STORMWATER MANAGEMENT PLAN

To:
AUCKLAND COUNCIL

On behalf of:

GOLDING MEADOW DEVELOPMENTS LTD & AUCKLAND TROTTING CLUB INC

Golding, Yates & Station Road
Pukekohe

REVISION D

NOVEMBER 2021
BSL REF: 4294

Stormwater Management Plan – Golding Road Plan Change				
Date	**Version**	**Description**	**Prepared by**	**Reviewed By**
18-V-2021	A	Final Consultation	K Bosgra	Sir W Birch
09-VI-2021	B	Submission	K Bosgra	Sir W Birch
08-VII-2021	C	Catchment Update	K Bosgra	Sir W Birch
03-XI-2021	D	Zoning Update	K Bosgra	Sir W Birch

REPORT PREPARED BY	REPORT REVIEWED BY	REPORT AUTHORISED BY
		
KELLY BOSGRA REGISTERED PROFESSIONAL SURVEYOR	SIR WILLIAM BIRCH REGISTERED PROFESSIONAL SURVEYOR	SIR WILLIAM BIRCH 18 MAY 2021

BIRCH SURVEYORS LTD
Property House
2A Wesley Street, Pukekohe
PO Box 475, Pukekohe 2340, New Zealand
Telephone: 64 9 237 1111
Website: www.birchsurveyors.co.nz Email: applications@BSLnz.com

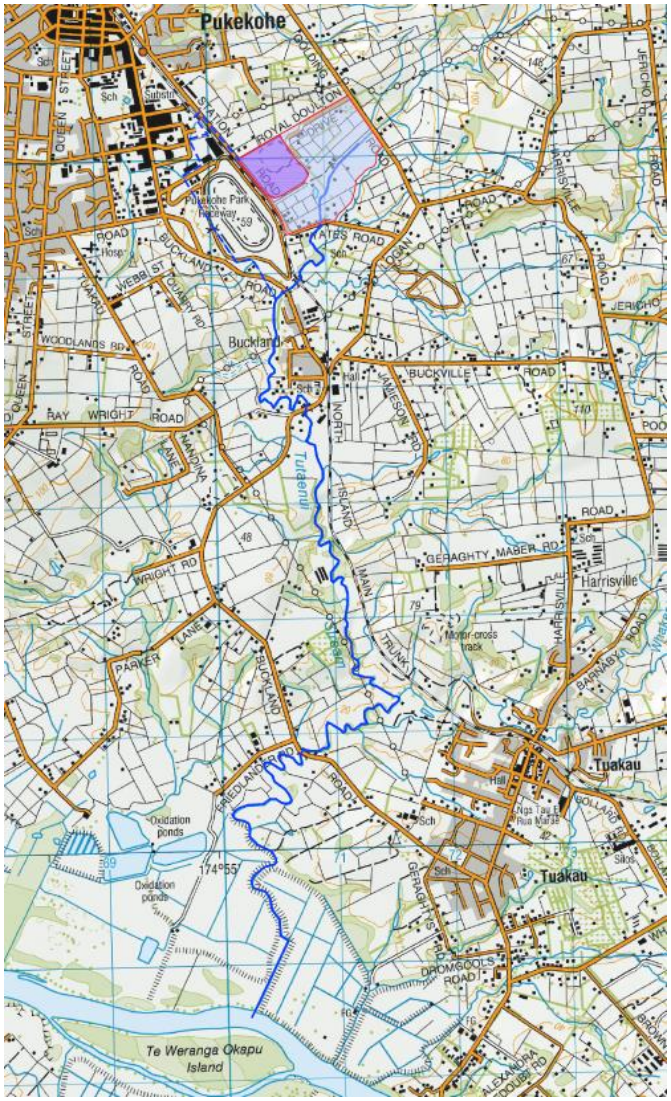
CONTENTS

APPENDICES

EXECUTIVE SUMMARY

The purpose of the Stormwater Management Plan is to support the Golding Road Plan Change and provide guidance on how the stormwater and existing freshwater system are to be managed when developing within the plan change area. This Stormwater Plan shows has been developed to achieve consistency with the objectives and policies of the Auckland Unitary Plan as well as Auckland Council's Guideline Documents and industry best practice options.

The Plan Change Area is located within the Pukekohe South-Tutaenui Stream Catchment, and is located south of Pukekohe and east of Buckland. This is a unique catchment within Auckland, as it drains to the Waikato River



The Stormwater Management Plan seeks to establish a cohesive approach to the management of stormwater runoff by specifying controls on the quality and quantity of the runoff and requiring ecological enhancements including:

- Identify Best Practice Options for Stormwater treatment for the development area
- Promote Water Sensitive Design to mitigate adverse effects of development on the receiving environment
- Minimise discharge of contaminants into the receiving environment
- Protect and improve existing freshwater systems
- Not worsening downstream flooding

Proposed methodologies to achieve the above outcomes include:

- Inert Roofing Materials to be utilised
- Provide for stormwater treatment either at source or within a centralised wetland or raingarden. Specific treatment to target business zone runoff contaminants.
- Provide for SMAF-1 equivalent hydrology treatment for all impervious areas
- Provide attenuation for 2yr ARI Rainfall event
- Utilise a Pass flows Forward approach for larger storm events to avoid superposition of peak flows.
- Reinstate natural habitat to degraded stream channel
- Remove existing culverts from streams and daylight piped streams

1 EXISTING SITE APPRAISAL

The Site appraisal was undertaken using data available from Council and other Consultants as well as site and catchment data collected reviewed or verified by Birch Surveyors. A summary of the existing site features, characteristics and sources of information is outlined in this chapter

1.1 SUMMARY OF DATA SOURCES AND DATES

Existing site appraisal item	Source and data of data used
Topography	Waikato District Council 0.5m LIDAR Contours & Auckland Council 0.5m LIDAR Contours
Geotechnical / soil conditions	S-MAP Soils Portal Geotechnical Feasability Assessment by GCL (2021) Paerata-Pukekohe Structure Plan: Geotechnical Assessment by Riley Consultants (2018)
Existing stormwater network	Auckland Council GeoMaps
Existing hydrological features	Auckland Council GeoMaps Paerata Pukekohe Future Urban Zone Structure Plan: Stormwater Management Plan by WSP OPUS (2019) Site inspections undertaken by Birch Surveyors (2020)
Stream, river, coastal erosion	Auckland Council GeoMaps
Flooding and flowpaths	Auckland Council GeoMaps
Coastal inundation	Auckland Council GeoMaps
Ecological / environmental areas	Golding Road Private Plan Change Ecological Assessment by JS Ecology (2021)
Cultural and heritage sites	Historic Heritage Assessment: Pukekohe-Paerata Structure Plan by Auckland Council (2017)
Contaminated land	Technical Investigation Contamination Assessment: Paerata-Pukekohe Future Urban Zone by Riley Consultants (2018)

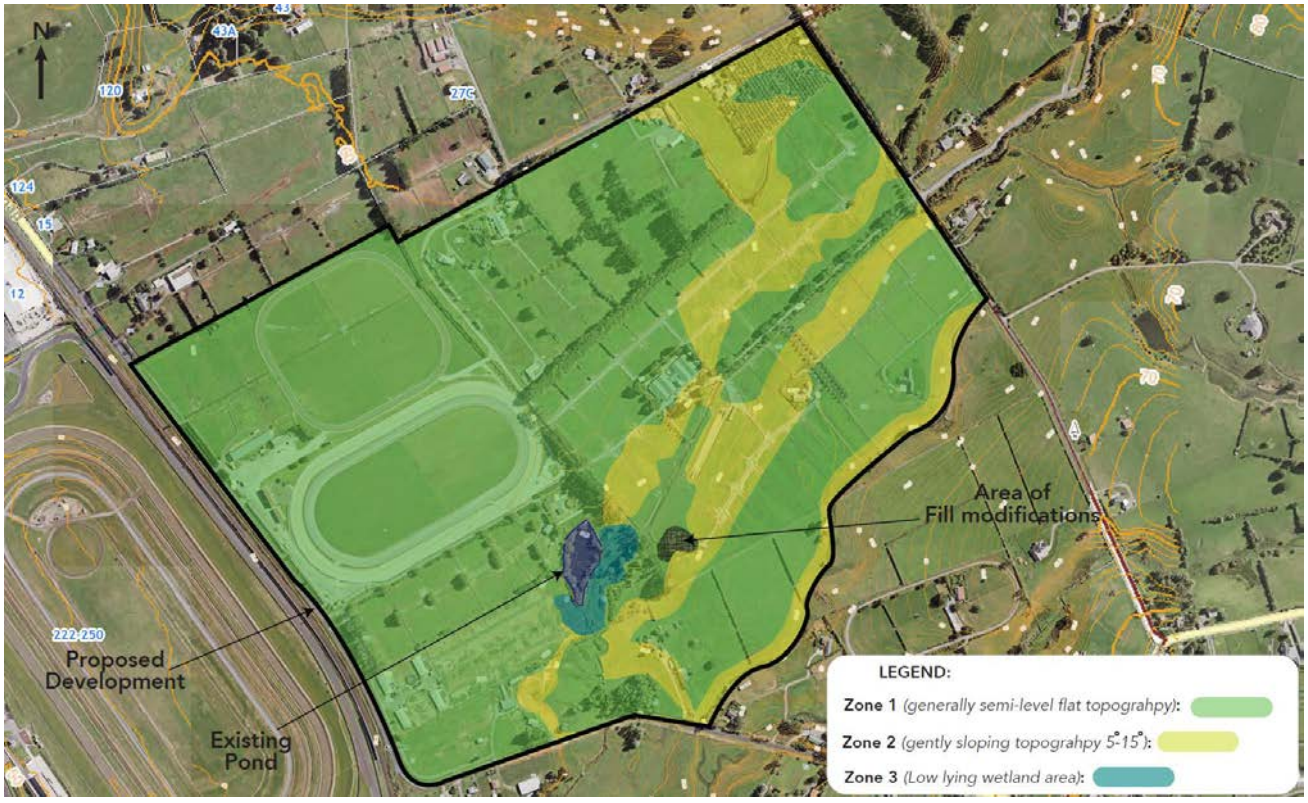
1.2 LOCATION AND GENERAL INFORMATION

The proposed Golding Road Plan Change area is within the Pukekohe Future Urban Zone and the Pukekohe-Paerata Structure Plan Area. It is located at the eastern end of Golding/Yates and Station Road approximately 1.2km south-east of the Pukekohe Train Station

Existing site element	
Site address	152, 154, 156, 158, 160 & 162 Golding Road 240 & 242 Station Road 27 & 49 Yates Road 17, 25, 27, 27a & 27d Royal Doulton Drive
Legal description	Lot 1 DP 62593, Lot 1 DP 97787, Lots 8 & 9 DP 102609, Lots 1 & 2 DP 147918, Lots 1-6 DP 437089, Lot 1 DP 443991 and Lot 6 Deeds Plan 70
Current land use	Rural Lifestyle, Orchard, Grazing and Horse Training
Current building coverage	<7% (13.5% impervious coverage)
Historical land use	Predominantly Pastoral use & Grazing

1.3 TOPOGRAPHY

The site is generally of flat contour, falling from north to south, from Golding Road to Station Road / Yates Road. It is bisected by an unnamed tributary of Tutaenui Stream, and bounded to the east by a further sub-tributary. The topography of the site predominantly comprises two types of terrain. These are: flat to level areas adjacent to the streams and is characterised with gradients of less than 5°, and isolated elevated areas of moderate slopes between 5° to 15°.

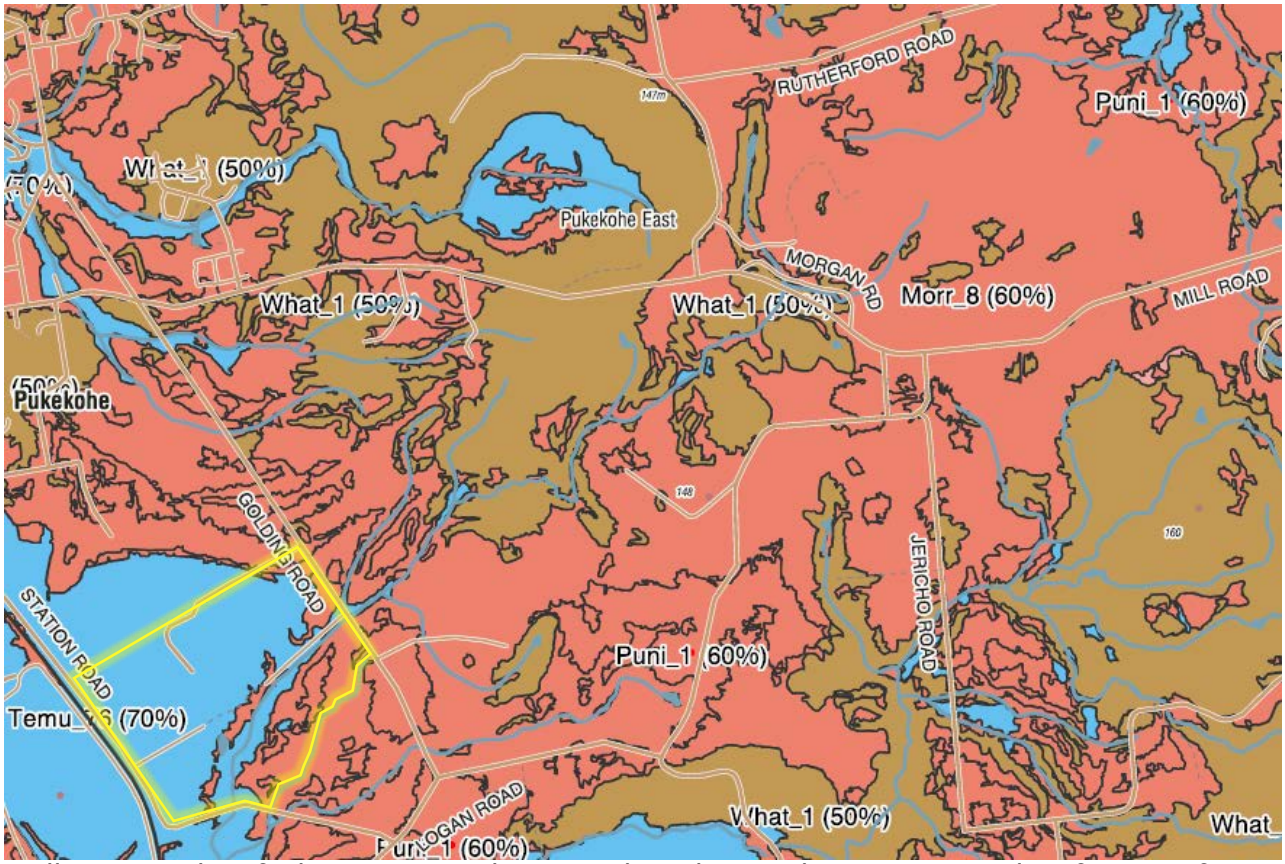


Ultimately, there are no topographical constraints with future development with the bulk of the site underlain by flat to semi-level topography.

1.4 GEOTECHNICAL

A Geotechnical assessment has been carried out by Ground Consulting Ltd (GCL) and outlined in their report "Golding Meadows Development Ltd & Auckland Trotting Club Inc. – Geotechnical Feasibility Assessment for a Proposed Plan Change" dated 27 November 2020. The feasibility study found that the low lying and topographically flatter areas are Alluvium deposits, and the elevated areas are weathered volcanic ash associated with the South Auckland Volcanic field and confirm that the site mapping is consistent with the published geology. The net effect of these findings is that the site has two distinct geological qualities that need to be considered when designing the stormwater treatment. The Geotechnical Report identifies the Alluvium as Zone B and the Volcanic Ash as Zone A.

The Volcanic Ash is identified as Zone A and consists of the elevated ground of gentle to undulating contour. The Soils Portal; S-Map defines this area as having a 50:50 ratio Morrinsville*f* (DSIR Soil Series Classification of Patumahoe Clay Loam - Air Fall Volcanic Ash) and Puni*f*. These are generally Granular Loams, from air fall volcanic ash and belong to Hydrological Soil Group A and Group B respectively. These soils are considered as 'good' ground, suitable for soakage structures and also have low liquefaction potential. This means that soakage is a viable option as part of the stormwater treatment within Zone A.



The Alluvium is identified as Zone B in the Geotechnical report have an S-Map classification of Temuka*f* Soils and has an historic DSIR Soil Classification of Ardmore Peat. These are poorly drained soils with a Hydrological Soil Classification as Class D and is although considered as suitable for residential and light industrial development, it has significant site constraints including a "Moderate to High" liquefaction potential and "moderate to High" settlement potential and as such soakage is not feasible in such soils. This means that retention for this zone can only be through reuse and if reuse is not viable, then any required retention volume must be included within detention volume.

1.5 EXISTING DRAINAGE FEATURES AND STORMWATER INFRASTRUCTURE

The site is bisected by a main tributary of the Tutaenui Stream, which drains an upstream catchment of 325Ha and a further sub-tributary network that drains a catchment of 90Ha that adjoins the site, which has its confluence with the main tributary within the southern portion of the site.

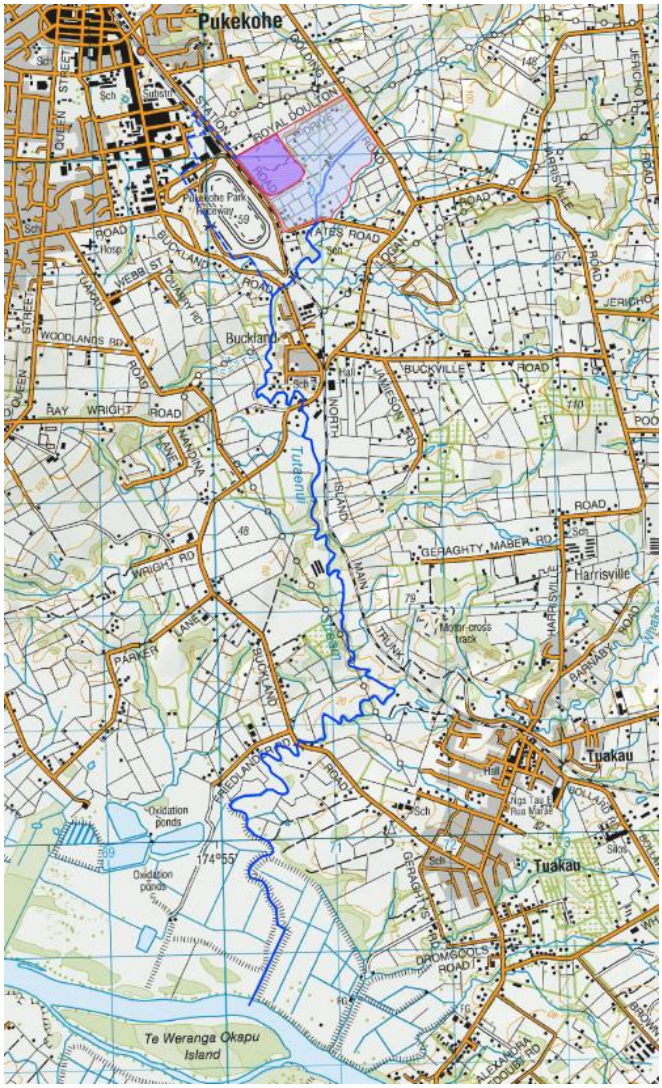
The site contains two artificially created ponds (one being intermittent) and an intermittent stream which has been pipes at some point in the past. The remaining water features consist of farm drainage having been excavated over time to assist with land management.

There is no existing public stormwater infrastructure within the site, however there are existing public infrastructure immediately upstream and downstream of the site in the form of Culverts under Golding and Yates Roads, and other culverts along Station Road. Private infrastructure within the site includes culverts across the main tributary and other drains as well as the piping of a portion of the intermittent stream. The pipe appears to have been installed in 1987.

1.6 RECEIVING ENVIRONMENT

1.6.1 RIVERS, STREAMS LAKES

Most of the site is drained by an unnamed tributary of the Tutaenui Stream, and has its confluence with the Tutaenui Stream, north of Buckland township. A small western portion of the site drains north along Station Road along existing open drains and pipes and ends up in the Tutaenui just north of the Pukekohe Park Raceway



The Tutaenui then flows on the western side of Buckland towards to south, generally following the railway. The Tutaenui flows into the Whakapipi Stream north of Tuakau, and then flows in a westerly direction discharging into the Waikato River, which flows to the Tasman Sea.

1.6.2 AQUIFERS

There are believed to be two aquifers underlying the site. A shallow basalt aquifer, being part of the Pukekohe Central Volcanic aquifer, and the deeper Pukekohe Kaawa sandstone aquifer.

The Unitary Plan identifies the Pukekohe Volcanic aquifers as High Use Aquifer Management Areas and water takes are carefully managed or discouraged from this aquifer. The deeper Kaawa Aquifer is not subject to this overlay.

Soakage is not recommended for the western portion of the site, identified as Zone B in the Geotechnical Report due to “Moderate to High” liquefaction potential, as introducing more water into these soils will further compromise development. Soakage is considered suitable for the eastern portion of the site, identified as Zone A in the Geotechnical Report. Utilising infiltration devices in this area recommended will assist in the goal to ensure adequate baseflow for the continued health of the aquifer and nearby streams.

Although Soakage is not recommended in Zone B, where any stormwater devices have sufficient clearance to nearby buildings and infrastructure, infiltration should be provided where not impractical, in accordance with Water Sensitive Design principles.

