13 December 2023

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PROPOSED DEVELOPMENT OF 70 KENRICK STREET, TE AROHA – 3 WATERS AND ACCESS CONSENTING REPORT

1.0 Introduction

Kenwyn Trust have engaged Sustain R Ltd to provide a 3-Waters and Access consenting assessment for the proposed development of the above headed address. The purpose of this report is to understand the effect of the proposed development on existing 3-Waters Infrastructure and site topography and propose suitable management methodologies and preliminary designs to comply with local authority standards.

2.0 Existing Site details

Address:	70 Kenrick Street, Te Aroha
Appellation:	Lot 4 DP 425692 & Lot 9 DP 9205
Land Area:	466m^2 & 1,012m^2 = 1,478m^2
Local Council:	Matamata Piako District Council
Zone:	Residential

2.1 Site Description and Topography:

The site sits on the eastern edge of the greater Hauraki Plains and more locally on the plains to the south-west of the Waihou River, approximately 1km to the south-west of Te Aroha Town centre. The site gains vehicle access directly from Kenrick Street. Kenrick Street forms part of State Highway 26 running in a south-west to north-east orientation.

Levels across the site are relatively flat with an overall trend towards Kenrick Street from the existing garage. The existing rear lot sits slightly lower (0.3m) than the front lot generally with depressed levels in the centre of the site. Property levels to the north-east and south-west are relatively consistent with the subject site. To the north-west over the rear boundary ground levels raise up gradually by approximately 0.4m. Overall levels on the front site range from RL 13.39m in the southern corner to RL 14.16m in front of the existing garage. Levels across the rear site range from RL 13.7m generally in the centre of the site to RL 13.95 in the southern corner.

Kenwyn Retirement Village abuts the north-eastern boundary of the site. 3 fee-simple urban residential properties abut the south-western boundary. The north-western (rear) boundary abuts a railway reserve, and behind that is located a reserve for motorhomes.

A single dwelling and separate garage currently occupy the front site with a combination of gravel and concrete driveway and parking areas. Established gardens and trees generally border the property with the remainder of the site covered in lawn. The rear site is currently unmaintained and presents as a blackberry and grass paddock.

Refer attached existing site plan (Layout 100) and Elevation Surveyors Topographical Survey for further details.

