ENVELOPE ENGINEERING
LAND
STRUCTURE
MANAGE

INFRASTRUCTURE ASSESSMENT

OTAKI MAORI RACING CLUB

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APPENDICES

1.0 INTRODUCTION

Th s report has been prepared to prov de an overv ew of the ex st ng nfrastructure surround ng the Ōtak Māor Rac ng Club and on the potent al for these serv ces to serv ce the development to support a fast-track consent appl cat on w th the M n stry for the Env ronment for development at the s te

n order to ut l se the fast-track consent ng process a referral appl cat on must be approved by the M n ster for the Env ronment t s understood that the referral appl cat on must nclude deta ls relat ng to the proposed serv c ng of the development and conf rmat on whether any on-s te or off-s te upgrades or add t onal nfrastructure may be requ red to serv ce the development Th s Assessment seeks to sat sfy these requ rements

2.0 PROPOSED DEVELOPMENT

t s proposed to develop the Ōtak Māor Rac ng Club nto a comprehens ve v llage development Th s w ll cons st of approx mately 400 – 580 res dent al sect ons and un ts nclud ng standalone houses townhouses apartments and cluster hous ng A commerc al area s proposed n the northeast of the s te (Zone D) together w th the redevelopment and reuse of ex st ng commerc al bu ld ngs w th n the s te The development can be broken up nto seven d st nct zones (Zones A – G) w th zones A – as proposed development areas and zone G conta n ng the ex st ng rac ng club bu ld ngs (grandstand and assoc ated fac l t es) The ex st ng racetrack and club bu ld ngs are to be reta ned as a fully funct onal racecourse

To date several act v t es have been carr ed out to determ ne appropr ate development concepts for the s te Assessments were then undertaken by experts from several d sc pl nes aga nst these concepts A summary of these act v t es s l sted below

- Numerous s te v s ts have been carr ed out by Envelope staff other consultants and key stakeholders
- Meet ngs d scuss ons and workshops w th Development and Eng neer ng staff from Kap t Coast D str ct Counc l and Greater Well ngton Reg onal Counc l about nfrastructure serv c ng stormwater management and treatment and earthworks ssues
- Meet ngs w th mana whenua
- Meet ngs w th key stakeholders

Figure 1. Development zon ng des gnat ons (Moller Arch tects)

3.0 EARTHWORKS

3.1 EROSION AND SEDIMENT CONTROL

Any d sturbance to ex st ng ground removes the ex st ng vegetat ve cover and potent ally allows eros on of the bare ground to occur The granular sandy and gravel so ls found on s te are less prone to eros on than more clayey mater als found n h ll er areas of the Ōtak reg on The flat nature of the s te s also an aspect wh ch means there s l kely to be less mob l sat on of so ls The r sk of generat ng eros on s proport onal to the surface area exposed the durat on of earthworks the steepness of the earthworks area and the ra nfall occurrences dur ng the earthworks process

The fast-track consent w ll nclude seek ng earthworks consent from both Kap t Coast D str ct Counc l and Greater Well ngton Reg onal Counc l Pr nc ples of Eros on and Sed ment control that w ll be assessed at the fast-track consent stage nclude

- M n m se d sturbance – M n m se the extent of earthworks as much as s pract cable
- Stage construct on – M n m se the amount of area open at one t me and the t me that these areas are left un-stab l sed
- Protect rece v ng env ronments – Apply add t onal protect on (e g s lt fences) and work methodolog es around sens t ve rece v ng env ronments (near stream corr dors etc)
- Rap d stab l sat on – Progress ve stab l sat on of d sturbed areas as soon as pract cable
- Per meter controls – nstallat on of per meter controls for the d vers on of clean water around the earthworks extent and separate th s from sed ment-laden water w th n the s te
- Employ sed ment retent on dev ces – nstall treatment dev ces to max m se the eff c ency of sed ment removal w th n treatment dev ces
- Rev ew – Rev ew and rev se the effect veness of eros on and sed ment controls on a regular bas s to ensure that they are st ll effect ve and appl cable to the current s te cond t ons

These are the fundamental elements of good pract ce that should be common to all s tes These l m t the opportun ty for eros on however even w th best pract ce there w ll always be the r sk of some sed ment be ng mob l sed dur ng and mmed ately after ra nfall events Therefore t s equally mportant to put n

place control measures to conta n collect and manage any sed ment that s generated before t can leave the s te The GWRC gu del ne document "Eros on and Sed ment Control Gu de for Land D sturb ng Act v t es n the Well ngton Reg on deta ls control measures and s w dely used as the appropr ate standard for management of eros on and sed ment control n the Well ngton Reg on

t s our v ew that the eros on and sed ment control des gn can be adequately addressed through future consents to ensure that potent al adverse effects can be managed and m t gated to an acceptable level We cons der that sub ect to employ ng the measures outl ned above there w ll be no s gn f cant adverse effects relat ng to the proposed earthworks

3.2 EARTHWORKS APPROACH

The s te s relat vely flat and t s proposed to mod fy the ex st ng ground as l ttle as poss ble wh le form ng m n mum floor levels above dent f ed flood he ghts Wh le earthworks are l kely across a large area due to the s te s s ze and for flood m t gat on (d scussed n Sect on 4) an earthworks balance w ll be targeted so that m n mal mater al s requ red to be brought onto or taken off s te Mater al unsu table for earthworks w ll be used on s te (e g n landscap ng areas) where th s s feas ble

t s our v ew that earthworks des gn can be adequately addressed through future consents

4.0 STORMWATER

4.1 EXISTING INFRASTRUCTURE

There s no ex st ng publ c stormwater nfrastructure at the s te A mod fed stormwater channel runs along the east boundary of the s te and along Rahu Road to the north of the s te before cross ng the road and enter ng Te Awahohonu Dra n north of the s te There are several ex st ng culverts that are located on the channel w th n the s te

To support the proposed development stormwater management measures w ll need to be employed on s te Resource consent from Kap t Coast D str ct Counc l w ll be requ red for stormwater d scharges and d scharge perm ts w ll be requ red from Greater Well ngton Reg onal Counc l

4.2 FLOOD HAZARD

The current flood hazard mapp ng s shown n gure 2 Th s shows that parts of the s te are sub ect to pond ng res dual pond ng res dual overflow and w th n stream corr dors We understand that the res dual pond ng and res dual overflow areas are h stor cal overlays from pr or to the Chrystalls Bend flood protect on mprovements Other pond ng areas on s te are largely shallow n nature (from G S maps) except for solated areas

