



Avondale Racecourse Development

Infrastructure Assessment

Prepared for Kainga Ora
Prepared by Beca Limited

2 March 2021



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better.**

Revision History

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1 Introduction

A report by Beca Ltd., assisted by Aurecon NZ Ltd., titled, "Avondale Development Assessment", prepared for Kainga Ora in December 2020, provided high level assessments of the development potential for both the state-owned housing in the Avondale area bounded by Great North Road to the south and east, Rosebank Road and Riversdale Road to the north and the Whau River to the west. The assessment included intensive redevelopment of the Avondale Racecourse for housing. Refer to the Site Plan **Figure 1** below.

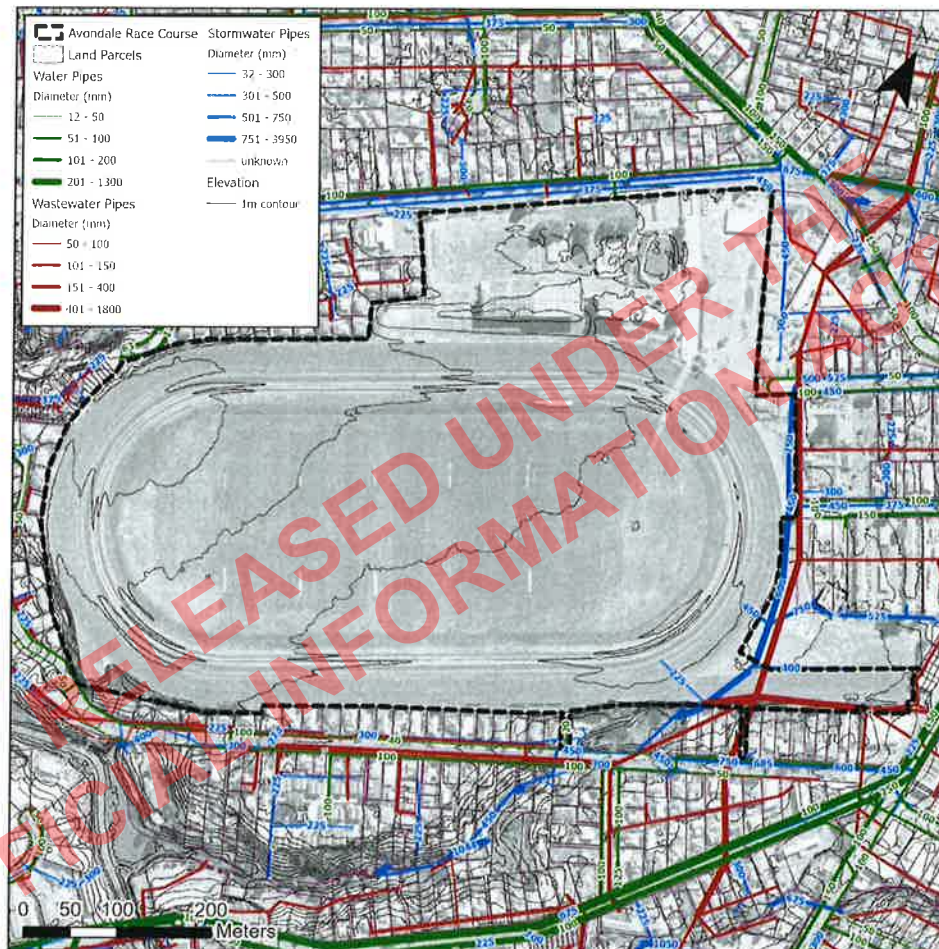


Figure 1: Site Plan and Existing Services

This further report looks in greater depth at the engineering required to develop the Racecourse site; how existing infrastructure constraints can be resolved to meet the redevelopment demands; and the costs associated with providing the extra infrastructure updates required to develop some 2,500 to 3,000 new dwellings on the 34.77 hectare site. Cost estimates have also been carried out for the treatment of potential contaminants within the site and the bulk earthworks required to create building platforms and the roading to service the development – both substantial development cost items.

The 2020 report assessed the potential number of dwellings on the Racecourse site as 2,532 and based infrastructure demand assessments on this number. This current report adopts the development potential as per the earlier report.

A first cut suite of expected key infrastructure upgrade projects external to the site and key contamination and earthworks within the site are identified. Internal infrastructure for servicing the development itself are not identified and we understand Kainga Ora is estimating the cost of these using per lot rates based on their development experience on other projects in Auckland.

2 Proposed Development

Kainga Ora are considering a high-density development of 5 to 8 storey apartment buildings, terrace housing and some business uses along the Ash Road frontage and the Racecourse land adjacent to the Avondale shopping precinct.

Some 2,500 to 3,000 dwellings can be developed on the site together with playgrounds, parks and playing fields. With more than 2,500 dwellings proposed the population will increase to over 10,000 residents.

The benefits of this location are the site offers a unique large land holding close to the city centre and in close proximity to public transport. The Avondale Railway Station is within easy walking distance and there are major bus routes along Great North Road to the south and east which also enable access to the nearby Metropolitan Centre of New Lynn.

A population increase of more than 10,000 will require a new primary school to cater for the development and this can be provided for - to the benefit of the development with the playing fields associated with a school enhancing the amenity and visual appearance of the area. There could also be a significant cost benefit as indicated in Section 4.4 below.

3 The Existing Site & Constraints to Development

The existing site is very flat, falling from east to west at a gradient of about 1V:250H (0.4%). The bulk of the site is in grass including the track and the extensive in-field. The northern portion of the site fronting Ash Street contains the grandstands and administration areas, maintenance buildings and parking hardstand.

The track was first used in 1890 when it was about one third of its present size. It was extended in 1901 when further land was acquired, and again in 1924. By 1943 the last piece of land was acquired and the track has not changed its configuration since then. The site was used as a hospital during the 1918 Spanish Flu pandemic; as a training and exercise ground for army troops in the 1930's and 1940's; more recently as a Sunday Market; and anecdotally as a car racing track; as well as for regular horse racing meetings.

The following constraints and issues relating to residential re-development of the Racecourse were identified in the 2020 report:

- (i) Soil contamination,
- (ii) Uncontrolled filling on the site (up to 2.8m of fill identified)
- (iii) Potential for areas of the site to have been used for rubbish or building demolition or building construction materials disposal,
- (iv) Inadequate existing stormwater capacity to cater for the development,
- (v) Inadequate existing wastewater capacity to cater for the development,
- (vi) Inadequate existing water supply capacity to cater for the development,
- (vii) Inadequate existing power capacity to cater for the development,

- (viii) Upgrading required to surrounding streets and intersections to cater for the increased traffic generated by the development,
- (ix) Weak underlying soils requiring piling of multi-level apartment buildings.

These "constraints" and "issues" have been considered below together with an outline of what can be done to resolve them to provide for the development envisaged and to provide a desirable and sustainable development.

4 Earthworks

4.1 Previous Earthworks

The north western, south western and southern sides of the track are raised up above the existing housing, indicating that filling has been placed at the western end of the site. The gully through the Wingate Reserve probably originally extended northwards across the eastern boundary of the site where the stormwater and wastewater pipelines are located, and this also is a likely area of filling. The quality and extent of cutting and filling on the site to create the large flat racecourse track is unknown and will need to be determined by geotechnical investigations. Investigations carried out at the south western corner of the Racecourse at 85 – 93 Wingate Street, (referred to in the 2020 report), determined that there was up to 2.8m of non-engineered fill at the elevation of the racecourse and ground water level was 3.2m below ground level at this location.

4.2 Potential Contamination of Site Soils

The previous uses of the land indicate that there may be isolated areas of contamination due to storage of hazardous liquids or where rubbish, demolition materials or building debris, may have been disposed of by burial in pits. More widely there is the potential for contaminants from pesticides and herbicides associated with the grass track, and the in-field sports fields. The degree of contamination over most of the site is likely to be relatively minor given the previous land uses over the last 131 years. Pesticide and herbicide contaminants present in the upper surface soils are not particularly mobile. Disposal of contaminated soils safely on site should therefore be seriously considered.

It is noted that the degree of contamination found at the Kainga Ora sites in Mount Roskill, Mangere, etc, is unlikely at the racecourse in any significant amounts as the site has not been previously used for housing. Therefore, the contaminants found at these previous sites, (asbestos and lead from paint), are not expected to be widespread other than where grandstands and other buildings have been located.

However, as noted above, the quality of filling and whether material has been brought onto site from other locations, is unknown and geotechnical and contamination site investigations are required.

4.3 Earthworks Proposed

Because of the very flat nature of the site, it will be necessary to reshape the land to provide for positive falls to drain the site. A minimum gradient of 1 in 200 (0.5%0 along kerb lines and between 1 in 100 and 1 in 50, or steeper (1% to 2%) on development sites is recommended for the development. A preliminary earthworks scheme undertaken for this exercise based on the above criteria is indicated on **Figure 2**. This scheme provides for excavation over the western part of the site (assumed to have been previously filled) and filling in the eastern and northern parts of the site where soil excavation was probably undertaken when the racecourse was built. Refer to Figure 2B for the cut and fill areas and depth contours.

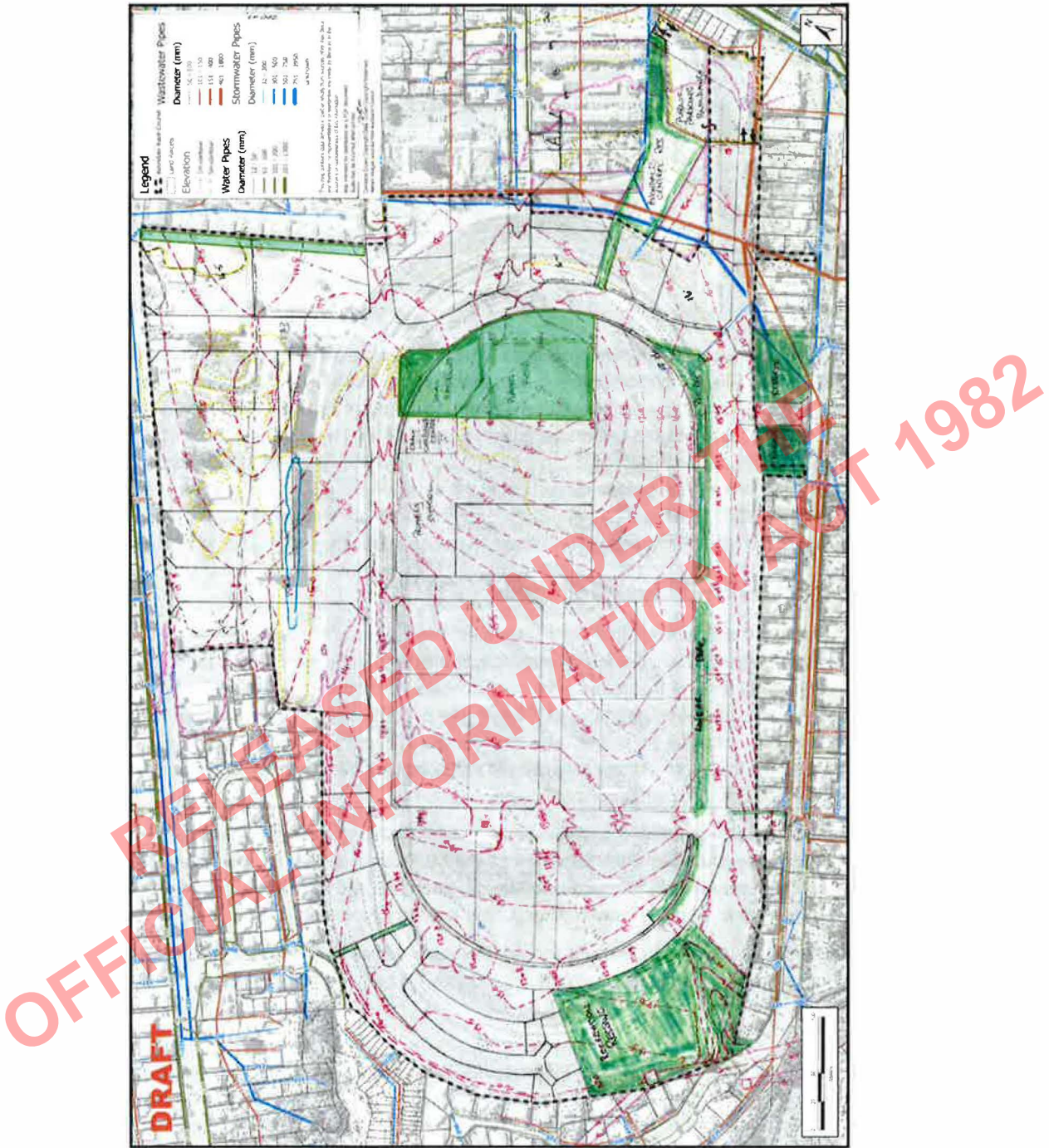


Figure 2A: Possible Layout and Earthworks

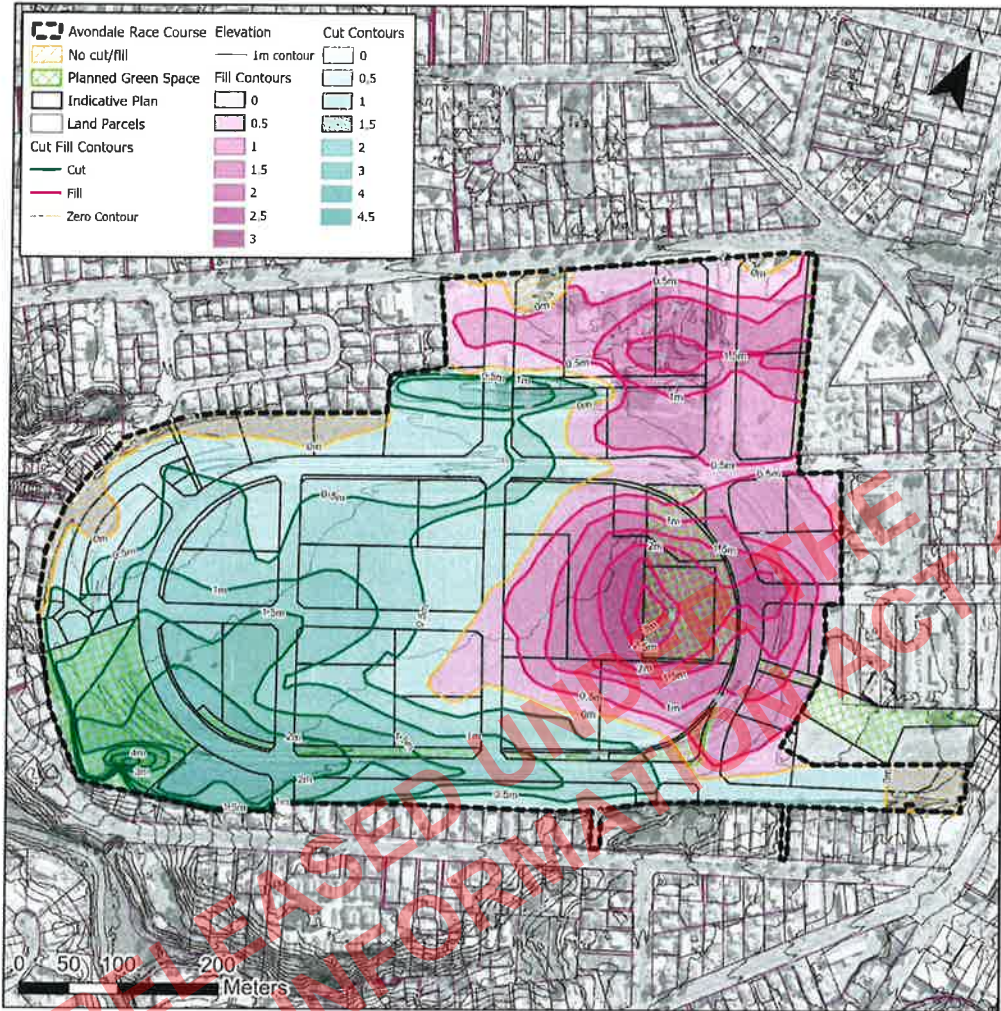


Figure 2B: Possible Cut and Fill Contours

The quantities resulting in the grading depicted on Figure 2A are:

(i)	Excavation of the top 300mm of the site potentially contaminated. Refer to 4.4 below. To be treated separately.	107,000 m ³
(ii)	Excavation from wester part of site to fill.	160,000 m ³
(iii)	Surplus excavation from on-site disposal of contaminants, available for fill	90,000 m ³
(iv)	Fill required based on Figure 2	195,000 m ³
(v)	Surplus excavation based on Figure 2 contours and on-site disposal of contaminants	55,000 m ³
NOTE: 1. Extra excavations will be required to develop each site and from basement carparks to apartment buildings.		

From the above numbers it is apparent that the earthworks for such a large development are quite modest. The above figures do not account for double handling uncontrolled filling, removal off site of materials unsuitable for structural filling or lime drying of significantly wet materials. Allowance for these have been made in the earthworks estimates of cost.

The completed earthworks envisaged generally provide for a rise from the roads onto the development sites; overland flow paths along the roads and access areas or reserves; and a balance of cut to fill depending on design proposals for apartments, (e.g. at grade or basement carparking). It is noted that a balance can readily be achieved by raising or lowering the site – a change of 0.1m increases or decreases the excavation required by 35,000m³

4.4 Dealing with Contaminated Soils On-Site

As noted in 4.2 above the degree of contamination over much of the site is expected to be caused from any pesticides and herbicides used on the grass fields and the racing track. These contaminants are not particularly mobile through the soil. So where on site could these be placed? There are significant areas of the site proposed as playgrounds, parks and fields. These are areas where structural filling is not essential and settlement over time can be easily rectified by releveling with topsoil. In discussion with Beca contamination team it is likely that a large portion of any contaminated grassed areas will be able to be disposed of on-site beneath these green areas where settlement, due to decay of organic topsoil, is not critical. This would involve undercutting these green areas say up to 3.5m deep; placing and compacting the contaminated soils in the undercut; providing a soil capping cover, of say 0.5 metres; then topsoiling with imported contamination free topsoil and grassing.

