects of the discharge. Therefore, notification is not considered to be required on any parties.

7. CONCLUSION

It is considered that the proposed changes to conditions of resource consents CRC061217 and CRC061218 approved for the Pegasus Town development satisfy those matters Environment Canterbury are required to implement under Section 127 of the Act. It is also considered that the proposed changes will not adversely affect any person. We, therefore, request that this application for a variation of conditions of CRC061217 and CRC061218 be granted without notification.

APPENDIX A

Certificates of Title



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



R. W. Muir
Registrar-General
of Land

Search Copy

Identifier 403111
Land Registration District Canterbury
Date Issued 17 March 2008

Prior References

378431

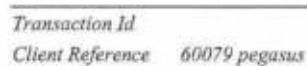
Estate Fee Simple
Area 4.3827 hectares more or less
Legal Description Lot 11 Deposited Plan 400595

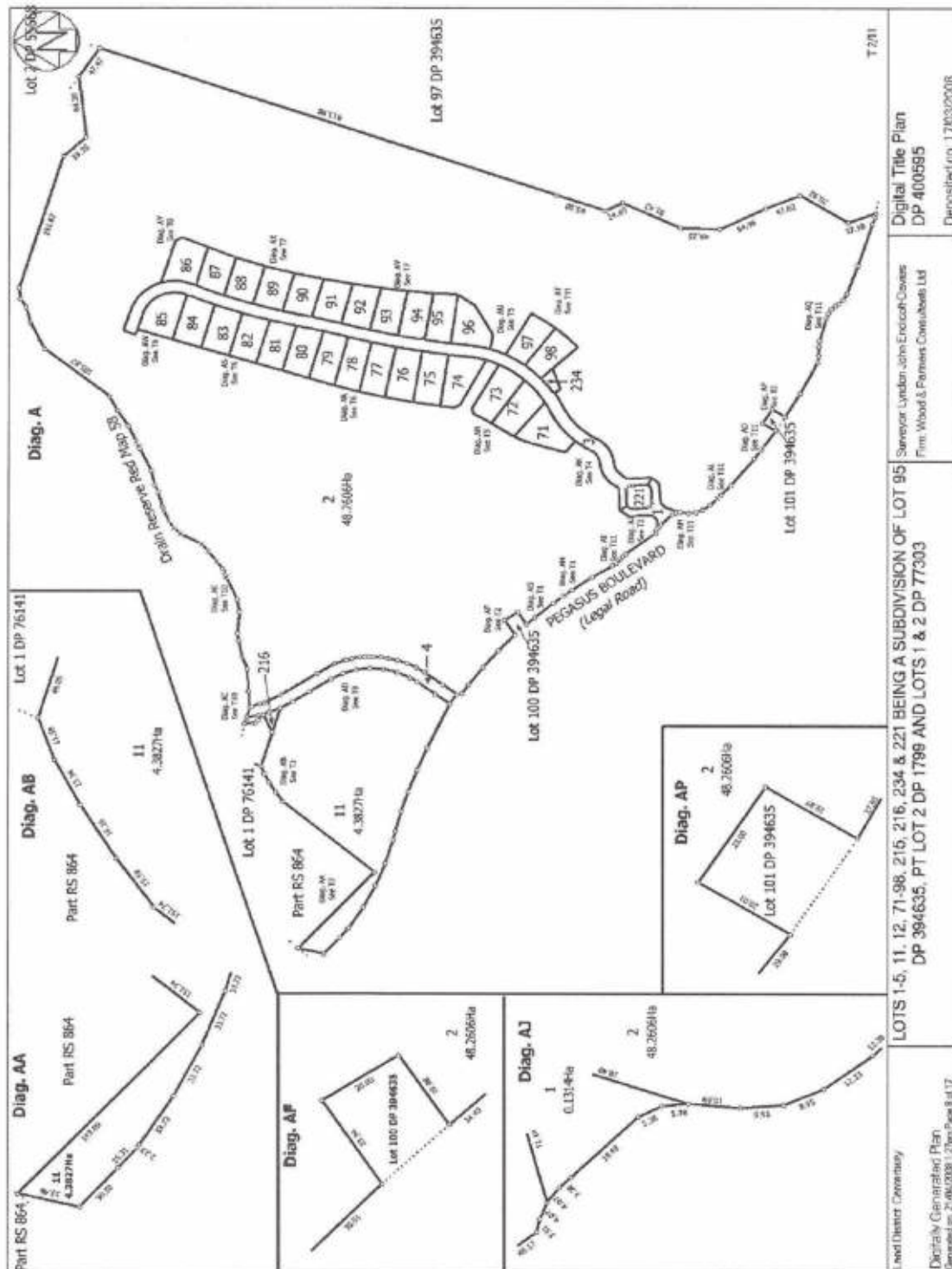
Proprietors

Pegasus Town Limited

Interests

775461 Gazette Notice (1969/1224) declaring the State Highway adjoining the within land to be a Limited Access Road - 9.9.1969 at 9:00 am
A440440.8 Fencing Agreement - 23.12.1999 at 2:35 pm (affects part formerly contained in CT CB46B/1092)
Subject to Part IVA Conservation Act 1987 (affects part formerly contained in CT 3981)
Subject to Section 11 Crown Minerals Act 1991 (affects part formerly contained in CT 3981)
7177207.5 Mortgage to (now) BOS International (Australia) Limited - 22.12.2006 at 9:00 am
Land Covenant in Easement Instrument 8271938.1 - 1.9.2009 at 9:00 am
Appurtenant hereto is a right of way and a right to convey water, electricity and telecommunications created by Easement Instrument 8432727.9 - 4.3.2010 at 3:26 pm





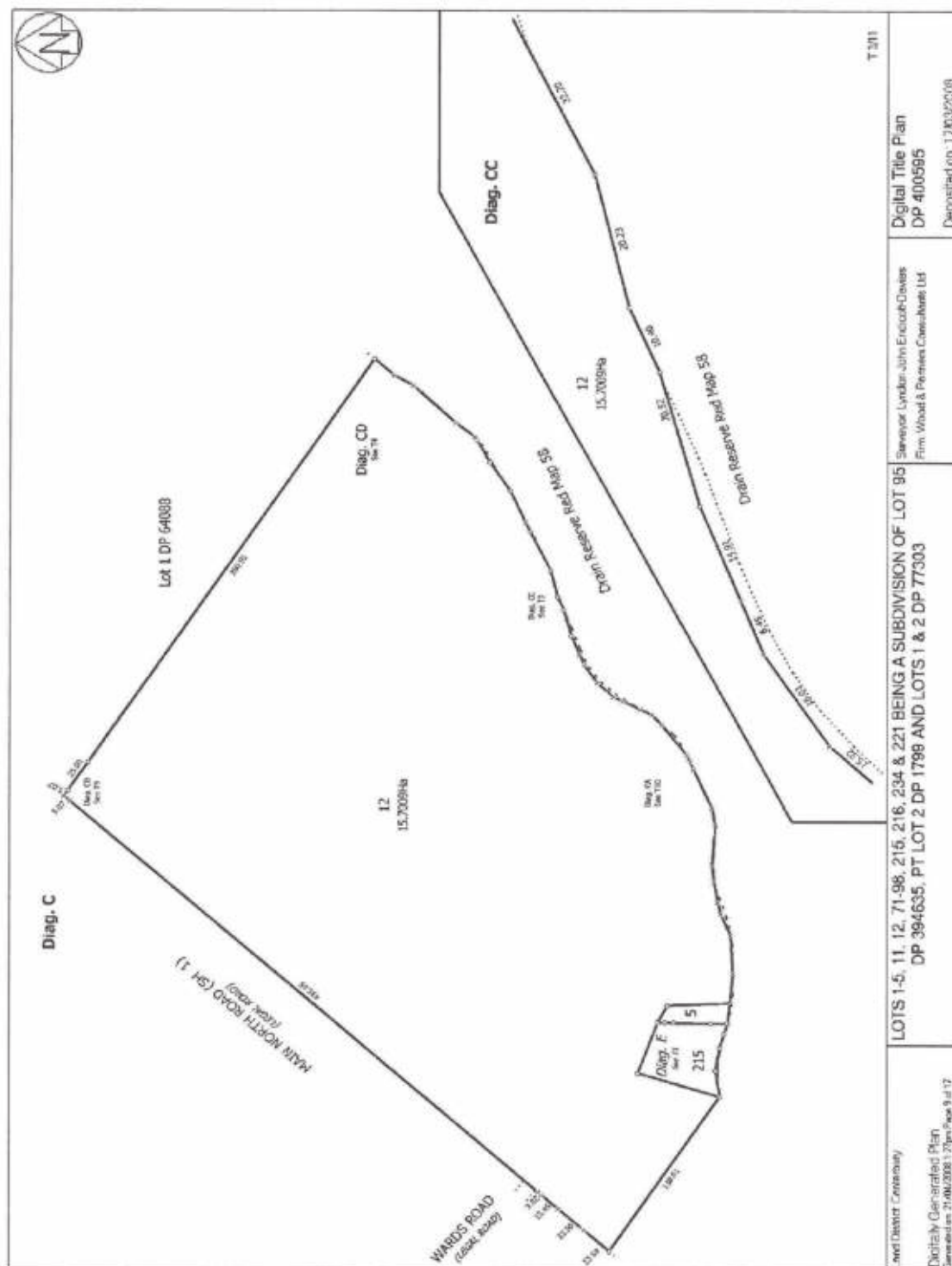
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DP 400595