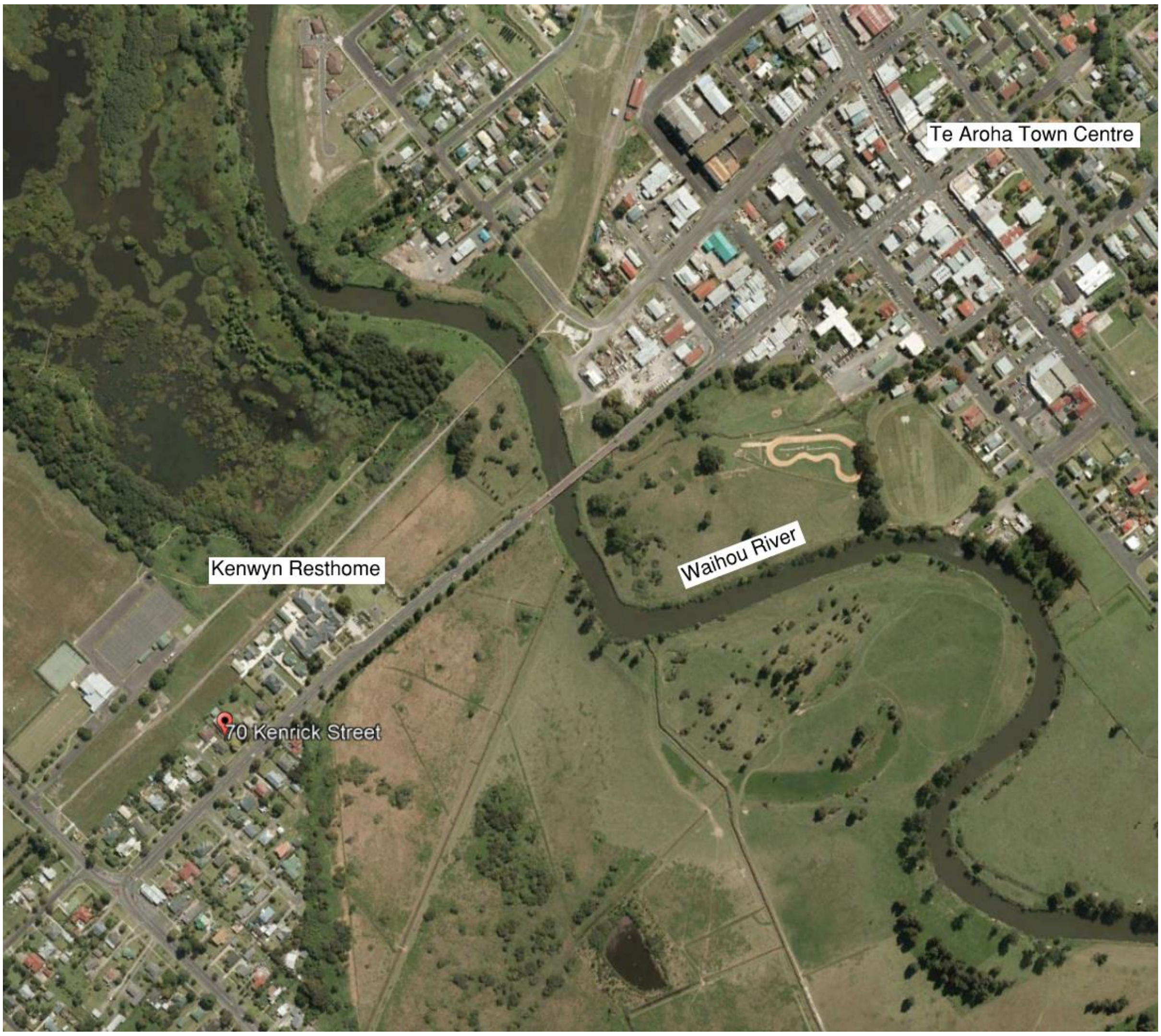

Figure 1. Aerial location image showing proximity of the site to the Waihou River and Te Aroha town centre. Image courtesy Google Earth.

2.2 Existing Services:

Stormwater:

No on-lot drainage plans were available at the time of writing the report. Site observations revealed half of the dwelling downpipes discharging stormwater directly to ground with no controls in place due to lack of maintenance. The other half of the dwelling downpipes discharged to on-lot drainage, which based on the age of the dwelling is most likely to drain to on-lot soakage pits. A sump is present at the base of one of the Garage downpipes, with the rest discharging directly to ground. No catchpits or sumps were present on the driveway, leaving stormwater to runoff to the surrounding grass and into Kenrick Street over the vehicle crossing.

An existing 200mm diameter culvert under the vehicle crossing allows kerb stormwater flows to convey within the kerb and channel.

Stormwater flows locally within Kenrick Street ultimately discharge into the drainage channels within the large undeveloped lot to the south-east of Kenrick Street, which subsequently drain to the Waihou River to the north-east of the site.

Wastewater:

An existing 225mm RC wastewater main is located within the near road shoulder of Kenrick Street, draining in a north-easterly direction to the pump station (60168) to the north of Kenwyn Resthome. The main is reported to be recently installed (2021) and in good condition. Wastewater is pumped over the Waihou River Bridge to

WWMH 2928 where flows are conveyed via gravity and additional pump stations, ultimately discharging to the Te Aroha Wastewater Treatment plant to the north of Te Aroha.

No laterals are reported to the subject site on the MPDC GIS, but as there are no other mains services within proximity to the site, the site is assumed to drain to the 225mm WW main within Kenrick Street.

Site observations revealed no evidence of an existing septic tank.

Council Development Engineers have been approached to confirm the existing capacity of the existing 225mm main, however at the time of writing this report no response has been received.

Water Supply:

A 150mm AC watermain is reported by the MPDC GIS in the near berm of Kenrick Street. The site is currently serviced by a 20mm lateral from the 150mm main located approximately centrally on the road boundary.

Two Fire Hydrants are located in very close proximity to the site. The first is in the near berm on the abutting boundary of #70 & #72 Kenrick Street. The second is located on the opposite side of the street affronting #73 Kenrick approximately 45m from the centre of the new proposed vehicle crossing location.

Vehicle Access & Street Furniture:

The front site is accessed directly from Kenrick Street via a 2.2m wide gravel vehicle crossing over a 200mm culvert and concrete footpath. The existing access is located approximately centrally to the site boundaries. A historic vehicle crossing, and culvert is located on the northern end of the road boundary. Grass and lichen has all but reclaimed the previous crossing, but the concrete slab/bridge over the kerb channel clearly remains.

Existing power and telecom pillars are located on the abutting boundary with #72 Kenrick Street.

No other street furniture or trees are located in the berm affronting the subject site.

Refer attached existing site plan for further details of the existing services.

3.0 Proposed Development

The existing dwelling and garage are to be demolished and the site cleared. The existing vehicle crossing is to be removed and the berm and kerb reinstated.

It is proposed to construct 4 separate dwelling units with attached garages on the site with a single shared access located on the northern side of the road boundary. A new vehicle crossing is proposed to align with the shared accessway.

Refer attached Edwards White site development plans for further details.

4.0 Design Standards

Preliminary Civil design for the subject site has been completed in accordance with the following standards:

- MPDC District Council Plan
- MPDC Stormwater Bylaw
- Waikato Regional Infrastructure Technical Specifications
- NZ Building Code – E1 Surface Water – Amendment 11

5.0 Earthworks

Bulk Earthworks are required for the site to provide:

1. Building platforms and level outdoor yard areas
2. Shared driveway access and vehicle manoeuvring areas
3. Primary and secondary surface drainage

A preliminary design surface has been graded using CAD and a cut-fill analysis completed comparing to the existing surveyed surface. A total of 99m^3 of cut and 96m^3 of fill over a total area of 1,470m^2 results from the proposed design surface when compared to the existing topographical survey surface. Maximum cut depths are up to 0.6m (within raised garden areas) and maximum fill depths to 0.4m (within the rear section).