There may, however, be areas of the site that were used for rubbish disposal by dumping or burying within the site. Depending on the type of contaminants these may need to be disposed of to a licenced landfill.

The extensive areas of existing parking hardstand and access roading on the site could also be contaminated by hydrocarbons and heavy metals typical from these areas. As new roads will be sealed, it is proposed that these aggregates and compactable clay soils, be used in road subgrades and as initial aggregate layers below the sealed surface.

The total potential "contaminated soil and aggregates", is 107,000 m³ based on the top 300 mm of the site being contaminated.

For costing purposes (Section 11) the following has been assumed:

- | | |
|--|-----------------------|
| • Material stripped from hardstand and roadways. | 15,000 m ³ |
| • Material to be disposed of to a licenced landfill, | 15,000 m ³ |
| • Balance to on-site containment, | 77,000 m ³ |

This cost is estimated to be in the order of \$18M and compares with a cost of \$37M if all the surface soils are removed from site to a licenced landfill.

Also, there is the carbon footprint saving achieved by disposal on- site. To remove 107,000 m³ off site would involve approximately 6,500 truck and trailer movements to and from a land fill with a round trip to, say Redvale landfill, taking 2.5 hours or more.

4.5 Sediment Controls

As noted in 5.1 below the receiving waters for the runoff from the Racecourse is the Whau River and ultimately the Waitemata Harbour at the western end of the Pollen Island Marine Reserve.

It will be important that these sensitive receiving waters are not compromised by silt laden runoff from the site during earthworks. It is envisaged that the earthworks phase of the development, including contaminant removal, containment and controls would be carried out over three earthworks seasons with earthworks limited to about 20 hectares each season.

Erosion and sediment controls using sediment ponds, chemical treatment, silt fences, etc. and robust site practices will need to be implemented and enforced together with effective site stabilisation at the end of each construction season.

5 STORMWATER

5.1 The Receiving Waters

The receiving water for stormwater runoff from the racecourse site is the Whau River located immediately to the west. The Whau River/Estuary is identified in the Auckland Unitary Plan as a General Coastal Marine Area (CMA) and Significant Ecological Area (Marine2). Areas categorised as Marine 2 are generally considered more robust than the more sensitive Marine 1 areas but more sensitive than general marine areas. Estuaries such as Te Whau are complex ecological systems that mark the transition between fresh water and the open harbour - (the Avondale Stream discharges into the Whau just upstream of the Racecourse at the Great North Road bridge) and are a settling zone for sediment, metals and other urban stormwater contaminants.

The Whau River flows between the Te Atatu and Rosebank Peninsula's and under State Highway 16 (the North Western Motorway) and discharges into the Waitemata Harbour west of Pollen Island. There is an ecologically important Marine Reserve of some 500 hectares surrounding Pollen Island and the coastal area to the south east. Refer **Figure 3**.

Several other streams discharge into the Whau from the Te Atatu Peninsula, downstream of the Racecourse, including the Manawa, Taroa, Wairau and Glendene Streams.

The Auckland Council's "State of Auckland Marine Report Card, 2014, for the Central Waitemata Harbour", which includes the Whau, rates the Harbour as "D" (on a scale of "A" to "F" from highest to poorest) considering water quality, ecological health and contaminants in sediment.

Also, the overall health of the Whau's water quality was considered poor in 2017 with the contamination described in detail in Angela Thomson's, "Te Whau: Connecting people and places."

The receiving waters are thus sensitive and ecologically important and developments within the Whau catchment must be undertaken with extra care taken to ensure sediment runoff is minimised and stormwater runoff is treated to remove contaminants before discharge to the Whau.

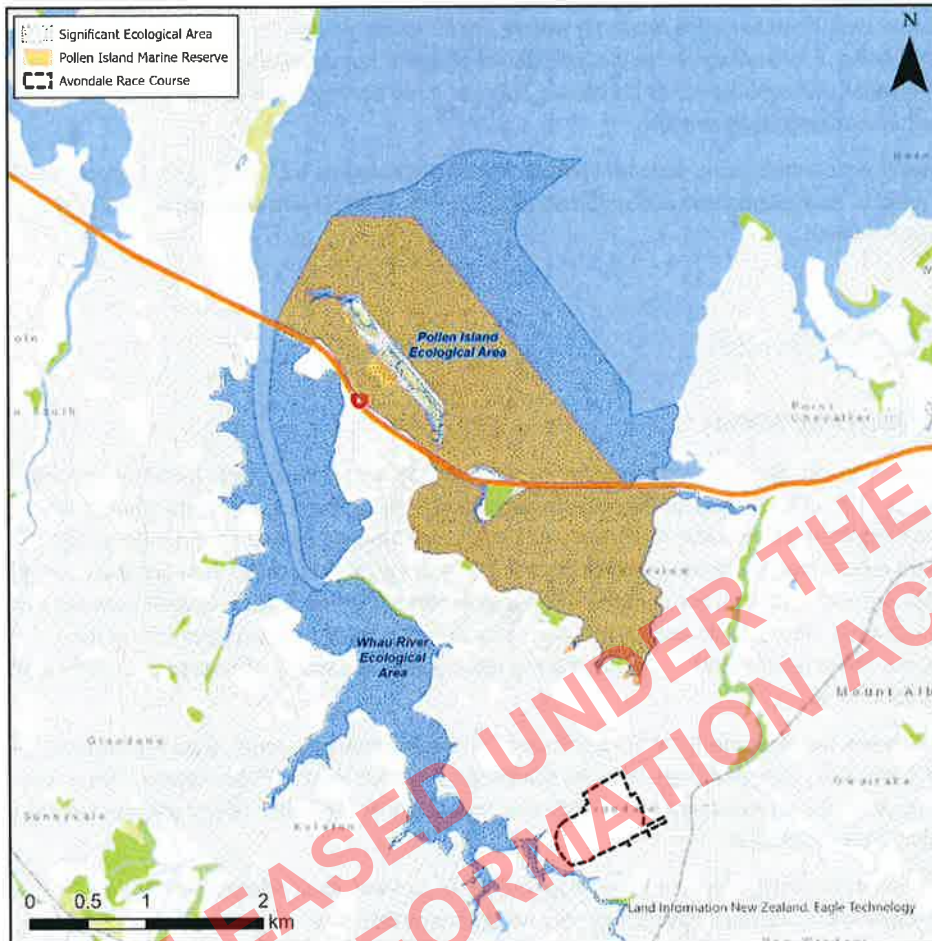


Figure 3: Whau River Discharge

5.2 Existing Reticulation

There is little existing stormwater reticulation within the racecourse site. A 900mm dia. public stormwater pipeline crosses the eastern side of the Racecourse, (to which part of the Racecourse is connected), and this pipeline discharges into an open watercourse within Wingate Reserve. Refer to **Figure 4 on next page.** (A4 copy attached at end of the report). This 900mm dia. pipeline serves a catchment of some 16 hectares. The pipe downstream from the reserve appears to be only a 450mm dia. pipe and therefore undersized considering there is the 900mm dia. pipe from the Racecourse and a further 675mm dia. and 450 mm dia. pipe from the east along Wingate Street also discharging into the Reserve. **Refer Figure 5.**

Downstream of Wingate Reserve the overland flow path along the watercourse appears to be compromised by culverting and obstructions such as fences, paving and buildings forming restrictions to flows.

The level of the 900mm public pipeline in the Racecourse is such that the pipeline flow could be intercepted and diverted to link in with a new internal reticulation for the Racecourse development and a new outfall, discharging directly into the Whau at the south west end of the Racecourse. This would have the significant benefit of reducing flows into the Wingate Reserve and flows in the watercourse downstream of the Reserve.

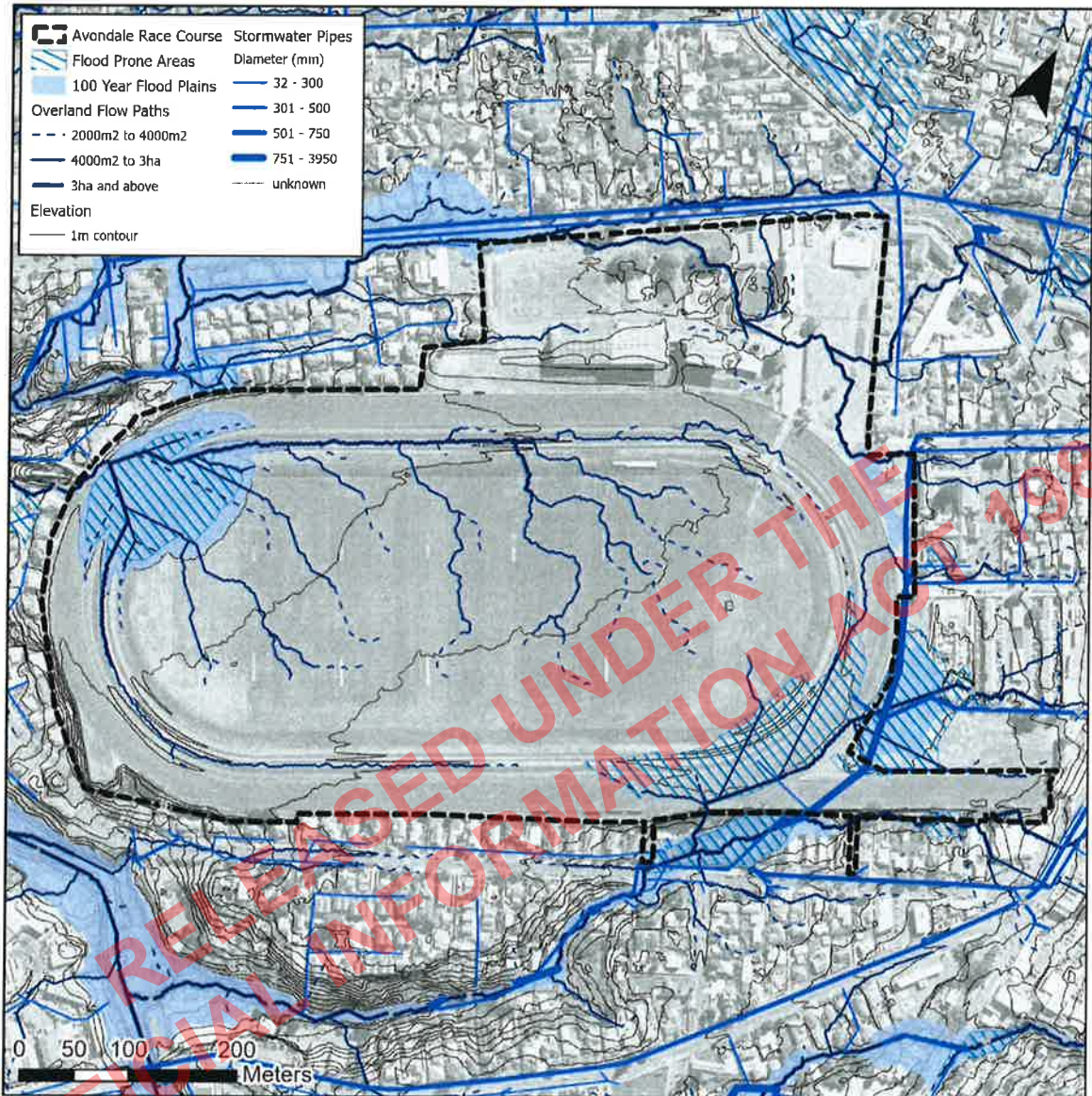


Figure 4: Existing Stormwater Drainage

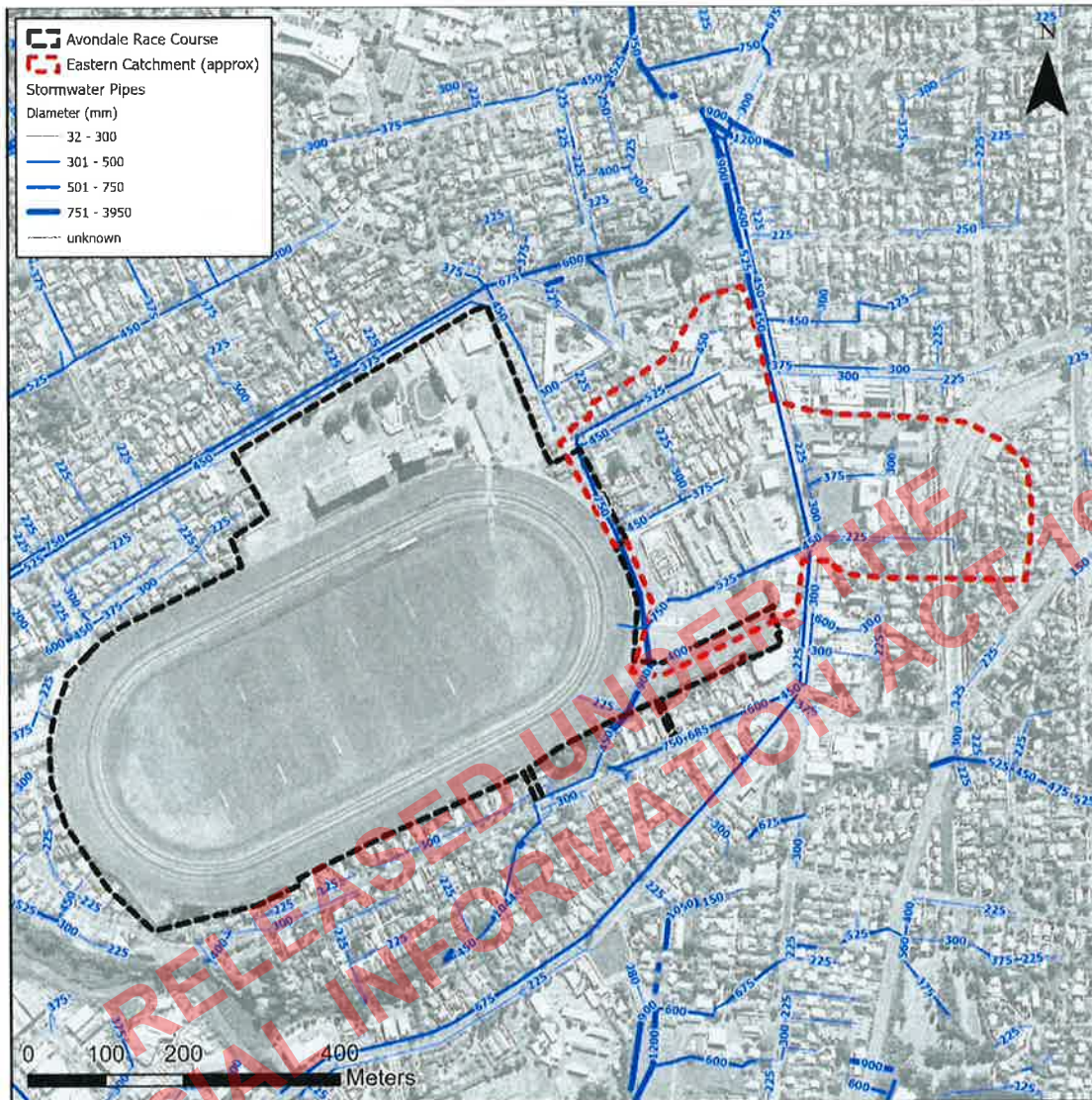


Figure 5 Eastern catchment and pipelines.

5.3 Flooding

Council's GIS maps indicate some surface flooding within the infield of the racecourse. (Refer to **Figure 4**). This area is very flat with gradients of 1 in 250 (0.4%). These local ponding areas will be removed when earthworks are undertaken.

Downstream of the site, the discharge will be direct to the CMA and therefore no attenuation for flooding or downstream pipe systems is required.

5.4 Servicing the Racecourse Development

A new single discharge pipe outlet can be installed into the Whau River at the south western end of the site, to cater for all the Racecourse site. This can be located through land owned by the AJC, under Wingate Street and through reserve land into the CMA. This would be a pipeline in the order of 1050mm dia. to cater

for all of the 34.77 ha. Racecourse Development, or, a 1350mm dia. to cater for both the Racecourse and the 16ha. catchment to the north east. The steep slope from the racecourse down to the CMA outfall will require special pipeline materials and design to limit scour to the pipe and river bank and to provide energy dissipation prior to discharge.



Whau at new Discharge Location – looking across the River



Vegetated Bank in Rizal Reserve.

A network of pipes will service the developed site providing for the 10-year rainfall event, all in accordance with Auckland Council's Subdivision standards.

5.5 Stormwater Treatment

Due to the nature of the receiving- waters it is anticipated that stormwater treatment will be provided to all stormwater runoff, with treatment provided at source. Roads will have treatment via grass treatment swales and/or raingardens. It is proposed that most of the housing developments will be high-rise buildings with basement car parks. This will have a restricted need for treatment other than the entry and exit roads.

Each site development will be required to look after their own stormwater treatment by way of proprietary in-ground systems, rain gardens or treatment swales. This would apply to all open car park areas on each lot as well.

