

Infrastructure Report

Spencerville Road, Brooklands

Whisper Creek - Proposed Subdivision

19432 Rev4
May 2025



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PLANNING SURVEYING ENGINEERING



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Revision History

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1. GENERAL

1.1. INTRODUCTION

This infrastructure report addresses servicing of the proposed residential development at 174, 220 & 240 Spencerville Road, 144 & 156 Turners Road and 21 & 24 Teapes Road, Spencerville.

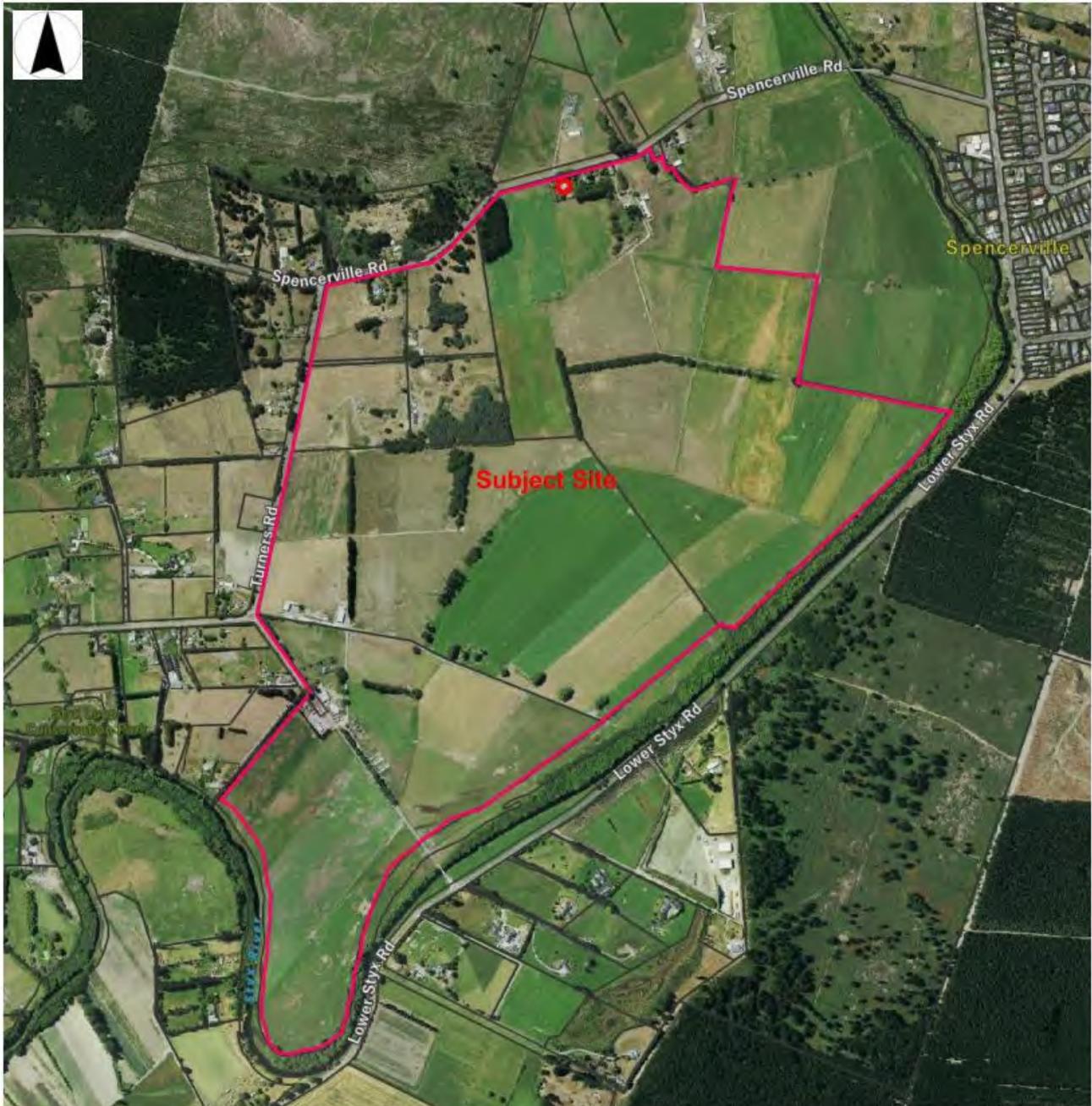


Figure A. Location Plan.

The total area of the plan change is approximately 170.3ha. Following approval of the plan change, it is proposed to subdivide the site into 800 residential lots, associated roads, balance land and reserves.

This report addresses the servicing of the proposed subdivision including stormwater treatment, storage, disposal and reticulation, sewer reticulation, water supply, earthworks, groundwater, roading, pavements, power and telecom.

Consultation will be undertaken with Orion and Enable to ensure the coordinated provision of these services.

A geotechnical investigation has shown that the soils are suitable for residential development, subject to standard land remediation and foundation design requirements. A copy of the Geotechnical Report is included with the application.

The design and construction of the proposed sub-division infrastructure will comply with the requirements of the Christchurch City Council (*Council*) standards.

1.2. SITE

The site has historically been used as a dairy farm and it continues to be grazed open pasture, along with four 4ha blocks located in the northeast corner, each of which contain a dwelling and garden curtilage. The current uses are best described as a small farm and lifestyle blocks.

The site is bounded by Spencerville Road to the north, Turners and Teapes Roads to the west, and the Styx River to the east and south.

The site has two distinct terrace levels, the lower level is along the edge of the river and is flood prone, and the upper level adjacent to the roads where the development is proposed.

The site is approximately 1km from Spencerville. Spencerville can be accessed east along Spencerville Road. Travelling west along Spencerville Road leads to Kainga and Chaney's.

There are seven houses and a number of farm buildings on the property. All of the farm buildings will be removed. Some housing may be retained.

Trees and fencing within the site will be removed along with other features such as silage pits.

Some years ago the site was identified by foreign investors as a potential golf resort and they were successful in obtaining a Specific Purpose Golf Resort Zone for the land. The existing zoning provides for residential housing, a hotel, apartments, a golf academy, a driving range, a golf course and a number of lakes woven into the golf course. The project eventually became commercially unfeasible and the site was on-sold. Please refer to Fig.B for the existing ODP of the area with the Golf Resort described.

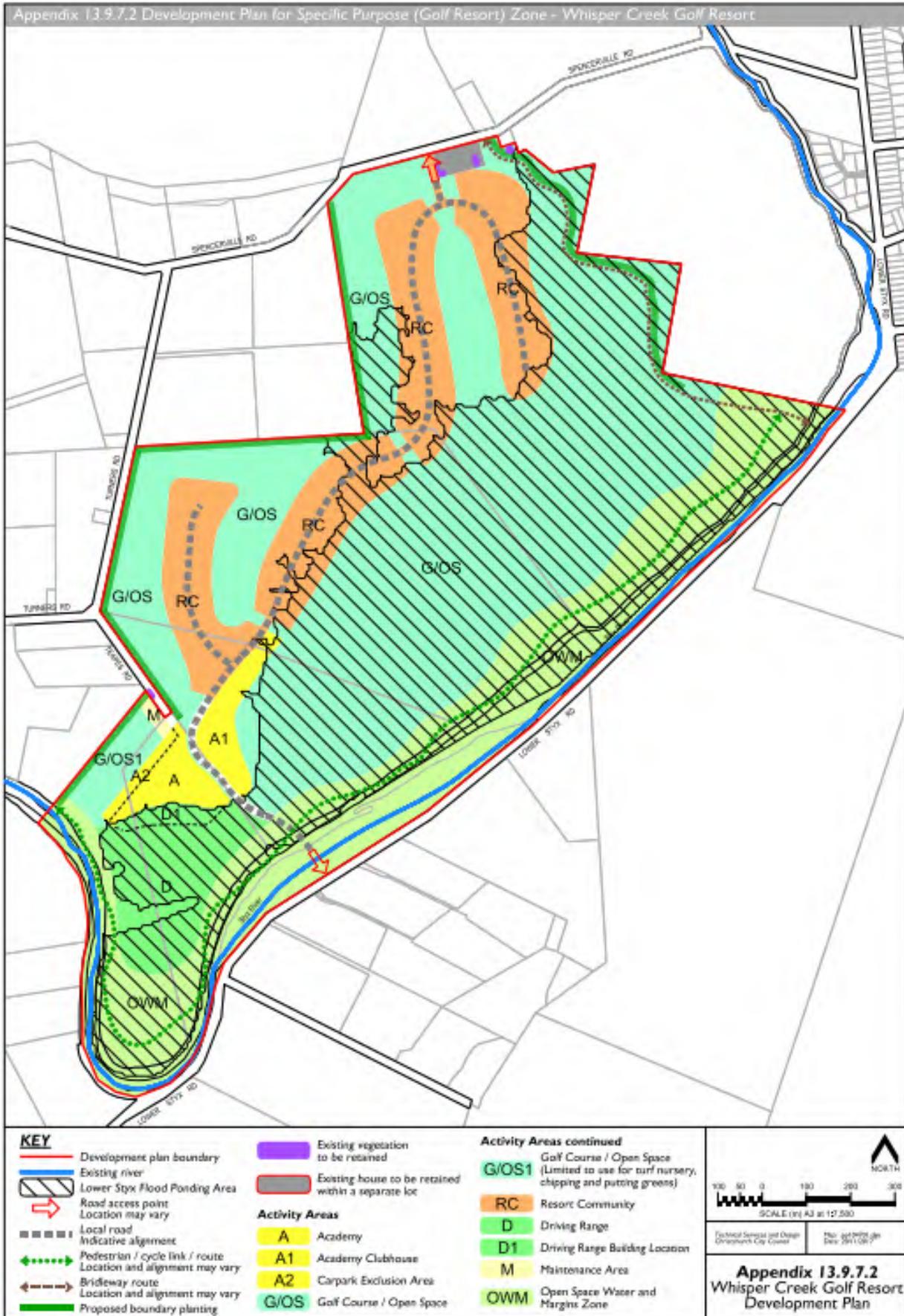


Figure B. Existing Outline Development Plan for the Golf Resort

2. SITE CONDITIONS

2.1. SOILS

The Canterbury Plains consist of intermingled alluvial and glacial fans composed of clays, silts, sands and graded combinations of these soils. Site investigations show a thin layer of topsoil overlying a layer of sand and silt to a depth in excess of 20m.

The soils have the potential to create a very good subgrade to the roads. Scala penetrometer tests have indicated that the minimum bearing capacity of 300kPa is reached at a depth of 500-800mm. Basic site compaction following the topsoil strip is expected to create the required bearing capacities at a shallower depth and meet the requirements of NZS 3604.

2.2. GROUNDWATER

The site is located over the unconfined aquifer system. The groundwater table was reached during the site investigations. Please refer to the Geotech report for interpolated and measured groundwater levels.

The Landtech Report provides a description and plan of the depths to groundwater across the development area. Unsurprisingly, the depth to groundwater on the lower terrace is shallow whilst the higher terrace provides for a greater depth. This depth will affect how we develop basins, wetlands and underground services. It is expected that the installation for services will require dewatering. This will entail obtaining the necessary consents from Environment Canterbury. Dewatering consents are common requirements for large-scale subdivision and construction projects and as such there are proven solutions to manage risks to ground water quality.

2.3. GEOTECHNICAL ASSESSMENT

An initial geotechnical investigation was undertaken by Tonkin and Taylor Ltd as part of an earlier subdivision application which was not progressed. Further investigation was undertaken by Landtech Consulting Ltd for the entire site to inform this plan change application.

The geotechnical investigations have concluded the following:

- There is a low liquefactive potential for a large portion of the site due to the nature of the soils and the level of the groundwater. (TC2)
- There is no Technical Category 3 land within the project area
- Proximity to existing fault lines is not of concern to this development.

Please refer directly to the Geotechnical Reports for detailed information a summary table that best describes the liquefactive nature of the land to be developed, is shown in Fig.C.

Project	Address	Turners Road & Spencerville Road, Spencerville, Christchurch
	Consenting Authority	Christchurch City Council
	Proposed Development	Land zoning plan change
	MBIE Technical Category	N/A - Rural and Unmapped
	Mapped Liquefaction Vulnerability	Possible
Preliminary Liquefaction Analysis & Site Assessment	Modelled vertical land settlement (SLSA)	<5mm to 20mm (TC2)
	Modelled vertical land settlement (SLSB)	5mm to 40mm (TC2)
	Modelled vertical land settlement (ULS)	15mm to 70mm (TC2)
	Global lateral movement category	Minor (0mm to 100mm at ULS, TC2)
	Lateral stretch category	Minor (0mm to 100mm at ULS, TC2)
	Provisional Technical Category and Liquefaction Vulnerability	TC2, Medium
	Site Subsoil Classification	Class D - Deep or Soft Soil Sites
	Geotechnical Hazard Assessment	Flood Management Area, Subsidence/slippage hazard as per TC2
	Groundwater Depth	Between 0.22m and 1.95m below ground level, with a median groundwater depth of 1.0m.

Figure C. Geotechnical Data

2.4. CONTAMINATION ASSESSMENT

A Preliminary Site Investigation in terms of the National Environmental Standards was undertaken by Tonkin and Taylor Ltd in 2017. That report identified potential HAIL activities requiring further investigation at the 240 Spencerville Road address.