Updated flood models are be ng prepared to nform development on the s te These w ll assess the ex st ng flood hazard and flood hazard post-development w th m t gat on measures mplemented w th n the model to assess on and off-s te effects

t s expected that some form of flood m t gat on w ll be requ red Th s w ll l kely cons st of the creat on of ded cated flood storage areas on s te where water s allowed to pond and w den ng of the ex st ng stormwater dra ns to allow for natural bu ld-up n these areas Allowance for these areas has been prov ded on the masterplan

Based on the prel m nary flood modell ng results the proposed mprovement measures (nclud ng the flood storage areas) w ll appropr ately address the ex st ng flood hazard at the s te as well as m t gat ng any ncrease n stormwater runoff assoc ated w th the development n th s regard the proposed stormwater concepts and measures has been des gned on the bas s that the development w ll ach eve hydraul c neutral ty

t s our v ew that flood modell ng and assessment of flood hazards can be adequately addressed through future consents n short the assessments and modell ng undertaken to date conf rms that appropr ate measures can be employed (as have been allowed for n the masterplan des gn) to ensure potent al adverse effects assoc ated w th stormwater d scharge or w th undertak ng earthworks and development w th n the ex st ng flood areas can be adequately m t gated

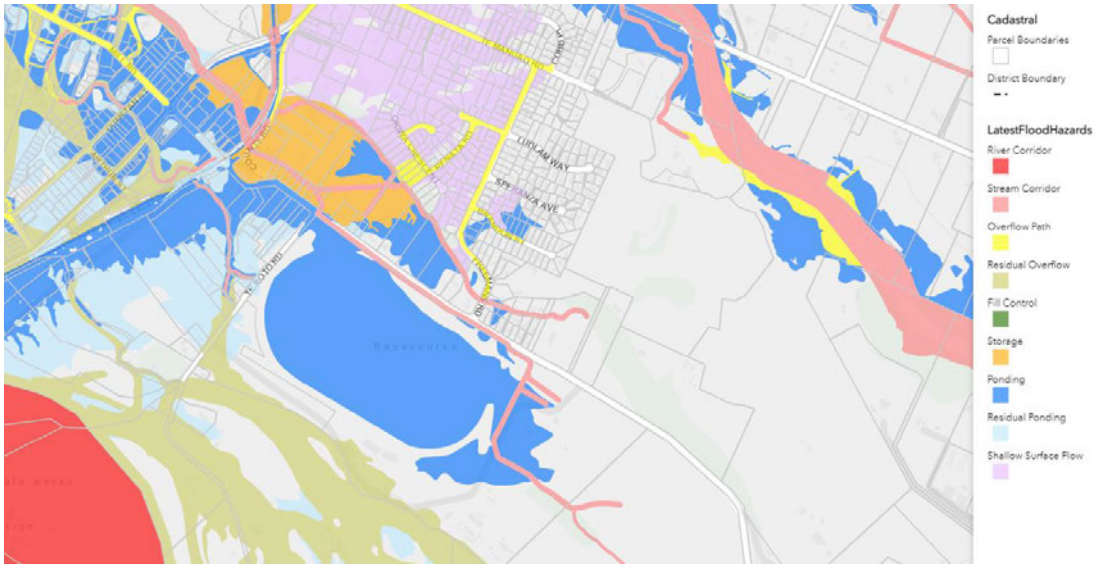

Figure 2. KCDC G S flood map of the s te and surround ng area

4.3 PROPOSED INFRASTRUCTURE

Hydraul c neutral ty w ll be ach eved us ng local and/or central sed soakage dev ces (where ground soakage rates perm t) and storage ponds wh ch may be ntegrated nto the flood m t gat on areas where th s s poss ble

Stormwater runoff from publ c roadways would need to pass through a treatment dev ce pr or to connect ng to the new publ c stormwater network and ult mately d scharg ng to the natural env ronment at the stormwater channels Th s s l kely to be by roads de ra n gardens or central sed treatment wetlands

The stormwater system w ll be des gned w th the pr nc ples of Te Mana o te Wa and Water Sens t ve Urban Des gn n m nd Th s w ll be done by preserv ng var ous watercourses and vegetated areas around the property treat ng stormwater runoff and peak flow attenuat on

t s our v ew that the des gn of stormwater nfrastructure can be adequately addressed through future consents Based on the assessments undertaken to date t s our v ew that no s gn f cant adverse effects w ll ar se as a result of the proposed stormwater serv c ng and flood hazard m t gat on works

5.0 WASTEWATER

5.1 EXISTING INFRASTRUCTURE

There are ex st ng 150mm d ameter grav ty wastewater p pes runn ng along Te Roto Road and Rahu Road to the northwest and northeast of the s te Wh le the cond t on of these p pes s unknown Kap t Coast D str ct Counc l have adv sed they are currently go ng through a process of modell ng ex st ng wastewater constra nts w th n the w der catchment

The wastewater s collected at a pump stat on on the ntersect on of Rahu Road and Te Roto Road Th s d scharges to a grav ty sewer l ne wh ch runs to a second pump stat on on County Road rom here the wastewater s conveyed through a ser es of grav ty p pes pump stat ons and r s ng ma ns to the central wastewater treatment plant on R verbank Road

Hydraul c Analys s L m ted have assessed the ex st ng capac ty of the grav ty p pes n the v c n ty of the development The grav ty sewer p pe along Te Roto Road has suff c ent capac ty for up to 209 total dwell ngs (nclud ng ex st ng dwell ngs) and the p pe along Rahu Road s already at des gn capac ty

5.2 PROPOSED INFRASTRUCTURE

As noted above deta led network modell ng s currently be ng undertaken by Kap t Coast D str ct Counc l to nform the proposed development n t al feedback suggests that there w ll be upgrades requ red to the

pump stat ons on Te Roto Road County Road and Arthur Street w th var ous upgrades expected to the r s ng ma ns and grav ty p pes to the wastewater treatment plant

Kap t Coast D str ct Counc l has secured fund ng for the upgrades v a the nfrastructure Accelerat on und Based on the proposed development t meframes and our d scuss ons w th Kap t Coast D str ct Counc l t s expected that the upgrade of these w ll co nc de w th the requ rements of the development Relevant staff at Counc l have conf rmed that the upgrade works can be programmed to al gn w th the del very of the development