1.7 EXISTING HYDROLOGICAL FEATURES

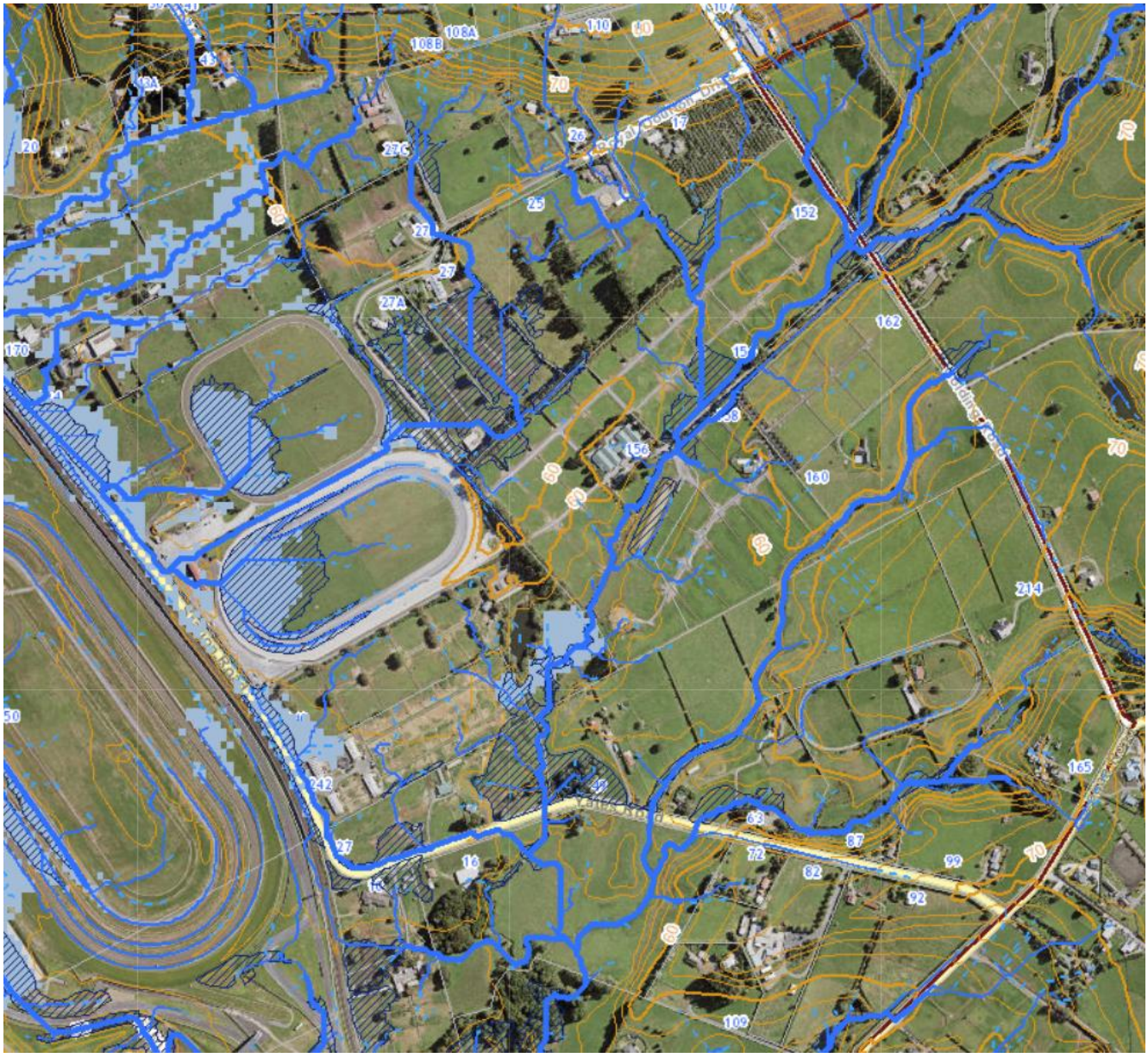
Existing natural hydrological features consist of the existing streams (permanent and intermittent) as well as the two small wetlands near the southern end of the site as identified in the Ecological Report. Existing artificial hydrological features include the two ponds (one being intermittent) created for stormwater and water reservoir purposes and numerous farm drains to assist with land management.

An inspection of the drainage system within Station Road shows a very convoluted and complex system of open drains and small culverts, and runoff is conveyed up, down and across Station Road, with drains flowing in different directions on both sides of the road. We noted that the drains are all connected and the culverts are all measured as being 300mm, except a main culvert at the northern end of Station Road, where this is 750mm. Maintenance of this open drain network is not readily apparent, as a number of culverts appear blocked or partially blocked and the drains are likewise shallow & silted up, and contain dumped rubbish & standing water. These all affect the hydraulics of the drains, and we note that given that limited capacity of the culverts and drainage network, the majority of the runoff will travel as overland and be directed alongside the road.

The Golding Road Culvert at the exit of the site is a 3.0 x 3.2m box culvert. Preliminary calculations show that this may not ordinarily convey the flood flows, however Yates Road acts as an embankment, creating an informal detention pond and modelling shows that the incidental detention allows the culvert to cope with the otherwise excessive flows. Upgrades to this culvert is not currently proposed. This may need to be reassessed upon detailed engineering design.

1.8 FLOODING AND FLOWPATHS

Auckland Council GeoMaps summarise anticipated flowpaths and extent of the expected flooding in a one in a hundred year rainfall event:



Council has undertaken some flood modelling for this catchment, as reference to this is made in the WSP|OPUS "Paerata Pukekohe Future Urban Zone Structure Plan: Stormwater Management Plan" We have received updated Flood Data from Healthy Waters for this site and the data supplied while more complete that the information initially supplied appears to be missing some hydrological data and flow inconsistencies. Notwithstanding this, the data above from GeoMaps does identify low lying and flood prone areas, highlighting stormwater management will be required to address potential stormwater and flood flows. We are willing to work with Healthy Waters to ensure flood information for the pre-development scenario is as accurate as possible, and will collaborate to ensure the optimal outcome is achieved.

Upon inspecting the data, it is apparent that overland flowpaths generally follow the natural streams and drains within and around the site. the largest of the overland flows generally follows the main tributary. This overland flow will be maintained and improved as part of the proposed stream remediation works. The flood plains also generally follow the same drainage pattern, with the

addition of localised depressions due to previous land modifications. This is most apparent within the horse trotting/training tracks, as these have been constructed with outside banking, effectively creating a ponding area and holding water in large storm events. The ultimate development of the property will create elevated development sites with the roading network forming part of the overland flow system to safely convey excess surface water to the receiving environment eliminating the small, localised ponding areas.

1.9 COASTAL INUNDATION

The site is not within the Coastal Area and coastal inundation is not relevant to this Plan Change.

1.10 BIODIVERSITY

The Ecological report from J S Ecology identifies that the site has been heavily modified with minimal natural habitat remaining. This is concentrated mainly in the relict native kahikatea stand at the southern end of the site and this is where the main tributary has had the least modification. The eastern tributary has suffered fewer physical modifications however it has suffered a loss of habitat and riparian plantings.

J S Ecology recommends a number of positive environmental enhancements are undertaken as part of the development. These include protecting existing kahikatea stand is and to restore the surrounding wet areas to improve the biodiversity and health of this ecosystem. That the main tributary and the eastern tributary is enhanced and riparian planting undertaken, with all enhancement planting be locally sourced.

1.11 CULTURAL AND HERITAGE SITES

Consultation with Ngati Tamaoho has been undertaken and no specific cultural sites have been identified within the plan change area. Chapter 4 details further consultation and proposed methods of conformity with mana whenua and Iwi guidance. The Heritage Report also does not identify any historic sites within the plan change area.

1.12 CONTAMINATED LAND

The Contamination Assessment report undertaken by Riley Consultants as part of the Pukekohe-Paerata Structure Plan does not identify any HAIL activities have been undertaken within the plan change area, and as such, the area is not considered as containing contaminated land.

2 DEVELOPMENT SUMMARY AND PLANNING CONTEXT

2.1 REGULATORY AND DESIGN REQUIREMENTS

Auckland Council has a number of general regulatory and specific stormwater policies, standards, guidelines and documentation regarding stormwater management. Relevant regulatory documents are listed below and a summary is provided in the following sections:

Requirement	Relevant regulatory / design to follow
Natural Resources of the Regional Policy Statement	AUP Chapter B7
Unitary Plan - Water Quality and Integrated Management	AUP Chapter E1
Unitary Plan – Lakes, Rivers, Streams and Wetlands	AUP Chapter E3
Unitary Plan – Discharge and Diversion	AUP Chapter E8
Unitary Plan - High Contaminant Generating Areas	AUP Chapter E9
Unitary Plan - SMAF hydrology mitigation	AUP Chapter E10
Unitary Plan – Industrial and Trade Activities	AUP Chapter E33
Unitary Plan - Natural Hazards and Flooding	AUP Chapter E36
Auckland Council Regionwide Stormwater Network Discharge Consent	Schedule 4
Existing Catchment Management Plan	Paerata Pukekohe FUZ Structure Plan Stormwater Management Plan – WSP Opus February 2019 Pukekohe South Stormwater Catchment Management Plan – Opus May 2010
Design of Stormwater Management Devices	Stormwater Management Devices in the Auckland Region - GD2017/001 (GD01) Auckland Council December 2017 Stormwater Management Devices: Design Guidelines Manual – TP10 Auckland Regional Council (2003)
Water Sensitive Design for Stormwater	Water Sensitive Design for Stormwater – GD2015/004 (GD04) Auckland Council March 2015
Hydrology in the Auckland Region	Guidelines for Stormwater Runoff Modelling in the Auckland Region – TP108. Auckland Regional Council (1999)

2.1.1 NATURAL RESOURCES OF THE REGIONAL POLICY STATEMENT

Chapter B7 of the Unitary Plan sets out the objectives and policies to manage the pressures of development on the environment for social, economic and cultural well-being. These are:

- *Freshwater Systems Policies 1 - 6 (B7.3.2)*

  Integrate the management of subdivision, use and development and freshwater systems by undertaking all of the following:

  - *ensuring water supply, stormwater and wastewater infrastructure is adequately provided for in areas of new growth or intensification;*
  - *ensuring catchment management plans form part of the structure planning process;*
  - *controlling the use of land and discharges to minimise the adverse effects of runoff on freshwater systems and progressively reduce existing adverse effects where those systems or water are degraded; and*
  - *avoiding development where it will significantly increase adverse effects on freshwater systems, unless these adverse effects can be adequately mitigated*

  Identify degraded freshwater systems.

  Promote the enhancement of freshwater systems identified as being degraded to progressively reduce adverse effects.

  Avoid the permanent loss and significant modification or diversion of streams and (natural) lakes,

  Manage subdivision, use, development, including discharges and activities in the beds of lakes, rivers, streams, and in wetlands, to do all of the following:

  - *protect identified Natural Lake Management Areas, Natural Stream Management Areas, and Wetland Management Areas;*
  - *minimise erosion and modification of beds and banks of (natural) lakes, rivers, streams and wetlands;*
  - *limit the establishment of structures within the beds of lakes, rivers and streams and in wetlands to those that have a functional need or operational requirement to be located there; and*
  - *maintain or where appropriate enhance*
    - *freshwater systems*
    - *existing riparian vegetation located on the margins of lakes, rivers, streams and wetlands*
    - *areas of significant indigenous biodiversity.*

  Restore and enhance freshwater systems where practicable when development, change of land use, and subdivision occur.

- *Coastal Water, Freshwater and Geothermal Water Freshwater Systems Policies 4 & 6 - 9 (B7.4.2)*

  Identify areas of coastal water and freshwater bodies that have been degraded by human activities and progressively improve water quality in areas identified as having degraded water quality through managing subdivision, use, development and discharges. Manage the discharges of contaminants into water from subdivision, use and development to avoid where practicable, and otherwise minimise, all of the following:

  - *significant bacterial contamination of freshwater and coastal water;*
  - *adverse effects on the quality of freshwater and coastal water;*

- *adverse effects from contaminants, including nutrients generated on or applied to land, and the potential for these to enter freshwater and coastal water from both point and non-point sources;*
- *adverse effects on Mana Whenua values associated with coastal water, freshwater and geothermal water, including wāhi tapu, wāhi taonga and mahinga kai; and*
- *adverse effects on the water quality of catchments and aquifers that provide water for domestic and municipal supply. Sediment runoff*

Minimise the loss of sediment from subdivision, use and development, and manage the discharge of sediment into freshwater and coastal water, by:

- *promoting the use of soil conservation and management measures to retain soil and sediment on land; and*
- *requiring land disturbing activities to use industry best practice and standards appropriate to the nature and scale of the land disturbing activity and the sensitivity of the receiving environment. Stormwater management*

Manage stormwater by all of the following:

- *requiring subdivision, use and development to:*
    - *minimise the generation and discharge of contaminants; and*
    - *minimise adverse effects on freshwater and coastal water and the capacity of the stormwater network;*
- *adopting the best practicable option for every stormwater diversion and discharge; and*
- *controlling the diversion and discharge of stormwater outside of areas serviced by a public stormwater network.*

2.1.2 WATER QUALITY AND INTEGRATED MANAGEMENT

Chapter E1 of the Unitary Plan sets out the objectives and policies to manage the quality and health of Auckland's freshwater resources by controlling the quality of discharge to or on freshwater systems as a result of land development. the following policies are of particular regard:

- *Policies 2 & 3 Freshwater quality and ecosystem health interim guidelines (E1.3 (2) & (3))*

  Manage discharges, subdivision, use, and development that affect freshwater systems to:

  - *maintain or enhance water quality, flows, stream channels and their margins and other freshwater values, where the current condition is above National Policy Statement for Freshwater Management National Bottom Lines and the relevant Macroinvertebrate Community Index guideline in Table E1.3.1 below; or*
  - *enhance water quality, flows, stream channels and their margins and other freshwater values where the current condition is below national bottom lines or the relevant Macroinvertebrate Community Index guideline in Table E1.3.1 below*

  Table E1.3.1 Macroinvertebrate Community Index guideline for Auckland

Land use	*Macroinvertebrate Community Index guideline*
Native forest	*123*
Exotic forest	*111*
Rural areas	*94*
Urban areas	*68*

This policy identifies National Bottom Lines to gauge stream health using Macroinvertebrate Community Index (MCI) and requires either enhancement if the current stream conditions do not achieve the minimum values or maintenance of the stream where the minimum values are achieved. The bottom line scores of 94 & 68 for rural (existing land use) and urban (future land use) are of particular relevance for this assessment. The Pukekohe Tutaenui Stream Catchment Watercourse Assessment Report (Auckland Council, June 2018) undertook several Stream Ecological Valuation's, and the SEV site 2 was undertaken within the main tributary of this proposed plan change. A MCI score of 47 was determined, indicating a degraded freshwater system, and therefore Policy 2 requires the enhancement of the freshwater system within the plan change area.

Require freshwater systems to be enhanced unless existing intensive land use and development has irreversibly modified them such that it practicably precludes enhancement

- *Policies 4 & 5 National Policy Statement on Freshwater Management (E1.3 (4) & (5))*

  Discharges are to avoid contamination that will have an adverse effect on the life-supporting capacity of freshwater including on any ecosystem associated with freshwater

  Discharges are to avoid contamination that will have an adverse effect on the health of people and communities as affected by their secondary contact with fresh water

- *Policies 8 - 14 Stormwater Management (E1.3 (8) – (14))*

  Avoid as far as practicable, or otherwise minimise or mitigate, adverse effects of stormwater runoff from greenfield development on freshwater systems, freshwater and coastal water by:

  - *taking an integrated stormwater management approach (refer to Policy E1.3.10);*
  - *minimising the generation and discharge of contaminants, particularly from high contaminant generating car parks and high use roads and into sensitive receiving environments;*
  - *minimising or mitigating changes in hydrology, including loss of infiltration, to:*
    - *minimise erosion and associated effects on stream health and values;*
    - *maintain stream baseflows; and*
    - *support groundwater recharge;*
  - *where practicable, minimising or mitigating the effects on freshwater systems arising from changes in water temperature caused by stormwater discharges; and*
  - *providing for the management of gross stormwater pollutants, such as litter, in areas where the generation of these may be an issue*

  Minimise or mitigate new adverse effects of stormwater runoff, and where practicable progressively reduce existing adverse effects of stormwater runoff, on freshwater systems, freshwater and coastal waters during intensification and redevelopment of existing urban areas by all of the following:

  - *requiring measures to reduce contaminants, particularly from high contaminant-generating car parks and high-use roads;*
  - *requiring measures to reduce the discharge of gross stormwater pollutants;*
  - *requiring measures to be adopted to reduce the peak flow rate and the volume of stormwater flows:*
    - *where development exceeds the maximum impervious area for the relevant zone; or*
    - *from areas of impervious surface where discharges may give rise to flooding or adversely affect rivers and streams;*

- *taking an integrated stormwater management approach for large-scale and comprehensive redevelopment and intensification (refer to Policy E1.3.10 below) and encourage the restoration of freshwater systems where practicable; and*
- *ensuring intensification is supported by appropriate stormwater infrastructure, including natural assets that are utilised for stormwater conveyance and overland flow paths*

In taking an integrated stormwater management approach have regard to all of the following:

- *the nature and scale of the development and practical and cost considerations,*
- *the location, design, capacity, intensity and integration of sites/development and infrastructure, including roads and reserves, to protect significant site features and hydrology and minimise adverse effects on receiving environments;*
- *the nature and sensitivity of receiving environments to the adverse effects of development, including fragmentation and loss of connectivity of rivers and streams, hydrological effects and contaminant discharges and how these can be minimised and mitigated, including opportunities to enhance degraded environments;*
- *reducing stormwater flows and contaminants at source prior to the consideration of mitigation measures and the optimisation of on-site and larger communal devices where these are required;*
- *the use and enhancement of natural hydrological features and green infrastructure for stormwater management where practicable*

Avoid as far as practicable, or otherwise minimise or mitigate adverse effects of stormwater diversions and discharges, having particular regard to:

- *the nature, quality, volume and peak flow of the stormwater runoff;*
- *the sensitivity of freshwater systems and coastal waters,*
- *the potential for the diversion and discharge to create or exacerbate flood risks;*
- *options to manage stormwater on-site or the use of communal stormwater management measures;*
- *practical limitations in respect of the measures that can be applied;*
- *the current state of receiving environment*

Require freshwater systems to be enhanced unless existing intensive land use and development has irreversibly modified them such that it practicably precludes enhancement

Manage contaminants in stormwater runoff from high contaminant generating car parks and high use roads to minimise new adverse effects and progressively reduce existing adverse effects on water and sediment quality in freshwater systems, freshwater and coastal waters.

Require stormwater quality or flow management to be achieved on-site unless there is a downstream communal device or facility designed to cater for the site's stormwater runoff

Adopt the best practicable option to minimise the adverse effects of stormwater discharges

- *Policies 15 & 16 Ground Soakage (E1.3 (15) & (16))*

  Utilise stormwater discharge to ground soakage in areas underlain by shallow or highly permeable aquifers provided that:

  - *ground soakage is available;*
  - *any risk to people and property from land instability or flooding is avoided;*
  - *stormwater quality treatment is implemented to minimise effects on the capacity and water quality of the underlying aquifer system; and*

- *discharge to ground soakage is the most effective and sustainable option.*

Require land use development and drainage systems within areas underlain by peat soils to provide for stormwater discharge to ground soakage that maintains underlying water levels and the geotechnical stability of the peat soils.

2.1.3 LAKES, RIVERS, STREAMS AND WETLANDS

Chapter E3 of the Unitary Plan sets out the objectives and policies to ensure protection, maintenance and enhancement of Auckland Lakes, Rivers, Streams and Wetlands while providing for growth and infrastructure. This chapter seeks to minimise permanent loss, avoid significant modifications and to provide for environmental benefits (enhancements) where possible. The following policies are of particular regard:

- *Policy 7 National Policy Statement for Freshwater Management 2020: Fish Passage*

  The passage of fish is maintained, or is improved, by instream structures, except where it is desirable to prevent the passage of some fish species in order to protect desired fish species, their life stages, or their habitats.Manage discharges, subdivision, use, and development that affect freshwater systems to:

- *Policies 2, 3 & 5 General (E3.3 (2), (3) & (5))*

  Manage the effects of activities in, on, under or over the beds of lakes, rivers, streams or wetlands by:

  - *avoiding where practicable or otherwise remedying or mitigating any adverse effects on lakes, rivers, streams or wetlands;*
  - *where appropriate, restoring and enhancing the lake, river, stream or wetland*

  Enable the enhancement, maintenance and restoration of lakes, rivers, streams or wetlands

  Avoid significant adverse effects, and avoid, remedy or mitigate other adverse effects of activities in, on, under or over the beds of lakes, rivers, streams or wetlands on:

  - *the mauri of the freshwater environment;*
  - *Mana Whenua values in relation to the freshwater environment.*

- *Policy 8 Structures and the diversion of surface water (E3.3 (8)*

  Enable the removal or demolition of any structure or part of any structure in, on, under, or over the bed of a lake, river, stream or wetland, and any associated diversion of water, provided adverse effects are avoided, remedied or mitigated

- *Policies 10 - 12 Planting of plants (E3.3 (10) - (12))*

  Enable the planting of any plant, excluding pest species, in, on, or under the bed of a lake, river, stream or wetland where it is suitable for habitat establishment, restoration or enhancement, the maintenance and enhancement of amenity values, flood or erosion protection or stormwater runoff control provided it does not create or exacerbate flooding.

  Encourage the planting of plants that are native to the area.

  Encourage the incorporation of Mana Whenua mātauranga, values and tikanga in any planting in, on, or under the bed of a lake, river, stream or wetland

- *Policies 15 & 16 Riparian Margins (E3.3 (15) & (16))*

  Protect the riparian margins of lakes, rivers, streams, and wetlands from inappropriate use and development and promote their enhancement to through all of the following:

- *safeguard habitats for fish, plant and other aquatic species, particularly in rivers and streams with high ecological values;*
- *safeguard their aesthetic, landscape and natural character values;*
- *safeguard the contribution of natural freshwater systems to the biodiversity, resilience and integrity of ecosystems;*
- *avoid or mitigate the effects of flooding, surface erosion, stormwater contamination, bank erosion and increased surface water temperature.*

Protect land alongside streams for public access through the use of esplanade reserves and esplanade strips, marginal strips, drainage reserves, easements or covenants where appropriate and for water quality, ecological and landscape protection purposes.

2.1.4 Discharge and Diversion

Chapter E8 of the Unitary Plan sets out the provisions and standards to manage the diversion and discharge of stormwater runoff from impervious areas on, to, or in land, water or the existing stormwater network. This section establishes standards that if achieved, ensure compliance with the policies and objectives contained within E1 & E2. The relevant standards and provisions are

- *The design of the proposed stormwater management device(s) must be consistent with any relevant precinct plan that addresses or addressed stormwater matters.*
- *The diversion and discharge must not cause or increase scouring or erosion at the point of discharge or downstream.*
- *The diversion and discharge must not result in or increase the following:*
    - *flooding of other properties in rainfall events up to the 10 per cent annual exceedance probability (AEP);*
    - *inundation of buildings on other properties in events up to the 1 per cent annual exceedance probability (AEP).*
- *The diversion and discharge must not cause or increase nuisance or damage to other properties.*
- *The diversion and discharge of stormwater runoff must not give rise to the following in any surface water or coastal water:*
    - *the production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials;*
    - *any conspicuous change in the colour or visual clarity;*
    - *any emission of objectionable odour;*
    - *the rendering of fresh water unsuitable for consumption by farm animals;*
    - *any significant adverse effects on aquatic life.*
- *Where the diversion and discharge is to ground soakage, groundwater recharge or peat soil areas any existing requirements for ground soakage, including devices to manage discharges or soakage, must be complied with*

2.1.5 High Contaminant Generating Areas

Chapter E9 of the Unitary Plan sets out the Regional Rules for managing the stormwater runoff quality from high contaminant generating activities, specifically high contaminant carparks (30 carparks or greater) and high use roads (greater than 5000 vehicles per day)

This section establishes rules specific to the high use activities to ensure compliance with the policies and objectives contained within E1 & E2. The relevant rules are

- *Stormwater runoff from the impervious area is treated by stormwater management device(s)*
- *Stormwater management device(s) must meet the following:*
    - *the device or system must be sized and designed in accordance with 'Guidance Document 2017/001 Stormwater Management Devices in the Auckland Region (GD01)';*
    - *where alternative devices are proposed, the device must demonstrate it is designed to achieve an equivalent level of contaminant or sediment removal performance to that of 'Guidance Document 2017/001 Stormwater Management Devices in the Auckland Region (GD01)'*

2.1.6 HYDROLOGY MITIGATION

Chapter E10 of the Unitary Plan sets out objectives and policies to protect receiving streams from the adverse effects of stormwater discharges by managing the flows to simulate a more natural environment for 95% of all storm events. This chapter also sets the framework for managing this runoff to achieve the stated objectives and policies for all development within the overlay area identified as Stormwater Management Area Flow 1 and Flow 2 (SMAF 1 and SMAF-2).