A Detailed Site Investigation and Remediation Action Plan was undertaken in 2018 for 240 Spencerville Road by Malloch Environmental.

This report recommends remediation involving excavation and disposal to an approved off-site facility of the contaminated soils. The kerosene and diesel tanks will be removed prior to the issue of title. Removal of the contaminated soil near the existing house would not be required unless there is a new building or the site is being redeveloped.

A third report was commissioned from Sephira Environmental Ltd to carry out a Preliminary Site Investigation to cover the entire development site. That report addressed the following properties:

- 144 Turners Road – Part Lot 30 DP 2773, RS 19765, Lot 29 DP 2773, Lot 2 DP 4047, Lot 1 DP 4047
- 156 Turners Road – Lot 4 DP 76333
- 176 Turners Road – Lot 3 DP 76333
- 174 Spencerville Road – Lot 1 DP 76333

- 220 Spencerville Road – Lot 2 DP 76333
- 240 Spencerville Road – Part Lot 2 DP 5889

That report stipulated the need for a Detailed Site Investigation:

A Detailed Site Investigation (DSI) with discrete soil sampling will be required to determine whether the HAIL activities have caused significant contamination. Likely contaminants of concern include heavy metals, organochlorine pesticides, organonitrogen pesticides, organophosphorus pesticides, polycyclic aromatic hydrocarbons, petroleum hydrocarbons and asbestos.

Whilst there appears to be contamination on the site, it is in small amounts and will be dealt with simply by removing it to licenced fills. The site will then be validated as being suitable for both construction activity and residential use.

2.5. FLOODING

Please refer to Appendix G for a Flooding Plan describing the various Flood Management Areas, the general contour of the site, and the area outside the Flood Management Area.

Consultation has been carried out with the Council regarding the effects of various flood scenarios on the property. The area is within the Fixed Minimum Floor Level Overlay. This has a minimum required floor level of 12.3m. This level is an accepted standard but modelling undertaken by the Council has set a more robust set of circumstances where the minimum floor level shall be the highest of:

- Flooding predicted to occur in a 0.5% AEP (1 in 200--year) rainfall event concurrent with a 5% AEP (1 in 20--year) tidal event, including 1 metre sea level rise plus 400mm freeboard, as predicted by the relevant Council model and version identified in Table 5.4.1.1a; or
- Flooding predicted to occur in a 0.5% AEP (1 in 200-year) tidal event concurrent with a 5% (1 in 20-year) rainfall event, including 1m sea level rise plus 400mm freeboard, as predicted by the relevant Council model and version identified in Table 5.4.1.1a; or
- 12.3 metres above Christchurch City Council Drainage Datum.

The Council flood modelling has determined that the critical flood level is 12.09m and this is the level that will be used on this development. Final flood levels are 400mm higher than this at 12.49m. From this we have determined a minimum building platform level of 12.34m to ensure a standard NZBC foundation design will achieve a minimum FFL.

Flooding of roads should also be taken into account. The road network will be designed to function as secondary flow paths in high rainfall events, whilst remaining safely navigable by vehicles. As such, road levels below the level of say 12.0 should be avoided in the subdivision design, that being approximately 100mm below the critical flood level.

Further consultation has been undertaken with Council as to the proposed updating of the flood model. The following response has been received.

“Currently projecting maybe mid-year (for the model to be completed), but the calibration on this one is quite complex with the Waimakariri groundwater interactions, so until we’re through that obstacle, the timeframe will remain quite unclear. I’d guess that later in the year would be more realistic.”

The potential outcomes from this model cannot be undertaken at this time. Further consideration into flood levels will need to be reviewed but for the purposes of this application the current data is being applied.

There will need to be significant earthworks across the site to ensure that the effects of flooding are mitigated. These earthworks will include the shaping of roads to drain off the site to the river. Additional soil may also be imported to the site or excavated from the lower terrace and used to elevate building sites.

In conclusion, the Council’s flood model is, appropriately, based on a number of conservative assumptions relating to a 1 in 200 year rainfall event that coincides with a 1 in 20 year high tide event, that in turn coincides with a 1m increase in sea level, with a further allowance of 400mm freeboard. The compounding effects of these risk assumptions means that a high level of confidence can be placed on the required floor levels being clear of plausible flood events, even with a changing climate. The site is relatively low lying, with the ODP explicitly designed to focus urban development on the upper terrace area where flood risk is reduced. The flood risk across the upper terrace is able to then be effectively managed through first the bulk earthworks undertaken as part of the sub-division/land development phase to lift levels on the upper terrace, and secondly through the design of individual residential unit foundations, to ensure that internal floor levels are elevated above the design flood event. The road corridors will be designed to act as secondary flow paths in high rainfall events, whilst still being navigable by vehicles. Given these design solutions are well-proven and readily achievable, flood risk is not considered to be a barrier that would preclude the rezoning sought through the proposed plan change.

It should also be noted that these levels provided by Council are in terms of the Christchurch Drainage Datum. To be terms of the New Zealand Vertical Datum, a vertical correction of -9.377 needs to be applied for the levels on this site. This correction has been determined from the levels provided at CCBM42(EHD8) on Lower Styx Road.

- The flood level of 12.09 in CDD is 2.713 in NZVD.
- The Minimum Floor Level is 3.113 in NZVD
- The Minimum Site Level is 2.963 in NZVD
- The Minimum Road Level 2.613 in NZVD

3. EARTHWORKS

Earthworks associated with the sub-division will be managed under the usual suite of land use, sub-division, and regional consents. As is standard practice, these consents are expected to include a detailed set of conditions relating to dust management and erosion and sediment control. The basis of the sediment control will be the Environment Canterbury Guidelines and the discharge during construction will be dealt with in association with the overall discharge consent.

Earthworks will be carried out on the site to cut out the roads & basins and fill the low areas on the upper terrace. The intention will be to ensure that the site drains effectively and that all house sites are elevated above flood plains as mentioned in Sec.2.5 of this report. It is proposed that each site will have a building platform area filled to at least 12.34m RL. It is not intended that the whole of each new lot be filled to this level. The minimum floor level is 12.49m in CDD or 3.113 in NZVD.

Please refer to the attached Earthworks Plan in Appendix C that details the general expectation of cut and fill areas outside of the High Flood Hazard Area.

The site is adjacent to a Flood Ponding Area, located on the lower terrace. The site naturally slopes towards this Flood Ponding Area. No earthworks will occur in this area except for the potential excavation to create additional lakes for floodplain volume, the construction of pathways, landscaping and for the creation of naturalised streams and wetlands. There will also be pipework and trenching associated with the operation of these features.

The project will be designed to drain from the house sites directly to the road network and on to the stormwater basins. Any obvious potential flow channel features will be safely directed towards the roads, reserves or other safe secondary flow paths and then on towards the lower terrace and the Styx River. Essentially, the built-up building platforms will be protected from secondary flow.

Additional soils may be imported to the site to improve drainage and flood protection levels.

All topsoil on site will be retained and replaced on the land immediately following bulk earthworks. All disturbed topsoil will be resown with Council specification grass seed mixes. A balance of cut and fill will be maintained on site and removal of material from site will be kept to a minimum.

All bulk filling will be compacted in accordance with NZS 4431:2022. All fill testing will be carried out by an independent laboratory. The maximum depth of fill will be approximately 1.6m. The approximate volume of earthworks will be 260,000m³.

The liquefaction level of the site is considered to be TC2. No specific earthworks treatment is required for the development of the site. The underlying soils are considered suitable for use in bulk earthworks i.e. excavation of soils from the lower terrace to create basins is also appropriate for reuse on the upper terrace as fill for roads and building platforms.

4. STORMWATER

It is proposed that all stormwater from the proposed roads and the proposed new lots will drain via sumps and pipework to stormwater treatment and detention areas as shown on the attached plan in Appendix F.

It is proposed that the discharge of stormwater to the Styx River, be allowed under the global consent CRC231955. However, several conditions are to be met to allow discharge under this consent. It is expected that the Council will recommend a “full detention” strategy, which has a primary focus on water quality as well as flood protection.

The proposed development would look to discharge stormwater to existing drainage waterways that connect to the Styx River. The existing waterways are in the form of farm drains.

To provide a better understanding of the natural values of the area and to assist in design of the subdivision the applicant commissioned Viridis to undertake an assessment of the ecological values and restoration options. This report (which is attached to the plan change application) makes the following comments and assessment of the drains on the property:

Several drainage channels traverse lower elevations of the property, forming a network that channels into the Styx River. The drainage channels are not permanently wet, as is evidenced by the type of vegetation present and comments from the local farmer, and mainly carry water in the winter months. On the banks of the drainage channels there are only occasional, scattered rushes and some sedges and for some stretches of the drainage channels these species are absent. Some common exotic plants that are usually indicative of the site being permanently wet were either absent or present in low numbers.(s4.2.3)

The range of species that have been recorded in this lowland catchment highlight the values of the Styx River and its tributaries. Although the drainage channels within the project site are manmade and only contain water on a seasonal basis, they are connected to the Styx River and so freshwater fauna could be moving in and out of them and/or be temporarily residing in them, subject to water presence. These waterways could therefore provide seasonal habitat and feeding opportunities for freshwater fauna and could also provide refuge during times when the Styx River is in flood. (s4.6)

To improve water quality in the drainage channels and also the Styx river and to protect the banks of the channels from erosion and stock damage the Vidiris Report recommends that the main drainage channels be fenced and have riparian plantings. They recommend specific species for this planting to achieve shading, nutrient and sediment filtering and to enhance habitat and food sources. The subdivision design utilises the low-lying areas adjoining the subdivision which contain drainage channels by incorporating these into the stormwater treatment and detention facilities. The design importantly creates additional wetland habitat for filtering of stormwater, using the wetland species recommended in the Vidiris report.

The overall stormwater strategy is outlined below, please refer to the Stormwater Plan included in Appendix F:

- The discharge will be to the existing drain (Spencers Drain) shown on the plan just to the east of the development. The levels of the basin and wetland will be determined from this existing drain level and the Flood Ponding model. The Catchment E Stormwater Facility

may drain directly to the Styx River.

- Capture the 25 mm first flush (FF) volume in a dry sedimentation basin.
- Runoff Coefficient of 0.63 used for the development for First Flush. Equivalent to an RNN zone.
- Design the FF basin to discharge to wetland over 4 days for further treatment
- Use the CCC Simplistic Method for Wetland Sizing with 250 mm average static water depth to determine the wetland area
- Design the wetland to fill by 500 mm depth in a 50-year ARI, 48-hour event
- All other excess flows for this critical event are to be stored on site and released at pre-development rates.

Calculations following the design criteria are included in Appendix F, and summarised below.

- Total catchment area 83.05ha being the majority of the development area.
- First flush basin volume of 13080 m³ required
- Area of wetland required is 17440m²
- Overall storage required = 53597 m³

A calculation was also undertaken to determine the critical duration event for the receiving Spencers Drain. The drain connects to the Styx River approximately 3km to the north of the site. The grade is very flat and has been estimated to have 0.5m fall over its length. This gave a time of concentration of 172 minutes. At this duration the additional storage required in the development is approximately 25000m³. Well below the volume being provided and therefore of no adverse effect on the water levels in the Drain or Styx River is expected.

It is proposed that the Whisper Creek development will include filling within the Flood Management Area. For the purposes of proving to CCC that the proposed sites at Whisper Creek can be formed within the criteria of the Natural Hazards Section of the District Plan, please refer to the attached Flooding Plan.

- The area outside the Flood Management Area is shaded green
- The Flood Management Area boundary is shown as a Blue line
- The Flood Ponding Management Area boundary is shown as a Green line
- The High Flood Hazard Management Area boundary is shown as a Red line

The flood level used in these calculations is 2.713 in NZVD. This level has been confirmed with council as the 1 in 200 year critical event. The Final Floor levels are 400mm higher than this at 3.113. From this we have determined a building platform level of 2.963 NZVD. To achieve these safe building platform levels, the site will require filling.

Filling will occur outside of the Flood Ponding Management Area, but within the Flood Management Area. Excavations for basins will occur within the Flood Ponding Management Area but outside of the High Flood Hazard Management Area.

The only works in the High Flood Hazard Management Area will be associated with the naturalisation of drains and wetlands. The flood volume of the High Hazard Management Area will not be reduced.

5. ROADING

Please refer to the Integrated Transport Assessment in the Application. This assessment has been compiled by Novo Group and addresses the effects of the proposal on the surround existing Transport routes and intersections.

Access into the site will initially be off Spencerville Road. Spencerville Road is described in the District Plan as a Collector Route but is very much of a rural nature. The road reserve width is 20.12m but the seal formation is approximately 6m. There is no kerb and channel or footpath.

It is proposed that there will be one intersection onto Spencerville Road. The intersection is on a relatively straight section of Spencerville Road with a minimum sight distance of 150m.

As the development progresses, there will be access onto Teapes Road and Turners Road. Both roads are similar in nature to Spencerville Road.

All three roads at this location are in an 60km/hr speed zone. It is not expected that this will change. Travel speeds within the development will be restricted to 50kph.

There is no direct access to any proposed new house sites from any of the three existing roads. All access to the new homes will be internal top the development.

The transport modelling indicates that the majority of new traffic generated, will use Turners road as access to Marshlands Road and beyond. A lesser amount of traffic will be added to Spencerville Road heading west and very little traffic will be added to Spencerville Road heading east.