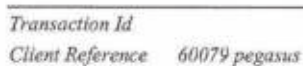
Surveyor Lyndon John Enoch-Davies Ltd
Firm Wood & Partners Consultants Ltd

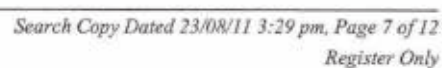
LOTS 1-5, 11, 12, 71-98, 216, 234 & 221 BEING A SUBDIVISION OF LOT 95
DP 394635, PT LOT 2 DP 1799 AND LOTS 1 & 2 DP 77303

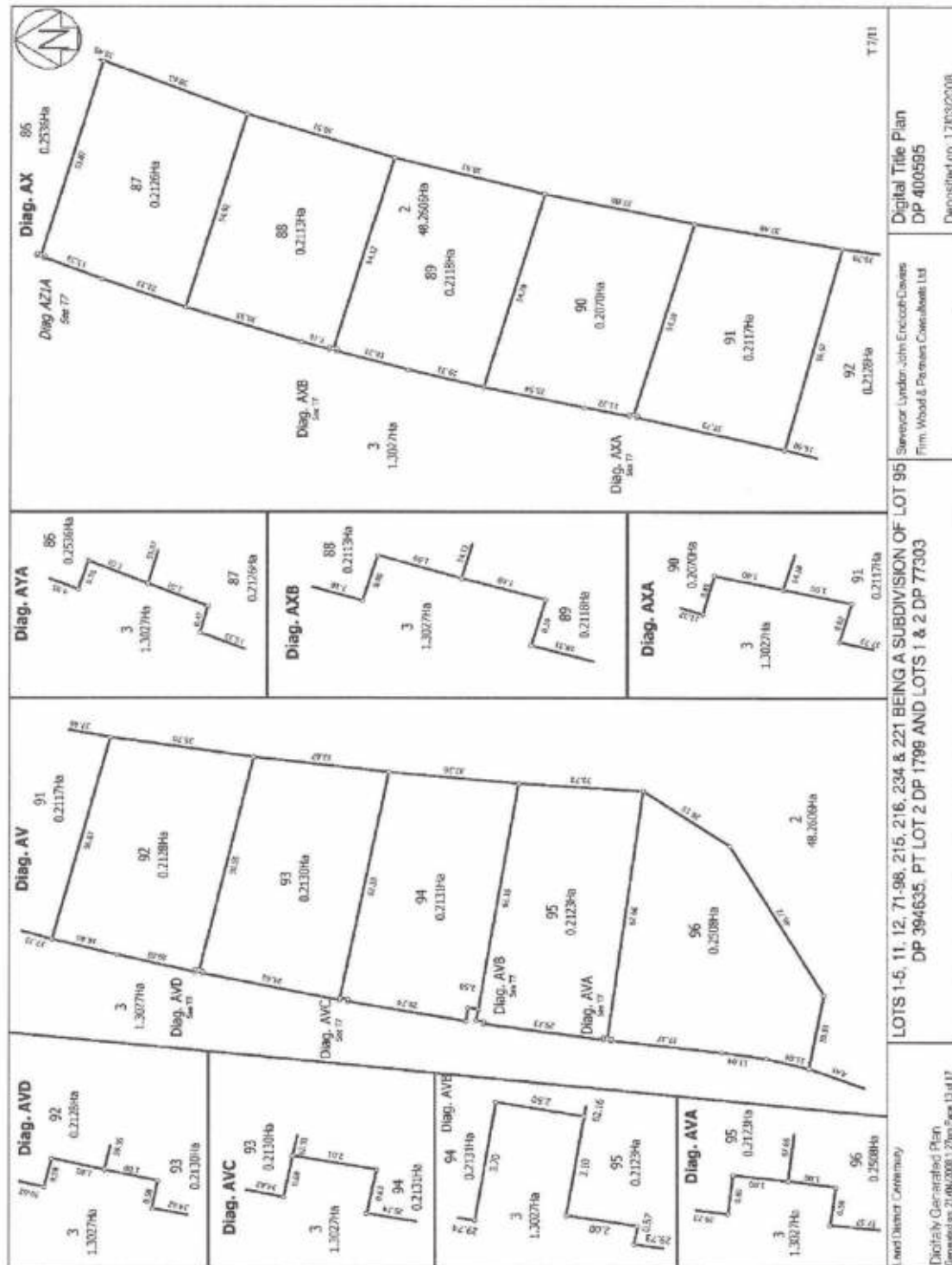
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Deposited on: 17/03/2008