We expect that wastewater m t gat on w ll be requ red n the form of pump ng stat ons These could be ncorporated nto the w der network upgrades prov ded for w th n the development or as upgrades to operat onal storage on ex st ng pump stat ons Th s dec s on w ll be nformed by the results of the deta led network modell ng

 t s our v ew that the des gn of wastewater nfrastructure can be adequately addressed through future consents urther g ven that Kap t Coast D str ct Counc l have rece ved fund ng for the necessary wastewater upgrades are undertak ng the necessary modell ng to conf rm the extent of works and have conf rmed that such works can al gn w th the proposed development there are no mped ments to advanc ng th s work to ensure the necessary wastewater nfrastructure s ava lable for the proposed development

Figure 3. Wastewater network n v c n ty of the s te

6.0 POTABLE WATER

6.1 EXISTING INFRASTRUCTURE

There s an ex st ng 150mm d ameter water ma n located w th n Rahu Road wh ch s suppl ed by the Wa tohu Valley Reservo r The base elevat on of the reservo r s RL100 w th the s te hav ng typ cal elevat ons of RL15 to RL20

6.2 PROPOSED INFRASTRUCTURE

Deta led network modell ng s currently be ng undertaken for the development by Kap t Coast D str ct Counc l w th results not yet ava lable However we understand that a new reservo r w ll be requ red to serv ce the new development and that th s w ll be located near R ngawhat Road Kap t Coast D str ct Counc l have secured fund ng for th s through the nfrastructure Accelerat on und and we understand

from our d scuss ons w th Counc l that the works w ll be undertaken to al gn w th the del very programme for the development

Based on our d scuss ons w th Kap t Coast D str ct Counc l we understand that a new water ma n w ll be requ red from County Road wh ch w ll be grav ty fed by the proposed reservo r Sub ect to deta led hydraul c modell ng t s expected that adequate supply of water for f re f ght ng and potable water can be suppl ed to the development t s expected that the al gnment of th s new ma n can be accommodated w th n publ c land (e ex st ng road corr dors)

t s our v ew that the des gn of potable water nfrastructure can be adequately addressed through future consents urther g ven that Kap t Coast D str ct Counc l have rece ved fund ng for the necessary potable water upgrades and are currently programm ng such works there are no mped ments to advanc ng th s work to ensure supply s ava lable for the proposed development

Figure 4. Potable water network n v c n ty of the s te (proposed upgrades not shown)

7.0 UTILITIES

We have contacted Chorus who have adv sed that there s ex st ng nfrastructure n the area surround ng the s te and that th s can be extended and upgraded where requ red to serv ce the development

A power supply network s ava lable ad acent to the s te We have had prel m nary d scuss ons w th the Network Ut l ty Operator (Electra) who have adv sed us that upgrades w ll be requ red from Ōtak town centre to the proposed development Th s can occur w th n ex st ng publ c road corr dors

Ret culated gas s not proposed for the development and as such we have not contacted the Network Ut l ty Operator to establ sh f there s suff c ent capac ty n the ex st ng nfrastructure to serv ce the development

t s our v ew that the des gn of ut l t es nfrastructure can be adequately addressed through future consents

8.0 SUMMARY

Th s memo has been prepared to prov de an overv ew of the ex st ng nfrastructure surround ng the Ōtak Māor Rac ng Club and the potent al for these serv ces to support the proposed development

Three waters nfrastructure w ll be des gned to Counc l standards The f nal des gn w ll be developed n consultat on w th D str ct Counc l to ach eve an acceptable outcome w th regard to the Counc l s D str ct Plan and Subd v s on and Development Pr nc ples and Requ rements document

The resource consent appl cat on w ll nclude an nfrastructure Report that prov des full deta ls of the proposed serv c ng of the Pro ect n add t on a Stormwater Management Plan w ll outl ne how stormwater w ll be appropr ately managed on the s te

n summary t s our v ew that the s te can be developed and adequately serv ced sub ect to further eng neer ng des gn and that th s can be addressed through future consents urther as Kap t Coast D str ct Counc l has rece ved the necessary fund ng for off-s te nfrastructure upgrades to support the development and has already commenced the necessary modell ng and des gn work to advance these upgrades there appear to be no mped ments to mplement ng the proposed development based on the del very programme prov ded w th the referral appl cat on

APPENDICES

APPENDIX 1 HYDRAULIC ANALYSIS LIMITED REPORT

KAPITI COAST DISTRICT COUNCIL

OTAKI RACECOURSE DEVELOPMENT IMPACT ASSESSMENT

JULY 2022

HAL HYDRAULIC ANALYSIS LIMITED

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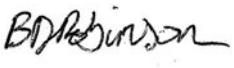
Brian Robinson	Director	Hydraulic Analysis Ltd	

REVISION HISTORY

Revision	Publication Date
Draft	20 July 2022

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1. INTRODUCTION

1.1. OBJECTIVE

The objective of this study is to utilise the existing hydraulic model of the Otaki wastewater network (Aurecon, 2009, with 2020 updates undertaken by HAL) to assess the impact of the proposed Otaki Racecourse development on the wastewater network. The existing modelled populations have been updated by HAL to provide an estimated existing (2018) and future (2043) population scenario.

1.2. BACKGROUND

Otaki is the third largest township in the Kapiti region with a 2018 population of 7,300 (2018 census). The topography of the Otaki catchment is relatively flat and is separated into two parts on the east and west by a green belt. Otaki Beach is located to the west of the catchment and the Otaki River to the south. The bulk of the sewerage system was laid in the early part of the 1980s and incorporates a number of pumping stations (32 at the time of writing) to support development in low lying areas of the catchment.

The discharge to the Otaki Wastewater Treatment Plant (WWTP) is controlled by a major pumping station (Otaki Terminal Station PS12 - OSP00012). The wastewater from this system is treated by a combination of oxidation pond, clarifier and aerated lagoon at the Otaki WWTP before discharging to a landfill disposal system (Source: Otaki Sewerage System Model Build & Calibration Report, Aurecon 2009).

Significant growth is forecast for Otaki over the next 25 years, with KCDC's latest 'medium growth scenario' estimates showing a projected population of the Otaki catchment of 10,400 in 2043 (a 42% increase from 2018).

The planned development of 700 units of residential dwellings and 1250m^2 of low water use commercial space at the Otaki Racecourse is located south-east of the Otaki wastewater network. It is proposed that the development is connected to the existing 150mm sewer along Te Roto Road which flows north-east via gravity to the Rahui Rd Wastewater Pump Station (OSP0001), located at the intersection of Rahui Road and Te Roto Road.