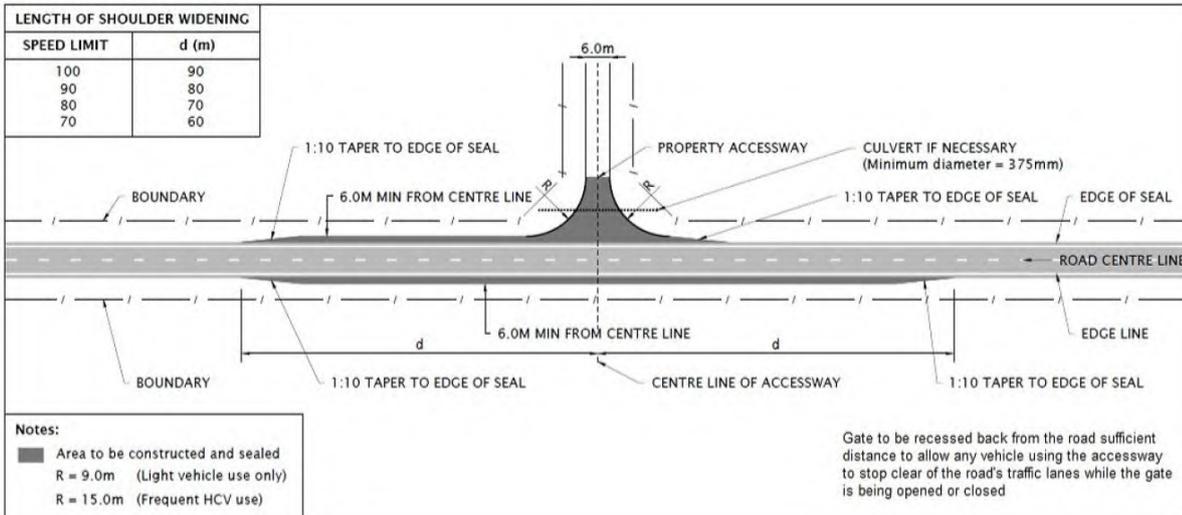
As a result of the added traffic, it is expected that there will need to be a series of upgrades required to the existing road network:

- Upgrade Turners Road from Spencerville Road to Marshlands Road to 7m sealed width.
- Upgrade Teapes Road to 6.5m sealed width.
- Upgrade the Turners Road/Teapes Road intersection to a standard tee arrangement.
- Upgrade the Turners Roads/Marshlands Road intersection with an additional turning lane on Turners Road.

In addition to this, the local pedestrian/cycling network will be extended with:

- a shared path from the development area to the Ouruhia Model School via the Styx Mill Conservation Loop and a short length on Turners Road.
- A shared path along Lower Styx Road linking the site to Te Korari St.

It is proposed that the intersection of the Development Road onto Turners Road will comply with Figure 14 in Appendix 7.5.10 of the Christchurch District Plan. Please refer to the following diagram.



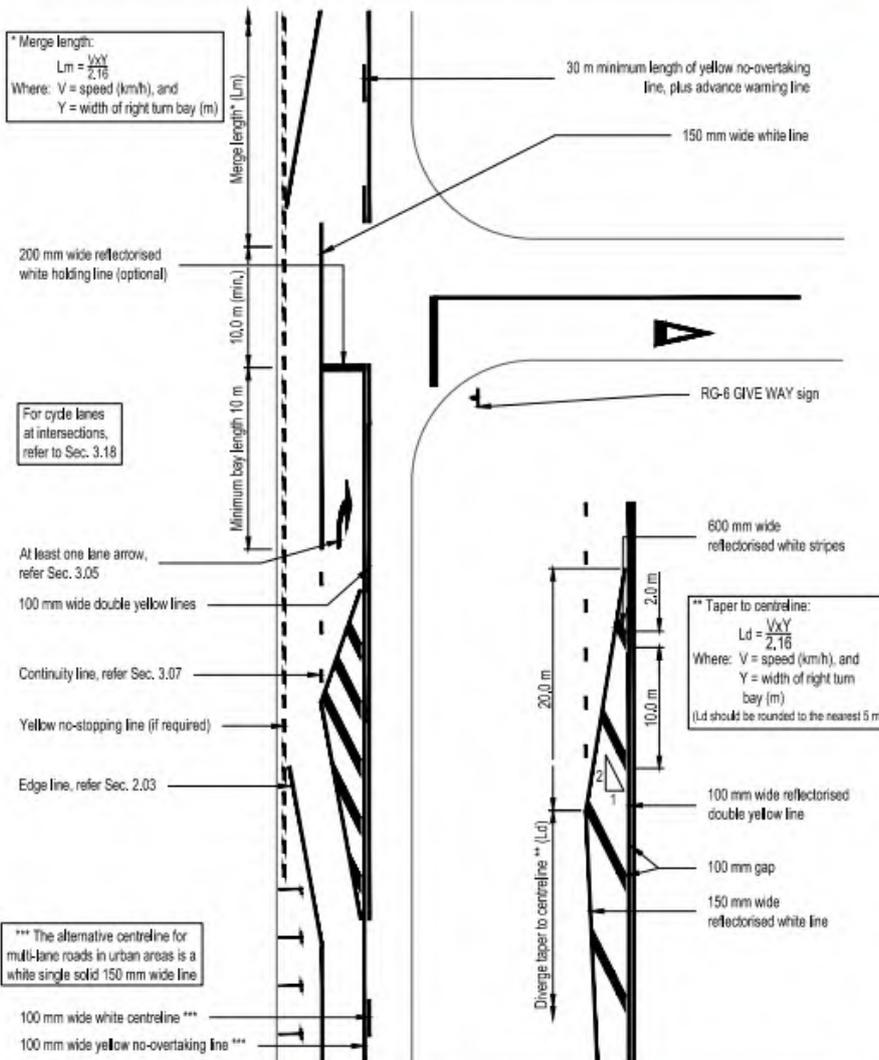
It is proposed that the intersection of Road 1 onto Spencerville Road will comply with MOTSAM Part 2, Figure 3.26. Please refer to the following diagram.

Part 2: Markings

RIGHT TURN BAYS

3 - 53

June 2009



MARKINGS FOR RIGHT TURN BAYS IN URBAN AREAS

FIGURE 3.26

The roads within the proposed development will be compliant with the urban streets dictated in the District Plan and the Proposed Outline Development Plan. A sealed footpath will be located on both sides of the carriageway with street trees lining both sides of the roads.

Please refer to the appendices for typical road cross sections in Appendix D.

The entrance into the development off Spencerville Road will pass between two large mature trees and will extend through the development as a collector route, past the commercial area, and connecting to Turners Road. Another collector road will connect from the commercial and community area to the end of Teapes Road. These roads will provide the vehicular spine to the development. All other roads connect to these main routes.

Private access and rights of way will be constructed to Council standards.

Pedestrian/Cycle access through the development will be provided by footpaths along the roads and through the connecting reserves. The network of pedestrian and cycle routes through the site and into the region is set out in the reports on Transport and urban design matters.

Proposed lighting includes lights at roads, intersections, cul de sac heads, and lighting along the pedestrian routes. The intersections onto existing roads will be lit to Council Standards.

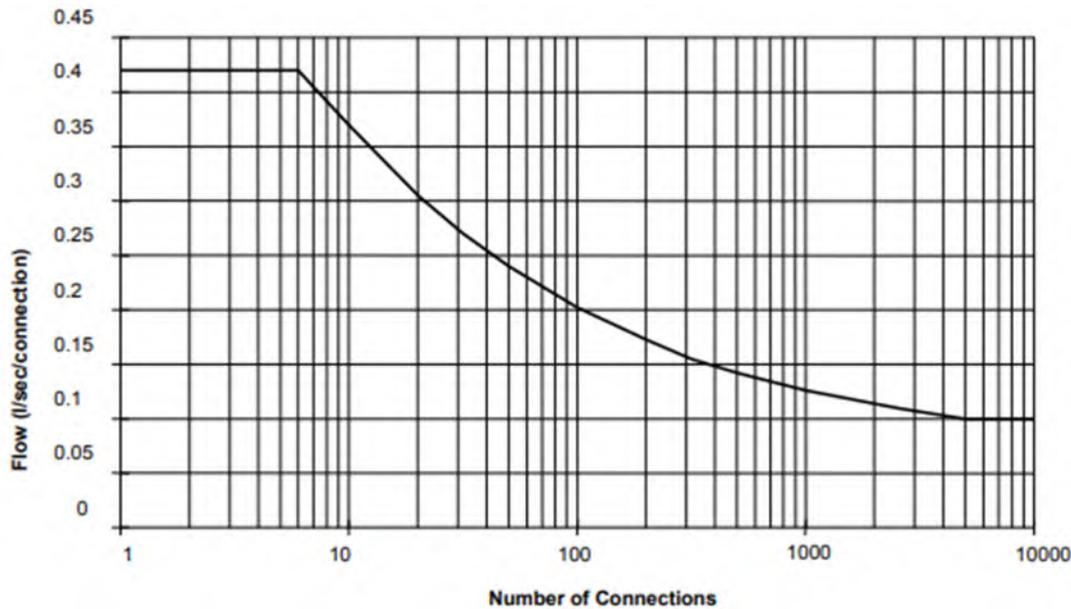
All runoff from the roads up to and including a 1 in 50 year storm event will be treated, attenuated and disposed of on site in accordance with the proposed stormwater concepts in sections 3 and 4.

All pavements will be designed and constructed to Council Standards.

6. WATER SUPPLY

The water supply demand for the proposed 800 lot residential development can easily be determined from a calculation derived from the Council's Infrastructure Design Standard.

Water Supply demand calculated using the CCC IDS



800 connections equates to a peak flow rate of 0.135l/s/connection	108 l/s
The proposed development will have a Fire Classification of FW2	25 l/s
Small Commercial Area	3 l/s
Total peak flow	136 l/s

Daily Demand is determined from each site using 3000l/day	
Total daily Demand	2400 m ³
Average flow	27.78 l/s

This calculation has been checked against a daily demand of 3000 l/hh and appears to be feasible.

Consultation has been undertaken with Council Engineer – Michele McDonald. Her advice is as follows:

“the existing Brooklands / Kainga WSZ does not have capacity to service the proposed Whisper Creek Plan Change request. I would also like to caution that the solution is not simply, the addition of a new well, especially because:

- *An increased demand at the closest PS will likely trigger the need to upgrade the DN200 in Lower Styx Road to comply with IDS head loss requirements*
- *A new well abstraction consent will be required – a deep well to be drilled to avoid risk of nitrates*

- *Drinking water quality compliance rules require achievement of a bacteriological barrier and which necessitates the introduction of suction tanks at new 'treatment' sites to achieve adequate chlorine contact time*
- *Drinking water quality compliance necessitates that that new sites be developed as comprehensive 'treatment' sites complete with buildings to house treatment facilities"*

Additional advice from Council suggests that a new treatment plant and pump station will need to be designed at 2/3 peak flow + FW2 (25l/s) and that the argument can be made that peak flow for a treatment plant could be sized at 0.05 l/s per property (as per current peak factor after reduction due to excess charges as opposed to 0.113 l/s in 2019). For 800 lots, this equates to a peak domestic flow of = 40 l/s. Two thirds of 40 + 25 = 51.7 l/s.

Please refer to Appendix A for the full consultation.

In effect, the Council have confirmed that a new well and treatment plant will be required. Essentially the development will be serviced as an individual development. The estimated cost of this facility is approximately \$10M. The facility will be constructed to Council Standards and then vested.

The facility will include for a bore, treatment plant, storage and pumping. The storage volume will be reliant on the potential abstraction rates that can only be determined at the time of drilling. There is an existing significant bore on site – M35/10558. This bore does not have a water permit but was installed as part of the Golf Resort project and had a drawdown test as follows:

STEP TEST DATE	STEP	YIELD (L/S)	YIELD (GPM)	DRAWDOWN (M)
20 Jul 2009	1	14.8505278	196	1.22
20 Jul 2009	2	20.07852	265	1.79
20 Jul 2009	3	25.00344	330	2.39
20 Jul 2009	4	30.68604	405	3.1
20 Jul 2009	5	38.4901428	507.999969	4.22

From these simple results, there appears to be sufficient underlying water but still some way off the 51.7l/s required to avoid having to provide a fire fighting reserve reservoir.

An extension of this existing bore may be considered but it is in the flood plain and as a result of the potential inundation of the bore head, it is expected that a new bore will be installed on a site away from the floodplain. The likely location will be central to the development, adjacent to the commercial and community area. Verification of the true yields can only be obtained from testing a new well.

From the new water supply plant, mains will radiate into the roading network and the development will be fully reticulated. All new residential sites will be serviced by a 63mmø submain, laid along the berms of the streets.

The water supply network will be fully modelled and designed in compliance with Council specifications and SNZ PAS 4509:2008, New Zealand Fire Service Fire Fighting Water Supplies Code of Practice. The firefighting water supply classification will be FW2.

In conclusion, there is no existing potable water capacity in the wider network, and therefore the site will need to provide its own solution to water supply in terms of both volume and quality. The proposed solution is to sink a new bore of sufficient depth to manage water quality risks. On-site treatment is now required for all community drinking water supply schemes, with an on-site treatment and chlorination plant also proposed. The creation of new bores and associated treatment plants are able to draw on proven solutions and common technology. As such, the provision of a suitable potable water supply is considered to be plausible and does not present a barrier to the site being rezoned.