Proposed ground levels raise up from Kenrick Street by approximately 0.3m to the building platform for Unit 1 at RL 13.6385m. Levels then step up another 0.15m to the building platforms for Units 2-4 at RL 13.835m.

The shared accessway is provided with a minimum of 2% crossfall, grading away from the Units to the north-eastern boundary. Surface drainage is conveyed to low points at CH 16 and 64m within a saw-toothed pavement.

Ground levels are maintained at site boundaries using low height integral retaining boards on boundary fencing with the maximum height of the retaining component reaching 0.4m from existing ground levels in the south-eastern corner of the site.

HDGeo have completed a Geotechnical Assessment Report for the proposed development which has highlighted the requirement for a significant Subgrade Improvement Layer (SIL) of 1.2m depth to support the building foundations. The extents of this have been modelled in CAD to understand the effect on overall earthworks volumes and comparisons from the existing topo surface and to the design surface have been made. The overall resulting Earthworks Cut volume is 912m^3 from existing topo to the design subgrade with maximum cut depths of 1.4m (at Unit 3 foundations). Fill of 896m^3 is required from the design subgrade to the finished design levels with maximum depths of 1.3m. Analysing the materials required to achieve the SIL results in the following estimated volumes:

1. Total cut from existing to Design Subgrade = 912m^3
2. GAP 65 SIL volume import = 244m^3
3. Reuse of site won sands for balance of SIL = 595m^3
4. Balance of cut to waste from site cut material = 317m^3
5. Total imported clean fill to design levels (ROW pavement, topsoils) = 146m^3
6. **Total Exported materials from site = 317m^3**
7. **Total Imported materials to site = 390m^3**

Allowing for 2 x 6-wheeler trucks in use, with a 1 hour turn around time from the local quarries results in a total of 40 exporting and 49 importing movements. Assuming in the worst case of no backloads the total vehicle movements could be completed in 6 working days. Allowing for Engineering geotechnical testing for certification, additional landscaping retaining works and weather would most likely push out the bulk earthworks to be completed within a 4-week period.

A single 12Ton Excavator, 2Ton roller compactor and 2 x 6-wheeler trucks would be the most appropriate construction equipment for this project.

Refer attached preliminary plans, Layouts 200 - 242 for further details.

5.1 Erosion & Sediment Control

As the site is relatively flat and comprises very permeable soils, sediment retention onsite will easily be achieved through the use of construction soakage bunds, upslope clean water diversions and very minor use of silt fencing on the road boundary. The existing vehicle crossing and gravel driveway will be used as long as practically possible to complete bulk earthworks. Once this is no longer viable a stabilised construction entrance will be formed in the location of the new vehicle crossing comprising a clean rock pad on a non-woven Geotech filter cloth separation layer measuring a minimum of 4m wide and 10m in length.

All earthworks are required to comply with Waikato Regional Council Erosion and Sediment Control Guidelines.

6.0 Stormwater

6.1 Site and Soils Soakage Suitability Investigation:

Sustain R Ltd attended the site on 3rd February 2023 to complete soils percolation testing. Two boreholes were completed across the site with one percolation test completed in the front yard. The second borehole was unable to be completed in the rear yard due to impacting a historic concrete slab.

Soils within boreholes were found to comprise topsoil to 0.3m over silts to 0.7m BGL underlain by sands to the base of the borehole at 2.175m. No Groundwater was discovered within boreholes. Percolation testing in general accordance with NZBC E1/VM1 was completed within the borehole in the front yard. A resulting raw soakage rate of 1,800mm/hr was calculated.

HD Geo completed an additional site visit to investigate soils for development suitability purposes. 3 boreholes were completed across the site with one in the front yard, one in the existing rear yard and a third approximately in the centre of the undeveloped rear lot. Soils within boreholes were found to comprise topsoil to 0.2-0.4m BG over Silts to 1.4-1.8m BGL overlaying sands to the end of the boreholes. No groundwater was discovered to 3.0m below ground level. Soakage testing was completed within the borehole in the centre of the rear lot in general accordance with NZBC E1/VM1 resulting in a calculated raw soakage rate of 1,920mm/hr.

Soils within boreholes were consistent across the site and between the two site visits by Sustain R & HD Geo. Soakage is a viable method for primary Stormwater Management for the site.

Adopted DSR (Design Soakage Rates) apply a reduction of 50% to raw results to allow for loss of performance over time. For preliminary calculations an adopted conservative DSR of 900mm/hr is recommended, representing the lower of the site test results. Refer attached Soils Soakage Assessment graphs, HD Geo soils logs, and site investigation plan for further details.