5.6 Retention/Detention.

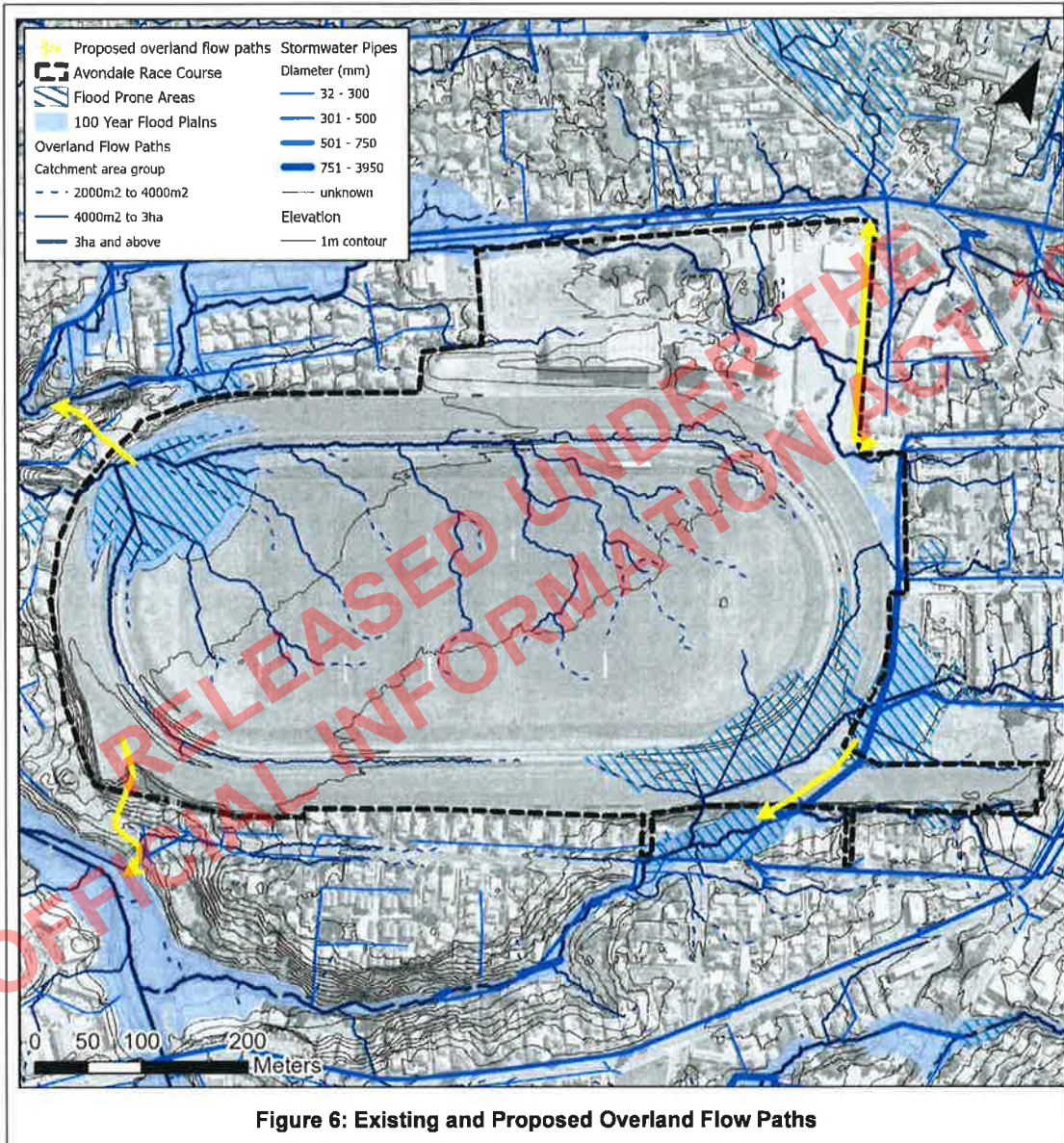
A new discharge pipe is proposed directly into the CMA at the low point in Wingate Street at the south western end of the Racecourse. At this location there is a heavily vegetated bank, 4m to 5m high, dropping into the Whau River and the waterway is some 25m wide with mangroves along each bank. Stormwater detention is not usually required when discharge is directly into the CMA due to the width of the waterways and the lesser risk of bank erosion. At this discharge location a specifically designed outfall structure will be provided to dissipate the pipe flow energy and train, or direct, flows so bank erosion does not occur. Detention and retention is therefore not proposed.

5.7 Overland Flow Paths.

The Council GIS maps indicate two overland flows from the site one at the north west and the other at the south east ends of the site. Refer to **Figure 6**.

The overland flow path to the north west is under the boundary fence with the neighbouring Tamora Lane, terraced housing, development. The Tamora Lane development is currently under construction and a dedicated overland flow path has been designed to cater for overland flow from the Racecourse.

A bund around the Racecourse boundary directs overland flow to a low point on the fence line and down a steep bank between two block walls, across Tamora Lane and into a branch off the Whau River. This overland flow path seems substantial and can be utilised for some overland flows from the Racecourse.

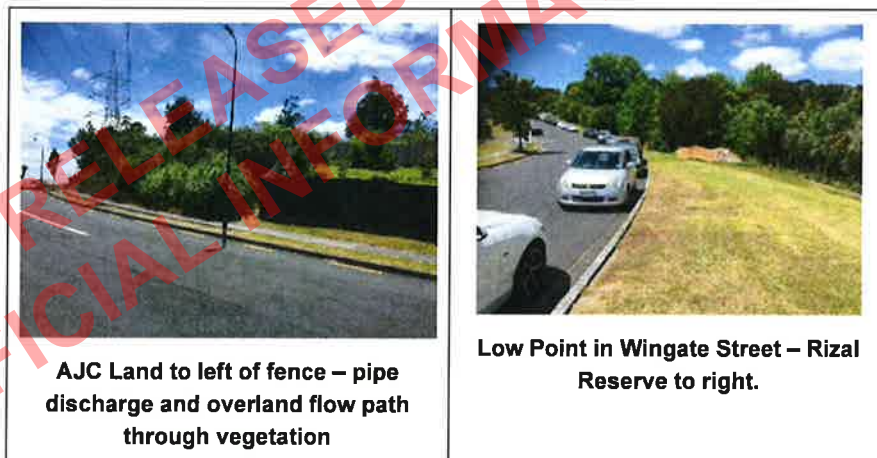




The second overland flow path is across the south eastern corner of the site and into the gully in Wingate Reserve. This overland flow path caters for the catchment east and north of the Racecourse and part of the eastern Racecourse land. This overland flow path will need to be maintained when the Racecourse is developed.

A small flowpath from adjacent property in the north east crosses the site into Ash Street and will also need to be maintained.

Because of the flat nature of the site, it is proposed that earthworks will be undertaken to provide positive grades of 1% to 2% on lots and overland flow will occur along roads with a second overland flow path located at the proposed outlet pipe position, across the low point in Wingate Street, through Rizal Reserve and into the Whau River.



Maximum ponding on road carriageways will be 200mm depth. Erosion protection will be provided to the steeper slopes along flow paths.

Flow paths onto the site from properties in the north and east will be maintained and part of the site fronting Ash Street will drain out to the street. A part of the Racecourse site along the eastern boundary will continue to drain to the south east and into Wingate Reserve, however an alternative approach of capturing and conveying this catchment through the racecourse site has also been considered in the costing section.

6 Wastewater

6.1 Existing Reticulation

A 450mm dia. trunk sewer main crosses the south eastern corner of the Racecourse and flows runs northwards and the pipe increasing to a 525mm dia. beyond the intersection of Holly and Victor Streets. Refer to **Figure 1**. Ultimately this trunk main is connected to the Orakei trunk main and the Mangere Treatment Plant. The Racecourse connects to the 450mm dia. trunk main.

Properties surrounding the western part of the Racecourse are too low to connect to this trunk main by gravity and drain westward to two pump stations – one located at 6 Wingate Street, adjacent to the Whau River, and the other located at the western end of Ash Street. Both pump stations have rising mains connected to branches of the 450mm dia. trunk main. These two pump stations are relatively small with capacities of 7.1 L/s (Wingate Street) and 12.2 L/s (Ash Street). These pump stations do not have capacity to take flow from the Racecourse development unless there were significant upgrades.

An assessment of the capacity of the 450mm dia. trunk main was undertaken for the 2020 report and indicated that this main did not have sufficient capacity over 28% of its length to cater for the increases due to Kainga Ora developments including the Racecourse, and 32% of its length if allowance was made for other infill housing.

6.2 The Proposed Avondale Branch Sewer

WSL have committed to what is now termed the Avondale Branch Sewer, ABS, as part of the Central Interceptor Main Tunnel and Link Sewer project. The Avondale Branch Sewer was originally referred to as Collector Sewer 6 (CC6) and extends from a pumpstation (PS25) in Miranda Reserve, (off Blockhouse Bay Road to the south of the Racecourse) and extends northwards along or through the eastern side of the Racecourse to the intersection of Holly and Victor Streets to the north of the Racecourse. Flows south of Victor St, which would have previously run down to the north will be redirected to run down to the south.

The route of this sewer has been consented and according to a report from Hydraulic Analysis Ltd., HAL, in December 2020, titled, "Waterview and Avondale Options Assessment", for WSL, construction is programmed to be completed in the next four years i.e. by 2025. Refer to **Figure 7** on next page.

The HAL Options Assessment report indicates that the ABS will comprise a 900 dia pipe commencing at IL 0.37 at PS25 in Miranda Reserve and extending northwards to intercept the existing 450mm dia. trunk main at Victor Street, north of the Racecourse, at IL 10.40.

It is unclear if any development of the Racecourse site has been provided for in the HAL assessment or the ABS design. It is also not known at what level the ABS pipeline will be where it crosses the southern boundary of the racecourse land. However, it will need to be lower than the existing Trunk sewer to be able to intercept the lower Victory Street flows.

Although the timing of this new sewer is programmed for 2025 it is not known if this is a firm commitment from WSL.

Given these uncertainties it is recommended that Kainga Ora writes to WSL asking for confirmation of the following:

- (i) Have WSL provided for the Racecourse redevelopment in the ABS design and if so for what population?

- (ii) Will the ABS be at a sufficient depth at the Racecourse southern boundary to be able to cater for a gravity feed from all of the Racecourse site. An IL of about 9.00 is required. i.e. about 3m deeper than the existing 450mm dia. trunk main at this location.
- (iii) Is the programme for completion of the ABS reliable? i.e. budget, consents design and construction by 2025?

6.3 Wastewater Flows from the Development

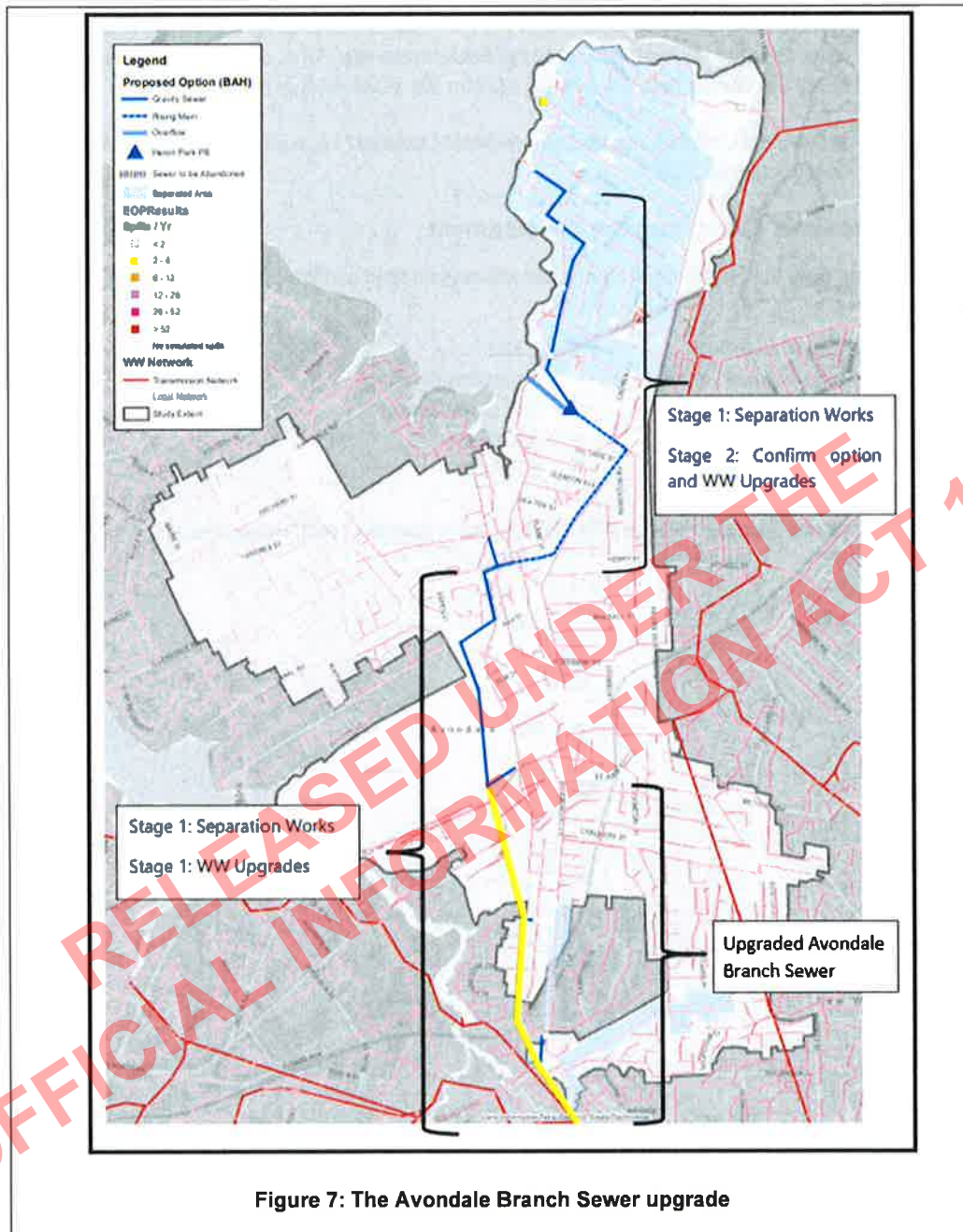
Wastewater flows from the Racecourse have been assessed based on the 2020 report based on the following:

- Number of Dwellings 2,532
- Average occupation. 4 persons/dwelling
- ADWD 225 L/person/day
- PDWF 3 X ADWF
- PWWF 5 X ADWF

Therefore, expected wastewater flows from the Racecourse development are:

- ADWF 27 L/s
- PDWF 79 L/s
- PWWF 132 L

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6.4 Will the Proposed Upgrade by WSL Cater for a Gravity System?

Based on the grading of the site as indicated on **Figure 2**, approximately 40% of the western development sites within the Racecourse cannot connect by gravity to the existing 450mm dia. trunk main and would need to be pumped. The need for pumping is however dependant on the level of the proposed Avondale Branch Sewer where it crosses the Racecourse site. Because the existing 450 main falls northwards to Victor Street

and the Avondale Branch Sewer (ABS) falls southwards, the ABS will need to be at a lower invert level through the Racecourse.

[Note: The existing 450 falls to the north at approx. 1 in 750 and the IL at Victor Street (825m downstream) will be in the order of 1.1m lower than at the southern boundary of the Racecourse at IL 11.94. Therefore, the ABS will need to commence at Victor Street at about IL 10.84 and even at a gradient of only 0.1%, would have an invert level of about 10.00 at the southern boundary of the Racecourse which is some 1.9m lower than the existing trunk main. At IL 9.00 on the ABS, at this location, all of the Racecourse site could have gravity disposal of wastewater. The main sewer within the site along the southern boundary will be deep at between 5.0m and 7.0m].

It is likely from the diagrams in the HAL report that no redevelopment of the Racecourse site has been provided for. It is therefore recommended that an allowance be provided for in the preliminary budget cost estimate to allow for an increase in the ABS pipe size from 900mm dia. to 1050mm dia. to cater for the additional flow from the Racecourse development. The ABS line is deep and it is envisaged that it will be installed by micro tunnelling and a lower invert at the Racecourse can be accommodated to enable a gravity discharge from all of the development. The extra over cost has been estimated in the costs at Section 11.

6.5 Interim Measures if Upgrade Delayed

If the Avondale Branch Sewer is delayed what are the options for development of the Racecourse? An option is to provide waste water storage on site and pump to the existing 450 trunk main only when the main has capacity to receive more flow in non-peak times. This could vary during the day and if there was rain within the catchment. Discharges could be controlled with valves or a pumped discharge, activated when downstream monitoring identifies capacity is available and shuts off the discharge when the trunk main is at capacity. Such a system would be limited by the storage provided and the number of persons being catered for. However, by allowing costs for such an interim system development may be able to proceed and sales effected even if there is a delay.

6.6 Costing Allowances

For budgeting purposes, it is assumed that the design and construction of the Avondale Branch Sewer is already committed but has not allowed for the Racecourse Development. An increase in pipe size from 900 to 1050mm dia. is therefore recommended from P 25, in Miranda Reserve, to the Racecourse site, a distance of 1,600m.

Because of the unknown final design timing of the Avondale Branch Sewer, it is recommended that storage for a development of say 1,000 people be provided for in the event that the ABS is delayed.

A deeper sewer line should also be allowed for along the southern side of the site (in on site development costs) with depths ranging from 4.5m to 7m over a 500m length assuming gravity connections to all of the Racecourse to the ABS.

7 Water Supply

7.1 Existing Reticulation

The water demand for the development cannot be met by the existing water supply network.

The Watercare GIS shows the area is serviced through a series of pressurised local water supply mains ranging between 150mm and 250mm. These networks are fed off a 250mm diameter water supply main that is located along Great North Road east of the racecourse site and north of the site along Ash Street and

Rosebank Road. A 700mm diameter mild steel transmission main is also located along Great North Road. The nearest water supply reservoir to the site is the Mt Albert Reservoir located approximately 2km from Great North Road and the Avondale Racecourse site. Refer **Figure 8**.