Chapter E10 is a requirement of Brownfields Development within the identified SMAF overlay and this Plan Change is a Greenfields Development and does not fall within the SMAF overlay.

The current Network Discharge Consent and the Paerata Pukekohe Future Urban Zone Stormwater Management Plan require hydrology mitigation to protect the receiving streams to a SMAF-1 equivalent standard. This is also BPO to achieve the objectives and policies of E1 & E2 and will compliment the proposed remedial stream works.

The proposed hydrological mitigation is SMAF-1 equivalent being:

> *Provide retention (volume reduction) of at least 5mm runoff depth for the impervious area for which hydrology mitigation is required; and*
>
> *Provide detention (temporary storage) and a drain down period of 24 hours for the difference between the predevelopment and post-development runoff volumes from the 95th percentile, 24-hour rainfall event minus the 5 mm retention volume over the impervious area for which hydrology mitigation is*
>
> *If:*
>
> - *a suitably qualified person has confirmed that soil infiltration rates are less than 2mm/hr or there is no area on the site of sufficient size to accommodate all required infiltration that is free of geotechnical limitations (including slope, setback from infrastructure, building structures or boundaries and water table depth); and*
> - *rainwater reuse is not available because:*
>   - *the quality of the stormwater runoff is not suitable for on-site reuse (i.e. for non-potable water supply, garden/crop irrigation or toilet flushing); or*
>   - *there are no activities occurring on the site that can re-use the full 5mm retention volume of water.*
> - *the retention volume can be taken up by detention as follows:*
>   - *Provide detention (temporary storage) and a drain down period of 24 hours for the difference between the pre-development and post-development runoff volumes from the*

95th percentile 24-hour rainfall event minus any retention volume that is achieved (if any), over the impervious area for which hydrology mitigation is required

2.1.7 Industrial and Trade Activities

Chapter E33 of the Unitary Plan sets out the objectives and policies to manage Industrial and Trade Activities and associated hazardous substances. The overriding purpose of this section is to avoid the discharge of contaminants and to minimise adverse effects where avoidance is not reasonably practical. In addition to E1, E2, E8 & E10, the following objectives and policies are relevant:

- *Policies 1 - 3 Industrial & Trade Activities (E33.3(1) – (3))*

  Manage the use of land for industrial or trade activities to prevent or minimise any adverse effects of storage, use or disposal of environmentally hazardous substances.

  Require industrial or trade activities to have, where reasonably practicable, onsite management systems, processes, containment, treatment, or disposal by lawful means.

  Require measures to be implemented, where contaminants cannot be disposed as trade waste to the wastewater network or contained on site, to minimise adverse effects on land and water including:

  - *reducing contaminant volumes and concentrations as far as practicable; and*
  - *applying measures, including treatment, management procedures, monitoring, controls, or offsite disposal, having regard to the nature of the discharge and the sensitivity of the receiving environment.*

Depending upon the activities that establish within the proposed Business – Light Industry Zone, it is anticipated that in addition to the requirements of E8 & E10, the installation of Gross Pollutant Traps and Oil/Grit Separators or alternative products like hydrodynamic separators will be required to minimise discharge of contaminants from these sites.

This section establishes rules specific to the high use activities to ensure compliance with the policies and objectives contained within E1 & E2. The relevant rules are

- *Stormwater runoff from the impervious area is treated by stormwater management device(s)*
- *Stormwater management device(s) must meet the following:*
  - *the device or system must be sized and designed in accordance with 'Guidance Document 2017/001 Stormwater Management Devices in the Auckland Region (GD01)';*
  - *where alternative devices are proposed, the device must demonstrate it is designed to achieve an equivalent level of contaminant or sediment removal performance to that of 'Guidance Document 2017/001 Stormwater Management Devices in the Auckland Region (GD01)'*

2.1.8 Natural Hazards and Flooding

Chapter E36 of the Unitary Plan sets out the objectives and policies to identify and understand the risks a development may have on the wider environment and to manage the current and future risks through appropriate development. The relevant policies are:

- *Policies 1 & 4 General (E36.3(1) & (4))*

  Identify land that may be subject to natural hazards, taking into account the likely effects of climate change,

Control subdivision, use and development of land that is subject to natural hazards so that the proposed activity does not increase, and where practicable reduces, risk associated with all of the following adverse effects:

- *accelerating or exacerbating the natural hazard and/or its potential impacts;*
- *exposing vulnerable activities to the adverse effects of natural hazards;*
- *creating a risk to human life; and*
- *increasing the natural hazard risk to neighbouring properties or infrastructure.*

- *Policies 17, 18 & 20 Floodplains in Greenfield Areas (E36.3(17), (18) & (20))*

  Avoid locating buildings in the 1 per cent annual exceedance probability (AEP) floodplain unless it can be designed to be resilient to flood damage.

  Enable flood tolerant activities to locate in the 1 per cent annual exceedance probability (AEP) floodplain where these activities do not exacerbate the flood hazard to other properties upstream or downstream of the site.

  Require earthworks within the 1 per cent annual exceedance probability (AEP) floodplain to do all of the following:

  - *remedy or mitigate where practicable or contribute to remedying or mitigating flood hazards in the floodplain;*
  - *not exacerbate flooding experienced by other sites upstream or downstream of the works;*
  - *not permanently reduce the conveyance function of the floodplain.*

- *Policy 21, 24 & 26 Floodplains - general (E36.3(21), (24) & (26))*

  Ensure all development in the 1 per cent annual exceedance probability (AEP) floodplain does not increase adverse effects from flood hazards or increased flood depths and velocities, to other properties upstream or downstream of the site.

  Enable the planting and retention of vegetation cover to enhance amenity values, green linkages and ecological values in floodplains as long as it does not create or exacerbate flooding upstream or downstream or otherwise increase flood hazards.

  Construct accessways, including private roads, so that flood hazard risks are not increased.

- *Policy 29 & 30 Overland Flow Paths (E36.3(29) & (30))*

  Maintain the function of overland flow paths to convey stormwater runoff safely from a site to the receiving environment.

  Require changes to overland flow paths to retain their capacity to pass stormwater flows safely without causing damage to property or the environment.

2.1.9 Regionwide Stormwater Network Discharge Consent

The Auckland Council Stormwater Network Discharge Consent (NDC) came into effect in October 2019, superseding all Legacy Council Discharge Consents, and encompasses all existing and future urban areas. The NDC provides for the discharge of stormwater from the Plan Change Area to be incorporated into the NDC and for stormwater assets to be vested in Auckland Council provided compliance with the NDC consent conditions are achieved.

The NDC requirements for all developments are outlined in Schedule 4, and to achieve compliance with the relevant standards or to achieve BPO outcomes:

- *Treatment of all Impervious surfaces by a water quality device*
- *Achieve equivalent hydrology to pre-development levels*
- *Existing Buildings must not be flooded in 1% AEP Storm Event*

The treatment of all impervious surfaces is more strict than the Unitary Plan requires. However, it is BPO in greenfields development to provide treatment for impervious areas excluding those from inert roof materials, and it is anticipated that this will continue.

Equivalent hydrology is being provided using the hydrology mitigation as outlined in Section 2.1.5, providing Retention (where possible) and Detention equivalent to SMAF-1.

2.1.10 Catchment Management (Existing and Historic)

WSP Opus have created a draft or high level Stormwater Management Plan (SMP) as part of the Future Urban Zone (FUZ) in support of the Paerata Pukekohe Structure Plan.

The purpose of the FUZ SMP is to:

- Identify water sensitive design measures to demonstrate how stormwater management in the Auckland Unitary Plan can be met.
- Promote water sensitive design principles during development for the creation of water sensitive communities.
- Support the Structure Planning process by providing a robust analysis of stormwater issues and management measures across the three catchments, based on current, best available information.
- Inform development of stormwater management obligations (i.e. minimum requirements).
- Inform the community of how stormwater management will be changing in the future.
- Become an adopted Stormwater Management Plan under the notified Regional Network Discharge Consent.

To achieve the purpose of the FUZ SMP, a number of key principles and outcomes are identified and are proposed to be implemented as part of the development of the FUZ and these include:

- Development in the Future Urban Zone will exacerbate stream erosion if unmitigated. These watercourse assessments demonstrate that mitigation of hydrological adverse effects from erosive flows will be needed to provide stream bank stability, as well as associated effects on stream habitat and receiving environments.

- Even without development, erosion is likely to continue, therefore stream enhancement to avoid further adverse effects as part of development will be critical to delivering the objectives of the Auckland Unitary Plan.
- Resilient development should avoid flood prone areas, providing a buffer to flooding hazards as described in the Auckland Unitary Plan E36 objectives. Where this is not practicable, design must consider how to manage this residual risk in accordance with the Building Code
- Overland flowpaths need to be integrated as part of development proposals in accordance with the Auckland Unitary Plan, Stormwater Code of Practice and Building Code
- The sensitivity of the downstream receiving environment means all roads in the Future Urban Zone are to include stormwater treatment and inert roofing material shall be used to protect, and enhance, the water quality of stormwater runoff.
- Greenways (lineal parks) are to be incorporated to provide the framework to protect, conserve and link stream corridors as open spaces. These can provide important cycle and walkways, wildlife corridors and riverways linking natural, cultural and recreational areas. Greenways will need to be established early in the masterplanning process, in collaboration with landowners, Auckland Council, Auckland Transport and Local Boards.
- Where Greenways are not practical or appropriate, create Riparian Buffer Zone through private land on all permanent and intermittent streams. These can have a significant effect on water quality in the receiving environment. A minimum 10m riparian margin shall be provided either side of intermittent streams and a minimum 20m riparian margin either side of permanent streams. Guidance is available in the Auckland Regional Council Technical Publication TP148 *Riparian Management Guideline* (Becker et al., 2001).
- In combination with managing increased runoff preparing the stream corridor to receive flows from an urbanised catchment is critical to protect against erosion and to attenuate stormwater runoff. Depending on the size of the upstream catchment this may include enhancement planting around intermittent and permanent streams in headwater locations, or harder interventions such as rock armouring or bank shallowing where high flows are anticipated.
- Protect and enhance existing wetland areas of value. This will be via enhancement planting of qualifying areas.
- Development layout must maintain, as far as practicable, the natural drainage pattern of the site. GD04 (Auckland Council, 2013) identifies this could be achieved through:
    - Adapting the urban street grid pattern in response to existing topography and landform, including stream crossings perpendicular to the direction of flow.
    - Creating 'naturalised' drainage patterns to receive runoff from increased imperviousness,
    - placed along boundaries and within streetscapes.
    - Allowing flexibility for both road carriage width and riparian buffers.

- At strategic stream crossing points, favouring pedestrian and bike crossings over roads.
- Assisting vehicle movements by prioritising street connections and potential stream crossings based on neighbourhood density and travel distances.
- Creating streetscapes and street alignments which draw from and extend riparian open spaces.
- Increasing neighbourhood cycle/pedestrian connections through stormwater reserves.
- Mitigating the occupation of the floodplain by road crossings by enhancing stream habitats elsewhere (internal to blocks).
- Providing for wider stream corridors at road crossings to accommodate bridge abutments, landscape transitions, and habitat refuges above and below culverts.

3 MANA WHENUA MATTERS

Consultation with Mana Whenua has been initiated and a site specific Cultural Values Assessment (CVA) has been received from Ngaati Tamaoho, no formal feedback has been received from Waikato-Tainui. We have used the published Waikato-Tainui Environmental Plan, Tai Tumu Tai Pari Tai Ao (WTEP) as a focus to identify pertinent issues and to identify relevant issues, objectives & policies.

3.1 IDENTIFICATION AND INCORPORATION OF MANA WHENUA VALUES

A focus on environmental outcomes is clear when reviewing the CVA and WTEP, as the overarching purpose of the WTEP is to "provide a map or pathway that will return the Waikato-Tainui rohe to the modern-day equivalent of the environmental state that it was in when Kiingi Taawhiao composed his maimai aroha."

The CVA from Ngaati Tamaoho is consistent with the WTEP, with Ngaati Tamaoho being the haapu who exercise mana whenua in the area encompassed by the Golding Road Plan Change.

Of particular note are Chapters 19 (Freshwater), 20 (Wetlands), 21 (Land), which establish objectives, policies and methods to manage the effects of development to comply with the purpose of the WTEP. These are summarised:

- *Policy 19.4.2.1 (Water Quality)*

  regulators to set clearer and higher water quality targets, and to develop and incentivise methods to achieve these targets

Methods to achieve this are two-pronged, being both regulatory (Council Policies to be amended and specific water quality targets established) and practical, with recommendations including best practice water quality management.

- *Policy 20.3.1.1 (Wetlands)*

  to encourage improvements to local hydrology (where possible) to support healthy wetland function, and restoration of locally appropriate wetland biodiversity within local planning and land management practice

The main wetland types historically found in the Waikato catchment include kahikatea swamp, manuka wetlands, raupoo and harakeke swamps and peat bog complexes. The wetlands on the site are wetlands by definition of the NES-FW and these along with the remnant kahikatea forest will be protected and are captured within the proposed open space, and enhancement planting is proposed.

- *Policy 21.3.1.2 (Land)*

  all major excavation works that have the potential to impact on waterways shall have sufficient erosion and sediment control measures in place to ensure that adverse effects on water bodies are managed

This is also managed by Council using GD2016/005 Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05) and compliance with this document will be required upon development of the site.

- *Policy 21.3.1.3 (Land)*

  to ensure that riverbank erosion, including the erosion of river islands is effectively managed

The preferred methods to achieve this policy includes indigenous riparian planting from locally sourced vegetation propagation and to minimise use of hard-engineering structures for erosion protection. Riparian planting to permanent and intermittent streams is proposed, and the proposed stream remediation will ensure the overland flow paths and flooded extents are contained within the new stream banks without the need for rock armour

- *Policy 21.3.4.1 (Land)*

  to promote the development and use of integrated catchment management plans that adequately considers land use, floodplain and drainage management and that promotes habitat restoration.

The Golding Road Plan Change seeks to establish a Stormwater Management Plan that achieves the goals of this policy to achieve an outcome that allows for development while providing a net environmental gain through BPO stormwater treatment and ecological restoration and enhancement

4 STAKEHOLDER ENGAGEMENT AND CONSULTATION

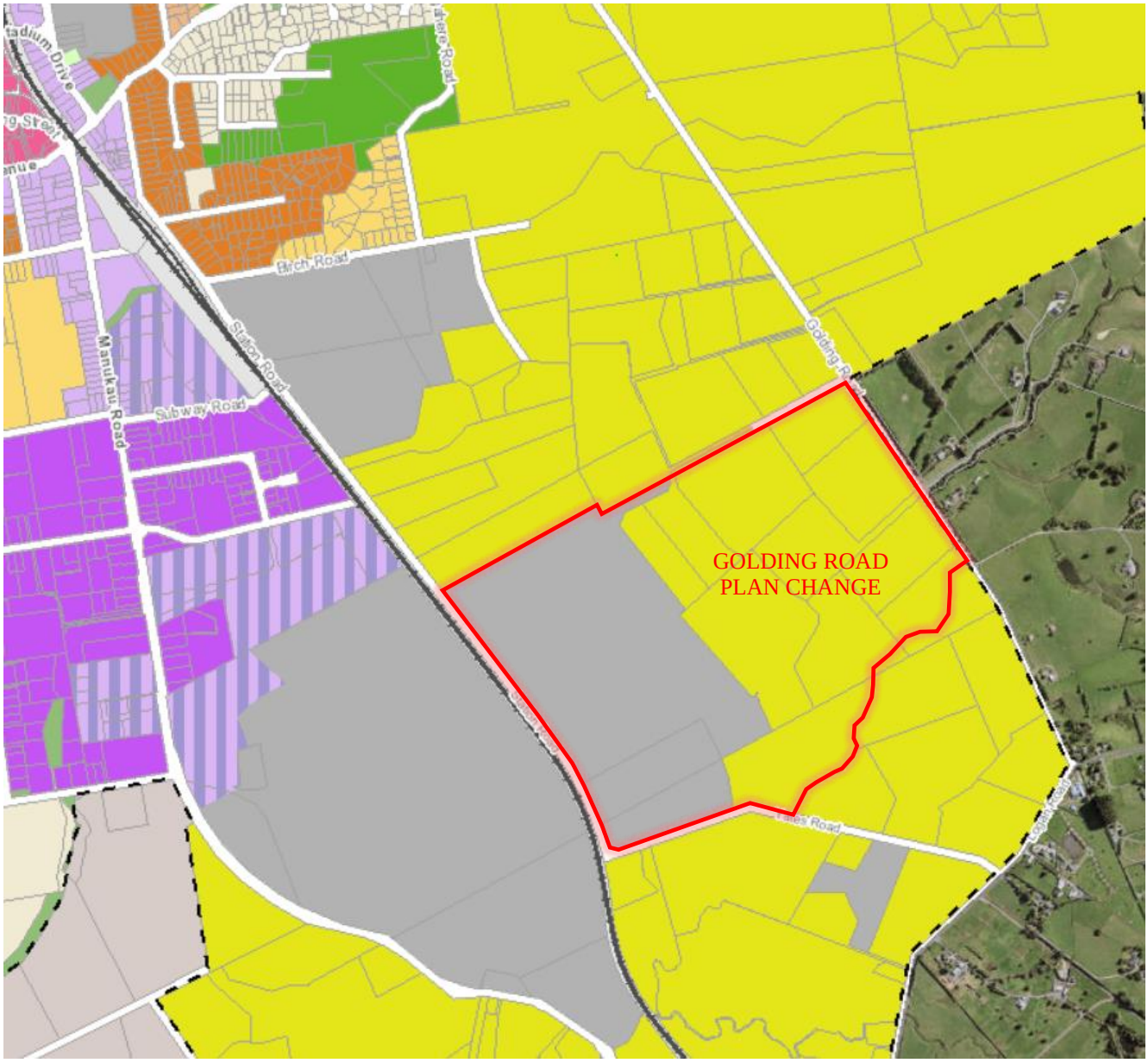
Stakeholders	What is the reason for interest?	What engagement has been completed?	Feedback and response
WaterCare	Wastewater and Water Supply Reticulation	Water Supply and Wastewater infrastructure reports submitted.	Conditional support has been received subject to minor plan amendments.
Auckland Transport	Transportation Issues	Engagement undertaked with proposed Traffic Management Plan regarding roading and Public Transport	No major concerns were raised.
Healthy Waters	Stormwater Discharge & Ecological Enhancement	Initial consultation and current proposal to be evaluated-	Current iteration expanded as result of initial engagement
Mana Whenua: Ngaati Tamaoho Waikato-Tainui	 haapu exercising mana whenua Ultimate discharge to Waikato River	 Cultural Impact Assessment requested Engagement initiated	 Cultural Values Assessment Received Awaiting response
Neighbours	Co-party or adjacent to proposed plan change	All neighbours have been contacted and invited to join or be party to proposal	Interested parties have joined, some have not responded, or have responded but will neither join nor oppose proposal.
Waikato Regional Council	Ultimate discharge to Waikato River	Engagement initiated	Awaiting Feedback

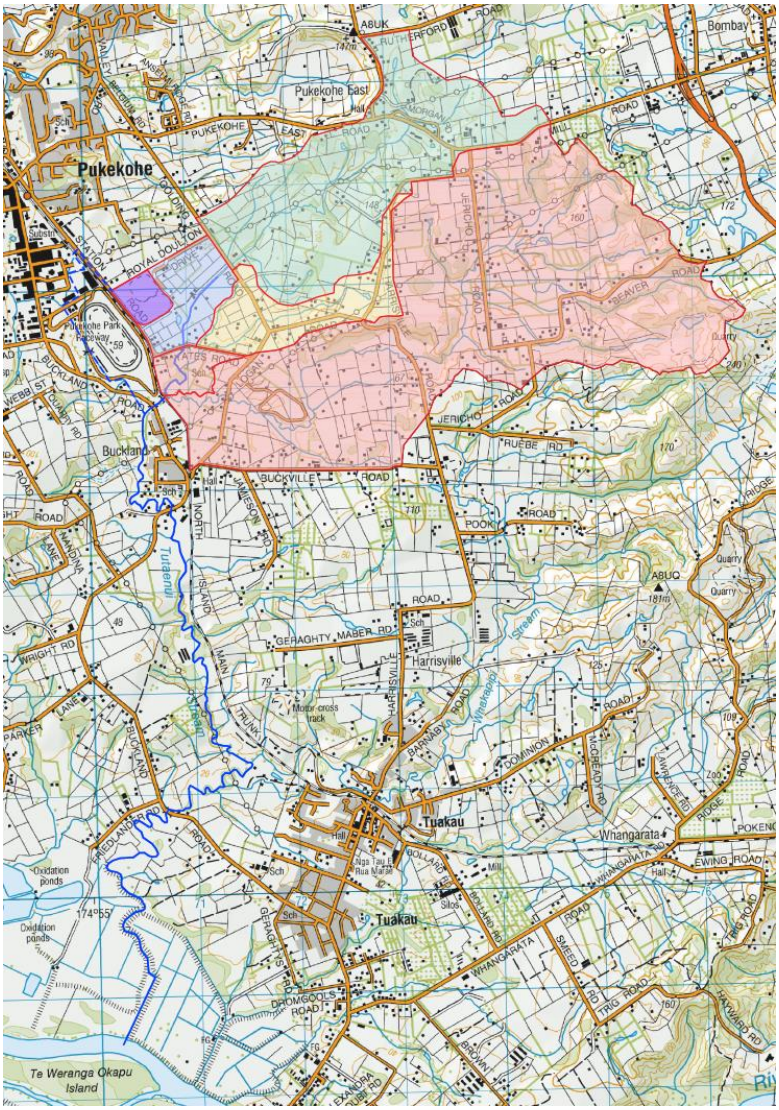
5 PROPOSED DEVELOPMENT

The Auckland Plan 2050 anticipates that Auckland's population could reach 2.4 million people in the next 30 years and that 32% of this growth will be accommodated in future urban zoned areas. The Auckland Plan identifies Pukekohe as a "satellite town" with a potential of an additional 14,000 dwellings and the associated need of land for business activities.

5.1 LOCATION AND AREA

The proposed Golding Road Plan Change area is within the Pukekohe Future Urban Zone and within the larger Pukekohe-Paerata Structure Plan Area, specifically at the eastern end of Golding/Yates and Station Road approximately 1.2km south-east of the Pukekohe Train Station





The site is situated near the bottom end of a side Tributary to Tutaenui Stream. Most of the catchment the site is located in drains about 1490Ha of Rural Zoned, east of Buckland, with 325Ha being upstream of the site (Green), 60Ha containing the Eastern Catchment of the site (Blue), 90Ha catchment skirting the site to join the catchment on the southern boundary (Yellow) and some 995Ha being the immediate downstream catchment (Red). These all join together join together to empty into the Tutaenui Stream west of Buckland.

A small portion of the site, the Western Catchment (Purple) drains along Station Road to the north-west, and is conveyed by existing open drains and culverts to the Tutaenui Stream near the southern end of Pukekohe.