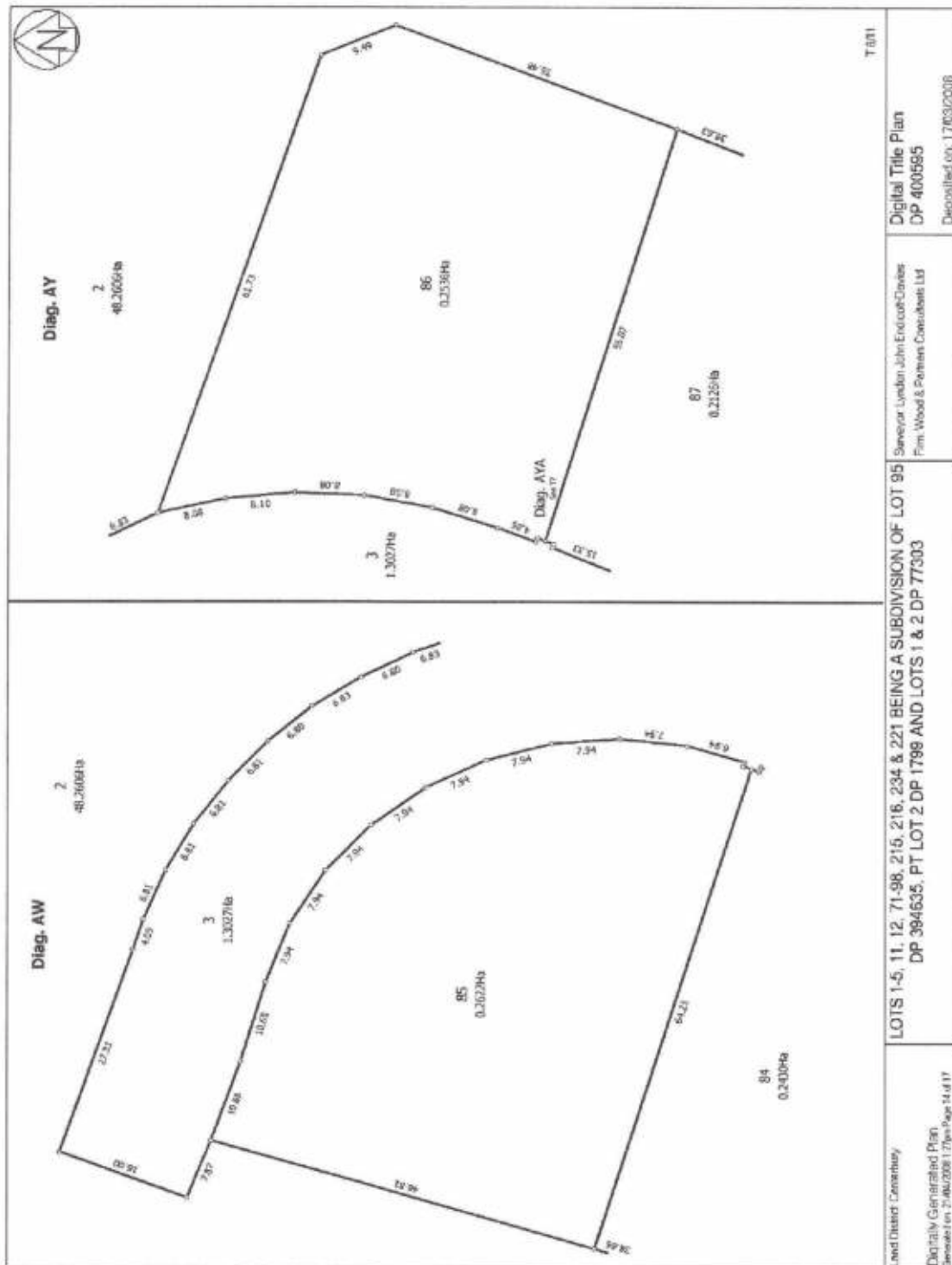


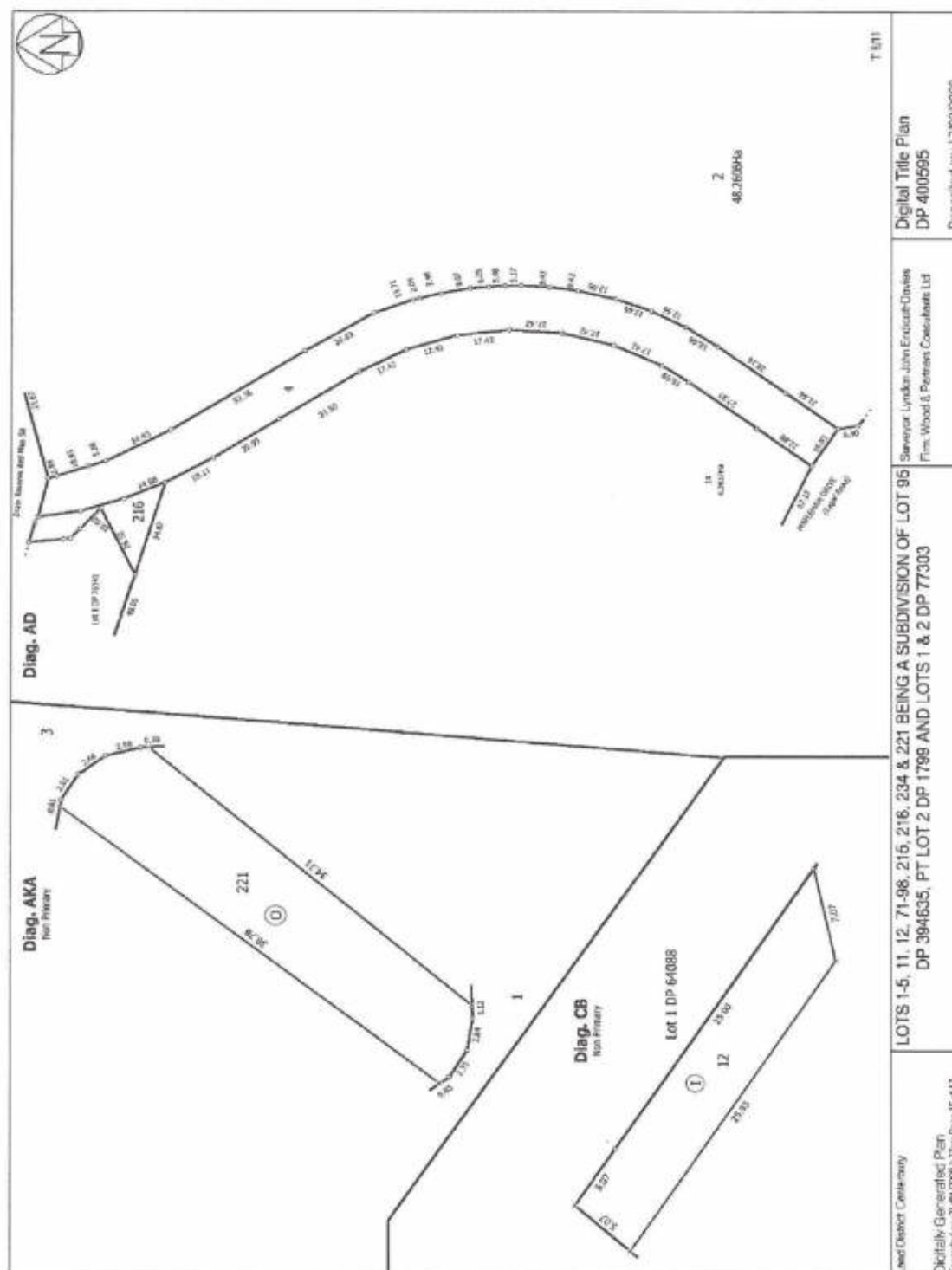


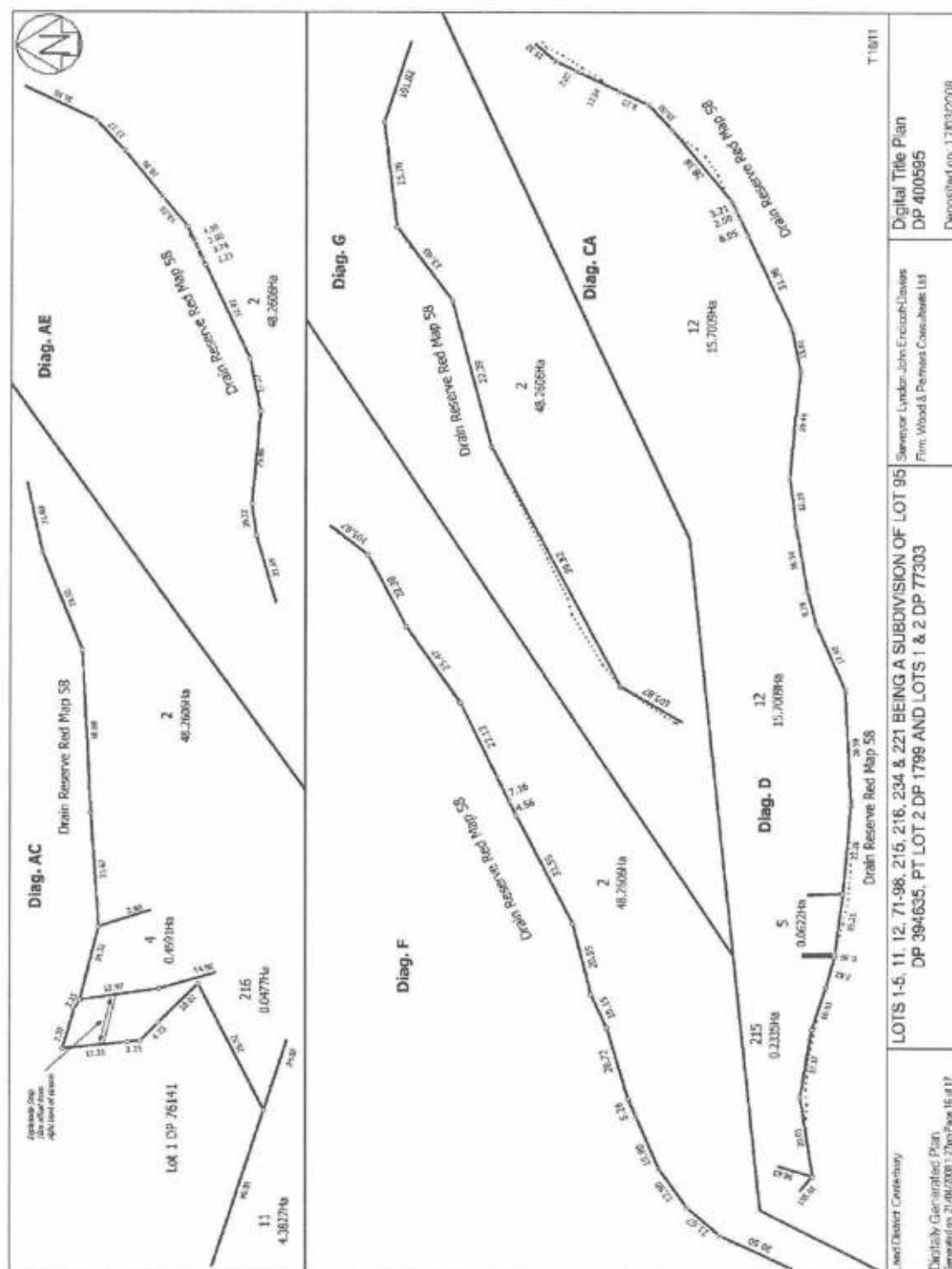
Lived District Community

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(Generation: 21/06/2008 11:20pm Page 13 of 17)LOTS 1-6, 11, 12, 71-98, 215, 216, 234 & 221 BEING A SUBDIVISION OF LOT 95
DP 394635, PT LOT 2 DP 1798 AND LOTS 1 & 2 DP 77303Surveyor Lyndon John Ericoch-Dawson
Firm Wood & Partners Consulting LtdDigital Title Plan
DP 400595

Deposited on: 17/03/2008







Used District Certificate

Digitally Generated Plan
Generated on 21/08/2008 1:27pm Page 16 of 17LOTS 1-6, 11, 12, 71-98, 215, 216, 234 & 221 BEING A SUBDIVISION OF LOT 95
DP 394635, PT LOT 2 DP 1798 AND LOTS 1 & 2 DP 77303Surveyor Lyndon John Ennoch-Davies
Firm Wood & Palmer Consulting LtdDigital Title Plan
DP 400595

Deposited on 17/03/2008



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



R. W. Muir
Registrar-General
of Land

Search Copy

Identifier 425883
Land Registration District Canterbury
Date Issued 04 March 2010

Prior References

405164 448264

Estate Fee Simple
Area 8.5014 hectares more or less
Legal Description Lot 2, 4 Deposited Plan 407339

Proprietors

Pegasus Town Limited

Interests

775461 Gazette Notice (1969/1224) declaring the State Highway adjoining the within land to be a Limited Access Road - 9.9.1969 at 9:00 am (affects Lot 4 DP 407339)

Appurtenant to Lot 2 and part Lot 4 DP 407339 formerly Lot 1 DP 77303 is a right of way, right to convey water, electric power and telephonic communications created by Transfer A107579.4 - 19.4.1994 at 12:20 pm

Subject to a right of way, right to convey water, electric power and telephonic communications over Lot 4 DP 407339 over part marked AE on DP 407339 created by Transfer A107579.4 - 19.4.1994 at 12:20 pm