2. SCOPE

The following tasks were undertaken as part of this assessment:

- Calculation of design flows for the Otaki Racecourse development
- Assessment of the Otaki Racecourse development impact on the existing network for both current (2018) and future population scenarios

Each of these tasks is discussed in more detail in the following sections.

3. OTAKI RACECOURSE DESIGN FLOWS

3.1. OVERVIEW

The Otaki Racecourse proposal seeks to develop a vacant site at the racecourse, along Rahui Road into a 700-lot residential development and 1250m^2 low water use commercial space. The location of the proposed development and proposed connection points is shown in Figure 3-1 below.

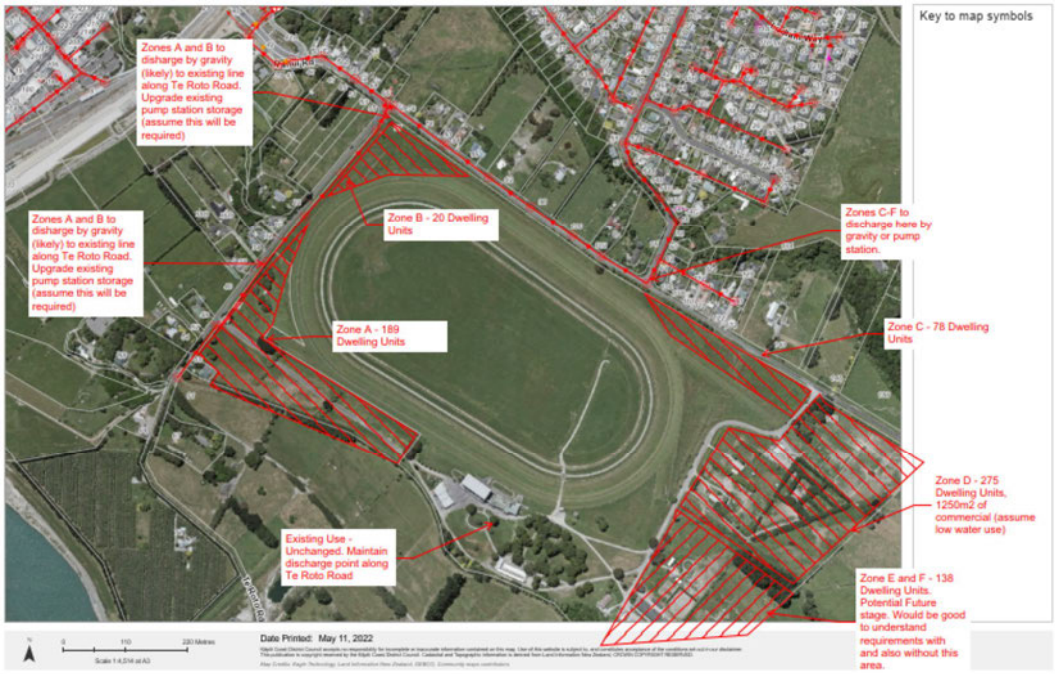


FIGURE 3-1 PROPOSED OTAKI RACE]COURSE DEVELOPMENT LOCATION

The proposed discharge points for the development are to the 150mm pipeline on Te Roto Road (Zone A&B), and to the 150mm pipeline on Rahui Rd (Zones C-F), both of which drain to the Rahui Rd Wastewater Pump Station (OSP0001) located at the intersection of Rahui Road and Te Roto Road. The connecting network flows west of the catchment via a series of gravity network and pump stations, and eventually terminates at the Otaki WWTP.

The feasibility and sizing of the internal site connections, particularly with respect to adequate grade for gravity flow and the sizing of the private pump station, if any, has not been assessed as part of this study.

3.2. DEVELOPMENT DESIGN FLOWS

The PWWF for this development assessment has been calculated using the proposed 700 residential lot yield and 1250m^2 commercial space as provided in the concept plan.

Following the KCDC 'Subdivision and Development – Principles and Requirements' code the design flow formulas as shown below in Table 3-1 can be used to calculate a proposed residential and commercial Peak Wet Weather Flow (PWWF) of 25.6 l/s for the development.

TABLE 3-1: OTAKI RACECOURSE DESIGN FLOWS

	Residential Lots
No. of Units	700
Occupancy	2.5
Population	1750
ADWF (l/p/day)	*250*
ADWF (l/s)	5.06
DWF Peaking Factor	*x2.5*
PDWF (l/s)	12.7
WWF Peaking Factor	*x5*
PWWF (l/s)	25.3 l/s

	Commercial Space
Area (Ha)	0.125
Industry Type	Low water use
Design Flow (l/s)	0.4
ADWF (l/s)	0.05
WW Peaking Factor	*5*
PWWF (l/s)	0.25

4. OTAKI RACECOURSE DEVELOPMENT IMPACT

4.1. PRE-DEVELOPMENT SCENARIO

The Otaki wastewater model (Aurecon, 2009) with HAL 2020 updates, was run for a 24-hour, 5-year ARI nested design storm to assess how the local network performs during storms of this magnitude, without the proposed Otaki Racecourse development.

The standard design storm of 5-year ARI (which is the level of service (LOS) recently adopted by KCDC) has been used as the containment standard for this assessment.

As shown in the Figure 4-1 long section below, the existing 150mm gravity network flowing north-east from the development site to Pump Station OSP00001 shows minor surcharge in the section of pipeline immediately downstream from the discharge point. This indicates a minor existing capacity constraints in the immediate downstream gravity network and pump station, but not resulting in an unacceptable risk of overflows.