6.2 Stormwater Management Methodology

The proposed development will require stormwater management in accordance with the following standards:

MPDC Operative District Plan

MPDC Stormwater By-Law

Regional Infrastructure Technical Specifications

NZBC E1/VM1 – Surface Water

The following Stormwater management methodology is proposed to service the developed site:

Quantity Control:

Stormwater runoff from all developed surfaces is to be captured and conveyed to private soakage systems.

The soakage systems are to be designed to provide primary management of stormwater discharges from the development up to and including the 100-year ARI event including a climate change factor.

Quality Control:

Stormwater quality controls will be required for all new hardstand and trafficked impervious areas. A treatment train consisting of driveway sumps, serviceable porous liners, Shared Access catchpits with sumps and MH sumps at each end of soakage system linear access pipes is proposed to ensure sediment particulate retention.

6.3 Preliminary Design

Preliminary design for the stormwater management of the site has been completed to demonstrate the viability of the proposed system.

6.3.1 Shared Access Private Soakage System

Preliminary design of the Shares Access soakage system has been completed in accordance with the above-mentioned design standards.

Catchment areas were calculated from CAD plans constructed from data received from Edwards White Architects dated 21/07/2023, and are recorded in the attached calculation sheets. Rainfall data was obtained from HIRDs V4, adopting RCP 8.5 for the period 2081-2100 representing a conservative climate change factor.

Modelling of developed stormwater runoff, soakage and required storage volumes was completed within excel using the 100-year ARI storm event with storm durations from 10 minutes to 72 hours simulated to determine the required storage capacity to manage runoff generated from the developed site.

Design has been based on a Cirtex Rainsmart Trafficable system as the system is to be located under the proposed shared accessway. The Cirtex Rainsmart System maximises the storage capacity of a soakage system based on footprint area due to the high porosity of the design.

The resulting System key parameters of the Shared Access soakage system are presented below:

- 36 units (25.7m) long x 3 units (1.2m) wide x 2 units (0.86m) deep
- Effective storage volume of 25.2m^3
- Total Basal infiltration area of 30.9m^2

Stormwater runoff from the unit driveways, yards draining to the Shares Access and the Accessway is to grade to the dish channel in the pavement and convey to 1 of 2 catchpits. After pre-treatment in the catchpits stormwater will discharge to the soakage system via linear access manholes and a linear access pipe, designed to further extract suspended sediment from the stormwater.

As the shared access ramps up from the vehicle crossing, a strip drain will be required on the road boundary to capture site-generated stormwater and convey this back to the soakage system.

Refer attached calculations and Civil Engineering plans, layout 400, for further detailed information.

6.3.2 Individual Unit Private Soakage Systems

Preliminary design has been completed on the individual Unit soakage systems in accordance with previously mentioned design standards.

Catchment areas were calculated from CAD plans, derived from data received from Edwards White Architects dated 21/07/2023, and are recorded in the attached calculation sheets. Rainfall Data was adopted from HIRDv4 using RCP8.5 for the period 2081-2100 as a conservative climate change factor.

Modelling of developed stormwater runoff, soakage and required storage volumes was completed in excel using the 100-year ARI storm event with storm durations from 10 minutes to 72 hours simulated to determine the required storage capacity to manage runoff generated from the Units.

Design for the individual Unit soakage systems is based on porous liners with gravel filled trenches.

The resulting key parameters of the Unit Soakage systems is presented in the table below:

Site	Porous Liner Dims (Dia x Depth (m))	Gravel Trench Width (m)	Gravel Trench Length (m)	Gravel Trench Depth (m)	Total Storage Volume (m^3)	Total Basal Infiltration Area (m^2)
Unit 1	0.9 x 0.9	1.5	4	0.9	2.41	6
Unit 2	0.9 x 0.9	1.5	4	0.9	2.41	6
Unit 3	0.9 x 0.9	1.5	4	0.9	2.41	6
Unit 4	0.9 x 0.9	1.5	5	0.9	2.92	7.5

Stormwater runoff from the Units Roof is to be collected in downpipes and conveyed to the porous liner. Stormwater runoff from yards and patios is to be collected in sumps and conveyed via solid pipe to the porous liners.

A high-level overflow is to be provided from each porous line to the Shared Access stormwater manholes, allowing overflows to further soak away within the shared system, allowing additional resilience within the stormwater management system.

Modelling shows the combined total soakage system storage volume required is governed by the 30-minute duration event and that following an event of this magnitude the entire system will be completely drained in 42 minutes.

Stormwater flows exceeding the capacity of the primary management system will safely bubble up from SWCP 1/4 adjacent the vehicle crossing and discharge via sheet flow over the road berm to the kerb and channel.

Refer attached 3 Waters Servicing Preliminary Plan for further details and layout of the proposed system.

6.4 Detailed Design and Certification

Detailed design of the stormwater management system to support the development will be completed and supplied to MPDC for approval prior to development works commencing. A PS1 for design of the private systems will be supplied to MPDC to support building consent applications. Construction supervision will be required by a suitably qualified Engineer to ensure construction meets the design intent. A PS4 will be supplied to Council to support code of compliance applications post successful inspections and receipt of as-built plans and PS3 from the construction contractor.