7177207.5 Mortgage to (now) BOS International (Australia) Limited - 22.12.2006 at 9:00 am

7752342.12 Esplanade Strip Instrument pursuant to Section 232 Resource Management Act 1991 - 17.3.2008 at 9:00 am (affects Lot 4 DP 407339)

Subject to a right of way over Lot 4 DP 407339 over part marked J on DP 407339 created by Easement Instrument 7752342.18 - 17.3.2008 at 9:00 am

The easement created by Easement Instrument 7752342.18 is subject to Section 243 (a) Resource Management Act 1991

7847832.5 Esplanade Strip Instrument pursuant to Section 232 Resource Management Act 1991 - 16.6.2008 at 9:00 am (affects Lot 4 DP 407339)

7847832.6 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 16.6.2008 at 9:00 am (affects Lot 4 DP 407339)

7847832.7 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 16.6.2008 at 9:00 am (affects Lot 4 DP 407339)

Subject to a right (in gross) to drain stormwater over Lot 4 DP 407339 over part marked A and B on DP 407339 in favour of Waimakariri District Council created by Easement Instrument 8079663.9 - 20.2.2009 at 10:06 am

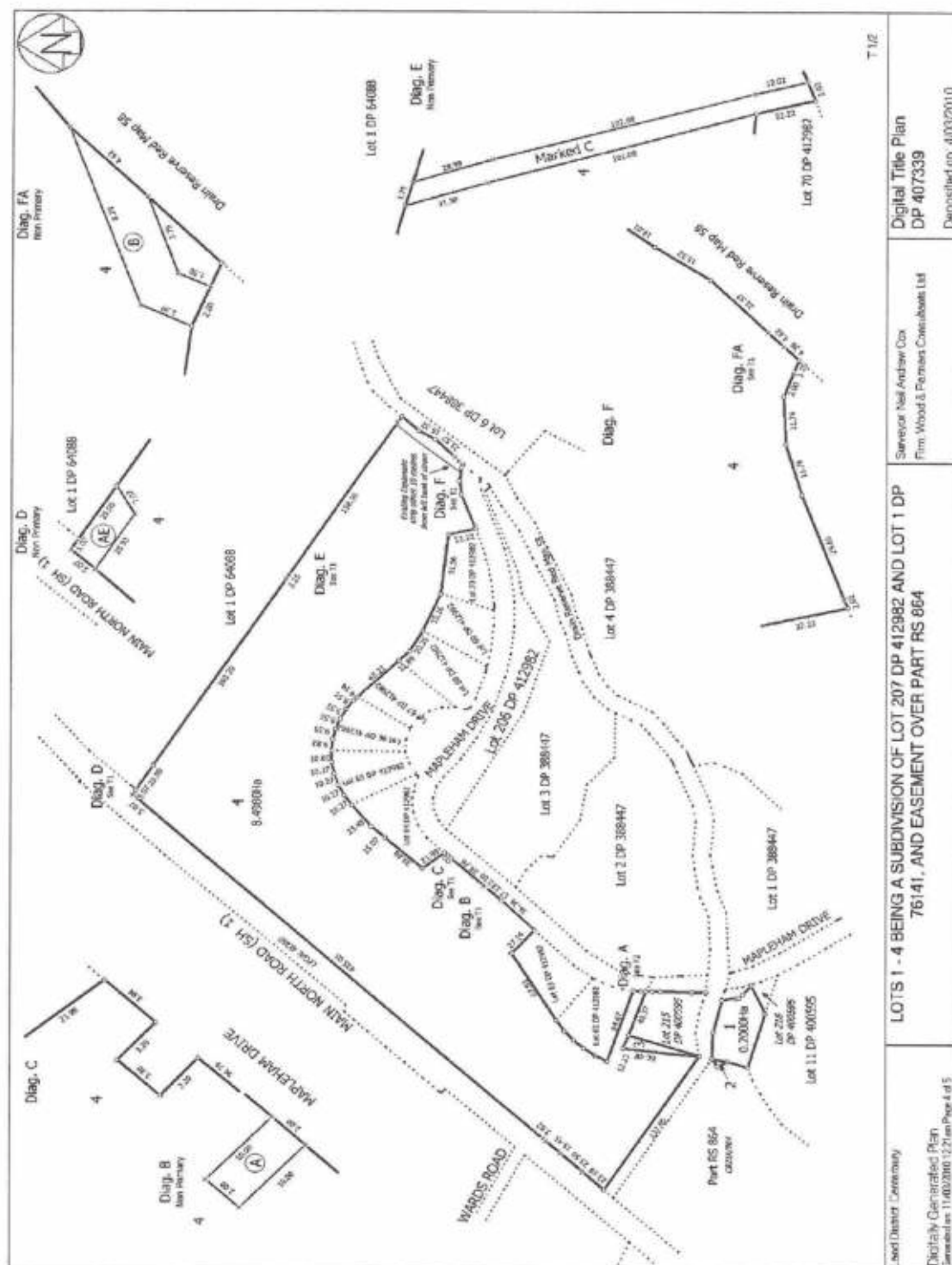
The easement created by Easement Instrument 8079663.9 is subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Easement Instrument 8271938.1 - 1.9.2009 at 9:00 am (affects Lot 4 DP 407339)

Subject to Section 241(2) and Sections 242(1) and (2) Resource Management Act 1991(affects DP 407339)

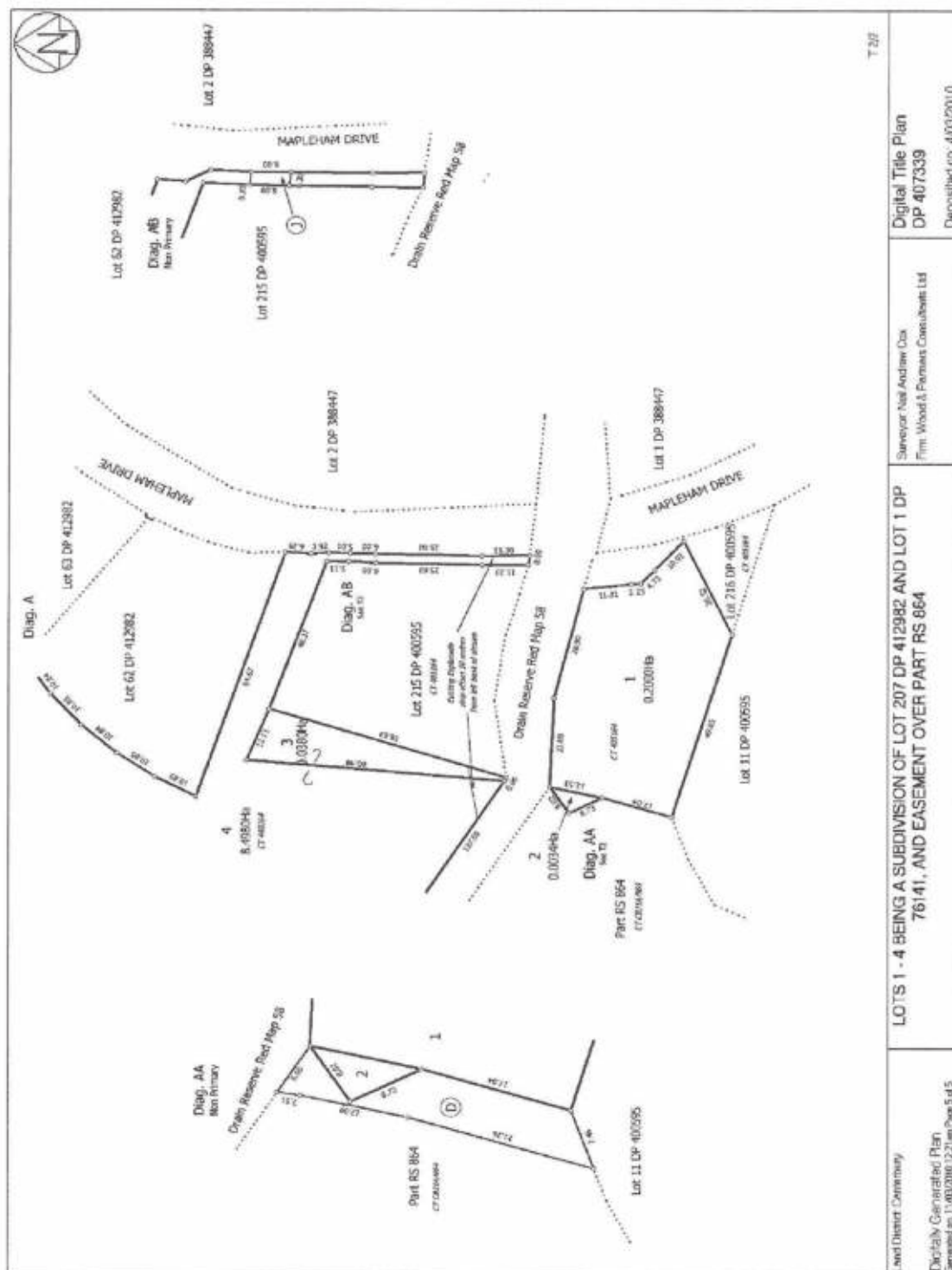
Land Covenant in Easement Instrument 8432727.8 - 4.3.2010 at 3:26 pm