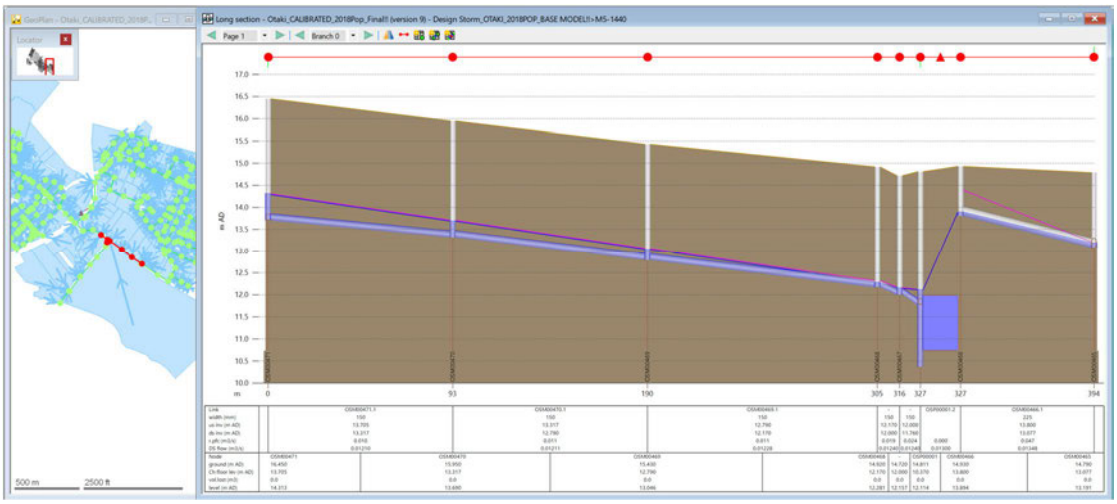


FIGURE 4-1 PRE-DEVELOPMENT FLOWS TO OSP00001 – 5-YEAR ARI DESIGN STORM

4.2. POST-DEVELOPMENT SCENARIO

The Otaki wastewater model (Aurecon, 2009) with HAL 2020 updates was run for a 24-hour, 5-year ARI nested design storm to assess how the local network performs in the post development scenario. The standard design storm of 5-year ARI (which is the recently adopted LOS by KCDC) has been used as the containment standard for this assessment. The model used the additional 25.6 L/s that was created by the proposed 700 residential dwellings and commercial space. This was connected to the existing Manhole KWWN000523.

As shown in the Figure 4-2 long-section below, in the post development scenario the downstream 150mm network flowing north-east to Rahui Road Pump Station (OSP00001) shows significant surcharge and uncontrolled manhole overflow at Manhole OSM00469, along

the pipeline downstream from the discharge point, indicating capacity constraints in this section of the network. For the scenario with future development yields connected to the network, as shown in Figure 4-3, the surcharge and overflow volume at Manhole OSM00469 are further exacerbated.

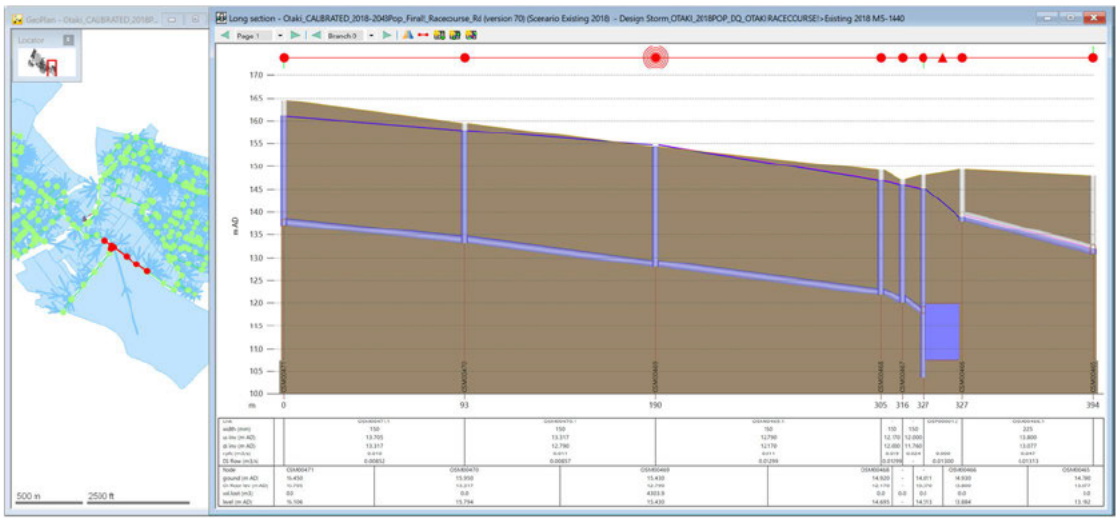


FIGURE 4-2 EXISTING SCENARIO WITH POST-DEVELOPMENT FLOWS (25.6 L/S) TO OSP00001 – 5-YEAR ARI DESIGN STORM

FIGURE 4-3 FUTURE SCENARIO WITH POST-DEVELOPMENT FLOWS (25.6 L/S) TO OSP00025 – 5-YEAR ARI DESIGN STORM

4.3. PUMP STATION ASSESSMENT

4.3.1. OSP0001 PUMP STATION

The local network flows northwest via gravity to Pump Station OPS0001, which has a modelled capacity of 13 l/s (based on KCDC records). The existing pre-development scenario has a modelled peak inflow of approximately 13.1 l/s in the 5-year design storm, which suggests that the existing pumpstation (and associated rising main infrastructure) is already operating at capacity and does not have the pass forward capacity for the additional flows from the proposed Otaki Racecourse development.

Modelled inflows and outflows for the pre-development scenario, is shown in Figure 4-5 below.