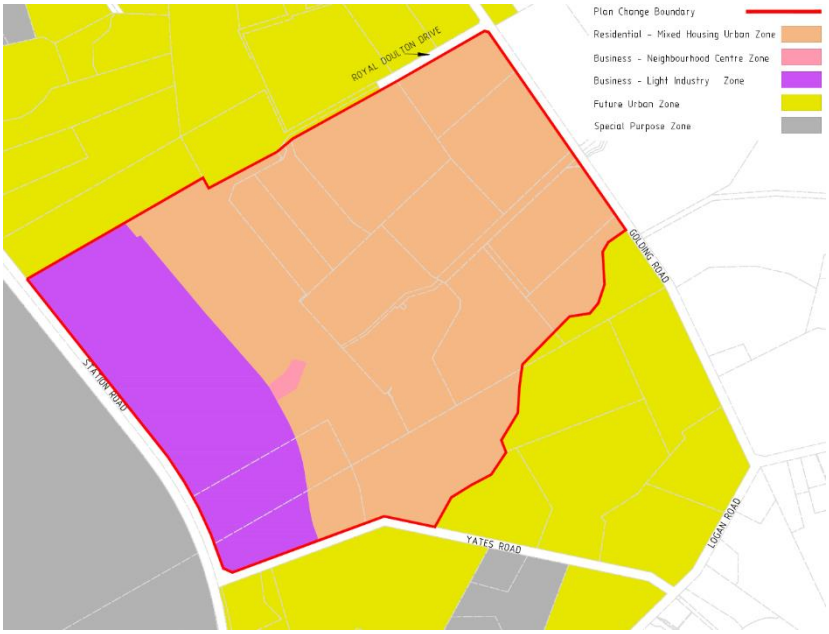
The Tutaenui Stream then flows south and joins the Whakapipi Stream before discharging into the Waikato River downstream of Tuakau.

The immediate Catchment is as shown; and is predominantly rural and contain rural activities. This catchment is currently serviced by open drains and culverts that direct surface flows from north-east to south-west. Some existing culverts appear undersized for major storms, and may cause localised flooding behind road embankments if they become blocked.

5.2 PURPOSE OF THE DEVELOPMENT

The Plan Change seeks to rezone approximately 82.5Ha of Future Urban and Special Purpose Zones to:

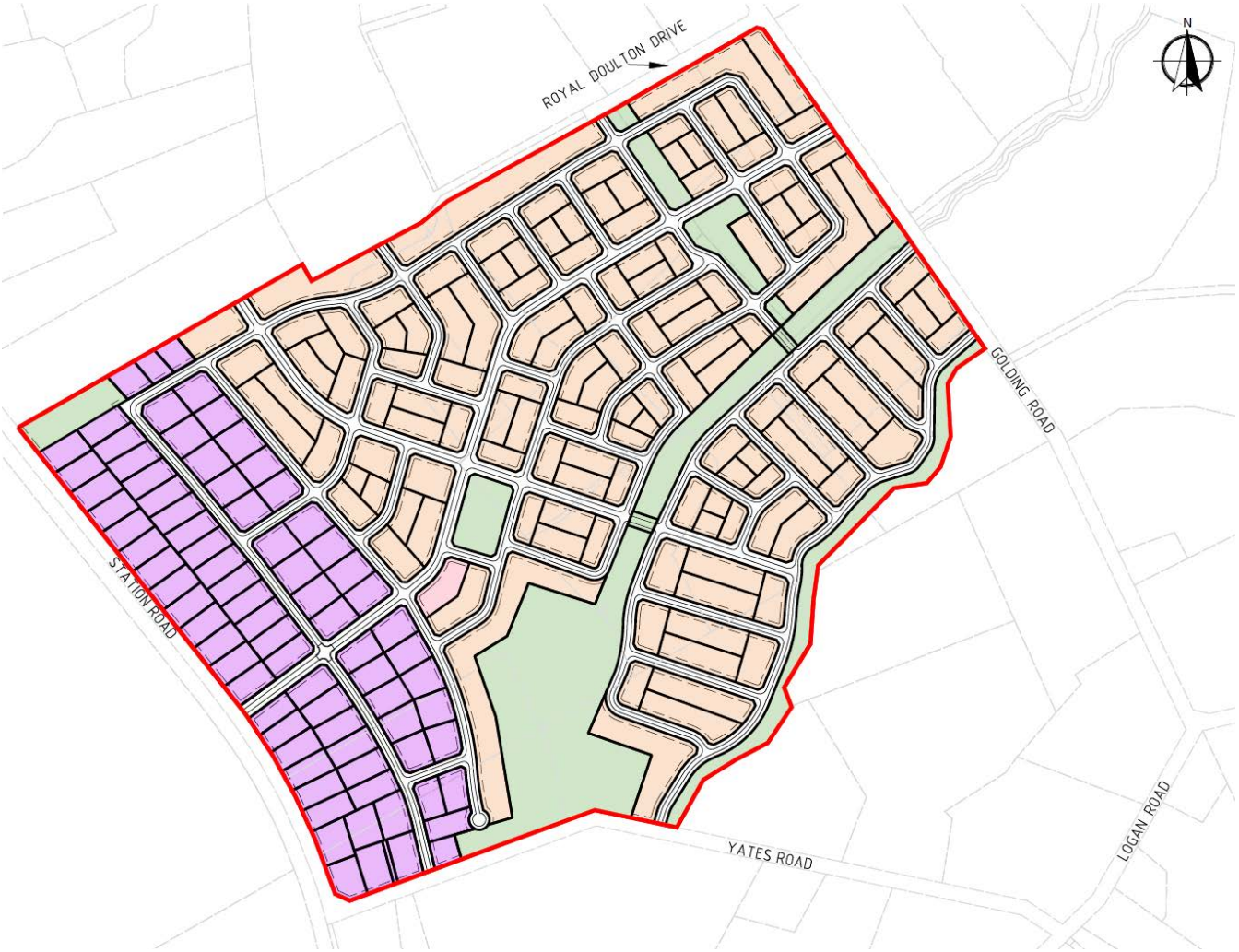
- Residential - Mixed Housing Urban
- Business - Neighbourhood Centre,
- Business - Light Industry,
- Open Space.



5.3 SITE LAYOUT AND URBAN FORM

The Concept Plan prepared by Birch Surveyors will includes the following design features:

- A Neighbourhood Centre to provide local services to the community, these are anticipated to include a dairy, coffee shop, lunch bar & hairdresser and will coalesce into a hub for both the Residential and Business residents.
- Open Space Reserves are proposed along all Permanent and Intermittent Streams and will encompass the remnant Kahikatea Stand near the Yates Road culvert.
- The existing Permanent Stream has been channelised in the past, and is proposed to be rehabilitated, creating a natural environment by creating meanders, pools and riffles and planting along with terraces to minimise uncontrolled flooding.
- Provide for a range of both Residential and Commercial land uses creating a community that encourages living, working and playing to minimise commuting travelling



5.4 EARTHWORKS

The proposed Plan Change does not currently have a proposed earthworks plan, and these will be developed as part of the detailed design and will incorporate all relevant topological design features such as overland flow paths, roads, terraces and daylighting piped streams.

The future earthworks for the site will be designed to achieve a cut to fill balance while preserving all Stormwater & Overland Flow entry and exit points. Careful design of the earthworks will be undertaken to safely manage the overland flows through the site, ensuring safe and stable building platforms are created and conforming to the recommendations of the Geotechnical Report by Ground Consulting Ltd.

6 STORMWATER MANAGEMENT

This Chapter sets out the holistic approach to post-development stormwater management to be consistent with the requirements of the Unitary Plan, Guidance Documents GD01 & GD04, the recommendations within the Pukekohe Paerata Stormwater Management Plan and incorporating feedback from the Mana Whenua.

6.1 PRINCIPLES OF STORMWATER MANAGEMENT

6.1.1 ORIGINAL PRINCIPLES

The plan change seeks to implement a holistic approach to stormwater management to supplement, enhance and improve the existing stream ecology as well as providing stormwater treatment that is an asset to the greater community, with the goals including:

- Provide for efficient urban development within the plan change area.
- Maintain and enhance the existing natural habitat.
- Connect communities with the waterways.
- Minimise discharge of contaminants into the receiving environment.
- Protect people and places from the effects of flooding and not worsen downstream flooding.

6.2 PROPOSED STORMWATER MANAGEMENT

6.2.1 GENERAL

The proposed stormwater management is founded upon the objectives and policies of the Unitary Plan and Mana Whenua values and seeks to improve water quality, ecological quality and appropriate management of flood flows by:

- Minimise generation of contaminants by requiring inert roofing materials and requiring water treatment devices for all impervious areas, allowing at source or communal devices
- Require contaminant specific treatment for Business areas.
- Provide SMAF-1 equivalent hydrological mitigation to minimise changes in stream hydrology
- Preserve protect and enhance streams and wetlands by requiring removal of all in-stream culverts & obstructions, require daylighting of piped intermittent streams and undertake enhancement and riparian planting within the proposed open space areas and promote community access to the on-site freshwater system by developing walkways within the proposed open space
- Limited attenuation of post-development flows from Catchment East for the 50% AEP Storm Event to mitigate downstream changes in hydrology.
- Adopt a pass flows forward for Catchment East during larger flood events to not worsen downstream flooding. Due to the large upstream catchment, an inadvertent side effect of detention is the superposition of peak flows, where the detained site runoff peak at the same time as the upstream catchment. In this scenario, detention will increase the catchment flows, increasing downstream flooding, even though site flows are maintained or decreased.
- Full Attenuation of post-development flows from Catchment West for all Storm Events up to the 1% AEP event to mitigate downstream changes in hydrology.

Golding Road Plan Change Stormwater Toolbox: Catchment East

Area of Interest/Zone	Runoff Source	Stormwater Targets				Best Practice Options
		Water Quality	Hydrology Mitigation	Flood Attenuation	Water Sensitive Design	
		GD01	SMAF-1 Equivalent	Post Dev Flows ≈ 86% unattenuated Post-Dev flows	GD04	
Residential: Mixed Housing Urban	Roof	✗	✔	✔	✔	Inert Roofing Materials Hydrology Mitigation Retention: Soakage or Reuse Hydrology Mitigation Detention Detention Tank for 2yr Storm Attenuation
	Driveway/Access	✔	✔	✔	✔	Treepits and/or Raingardens or Swales & Communal Raingardens or Wetlands for hydrology mitigation & attenuation
Business: Light Industry Neighbourhood Centre	Roof	✗	✔	✔	✔	Inert Roofing Materials Hydrology Mitigation Retention: Soakage or Reuse Communal Raingardens or Wetland for hydrology mitigation and attenuation
	Driveway/Access/Yards	✔	✔	✔	✔	Contaminant Specific pre-treatment using Gross Pollutant Trapsand/or Oil/Grit Separators or Hydrodynamic Separators depending upon activity Communal Raingardens or Wetland for hydrology mitigation and attenuation
Roading	Impervious Surfaces	✔	✔	✔	✔	Treepits and/or Raingardens or Swales & Communal Raingardens or Wetlands for hydrology mitigation & attenuation

Birch surveyors

Golding Road Plan Change Stormwater Toolbox: Catchment West

Area of Interest/Zone	Runoff Source	Stormwater Targets				Best Practice Options
		Water Quality	Hydrology Mitigation	Flood Attenuation	Water Sensitive Design	
		GD01	SMAF-1 Equivalent	Post Dev Flows ≈ Pre-Development Flows for all Storm Event	GD04	
Residential: Mixed Housing Urban	Roof	✗	✔	✔	✔	Inert Roofing Materials Hydrology Mitigation Retention: Soakage or Reuse Communal Raingardens or Wetlands for hydrology mitigation & attenuation
	Driveway/Access	✔	✔	✔	✔	Treepits and/or Raingardens or Swales & Communal Raingardens or Wetlands for hydrology mitigation & attenuation
Business: Light Industry Neighbourhood Centre	Roof	✗	✔	✔	✔	Inert Roofing Materials Hydrology Mitigation Retention: Soakage or Reuse Communal Raingardens or Wetland for hydrology mitigation and attenuation
	Driveway/Access/Yards	✔	✔	✔	✔	Contaminant Specific pre-treatment using Gross Pollutant Trapsand/or Oil/Grit Separators or Hydrodynamic Separators depending upon activity Communal Raingardens or Wetland for hydrology mitigation and attenuation
Roading	Impervious Surfaces	✔	✔	✔	✔	Treepits and/or Raingardens or Swales & Communal Raingardens or Wetlands for hydrology mitigation & attenuation

Birch surveyors

Golding Road Plan Change Stormwater Management Approach					
Area of Interest/Zone	SW Component	SW Outcome	At Source	Communal Device	Other Requirements
Residential: Mixed Housing - Urban;	Water Quality	Eliminate or minimise generation of contaminants	✔ Inert Roofing Materials ✔ Driveway runoff to private treatment device (Swale, raingarden or similar)	✔ Runoff directed to Communal Raingarden or Wetland	If all at source treatment is achieved for Water Quality and Hydrological Mitigation, Communal Devices may be bypassed Where Soakage or re-use is not feasible, Retention made up as Detention in Tanks or Communal Raingarden/Wetland
	Hydrological Mitigation	SMAF-1 Equivalent hydrological mitigation and Required flow mitigation	✔ Retention via Soakage or Re-use Tanks ✔ Detention Tanks (SMAF-1 equivalent and required flow attenuation	✔ Runoff directed to Communal Raingarden or Wetland	
Business: Light Industry; Neighbourhood Centre	Water Quality	Eliminate or minimise generation of contaminants	✔ Inert Roofing Materials ✔ Driveway and Yard runoff to private treatment device (Raingarden, Tree Pit, Swale, Gross Pollutant Traps, Oil/Grit separators or hydrodynamic separators for contaminant specific treatment)	✔ Runoff directed to Communal Raingarden or Wetland for treatment and attenuation	Where Soakage or re-use is not feasible, Retention made up as Detention in Tanks or Communal Raingarden/Wetland
	Hydrological Mitigation	SMAF-1 Equivalent hydrological mitigation required flow mitigation	✔ Retention via Soakage or Re-use Tanks ✔ Detention Tanks (SMAF-1 equivalent and required flow attenuation	✔ Runoff directed to Communal Raingarden or Wetland for treatment and attenuation	
Roading	Water Quality	Eliminate or minimise generation of contaminants	✔ Tree Pits / Raingardens Designed to SMAF-1 equivalent and attenuate 50% AEP Rainfall ✔ Swales and filter strips ✔ Gross Pollutant Traps	✔ Runoff directed to Communal Raingarden or Wetland for treatment and attenuation	Where Soakage or re-use is not feasible, Retention made up as Detention in Tanks or Communal Raingarden/Wetland
	Hydrological Mitigation	SMAF-1 Equivalent hydrological mitigation and required flow mitigation		✔ Runoff directed to Communal Raingarden or Wetland for treatment and attenuation	
Open Space/ Reserves	Stream Environment	Enhance and Restore Natural Habitat	✔ Remove existing culverts in Permanent and Intermittent streams ✔ Daylight piped intermittent stream ✔ Reinstate natural habitat in main tributary ✔ Riparian Planting to intermittent and permanent streams ✔ All Discharge Points to receiving environment are via Green Outfalls		

6.2.2 WATER QUALITY

Urban and Commercial Development of the Plan Change Area could increase the contamination of the stormwater runoff due to increased impervious areas and changes of activities undertaken on site. The stormwater runoff quality (and quantity) will change and, without mitigation, may impact the receiving environment, both within the site and downstream.

The Water Quality management seeks to improve the condition of the stormwater runoff by:

- minimising the generation of contaminants as much as practical
- treat all probable contaminant generating areas at or near the source using an appropriate Water Quality Device in accordance with GD01/TP10 to target the range of predicted contaminants for that area

These goals will generally be met using the following stormwater devices in the specified zones:

Buildings

- Inert building materials to be used for all roof and walls. This will eliminate contaminants generated from exposed metallic surfaces of zinc and copper and exposed treated timber surfaces of copper, chromium and zinc.

Elimination of contaminant generation is considered BPO to improve runoff quality.

Business - Light Industry & Neighbourhood Centre: Yards, Carparks & Access

- Oil & Grit Interceptor systems or hydrodynamic separator to be installed to all yards, driveways and accessways in the Business – Light Industry zone. These will assist with a good level of at source treatment specifically targeting the predicted contaminants associated with the zone activities. Hydrodynamic separators have the added benefit of treating the runoff to remove >75% TSS maximising the efficiencies of downstream communal stormwater devices.

Where contaminants cannot be eliminated, removal of targeted contaminants at source is considered BPO to improve runoff quality.

Residential – Mixed Housing Urban: Carparks, Driveways and Access and all Roads

- Grated Catchpits, sumps and inlets are used to provide coarse treatment, capturing gross pollutants (large detritus & rubbish) and coarse sediments and gravels.
- Bio-retention will be constructed to treat runoff and finer pollutants. Suitable devices include swales, raingardens and tree-pits. Where appropriate these will be integrated within the berm to create landscaped areas treating the contaminants at source. It is recognised that a plethora of individual devices is not conducive to community amenity or future maintenance, and communal devices are encouraged, creating mini-parks centred around appropriately sized and planted stormwater devices and located within public spaces and in close proximity to the streams and designed to be above the 10-year-flood event. These devices will generally consist of raingardens and wetlands and will provide a way of connecting the community with the waterways and provide maintenance efficiencies.
- For economic and ecological efficiencies, the Communal Devices will be designed as dual-purpose devices, providing hydrological mitigation in addition to water quality treatment.

6.2.3 STREAM HYDROLOGY (HYDROLOGY MITIGATION)

The Golding Road plan change will change the predominantly rural area into a thriving urban community. Unless this urbanisation is managed carefully, the increased impervious area and associated increase in stormwater runoff may have the following impact on the receiving environment:

- Stream aggradation through deposition of sediments
- Stream bed and stream bank degradation due to increased peak flows, volume and velocity
- Change in flood plains due to increased flood flows
- Change in Stream Ecology and Chemistry due to change in nutrient loading and runoff temperature caused by heating from impervious surfaces
- Increased runoff volume from small frequent rainfall events, increasing stream levels and potential for flooding
- Increased velocity of runoff during rainfall events, which increases erosion of streams, rivers and coastal environments and flooding
- Reduced stream flows in dry periods
- Increased water temperatures: Water is no longer cooled as it moves through the ground and/or it absorbs the heat as it runs over impervious surfaces.

The Water Quantity management seeks to mitigate the effects of the increased impervious surfaces by moderating the runoff from the frequent storm events by mimicking natural processes of the pre-development environment as much as practical. This goal can be achieved by providing retention and detention to decrease the runoff velocity, extend the baseline flows by increasing the time for the runoff to reach the receiving environment and provide a cooling mechanism for the surface runoff.

Physical stream health is maintained when detention and release over 24 hours is provided for the 95th percentile storm events. Other stream protection measures include riparian planting, or passing water through vegetation (such as in a wetland) and these assist with reducing the temperature of the runoff and streams. Detention devices moderate stormwater peak flows, replicate extended base flows, reduce runoff velocities and can allow fine contaminants to settle. They can be designed as wetlands, raingardens, ponds, rainwater tanks and others.

These goals will generally be met by providing SMAF 1 equivalent treatment to all impervious surfaces and is described as follows:

- Retention of at least 5mm runoff depth where possible
- Detention and release over 24hrs for the difference between the pre- and post-development runoff volumes from the 95th percentile, 24-hour rainfall event minus any achieved retention volume

Retention is the storage and reuse of runoff on site, reducing the overall volume of stormwater runoff. This can occur via infiltration or ground soakage or used to supply the site with non-potable water e.g. toilet flushing, laundry and watering gardens.

Detention is temporary storage and controlled release of stormwater runoff at a reduced rate, reducing runoff velocities and extending runoff times, thereby protecting the receiving environment from erosive velocities and minimising changes in stream hydrology from large disparities of runoff.

The water quantity mitigation is provided through retention and detention. The suitability of retention is dependent on the land use of the specific sites and underlying geology.

It is recognised that a significant portion of the Plan Change Area has underlying soils with a Class D Hydrological Classification. These have very low infiltration potential of <1mm and will preclude infiltration as a way of managing retention volume. In situations where the demand for on-site reuse is limited and infiltration is not geologically viable, the retention volume will be added to the detention volume. The extent of this exception will be established at the time of detailed design.

The following stormwater devices are proposed to meet the Retention requirements:

- By infiltration where the soakage or evapotranspiration rates permit via bioretention using raingardens and tree-pits
- On-site reuse for all buildings via rain harvesting using rainwater tanks and using the collected volume for non-potable uses. Overflow to public system to be provided for larger storm events

The following stormwater devices are proposed to meet the Detention requirements:

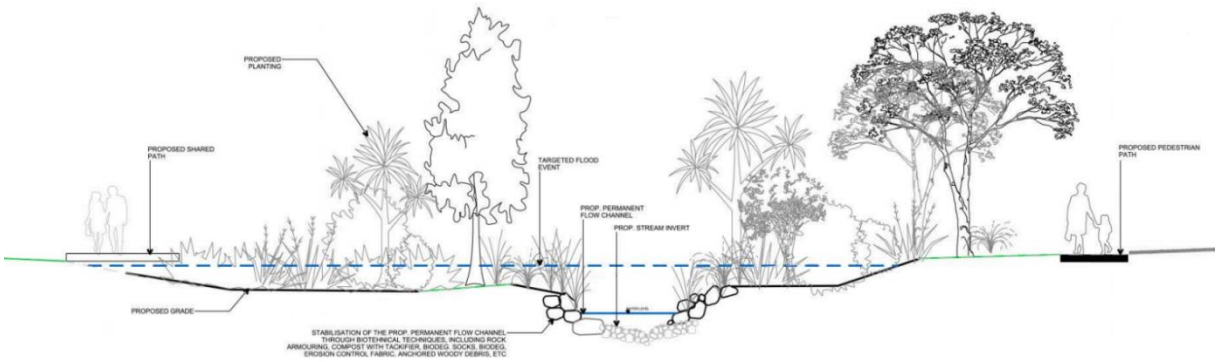
- Bioretention devices where detention is designed, such as Wetlands and Raingardens, Tree pits and planter boxes designed to GD01 standards can be used where appropriate and can be installed along Road corridors and to shared accessways and on private property. Bioretention devices can be dual purpose fulfilling the requirements for both water quality and quantity
- Stormwater Detention Tanks can be provided to buildings to provide storage and controlled release over 24hours via orifice, sized for the roof area and tank dimensions. This can be combined with Retention to provide both in the single tank. If Detention tanks are used to mitigate non-roof water, separate water quality devices must be used prior to the detention facility.
- Centralised communal bioretention devices are preferrable to a plethora of individual devices and these are anticipated within public spaces, being on Reserves and the Road. These are anticipated to be constructed wetlands, specifically sized for the contributing catchment in accordance with GD01. It is anticipated that these communal devices are dual purpose and will offer both water quality and water quantity treatment.

