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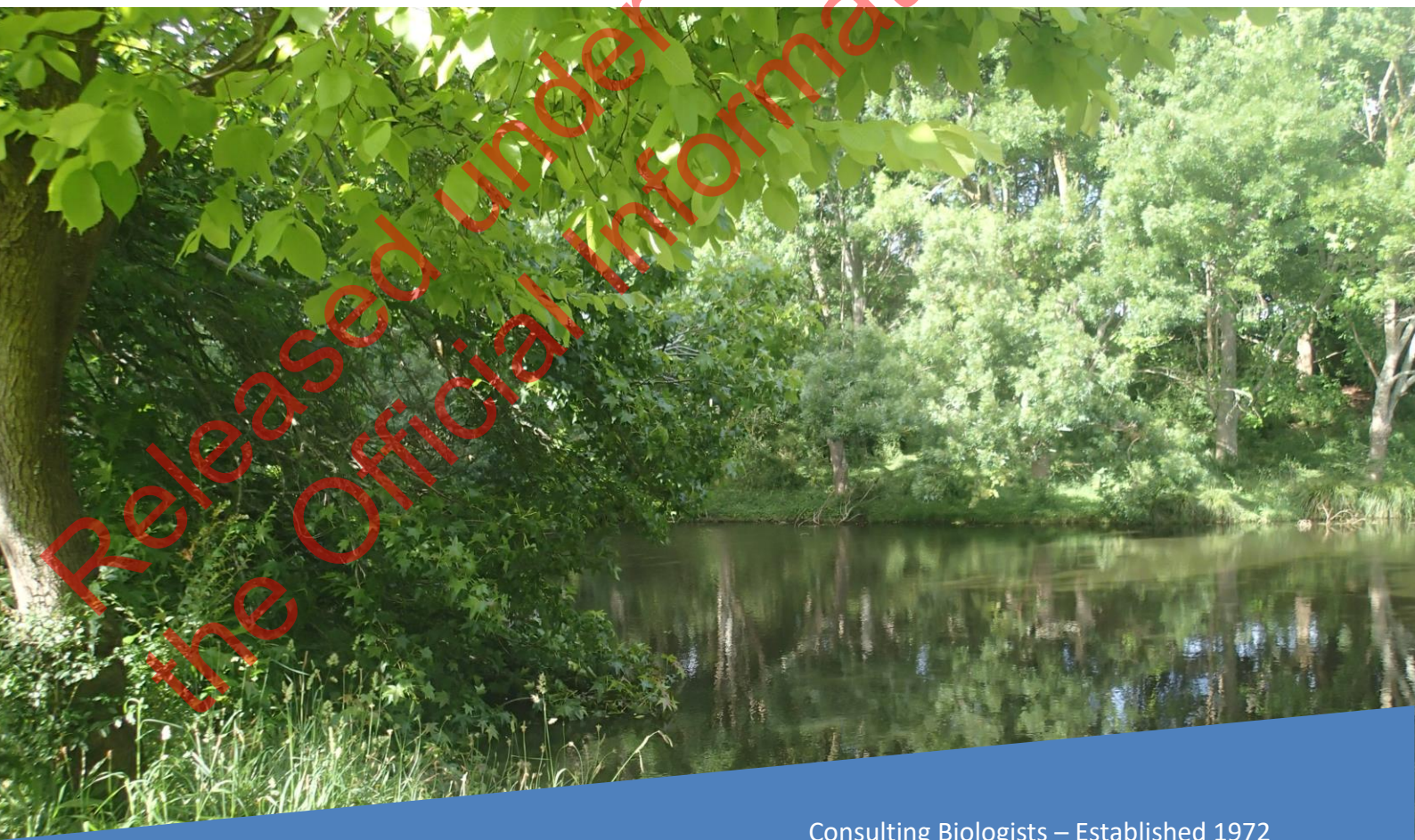
Karaka North Village – Ecological Assessment

June 2020



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Karaka North Village – Ecological Assessment June 2020

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Cover Illustration: Karaka North Village central pond, Dec 2019.

CONTENTS

1. INTRODUCTION

Karaka North Village Limited proposes to develop a residential village on the properties 69A Dyke Road and 348 Linwood Road, Papakura (Karaka North Village) under the provisions of the Karaka North Precinct. This will initially consist of a 14 lot superlot subdivision (with no physical works intended) and accompanying masterplan showing the ultimate development of up to 850 residential sections.

The site is roughly square, bounded by the Whangamaire Stream estuary and Dyke Road Esplanade Reserve to the west, Linwood Road to the south, Dyke Road to the east and 101 Dyke Road to the north (Figure 1).