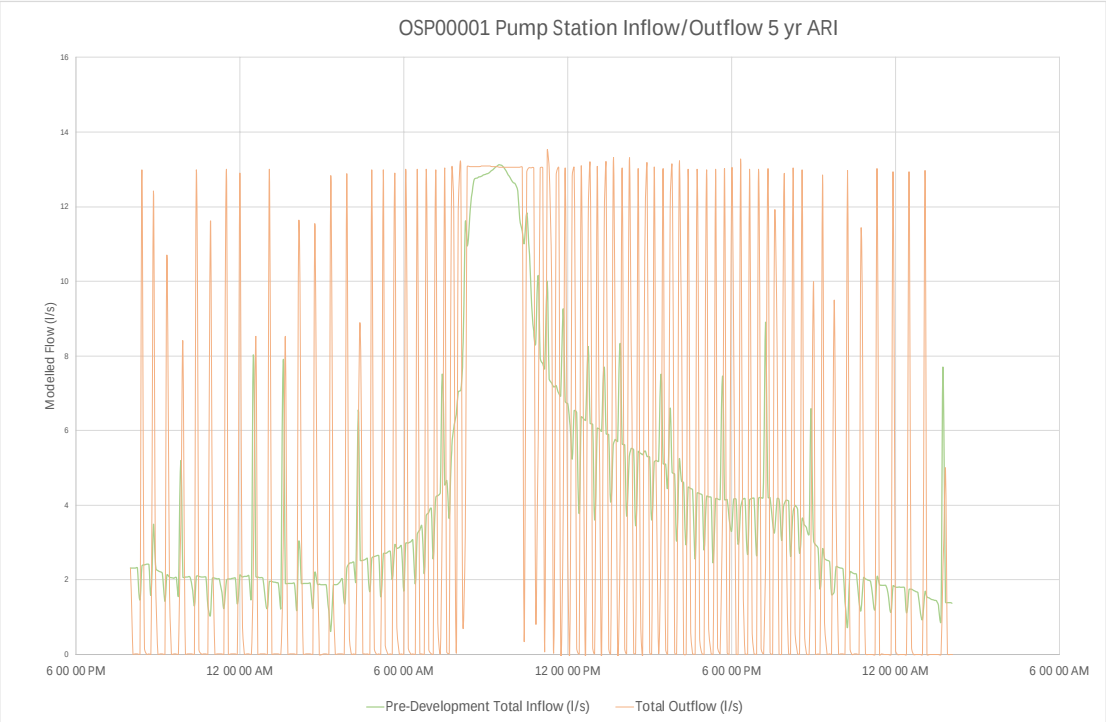


Figure 4-5 PRE-DEVELOPMENT AND POST-DEVELOPMENT OSP00001 PUMP STATION FLOWS – 5-year ARI DESIGN STORM

The network capacity downstream of Rahui Road pumpstation was not assessed as the flows are governed by the existing Rahui Road pumpstation capacities; increasing the Rahui Road pumpstation capacity will only result in a domino effect downstream of the network , requiring further upgrades works up to the Otaki Wastewater Treatment Plant.

4.4. PREVIOUS DEVELOPMENT KNOWLEDGE

There is an additional known development within the Rahui Road Pump Station (OSP00001) wastewater catchment, at the Otaki Maori Racing Club, for which a Resource Consent application was lodged with KCDC and assessed by HAL in February 2018. The calculated PWWF from this development is 1.52 l/s and it was concluded the local 150mm wastewater line running north-east along Te Roto Road to the Rahui Wastewater Pumpstation has sufficient capacity in both the existing and future scenarios, including with the proposed 209 dwellings assumed to connect to the Te Roto Road pipeline (which appears to encompass the area of the previously proposed Otaki Maori Racing Club development).

The location of the development is shown in Figure 4-4 below.

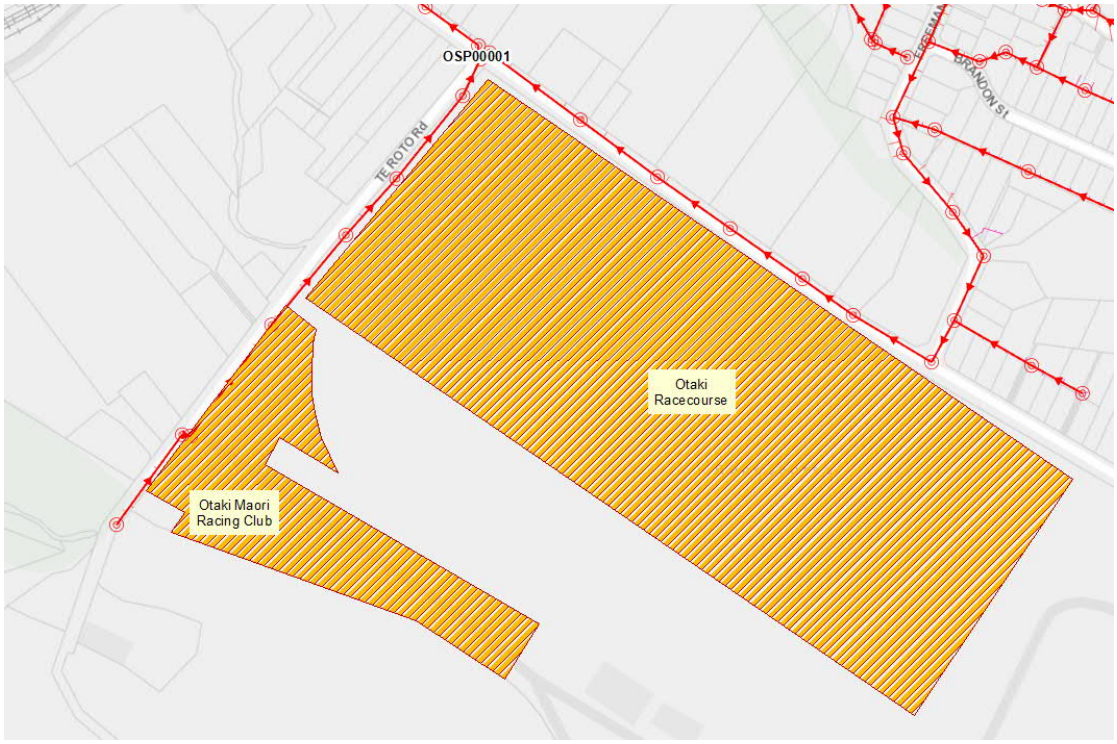


FIGURE 4-4 PLANNED DEVELOPMENT UPSTREAM OF RAHUI RD WASTEWATER PUMP STATION (OSP0001)

4.5. OTAKI RACECOURSE WASTEWATER NETWORK

Its worth noting that future upgrade options for the Otaki network for a range of ARI storms was investigated as part of the recent Level of Service review study (Morphum/Hal – 2020) and the output of this study is a set of future upgrade solutions to meet the preferred level of service. For Otaki Catchment, the recommended 10 year works programme includes an upgrade of the 150mm diameter wastewater line, along Rahui Road, which is identified as “Issue Area OT04”.

The recommended upgrades from the study are shown in Figure 4-4 below.