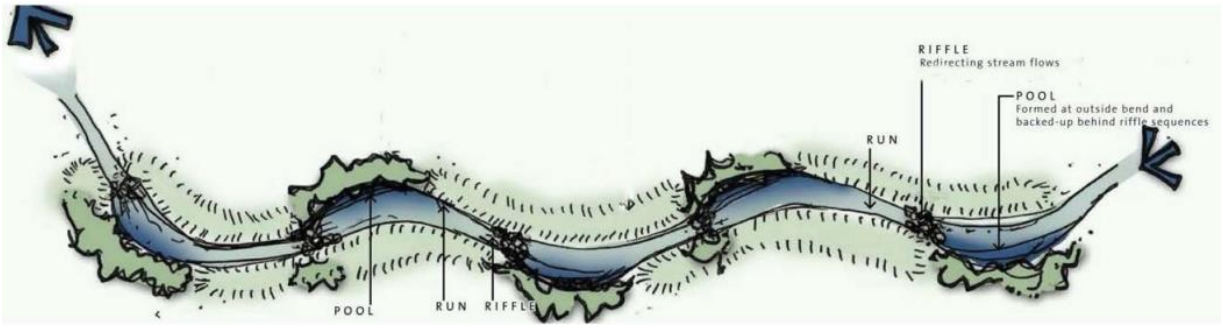
The potential for stream bed and bank degradation will be mitigated through the hydrology mitigation proposed above minimising the flow variability of 95% of the expected rain events. These devices, especially wetlands and raingardens, will also afford a certain amount of cooling by passing the runoff through plantings and plant media.

The streams (permanent and intermittent) traversing the property has been highly modified by channelising, piping and removal of riparian habitat. Whilst the proposed water quality and quantity mitigation measures will improve the runoff entering the stream, additional Stream

Hydrology measures are proposed to achieve the goals to improve and enhance the existing natural habitat and will also provide further mechanism to minimise stream bed and stream bank erosion:

- Remove existing culverts and obstructing structures within the stream, and daylight intermittent streams that have been piped
- Rehabilitate the streams and recreating a more natural environment. This will incorporate Pools and riffles, meanders and terracing associated with natural streams. This will be designed to both safely contain and convey the anticipated overland flows, minimising uncontrolled flooding and establish a natural stream habitat



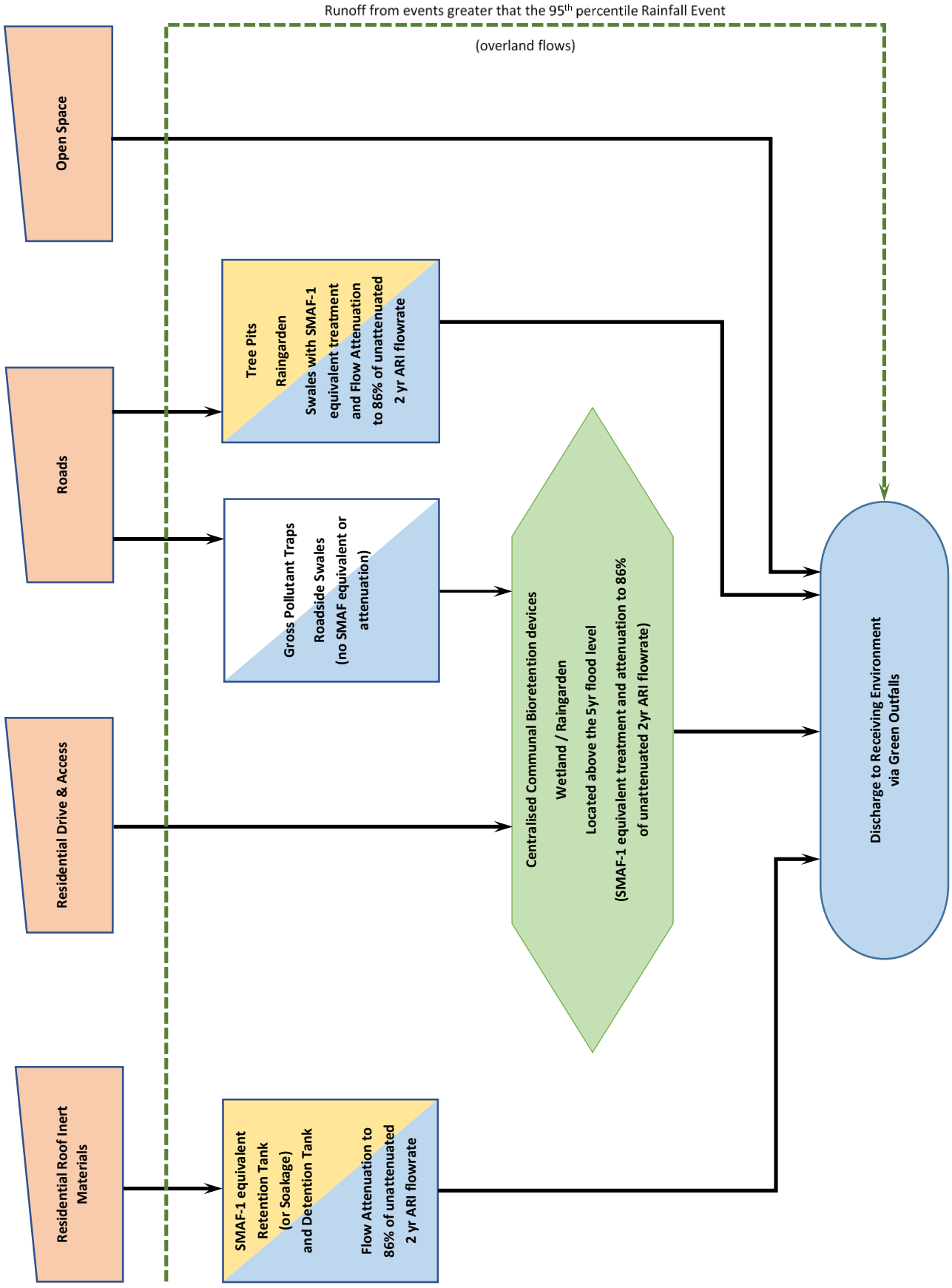


The expected width of the naturalised stream and reconstructed environs will range from 26-36m exclusive of additional site improvements and will require input from a Fluvial Expert for the detailed hydraulic design and riparian planting. It is anticipated that future consent will be required for such stream works. Future stream crossings will be designed to achieve the requirements of the National Environmental Standard for Freshwater Management, the Unitary Plan, the SWCoP and GD01-SMD with a preference for bridging rather than culverts.

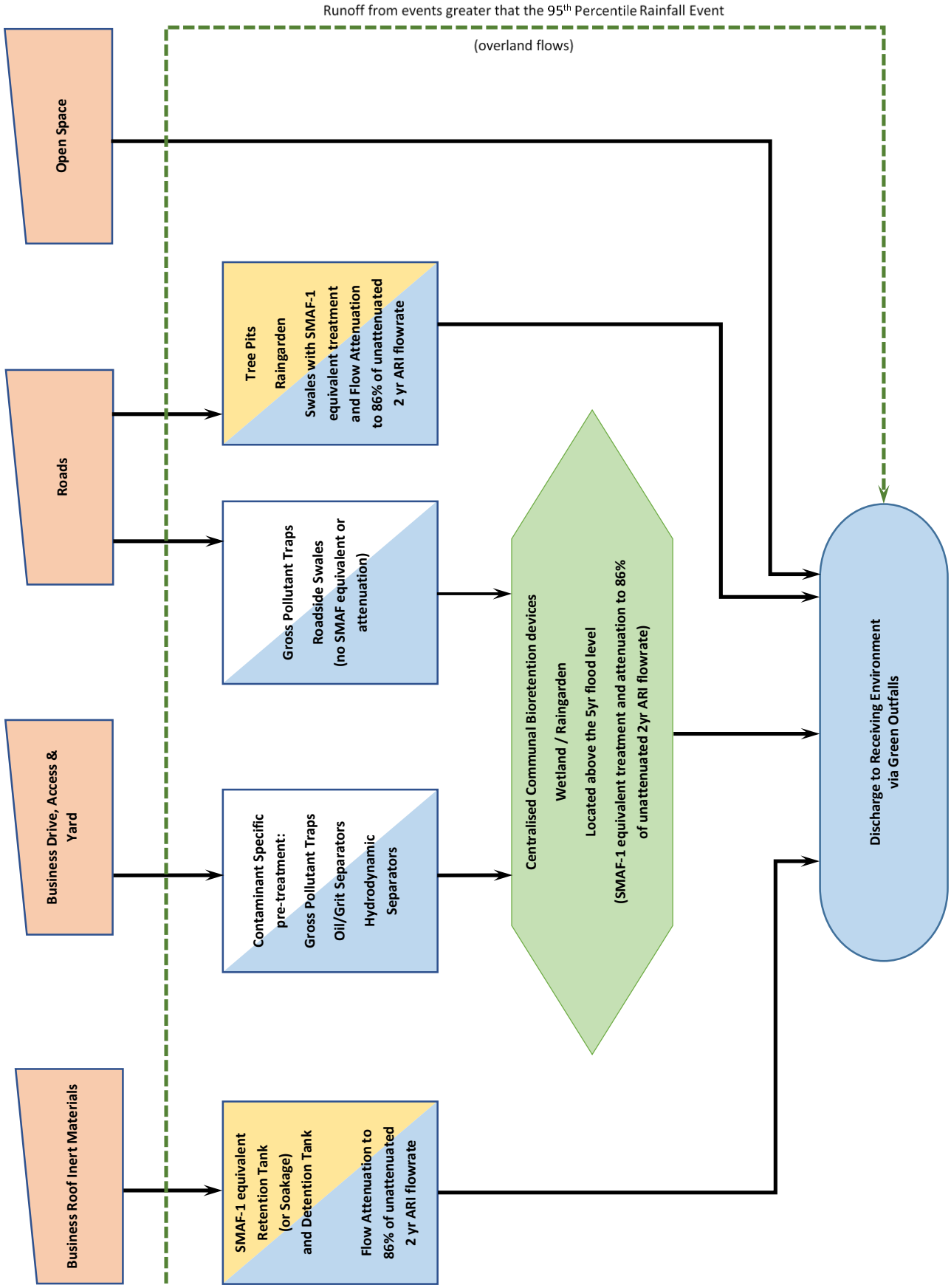
- Green Outfalls will be designed and constructed for all stormwater outfalls, ensuring pipes, wingwalls, erosion protection measures etc do not encroach into the main channel, thereby minimising new erosion nodes
- Comprehensive riparian planting along stream corridors to improve and enhance the stream habitat, maintaining stream temperature and improving community access to the freshwater system and the local environment

The proposed measures will achieve the Principles of Stormwater Management by improving and enhancing the existing natural habitat and together with the water quality and quantity measures, will minimise and mitigate erosion potential in the receiving environment.

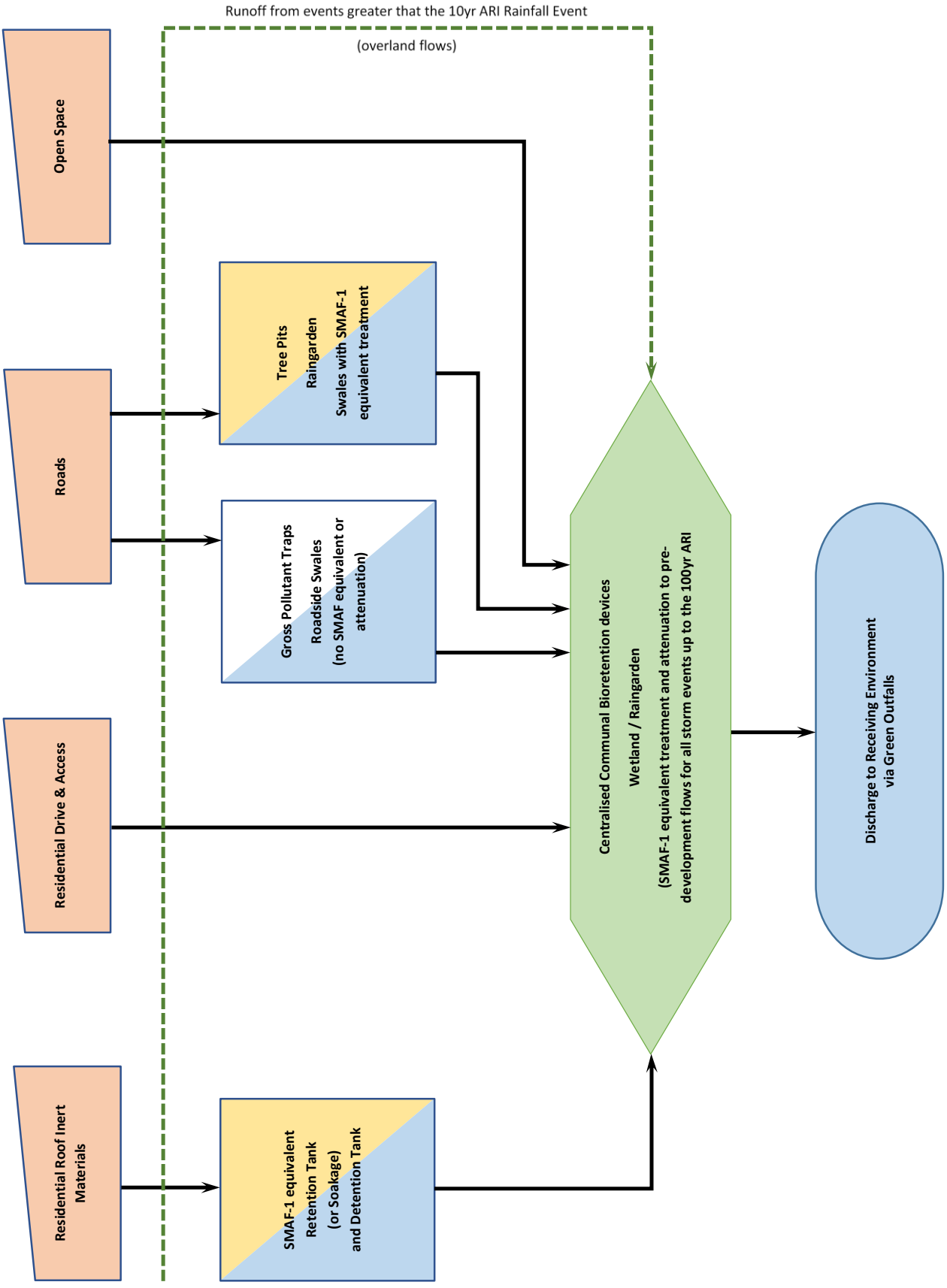
Stormwater Runoff Treatment Flowchart - Residential zone – Catchment East



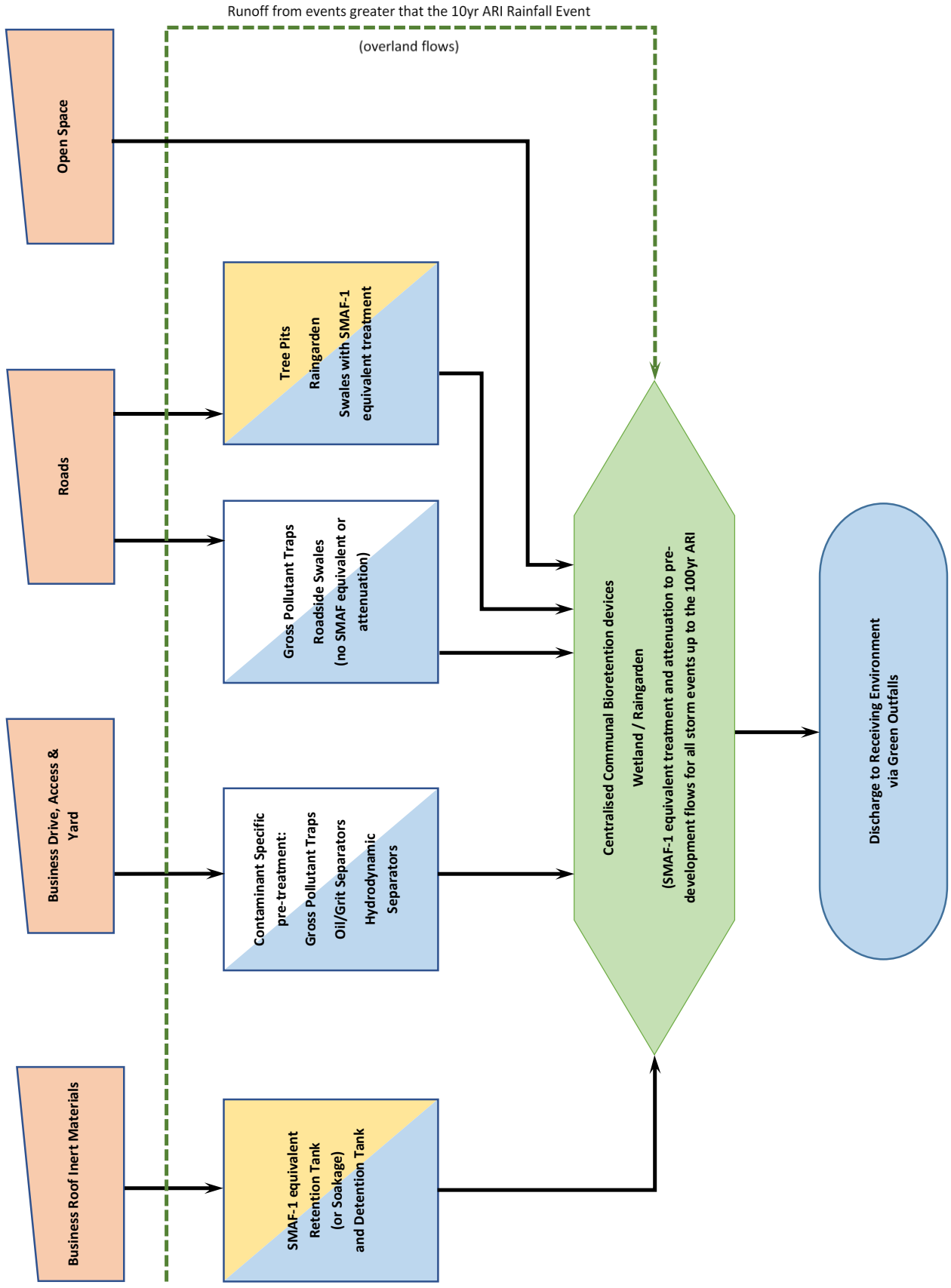
Stormwater Runoff Treatment Flowchart – Business Zone - Catchment East



Stormwater Runoff Treatment Flowchart - Residential zone-Catchment West

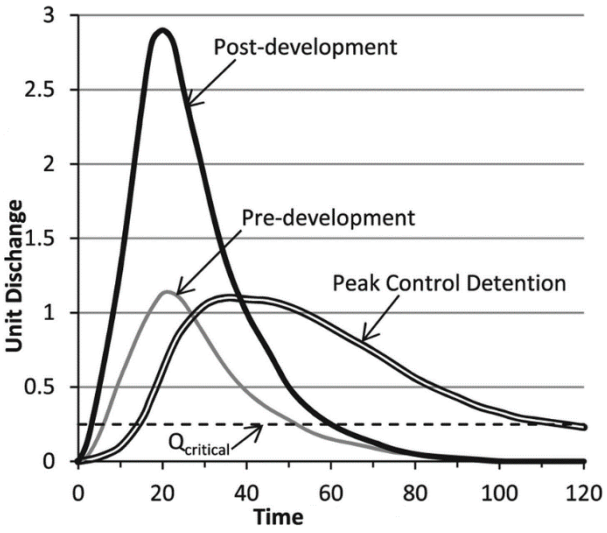


Stormwater Runoff Treatment Flowchart - Business zone-Catchment West



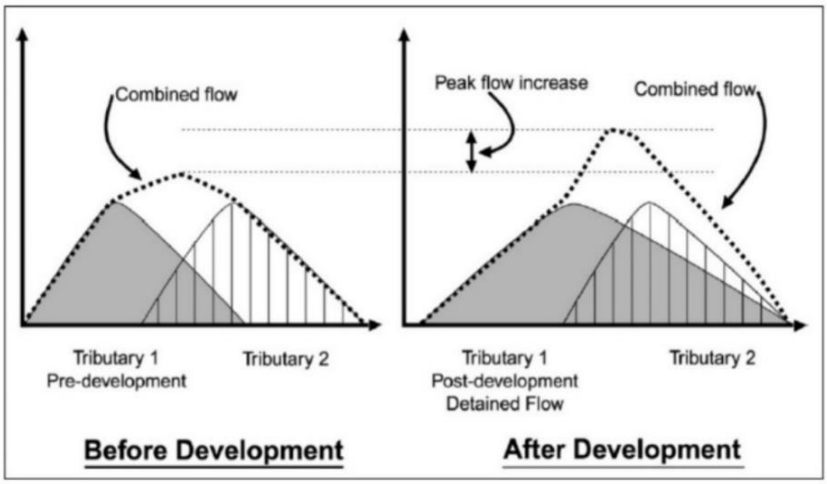
6.2.4 FLOODING

It is a well-known precept that development leads to increased stormwater runoff, in both peak flowrate & velocity and also in volume. The mitigation measures for flood control focus on detention and hydrological improvements to ensure flood flows and levels do not create a risk within the proposed development and are not increased on upstream or downstream properties.



Flooding is a 4-Dimension issue, with the timing of the peak flows and the location of the site within the catchment having the biggest influence on upstream and downstream flooding. Common Practice (and the Unitary Plan) require the peak flow at the outlet of a site such that post-development peak discharge equals pre-development peak discharge.

This type of Stormwater Management is commonly achieved using Wet or Dry Ponds and Wetlands. The peak flows are detained and released at a rate not exceeding the pre development rate. This does however extend the discharge rate for a longer period. While the mitigation requirements for the site are achieved, this does not always provide effective water quantity control downstream of the site, and may actually exacerbate flooding issues downstream with the prolonged detention outflow coinciding with peak flows from (multiple) upstream catchments, thereby increasing overall catchment flood flows even though the site flows are mitigated. This is identified in GD01 as superposition of peak flows.



Effect of Increased Post-Development Runoff Volume with Detention on a Downstream Hydrograph

Upon inspection of both the catchment and location of the site within the catchment, together with the results of the catchment calculations of the pre-developed site, we recognised that this superposition risk is true for this catchment, and that detention and delayed flows of the larger storm events will increase downstream peak flows, even though the site runoff flowrates are mitigated to pre-development values.

There is an accepted solution to this detention issue, and is known as 'pass flows forward'. This is only appropriate in situations where detention will not achieve the desired outcome, where mitigation will only exacerbate existing flooding issues.

Pass Flows Forward is an approach where the peak flows from large events are not mitigated, *i.e.,* flows are passed on; ensuring there are no detained peak flows that could increase the catchment runoff. This will result in the site runoff peaking earlier, but the resulting peak catchment runoff is lower that the pre-development runoff. The summary results below show the pre- and post-development flows, and the graph shows where the change in flows occur, confirming that the hydrological goals are achieved ensuring the upstream and downstream peak flows are not increased.