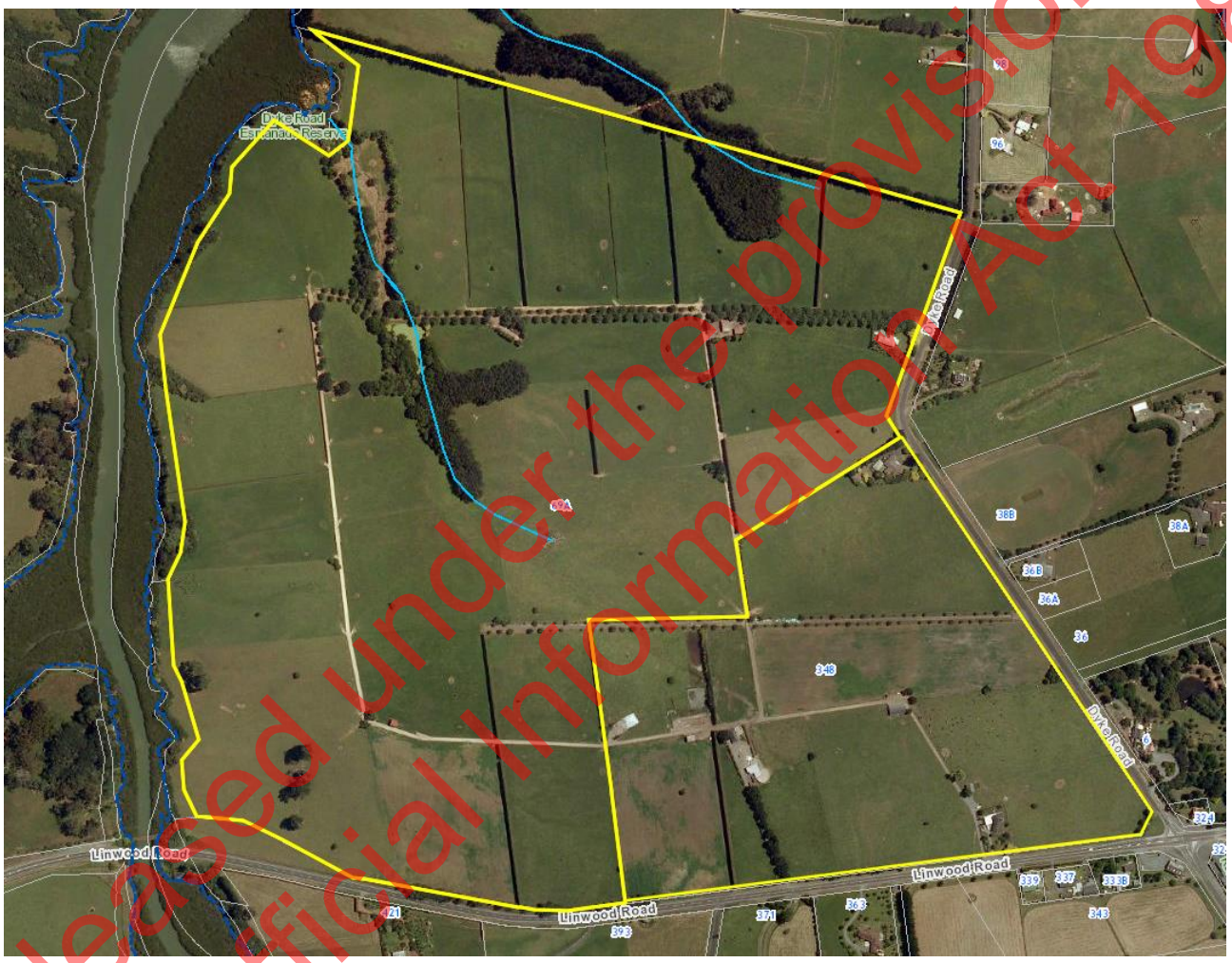

Figure 1. Proposed Karaka North Village development site.

The development proposes a new rural residential village with areas of open space, retaining rural amenity and character.

2. SIGNIFICANT NATURAL AREA OVERLAYS

The western boundary of the site is subject to two Significant Ecological Area (SEA) overlays. The coastal vegetation within Dyke Road Esplanade Reserve is covered by a SEA-Terrestrial and the Whangamaire Stream estuary is part of the Coastal Marine Area (CMA) and is covered by a SEA-Marine (Figure 2).

Figure 2. Auckland Council GeoMaps Significant Ecological Area overlay on adjacent to the development site.

The SEA on the Esplanade Reserve is designated SEA_T_4499, for factors 2, *Threat Status and Rarity* and 4, *Stepping-stones, migration pathways and buffers* (AUP, Schedule 3).

The adjacent SEA on Whangamaire estuary is designated SEA-M2-29a, which also covers Drury Creek, Bottle Top Bay and the southern shores of Pahurehure Inlet. AUP Schedule 4 Significant Ecological Area SEA-M2-29a lists the values of the area as:

Creeks and intertidal habitats

*This area is comprised of a variety of intertidal habitats ranging from sandy mud intertidal flats, to current-exposed rocky reefs and a variety of saline vegetation. Healthy and often expanding areas of mangroves grow in the shelter of the Whangamaire Stream, and Drury and Whangapouri Creeks and in the southern half of the Whangapouri Creek are notable eelgrass (*Zostera*) beds. Drury Creek is comprised of a variety of intertidal habitats ranging from sandy mud intertidal flats to current-exposed rocky reefs and a variety of saline vegetation. Wading bird roosting area, including important area for pied stilt.*

3. SITE ASSESSMENT

A site walkover and watercourse classification survey of the proposed Karaka North Development was conducted by an experienced freshwater and coastal ecologist on 3rd of December 2019. The aquatic habitats and flow paths identified on the Auckland Council GeoMaps Catchment and Hydrology Overlay were ground- truthed on the site, and were classified in accordance with the definitions of the Auckland Unitary Plan – Operative in Part (AUP). Photographs were taken and notes were made on the extent of the aquatic habitats and their ecological quality, including width, substrate type, vegetation, riparian cover and habitat-limiting factors. Watercourse extents, along with other notable features, culverts, and flow paths were marked using a handheld GPS unit. Avifauna was recorded opportunistically during the site survey, and areas containing woody debris and other suitable habitat for herpetofauna was noted.

The rainfall in the catchment within the previous four days exceeded 20mm, as recorded at the nearest Auckland Council Environmental Monitoring Rainfall data site – Karaka Lysimeter (Appendix 1), with 7.5mm recorded in the previous 24 hours. Although the classification was carried out at the very beginning of summer, this degree of recent rainfall allowed the classifications to be carried out with a high degree of confidence.

The results of the classifications were presented to Karaka North Village and informed the design of the proposed development.