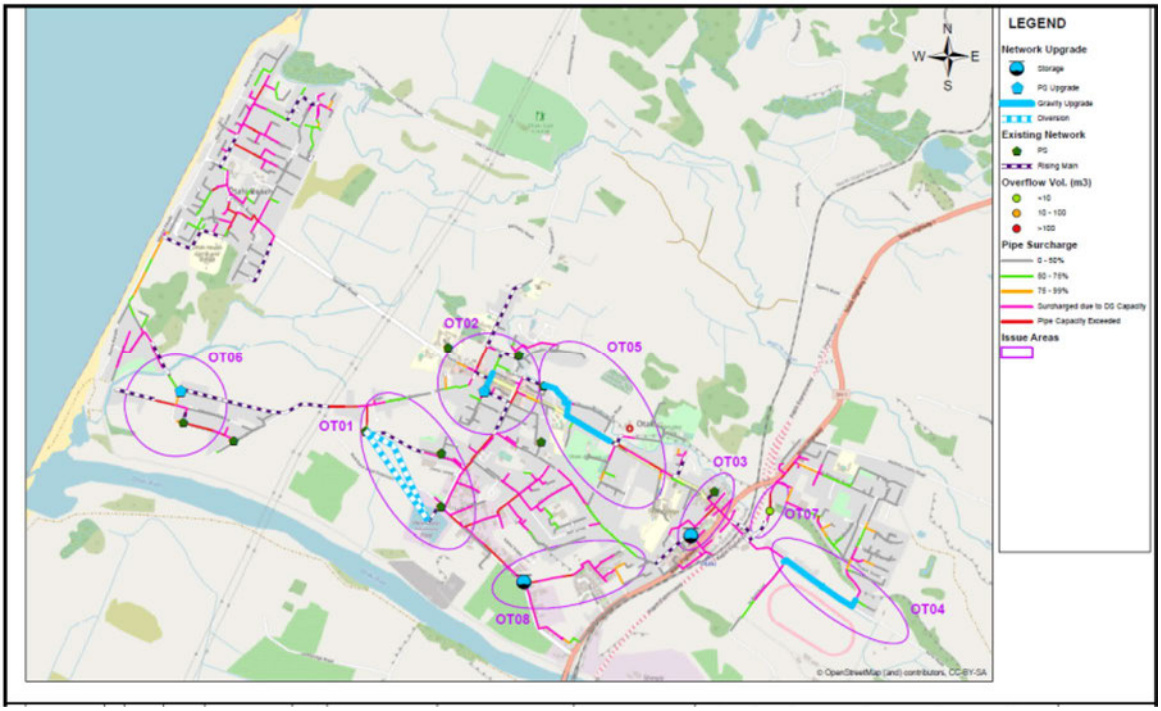


FIGURE 4-4 RECOMMENDED NETWORK UPGRADES FOR OTAKI – 2020 LEVEL OF SERVICE STUDY

However, to create sufficient passforward capacity for the additional peak flows of 25.57 l/s, the entire downstream network from the discharge point to the Otaki Treatment Plant, including the pumpstations, needs to be upgraded. Hence, it is recommended that the developer design and construct a separate wastwater network to cater for the peak flows from the development site, assumed to follow a similar alignment as the existing public network, but to be confirmed as part of the design process.

Below is an indicative alignment duplicating the existing network, with the pumpstation around the same location. The developer will need to calculate the required pipe sizing, pumpstation capacity and alignment during the concept/detailed design stage. There is potential for the new network to resolve some of the existing/future capacity constraints identified in the 2020 Level of Service study, so consultation is recommended with KCDC to enable any efficiencies and potential cost sharign arrangements to be identified.

An indicative alignment (following the existign alignment) of the new network for the proposed development is shown in Figure 4-4 below.

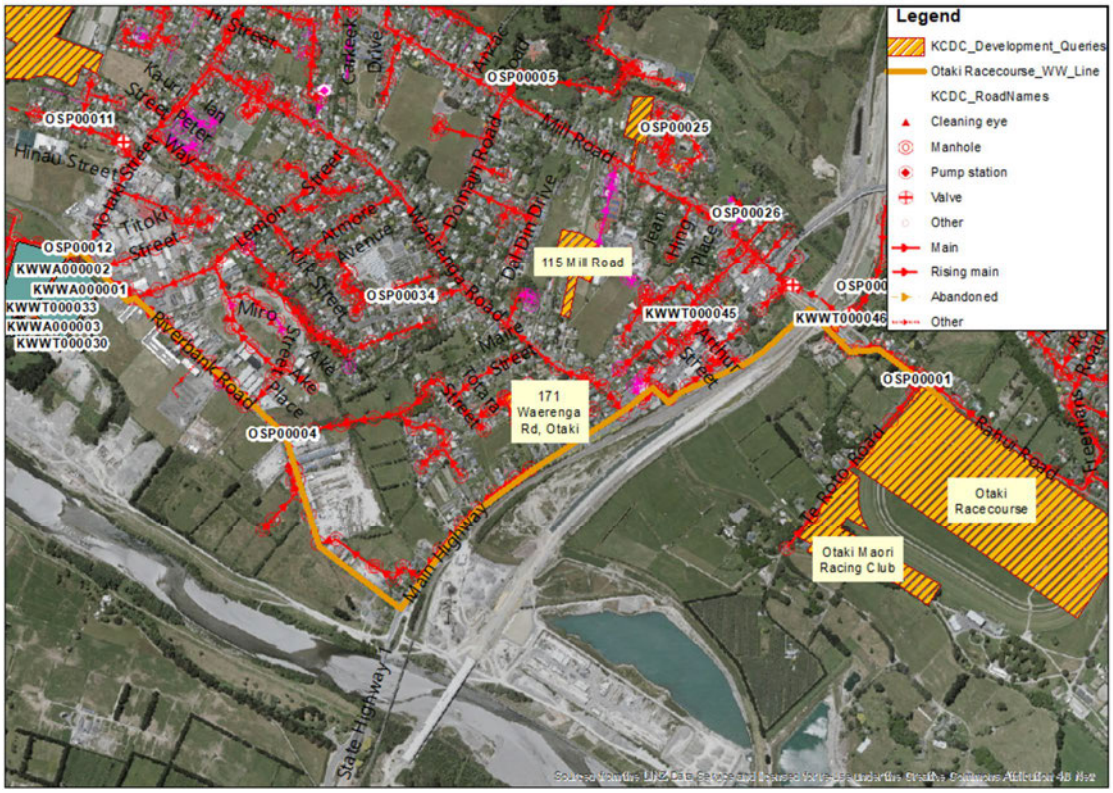


FIGURE 4-5 INDICATIVE ALIGNMENT OF THE WASTEWATER NETWORK FOR OTAKI RACECOURSE PROPOSED DEVELOPMENT SITE

5. MODEL ASSUMPTIONS AND LIMITATIONS

The following assumptions should be read in conjunction with the following reports:

- Aurecon's report 'Paraparaumu Wastewater System – Model Build and Calibration' Report, June 2009
- Watershed's Model Update Report (2016)
- Watershed's Model Recalibration and System Performance Report (2017)
- Morphum's report 'Setting a containment standard based on a cost benefit analyses and confirming the 10 year works programme' Report, February 2021

The following limitations apply to the modelling undertaken as part of these studies:

- The model has been verified (and recalibrated) against flows developed from KCDC pump station SCADA data, and as such has an inherent limitation to the degree of accuracy able to be achieved.
- The distribution of the modelled population is an approximation based on the population increase between the 2006 and 2018 census. No allowance has been made for additional growth since 2018 which is considered to be minor.
- Future growth has been distributed within the currently modelled extent, based on KCDC's projections at an area unit level. It is unlikely to accurately represent specific locations of large future developments, which will need to be considered on a case by case basis.
- Flows from new development have been applied to result in approximately Code of Practice wet weather flows in a 5 year ARI design storm
- An allowance has been made in the future growth model (2043) for increased inflow/infiltration in existing areas due to deterioration of existing sewers.
- Pump station model parameters are based on information provided by KCDC operations, and its accuracy has not been validated as part of these studies.
- The Otaki Wastewater Treatment Plant storage capacity was not assessed with the additional inflow from the Racecourse Development.

6. CONCLUSION

The objective of this study is to utilise the existing hydraulic model of the Otaki wastewater network to assess the impact of the proposed Otaki Racecourse Road development. The proposal seeks to develop an existing vacant site into 700 residential dwellings and 1250m^2 commercial space development.

The model was run for the existing and future population scenarios, with the additional PWWF of 25.6 l/s from the proposed Otaki Racecourse Road development. The development impact on the immediate network was assessed against a 5-year ARI design storm.

During the post development scenario, with existing population, the downstream 150mm network flowing to Rahui Road Pump Station (OSP00001) shows significant surcharge and uncontrolled manhole overflow at Manhole OSM00469, along the pipeline downstream from the discharge point, indicating capacity constraints in this section of the network (also due to inadequate pump station capacity). For the scenario with future development yields connected to the network, the surcharge and overflow volume at Manhole OSM00469 are further exacerbated.

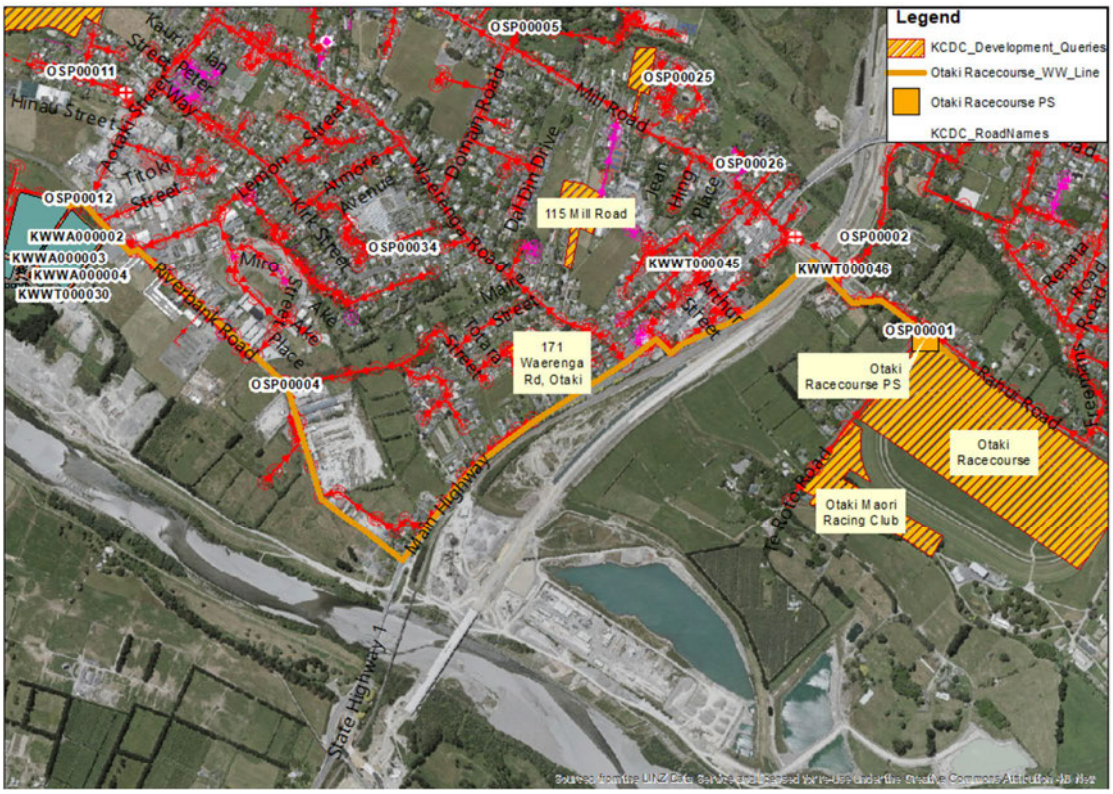
OSP00001 has a modelled capacity of 13 l/s (based on KCDC records). With a pre-development modelled inflow of 13.1 l/s in the existing scenario, the pump station (and associated rising main infrastructure) is already operating at capacity and cannot cater for the additional flows from the proposed development.

It should be noted that future upgrade options for the Otaki network for a range of ARI storms was investigated as part of the current Level of Service review study and the output of this study is a set of future upgrade solutions to meet the preferred level of service. For Otaki Catchment, the recommended 10 year works programme includes an upgrade of the 150mm diameter wastewater line, along Rahui Road, which is identified as “Issue Area OT04”.

However, to create sufficient passforward capacity for the additional peak flows of 25.6 l/s, the entire downstream network from the discharge point to the Otaki Treatment Plant, including the connecting pumpstations needs to be upgraded. Hence, it is recommended that the developer design and construct a wastwater line to cater for the peak flows from the development site, following the same alignment as the existing public network.

There is potential for the new network to resolve some of the existing/future capacity constraints identified in the 2020 Level of Service study, so consultation is recommended with KCDC to enable any efficiencies and potential cost sharign arrangements to be identified.

Below is an indicative alignment duplicating the existing network, with the pumpstation around the same location. The developer will need to calculate the required pipe sizing and alignment during the concept/detailed design stage.



The Otaki Wastewater Treatment Plant storage capacity was not assessed with the additional inflow from the Racecourse Development.