7. SEWER

It is proposed that all wastewater generated by the development will be connected to the Council's reticulated network and Bromley wastewater treatment plant. As such there will be no use of on-site treatment for the new development.

An estimate of the wastewater to be created by the proposed 800 lot development is calculated from Infrastructure Design Standard Methodologies.

Wastewater Demand calculated using the CCC IDS			
$\begin{aligned} \text{ASF} &= \text{number of lots} \times 220 \text{ l/person/day} \times 2.7 \text{ persons/lot} \\ &= 200 \text{ lots} \times 220 \text{ l/person/day} \times 2.7 \text{ persons/lot} \\ &= 118,800 \text{ l/day} \\ &= 1.38 \text{ l/s} \end{aligned}$			
$\begin{aligned} \text{MF} &= 1.8 \times 2.78 \times 1.38 \text{ l/s} \\ &= 6.88 \text{ l/s} \end{aligned}$			
ASF	475200 l/day		
	5.50 l/s		
MF	27.52 l/s		
add Commercial area	2.16 l/s	1 l/1000 residents	
Total MF	29.68 l/s		

It is proposed that the development will be serviced by a Local Pressure Sewer Network. This system has been selected primarily due to the high groundwater. Each new home will have a simplex pump and tank. These will be installed at the time of building consent and will not be part of the subdivision process. A consent notice on the title is expected to detail this. Each site will pump to a common rising main. The rising mains will be installed in the street berms and will connect as a network, progressively getting larger in diameter and flow, and finally culminating at the entrance to the development at Spencerville Road.

A rising trunk sewer will be laid along Spencerville Road, over the bridge, and then along Lower Styx Road to discharge into either the existing 300mm \varnothing wastewater pipe located at the intersection of Lower Styx Road and Spencerville Road (MH20228), or CCC Pump Station WwStation: PS0078 Heyders WW in Heyders Road, Spencerville. Please refer to the attached plan in Appendix E.

There is some expectation that existing the 300mm pipe in Lower Styx Road may be able to accommodate the site flows, as the current capacity of the pipe is approximately 60l/s at 80% of full bore. The Red Zoning of the upstream village of Brooklands after the earthquakes will have

assisted in providing spare capacity in the network. Some analysis and monitoring will be required to assess what the actual available capacity may be.

The use of a Local Pressure System has the ability to attenuate flows at peak times and even out the peak demand. The lesser peak flow will be determined at detailed design stage but it is generally expected that the flow will be approximately 14.85 l/s. The trunk sewer to be laid in Spencerville Road is expected to be a 125 – 180mm (OD) PE100 PN16 pipe.

Consultation has been carried out with the Council as to the capacity of the Heyders Rd Pump Station 78. Council commissioned a modelling report as detailed in Appendix B

The modelling concluded that:

There are no predicted surcharge or overflow issues for the Whisper Creek development.

However, with the addition of the development, the downstream pump station PS78 is predicted to be at capacity. Because of this and because PS78 is operating at a pump rate of 29.95 L/s which is significantly below its original design capacity of 40 L/s, the development would trigger the need for proactive maintenance to recover the pump station performance to the design flow rate.

As part of the development of the site, the applicant will undertake maintenance on the rising main and it is expected that there may also need to be an upgrade of the pumping.

Odour Control will also need to be installed at the discharge point at MH WwAccess20228. The treatment will be installed and located in the road berm. Care will be taken to ensure that the odour control will not be inundated by flood events. It is also expected that MH WwAccess20228 will need to be lined for corrosion protection.

In conclusion, all wastewater will be reticulated to the Council's network and associated wastewater treatment plant. The local network has sufficient capacity (with modest upgrades/pump station maintenance) to take the additional flows generated by the development.

8. POWER/TELEPHONE/STREET LIGHTS

Power and Telephone will be provided to all sites within the plan change to utility company and industry standards. All cables will be placed underground and all kiosks will be constructed on separate individual lots. The kiosk sites will be forwarded to Council for approval following the power design.

Existing power connections to the site will be incorporated into the proposed power design.

Street lights will be provided to the roading and reserves to Council standards or as previously described in this report. The applicant will also provide a street light style to the Council for approval.

9. CONCLUSION

Stormwater – Stormwater from any proposed development will be stored and treated on site in accordance with City Council Global Discharge consents.

Water Supply – A new bore and reticulated network will be installed on site along with suitable treatment to service the development.

Wastewater – All wastewater from the proposed development will be pumped to Pump Station 78 at Heyders Road in Spencerville. Upgrades will be required at Pump Station 78.

Roading – All proposed roading within the development will be constructed to District Plan standards. The surrounding existing road/cycle/pedestrian network will be upgraded to accommodate the additional demands on the proposed development.

Whilst upgrades are necessary to wastewater and potable water networks, these solutions are common for new development areas and as such these 2 waters do not present a barrier to rezoning. Stormwater and flood water management will require bulk earthworks, with development focussed on the upper terrace and stormwater attenuation and treatment focused on the lower terrace, along with associated opportunities for wetland restoration and ecological enhancement.

As such, the site is able to be serviced in line with the development enabled through the proposed plan change.

Appendix A – Water Supply Consultation with Council

Andy Hall

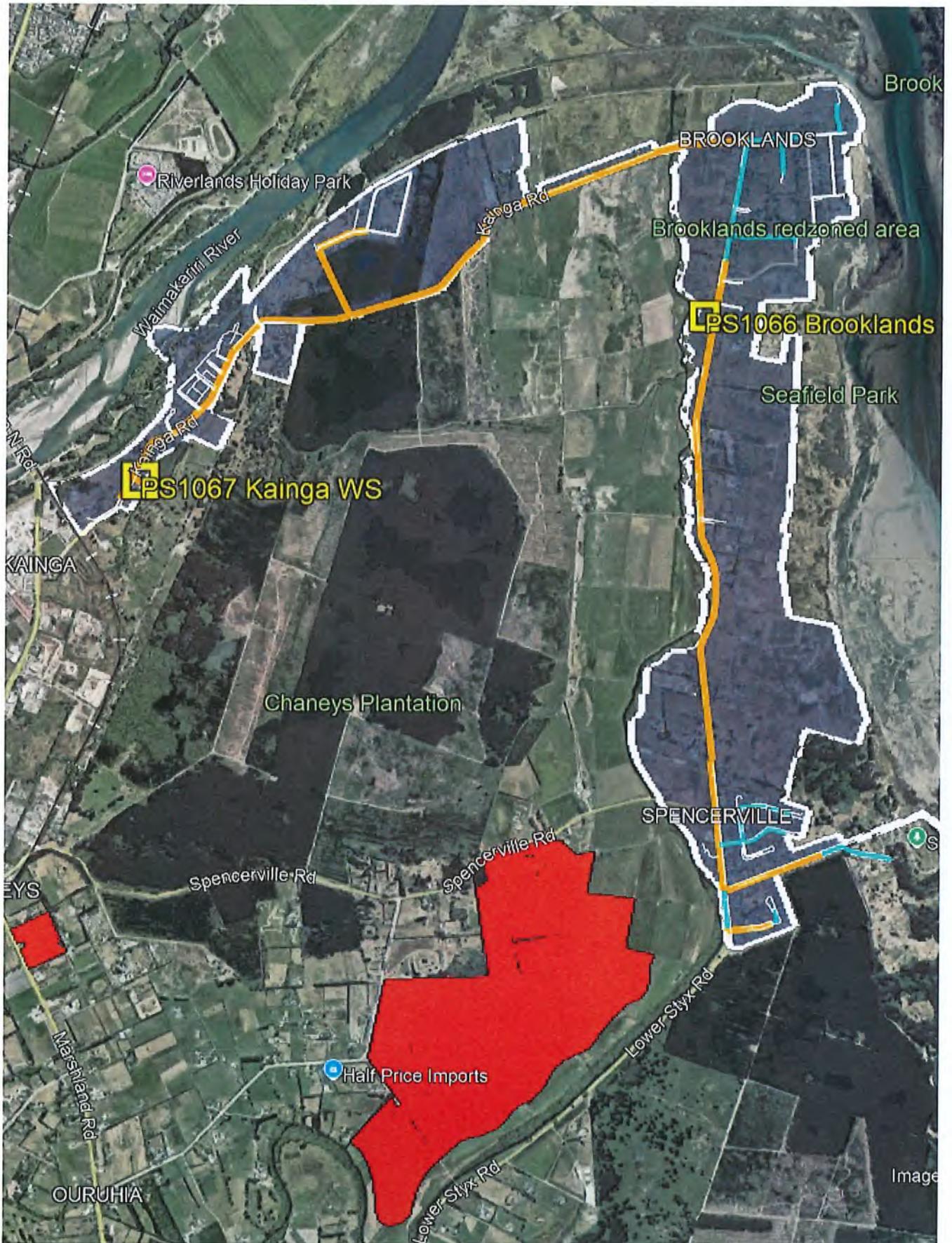
From: McDonald, Michele <Michele.McDonald@ccc.govt.nz>
Sent: Wednesday, 12 February 2025 1:40 pm
To: Andy Hall
Cc: Lightbody, Kirk; Ross Moffatt
Subject: RE: Water Supply Whisper Creek Plan Change

Dear Andy

I agree with you re growth...but this is what has been modelled for the LTP as based on Census growth projections. As noted, I am not too concerned about the future growth projections, especially since this is not the reason for the lack of capacity.

See below the highlighted Brooklands / Kainga WSZ with the location of the existing pump stations or rather 'treatment plants' shown as well.

Development Contributions are based on growth projects in the LTP and since the development of adequate capacity for this plan change request is not replacing an existing LTP project, DC's will still be payable – that said, I would imagine that a case could be made that this development does not fall in or connect to an existing DC catchment, and hence why it must build its own capacity. Please keep in mind that approval for this does not lie with me, or the Three Waters Unit and will have to be routed through the DC team.



Regards

Michele McDonald

Team Leader Asset Planning WWW
Asset Planning - Water & Wastewater

-  03 941 8131
-  Michele.McDonald@ccc.govt.nz
-  Te Hononga Civic Offices, 53 Hereford Street, Christchurch
-  PO Box 73014, Christchurch 8154
-  ccc.govt.nz



From: Andy Hall <Andy.Hall@dls.co.nz>
Sent: Wednesday, 12 February 2025 12:51 pm
To: McDonald, Michele <Michele.McDonald@ccc.govt.nz>
Cc: Lightbody, Kirk <Kirk.Lightbody@ccc.govt.nz>; Ross Moffatt <Ross.Moffatt@xtra.co.nz>
Subject: RE: Water Supply Whisper Creek Plan Change

Great

I'm surprised that we are going back to Brooklands – are you sure about this? The area is Red zone (recovery zone) The DCs out there are only \$647.26incl GST. This suggests that there is very little in the LTP for this growth.

Couple of things though:

1. Can you send me the Water Supply Zone for this area
2. Can you confirm that if we were to install a new well etc, that the DCs would not be payable?

Sorry to keep on – you know what I'm like.

Regards

Andy Hall | Engineering Director



DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road, Addington, Christchurch | P (03) 379 0793 | M 021 663 856 | www.dls.co.nz

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From: McDonald, Michele <Michele.McDonald@ccc.govt.nz>
Sent: Wednesday, 12 February 2025 8:30 am
To: Andy Hall <Andy.Hall@dls.co.nz>
Cc: Lightbody, Kirk <Kirk.Lightbody@ccc.govt.nz>; Ross Moffatt <Ross.Moffatt@xtra.co.nz>
Subject: RE: Water Supply Whisper Creek Plan Change

Dear Andy

The growth is predicted for the Kainga Brooklands WSZ and granted that this development could encompass the growth component – the fact remains that existing capacity is insufficient – the graph

simply confirms why there is no funding allocated in the LTP for additional capacity as there is no need for next say 15 years.

Given that the existing PS (or treatment plant) is about 4km away from the site and will need similar upgrades + would trigger the need for an increased water supply main at 4km, it will likely be more cost-effective to design and construct a new treatment plant for this development. Given the yield of the existing bore, and in consideration of the peak demand, an additional well will be needed. Note, that a new treatment plant (aka pump station) will need to be designed at 2/3 peak flow + FW2 and that the argument can be made that peak flow for a treatment plant could be sized at 0.05 L/s per property (as per current peak factor after reduction due to excess charges as opposed to 0.113 L/s in 2019) = 35 L/s and 2/3 of 35 + 25 = 48 L/s. Best would be to get a concept sized and priced up in the context of meeting the CCC minimum requirements, as directed by the DWQAR. Discussions on the plan change would then also have to consider the method of delivery i.e. IPA vs Council delivered with developer financial contribution.

Regards

Michele McDonald

Team Leader Asset Planning WWW

Asset Planning - Water & Wastewater

03 941 8131

Michele.McDonald@ccc.govt.nz

Te Hononga Civic Offices, 53 Hereford Street, Christchurch

PO Box 73014, Christchurch 8154

ccc.govt.nz



From: Andy Hall <Andy.Hall@dls.co.nz>

Sent: Wednesday, 12 February 2025 7:35 am

To: McDonald, Michele <Michele.McDonald@ccc.govt.nz>

Cc: Lightbody, Kirk <Kirk.Lightbody@ccc.govt.nz>; Ross Moffatt <Ross.Moffatt@xtra.co.nz>

Subject: RE: Water Supply Whisper Creek Plan Change

Cripes

That's not good for the heart.