4. AQUATIC HABITATS

4.1 Stream Classifications and Wetlands

The Auckland Council GeoMaps Catchments and Hydrology Overland Flow Paths overlay, for catchments of 4000m² and above are presented as Figure 3. These pathways can be indicative of permanent and intermittent streams, but require a site assessment against the criteria in the AUP for permanent and intermittent streams (ground-truthed) to determine if streams are actually present. Figure 3 provides the numbering of the flow paths used in the classification assessment and referred below, Table 1 provides the detail of the classifications and Figure 4 provides a summary map of the watercourse classifications.

Representative photographs of each of the number flow paths are provided in Appendix 2.

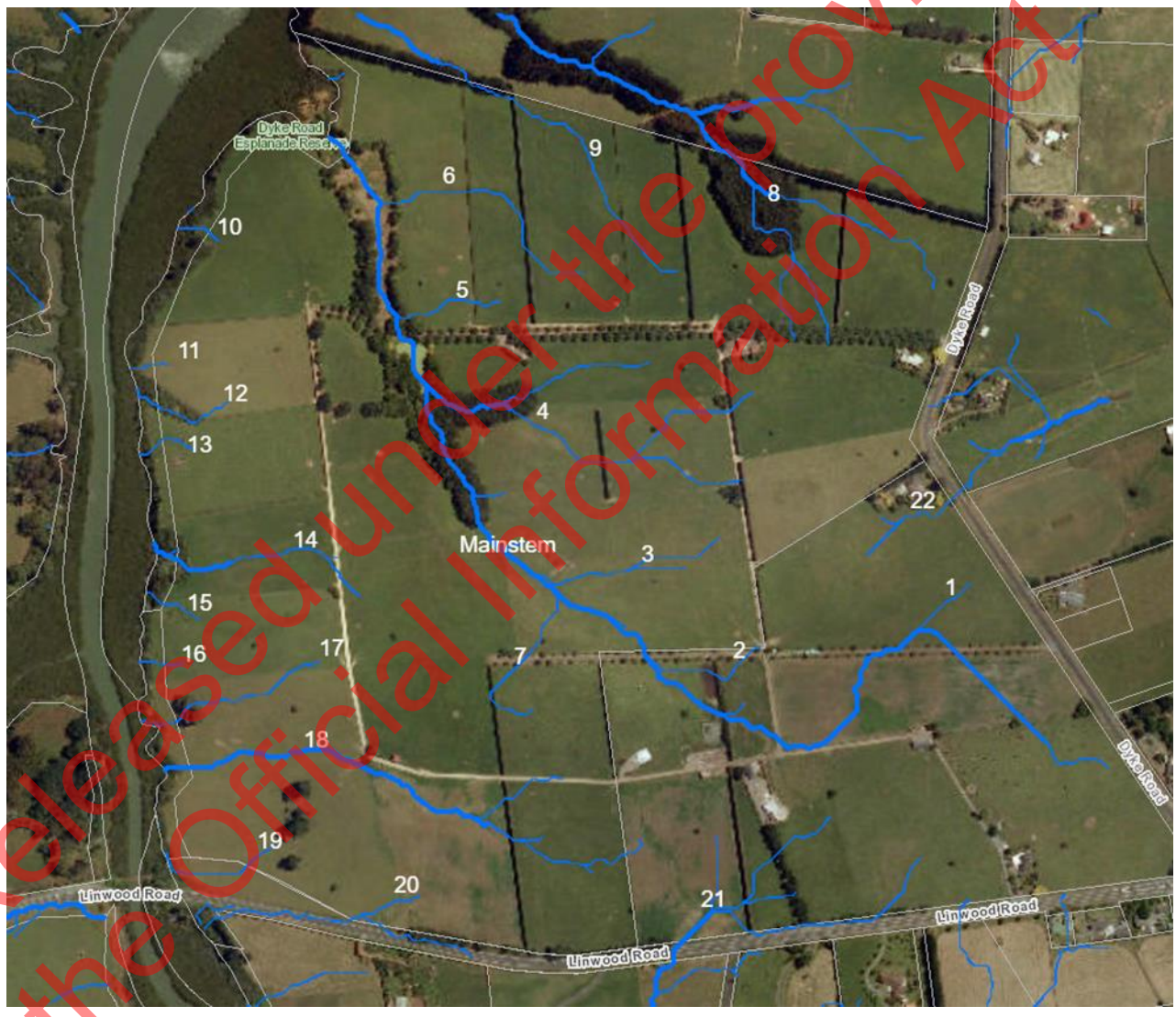

Figure 3. AUP predicted flow paths (Auckland Council GeoMaps, overland flow path overlay). Mainstem central watercourse and numbered flow paths.

Table 1. Summary of classification of AUP predicted flowpaths on Karaka North Development Properties.

Stream description or number (refer to Figure 3)		Classification
		OFP = overland flow path - not a stream
Mainstem - above the farm treatment ponds		OFP
Mainstem - between the ponds and the bush		
	Cleared overland flow path to grate near Oak lined access road	Not a stream
	From broken pipe below access road to 150m down from pipe	Occasional small patches with stream like characteristics; mostly OFP
	Final 115m to fence-line	OFP
Mainstem - from bush edge to Whangamaire Stream Estuary		Stream & Ponds
Mainstem Tributaries		
	1	OFP
	2	OFP
	3	OFP
	4	OFP into bush, intermittent stream within the bush, true left branch with some channel incision up to 8m just before fence line but terrestrial vegetation throughout (except where pugged); true right branch, overland flow path but signs of pugging.
	5	OFP
	6	OFP
	7	OFP
Northern and Western Boundary tributaries, clock-wise from Dyke Road (NE corner)		
	8	All minor tributaries OFP to within 20m of the boundary fence
	9	OFP
	10	OFP
	11	OFP
	12	OFP into bush, intermittent stream within bush
	13	OFP
	14	OFP into bush, intermittent stream within bush
	15	OFP
	16	OFP and potentially intermittent wetland
	17	OFP
	18	OFP with three patches of marginal aquatic habitat
	19	OFP
Southern and Eastern Boundaries clockwise from Linwood Road Bridge		
	20	OFP
	21	OFP, including all tributaries
	22	OFP