Appurtenant to Lot 4 DP 407339 herein is a right of way and a right to convey water, electricity and telecommunications created by Easement Instrument 8432727.9 - 4.3.2010 at 3:26 pm



T 1/2

Used District Certainty	Surveyor Neil Andrew Cox Firm Wood & Partners Consultants Ltd	Digital Title Plan DP 407339
Digitaly Generated Plan Generated on 11/03/2010 12:27 pm Page 4 of 5	Deposited on 4/03/2010	





COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



R. W. Muir
Registrar-General
of Land

Search Copy

Identifier 537609
Land Registration District Canterbury
Date Issued 19 January 2011

Prior References

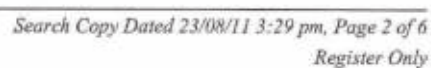
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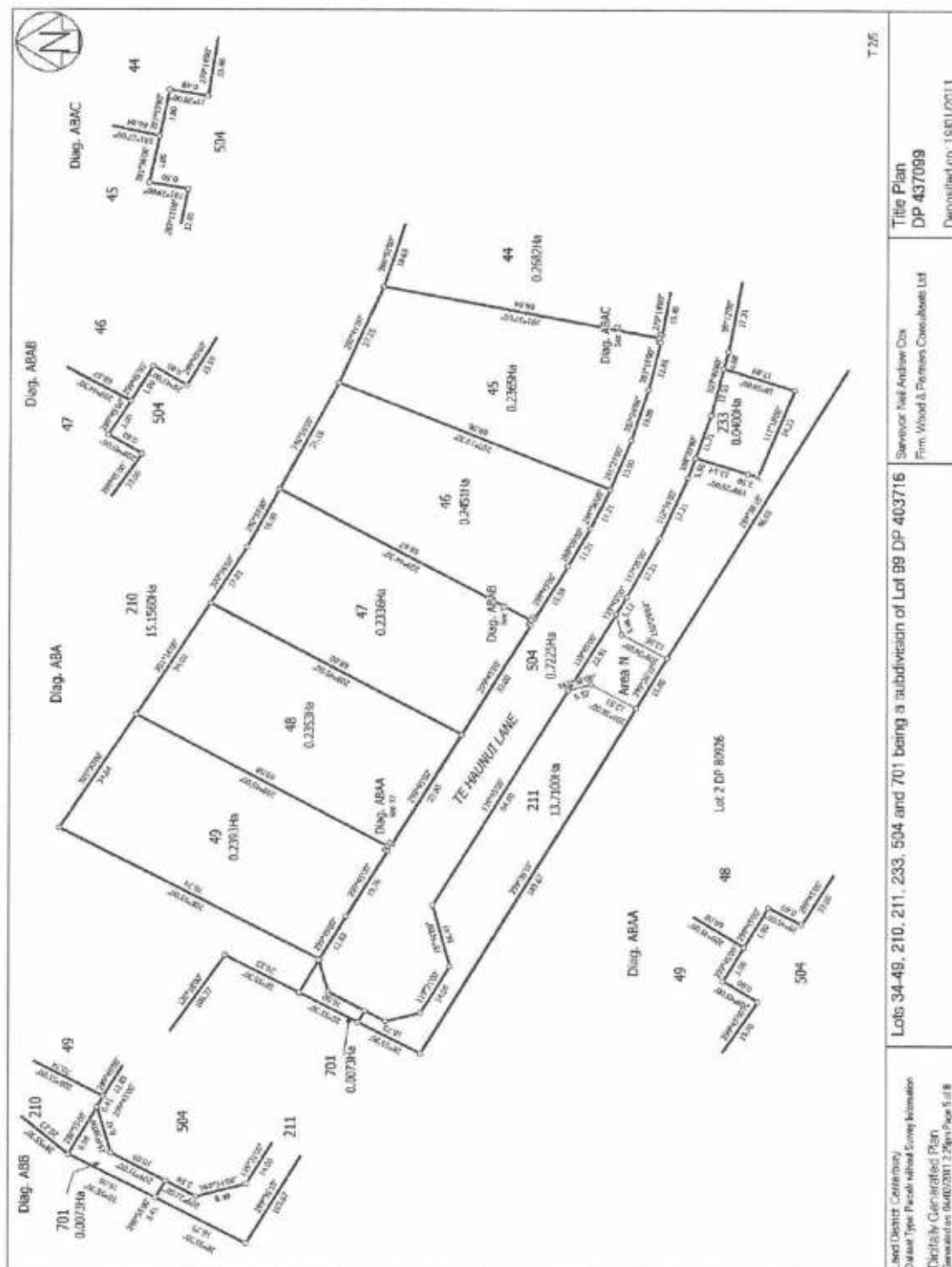
Estate	Fee Simple
Area	31.8582 hectares more or less
Legal Description	Lot 34-39, 41-49, 210-211, 701 Deposited Plan 437099

Proprietors
Pegasus Town Limited

Interests

775461 Gazette Notice (1969/1224) declaring the State Highway adjoining Lot 210 DP 437099 a limited access road - 9.9.1969 at 9:00 am
A440440.8 Fencing Agreement - 23.12.1999 at 2:35 pm
7177207.5 Mortgage to (now) BOS International (Australia) Limited - 22.12.2006 at 9:00 am
Subject to a right to convey water supply (in gross) over part Lot 211 herein marked O on DP 437099 in favour of Waimakariri District Council created by Easement Instrument 7670816.10 - 24.12.2007 at 9:00 am
The easements created by Easement Instrument 7670816.10 are subject to Section 243 (a) Resource Management Act 1991
Subject to a right to convey stormwater (in gross) over part Lot 211 herein marked B and C on DP 437099 in favour of Waimakariri District Council created by Easement Instrument 7752152.8 - 17.3.2008 at 9:00 am
The easements created by Easement Instrument 7752152.8 are subject to Section 243 (a) Resource Management Act 1991
Land Covenant in Easement Instrument 8271938.1 - 1.9.2009 at 9:00 am
Subject to Section 241(2) Resource Management Act 1991 (affects DP 437099)