Global Summary Results for Run "100yr w CC"

Project: Golding Road 2021 Simulation Run: 100yr w CC

Start of Run: 01Jan2018, 00:00 Basin Model: CATCHMENT 1 Pre-Development
End of Run: 02Jan2018, 18:00 Meteorologic Model: POST 100yr
Compute Time: 07Jul2021, 17:05:30 Control Specifications: Pre-Development Assessment

Show Elements: All Elements Volume Units: MM 1000 M3 Sorting: Hydrologic

Hydrologic Element	Drainage Area (KM2)	Peak Dischar... (M3/S)	Time of Peak	Volume (MM)
R8	2.78190	32.4734	01Jan2018, 12:28	129.59
UAAP	0.43760	3.9274	01Jan2018, 12:51	108.09
UAAI	0.01120	0.3174	01Jan2018, 12:17	224.36
J9	3.23070	35.6599	01Jan2018, 12:28	127.01
R9	3.23070	35.4237	01Jan2018, 12:30	127.02
ULP	0.30390	3.5631	01Jan2018, 12:36	119.05
ULI	0.00780	0.2484	01Jan2018, 12:13	224.36
US-GR	3.54240	38.9866	01Jan2018, 12:30	126.55
Stream	3.54240	38.1256	01Jan2018, 12:37	126.55
GMCbP	0.02490	0.5779	01Jan2018, 12:19	170.11
GMCbI	0.00970	0.2886	01Jan2018, 12:15	219.29
Div GMCb	0.03460	0.7579	01Jan2018, 12:17	66.38
GMBP	0.27590	5.6394	01Jan2018, 12:24	170.11
GMBI	0.02990	0.7852	01Jan2018, 12:20	219.29
GMCaP	0.08730	1.8911	01Jan2018, 12:22	170.11
GMCaI	0.01410	0.3921	01Jan2018, 12:17	219.29
J-N	0.44180	9.3326	01Jan2018, 12:22	166.89
GMAP	0.17540	3.3911	01Jan2018, 12:17	133.84
GMAI	0.00861	0.2956	01Jan2018, 12:11	219.29
J-C	0.18401	3.6414	01Jan2018, 12:16	137.84
J-Str	4.16821	47.2107	01Jan2018, 12:35	131.32
Reach-6	4.16821	46.4535	01Jan2018, 12:40	131.32
CXP	0.59670	5.9625	01Jan2018, 12:44	111.31
CXI	0.01530	0.4600	01Jan2018, 12:15	224.36
Reach-3	0.61200	6.1312	01Jan2018, 12:45	114.14
CWP	0.14550	2.3294	01Jan2018, 12:14	101.65
CWI	0.00370	0.1850	01Jan2018, 12:05	224.36
J21	0.76120	7.0131	01Jan2018, 12:41	112.29
Reach-4	0.76120	6.9942	01Jan2018, 12:46	112.29
CZP	0.07640	1.0766	01Jan2018, 12:18	101.65
CZI	0.00200	0.0910	01Jan2018, 12:06	224.36
Reach-1	0.07840	1.0981	01Jan2018, 12:23	104.76
CYP	0.15370	1.4052	01Jan2018, 12:43	101.65
CYI	0.00390	0.1217	01Jan2018, 12:14	224.36
J22	0.23600	2.3041	01Jan2018, 12:28	104.71
Reach-2	0.23600	2.2904	01Jan2018, 12:33	104.69
J23	0.99720	9.1384	01Jan2018, 12:43	110.49
Reach-5	0.99720	9.1309	01Jan2018, 12:44	110.48
Outlet Junction	5.16541	55.5308	01Jan2018, 12:40	127.30
Yates Road Culvert	5.16541	54.7186	01Jan2018, 12:44	125.93
Outlet	5.16541	54.7186	01Jan2018, 12:44	125.93
GMDP	0.13160	3.2922	01Jan2018, 12:16	170.11
GMDI	0.06250	2.0003	01Jan2018, 12:13	219.29
Station Road North	0.19410	5.2379	01Jan2018, 12:15	185.95
Station Road South	0.00000	0.1000	01Jan2018, 10:40	n/a

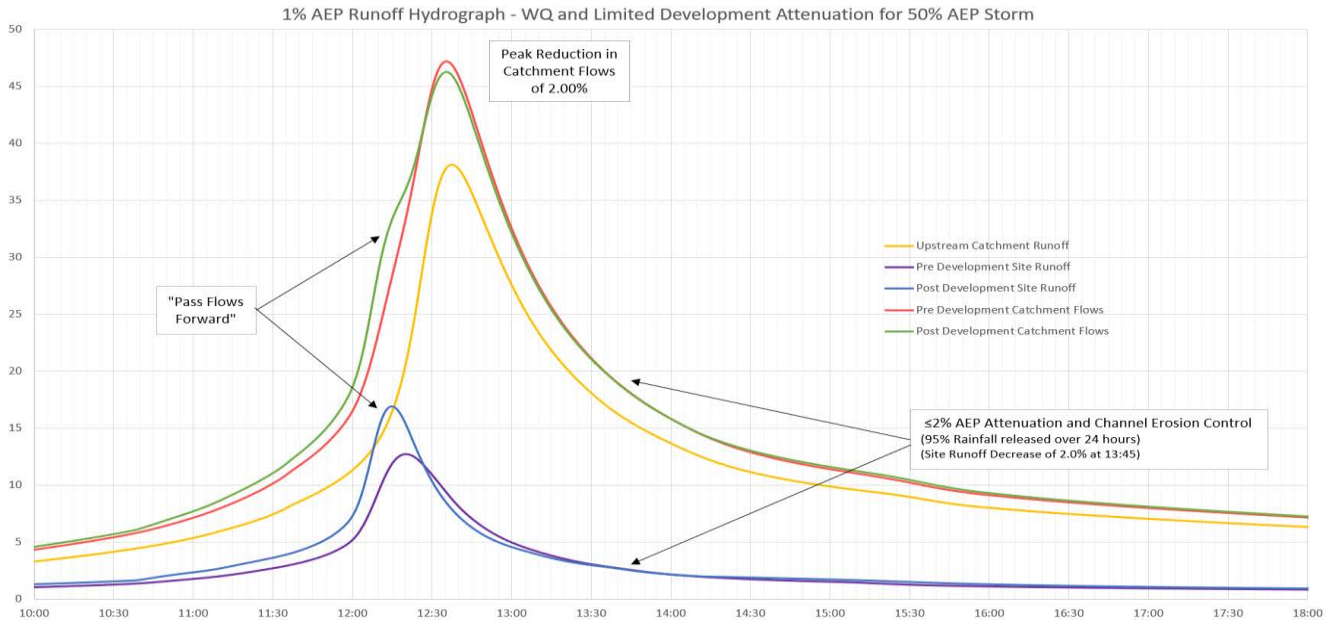
Global Summary Results for Run "POST 100yr"

Project: Golding Road 2021 Simulation Run: POST 100yr

Start of Run: 01Jan2018, 00:00 Basin Model: CATCHMENT 2 Post-Development
End of Run: 02Jan2018, 18:00 Meteorologic Model: POST 100yr
Compute Time: 07Jul2021, 16:48:17 Control Specifications: Post Development Assessment

Show Elements: All Elements Volume Units: MM 1000 M3 Sorting: Hydrologic

Hydrologic Element	Drainage Area (KM2)	Peak Dischar... (M3/S)	Time of Peak	Volume (MM)
ULI	0.0078	0.2484	01Jan2018, 12:13	224.36
US-GR	3.5424	38.9866	01Jan2018, 12:30	126.55
Stream	3.5424	38.1256	01Jan2018, 12:37	126.55
GMCbP	0.0013	0.0334	01Jan2018, 12:15	169.10
GMCbI	0.0333	1.1015	01Jan2018, 12:12	224.36
Div GMCb	0.0346	1.0335	01Jan2018, 12:12	80.06
GMBP	0.1148	2.6886	01Jan2018, 12:18	169.02
GMBI	0.1910	5.7854	01Jan2018, 12:15	224.36
GMCaP	0.0374	0.9135	01Jan2018, 12:16	166.45
GMCaI	0.0639	2.0584	01Jan2018, 12:13	224.36
Div-N	0.4417	10.9060	01Jan2018, 12:15	66.37
WL-N	0.0000	1.3884	01Jan2018, 13:59	n/a
J-N	0.4417	12.2912	01Jan2018, 12:15	193.77
GMAP	0.0770	1.3796	01Jan2018, 12:20	136.28
GMAI	0.1069	3.3355	01Jan2018, 12:14	224.36
Div-C	0.1839	4.0469	01Jan2018, 12:15	63.02
WL-C	0.0000	0.5363	01Jan2018, 14:11	n/a
J-C	0.1839	4.5818	01Jan2018, 12:15	187.48
J-Str	4.1680	46.2755	01Jan2018, 12:35	136.36
Reach-6	4.1680	45.5969	01Jan2018, 12:40	136.36
CXP	0.5967	5.9625	01Jan2018, 12:44	111.31
CXI	0.0153	0.4600	01Jan2018, 12:15	224.36
Reach-3	0.6120	6.1312	01Jan2018, 12:45	114.14
CWP	0.1455	2.3294	01Jan2018, 12:14	101.65
CWI	0.0037	0.1850	01Jan2018, 12:05	224.36
J21	0.7612	7.0131	01Jan2018, 12:41	112.29
Reach-4	0.7612	6.9942	01Jan2018, 12:46	112.29
CZP	0.0764	1.0766	01Jan2018, 12:18	101.65
CZI	0.0020	0.0910	01Jan2018, 12:06	224.36
Reach-1	0.0784	1.0981	01Jan2018, 12:23	104.76
CYP	0.1537	1.4052	01Jan2018, 12:43	101.65
CYI	0.0039	0.1217	01Jan2018, 12:14	224.36
J22	0.2360	2.3041	01Jan2018, 12:28	104.71
Reach-2	0.2360	2.2904	01Jan2018, 12:33	104.69
J23	0.9972	9.1384	01Jan2018, 12:43	110.49
Reach-5	0.9972	9.1309	01Jan2018, 12:44	110.48
Outlet Junction	5.1652	54.6741	01Jan2018, 12:40	131.36
Yates Road Culvert	5.1652	53.9773	01Jan2018, 12:43	128.73
Outlet	5.1652	53.9773	01Jan2018, 12:43	128.73
GMDP	0.0289	0.7979	01Jan2018, 12:13	169.64
GMDI	0.1651	5.8385	01Jan2018, 12:11	224.36
J-GMMc	0.1940	6.6172	01Jan2018, 12:11	216.21
Station Road Wetland	0.1940	4.3848	01Jan2018, 12:20	216.21
Station Road North	0.1940	4.3848	01Jan2018, 12:20	216.21
Station Road South	0.0000	0.1000	01Jan2018, 09:47	n/a



We have also previously received flow routing data for the Tutaenui Stream at the Pukekohe Park Raceway, some 700m distant and upstream from where this catchment joins, and together with the

flow data in the Pukekohe South Stormwater Catchment Management Plan, these indicate the Peak Flow rate at the Tutaenui Junction occurs between 13:00hrs and 14:00hrs (based on a normalised standard 24hr Storm hyetograph). This means that if the post development flows from the catchment exceed pre development flows prior to 14:00hrs, the peak flows and therefore flood levels on downstream properties are increased. The conclusion here is that the mitigation measures are not in compliance with section E8 of the Unitary Plan - even if the required Stormwater Mitigation is achieved for the site. This shows the importance of considering not only the peak flowrate, but also the timing of the peak flows.

A number of different scenario's were modelled, including full site mitigation, water quality and site mitigation up to and including the 10% AEP Storm, and water quality and limited catchment mitigation. The latter gave the best peak flow reduction and is the only scenario that ensured catchment flows were not increased in the time period between prior to 14:00 hours ensuring downstream flows and therefore downstream flood levels are not increased. Refer to Appendix A.

The optimal scenario was to convey flows up to the 95th percentile rainfall event to the Wetland/Raingarden, and ensuring the runoff in the 50% storm event is attenuated to be 86% of the unattenuated runoff. All excess flows will be Passed Forward, either bypassing the wetland via diversion manholes; or, in the case of overland flowpaths, being directed to the stream.

This ensures all water is appropriately treated, the stream hydrology is adequately preserved and flood levels are not increased.

6.2.5 Flooding 1% AEP event (Habitable Floors)

Based on the above calculations and time to peak flow for upstream and downstream catchments, there is no calculated increase in runoff flows and no calculated superposition of peak flows. Therefore, the objective to not increasing flood risk to existing (habitable) dwellings is achieved.

6.2.6 Overland flowpath and floodplain management

To ensure the proposed Plan Change does not create any new flooding effects or increase flood levels to downstream properties the following measures are proposed:

- The remediated stream channels will be holistically designed complete with terracing and flood plains designed to convey flood flows from both upstream and from within the site
- After water quality and quantity treatment and limited attenuation of the 50% AEP rainfall event, (runoff reduced to be 86% of unattenuated flows) all excess flows from Catchment East will be directed directly to the receiving environment, employing a 'Pass flows Forward' approach to prevent superposition of peak flows with the upper catchment.
- All flows for Catchment West will be directed to the communal wetland/raingarden for full attenuation up to and including the 1% AEP Storm Event.
- Roads will be designed as minor overland flowpaths, directing excess surface flows to the wetlands, streams or other designated overland flowpaths
- All existing overland flows will be retained or managed within the site to convey the anticipated flows within public land and away from private property
- Future earthworks will be designed to ensure new development is appropriately located above any existing or proposed flood plains or overland flowpaths

6.2.7 DEVELOPMENT STAGING

It is anticipated that the development of the Golding Road Plan Change will be staged. It is expected that at detailed design, any staging will ensure the required communal devices will be constructed or have been constructed at the time of development and that all properties will have consent notices registered on the titles requiring the construction of any at source devices at time of Building Consent.

6.3 HYDRAULIC CONNECTIVITY

Hydraulic connectivity refers to the hydraulic interaction between water sources, commonly between aquifers, between different parts of the same aquifer, and between surface water and ground water systems.

Hydraulic connectivity is improved when surface runoff is in contact with the ground rather than piped as soon as possible.

The proposed devices and stream daylighting within the Golding Road Plan Change Area will mitigate as much as practical the loss of hydraulic connectivity caused by increasing the amount of impervious surfaces. The proposed wetlands and swales are devices that prolong the contact period of surface runoff with the ground and the rehabilitation of the main stream channel and the daylighting and channel reinstatement of the piped watercourse will also increase the contact period of the runoff with the ground, improving the hydraulic connectivity of the surface flow with ground water.

6.4 ASSET OWNERSHIP

All public infrastructure and stormwater network reticulation as well as communal stormwater devices located in public land are proposed to be vested to Auckland Council. This includes all manholes and stormwater pipes and communal bioretention devices raingardens, wetlands, treepits and swales

6.5 ONGOING MAINTENANCE REQUIREMENTS

Appropriate Operation and Maintenance Guides and Plans for the specific devices will be submitted to Council and registered as Consent Notices on any titles requiring stormwater devices to ensure awareness of and maintenance of any on-site devices.

6.6 IMPLEMENTATION OF STORMWATER NETWORK

This will be addressed upon development of the site.

6.7 DEPENDENCIES

No off-site infrastructure upgrades are currently proposed.

6.8 RISKS

The table below identifies risks to the proposed stormwater management for the Golding Road Plan Change and identifies management of the risks throughout the design (and later the construction) phase.

What is the risk to the proposed stormwater management?	How can this be mitigated / managed?	What other management / mitigation could be used?	When does this risk need to be addressed?	What is the resultant level of risk?
Unknown Infiltration rate	Percolation testing	Retention through reuse or added to detention volume	At Resource Consent Stage	Low
Auckland Council Floodplain & Overland Flow mapping incorrect	Field Survey of site		At Resource Consent Stage	Medium
Existing Drainage Network different to GeoMaps	Field Verification and Topographical Survey		At Resource Consent Stage	Medium

7 DEPARTURES FROM REGULATORY OR DESIGN CODES

The proposed stormwater devices and treatment approach are consistent with the requirements of the Unitary Plan, Guidance Documents, Engineering Design Codes and is considered Best Practise Options for the proposed Plan Change.

8 CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK

The summary of the proposed stormwater management requirements are summarised in this section with recommendations for further work and considerations as during the ensuing work towards resource consenting and engineering design.

8.1 CONCLUSIONS

This Stormwater Management Plan has been developed based on the regulatory framework of the Auckland Unitary Plan, Auckland Council's Stormwater Guideline Documents and Network Discharge Consent, National Environmental Standards, Waikato-Tainui River Management Plan and the Paerata Pukekohe Future Urban Zone Stormwater Management Plan.

The Stormwater Management Plan seeks to establish a cohesive approach to the management of rainfall from raindrop falling to site discharge; by imposing controls on the quality and quantity of the runoff and requiring ecological enhancements including:

- Identify Best Practice Options for Stormwater treatment for the development area
- Promote Water Sensitive Design to mitigate adverse effects of development on the receiving environment
- Minimise discharge of contaminants into the receiving environment
- Protect and improve existing freshwater systems
- Not worsening downstream flooding

The proposed methodologies to achieve the above outcomes include:

- Inert Roofing Materials to be utilised
- Provide for stormwater treatment either at source or within a centralised wetland or raingarden. Specific treatment to target business zone runoff contaminants.
- Provide for SMAF-1 equivalent hydrology treatment for all impervious areas
- Provide attenuation for 2yr ARI Rainfall event
- Utilise a Pass flows Forward approach for larger storm events to avoid superposition of peak flows.
- Reinstate natural habitat to degraded stream channel
- Remove existing culverts from streams and Daylight piped streams

Detailed design of the location and types of stormwater treatment devices and configuration of stream and overland flow rehabilitation will be addressed upon detailed design required for resource consenting. Based on the current analysis, it is anticipated the effects of the discharge of stormwater runoff can be managed and even generate a net ecological gain due to the nature of the proposed remedial stream works.

Golding Road Plan Change Stormwater Toolbox: Catchment East

Area of Interest/Zone	Runoff Source	Stormwater Targets				Best Practice Options
		Water Quality	Hydrology Mitigation	Flood Attenuation	Water Sensitive Design	
		GD01	SMAF-1 Equivalent	Post Dev Flows ≈ 86% unattenuated Post-Dev flows	GD04	
Residential: Mixed Housing Urban	Roof	✗	✔	✔	✔	Inert Roofing Materials Hydrology Mitigation Retention: Soakage or Reuse Hydrology Mitigation Detention Detention Tank for 2yr Storm Attenuation
	Driveway/Access	✔	✔	✔	✔	Treepits and/or Raingardens or Swales & Communal Raingardens or Wetlands for hydrology mitigation & attenuation
Business: Light Industry Neighbourhood Centre	Roof	✗	✔	✔	✔	Inert Roofing Materials Hydrology Mitigation Retention: Soakage or Reuse Communal Raingardens or Wetland for hydrology mitigation and attenuation
	Driveway/Access/Yards	✔	✔	✔	✔	Contaminant Specific pre-treatment using Gross Pollutant Trapsand/or Oil/Grit Separators or Hydrodynamic Separators depending upon activity Communal Raingardens or Wetland for hydrology mitigation and attenuation
Roading	Impervious Surfaces	✔	✔	✔	✔	Treepits and/or Raingardens or Swales & Communal Raingardens or Wetlands for hydrology mitigation & attenuation

Birch surveyors

Golding Road Plan Change Stormwater Toolbox: Catchment West

Area of Interest/Zone	Runoff Source	Stormwater Targets				Best Practice Options
		Water Quality	Hydrology Mitigation	Flood Attenuation	Water Sensitive Design	
		GD01	SMAF-1 Equivalent	Post Dev Flows ≈ Pre-Development Flows for all Storm Event	GD04	
Residential: Mixed Housing Urban	Roof	✗	✔	✔	✔	Inert Roofing Materials Hydrology Mitigation Retention: Soakage or Reuse Communal Raingardens or Wetlands for hydrology mitigation & attenuation
	Driveway/Access	✔	✔	✔	✔	Treepits and/or Raingardens or Swales & Communal Raingardens or Wetlands for hydrology mitigation & attenuation
Business: Light Industry Neighbourhood Centre	Roof	✗	✔	✔	✔	Inert Roofing Materials Hydrology Mitigation Retention: Soakage or Reuse Communal Raingardens or Wetland for hydrology mitigation and attenuation
	Driveway/Access/Yards	✔	✔	✔	✔	Contaminant Specific pre-treatment using Gross Pollutant Trapsand/or Oil/Grit Separators or Hydrodynamic Separators depending upon activity Communal Raingardens or Wetland for hydrology mitigation and attenuation
Roading	Impervious Surfaces	✔	✔	✔	✔	Treepits and/or Raingardens or Swales & Communal Raingardens or Wetlands for hydrology mitigation & attenuation

Birch surveyors

Golding Road Plan Change Stormwater Management Approach

Area of Interest/Zone	SW Component	SW Outcome	At Source	Communal Device	Other Requirements
Residential: Mixed Housing - Urban;	Water Quality	Eliminate or minimise generation of contaminants	✔ Inert Roofing Materials ✔ Driveway runoff to private treatment device (Swale, raingarden or similar)	✔ Runoff directed to Communal Raingarden or Wetland	If all at source treatment is achieved for Water Quality and Hydrological Mitigation, Communal Devices may be bypassed Where Soakage or re-use is not feasible, Retention made up as Detention in Tanks or Communal Raingarden/Wetland
	Hydrological Mitigation	SMAF-1 Equivalent hydrological mitigation and Required flow mitigation	✔ Retention via Soakage or Re-use Tanks ✔ Detention Tanks (SMAF-1 equivalent and required flow attenuation	✔ Runoff directed to Communal Raingarden or Wetland	
Business: Light Industry; Neighbourhood Centre	Water Quality	Eliminate or minimise generation of contaminants	✔ Inert Roofing Materials ✔ Driveway and Yard runoff to private treatment device (Raingarden, Tree Pit, Swale, Gross Pollutant Traps, Oil/Grit separators or hydrodynamic separators for contaminant specific treatment)	✔ Runoff directed to Communal Raingarden or Wetland for treatment and attenuation	Where Soakage or re-use is not feasible, Retention made up as Detention in Tanks or Communal Raingarden/Wetland
	Hydrological Mitigation	SMAF-1 Equivalent hydrological mitigation required flow mitigation	✔ Retention via Soakage or Re-use Tanks ✔ Detention Tanks (SMAF-1 equivalent and required flow attenuation	✔ Runoff directed to Communal Raingarden or Wetland for treatment and attenuation	
Roading	Water Quality	Eliminate or minimise generation of contaminants	✔ Tree Pits / Raingardens Designed to SMAF-1 equivalent and attenuate 50% AEP Rainfall ✔ Swales and filter strips ✔ Gross Pollutant Traps	✔ Runoff directed to Communal Raingarden or Wetland for treatment and attenuation	Where Soakage or re-use is not feasible, Retention made up as Detention in Tanks or Communal Raingarden/Wetland
	Hydrological Mitigation	SMAF-1 Equivalent hydrological mitigation and required flow mitigation		✔ Runoff directed to Communal Raingarden or Wetland for treatment and attenuation	
Open Space/ Reserves	Stream Environment	Enhance and Restore Natural Habitat	✔ Remove existing culverts in Permanent and Intermittent streams ✔ Daylight piped intermittent stream ✔ Reinstate natural habitat in main tributary ✔ Riparian Planting to intermittent and permanent streams ✔ All Discharge Points to receiving environment are via Green Outfalls		

8.2 RECOMMENDATIONS

Recommendations for further investigations to support detailed design include:

- Percolation testing to confirm assumptions based on published geological data
- Confirmation of stormwater modelling with Healthy Waters where Council data differs
- Detailed Design of earthworks
- Detailed design of proposed stormwater treatment and communal devices
- Detailed Design of proposed ecological enhancements and stream rehabilitation.
- The SMP and supporting calculations be updated as the plan change and development progresses to ensure currency with Best Practice Options

