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 area[2]. 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 site[3].

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 2018[4] 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 community[5].

[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 vegetation[6]. 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
Anguilla sp.	Unidentified eel	n/a
Anguilla australis	Shortfin eel	Not threatened
Anguilla dieffenbachii	Longfin eel	At risk: declining
Galaxias sp.	Unidentified galaxiid	n/a
Galaxias maculatus	Inanga	At risk: declining
Galaxias vulgaris	Canterbury galaxias	At risk: declining
Gobiomorphus sp.	Unidentified bullies	n/a
Gobiomorphus cotidianus	Common bully	Not threatened
Gobiomorphus gobioides	Giant bully	At risk: naturally uncommon
Neochanna burrowsius	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 aerials 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 aerials 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 Gully[7]. 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,

Keren Bennett
Principal Ecology Consultant
4Sight Consulting Ltd

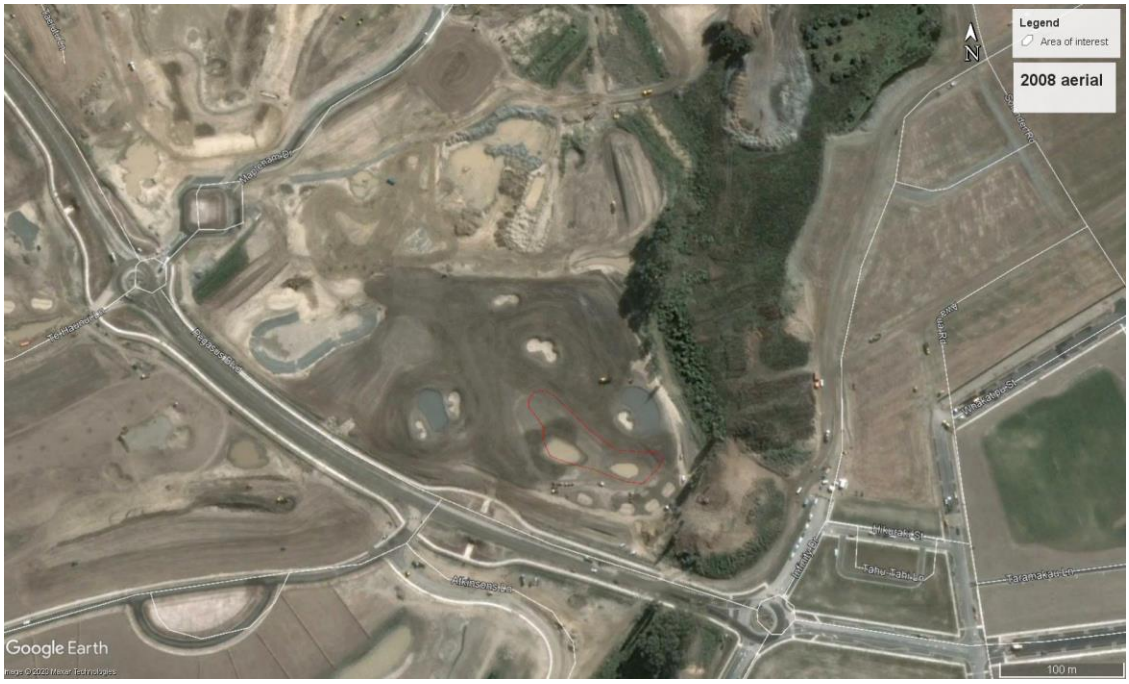
Attachment A: Google Earth imagery of potential wetland area and flowpath

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