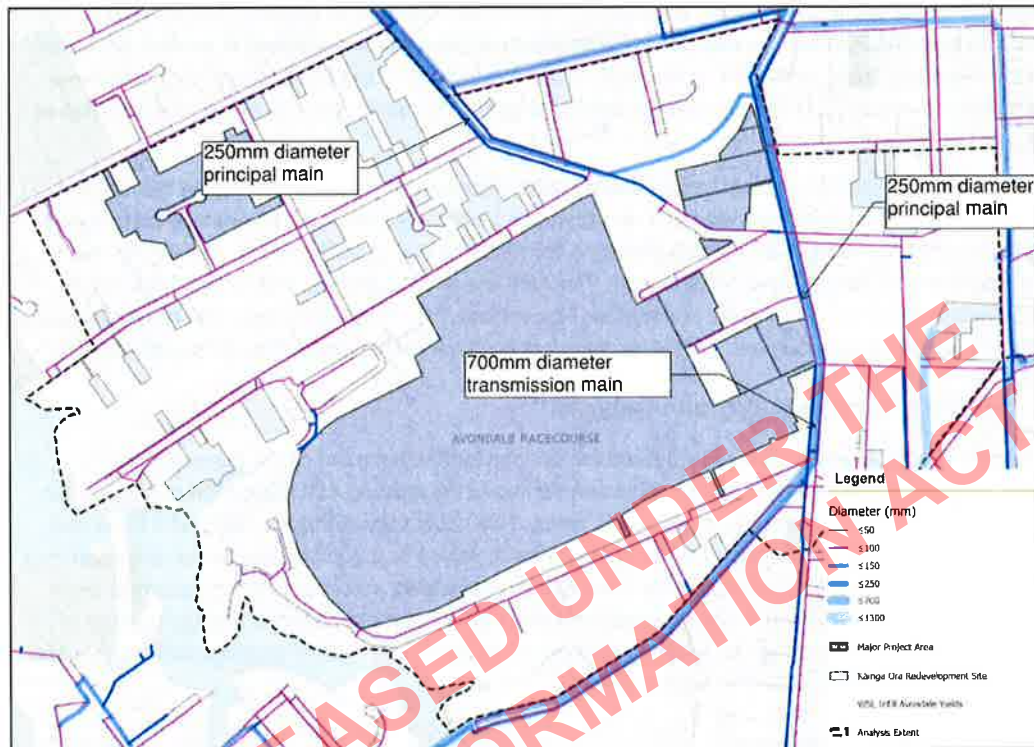


Figure 8 Water Supply Network within the Study Area (Pipe Network Source: Watercare GIS, November 2020)

7.2 Upgrade to Service the Development

WSL have advised that to service the development an existing 250mm dia. supply main from a bulk supply point in Great North Road at the Whau Bridge and along Great North Road to Racecourse Parade would need to be upgraded and a new connection provided down Racecourse Parade to service the development. We assess the upgrade to require a 350mm dia. pipe.

WSL indicate that the 250mm dia. pipe upgrade would be required on the assumption that the Racecourse development had a population of 7,800 persons. The Racecourse Development envisages at least 10,000 people and if 3,000 dwellings were consented this could be even higher. It is therefore recommended that a new separate bulk main be installed from the same bulk supply point, and a 350mm dia. pipe laid to the Racecourse via Larch Street. This would be a shorter route than upgrading the 250mm dia. existing pipe and allows for better distribution within the Racecourse site and provides for augmentation of flows to adjacent areas to the north and east. Refer **Figure 9**.

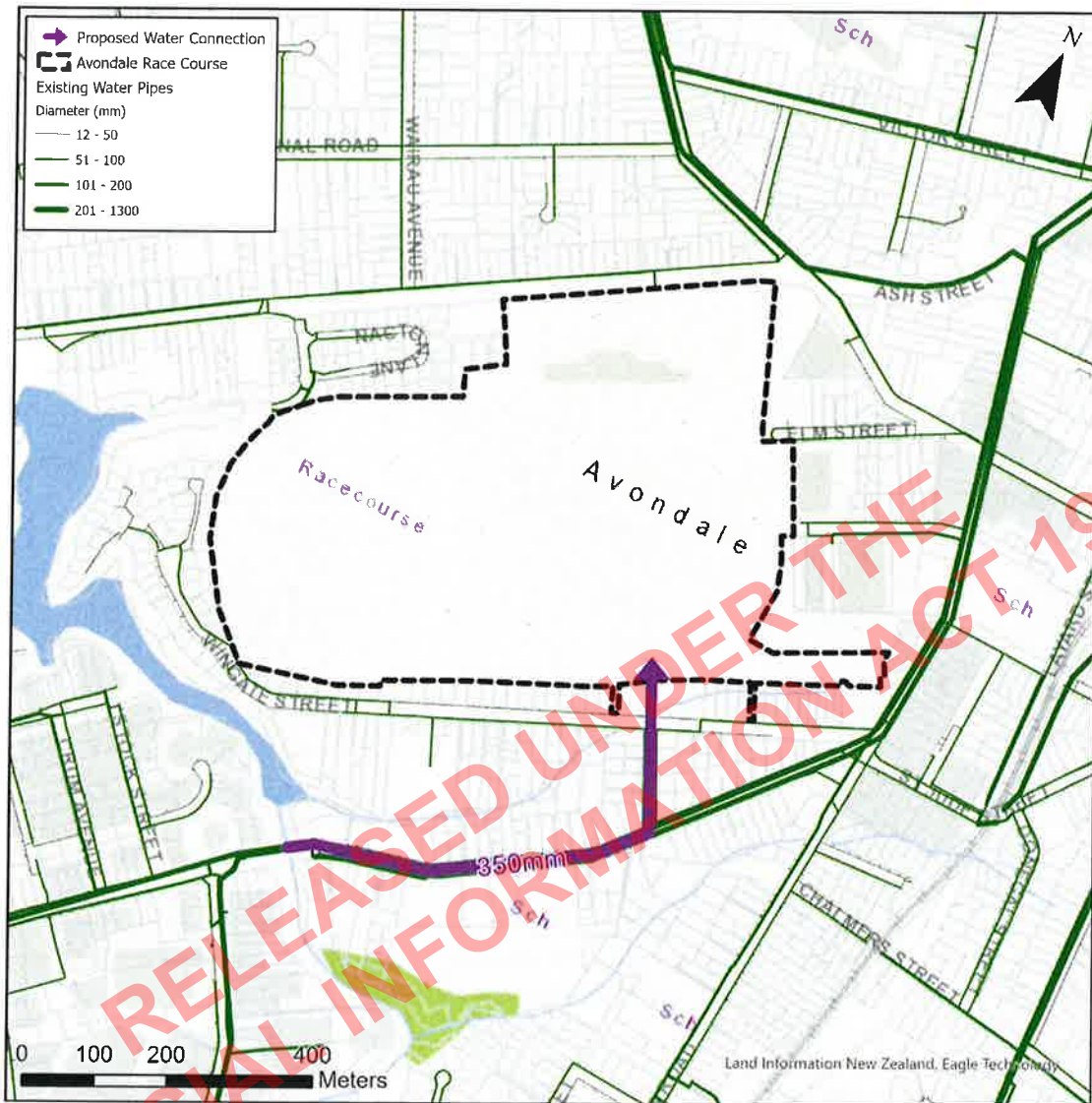


Figure 9: Proposed new water supply link.

8 Power Supply

8.1 Advice from Vector on Upgrades Required

Review of Vector power records indicate good coverage through the Avondale study area. Through consultation, Vector has indicated that the existing feeders in Ash Street and Racecourse Road have some capacity to supply new load. However, the overhead supply along Wingate Street is too small hence a new 11kV feeder will be required. Vector has advised that the new feeder will need to be installed from Avondale substation to the proposed Avondale Racecourse site. This is shown within **Figure 10** below, with arrows indicating where existing feeders can be extended to supply new housing. Vector has noted that the cable

route is indicative only and would need to be confirmed once the road layout through the racecourse is established.



Figure 10: Proposed new 11kV electrical feed (Source: Vector, November 2020)

During consultation, Vector also noted that they are anticipating load growth on the network in the future as a result of major developments within the Avondale town centre and surrounding areas. It is anticipated that with time this will trigger the requirement to upgrade capacity within the Avondale substation. Vector intends to monitor this load growth and carry out the required reinforcement projects when required.

9 Transportation

9.1 Network Upgrades around the Development

The transport and road network adjacent to the site will need to be upgraded to accommodate the Racecourse Development. Initial assessments based on the site layout indicated in Figure 2 suggest that the following upgrades will be required:

- The two roads accessing the site from Ash Street will need to be new signalised intersections, albeit, as noted below the eastern access may need to be limited access and not signalised.
- The intersection of Elm Street with Rosebank Road and the three existing intersections with Great North Road at Racecourse Parade, Wingate Street and Larch Street may need to be signalised. [Note it may be preferable to close the Wingate intersection at Great North Road]
- Elm Street, Racecourse Parade Wingate Street and Larch Street will need to be upgraded including pavements to cater for the increased traffic and their urban streetscape to provide for pedestrians, cyclists, utility services and stormwater treatment.

Refer to **Figure 11** below.

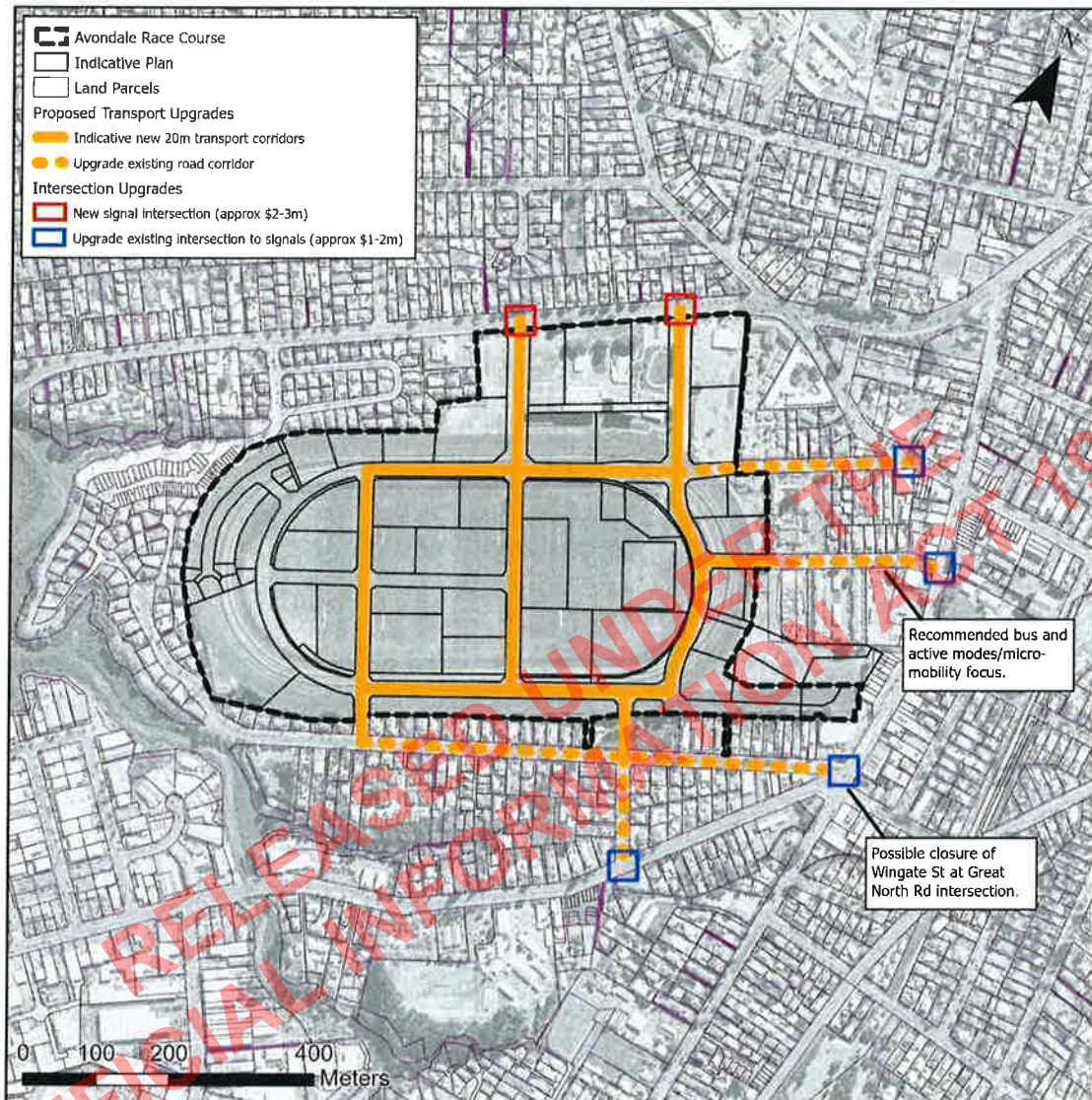


Figure 11: Intersection and Road Upgrades

The eastern access road onto Ash Avenue is close to the Rosebank Road / Ash Street intersection and consideration will need to be given to limiting this access to say left in, left out whilst considering a further access point to the west at Sandy Lane.

9.2 Access over Wingate Reserve

It is intended to extend Larch Street across Wingate Reserve to provide a direct connection to Great North Road to the south. The open water course through the reserve is vegetated and has a 900dia, 675 dia. and 450dia. stormwater pipes discharging into the watercourse at its upstream (eastern) end. Rather than culverting and filling over the culvert(s) to construct the new road link it is suggested that a bridge be installed to minimise disturbance to the watercourse and the inevitable destruction of much of the vegetation. This is expected to provide an easier consenting path.

9.3 Road Access of Western end of Wingate Street.

A further road access is proposed at about number 81 Wingate Street. This site has a house on it and will need to be acquired to effect the proposed road layout.

9.4 Public Transport Upgrades

It is considered that the Racecourse Parade access between the Racecourse and Avondale town centre should be focussed on moving local movement to the town centre with bus connections, as well as high quality cycling (micro-mobility) and walking connections.

The costing below provides an allowance for public transport upgrades including potential upgrades to the Avondale rail station, given the substantial population increase anticipated.

10 Third Pipe Considerations

10.1 Introduction

Is there place for the use of recycled water in residential areas of Auckland through a separate pipe for use in washing machines, toilet flushing, irrigation, etc.? Should a third pipe be considered for the Avondale Racecourse?

We examine the experience of Hunter Water Sustainable Water team leader, Danial Livingston, [*water e-Journal Vol 5, No 3, 2020*] and the lessons learnt from the third pipe installation at Stonefields and the reasons why it was abandoned.

10.2 The Australian Experience

There is a significant debate in Australia surrounding various options for water security with everything on the table for analysis from desalination, further dams, potable reuse and source separation.

Mr Livingston said, "that the Gold Coast's Pimpama recycled water treatment plant was once considered state-of-the art infrastructure showing just how quickly values and priorities can shift." Back in early 2000's [the plant] was considered to be the shining light of innovative water management. But it was decommissioned in 2014," he said. "Economic assessments in the 2010's showed that there was a \$100M disbenefit continuing the scheme ..".

The Australian experience as set out by Mr Livingston are tabulated in the table below:

Pros.	Cons.	Comment
Dual systems driven by water scarcity.		Not likely to occur in Auckland when Waikato River supplies are further implemented.
Effluent management constraints		Not an Auckland issue.
Unitary Plan Regulatory incentives for	Health Act requirements to manage public health could add compliance costs	Where good public water services and good water sources are available this is not a driver.

alternative water sources		
	Price to consumer is higher than standard water supply	Typically the case.
	Developers' contributions paid for public water supply are often insufficient to cover costs of a third pipe.	In most cases the public utility subsidises the scheme.
	Regulative Authorities required to spend more time on testing	

10.3 Rejection by WSL of the third pipe at Stonefields

A report in *Stuff* dated April 2014, reported that Watercare Services Ltd had refused to take over and operate a recycled water scheme at Stonefields because of their concerns relating to the "third pipeline" jeopardising their A-grade water supply rating because of the risk of cross-pipe contamination. The third pipe stormwater and rainwater recycling is not treated to the same standard as drinking water.

The Stonefields' third pipe initiative was a condition of resource consent, and the subsequent subdivision consent, imposed by the legacy Auckland Council pre amalgamation. The scheme did not involve WSL. The initiative was based on considerations of environmental sustainability. The scheme piped the recycled water to each house bringing water from a central reservoir to toilets and outside taps. Prior to being abandoned the scheme had cost \$7.2M for the network then installed.

WSL also noted that the cost of the recycled water to residents would be more expensive than the city supply without the same standard of treatment. The sustainability issues were considered outweighed by the significant cost differential and potential water quality issues. The third pipe is now utilised for the same water as supplied by WSL.

With current plans to augment Auckland's water supplies from further takes from the Waikato River water shortages, like those during 2020, are likely to be a thing of the past. Recycling water for a needless purpose at a greater cost is not sustainable.

10.4 WSL Consultation

Unless there becomes a further water shortage in Auckland in future years it is very unlikely that a third pipe option will be supported by WSL. Of-course ideas change and a conversation on the third pipe desirability should be investigated between Kainga Ora and WSL to get an update from WSL to determine their current thinking. Unless there is support from WSL no third pipe scheme is likely to get off the ground.

A third pipe option is not therefore considered an option for the Avondale Racecourse development at this stage.

11 Costings

11.1 Basis of Costs

Preliminary Budget Cost Estimates have been undertaken for handling the contamination on site and the bulk earthworks. Estimates have also been made for the works external to the site necessary to upgrade the infrastructure to cater for the Racecourse Development.

In the sections below, the high level raw construction cost estimate (raw) is provided first and then a total including overhead costs.

The following overhead costs are allowed for:

i)	Preliminary and General.	15% of (iii)
ii)	Environmental Compliance and Traffic Control.	10% of (iii)
iii)	Construction estimate.	As estimated.
iv)	Professional Fees	10% of (i), (ii), (iii).
v)	Contingency Sum	<u>30% of (i) to (iv)</u>
	TOTAL excluding GST	<u>\$Sum of above</u> (note total = 1.78 x Item (iii))

11.2 Contamination

Investigations are required to confirm the extent of contamination and the approach to be used for management of contaminated soils that may be present on site.