APPENDIX A

PLAN OF EXISTING SITE FEATURES

I/We confirm that this proposal has been examined by me/us and agree to the use and reproduction of this plan for the purpose of obtaining a resource consent

.....
Applicants Approval

Approved for submission by: .....
Birch Surveyors Ltd

KEY

- Plan Change Area
- Abuttal Boundaries
- Existing Road Boundaries
- Existing Intermittent Stream
- Existing Permanent Stream
- Old Stream Bed (Not in Use - Water Diverted)
- Existing Drain
- Existing Culvert/Pipe
- Existing Intermittent Pond
- Existing Reservoir Pond
- Existing NES Wetland
- Existing Remnant Forest

NOTES:

1) Areas and measurements are approximate only and subject to final survey
2) Roads shown are legal
3) Datum is arbitrary and subject to final survey
4) This document shall be used only for the purpose for which it is supplied. No reproduction, copying, reuse, sale, hire, loan or gift of this document directly or indirectly is permitted without the prior written consent of Birch Surveyors Ltd
5) This document is subject to copyright

original size A3

Telarc Registered Quality ISO 9001

Birch surveyors
Property House
2A Wesley Street, Pukekohe
PO Box 475,
Pukekohe 2340
Ph: 09 237 1111
Fax: 09 238 0033
pukekohe@bslnz.com
www.birchsurveyors.co.nz

LOCAL AUTHORITY	AUCKLAND COUNCIL
PLANNING MAP	-
ZONING	FUTURE URBAN ZONE
ACTIVITY	
COMPRISED IN	-
TOTAL AREA	-
REGISTERED OWNERS	-

PROJECT NAME

GOLDING MEADOW DEVELOPMENT LIMITED

154-162 GOLDING ROAD
PUKEKOHE

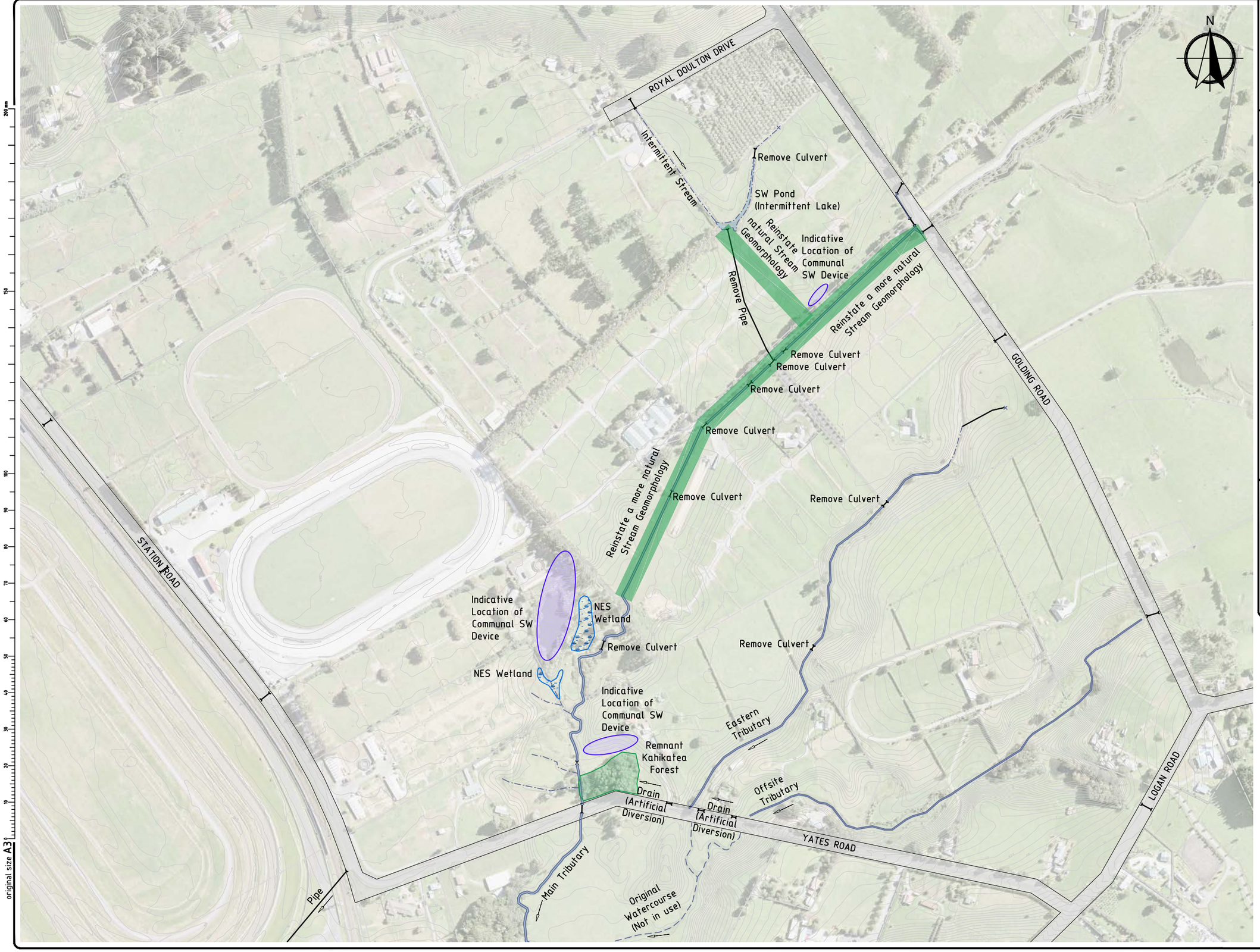
Surveyed -	Date -	Project No. 4294
Designed -	Date -	Scale Hz: 1:5000 @ A3
Drawn K. Bosgra	Date 05-2021	
Approved PROJECT MANAGER	Date	

REV.	BY	DATE	COMMENT
A	KB	05-21	Release
B	KB	06-21	Station Rd Update
C	KB	07-21	Catchment Update

TITLE

GOLDING ROAD PLAN CHANGE
EXISTING HYDROLOGICAL FEATURES

Drawing Name	F:\..\CAD\SW Features v3.dwg /	SUBJECT TO FINAL SURVEY	Rev. C



I/We confirm that this proposal has been examined by me/us and agree to the use and reproduction of this plan for the purpose of obtaining a resource consent

.....
Applicants Approval

Approved for submission by: .....
Birch Surveyors Ltd

KEY

- Plan Change Area
- Abuttal Boundaries
- Existing Road Boundaries
- Existing Intermittent Stream
- Existing Permanent Stream
- Old Stream Bed (Not in Use - Water Diverted)
- Existing Drain
- Existing Culvert/Pipe
- Existing Intermittent Pond
- Existing Reservoir Pond
- Existing NES Wetland
- Existing Remnant Forest

NOTES:

1) Areas and measurements are approximate only and subject to final survey
2) Roads shown are legal
3) Datum is arbitrary and subject to final survey
4) This document shall be used only for the purpose for which it is supplied. No reproduction, copying, reuse, sale, hire, loan or gift of this document directly or indirectly is permitted without the prior written consent of Birch Surveyors Ltd
5) This document is subject to copyright

original size A3

Telarc Registered Quality ISO 9001

Birch surveyors
Property House
2A Wesley Street, Pukekohe
PO Box 475,
Pukekohe 2340
Ph: 09 237 1111
Fax: 09 238 0033
pukekohe@bslnz.com
www.birchsurveyors.co.nz

LOCAL AUTHORITY	AUCKLAND COUNCIL
PLANNING MAP	-
ZONING	FUTURE URBAN ZONE
ACTIVITY	
COMPRISED IN	-
TOTAL AREA	-
REGISTERED OWNERS	-

PROJECT NAME

GOLDING MEADOW DEVELOPMENT LIMITED

154-162 GOLDING ROAD
PUKEKOHE

Surveyed	-	Date	-
Designed	-	Date	-
Drawn	K. Bosgra	Date	05-2021
Approved	PROJECT MANAGER	Date	

Project No. 4294

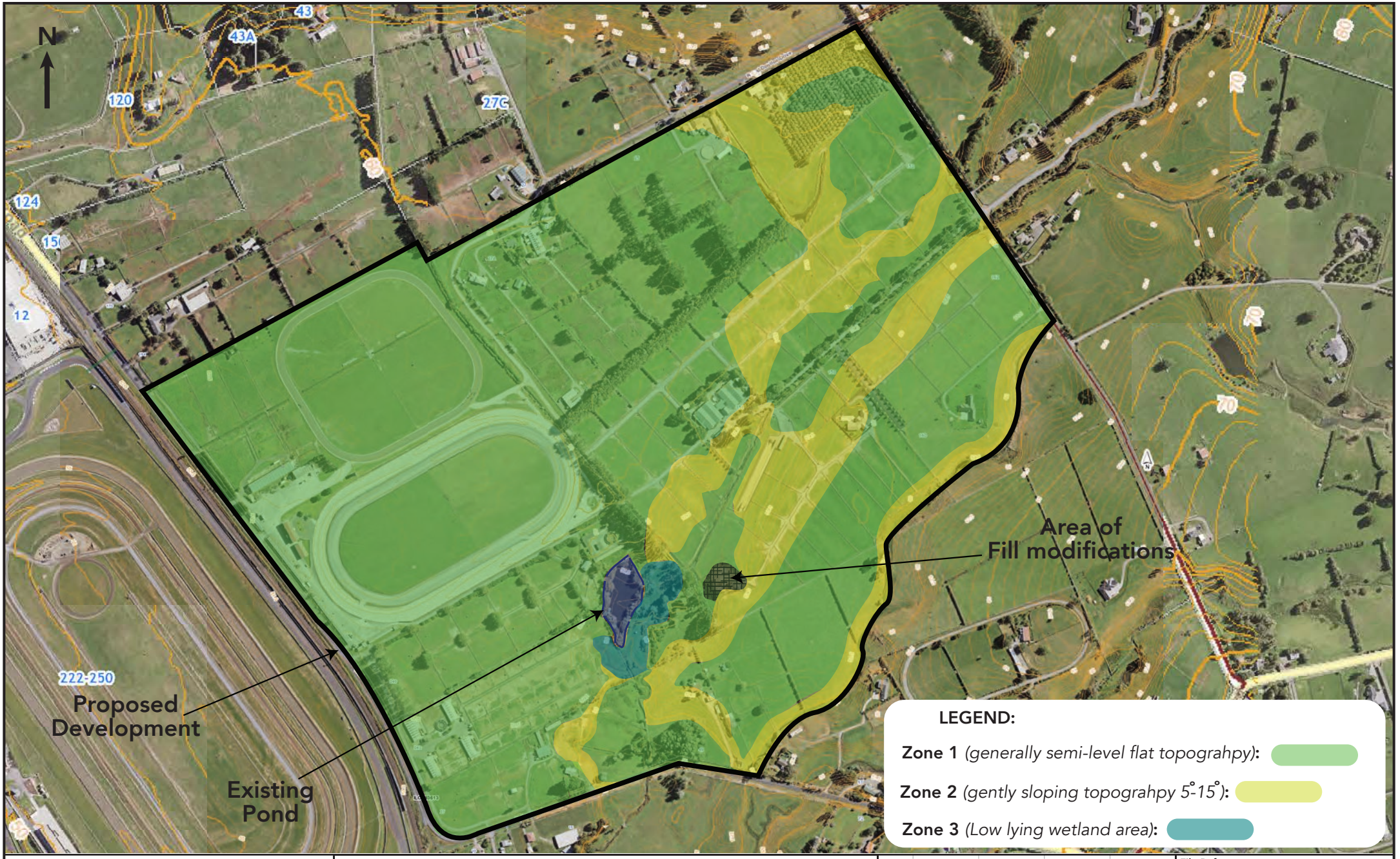
Scale Hz: 1:5000 @ A3

REV.	BY	DATE	COMMENT
A	KB	05-21	Release
B	KB	06-21	Station Rd Update
C	KB	07-21	Catchment Update

TITLE

GOLDING ROAD PLAN CHANGE
PLAN SHOWING PROPOSED
MAJOR HYDROLOGICAL ENHANCEMENTS

Drawing Name F:\...\CAD\SW Features v3.dwg / SUBJECT TO FINAL SURVEY Rev. C



GCL Ground Consulting Ltd

Golding Meadows Development Ltd

Golding Road, Pukekohe

SITE TOPOGRAHPY / GEOMORPHOLOGY OVERVIEW

Rev	Date	Status	Drafted	Reviewer
A	17/09/2020	Issued	AL	FW

File Ref. MAC://Projects_65 00/6518/R6518-1A/R6518-1A-DRW002.ai

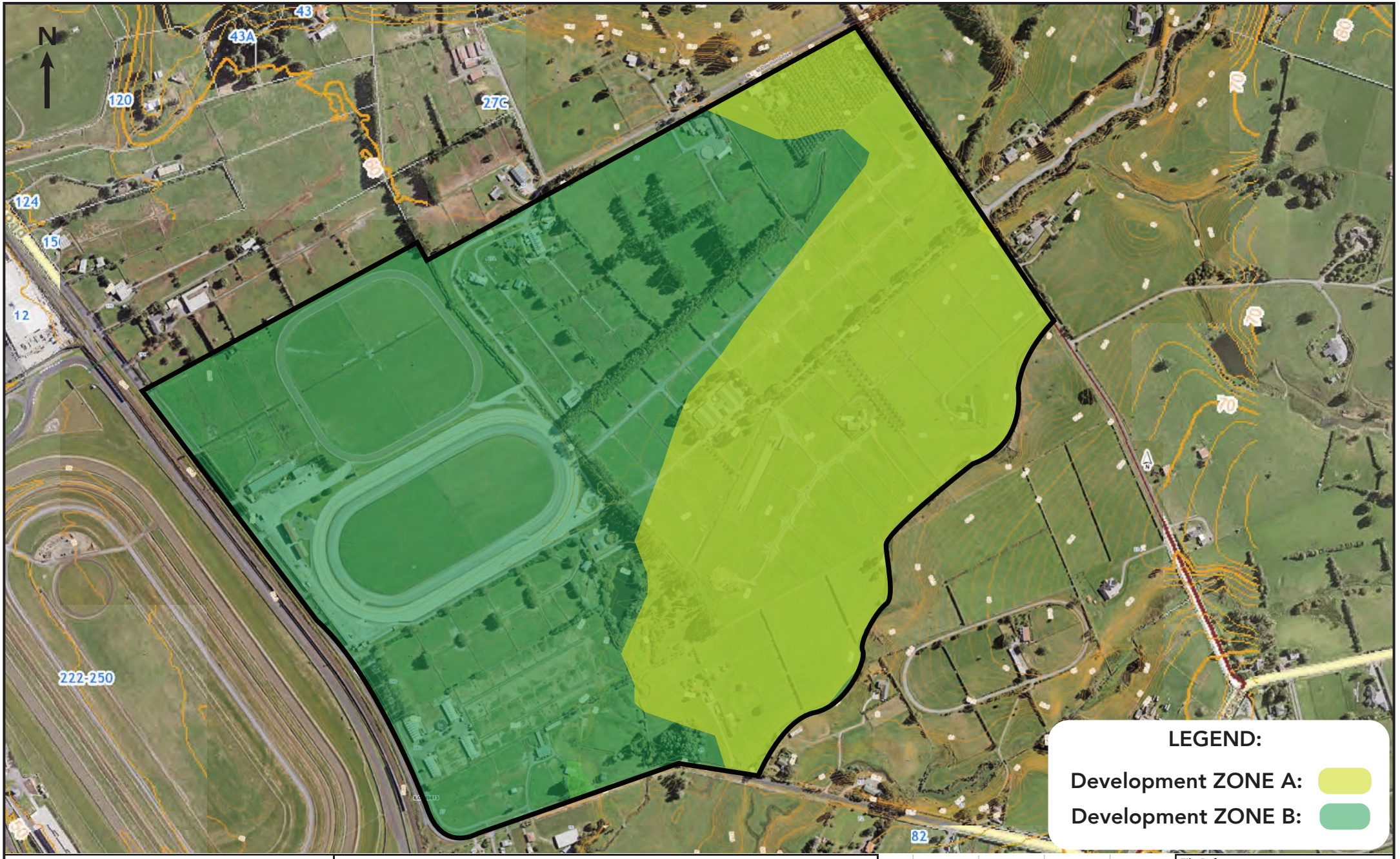
Scale (A4) 1:7,000

0 28 140 280m

Project No. 6518

Report Ref. R6518-1A

Drawing No. 002



GCL Ground Consulting Ltd

Golding Meadows Development Ltd

Golding Road, Pukekohe

SUBDIVISION DEVELOPMENT ZONING

Rev	Date	Status	Drafted	Reviewer
A	17/09/2020	Issued	AL	FW

File Ref. MAC://Projects_65 00/6518/R6518-1A/R6518-1A-DRW002.ai

Scale (A4) 1:7,000

0 28 140 280m

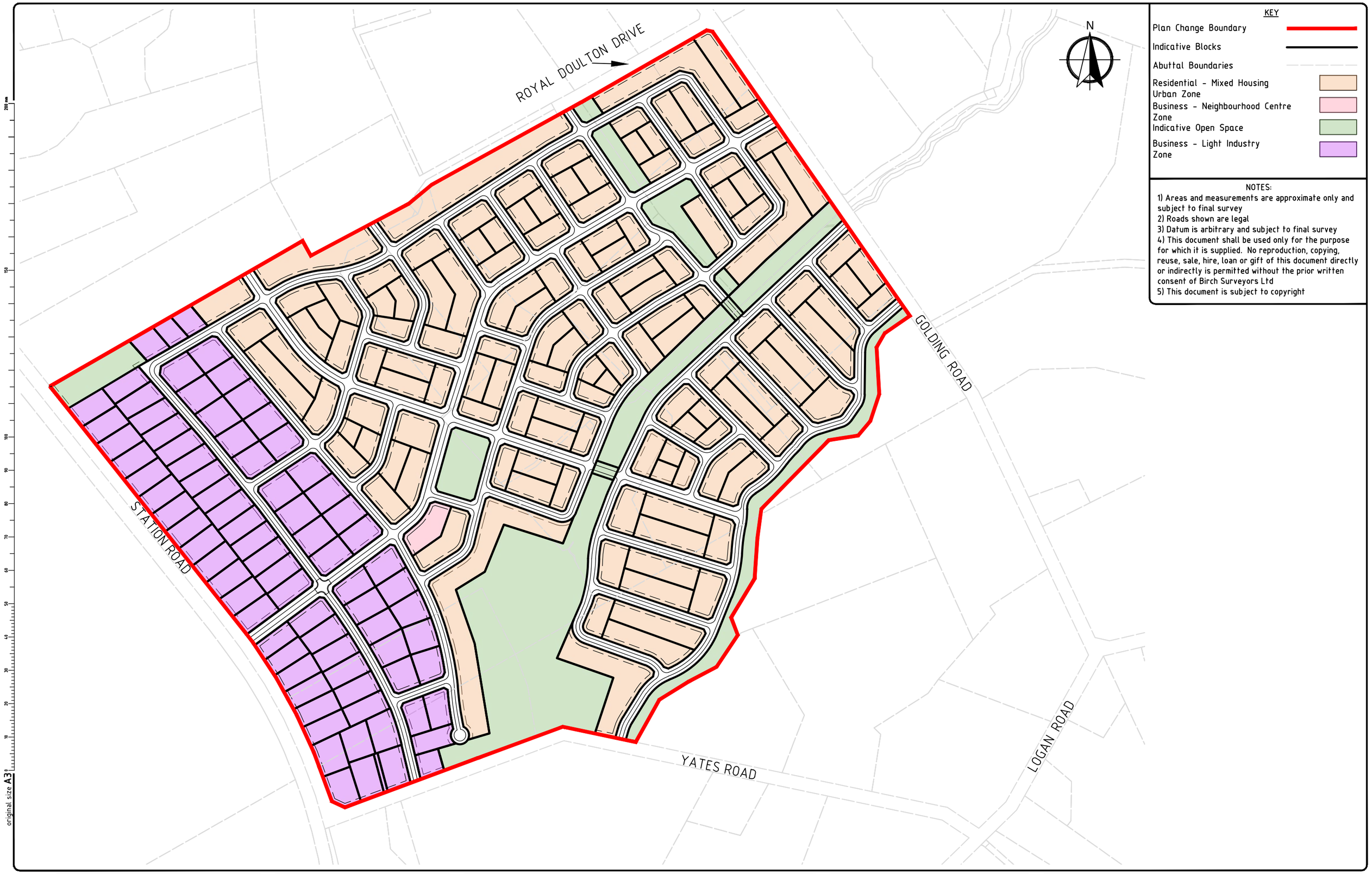
Project No. 6518

Report Ref. R6518-1A

Drawing No. 003

APPENDIX B

PROPOSED DEVELOPMENT PLANS



KEY

- Plan Change Boundary
- Indicative Blocks
- Abuttal Boundaries
- Residential - Mixed Housing Urban Zone
- Business - Neighbourhood Centre Zone
- Indicative Open Space
- Business - Light Industry Zone

NOTES:

1) Areas and measurements are approximate only and subject to final survey
2) Roads shown are legal
3) Datum is arbitrary and subject to final survey
4) This document shall be used only for the purpose for which it is supplied. No reproduction, copying, reuse, sale, hire, loan or gift of this document directly or indirectly is permitted without the prior written consent of Birch Surveyors Ltd
5) This document is subject to copyright

original size A3

Telarc Registered Quality ISO 9001

Birch Planning Surveying Engineering
LAND DEVELOPMENT CONSULTANTS
2A Wesley Street
Pukekohe 2120
PO Box 475
Pukekohe 2340
Ph: 09 237 1111
pukekohe@bslnz.com
www.birchsurveyors.co.nz

LOCAL AUTHORITY	AUCKLAND COUNCIL
PLANNING MAP	-
ZONING	FUTURE URBAN ZONE & MAJOR RECREATION FACILITY ZONE
ACTIVITY	
COMPRISED IN	-
TOTAL AREA	82.6666ha
REGISTERED OWNERS	-

PROJECT NAME

PRIVATE PLAN CHANGE PUKEKOHE GOLDING PRECINCT

GOLDING ROAD
PUKEKOHE

Surveyed	-	Date
Designed	GRPC	Date 2019
Drawn	BSL	Date 01/2019
Approved	Project Manager	Date