6.5 Stormwater Secondary Flows

Secondary flows exceeding capacity of the primary stormwater management system will discharge from SWCP 1/4 adjacent the vehicle crossing and safely discharge over the vehicle crossing into Kenrick Street via sheet flow.

Secondary flows from the small upslope catchment of 280m^2 to the north-west of the site will be directed to and conveyed safely within the Shared Access way to Kenrick Street. Detailed design calculations will confirm this requirement is satisfied to support Engineering Approval application.

7.0 Wastewater

7.1 Wastewater Flow Calculations

No known capacity issues exist within the immediate downstream public 225mm wastewater drainage network. According to MPDC GIS maps the 225mm main services Kenrick, Short, Islington and numbers 11-33 of Stanley Street and 1, 3, 5, 7, 9 of Gordon Ave and 2, 4, 6 of Waihou Road. The total WW catchment area is 10.87Ha. Image 2 below shows the extent of the WW catchment as modelled from the MPDC GIS.

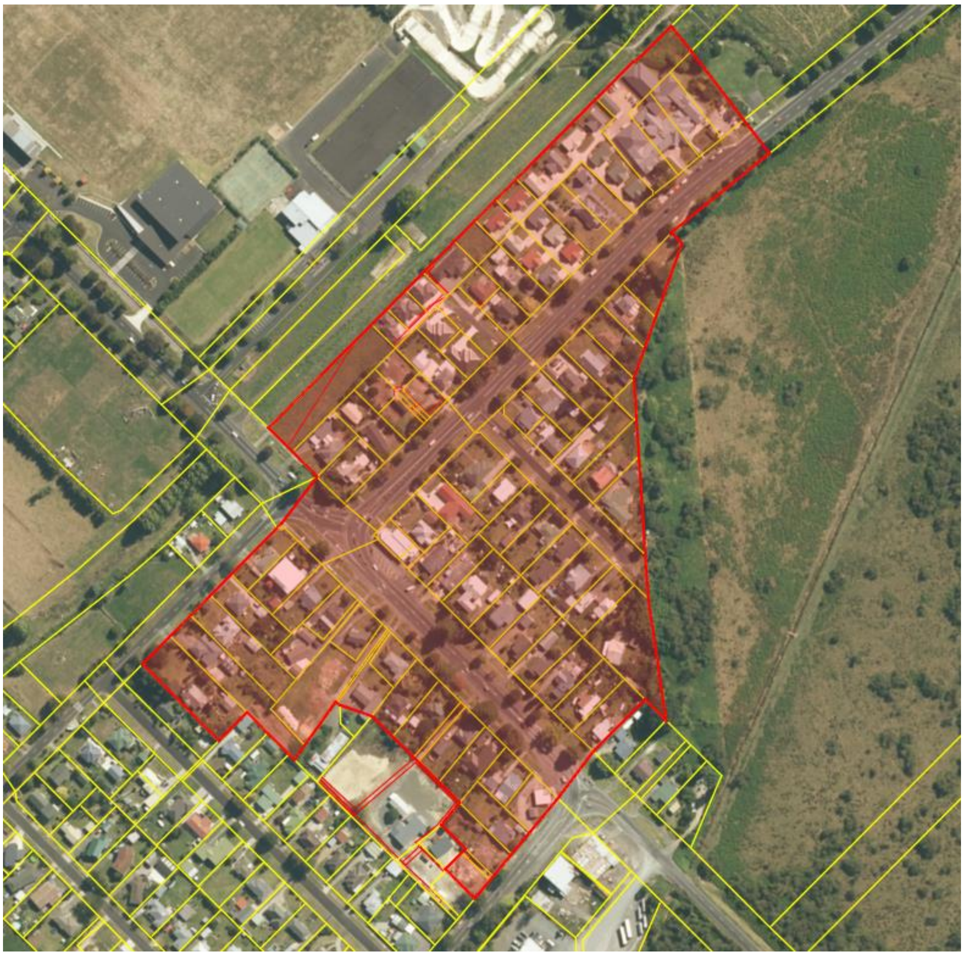

Figure 2. Catchment area of the 225mm AC WW main within Kenrick Street, Te Aroha. Image courtesy LINZ Data.

Wastewater catchment flows for the existing 225mm AC main are calculated based on RITS methodology within section 5.2.4.2.

Existing Daily (**ADF**) and Peak Wet Weather (**PWWF**) wastewater flows are calculated as:

- 2250 (L/Ha/day infiltration allowance) x 10.87 (catchment area) + 45 (RITS Table 5-3 population equivalent for Residential area per Hectare) x 10.87 (Ha Catchment area) x 200 (L/person/day) = **ADF = 122.3m^3/day**
- 2250 (L/Ha/day infiltration allowance) x 10.87 (catchment area) + 16500 (L/Ha/day surface water ingress) x 10.87 (catchment area) + 45 (RITS Table 5-3 population equivalent for Residential area per Hectare) x 10.87 (Ha Catchment area) x 200 (L/person/day) x 3.4 (Wastewater Peaking factor) = **PWWF = 6.21L/s**

Using the Colebrook-white formula and adopted pipe roughness coefficient of 0.6 (RITS table 5-4) shows the minimum grade to convey peak flows is 0.016%.