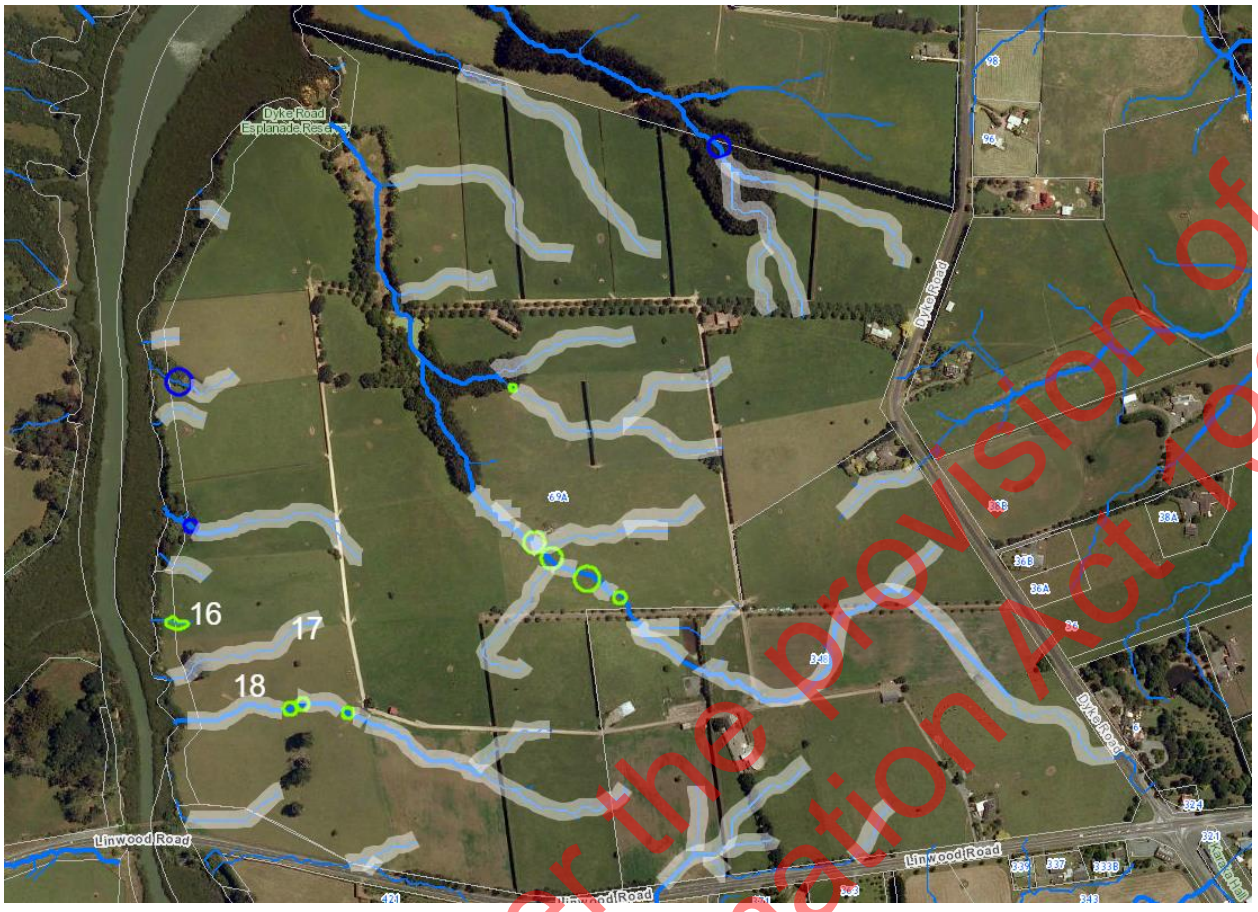

Figure 4. Ground-truthed Classifications of AUP Overland Flow Paths Overlay. Aquatic habitats (blue); overland flow paths i.e. not a stream (white), wetlands or areas with small patches of hydrophytic vegetation (green).

With the exception of the central Mainstem watercourse, below the treeline, which formed a permanent stream, five areas on the property provided indeterminate habitats (Figure 5 to Figure 9), and the lower reaches of three tributaries formed intermittent streams, tributaries 8, 12 and 14 (Figure 8 and Figure 9).

The areas of indeterminate habitat were:

- Mainstem central reach below the Oak lined farm access, downstream of a broken pipe – some boggy ground separated by a fence area of grass and dock (Figure 5);
- Several small boggy patches below this site in the central flow path, with 10% or less cover of water pepper (green circles in Figure 4 and Figure 5);
- Tributary 4, true left branch just before treeline with some channelization (Figure 6);
- Tributary 16 near the boundary fence which formed a boggy area, but with only 10 – 50% vegetation indicative of a wetland (Figure 4, Figure 7);
- Lower third of Tributary 18, two small boggy areas with a low presence of vegetation indicative of a wetland and a short area of channelisation. The upper patch was induced by vehicle ruts in the access track to the south–western paddock where it crossed the flow path, and the second patch was located on a hillock approximately 115m up the catchment from the estuary. Immediately below

the hillock was a 4m channelised area before the area reverted to a grassy overland flow path (Figure 7).