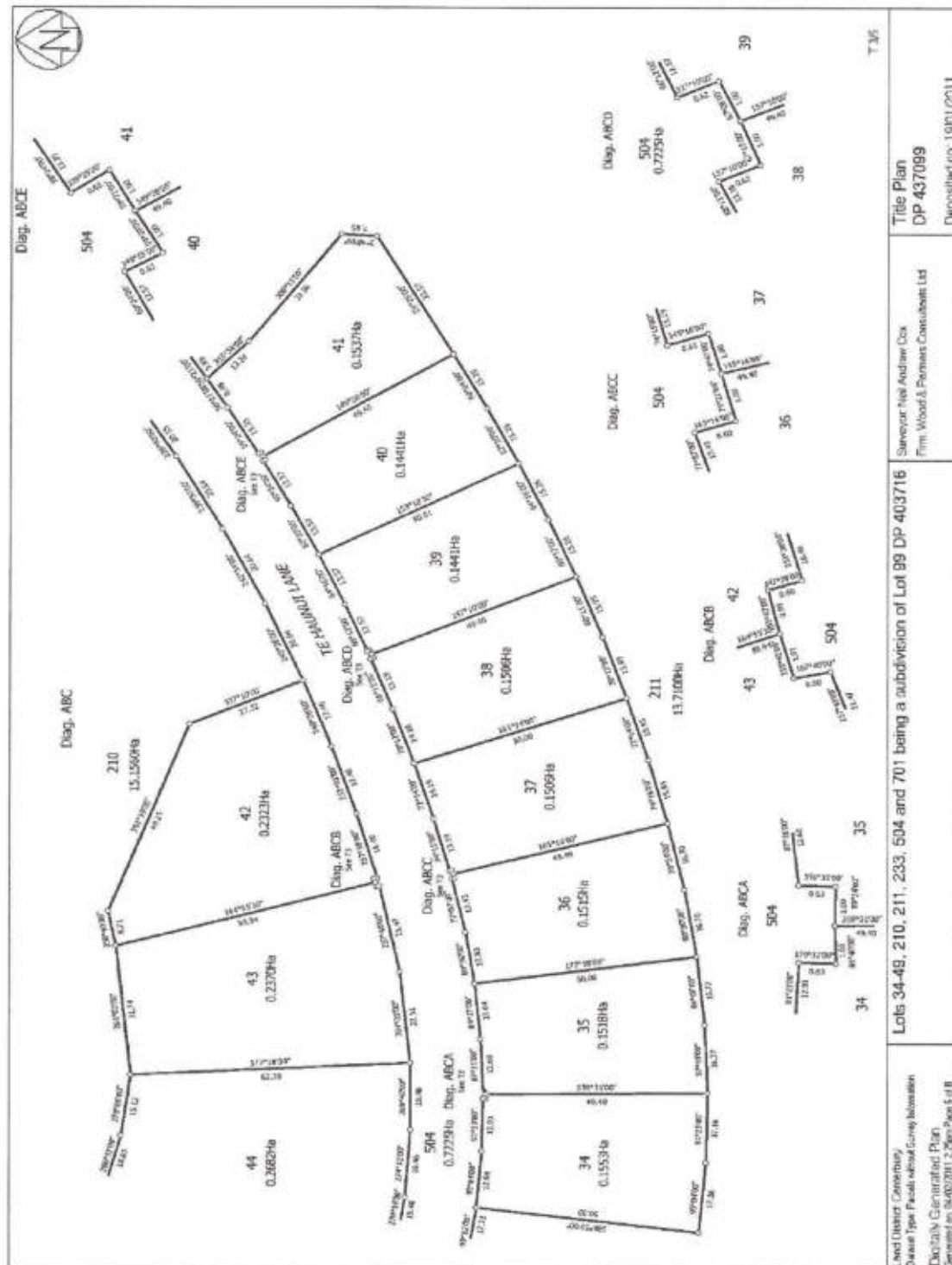


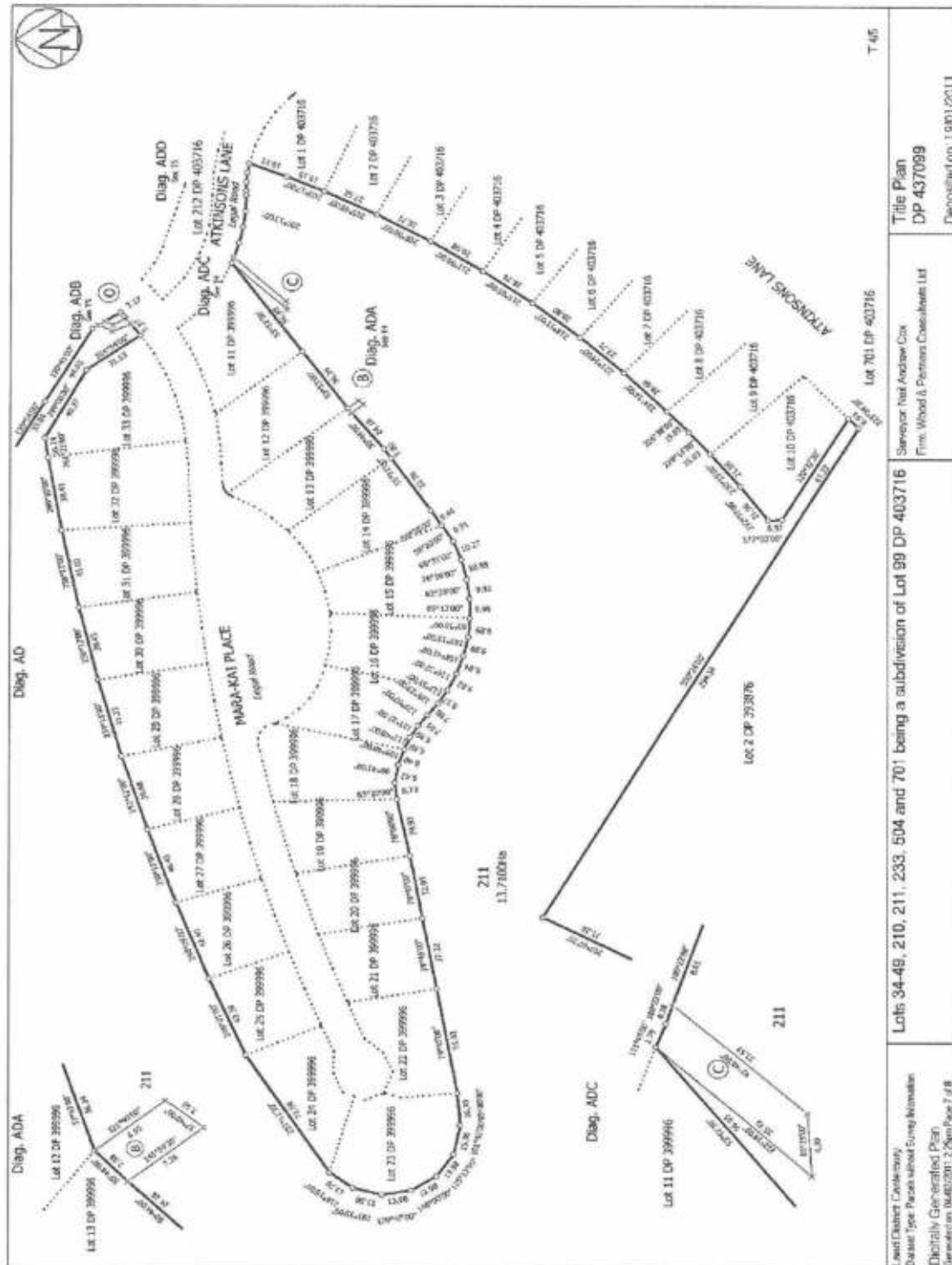
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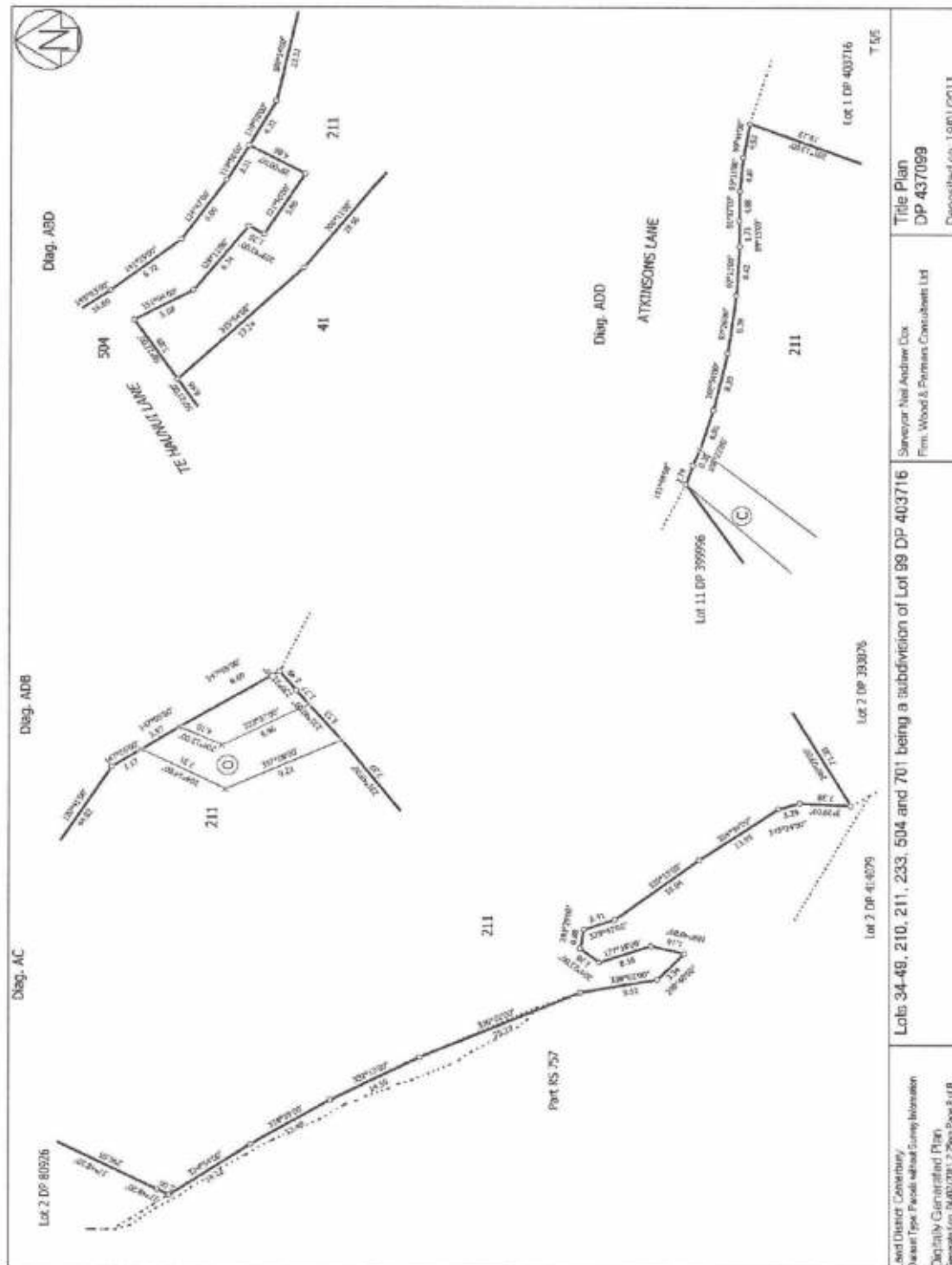
Title Plan
DP 437099Surveyor Neil Andrew Cox
Firm Wood & Partners Consultants Ltd

Lots 34-49, 210, 211, 233, 504 and 701 being a subdivision of Lot 99 DP 403716

Used District Certificate
Default Type: Paced without Survey Information
Default Certificate Plan
Generated on 19/01/2011 Page 1 of 8







APPENDIX B

Conditions of Resource Consents
CRC061217 and CRC061218

Resource Consent Number: CRC061217

File Number: CO6C/25000-04

Client Name: Pegasus Town Limited

To: To discharge water and contaminants from new lakes associated with the golf course to an ephemeral watercourse, being Taerutu Gully, to Taranaki Stream

Consent Location: Mapleham Development, Main North Road, WOODEND

State: Current

15/02/2006 Consent Commenced

15/02/2016 Lapse Date if not Given Effect To

31/01/2041 Consent Expires

Subject to the following conditions:

- 1 Discharge to Taranaki Stream from the lakes within the Mapleham golf course and residential complex, shall occur, via Taerutu Gully at or about:
 - NZMS 260 M35 Grid 5766620 North, 2484740 East.
- 2 The maximum rate of discharge to the Taranaki Stream from the lakes shall not be more than the rate of discharge from the land, in its state before the development commences, for all events up to the 1 in 50 year return period storm for the critical duration of the land before development.
- 3 A certificate signed by the person responsible for designing the stormwater system, or a competent person, shall be submitted to Canterbury Regional Council within one month of construction, to certify that the system has been constructed and installed in accordance with the plans, design details and procedures submitted with the application as required by conditions 1-2 of this consent.
- 4 The consent holder shall take all practicable measures to avoid spillages of contaminants into the lakes. In the event of any accidental spillage, the consent holder shall inform Canterbury Regional Council within 24 hours of the event, and shall provide the following information:
 - (a) The date, time, location, and estimated volume of the spillage.