The following assumptions have been made for dealing with contamination on the Racecourse site:

- The top 300mm of the site is contaminated i.e. **107,000 m³**
- 15,000 m³ required to go offsite to a certified landfill
- 15,000 m³ from roads and hardstand areas to be used in road subgrades
- 77,000 m³, the balance, to be disposed of on-site beneath fields and parks

Contamination	\$10,300,000
TOTAL Estimate, including overheads but excluding GST	<u>\$18,300,000</u>

11.3 Earthworks and Erosion and Sediment Controls

The Earthworks will require robust sediment controls because of the sensitive nature of the receiving waters. There have been no geotechnical investigations on the site and the nature of the previous earthworks undertaken, between 80 and 130 years ago, is unknown. Investigations will be required to confirm geotechnical conditions, the usability of soils in earthworks and the extent of unsuitables present.

The cost estimates have therefore allowed for some double handling of non-engineered fill; removal off site of materials or rubbish unsuitable for use on site, control of ground water in excavations and drying of wet materials using lime.

Erosion and Sediment Control	\$1,500,000
Earthworks	\$11,700,000
TOTAL Estimate, including overheads but excluding GST	<u>\$23,000,000</u>

11.4 Stormwater Discharge.

11.4.1 Discharge Pipe and Outlet Structure to Whau

There is a significant drop from the Racecourse level down to Wingate Street in the order of 7 m, and again from Wingate Street to the Whau River. Flow velocities in stormwater pipes will be very high due to the pipes being laid at gradients of about 25%, and special pipe materials (e.g. HDPE) will be required to restrict scour of the pipes. Design of a specific reinforced concrete structure will be required to dissipate energy and prevent scour at the outlet.

Outfall Pipe	\$400,000
Outlet Structure	\$250,000
TOTAL Estimate, including overheads but excluding GST	<u>\$1,200,000</u>

11.4.2 Additional Costs to Divert Flows from Wingate Reserve to New Outlet

To improve the watercourse downstream of Wingate Street flows from the catchment immediately east of the Racecourse could be diverted to the new outfall location. This will involve the following additional costs:

- Increases in pipe sizes along the southern side of the racecourse over a length of 700m
- Increase in manhole sizes from 1200dia to 1800 dia – 8 number
- Discharge pipe increased from 1,050 dia. to 1,350 dia.
- Additional cost of larger manholes and outlet structure
- Allow for a gross pollutant trap on this pipeline as there is currently little if any stormwater treatment in the eastern catchment

Extra over for increasing pipe, GPT, etc	\$850,000
TOTAL Estimate, including overheads but excluding GST	<u>\$1,500,000</u>

11.4.3 Overland Flow Paths

Specific works will be required external to the site to cater for overland flows.

Allowances has been made for the following;

- Adjustments to the existing overland flow path at the north western boundary where provision has been made to take overland flows through the Tamora Lane Development.
- Slope protection at the new outfall location
- Reshaping of Wingate Street to provide for the overland flow from the racecourse.
- Providing an overland flow path in the form of a concrete path along the eastern boundary between Ash Street and Elm Street to protect the existing adjacent retirement Village buildings
- Maintaining a flow path from the eastern side of the Racecourse and the properties to the east draining to Wingate Reserve.

Overland flow paths	\$500,000
TOTAL Estimate, including overheads but excluding GST	<u>\$900,000</u>

11.4.4 Stormwater Treatment.

Stormwater treatment will be provided at source and each development site will be required to provide treatment of external parking and access roads.

Streets within the development will include water treatment facilities such as raingardens and treatment swales as part of the urban design. Treatment of stormwater on roads to be upgraded external to the site are included in the costs for those upgrades.

A gross pollutant trap has been allowed for if the 16ha external catchment to the east of the site is connected to the site's stormwater system.

11.5 Wastewater Upgrade

11.5.1 The Avondale Branch Sewer

The Avondale Branch Sewer (ABS) has been estimated to cost in the order of **\$52.6M** [Report by Hydraulic Analysis Ltd., "Waterview and Avondale Options Assessment", Nov.2020, Executive Summary]

This is a committed work by WSL, expected to be completed within the next four years.

Kainga Ora will need to confirm with WSL the design allowance provided for the Racecourse Development; the level of the branch sewer proposed through the Racecourse; and the timing of when the new system will be operational.

However, for preliminary budgeting it is assumed that the Racecourse development has not been provided for by WSL and therefore a larger pipeline will be required for the ABS from PS 25, in Miranda Reserve, to the Racecourse – a distance of 1,600m. It is also assumed that the pipeline will be installed by micro tunnelling and can achieve the required depth to service the total Racecourse site by gravity.

It is assumed that the downstream connector sewer from Miranda PS to the Central Interceptor does not need upgrading and that the CI "gating strategy" can accommodate the additional flow.

The cost allowed for is the extra over cost to increase the pipe size from 900mm dia. to 1,050mm dia. assuming both are installed by micro tunnelling.

Upsize 1600m of proposed Avondale BS from 900 dia to 1050 dia	\$3,400,000
TOTAL Estimate, including overheads but excluding GST	<u>\$6,000,000</u>

11.5.2 Storage to allow some development if ABS delayed. (Provisional Sum)

The timing of the construction and commissioning of the Avondale Branch Sewer has not been confirmed by WSL and the development of the Racecourse is dependent on an upgrade of the present trunk main that is overloaded in wet weather. To allow some development to occur in the event that the commissioning of the ABS is delayed it may be possible to provide storage on site and to discharge to the existing 450mm dia. trunk main during off peak times during fine weather. The discharge could be controlled by instrumentation that shut down or opened valves (or pump) when there was no surcharging downstream. The availability of the trunk main and the amount of storage provided, and also the minimum storage required by WSL, would dictate the extent of any initial development.

A storage tank of 12m x 12m x 2m deep would provide for 24 hrs storage of the ADWF for 1,000 persons.

300 m ³ storage tank	\$1,400,000
TOTAL Estimate, including overheads but excluding GST	<u>\$2,500,000</u>

11.6 Water Supply Upgrade to Site

A 350mm dia. new bulk supply main has been costed with its offtake point in Great North Road at the Whau River bridge and laid along Great North Road eastward to Larch Street, into Larch Street and across Wingate Reserve via a new access road, to link up with the Racecourse Development 's reticulation.

The 350 ID diameter allows for replacing the flow currently serviced by the existing 250 dia pipe plus the proposed racecourse development population. It is assumed that the connection at the supply point will be from the existing BSP at WSL's cost in accordance with the IGC's as per the recent Kainga Ora Northcote example.

720m of 350 ID water supply	\$1,000,000
TOTAL Estimate, including overheads but excluding GST	<u>\$1,800,000</u>

11.7 Power Supply Upgrade To and Through Site

Vector have confirmed that a new mains supply will be required for the development from their substation in Avondale as indicated in Section 8.0 above.

An allowance for providing an 11kV reinforcement supply has been made as follows:

830m of underground line from Avondale substation to racecourse (assume three multi core cables):	\$1,500,000
1030m of underground line within racecourse (assume three multi core cables):	\$1,800,000
900m of underground line within racecourse to distribute	\$900,000
TOTAL Estimate, including overheads but excluding GST	<u>\$7,500,000</u>

No allowance has been made for low voltage supply /transformers/upgrades at the substation.

11.8 Transportation Upgrades Beyond the Site

11.8.1 Intersection Upgrades

A cost allowance has been made to provide two new intersections with traffic signals on Ash Street, and upgrades to provide signals to the existing intersections at Great North Road intersection with Elm Street, Racecourse Parade, Wingate Street and Larch Street. It assumed no land needs to be purchased as the intersections on Ash street will be immediately adjacent to the racecourse itself. An allowance has been included for land take for the other four intersections.

Two new signalised intersections to Ash St	\$3,000,000
Four existing intersections upgraded to signals	\$4,000,000
TOTAL Estimate, including overheads but excluding GST	<u>\$12,500,000</u>

11.8.2 Existing local street upgrades

The local streets servicing the Racecourse development will need upgrading to cater for the additional traffic. This includes:

Elm Street	230m
Racecourse Parade	235m
Wingate Street	675m
Larch Street	<u>140m</u>
Total	1,280m

Local road upgrades external to the site, 1280m	\$7,000,000
TOTAL Estimate, including overheads but excluding GST	<u>\$12,600,000</u>

11.8.3 Bridge Link Over Wingate Reserve

Allow for Bridge 30m long x 15m wide plus standard road formation over a further 25m.

30m long bridge	\$3,400,000
Local road works	\$250,000

TOTAL Estimate, including overheads but excluding GST **\$6,200,000**

11.8.4 Land Take and Road Link for Road Access at Wingate Street West

Requires land take of 1 property with house and construction of 25m of new road.

1 property purchase (no overhead applied)	\$1,250,000
Local road works (overhead applied)	\$250,000
TOTAL Estimate, excluding GST	<u>\$1,700,000</u>

11.8.5 Public Transport improvements

A provisional sum has been allowed for contributions to upgrades of the Avondale Railway station and public transport in the area. No specific overhead allowance is included.

Public transport upgrades	\$5,000,000
Avondale Train station upgrades	\$10,000,000
Provisional Sum	<u>\$15,000,000</u>

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Appendix A: Figures

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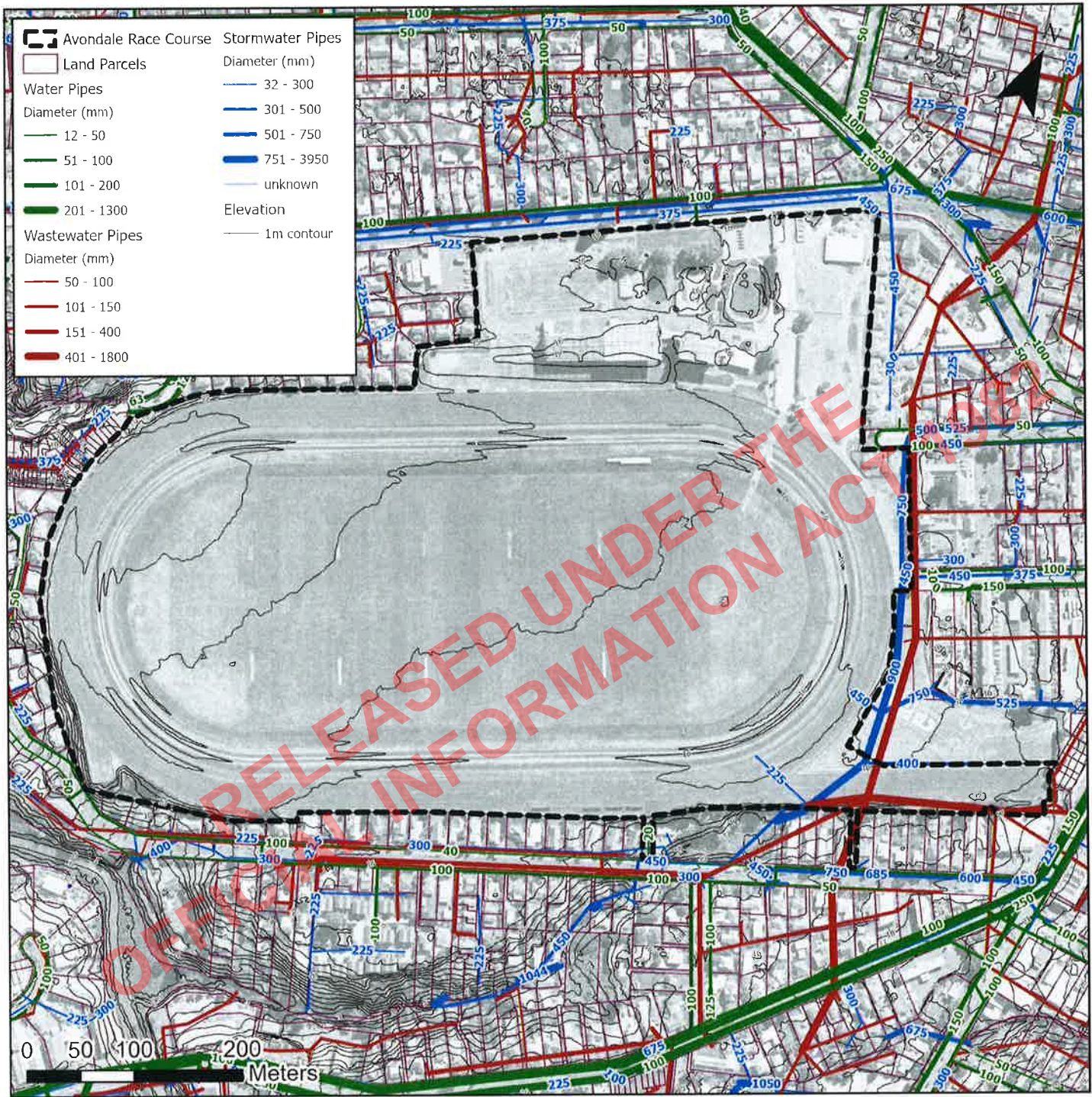