The upward trend of usage looks to be based on residential growth – where is that growth geographically?

Also, we have a 300mm bore on site at about 90m. No consent to take but a drawdown test looked pretty good.

STEP TEST DATE	STEP	YIELD (L/S)	YIELD (GPM)	DRAWDOWN (M)
20 Jul 2009	1	14.8505278	196	1.22
20 Jul 2009	2	20.07852	265	1.79
20 Jul 2009	3	25.00344	330	2.39
20 Jul 2009	4	30.68604	405	3.1
20 Jul 2009	5	38.4901428	507.999969	4.22

If a new well were to be installed here, could we pipe it to the treatment plant and back?

Is the treatment plant relatively simple to upgrade? Is it modular?

Consents, pipes and upgrade would be on the developer of course.

Cheers

Andy Hall | Engineering Director



116 Wrights Road, Addington, Christchurch | P (03) 379 0793 | M 021 663 856 | www.dls.co.nz

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From: McDonald, Michele <Michele.McDonald@ccc.govt.nz>

Sent: Tuesday, 11 February 2025 3:21 pm

To: Andy Hall <Andy.Hall@dls.co.nz>

Cc: Lightbody, Kirk <Kirk.Lightbody@ccc.govt.nz>

Subject: Water Supply Whisper Creek Plan Change

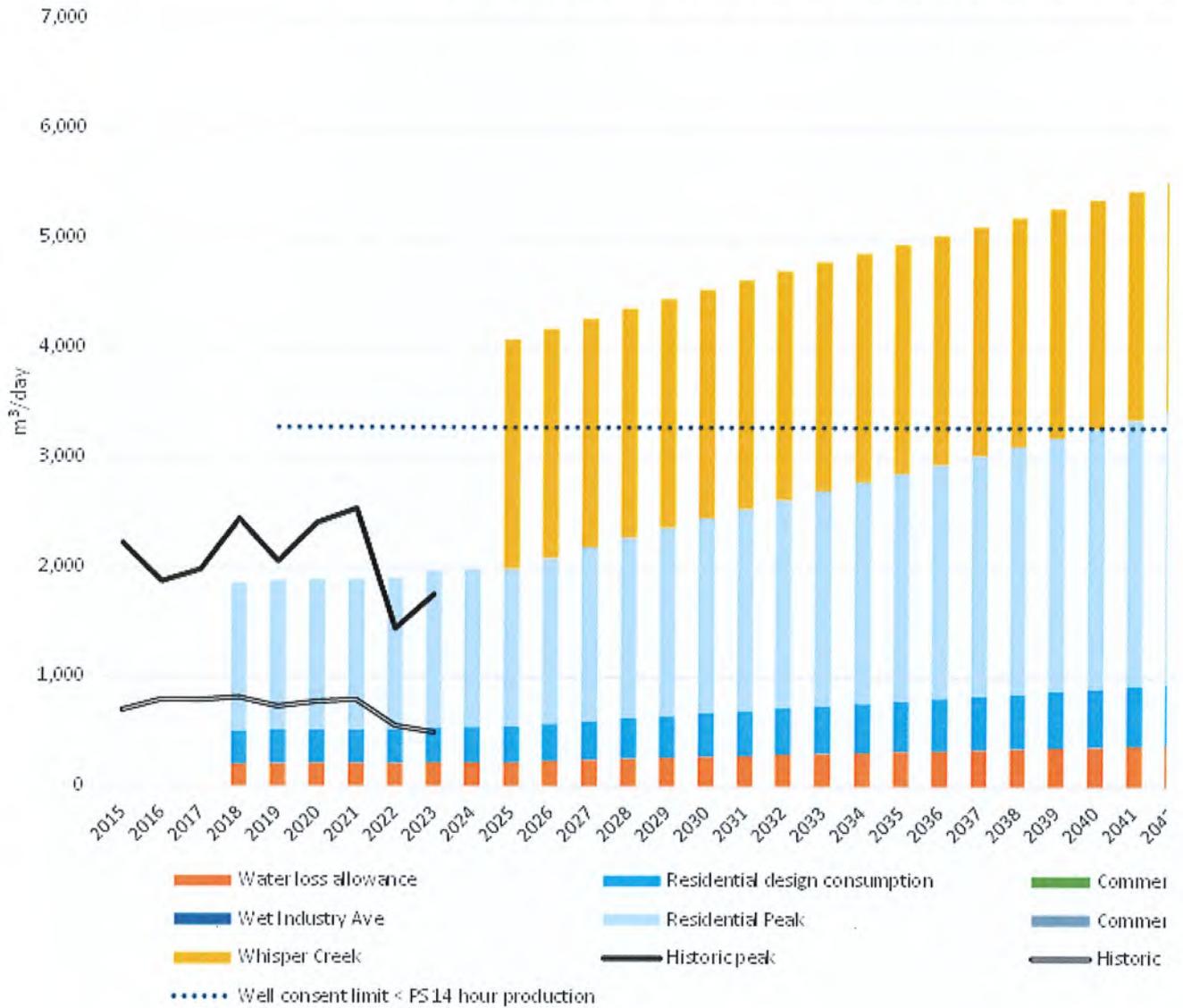
Dear Andy

Please find below confirmation of the fact that the existing Brooklands / Kainga WSZ does not have capacity to service the proposed Whisper Creek Plan Change request. I would also like to caution that the solution is not simply, the addition of a new well, especially because:

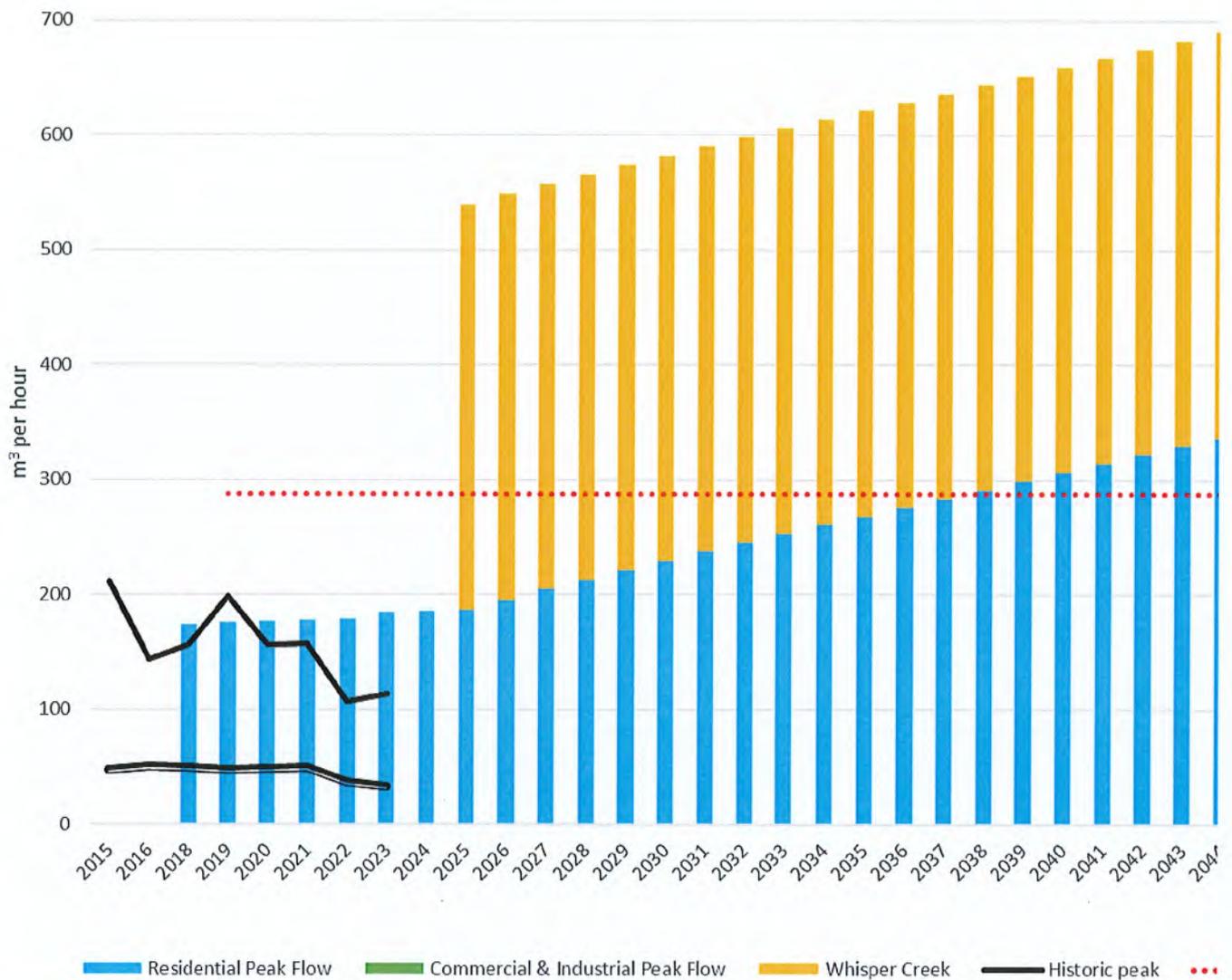
- An increased demand at the closest PS will likely trigger the need to upgrade the DN200 in Lower Styx Road to comply with IDS head loss requirements
- A new well abstraction consent will be required – a deep well to be drilled to avoid risk of nitrates
- Drinking water quality compliance rules require achievement of a bacteriological barrier and which necessitates the introduction of suction tanks at new ‘treatment’ sites to achieve adequate chlorine contact time
- Drinking water quality compliance necessitates that that new sites be developed as comprehensive ‘treatment’ sites complete with buildings to house treatment facilities

Our rough order planning estimate for a new PS site supplied by 1 well (excluding land) is \$10 million. The current LTP does not provide funding for increased water supply capacity of the Brooklands / Kainga WSZ.

Brooklands / Kainga WSZ - Peak Day Demand Forecast



Brooklands / Kainga WSZ - Peak Hour Peak Day Forecast



Regards

Michele McDonald

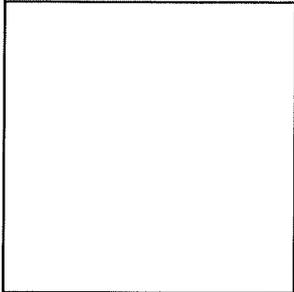
Team Leader Asset Planning WWW
 Asset Planning - Water & Wastewater

- ☎ 03 941 8131
- ✉ Michele.McDonald@ccc.govt.nz
- 📍 Te Hononga Civic Offices, 53 Hereford Street, Christchurch
- 📦 PO Box 73014, Christchurch 8154
- 🌐 ccc.govt.nz



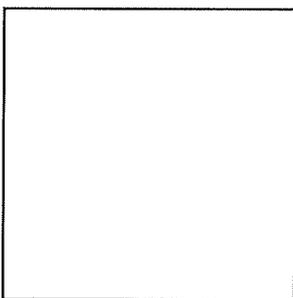
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Appendix B – Wastewater Modelling Memo



MEMORANDUM

<i>To</i>	Michele McDonald, David Ripley
<i>Copy</i>	Sue Harrison (WSP)
<i>From</i>	Lucy Gray, Kelsey van der Schyff, Charlotte Mills
<i>Office</i>	Christchurch
<i>Date</i>	13 March 2025
<i>File/Ref</i>	3-CHDM1.05 / 00012
<i>Subject</i>	Plan Change Query - Whisper Creek

1. Introduction

Christchurch City Council (Council) engaged WSP to model the impact on the wastewater network for a proposed plan change at Whisper Creek Golf Resort from Specific Purpose (Golf Resort) Zone to Residential New Neighbourhood. Council provided the following information for this investigation:

- The development is to be an 800-unit residential development discharging to the existing manhole WwAccess20228.
- The development will be a local pressure sewer (LPS) system with a maximum flow (MF) of 14.85 L/s, based on a storm peak factor (SPF) of 1.5.
- The pump station downstream of the development, PS0078 Heyders WW, is to be updated with the drawdown test pump rate of 29.95 L/s in the base model.

2. Modelling

2.1 Assumptions, Uncertainties, and Limitations

General

- This assessment was performed using InfoWorks ICM v2024.5.1, using the existing 2020 wastewater model¹. Only the existing model (2020 Model – Version 925) was used. It is assumed that this model is suitable for this assessment.

More details with regards to this model can be found in the **Christchurch City Wastewater Model: Model Update and Calibration Report** (WSP, 2020)

The model is predominantly a trunk main model. Hence, pipes smaller than DN 225 are generally not included in the model, unless this would cause connectivity issues. Additionally, subcatchments

¹ WSP model reference: dcapa500app57:40000/CCC 2019 InfoNet

in this model can be quite large and are not split up by each manhole. If required during development queries, pipes smaller than DN 225 can be added to the model and large subcatchments can be split up to better reflect the flow distributions in the area.

- Pump stations are modelled using a “screw pump”. The modelled pump operates continuously with the discharge rate matching the incoming flow up to the maximum possible pump rate, as opposed to start-stop operation. This method reduces model run times but may lead to under predictions of peak flows downstream.
- For wet weather flow (WWF), the design event used is the 2024 design storm generated from the Long Time Series (LTS) analysis. See the report **Christchurch City Council 2024 Design Storm Review** (WCS, August 2024) for more information.
- The impact of the development was assessed using the 2024 design event. However, a variety of storm events would be necessary to fully understand the impact of WWF on the network. Variables to consider include the annual exceedance probability (AEP), intensity, duration, and timing of the event with respect to flow patterns in the network.
- The wastewater network model has both a Base Model and a Growth Model. The base model represents the current network and flow inputs. The Growth Model has committed network and growth changes included in addition to the Base Model.