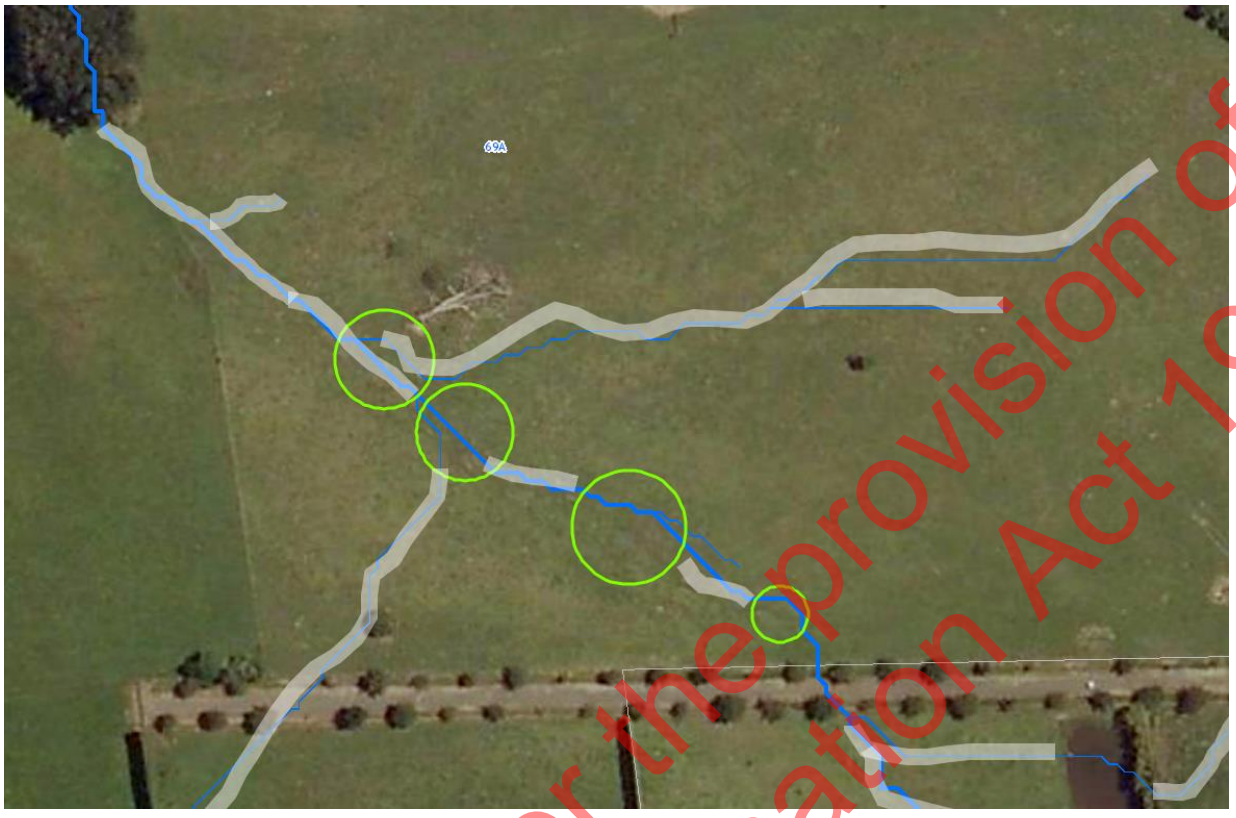

Figure 5. Mainstem watercourse downstream of dairy shed treatment ponds (GeoMaps)

Figure 6. Tributary 4, left branch, indeterminate start of intermittent stream.

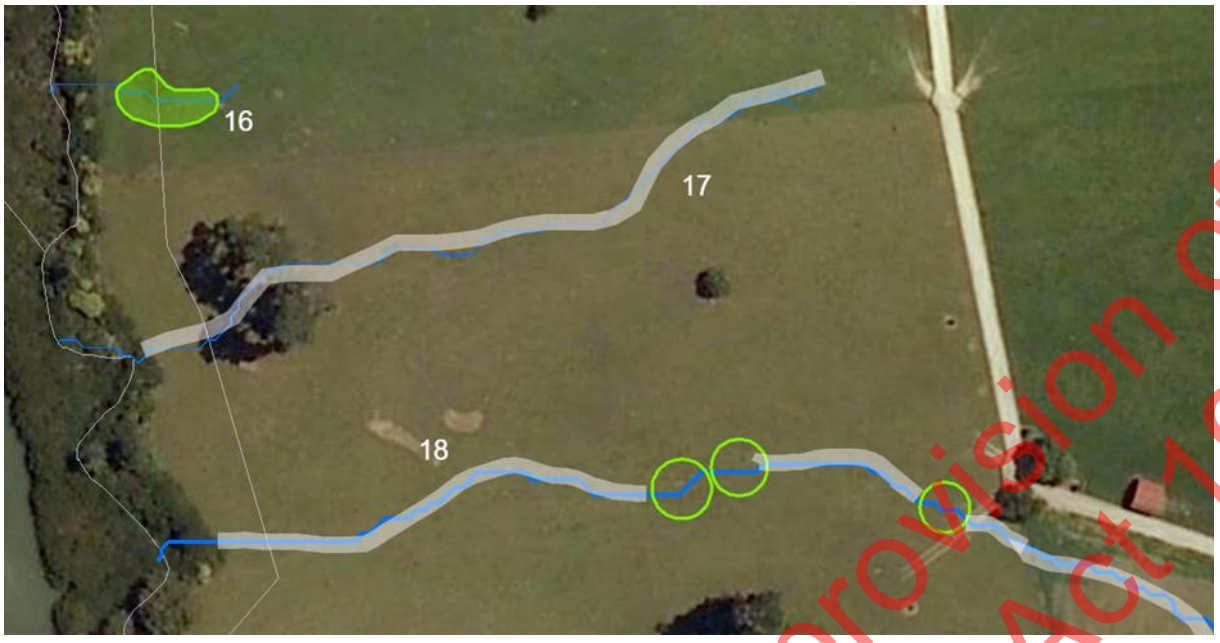

Figure 7. Tributary 16 – potential intermittent wetland and Tributary 18 identifying areas of marginal aquatic habitat.