- (b) The cause of the spillage, details of the steps taken to control and remediate the effects of the spill on the receiving environment, and measures taken to prevent a reoccurrence.
- 5 The consent holder shall ensure that an on-going record is kept of the number of times per year that water from the lakes is discharged into Taerutu Gully, including a record of the level that the wetland in Taerutu Gully rises to in situations of discharge. Copies of these records shall be provided to Canterbury Regional Council on request.
- 6 The consent holder shall ensure that the receiving environment immediately downstream of the wetland rock filters at Taerutu Gully is inspected monthly on an ongoing basis to identify if there is evidence of settled material or scour. Copies of these records shall be provided to Canterbury Regional Council on request.
- 7 The consent holder shall sample annually during a discharge from the wetland to the Taranaki Stream, the sediment depth, water clarity, dissolved oxygen, pH, and temperature in the Taranaki Stream. Sampling shall include sampling points both up and downstream of Mapleham. These sampling points shall be easily identified and accessible, and the upstream sampling point shall be located no more than 200 metres upstream of Mapleham. A map showing the location of these sampling points shall be submitted to Canterbury Regional Council at least 10 working days prior to the first sampling period.
- 8 The results of the sampling in condition 7 shall meet the following criteria:
 - (a) The increase in the depth of sediment at the downstream site shall not be more than 10 percent higher than that which has occurred in the upstream site.
 - (b) Water clarity shall not be reduced by more than 20 percent in the downstream sample from the upstream sample.
 - (c) The dissolved oxygen concentration in the downstream sample shall not be lower than that in the upstream sample.
 - (d) There shall not be more than a 0.5 unit difference in the pH in the downstream sample compared with the upstream sample.
 - (e) The water temperature in the downstream sample shall not be more than three degrees Celsius higher than that in the upstream sample.

- 9 The results of the samples taken in Condition 7 shall be submitted to Canterbury Regional Council within 30 working days of the date of sampling. Where results exceed the requirements of Condition 8 the report shall provide an explanation for these and where necessary provide details of how the stormwater system will be changed to ensure compliance with Condition 8 in future sampling.
- 10 Records of the operation and maintenance of the stormwater system shall be kept. The records shall include, but not be limited to information that demonstrates compliance with the management plan referred to in condition 11 of this consent. Copies of these records shall be provided to Canterbury Regional Council on request.
- 11 A Stormwater Management Plan detailing the operation and maintenance of the stormwater system, including measures undertaken to ensure compliance with conditions 4 to 10, shall be developed for the site and submitted to Canterbury Regional Council at least 10 working days prior to the operation of the system. A copy shall also be held by the consent holder along with a copy of the consent. The consent holder shall comply with the provisions of this plan at all times. Where necessary, this Plan may be reviewed and updated and resubmitted to Canterbury Regional Council.
- 12 Operation and maintenance of the stormwater system shall at all times be in accordance with the Stormwater Management Plan required by condition 11 of this consent.
- 13 Discharge of treated stormwater from Taerutu Gully to Taranaki Stream shall only be as described in the application and shall be located at or about NZMS 260 M35: 5766620 North-2484740 East.
- 14 Stormwater secondary flow paths shall be designed such that when flows exceed the capacity of the proposed system due to an extreme rainfall event, the overland flows from Mapleham will not have an adverse effect off-site.
- 15 Pursuant to Section 128 of the Act or the Resource Management Act, the Canterbury Regional Council may review the conditions of the consent by

serving notice on any of the last five working days of January each year, for any of the following purposes:

- (a) To deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or
- (b) To require the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment.

- 16 The lapsing provisions of Section 125 of the Act or the Resource Management Act will apply on expiry of ten years from the date of commencement of this consent.

Resource Consent Number: CRC061218

File Number: CO6C/25000-04

Client Name: Pegasus Town Limited

To: To discharge stormwater to land and water, and to land in circumstances where it may enter water.

Consent Location: Mapleham Development, Main North Road, WOODEND

State: Current

15/02/2006 Consent Commenced

15/02/2016 Lapse Date if not Given Effect To

31/01/2041 Consent Expires

Subject to the following conditions:

- 1 Stormwater discharge to Taranaki Stream via swales and artificial waterbodies from roads, roofs, hardstand areas, tees and greens within the Mapleham golf course and residential complex, shall occur, as shown in the Figure CRC061218, at or about:
 - NZMS 260 M35 Grid 5766620 North, 2484740 East,
 - NZMS 260 M35 Grid 5766500 North, 2484000 East; and
 - NZMS 260 M35 Grid 5766770 North, 2484500 East
- 2 There shall be no untreated discharge from roads, roofs, hardstand areas, tees and greens to Taerutu Gully or Taranaki Stream.
- 3 Design, construction and management of the stormwater system including grassed swales and artificial waterbodies, shall be carried out in accordance with the design details and procedures provided in the Stormwater Management Report in the application.
- 4 The maximum rate of discharge to the Taranaki Stream from the stormwater treatment system shall not be more than the rate of discharge from the land, in its state before the development commences, for all events up to the 50 year return period storm for the critical duration of the land before development.

- 5 A certificate signed by the person responsible for designing the stormwater system, or a competent person, shall be submitted to the Canterbury Regional Council within one month of construction, to certify that the system has been constructed and installed in accordance with the plans, design details and procedures submitted with the application as required by conditions 1-4 of this consent.
- 6 At least one month prior to the construction of each stage of the development the consent holder shall submit to the Canterbury Regional Council:
 - (a) design plans for the stormwater treatment and disposal system, including the sumps; and
 - (b) any additional assessments and calculations not included in the application that are necessary and have been undertaken to ensure compliance with Conditions 1-4 of this consent.
- 7 The consent holder shall take all practicable measures to avoid spillages of contaminants to the stormwater system. In the event of any accidental spillage, the consent holder shall inform Canterbury Regional Council within 24 hours of the event, and shall provide the following information:
 - (a) The date, time, location, and estimated volume of the spillage.
 - (b) The cause of the spillage, details of the steps taken to control and remediate the effects of the spill on the receiving environment, and measures taken to prevent a reoccurrence.
- 8 All catchpits, swales, filter strips, rain gardens and artificial waterbodies shall be inspected at least once every six months. Any visible sediment and litter on the swales shall be removed immediately. All other necessary measures shall be undertaken to ensure that the catchpits, swales, filter strips, rain gardens and artificial waterbodies are operating in accordance with the design details and procedures specified in condition 3.
- 9 As a means of providing for their appropriate disposal all sediments removed from the stormwater system shall be tested to determine the concentration of copper, lead, zinc and total petroleum hydrocarbons. The tests shall be carried out by a laboratory accredited for the above tests. Should the concentrations found exceed the sediments shall be disposed of at an appropriate facility. A certificate shall be retained by the applicant showing the volume and location of

disposal. This certificate shall be made available to Canterbury Regional Council on request.

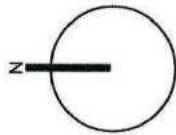
- 10 All swales, filter strips, rain gardens and artificial waterbodies shall be regularly maintained to ensure that vegetation is in a healthy and uniform state.
- 11 The consent holder shall ensure that an on-going record is kept of the number of times per year that water from the artificial waterbodies is discharged into Taerutu Gully, including a record of the level that the wetland in Taerutu Gully rises to in situations of discharge. Copies of these records shall be provided to Canterbury Regional Council on request.
- 12 The consent holder shall ensure that the receiving environment immediately downstream of the wetland rock filters at Taerutu Gully is inspected monthly on an ongoing basis to identify if there is evidence of settled material or scour. Copies of these records shall be provided to the Canterbury Regional Council on request.
- 13 The consent holder shall sample annually during a discharge from the wetland to the Taranaki Stream, the sediment depth, water clarity, dissolved oxygen, pH, and temperature in the Taranaki Stream. Sampling shall include sampling points both up and downstream of Mapleham. These sampling points shall be easily identified and accessible. A map showing the location of these sampling points shall be submitted to Canterbury Regional Council at least 10 working days prior to the first sampling period.
- 14 The results of the sampling in condition 13 shall meet the following criteria:
 - (a) The increase in the depth of sediment at the downstream site shall not be more than 10 percent higher than that which has occurred in the upstream site.
 - (b) Water clarity shall not be reduced by more than 20 percent in the downstream sample from the upstream sample.
 - (c) The dissolved oxygen concentration in the downstream sample shall not be lower than that in the upstream sample.
 - (d) There shall not be more than a 0.5 unit difference in the pH in the downstream sample compared with the upstream sample.