Additional Daily (ADF) and Peak (PDF)wastewater flows from the proposed site development are calculated in accordance with the RITS as:

- 3 (additional dwelling units) x 200 (L/person/day) x 2.7 (population per dwelling) = **ADF = 1.62m^3/day**
- 3 (additional dwelling units) x 200 (L/person/day) x 2.7 (population per dwelling) x 3.4 (Wastewater Peaking factor for catchment) = **PDF = 0.064L/s**

While Pipe gradients are unknown as the MDPC GIS does not report on this, the additional peak daily flow of 0.064L/s generated from the proposed development represents a mere 1% increase over the existing peak wet weather flows from the downstream pipe catchment. Minimum gradients to convey PWWF of 0.016% are considered very flat and achievable considering the proximity of the downstream pipe to the downstream pumpstation.

The proposed development is considered to have less than minor effect on the existing downstream public infrastructure.

7.2 Wastewater Servicing Requirements

The existing site lateral is to be located during site clearing works and used to service Unit 1.

A new WWMH A/1 will be required to be constructed over the existing 225mm AC main within the pavement of Kenrick Street, providing a new 150mm lateral to the site, located within the shared accessway. The lateral will be terminated with an additional WWMH A/2 within the Shared Accessway from which a new 100mm service lateral is provided for Unit 2. An additional 150mm wye lateral from WWMH A/2 provides 2 x 100mm service laterals for Units 3 & 4.

Wastewater works within the Kenrick Street Road Reserve will be public and the assets are to be vested to MPDC on completion. Wastewater works within the Shared Accessway and within the unit boundaries are private and will remain in ownership by the lot owner.

The proposed 150mm lateral within the shared accessway is positioned approximately 0.8m from the private soakage system. An impermeable liner is proposed on the side of the soakage system adjacent the private wastewater lateral to mitigate for potential side-wall stormwater infiltration effects to the wastewater main and bedding/backfill materials.

Refer attached 3 Waters Servicing Preliminary Plan (layout 400) for further details.

7.3 Detailed Design and Certification

Detailed design will be required to confirm wastewater levels and layout to service the development prior to construction. The existing public upstream and downstream WWMHs (2092 & 2091 respectively) will require surveying to understand existing pipe invert levels and the resulting effect on surrounding infrastructure within the road berm. RITS design confirmation statements will be provided to MPDC to support the design.

Any public assets constructed by the developer and vested to MPDC will be accompanied with a full RITS QA and construction supervision package, supplied to Council.

It is recommended that private assets within the Shared Accessway are also constructed to a RITS standard with full supervision and QA documentation compiled and supplied to MPDC on completion.

8.0 Water

8.1 Service Connections:

The existing dwelling is serviced from a 20mm connection to the 150mm AC watermain in the near berm of Kenrick Street. This service lateral is to remain and to be re-routed to service Unit 1.

An additional 3 x 25mm MDPE service connections to the 150mm watermain are required for Units 2, 3 & 4. In accordance with the RITS the connection meters and isolation valves are to be located to the south-west of the proposed vehicle crossing and are to be laid out in a logical oriented manner within a single box. Works on the public live watermain are to be completed by KVS and laterals extended within the Shared Accessway boundary to each of the respective Units.

The additional 3 service connections proposed to service the development will create additional water demand of:

- 3 x 260L/person/day x 2.7persons/dwelling = 2.1m^3/day
- Peak usage demand = 5 x daily rate = 0.12L/s

Final details for the connections will be provided within Engineering Design plans, submitted to MPDC for approval before construction. Refer attached 3 Waters Preliminary Servicing Plan (Layout 400) for further details.

8.2 Fire Fighting Servicing:

The developed site shall be serviced to ensure conformance with the code of practice for Fire Fighting Water Supplies (SNZ PAS 4509). As the development is a residential site the service level shall be FW2. FW2 requires one hydrant providing 750L/min within 135m and a secondary hydrant providing a further 750L/min within 270m of the dwelling, as measured in Road and shared access reserves. Two existing hydrants on the existing water reticulation network are located within 45m of the proposed vehicle crossing for the developed site. The greatest distance to Unit 4 within the Shared Access is 60m, representing a total path length of 105m to two existing hydrants, well within the level of service required for firefighting. The closest hydrant is located within the berm affronting 72 Kenrick Street. The next closest Hydrant is located within the berm affronting 73 Kenrick Street, on the opposite side of the road.

8.3 Detailed Design and Certification

Detailed design will be completed and supplied to MPDC to confirm the final water layout to service the development prior to construction. RITS design confirmation statement will be provided to MPDC to support the design. Works on the public mains will be completed by Kaimai Valley Services, as the works division of MPDC, or by an otherwise registered Council Approved Contractor, under council approval.