More information on the creation of the Growth Model can be found in **Christchurch City Wastewater Model - Updated Growth Model Report (Council Ref CPMS#51866** (WSP, 2020)). In summary, the Growth Model differs from the Base Model through the inclusion of the following:

- City wide population uplift using Stats NZ 2013 Meshblocks with Council calculated 2041 populations, adjusted to a 2068 population.
- Identified population growth areas from 2016 with either lot density or number of lots.
- Large industrial / commercial areas:
 - Christchurch Airport
 - Dakota Park, Memorial Avenue Investments Ltd (MAIL) and North West Review Area 3 (NWAR3)
 - Ravensdown
 - East Frame (mixed use)
 - Riccarton Park (mixed use)
- Additional industrial / commercial areas modelling using the **Infrastructure Design Standards, Part 6** (Christchurch City Council, 2022)

Scenario Specific

- The nearest flow monitor for the area is STFM31, which is located just upstream of PS78. A good level of calibration was achieved against data between August 2018 and November 2018. See the 2020 calibration report **Christchurch City Wastewater Model: Model Update and Calibration Report** (WSP, 2020).
- No growth scenarios have been included in this assessment.
- Since we are not assessing this development during dry weather, we will apply the maximum flow (peak wet weather flow) from the development as a constant discharge.

2.2 Methodology

The following methodology was undertaken:

- 1 We updated the base model to include the new drawdown test pump rate for PS78 of 29.95 L/s, as provided by Council.
- 2 We created a new scenario for the development using the updated base model:

- (a) A new subcatchment representing the development was created in the same rough location as indicated in the master plan sent by Council—see Figure 2-1.
- (b) The development subcatchment was set to discharge to the existing manhole WwAccess20228.
- (c) We applied the maximum flow of 14.85 L/s as a constant discharge since we are not assessing the development impact during dry weather.

3 We ran both the base model and development scenario during wet weather flow.

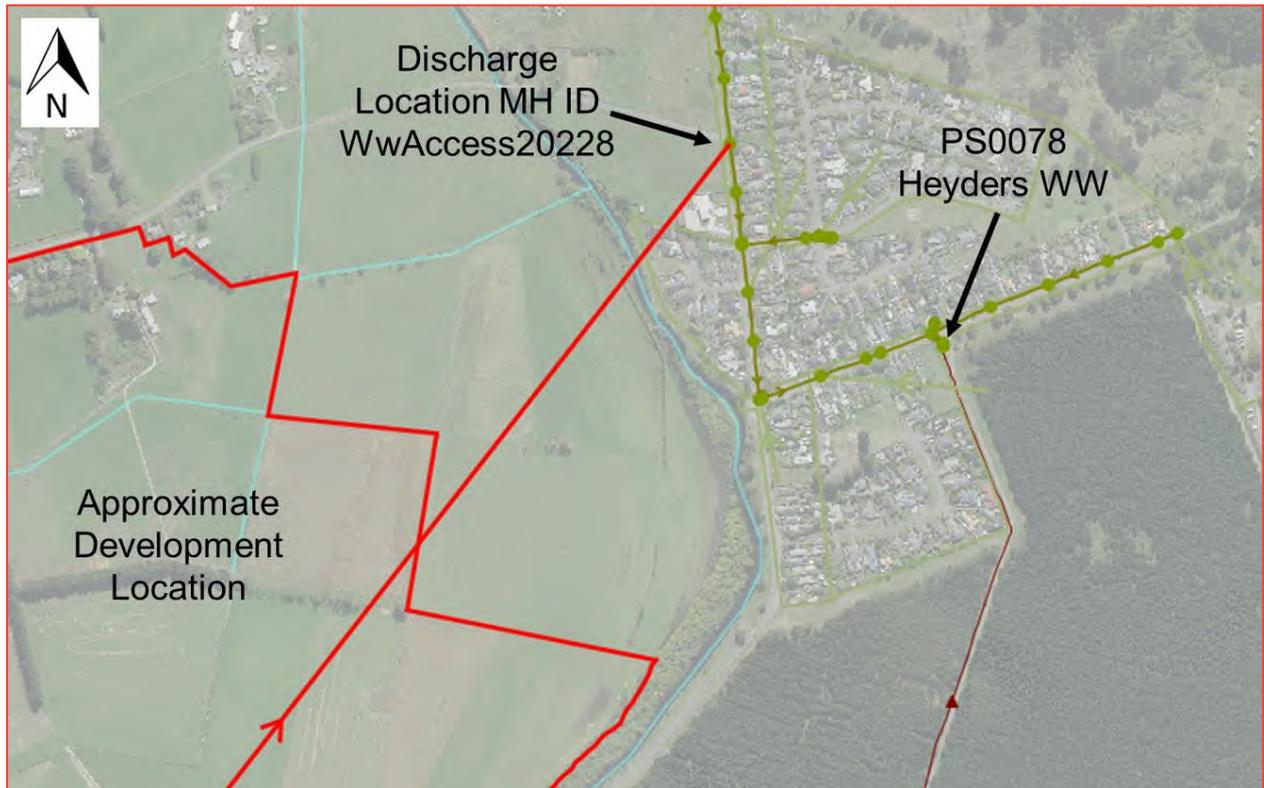


Figure 2-1: Development location.

3. Results

Figure 3-1 shows the long section results between the discharge location (WwAccess20228) and PS78.

The model predicts that the system has sufficient capacity for the proposed development. There is no predicted surcharge in the long section and no increase in predicted spills at manholes and constructed overflows due to the development.

However, with the addition of the development, the downstream pump station PS78 is at its capacity. The predicted inflow to PS78 is 30.8 L/s, which is just over its tested capacity of 29.95 L/s.

The SCIRT detailed design report (SCIRT, 13 Oct 2014) states the design flow rate for the pump station is 40 L/s. The report also states that deterioration in hydraulic performance could be caused by a build-up in slime and sediment in the dual rising mains. If the development were to be progressed, proactive maintenance of the pump station and rising mains would be needed to recover the pump station performance to the design flow rate.



Long section location

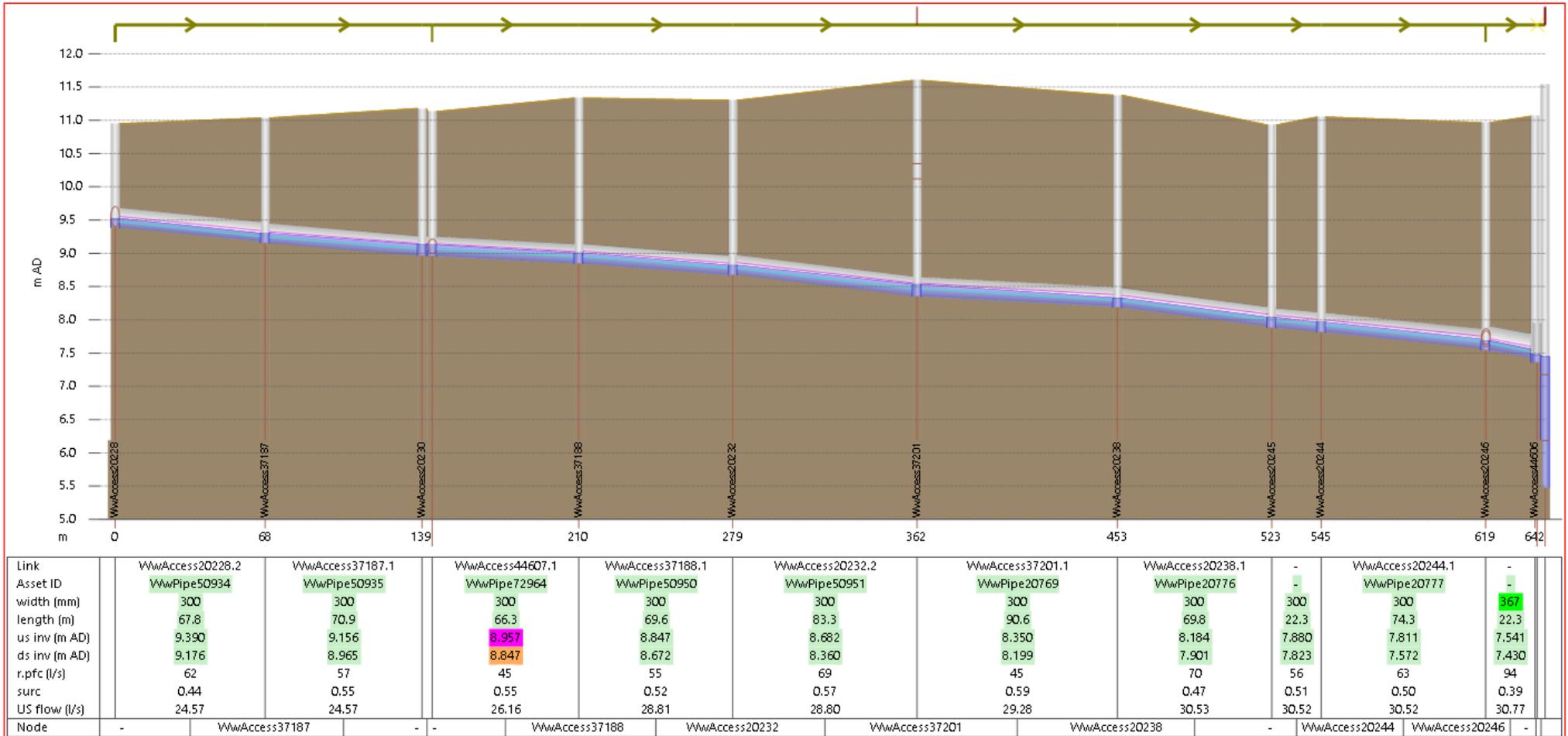


Figure 3-1: Long section results from the Whisper Creek development discharge location to PS78.

4. Conclusions

There are no predicted surcharge or overflow issues for the Whisper Creek development.

However, with the addition of the development, the downstream pump station PS78 is predicted to be at capacity. Because of this and because PS78 is operating at a pump rate of 29.95 L/s which is significantly below its original design capacity of 40 L/s, the development would trigger the need for proactive maintenance to recover the pump station performance to the design flow rate.

5. References

Christchurch City Council. (2022). *Infrastructure Design Standard*.

SCIRT. (13 Oct 2014). *11058 Kainga, Brooklands, Spencerville (WW) Detailed Design Report*.

WCS. (August 2024). *Christchurch City Council 2024 Design Storm Review*. WSP Reference: 3-CHDM2.05.

WSP. (2020). *Christchurch City Wastewater Model - Updated Growth Model Report Council Ref CPMS#51866*.

WSP. (2020). *Christchurch City Wastewater Model: Model Update and Calibration Report*. Council Reference: CPMS#51866/TRIM 20/197253 CCC: WSP Reference: 3-CHCH3.28.

Appendix C – Earthworks Plan

HT LUKT LUZ A
 HT LUKT LUJ KH L KLZJYWRU

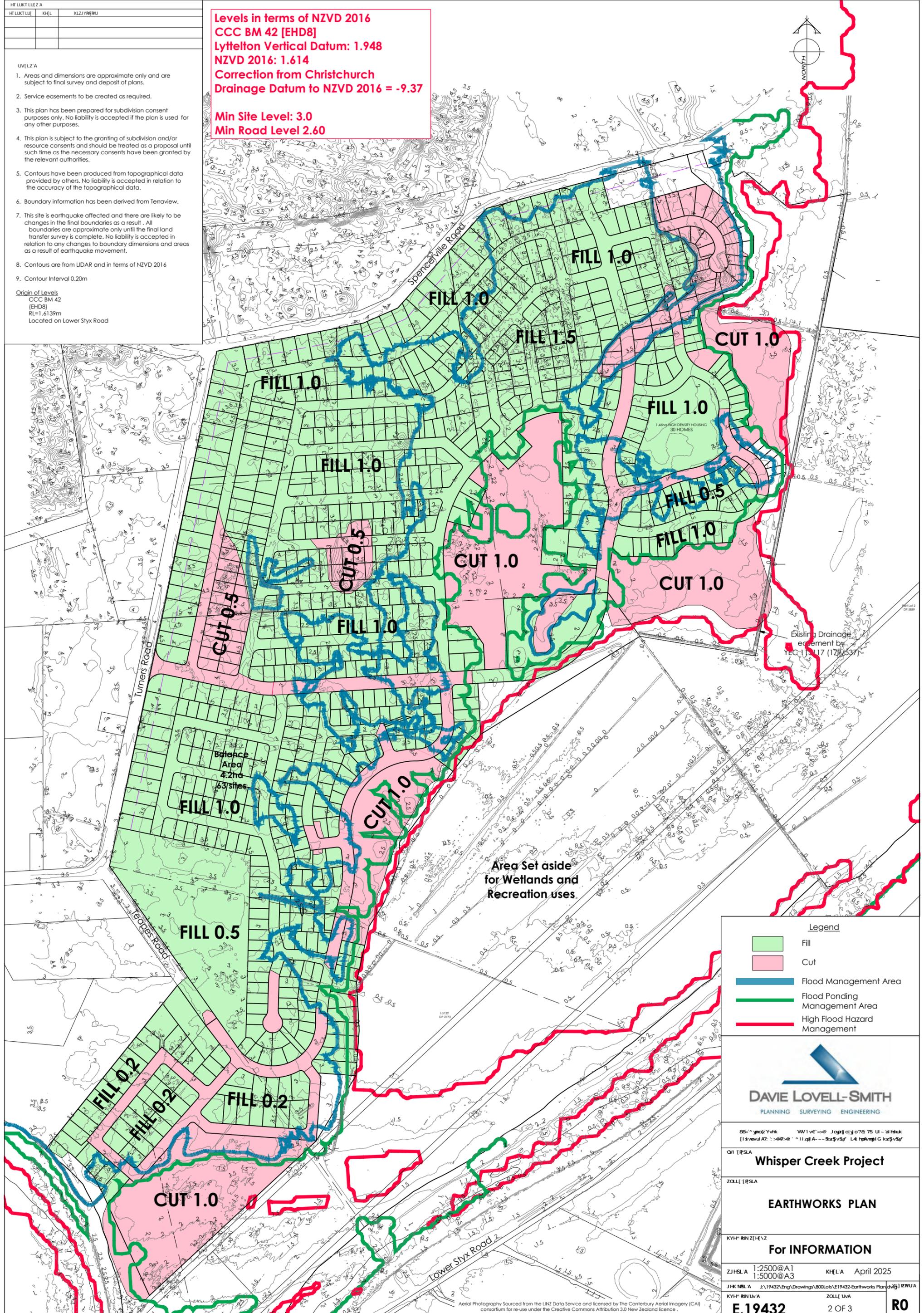
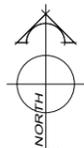
UVLZA