Figure 8. Tributary 8 – North-east corner and start of intermittent stream (blue circle).

Figure 9. Tributary 12 and Tributary 14 start of intermittent stream sections (blue circles).

4.2 Central Watercourse and Pond

The central watercourse formed defined channels at or within the bush areas fenced off upstream of the pond. The main stream originated in a defined pool (1-2m wide by 4m long) with starwort (*Callitriche stagnalis*) 4m upstream from the bush fenceline. Within the bush it formed a narrow incised channel, with high shading (Photo 1). The riparian vegetation comprised poplar (*Populus* species), privet, rank grasses, Yorkshire fog (*Holcus lanatus*) and redwoods (*Sequoia sempervirens*) A second, mainly dry intermittent stream flow path was present with the eastern tongue of bush. The streams flowed north and north-west to a large pond in the centre of the site (refer cover photo).

Photo 1. Upper section of central watercourse within the fenced bush area.

The pond is roughly triangular with an approximately 40m wide base adjacent to the access road tapering approximately 60m to the streams. The pond is shaded by established trees (redwood, poplar, oak *Quercus robur*). Common birds were seen utilising the pond, for feeding and breeding and it is expected that shortfin eels (*Anguilla australis*) will be present, and potentially banded kōkopu (*Galaxias fasciatus*) in the shaded stream reaches upstream of the pond. There were no indications (scums, odour, dominance by exotic macrophytes) of poor water quality and temperature control is provided by both the high shading of the upstream watercourses and the established trees surrounding the pond.

Downstream of the access track, the flow path drops approximately 5m over large boulders to form a stream initially 1.2m wide, narrowing to approximately 0.8m wide, then 220m to the boundary of the property before flowing 55m through the esplanade reserve to the CMA. The riparian vegetation in the immediate vicinity of the stream comprised rank grasses and gorse.

4.3 Indeterminate aquatic habitat and potential wetland

In the south-western section of the property two areas of indeterminate potential wetland habitat were present.

At Tributary 16 near the boundary fence a boggy area was present grading from 10% to 50% hydrophytic vegetation i.e. vegetation indicative of a wetland. The area was dominated by pasture grasses with 10 – 50% exotic soft rush, *Juncus effusus,* Yorkshire fog and buttercup (*Ranunculus* species). The potential of the site if stock are prevented access is indeterminate, as the boggy ground appears to have formed from a damaged overland flow path. The potential of the area as a wetland if stock are removed and the coastal vegetation zone planted is very poor, as it is highly likely to revert to an overland flow path. The area lies mostly within the 20m yard of the CMA.

Photo 2. Boggy ground near fenceline – located mainly within the Esplanade reserve.

Within the lower third of Tributary 18, a patch of boggy habitat dominated by water pepper (*Persicaria hydropiper*) had been induced by vehicle ruts in the access track where it crossed the flow path.

Photo 3. Lower tributary 18, small area of induced boggy habitat with water pepper

Downstream, within the lower part of the Tributary 18 flow path, approximately 120m from the property boundary, a small isolated boggy area was present on a hillock. The area was pugged by cattle. The vegetation was pasture grass with a patch of rushes comprised of soft rush and fan-flowered rush (*Juncus sarophorus*) (Photo 4). The potential of these two small boggy areas as wetlands, if the area is re-vegetated with native vegetation is poor, as at both sites it is highly likely the site will revert to an overland flow path without the inducing effects of normal farm practices i.e. vehicles and cattle.

Photo 4. Tributary 19 - raised boggy patch with rushes

5. TERRESTRIAL HABITATS

5.1 Vegetation

The dominant terrestrial habitat on the development site was pasture, as the site is a working farm. Exotic trees dominated by European oak (*Quercus robur*) and London plane (*Platanus* x *acerifolia*) lined the access ways around much of the site (Photo 5), with occasional isolated large pines (*Pinus radiata*) in the southern corner of the property, and isolated oaks and magnolia (*Magnolia grandiflora*) protected within rectangular wooden fencing (Photo 6). Maintained hedgerows, comprised of macrocarpa (*Cupressus macrocarpa*) or privet, occasionally with holly interspersed, were common separating paddocks and along some of the raceways, particularly in the north and west of the property (Photo 7).

Photo 5. Pasture and European oak lined access road

Photo 6. Pasture and isolated magnolia, typical of the site

Photo 7. Pasture, maintained hedge rows, and pines on northern boundary.

Within the central area of the site, either side of the central stream and surrounding the pond a stand of established vegetation was fenced off (refer to front cover photo). The vegetation was dominated by exotic species including, oak, redwood and poplar with the exotic weed species woolly nightshade, Chinese privet. Native vegetation was depauperate with occasional areas of small native ferns lining the channel banks and occasional small māhoe.

Downstream of the pond the riparian area was fenced, with the vegetation dominated by rank grasses with gorse and patches of larger trees, (crack willow *Salix fragilis*, oak) on the outer extents of the riparian area (Photo 8).

Photo 8. View through riparian zone of lower Mainstem (stream path running left to right in the centre of the photo)

The bush around the northern intermittent stream was dominated by privet with occasional larger pine.

The coastal esplanade reserve and riparian areas on the western boundary were dominated by privet and the exotic ground cover and pest plant tradscantia (*Tradescantia fluminensis*); with the occasional Norfolk pine and poplar; and rarely native vegetation, māpou (*Myrsine australis*), ponga (*Cyathea dealbata*), tarata or lemonwood (*Pittosporum eugenioides*), and ground cover ferns (kiokio, *Parablechnum novae-zelandiae;* pakau, *Pneumatopteris pennigera*). No large native trees or shrubs or stands of native vegetation were present.