9.0 Vehicle Crossing

The proposed development is to gain access from a new single vehicle crossing located adjacent to the northern road boundary. A 3.5m crossing width is proposed, leading into a shared access pavement of 3.5m width, within a shared access reserve width of 4.0m. The new vehicle crossing is required to be constructed to a residential standard for 2-6 dwellings with minimum 125mm depth concrete pavement to match the existing concrete footpath. Vehicle crossings within Kenrick Street pass over the existing kerb and channel via a concrete bridge, or a culvert to allow conveyance of stormwater flows. The existing culvert is a 200mm pipe, and this is recommended as a minimum for the new crossing location.

The existing vehicle crossing is required to be removed and the berm and kerb reinstated in accordance with RITS requirements.

There are no other items of street furniture or services effected by the proposed vehicle crossing location.

Waka Kotahi reports the current AADT is 6,628 Vehicles per day. Table 3-A of the MPDC Development Manual requires a minimum sight distance of 89m. Table 3-B of the MPDC development manual requires a minimum separation distance between vehicle crossings of 15m. Table 3-C of the MPDC Development manual requires a separation distance of 30m from an intersection to a vehicle crossing on a state highway.

Minimum sight distances are easily achievable as Kenrick Street is straight, relatively level and the existing street trees are set well back from the intersection of the vehicle crossings and the Road pavement.

On the common roadside with the development site the vehicle crossing for 68 Kenrick Street is located 25m away from the new proposed crossing location. The vehicle crossing for 72 Kenrick Street is located on Short Street and hence does not interact with the new proposed crossing location. The intersection of Short and Kenrick Streets is located 48m from the proposed vehicle crossing, approximately 7m more than the distance from the existing site vehicle crossing. Both of these are compliant with the MPDC District Plan section 9.1.2 – Access and the MPDC Development Manual section 3.12.

On the opposite side of Kenrick Street the existing residential vehicle crossing for 71 Kenrick Street is almost directly opposite the new crossing location. The existing crossing for 69 Kenrick is located 20m to the north-east and the existing crossing for 73 Kenrick is located 20m to the south-west. The proposed crossing for 70 Kenrick does not comply with the minimum separation distance of 15m when compared with the existing crossing for 71 Kenrick. Note the existing crossing location for 70 Kenrick results in 2 non-compliances for separation distances with numbers 71 and 73 Kenrick of 7m and 14m respectively. Accordingly, while the proposal is non-compliant with required separation distances, it is considered to be an improvement from the existing configuration due to the elimination of 1 non-compliant separation distance to 73 Kenrick Street.

Refer attached preliminary Design Level plans (Layout 200) for further details.

10.0 Summary and Conclusions

It is demonstrated that the site can be developed and serviced in accordance with MPDC and RITS requirements except for 1 minor non-compliance regarding vehicle crossing separation distance with 71 Kenrick Street.

Implementation of the stormwater recommendations as outlined in this report represents an improvement on the immediate receiving and downstream environments through the introduction of on-lot volume controls preventing existing uncontrolled discharges from the site. The adoption of Soakage as a primary stormwater management methodology for events up to and including the 100-year ARI event ensures post developed stormwater discharges are significantly lower than existing rates.

Key servicing requirements:

- Primary management of Stormwater on-lot by private soakage systems designed for storm events up to and including the 100-year ARI including climate change.
- New public wastewater manhole and 150mm lateral to the site with private WWMH & 3 new lateral connections to service units 2,3 & 4.
- 3 New 25mm MDPE water connections to the existing 150mm AC watermain are required to service Units 2, 3 & 4.
- A new vehicle crossing is required to a RITS residential standard for 2-6 dwellings.
- Existing vehicle crossing to be removed and berm and kerb reinstated.

11.0 Applicability of Report

This report has been prepared for the developer to supply to MPDC to support the Consent Application for development of the subject site. Information within this report is not to be used, or applicable for any other project without expressed written permission from the author.

I trust the contained information and recommendations meet your requirements. Should you have any further queries, please contact the undersigned.

Kind regards

Andrew Martin

Principal Engineer – BE (1st hons), MEngNZ

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Rev.	AMENDMENT DESCRIPTION	DATE
A	ORIGINAL RELEASE	05/09/2023

NOTES:

1) SITE SURVEY LEVELS COURTESY OF ELEVATIONS SURVEYORS LTD.