Project No. 4294

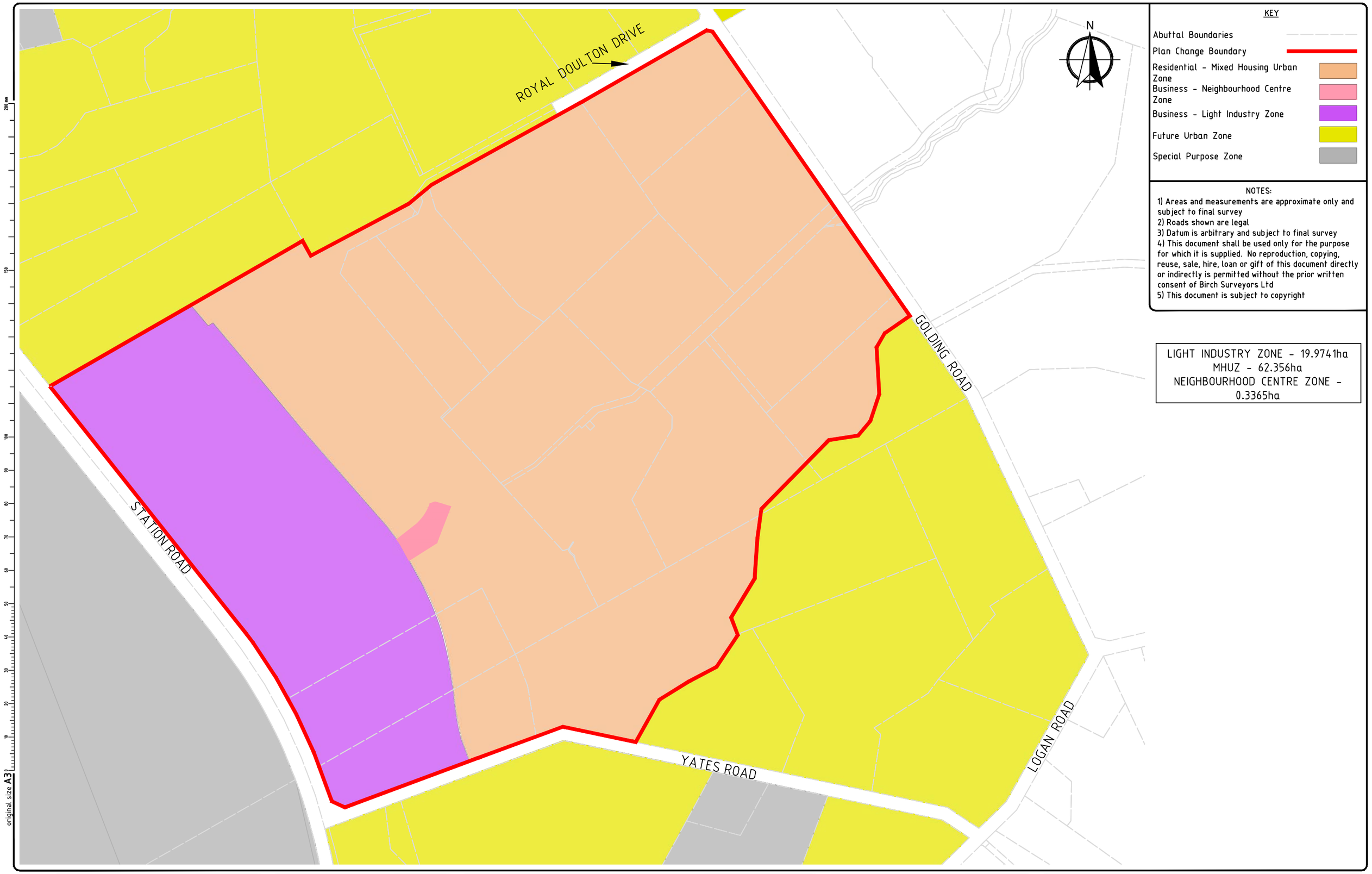
Scale Hz: 1:5000 @ A3

REV.	BY	DATE	COMMENT
J	SS	07/21	Updates
K	KB	10/21	Overlay Updates
L	TR	10/21	Overlay Updates
M	TR	11/21	Catchment Update

TITLE

CONCEPT PLAN

Drawing Name	F:\..CAD\CP 4294 M.dwg /Concept Plan	SUBJECT TO FINAL SURVEY	Rev. M



KEY

- Abuttal Boundaries
- Plan Change Boundary
- Residential - Mixed Housing Urban Zone
- Business - Neighbourhood Centre Zone
- Business - Light Industry Zone
- Future Urban Zone
- Special Purpose Zone

NOTES:

1) Areas and measurements are approximate only and subject to final survey
2) Roads shown are legal
3) Datum is arbitrary and subject to final survey
4) This document shall be used only for the purpose for which it is supplied. No reproduction, copying, reuse, sale, hire, loan or gift of this document directly or indirectly is permitted without the prior written consent of Birch Surveyors Ltd
5) This document is subject to copyright

LIGHT INDUSTRY ZONE - 19.9741ha
MHUZ - 62.356ha
NEIGHBOURHOOD CENTRE ZONE - 0.3365ha

original size A3

Telarc Registered
Quality ISO 9001

Birch LAND DEVELOPMENT CONSULTANTS
Planning
Surveying
Engineering

2A Wesley Street
Pukekohe 2120
PO Box 475
Pukekohe 2340

Ph: 09 237 1111
pukekohe@bslnz.com
www.birchsurveyors.co.nz

LOCAL AUTHORITY	AUCKLAND COUNCIL
PLANNING MAP	-
ZONING	FUTURE URBAN ZONE & MAJOR RECREATION FACILITY ZONE
ACTIVITY	
COMPRISED IN	-
TOTAL AREA	82.6666ha
REGISTERED OWNERS	-

PROJECT NAME

PRIVATE PLAN CHANGE PUKEKOHE GOLDING PRECINCT

GOLDING ROAD
PUKEKOHE

Surveyed	-	Date
Designed	GRPC	Date 2019
Drawn	BSL	Date 01/2019
Approved	Project Manager	Date

Project No. 4294

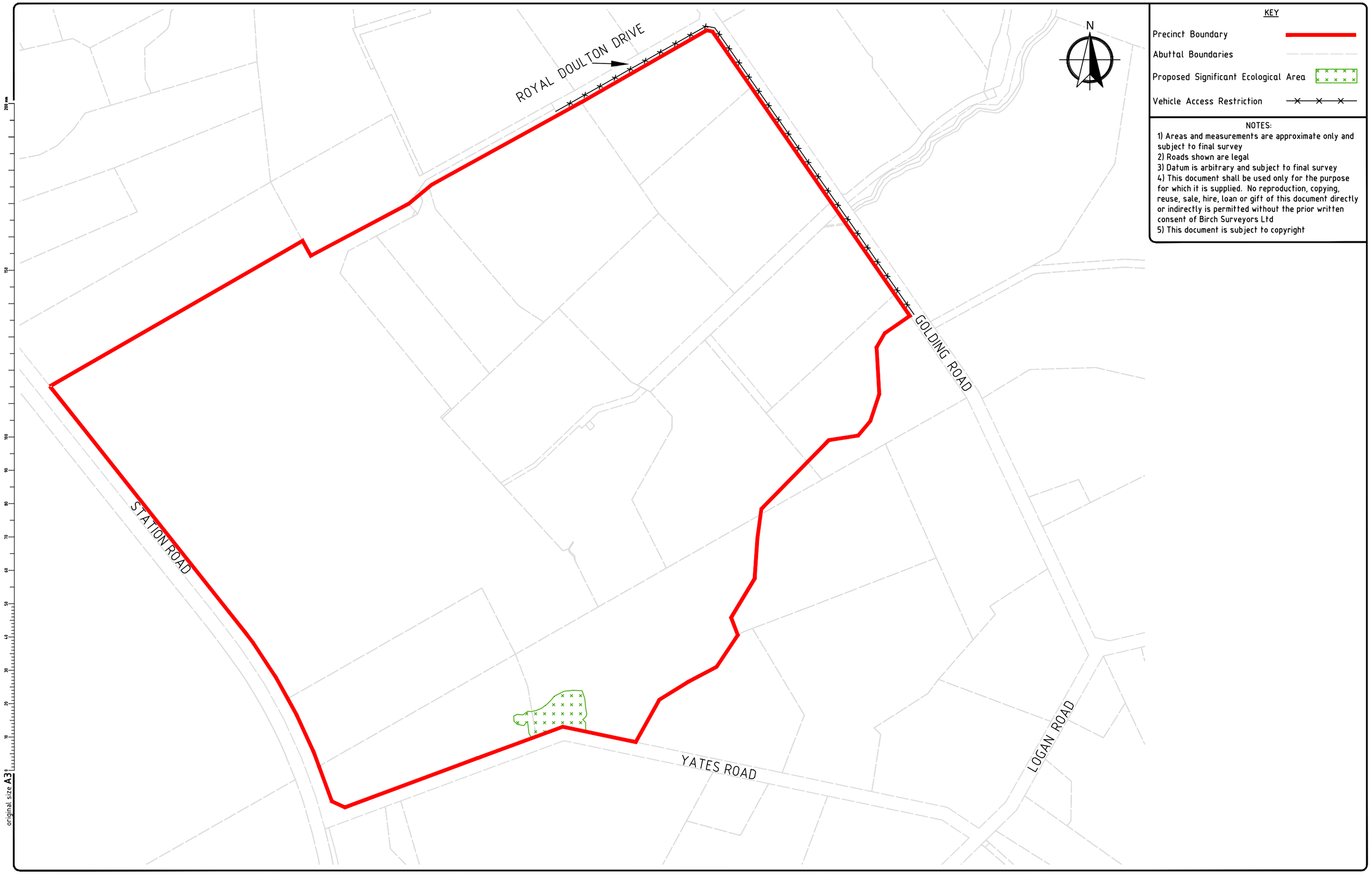
Scale Hz: 1:5000 @ A3

REV.	BY	DATE	COMMENT
J	SS	07/21	Updates
K	KB	10/21	Overlay Updates
L	TR	10/21	Overlay Updates
M	TR	11/21	Catchment Update

TITLE

ZONE MAP

Drawing Name	F:\..CAD\CP 4294 M.dwg /Zone Map	SUBJECT TO FINAL SURVEY	Rev.	M



KEY

- Precinct Boundary
- Abuttal Boundaries
- Proposed Significant Ecological Area
- Vehicle Access Restriction

NOTES:

1) Areas and measurements are approximate only and subject to final survey
2) Roads shown are legal
3) Datum is arbitrary and subject to final survey
4) This document shall be used only for the purpose for which it is supplied. No reproduction, copying, reuse, sale, hire, loan or gift of this document directly or indirectly is permitted without the prior written consent of Birch Surveyors Ltd
5) This document is subject to copyright

original size A3

Telarc Registered
Quality ISO 9001

Birch LAND DEVELOPMENT CONSULTANTS
Planning
Surveying
Engineering
2A Wesley Street
Pukekohe 2120
PO Box 475
Pukekohe 2340
Ph: 09 237 1111
pukekohe@bslnz.com
www.birchsurveyors.co.nz

LOCAL AUTHORITY	AUCKLAND COUNCIL
PLANNING MAP	-
ZONING	FUTURE URBAN ZONE & MAJOR RECREATION FACILITY ZONE
ACTIVITY	
COMPRISED IN	-
TOTAL AREA	82.6666ha
REGISTERED OWNERS	-

PROJECT NAME

PRIVATE PLAN CHANGE PUKEKOHE GOLDING PRECINCT

GOLDING ROAD
PUKEKOHE

Surveyed	-	Date	
Designed	GRPC	Date	2019
Drawn	BSL	Date	01/2019
Approved	Project Manager	Date	

Project No. 4294

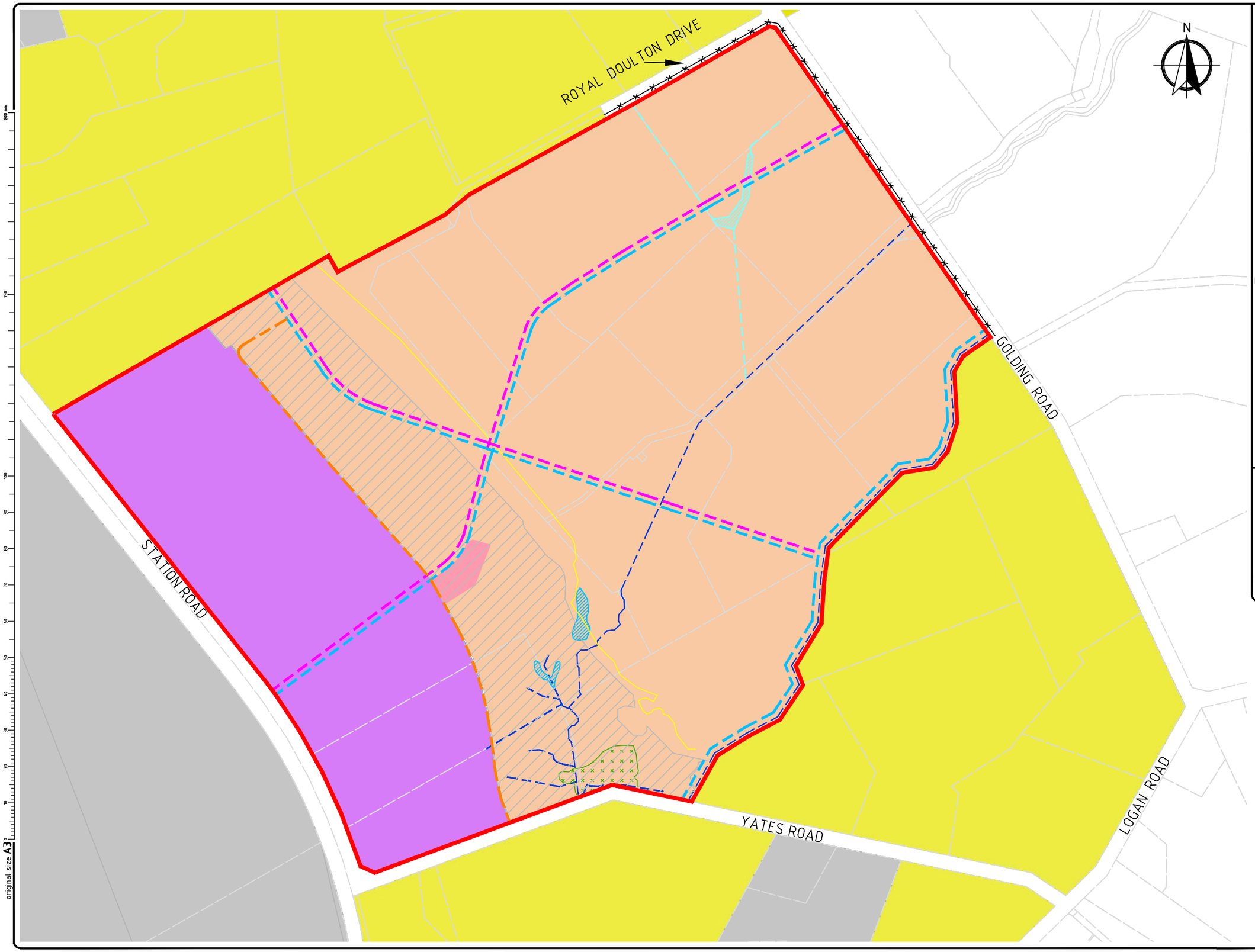
Scale Hz: 1:5000 @ A3

REV.	BY	DATE	COMMENT
J	SS	07/21	Updates
K	KB	10/21	Overlay Updates
L	TR	10/21	Overlay Updates
M	TR	11/21	Catchment Update

TITLE

OVERLAY PLAN

Drawing Name	F:\..CAD\CP 4294 M.dwg /Overlay Map	SUBJECT TO FINAL SURVEY	Rev. M



KEY

- Precinct Boundary
- Abuttal Boundaries
- Residential - Mixed Housing Urban Zone
- Business - Neighbourhood Centre Zone
- Business - Light Industry Zone
- Future Urban Zone
- Special Purpose Zone
- Indicative Neighbourhood Park
- Vehicle Access Restriction
- Proposed Significant Ecological Area
- Indicative Collector Road
- Indicative Local Road
- Indicative Key Walking/Cycling Route
- Indicative Location of Existing Stream
- Indicative Location of Existing Wetland
- Existing Modified Intermittent Stream (Farm Pond and Pipe)
- Area A
- 55 dBa LAeq Noise Contour

NOTES:

1) Areas and measurements are approximate only and subject to final survey
2) Roads shown are legal
3) Datum is arbitrary and subject to final survey
4) This document shall be used only for the purpose for which it is supplied. No reproduction, copying, reuse, sale, hire, loan or gift of this document directly or indirectly is permitted without the prior written consent of Birch Surveyors Ltd
5) This document is subject to copyright

original size A3

Telarc Registered Quality ISO 9001

Birch Planning Surveying Engineering
LAND DEVELOPMENT CONSULTANTS
2A Wesley Street
Pukekohe 2120
PO Box 475
Pukekohe 2340
Ph: 09 237 1111
pukekohe@bslnz.com
www.birchsurveyors.co.nz

LOCAL AUTHORITY	AUCKLAND COUNCIL
PLANNING MAP	-
ZONING	FUTURE URBAN ZONE & MAJOR RECREATION FACILITY ZONE
ACTIVITY	
COMPRISED IN	-
TOTAL AREA	82.6666ha
REGISTERED OWNERS	-

PROJECT NAME

PRIVATE PLAN CHANGE PUKEKOHE GOLDING PRECINCT

GOLDING ROAD
PUKEKOHE

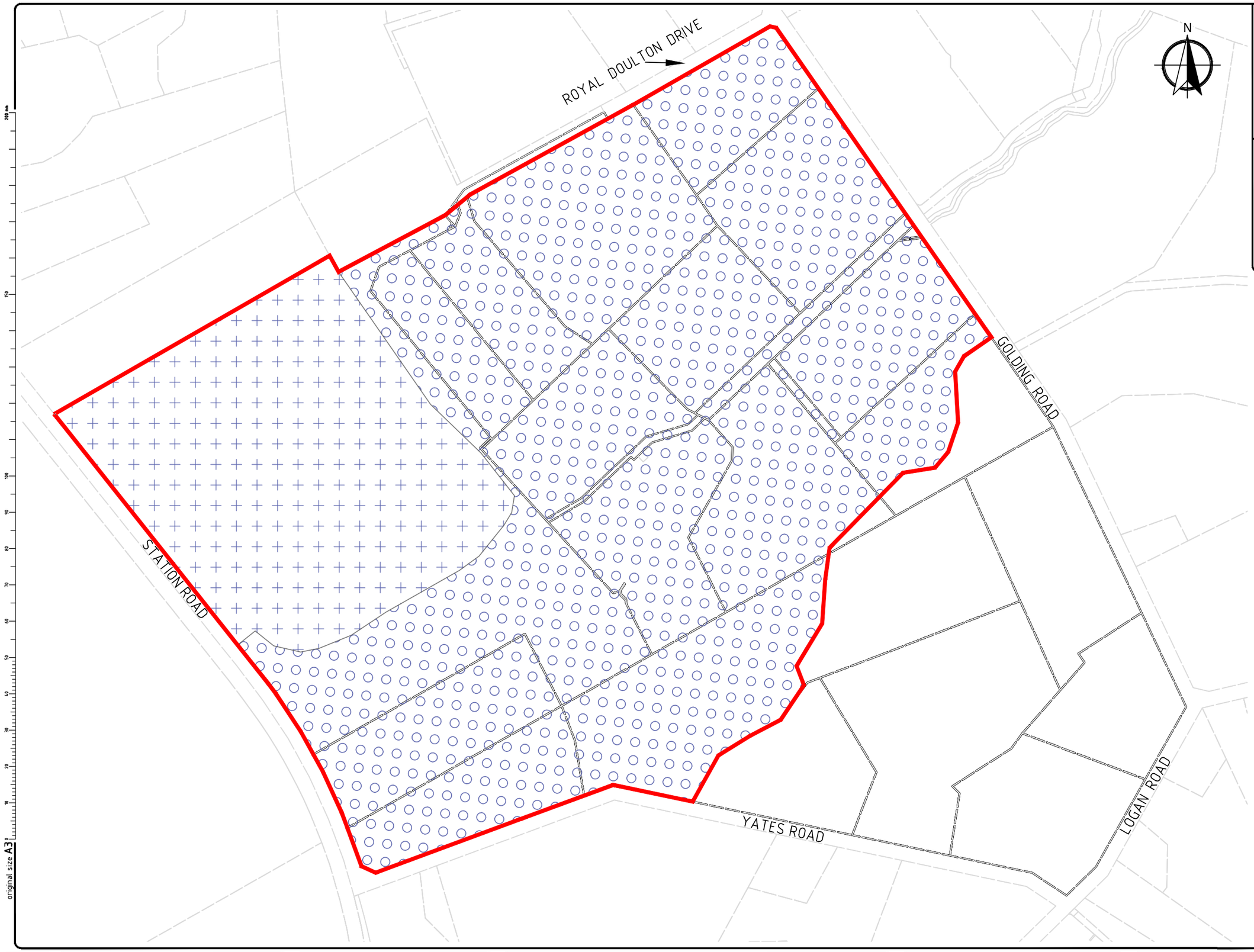
Surveyed -	Date	Project No. 4294
Designed GRPC	Date 2019	Scale Hz: 1:5000 @ A3
Drawn BSL	Date 01/2019	
Approved Project Manager	Date	

REV.	BY	DATE	COMMENT
J	SS	07/21	Updates
K	KB	10/21	Overlay Updates
L	TR	10/21	Overlay Updates
M	KB	11/21	Catchment Update

TITLE

PRECINCT PLAN 1

Drawing Name	F:\..CAD\CP 4294 M.dwg /Precinct Plan 1	SUBJECT TO FINAL SURVEY	Rev.	M



KEY

Precinct Boundary

Abuttal Boundaries

Western Catchment

Eastern Catchment

NOTES:

1) Areas and measurements are approximate only and subject to final survey
2) Roads shown are legal
3) Datum is arbitrary and subject to final survey
4) This document shall be used only for the purpose for which it is supplied. No reproduction, copying, reuse, sale, hire, loan or gift of this document directly or indirectly is permitted without the prior written consent of Birch Surveyors Ltd
5) This document is subject to copyright

original size A3

Telarc Registered Quality ISO 9001

Birch Planning Surveying Engineering
LAND DEVELOPMENT CONSULTANTS
2A Wesley Street
Pukekohe 2120
PO Box 475
Pukekohe 2340
Ph: 09 237 1111
pukekohe@bslnz.com
www.birchsurveyors.co.nz

LOCAL AUTHORITY	AUCKLAND COUNCIL
PLANNING MAP	-
ZONING	FUTURE URBAN ZONE & MAJOR RECREATION FACILITY ZONE
ACTIVITY	
COMPRISED IN	-
TOTAL AREA	82.6666ha
REGISTERED OWNERS	-

PROJECT NAME

PRIVATE PLAN CHANGE PUKEKOHE GOLDING PRECINCT

GOLDING ROAD
PUKEKOHE

Surveyed	-	Date	
Designed	GRPC	Date	2019
Drawn	BSL	Date	01/2019
Approved	Project Manager	Date	

Project No. 4294

Scale Hz: 1:5000 @ A3

REV.	BY	DATE	COMMENT
J	SS	07/21	Updates
K	KB	10/21	Overlay Updates
L	TR	10/21	Overlay Updates
M	KB	11/21	Catchment Update

TITLE

PRECINCT PLAN 2

Drawing Name F:\..CAD\CP 4294 M.dwg /Precinct Plan 2 SUBJECT TO FINAL SURVEY Rev. M

APPENDIX C1

PROPOSED STORMWATER MANAGEMENT

...···TO BE CONFIRMED AT RESOURCE CONSENTING···...

APPENDIX C2

STORMWATER MANAGEMENT SELECTION PROCESS AND ASSESSMENT

...···TO BE CONFIRMED AT RESOURCE CONSENTING···...

APPENDIX C3

DRAFT OPERATION AND MAINTENANCE

...···TO BE CONFIRMED AT RESOURCE CONSENTING···...