1. Areas and dimensions are approximate only and are subject to final survey and deposit of plans.
2. Service easements to be created as required.
3. This plan has been prepared for subdivision consent purposes only. No liability is accepted if the plan is used for any other purposes.
4. This plan is subject to the granting of subdivision and/or resource consents and should be treated as a proposal until such time as the necessary consents have been granted by the relevant authorities.
5. Contours have been produced from topographical data provided by others. No liability is accepted in relation to the accuracy of the topographical data.
6. Boundary information has been derived from Terraview.
7. This site is earthquake affected and there are likely to be changes in the final boundaries as a result. All boundaries are approximate only until the final land transfer survey is complete. No liability is accepted in relation to any changes to boundary dimensions and areas as a result of earthquake movement.
8. Contours are from LIDAR and in terms of NZVD 2016
9. Contour Interval 0.20m

Origin of Levels
 CCC BM 42
 (EHD8)
 RL=1.6139m
 Located on Lower Styx Road

**Levels in terms of NZVD 2016
 CCC BM 42 [EHD8]
 Lyttelton Vertical Datum: 1.948
 NZVD 2016: 1.614
 Correction from Christchurch
 Drainage Datum to NZVD 2016 = -9.37**

**Min Site Level: 3.0
 Min Road Level 2.60**



Legend

	Fill
	Cut
	Flood Management Area
	Flood Ponding Management Area
	High Flood Hazard Management

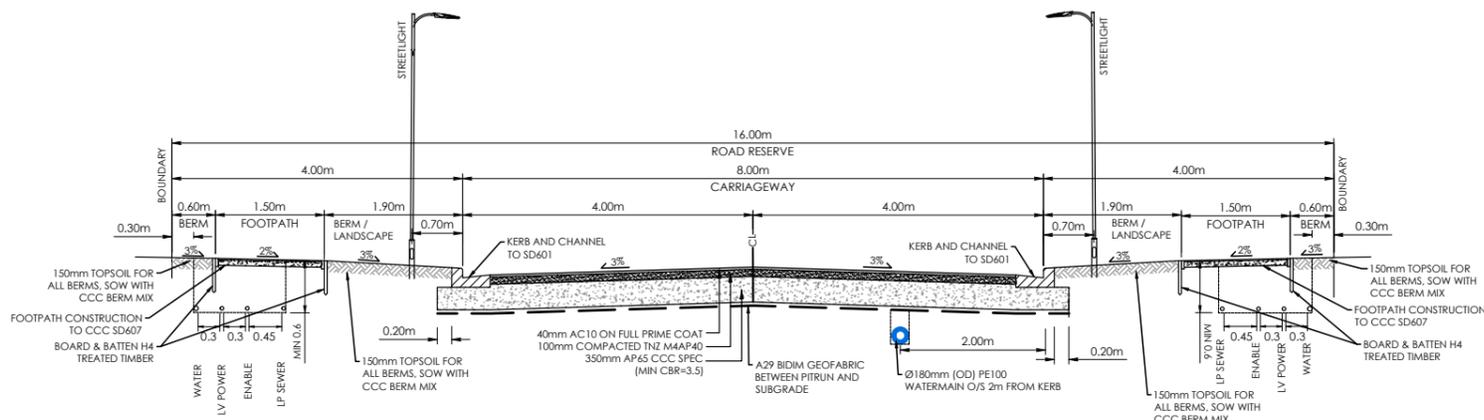
DAVE LOVELL-SMITH
 PLANNING SURVEYING ENGINEERING

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 [13vovl A7: : >07-@ ^11 zll A --- 829 v8r L4 h8rmp] G k29 v8r

Whisper Creek Project	
EARTHWORKS PLAN	
For INFORMATION	
ZJHSLA 1:2500@A1	KH(LA April 2025
JHK NBLA 1:5000@A3	
JHK NBLA J:\19432\Eng\Drawings\800Lots\E19432-Earthworks Plans\03\ZPLUA	
KYH* RN LVA	ZOLL LVA
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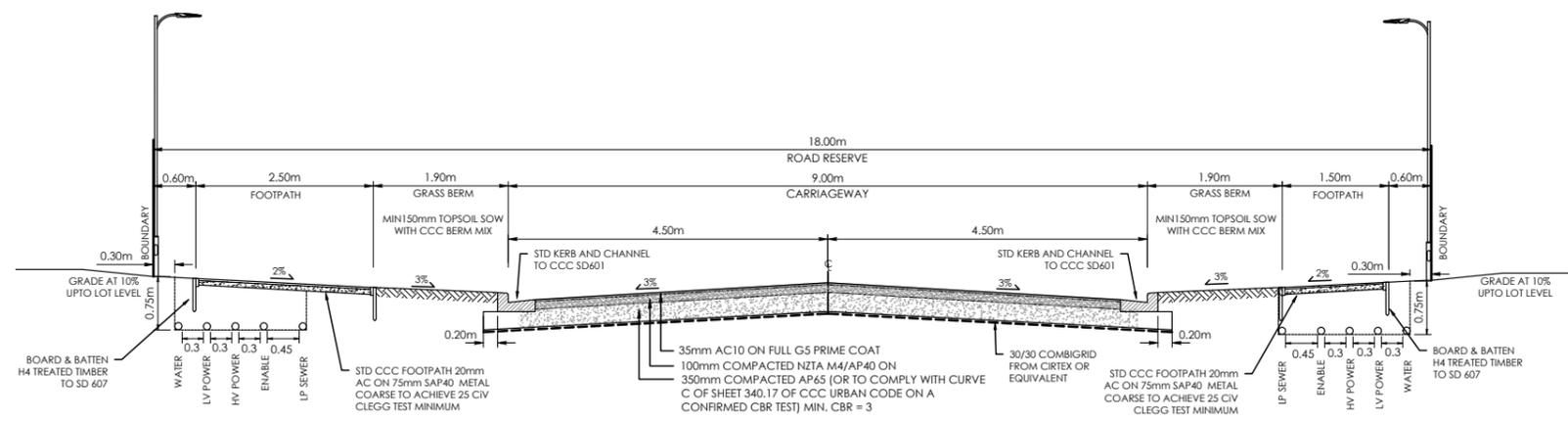
Aerial Photography Sourced from the LINZ Data Service and Licensed by The Canterbury Aerial Imagery (CAI) consortium for re-use under the Creative Commons Attribution 3.0 New Zealand licence.

Appendix D – Roding Cross sections



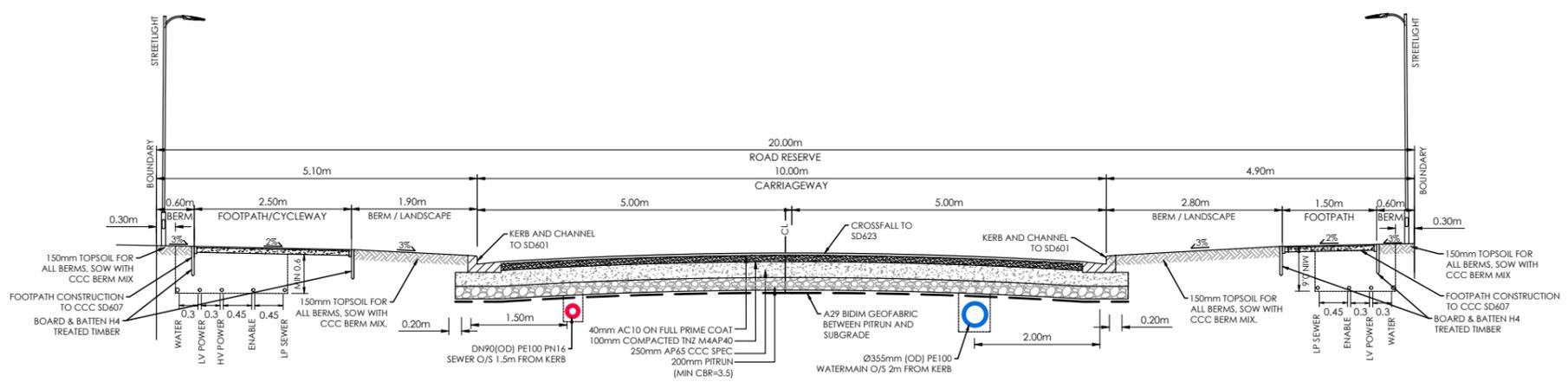
TYPICAL CROSS SECTION 16m ROAD

SCALE 1:50@A1
1:100@A3



TYPICAL CROSS SECTION 18m ROAD

SCALE 1:50@A1
1:100@A3



TYPICAL CROSS SECTION 20m ROAD

SCALE 1:50@A1
1:100@A3

HT LUKT LUZ A	KHL	KLZ JYRU
---------------	-----	----------

- NOTES :
- ALL WORKS IN ACCORDANCE WITH CCC IDS AND CSS PARTS 1-7 CURRENT ISSUE.
 - ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.
 - ORIGIN OF LEVELS**
BM, _____ RL= _____ LOCATED _____
LEVELS IN TERMS OF CHRISTCHURCH DRAINAGE DATUM. POST JUNE EMERGENCY LEVELS.
 - ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.
 - METAL DEPTHS TO BE CONFIRMED OR INCREASED PRIOR TO COMMENCEMENT OF WORK FOLLOWING THE CHECKING OF SUBGRADE CBR ON SITE.
 - CARRIAGEWAY AND FOOTPATH ACCEPTANCE TESTING IN ACCORDANCE WITH CCC CSS PART 6 AND CCC IDS.
 - FOOTPATH BASECOURSE TESTING - MINIMUM CLEGG HAMMER VALUE OF 25 REQUIRED FOR FOOTPATHS & RESIDENTIAL CROSSINGS.
- MINIMUM CLEGG HAMMER VALUE OF 35 REQUIRED FOR COMMERCIAL CROSSINGS.
 - KERB & CHANNEL BASECOURSE TESTING - MINIMUM DRY DENSITY OF 2100kg/m³ WITH 75% EQUAL OR EXCEEDING 2150kg/m³.
 - ROAD BASECOURSE TESTING - MAXIMUM BENKELMAN BEAM DEFLECTION OF 2.00mm WITH 95% BELOW 1.6mm FOR _____ AND A MAXIMUM DEFLECTION OF 2.5mm WITH 95% BELOW 2.00mm FOR _____.
 - ALL ROAD AND FOOTPATH AREAS TO BE SURFACED USING ASPHALTIC CONCRETE. FOOTPATHS TO BE CONSTRUCTED IN ACCORDANCE WITH CCC REQUIREMENTS WITH 20mm DEPTH AC, WHILE ROAD PAVEMENTS TO BE 30mm DEPTH.
 - ALL PAVEMENT CROSSFALLS ARE TO BE CONSTRUCTED IN ACCORDANCE SD623.
 - KERBS AT INTERSECTIONS HAVE A RADIUS OF 6.0m UNLESS SHOWN OTHERWISE.
 - CUTDOWNS AT RESIDENTIAL PARKING AREAS TO HAVE 280mm OF CONCRETE AS PER SD611 AND CUT DOWN IN COMMERCIAL PARKING AREAS TO HAVE 280mm OF CONCRETE WITH REINFORCEMENT AS PER SD611.
 - TACTILE PAVERS ARE TO BE INSTALLED AS PER SD627 AND RTS 14 GUIDELINES FOR FACILITIES FOR THE BLIND AND VISION-IMPAIRED PEDESTRIANS.
 - ALL ROW AND DRIVEWAYS ARE TO HAVE 50mm DUCTS INSTALLED FOR COMMUNICATIONS AND POWER SUPPLY.
 - ALL BERMS TO BE AND COVERED WITH A MINIMUM OF 150mm GRADE 1 TOPSOIL AND GRASSED WITH CCC BERM MIX.