The vegetation of the soft intertidal of the Whangamaire estuary is within the Coastal Marine Area (CMA) and was dominated by mangroves (*Avicennia marina subsp. Australasica*).

There are no 'Notable Trees' on the property (Auckland Council, GeoMap, Natural Heritage overlay).

5.2 Terrestrial Fauna

The site is a working farm with cattle throughout. No specific surveys were carried out for terrestrial fauna but all birds were noted throughout the site survey period and habitats were assessed for potential use. A drove of seven hares (*Lepus europaeus*) was observed in the paddock west of the pond outlet.

A list of the birds present on the site in December 2019 are presented in Appendix 3. All of these species were common rural and coastal species, with no rare or 'at-risk' species recorded.

One endemic species was recorded, paradise shelduck, a species considered abundant nationally (Heather & Robertson, 2015). The native species recorded were kingfisher, pūkeko, spur-winged plover, welcome swallow, and white-faced heron; all these species are also abundant on a national basis (Heather & Robertson, 2015).

A pukeko nest with seven eggs was within the riparian vegetation before the central pond (Photo 9), and three mallards were observed with four young ducklings on the pond.

Photo 9. Pukeko nest near the edge of the pond

Although no dedicated reptile surveys were undertaken, potentially suitable habitats for indigenous lizards in the form of woody debris piles, rank grassland, dense hedgerows were identified across the project area. To ensure that the development avoids and minimises the potential adverse effects on protected indigenous lizards that may occur on-site, it is recommended that a Lizard Management Plan (LMP) be prepared and implemented. The LMP should be prepared by an experienced herpetologist who holds a Wildlife Act Authority ('permit') to work with protected indigenous reptiles.

6. ASSESSMENT OF ECOLOGICAL EFFECTS OF PROPOSED DESIGN

6.1 Karaka North Village Design

The masterplan layout for the proposed village is illustrated in Figure 10.

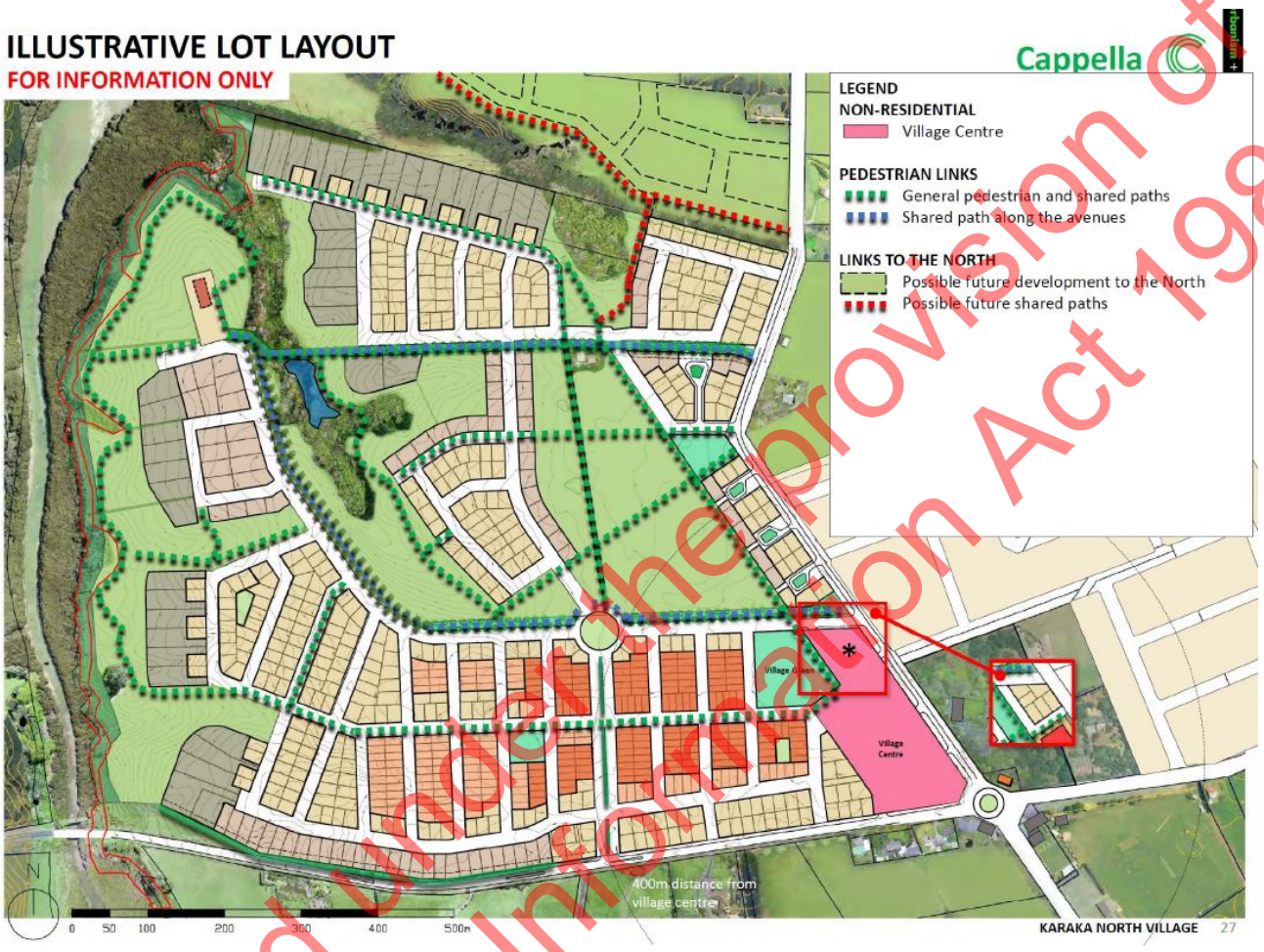

Figure 10. Karaka North Village illustrative lot layout (Source: Cappella, May 2020).