- (e) The water temperature in the downstream sample shall not be more than three degrees Celsius higher than that in the upstream sample.
- 15 The results of the samples taken in Condition 13 shall be submitted to Environment Canterbury within 30 working days of the date of sampling. Where results exceed the requirements of Condition 13 the report shall provide an explanation for these and where necessary provide details of how the stormwater system will be changed to ensure compliance with Condition 13 in future sampling.
- 16 Records of the operation and maintenance of the stormwater system shall be kept. The records shall include, but not be limited to information that demonstrates compliance with the management plan referred to in condition 11 of this consent. Copies of these records shall be provided to the Environment Canterbury on request.
- 17 A Stormwater Management Plan detailing the operation and maintenance of the stormwater system, including measures undertaken to ensure compliance with conditions 6 to 15, shall be developed for the site and submitted to Canterbury Regional Council at least 10 working days prior to the operation of the system. A copy shall also be held by the consent holder along with a copy of the consent. The consent holder shall comply with the provisions of this plan at all times. Where necessary, this Plan may be reviewed and updated and resubmitted to Canterbury Regional Council.
- 18 Operation and maintenance of the stormwater system shall at all times be in accordance with the Stormwater Management Plan required by condition 16 of this consent.
- 19 Discharge of treated stormwater from Taerutu Gully to Taranaki Stream shall only be as described in the application and shall be located at or about NZMS 260 M35: 5766620 North -2484740 East
- 20 Stormwater secondary flowpaths shall be designed such that when flows exceed the capacity of the proposed system for all events up to the 1 in 100 year return period storm, the overland flows from Mapleham will not have an adverse effect off-site.

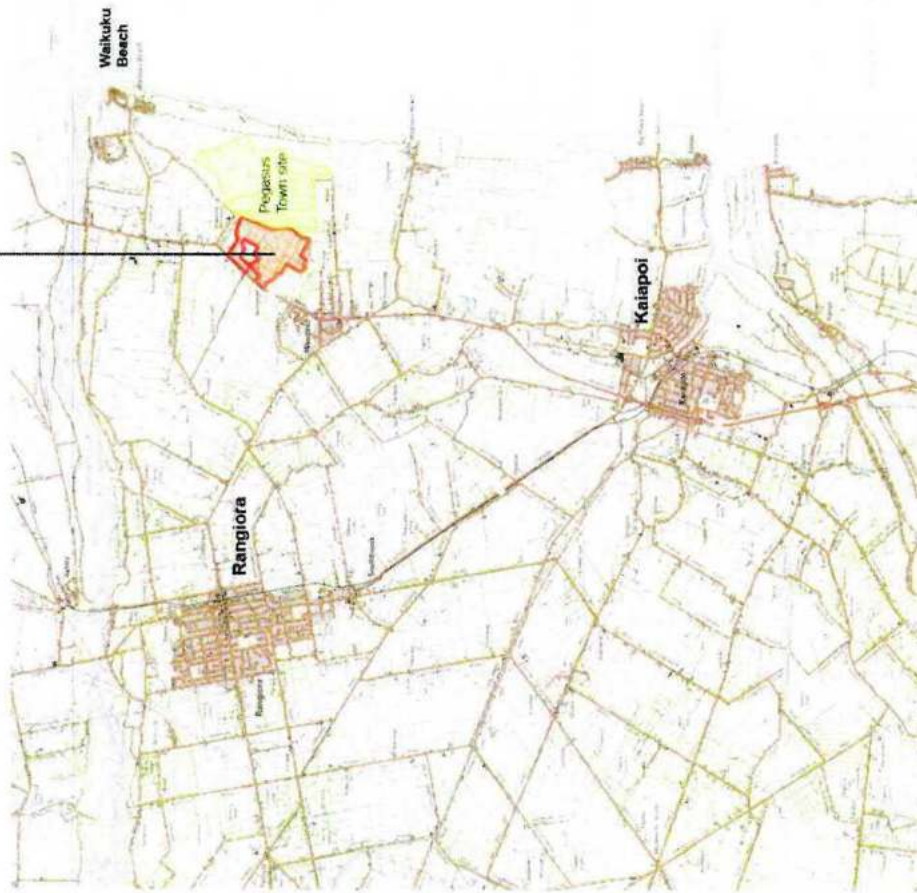
- 21 Pursuant to Section 128 of the Act or the Resource Management Act, the Canterbury Regional Council may review the conditions of the consent by serving notice on any of the last five working days of January each year, for any of the following purposes:
- (a) To deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or
 - (b) To require the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment
- 22 The lapsing provisions of Section 125 of the Act or the Resource Management Act will apply on expiry of ten years from the date of commencement of this consent.

APPENDIX C

Site Location Plan



Mapleham Application Site



Mapleham

Location Plan

1:100 000, C.04168

APPENDIX D

Master Plan



0 40 80 200m



Mapleham

masterplan

Revision 5 • Job No: 034189 • Date: 14 September 2008 • Scale: 1:5,000 (A1)
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APPENDIX E

Overview of Mapleham Stormwater System

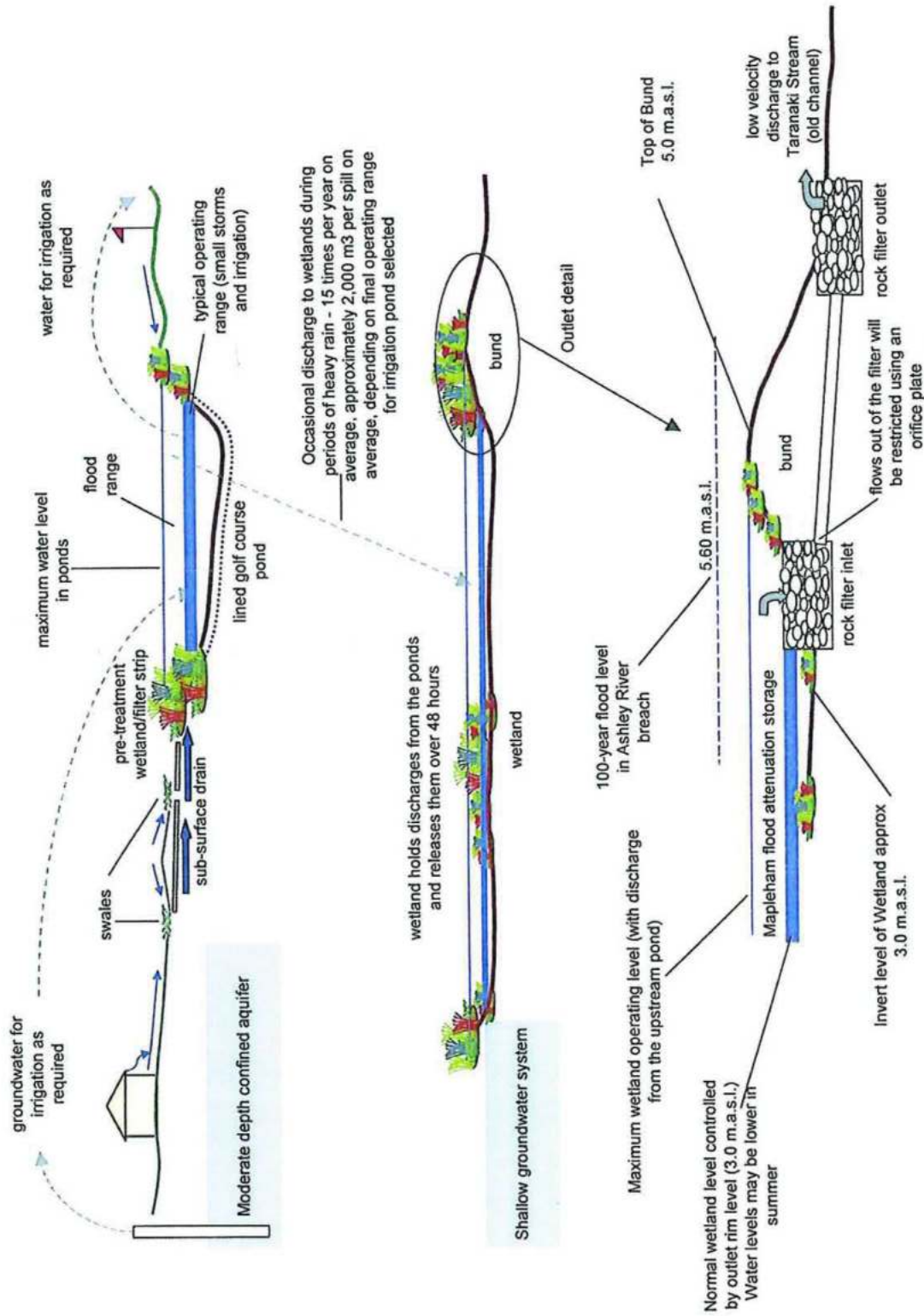


Figure 6 Overview of Proposed System