Figure 1: Site Plan and Services

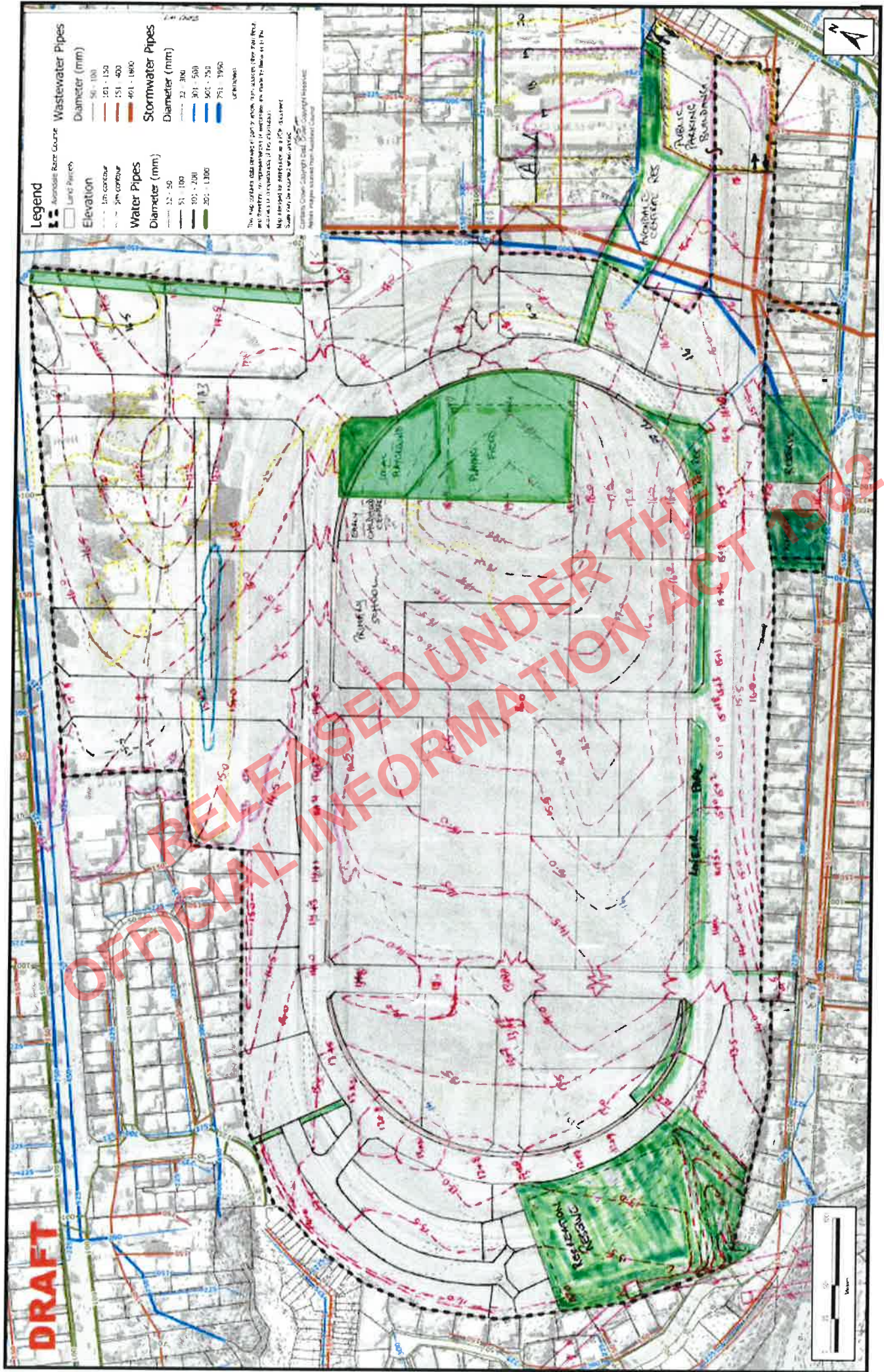


Figure 2a: Preliminary Earthworks Plan

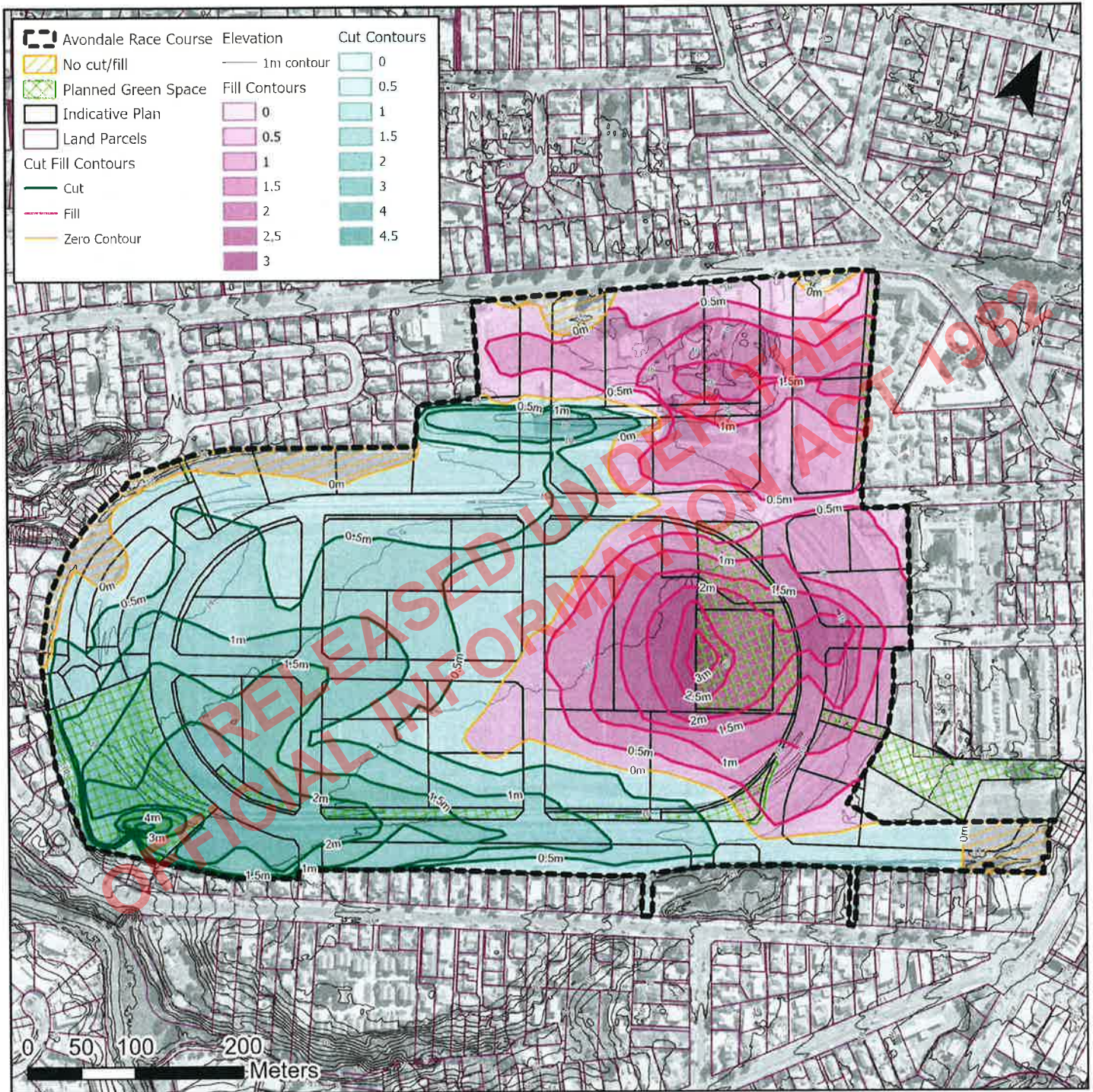


Figure 2b: Cut/Fill Depth Contours

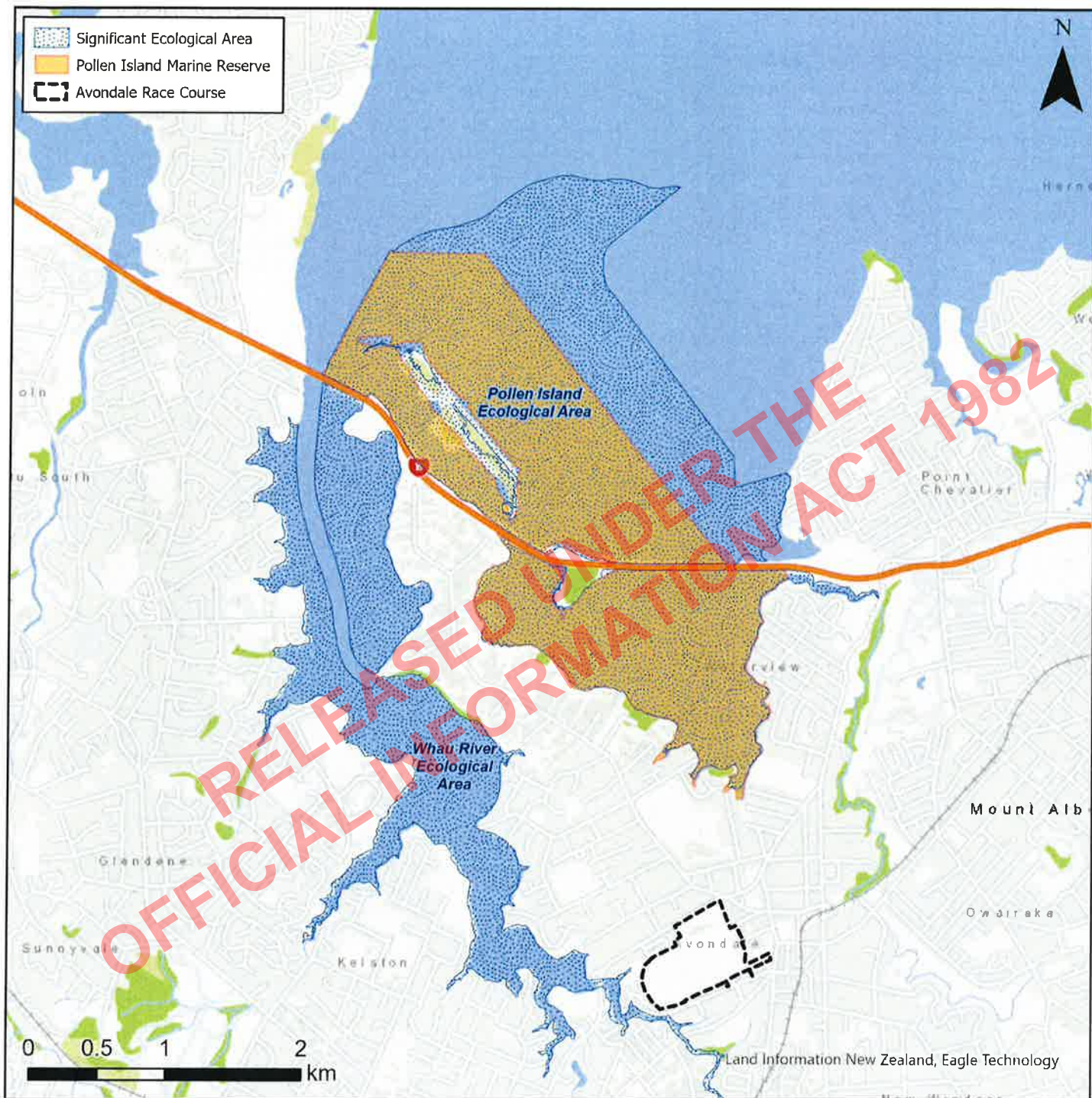


Figure 3: Whau River and Pollen Island

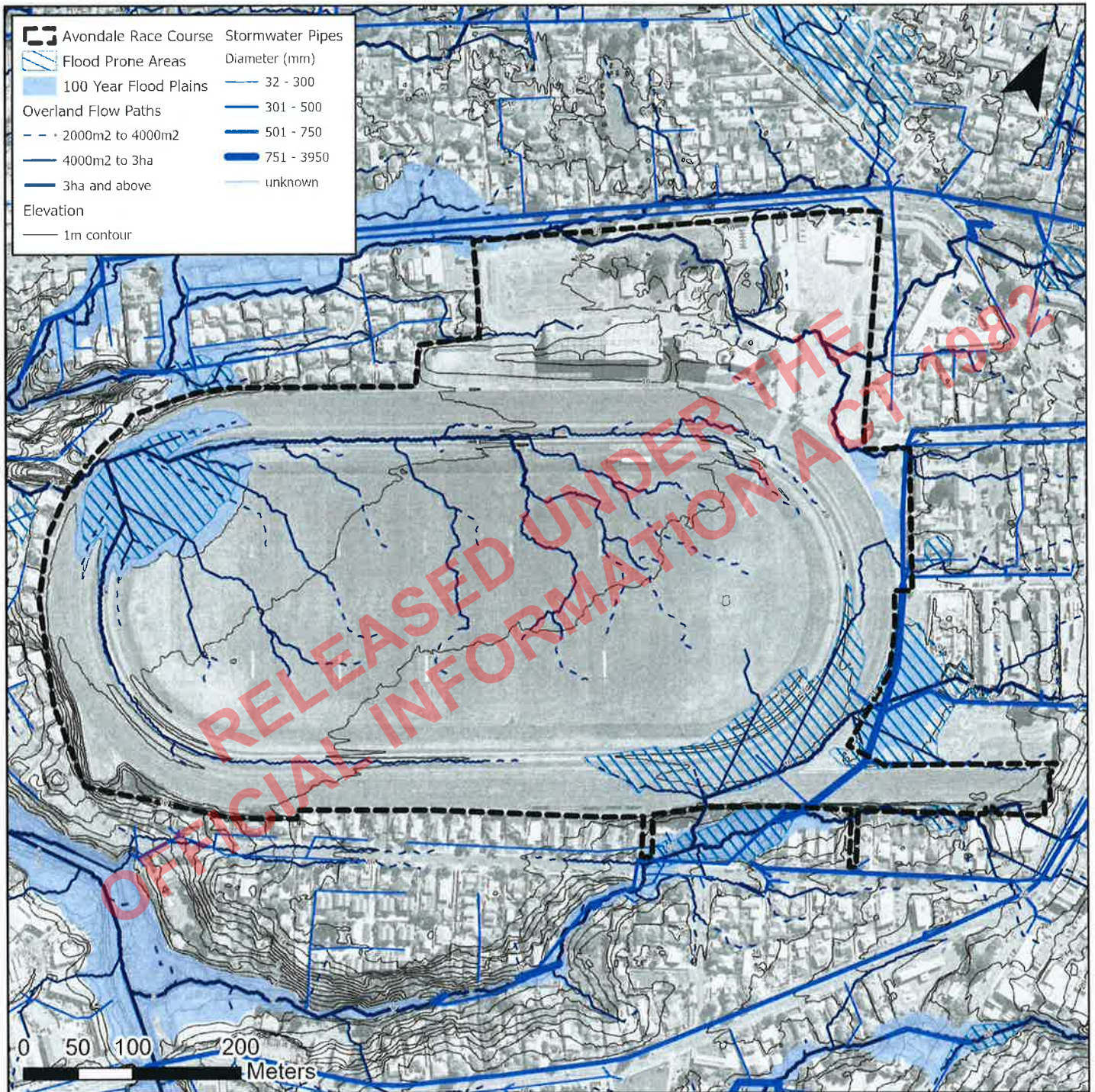


Figure 4: Existing Drainage

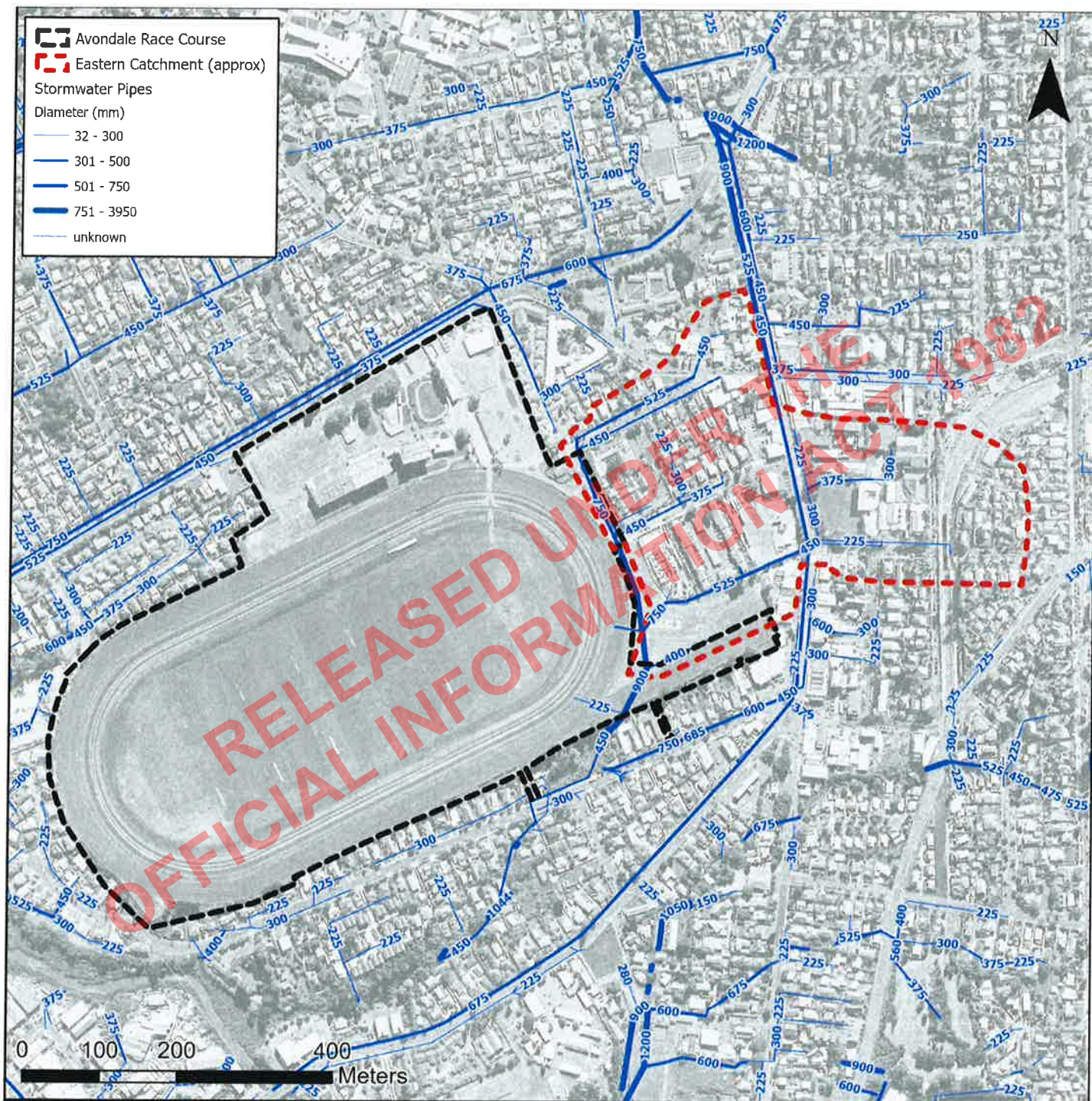


Figure 5: Eastern Catchment and Pipelines

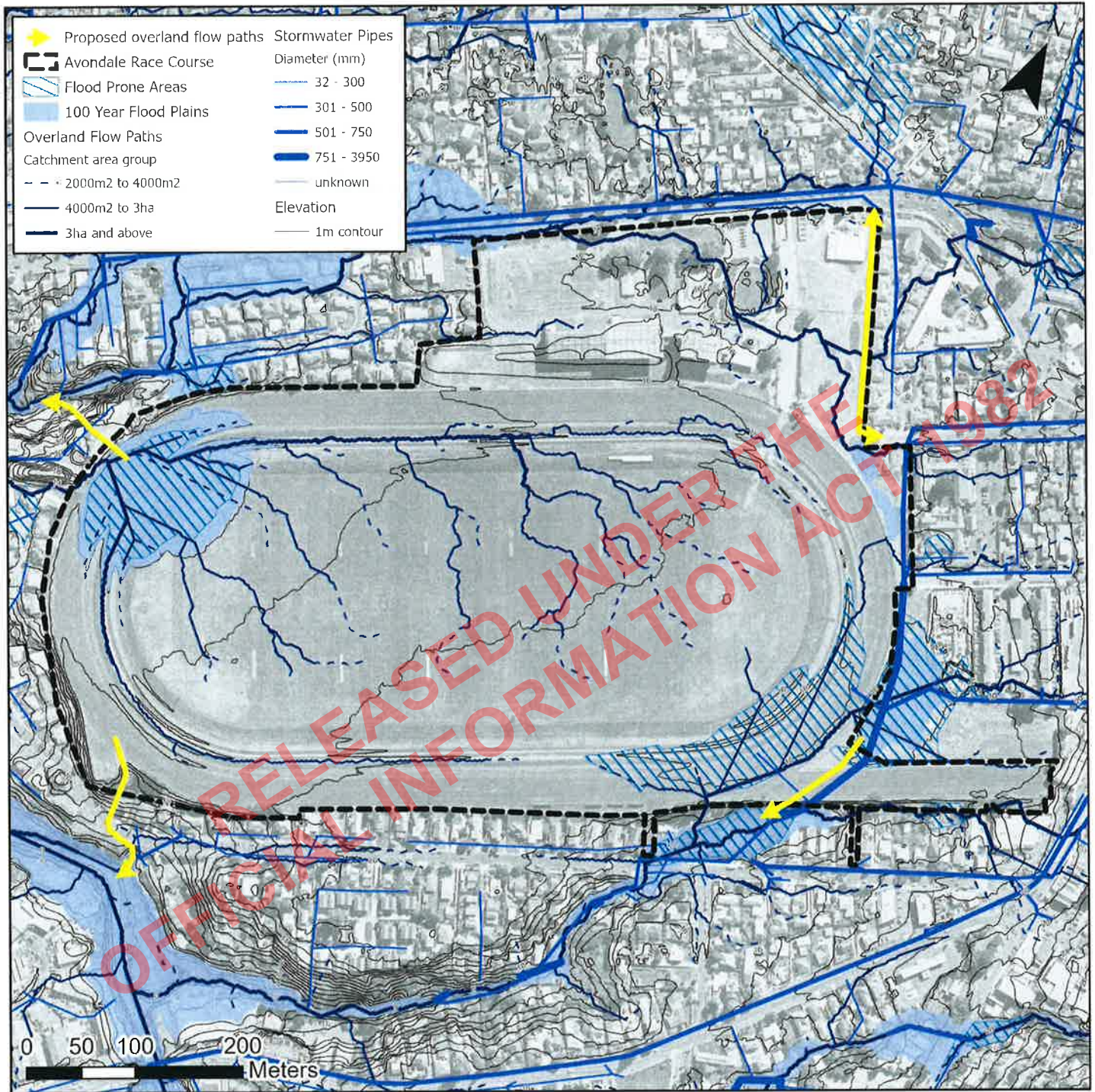


Figure 6: Proposed Overland Flowpath

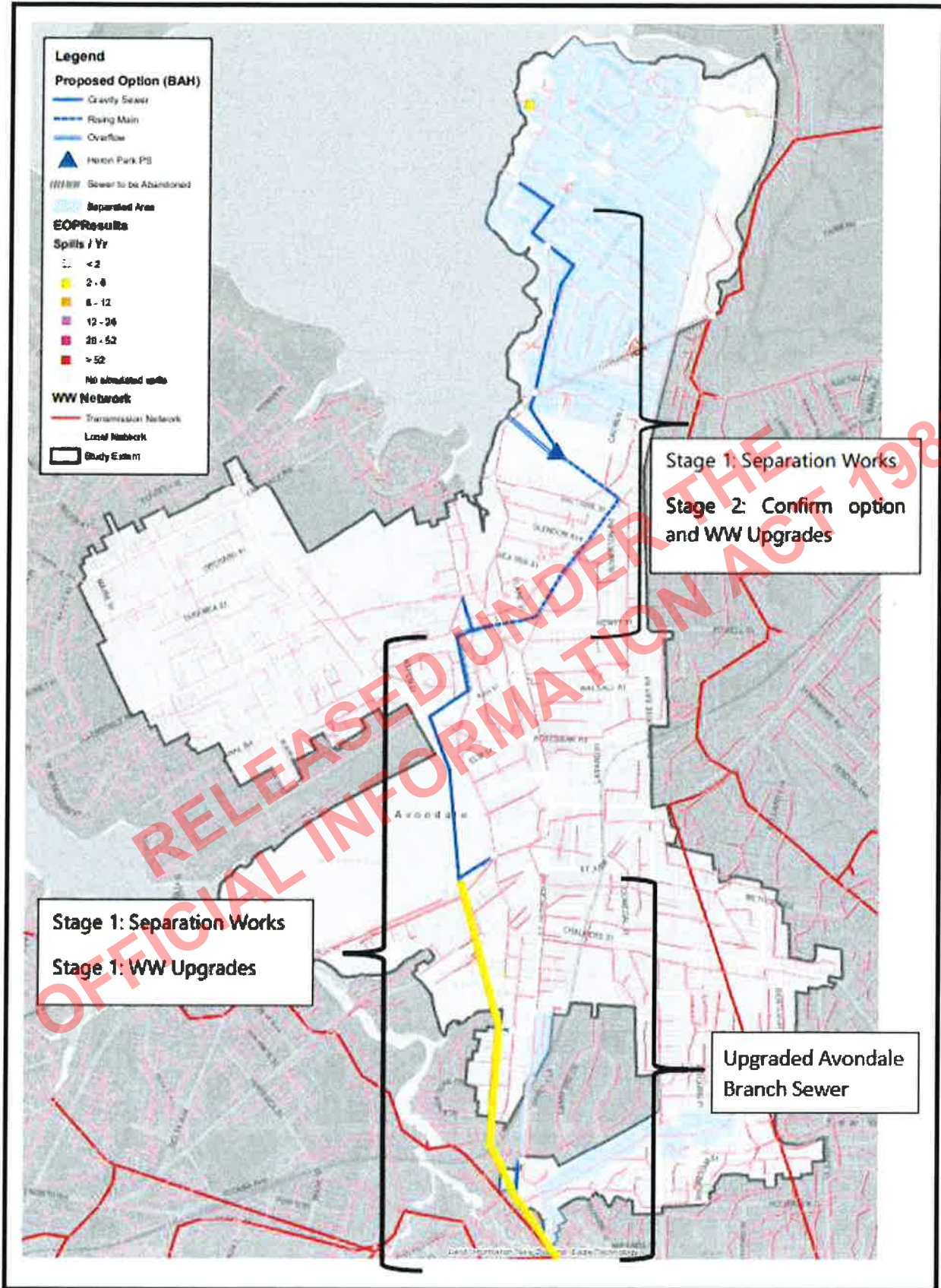


Figure 7: Avondale Branch Sewer Upgrade Plan

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Figure 8: Water Supply Network within Study Area (Pipe Network Source: Watercare GIS, November 2020)

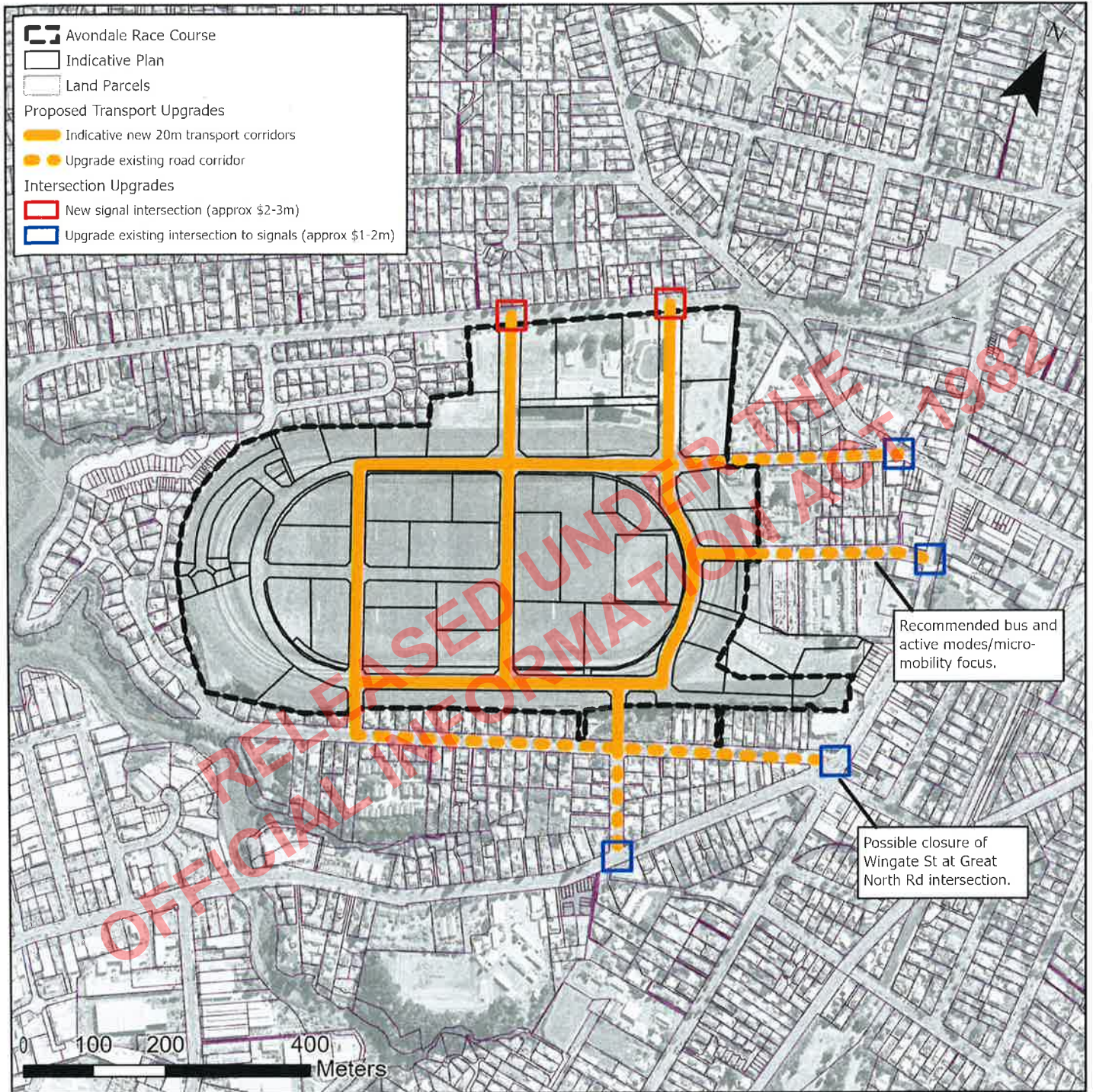


Figure 11: Transport Upgrades

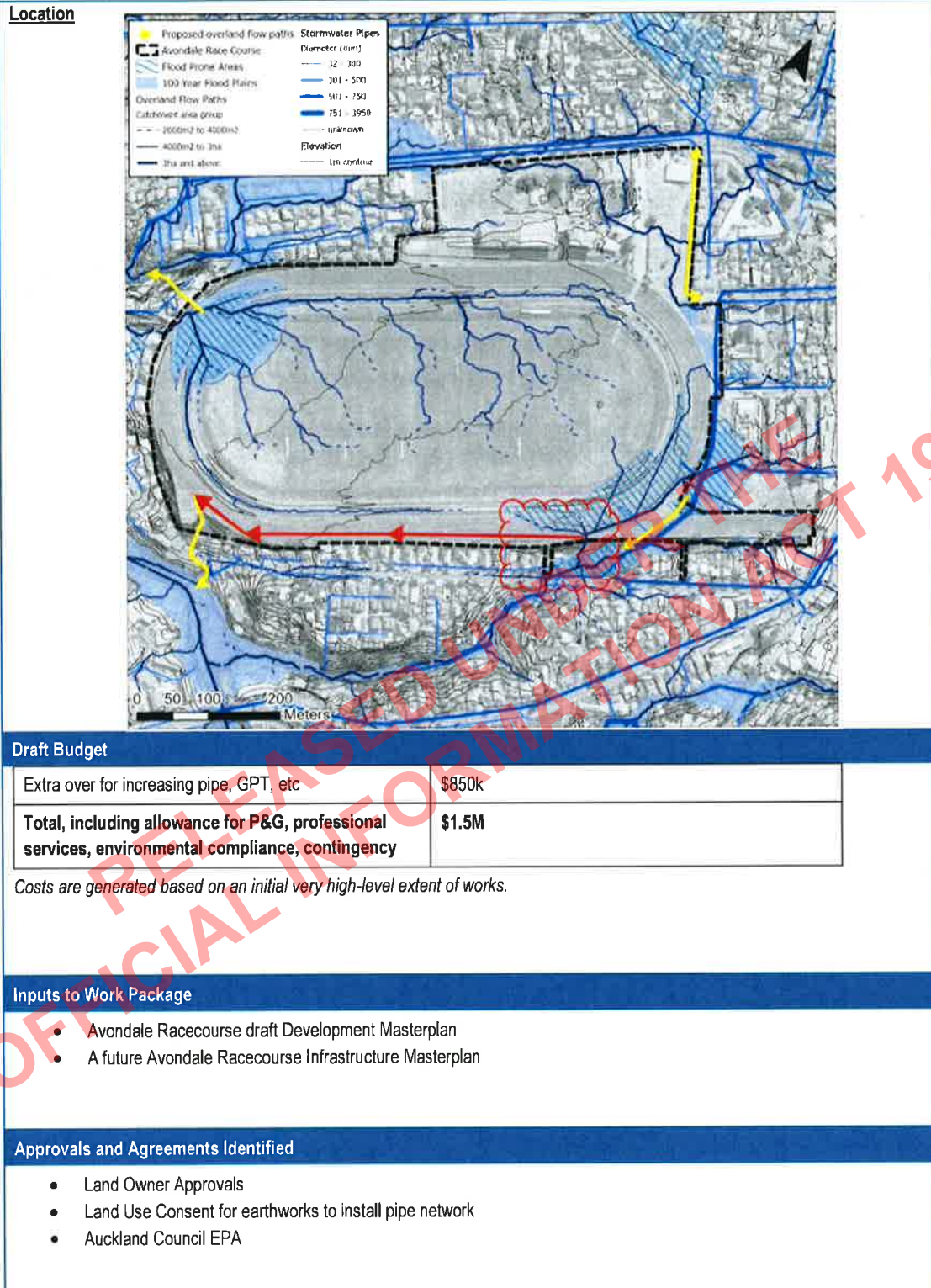
Appendix B: Two page summaries

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Two-page summary

	Avondale Racecourse Development Infrastructure Assessment		Rev A
Type	Divert Flows from Wingate Reserve to New Outlet	Project Budget Est: \$1.5M	
A: Physical Work Package Description:			
<p>This work package identifies the upgrade required to improve the resilience of the south-east Avondale Racecourse Development and existing areas east of the racecourse that are currently affected by flooding:</p> <ul style="list-style-type: none"> There is an existing 900 mm dia public stormwater pipeline that crosses the eastern side of the racecourse that discharges into an open watercourse within Wingate Reserve. It is proposed to divert the Wingate Street catchment immediately east of the Racecourse to the new outfall in the south-western corner of the site that is discharging into the Whau River. <p>Identified Physical Works and Purpose</p> <ul style="list-style-type: none"> Increases in pipe sizes to a proposed stormwater pipe within the southern side of the racecourse over a length of 700m Increase in eight manhole sizes from 1200dia to 1800 dia Discharge pipe to increase from 1,050 dia. to 1,350 dia. Additional cost of larger manholes and outlet structure Allow for a gross pollutant trap on this pipeline as there is currently little if any stormwater treatment in the eastern catchment <p>Design Considerations</p> <ul style="list-style-type: none"> Confirm proposed development and surrounding area catchment flows Options analysis Hydraulic modelling <p>Interested Parties Identified</p> <ul style="list-style-type: none"> Auckland Council as Regulatory Authority and Local Board Auckland Transport for work in the local road corridor Private property owners adjacent to upgrade Healthy Waters as an asset owner 			