6.2 Assessment of Ecological Effects

The masterplan layout has been designed to avoid all permanent and intermittent streams, and wetlands. All of the intermittent, permanent streams or even small areas of habitat with some hydric vegetation have been avoided in the lot layout.

There are no lots proposed within the esplanade reserve or immediately adjacent to permanent or intermittent streams. There are no works planned within the terrestrial SEA where it extends past the esplanade reserve and into the property.

The large pond in the centre of the site will be retained, avoiding habitat modification and loss, and the potential for significant downstream effects during removal. The pond provides an attractive aquatic habitat and amenity feature, with shaded and open areas, surrounded by established trees. Common birds were seen utilising the pond, for feeding and breeding and it is expected that shortfin eels will be present, and

potentially banded kōkopu. There were no indications of poor water quality and temperature control is provided by the high shading. The culvert under the access road is likely to require modification, and during the detailed design stage improvement of the current climbing fish passage will be addressed.

The larger terrestrial vegetation on the farm is comprised of exotic trees, either oaks or plane trees lining the access ways, or maintained hedgerows comprised of macrocarpa, privet and holly, or isolated amenity trees. There are no areas of native shrubs or trees on the site that will be impacted by the proposed lot design.

The lot design is highly unlikely to have adverse effects on the biodiversity values of the SEAs adjoining the site, and any potential adverse effects could be easily mitigated and turned into positive effects with weed control, pest control and some infill planting of the vegetated areas that sit within the development site. This would have long lasting positive effects on the biodiversity values of both SEAs and positive effects on the extent of the SEA-terrestrial, by vegetative buffering, increased ground cover, increasing filtration of contaminants, and reduction in both plant and animal pests.

The stormwater from the residential lots with be retained on the lots, and by stormwater wetlands within the residential areas. As well as providing for retention and detention the vegetation within the stormwater wetland will provide treatment of contaminants. The discharge from the wetland will be on the property using combination of rock for energy dissipation and vegetation. The green fingers of vegetation at the outlet will provide additional ecological functions, with rough surface areas allowing for further polishing of the water from the site, providing for an increase in the quality of the water leaving the site, as well as provision of habitat for fauna.

6.3 Summary

In summary, the masterplan design avoids streams and aquatic habitats, does not impinge upon the adjacent SEA-terrestrial or SEA-marine and does not adversely affect any other significant ecological habitats. To mitigate potential adverse effects of the development, at the detailed design stage, the following plans and design solutions are recommended:

- Weed Control Plan
- Coastal Vegetation Planting Plan and Stream Riparian Planting Plan, including the provision for maintenance and replacement plantings for a period of at least five years (where these areas sit within the development site).
- Animal Pest Control Plan
- Climbing fish passage design solutions to be incorporated into the pond outlet culvert, to improve the upstream and downstream connectivity.
- Lizard Management Plan

7. APPENDICES

7.1 Appendix 1 – Rainfall

Rainfall Depth – Karaka Lysimeter 3/11/19 -3/12/19 (Auckland Council GeoMaps Environmental Monitoring).

7.2 Appendix 2 - Photographs of flow paths

(refer Figure 1 for flow path number).

Upper Mainstem catchment from corner of Dyke and Lynwood Roads – no streams, no wetlands

Upper Mainstem catchment view from near the milking shed towards Dyke Road – no streams

Upper Mainstem catchment view towards Dyke Road – no streams

Upper Mainstem catchment above dairy shed treatment ponds (located behind the hedge)

Lower of three dairy shed treatment ponds

Cleared flow path from pond to grate – no stream

Catchment to start of the Mainstem (in the trees in the centre background) – no streams

Overland flow path to start of the Mainstem (within trees in background) – no stream

Start of Mainstem Stream- a pool with aquatic habitat 4m from the fence line

Mainstem stream within treeline – permanent stream

Mainstem Pond

Tributary 4 flow path, some pugging - no streams

Tributary 5 flow path - no stream

Tributary 6 flow path – no stream

Tributary 7 flow path - no stream

Tributary 8 flowpath – no streams before bush

Tributary 8 – start of intermittent stream just before property boundary fence

Tributary 9 flow path – no streams

Tributary 10 flow path - no streams

Tributary 11 flow path – no stream

Tributary 12 – intermittent stream within bush area

Tributary 12 flow path – no stream outside of fenced bush

Tributary 13 flow path – no stream

Tributary 14 flow path at fenceline – no stream

Tributary 16. Area with low presence of Juncus effusus and buttercup

Tributary 17 near fenceline – no stream

Tributary 18 Upper catchment - no stream

Tributary 18 - water pepper in flow path near access crossing

Tributary 18 – patch of rushes and pugged ground

Tributary 18 view towards Whangamaire Stream Estuary – no stream

Tributary 22 – no streams

7.3 Appendix 3 - Bird Species Recorded

Common Name	Status	Scientific Name
Blackbird		*Turdus merula*
Chaffinch		*Fringilla coelebs*
Housesparrow		*Passer domesticus*
Kingfisher	N	*Todiramphus sancta vagans*
Mallard		*Anas platyrhynchos*
Myna		*Acridotheres tristis*
Paradise shelduck	E	*Tadorna variegata*
Pheasant		*Phasianus colchicus*
Pūkeko	N	*Porphyrio porphyrio melanotus*
Spur-winged plover	N	*Vanellus miles novaehollandiae*
Welcome swallow	N	*Hirundo tahitica neoxena*
White-faced heron	N	*Ardea novaehollandiae novaehollandiae*

E = endemic, N = native, remainder are introduced species