Whisper Creek Project

Roading Sections

For INFORMATION

ZJHSL A As Shown KHL A April 2025

JHK MRL A J:\19432\Eng\Drawings\800\01\19432-Road Cross-Sections.dwg	KYH U A
KYH RNU A	ZLL U A
E.19432	E03.1 RO

Appendix E – Trunk Sewer Route



- WJLZA
1. Areas and dimensions are approximate only and are subject to final survey and deposit of plans.
 2. Service easements to be created as required.
 3. This plan has been prepared to show the proposed connection to existing sewer for subdivision consent purposes only. No liability is accepted if the plan is used for any other purposes.



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Proposed Sewer Connection

For Consent Purposes

ZJHSLA	1:2000@A1 1:4000@A3	KH/LA	April 2025
JHK/NRLA	J:\19432\Subcon\E19432-Sewer Connection Concept R0.dwg	ZOLL/UMA	
KYH/RIN/UA		ZOLL/UMA	

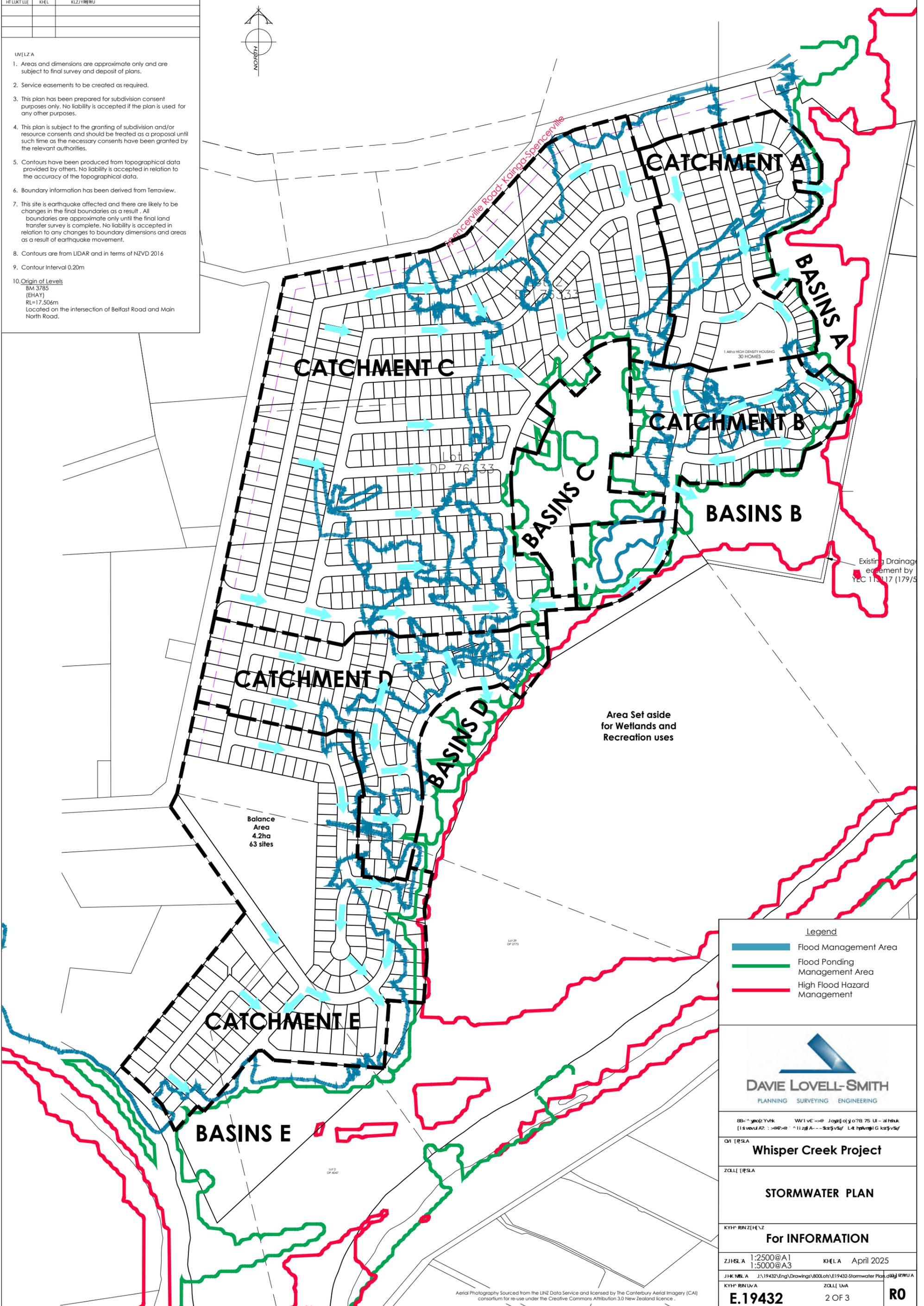
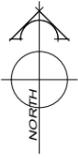
E.19432 1 OF 1 **RO**

Appendix F – Stormwater Concept Plan

HT LUKT LUZ A
 HT LUKT LUZ KHEL
 KLZJYWRU

UW(LZA

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7. This site is earthquake affected and there are likely to be changes in the final boundaries as a result. All boundaries are approximate only until the final land transfer survey is complete. No liability is accepted in relation to any changes to boundary dimensions and areas as a result of earthquake movement.
8. Contours are from LIDAR and in terms of NZVD 2016
9. Contour Interval 0.20m
10. Origin of Levels
 BM 3785
 (EHAY)
 RL=17.506m
 Located on the intersection of Belfast Road and Main North Road.



Legend

- Flood Management Area
- Flood Ponding Management Area
- High Flood Hazard Management

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STORMWATER PLAN

For INFORMATION

ZJHSLA 1:2500@A1 KHEL A April 2025
 1:5000@A3

JHK MBL A J\19432\Eng\Drawings\800Lots\E19432-Stormwater Plan.dwg RFRUA

KYH RIN UVA ZOLL UVA
E.19432 2 OF 3 **RO**

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Whisper Creek Subdivision Stormwater Calculations for Subcon

R6

19432

AH

10-Apr-25

First Flush Volume

Section 6.4.1 WWDG

Catchment Area 83.05 ha Refer to Catchment Plan
Cff 0.63 Table 6.10 WWDG

dff 25 mm

$V_{ff} = 10 \times C_{ff} \times d_{ff} \times A$

V_{ff} 13080.4 m³

Mean Depth is to be 1m

Wetland Design

Section 6.7.2 WWDG

FF discharge flow over spread over 4 days

t - hydraulic residence time

y - water depth

n - planting porosity

3270.09 m³/day

2 days

0.5 m

0.75

Area of wetland $A_s = Q_{tlyn}$

17440.50 m²

Discharge rate from FF to Wetland over four days

37.85 l/s

Storage Design

Predevelopment Runoff C

0.3

Postdevelopment Runcoff C

0.65

Predevelopment discharge (48hr)

246.38 l/s

Post Development Outfall at 48hr pre-development rate

Storm Duration D (min)	Intensity i (mm/hr)	Pre development		Post development		Flow Difference		Post Development Volume		Storage Req'd. V (cu.m)
		Peak Flow Q (Tc) (l/s)	Storm Vol V (cu.m)	Discharged Vol V (cu.m)						
10	70.3	4865.35	10541.58	5676.24	6324.95	147.83	6177.12			
15	57.4	3972.56	8607.21	4634.65	7746.49	221.74	7524.75			
20	49.6	3432.73	7437.59	4004.86	8925.11	295.66	8629.45			
30	40.5	2802.94	6073.03	3270.09	10931.46	443.49	10487.97			
45	33	2283.88	4948.40	2664.52	13360.67	665.23	12695.44			
60	28.6	1979.36	4288.61	2309.25	15439.00	886.97	14552.02			
90	23.3	1612.55	3493.87	1881.31	18866.88	1330.46	17536.42			
120	20.2	1398.01	3029.02	1631.01	21808.93	1773.95	20034.98			
240	14.2	982.76	2129.31	1146.55	30662.06	3547.90	27114.16			
360	11.6	802.82	1739.44	936.62	37571.82	5321.84	32249.98			
720	8.19	566.82	1228.10	661.29	53054.00	10643.69	42410.31			
1080	6.68	462.31	1001.68	539.36	64908.56	15965.53	48943.03			
1440	5.78	400.02	866.72	466.69	74884.52	21287.38	53597.15			
2160	4.35	301.06	652.29	351.23	84536.60	31931.06	52605.53			
2880	3.56	246.38	533.83	287.45	92245.30	42574.75	49670.54			
4320	2.68	185.48	401.87	216.39	104164.63	63862.13	40302.50			
5760	2.19	151.57	328.39	176.83	113492.81	85149.50	28343.30			

Required

Volume to be stored

53597.15 m³

Storage in the FF to 1.0m

13080.38 m³

Storage in the wetland at 0.5m depth

8720.25 m³

Additional storage to be provided in basin network

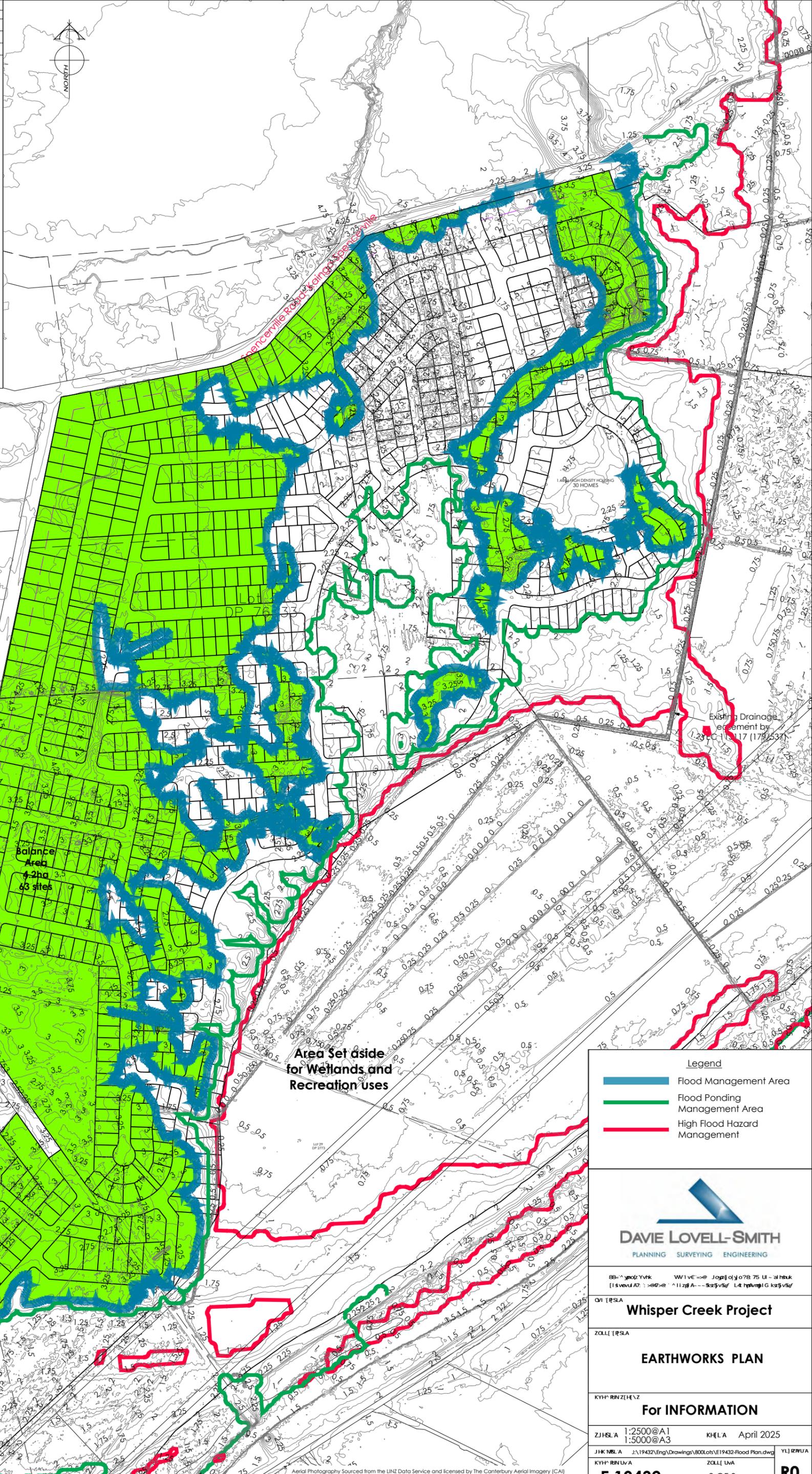
31796.52 m³

Appendix G – Flooding Plan

HT LUKT LUZ A	KH L	KLZ YWRU

UV(LZA

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[13 vvu A7 : >00-00 ^ 11 zll A --- k29 v5u' L4 h0m p] G k29 v5u'

Whisper Creek Project

EARTHWORKS PLAN

For INFORMATION

ZJHSLA 1:2500@A1 KH(LA April 2025
1:5000@A3

JHK NBLA J:\19432\Eng\Drawings\800Lots\E19432-Flood Plan.dwg YL ZRPUA
KYH RIN UVA ZOLL UVA

E.19432 2 OF 3 **RO**

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