Two-page summary



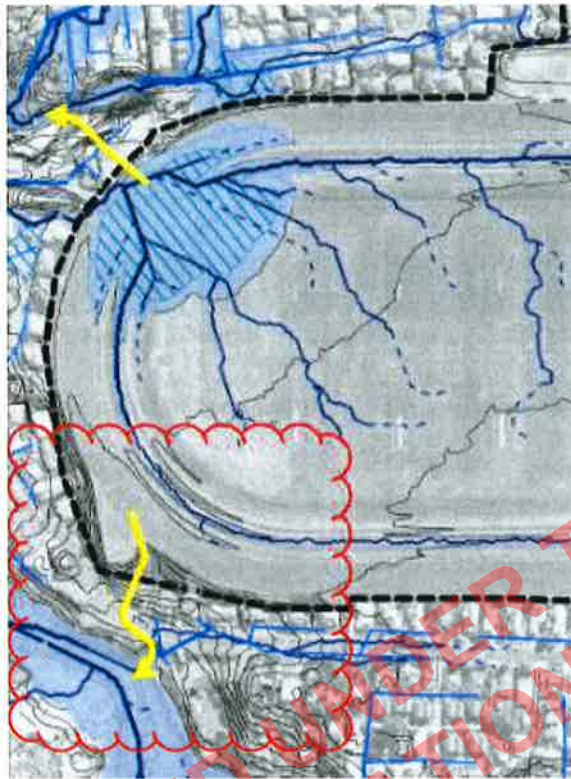
Two-page summary

	<h3>Avondale Racecourse Development Infrastructure assessment</h3>		Rev A
Type	Stormwater Network Discharge Pipe & Outlet Structure	Project Budget Est: \$1.2M	
A: Physical Work Package Description:			
<p>This work package identifies the work required to discharge the Avondale Racecourse Development Stormwater to the Whau River.</p>			
<ul style="list-style-type: none"> ■ It is proposed to install a new single discharge pipe outlet into the Whau River to cater for the stormwater for all of the Racecourse site. ■ There is a significant drop from the Racecourse level down to Wingate Street in the order of 7 m, and again from Wingate Street to the Whau River. Flow velocities in stormwater pipes will be very high due to the pipes being laid at gradients of about 25%, and special pipe materials (e.g. HDPE) will be required to restrict scour of the pipes. ■ Design of a specific reinforced concrete structure will be required to dissipate energy and prevent scour at the outlet. 			
<p>Identified Physical Works and Purpose</p>			
<ul style="list-style-type: none"> ■ 100 m of 1050 diameter HDPE pipe and three 2.0 m diameter manholes ■ Reinforced concrete impact basin and rock protection to stream banks 			
<p>Design Considerations</p>			
<ul style="list-style-type: none"> ■ Confirm proposed development catchment flows ■ Options analysis ■ Hydraulic modelling 			
<p>Interested Parties Identified</p>			
<ul style="list-style-type: none"> ■ Auckland Council as Regulatory Authority and Local Board ■ Auckland Transport for work in the local road corridor ■ Private property owners adjacent to upgrade ■ Healthy Waters as an asset owner 			

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Two-page summary

Location



Draft Budget

Outfall Pipe	\$400k
Outfall Structure	\$250k
Total, including allowance for P&G, professional services, environmental compliance, contingency	\$1.2M

Costs are generated based on an initial very high-level extent of works.

Inputs to Work Package

- Avondale Racecourse draft Development Masterplan
- A future Avondale Racecourse Infrastructure Masterplan

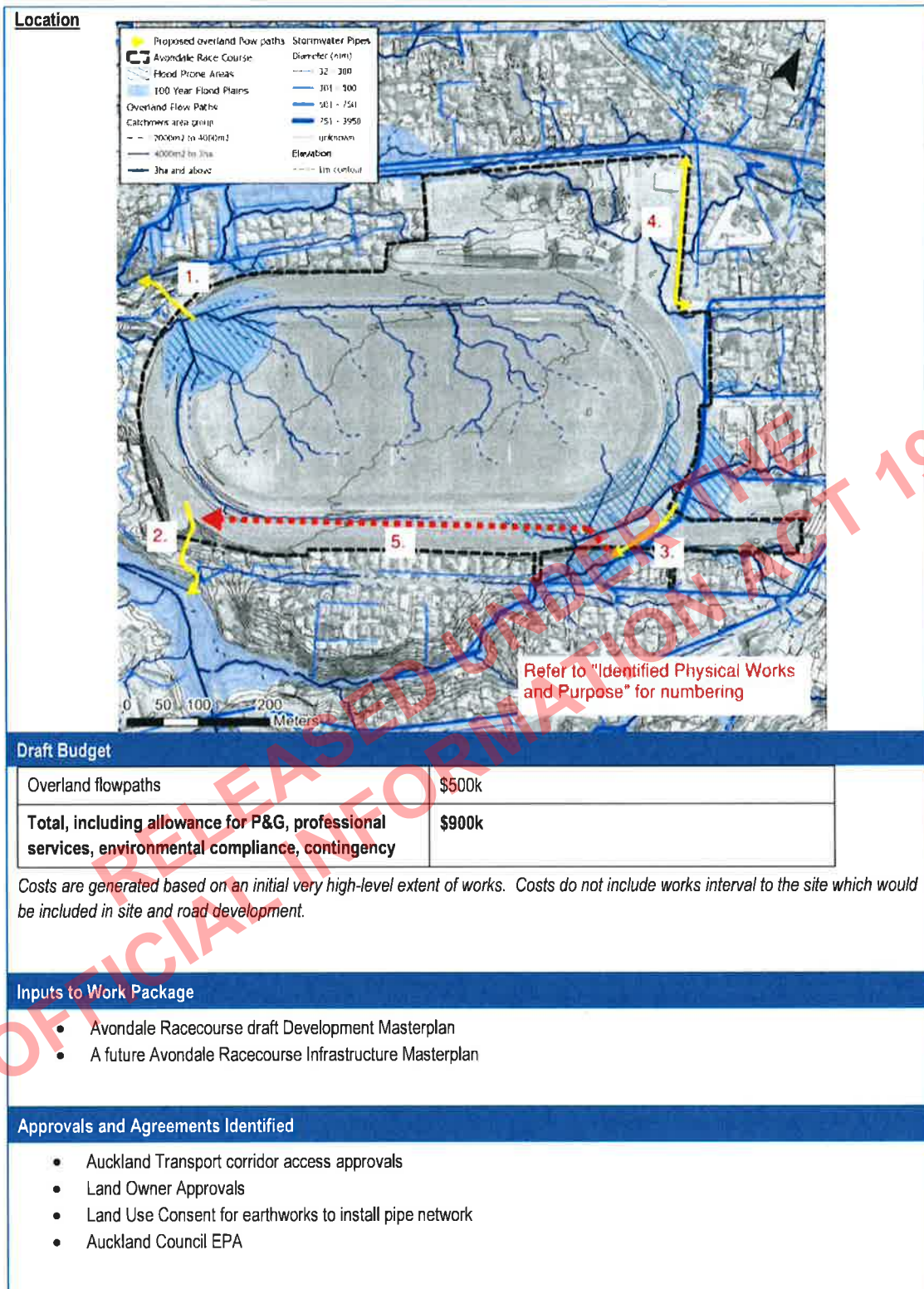
Approvals and Agreements Identified

- Auckland Transport corridor access approvals
- Land Owner Approvals
- Land Use Consent for earthworks to install pipe network
- Auckland Council EPA

Two-page summary

Avondale Racecourse Development Infrastructure Assessment		Rev A
Type	Diverting Overland Flow Paths	Project Budget Est: \$0.9M
A: Physical Work Package Description:		
<p>This work package identifies the specific works will be required external to the Avondale Racecourse Development to cater for overland flows:</p> <ul style="list-style-type: none"> ■ Auckland Council GIS maps indicate two overland flowpaths from the site, one at the north west and the other at the south east ends of the site. ■ To improve the resilience of the site and to not have any adverse effects on the surrounding properties it is proposed to adjust existing overland flow paths. <p><u>Identified Physical Works and Purpose</u></p> <ol style="list-style-type: none"> 1. Adjustments to the existing overland flow path at the north western boundary where provision has been made to take overland flows through the Tamora Lane Development in order to prevent it running through residential properties. 2. Slope protection at the new outfall location 3. Reshaping of Wingate Street to provide for the overland flow from the racecourse and maintaining a flow path from the eastern side of the Racecourse and the properties to the east draining to Wingate Reserve. 4. Providing an overland flow path in the form of a concrete path along the eastern boundary between Ash Street and Elm Street to protect the existing adjacent retirement Village buildings 5. A further option is to divert flow that currently enters Wingate Reserve and provide a new overland flow path through the racecourse land to the new outfall location. <p><u>Design Considerations</u></p> <ul style="list-style-type: none"> ■ Confirm proposed development overland flow paths ■ Options analysis ■ Hydraulic modelling <p><u>Interested Parties Identified</u></p> <ul style="list-style-type: none"> ■ Auckland Council as Regulatory Authority and Local Board ■ Auckland Transport for work in the local road corridor ■ Private property owners adjacent to upgrade ■ Healthy Waters as an asset owner 		

Two-page summary

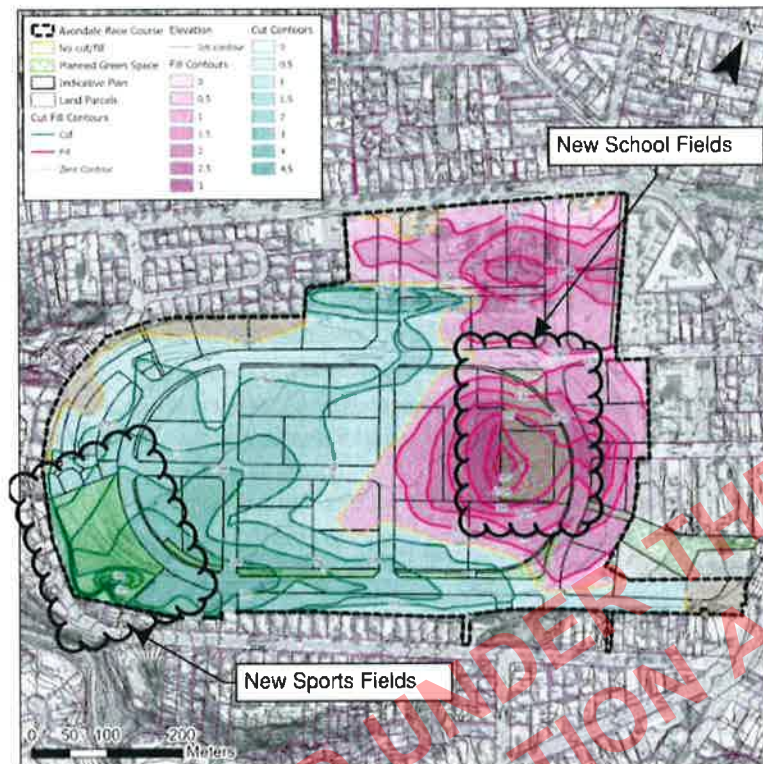


Two page summary

Avondale Racecourse Development Infrastructure Assessment		Rev A
Type	Land Contamination	Project Budget Est: \$18.3M
A: Physical Work Package Description:		
<p>This work package identifies the works required contain the risk associated with contaminated land on Avondale Racecourse development:</p> <ul style="list-style-type: none"> ■ The previous uses of the land indicate that there may be areas of contamination due to storage of hazardous materials and more widely from pesticides and herbicides associated with a grass track and sports fields. The degree of contamination is assumed to be generally suitable for on-site containment. ■ The proposed earthworks approach is to generally cut on the western part of the development and fill on the east. ■ New playing fields and school fields provide an opportunity to excavate existing clean soils and place the material with lower concentrations of contaminants on site and cap it with clean material. <p>Identified Physical Works and Purpose</p> <ul style="list-style-type: none"> ■ Removal and relocation of contaminated fill. ■ Investigations are required to confirm the extent of contamination and the approach to be used for management of contaminated soils that may be present on site. ■ The site is very flat so it will be necessary to reshape the land to provide positive falls to drain the site. The following assumptions have been made for dealing with contamination on the Racecourse site: <ul style="list-style-type: none"> ■ The top 300mm of the site is contaminated i.e. 107,000 m³ ■ 15,000 m³ required to go offsite to a certified landfill ■ 15,000 m³ from roads and hardstand areas to be used in road subgrades ■ 77,0000 m³, the balance, to be disposed of on-site beneath fields and parks <p>Design Considerations</p> <ul style="list-style-type: none"> ■ Confirm extent of earthworks ■ Options analysis <p>Interested Parties Identified</p> <ul style="list-style-type: none"> ■ Auckland Council as Regulatory Authority and Local Board ■ Auckland Transport for work in the local road corridor ■ Private property owners adjacent to upgrade ■ Auckland Council Contaminated Land Section 		

Two page summary

Location



Draft Budget

Contamination	\$10.3M
Total, including allowance for P&G, professional services, environmental compliance, contingency	\$18.3M

Costs are generated based on an initial very high level extent of works and standard rates for pipework in an urban area. It is assumed the level of contamination is generally low and on-site containment is practicable.

Inputs to Work Package

- Avondale Racecourse draft Development Masterplan
- A future Avondale Racecourse Infrastructure Masterplan

Approvals and Agreements Identified

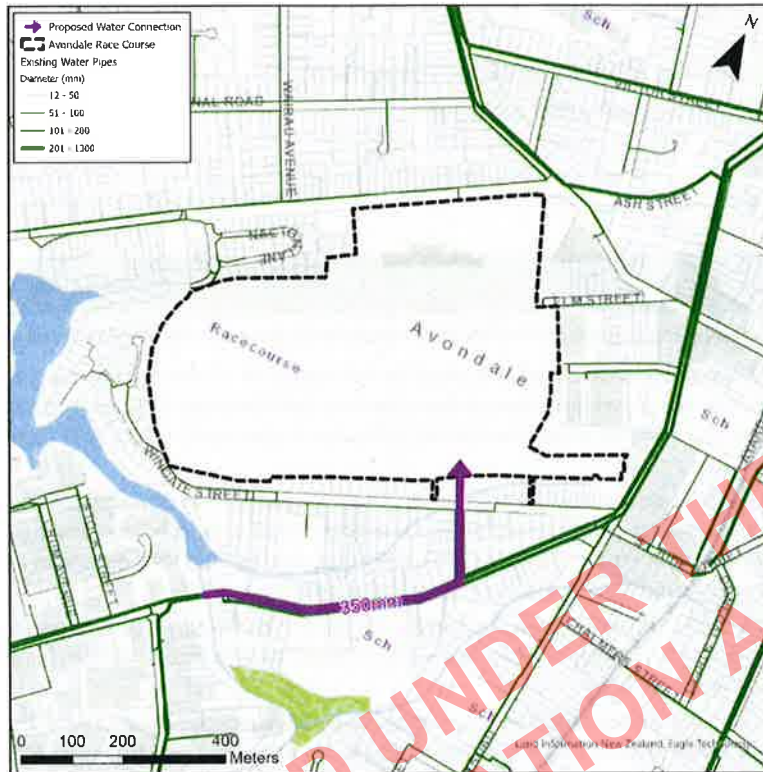
- Auckland Transport corridor access approvals
- Land Owner Approvals
- Auckland Council contaminated land consents.

Two page summary

Avondale Racecourse Development Infrastructure assessment		Rev A
Type	Water Supply Network	Project Budget Est: \$1.8M
A: Physical Work Package Description:		
<p>This work package identifies the upgrade required to boost supply to the Avondale Racecourse development</p> <ul style="list-style-type: none"> ■ Beca's Avondale Development network assessment anticipated that many of the 100 mm diameter water supply mains within the area will require upgrades to meet future demand requirements but confirmation with WSL was required. This two page summary scope does not include any works associated with distribution of water supply with the 34.77 ha racecourse development area. ■ WSL have done a high level assessment of the water supply effect of an additional 2600 household units situated on the racecourse – that is how water could be supplied from the transmission network to the overall racecourse development. WSL identified that a supply along an existing 250 dia line from a Bulk Supply Point on Great North Road to the south west of the racecourse, running along Great North Road to Racecourse Parade would be undersized ■ Options for the water supply may include a new dedicated 250 OD pipe from the BSP to the racecourse development via Larch St or upgrading the existing 250 OD pipe to 350 OD and a short extension down Racecourse Parade. The price included here is for a BSP and 1350m of 250 OD pipe ■ WSL has identified the current pressure in the network is about 70m but this is expected to reduce as WSL is undertaking pressure management within the area. Hydrant pressure and flow testing will be required to inform design. ■ Some other pipe renewal works and connections may be required. 61% of the pipework in this area may require renewal by 2040. <p>Identified Physical Works and Purpose</p> <ul style="list-style-type: none"> ■ Upgraded Bulk Supply Point on Great North Road ■ 1350 m of 250 OD pipe <p>Design Considerations</p> <ul style="list-style-type: none"> ■ Confirm proposed development yield and demand on water supply ■ Options analysis ■ Hydraulic modelling <p>Interested Parties Identified</p> <ul style="list-style-type: none"> ■ Watercare as asset owner ■ Auckland Council as Regulatory Authority and Local Board ■ Auckland Transport for work in the local road corridor ■ Private property owners adjacent to upgrade 		

Two page summary

Location



Draft Budget

720m of 350 ID water supply	\$1.0M
Total, including allowance for P&G, professional services, environmental compliance, contingency	\$1.8M

Costs are generated based on an initial very high level extent of works and standard rates for pipework in an urban area.

Inputs to Work Package

- Avondale Racecourse draft Development Masterplan
- A future Avondale Racecourse Infrastructure Masterplan
- Watercare water hydraulic model

Approvals and Agreements Identified

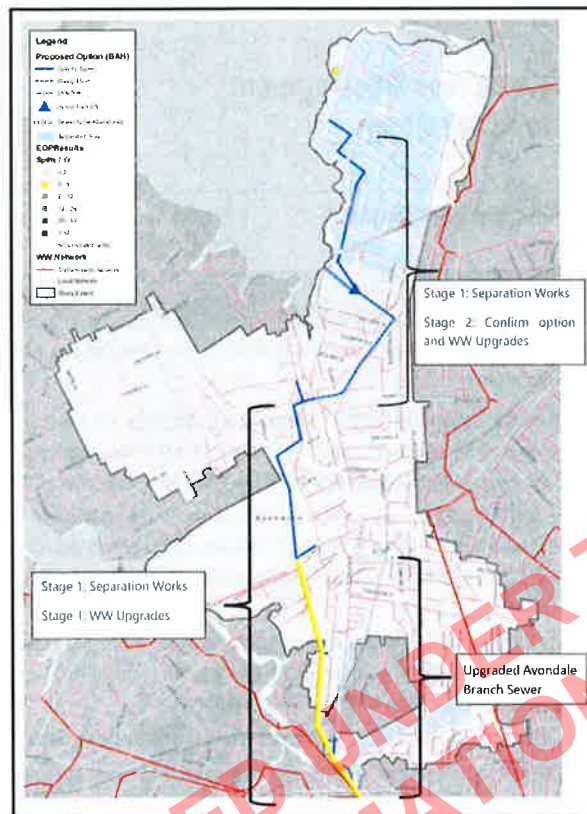
- Auckland Transport corridor access approvals
- Land Owner Approvals
- Land Use Consent for earthworks to install pipe network
- Auckland Council /Watercare EPA
- Watercare works over consent
- Watercare/Kainga Ora funding agreement

Two page summary

	Avondale Racecourse Development Infrastructure assessment		Rev A
Type	Wastewater Trunk Network Upgrade	Project Budget Est: \$6.0M	
A: Physical Work Package Description:			
<p>This work package identifies the upgrade required to the Avondale Branch Sewer project to allow for new discharges from the Avondale Racecourse development</p> <ul style="list-style-type: none"> ■ High level capacity checks of the network indicate that 33% of the network downstream of the Kainga Ora site will have insufficient capacity following the proposed development. There is a frequent overflow (predicted to occur every week to two week frequency on average) from the existing wastewater network in the north eastern corner of the racecourse site ■ A Watercare designation sits to the south east of the site (10 Larch St) to allow for the construction of a pump station and pipeline associated with the wider Central Interceptor programme. If WSL do not go ahead with the new pump station the two existing pump stations on Ash and Wingate St will also require upgrades to provide sufficient capacity to accommodate development flows. ■ WSL have identified several options for improving wastewater capacity in the area. Common to several of the options is construction of a new Avondale BS that drains south to a new branch line that will connect to CI – an early project has been promulgated to construct a 900 dia sewer from Victor Ave to the CI connector pipe. ■ The new pipe levels for the Avondale BS are close to those required to drain the racecourse development by gravity ■ Staging of the racecourse development should consider whether the Avondale BS is ready to receive flows from the racecourse development, or it may be necessary to provide temporary storage and/or a pump station ■ Some pipe renewal works may be required. 76% of the pipework in this area may require renewal by 2040. <p>Identified Physical Works and Purpose</p> <ul style="list-style-type: none"> ■ Watercare to install new pump station at 10 Larch St ■ Upgrade 1600 m of the new Avondale Branch Sewer from 900 dia to 1050 dia micro tunnel pipe from the racecourse to the entry to Pipe 6 <p>Design Considerations</p> <ul style="list-style-type: none"> ■ Confirm proposed development yield and discharge flow rates for wastewater ■ Options analysis ■ Hydraulic modelling <p>Interested Parties Identified</p> <ul style="list-style-type: none"> ■ Watercare as asset owner ■ Auckland Council as Regulatory Authority and Local Board ■ Auckland Transport for work in the local road corridor ■ Private property owners adjacent to upgrade 			

Two page summary

Location



Draft Budget

Upgrade Wastewater - 1600m long 1050 ID pipe	\$3400k
Total, including allowance for P&G, professional services, environmental compliance, contingency	\$6.0M

Costs are generated based on an initial very high level extent of works and standard rates for pipework in an urban area.

Inputs to Work Package

- Avondale Racecourse draft Development Masterplan
- A future Avondale Racecourse Infrastructure Masterplan
- Watercare wastewater hydraulic model

Approvals and Agreements Identified

- Auckland Transport corridor access approvals
- Land Owner Approvals
- Land Use Consent for earthworks to install pipe network
- Auckland Council /Watercare EPA
- Watercare works over consent
- Watercare/Kainga Ora funding agreement