CLIENT: KENWYN TRUST

PROJECT: 70 KENRICK STREET, TE AROHA, 3320

EXISTING SITE PLAN

SCALE: 1:150(A1) / 1:300(A3)
ORIGINAL SHEET SIZE: A1

STATUS: CONSENTING

JOB-DRAWING No. 1056-100

REVISION A

LEGEND:

45.0	MAJOR CONTOURS (0.5m CONTOURS)
42.5	MINOR CONTOURS (0.1m CONTOURS)
×34.276m	DESIGN LEVEL ELEVATIONS
	INTEGRAL FENCE/RETAINING
[0.3]	PROPOSED RETAINING HEIGHTS
	DEVELOPED SECONDARY SURFACE FLOWS
	BUILDING FOUNDATION
	ROW/PATH/DRIVEWAY CONCRETE

Sustain R

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PROJECT: 70 KENRICK STREET,
TE AROHA,
3320

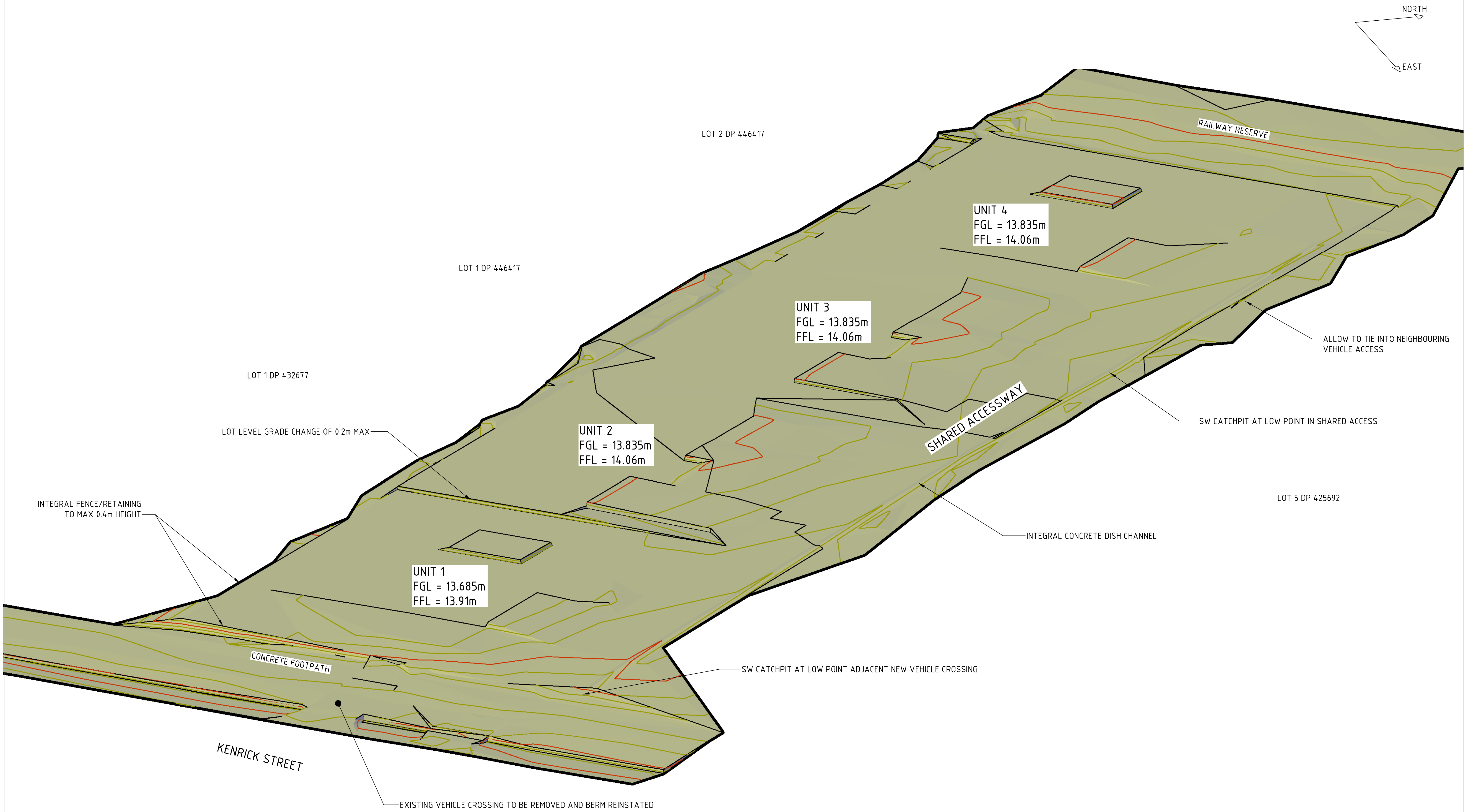
DESIGN LEVELS AND ACCESS PLAN

SCALE: 1:150(A1) / 1:300(A3)
ORIGINAL SHEET SIZE: A1
0 4.5 9 Meters

STATUS: CONSENTING

JOB-DRAWING No. 1056-200

REVISION A



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CLIENT: KENWYN TRUST

PROJECT: 70 KENRICK STREET, TE AROHA, 3320

DESIGN LEVELS 3D PERSPECTIVE

SCALE: NOT TO SCALE
ORIGINAL SHEET SIZE: A1

STATUS: CONSENTING

JOB-DRAWING No. 1056-202

REVISION A

LEGEND:

45.0 — MAJOR CONTOURS (0.5m CONTOURS)

42.5 - - - MINOR CONTOURS (0.1m CONTOURS)

INTEGRAL FENCE/RETAINING

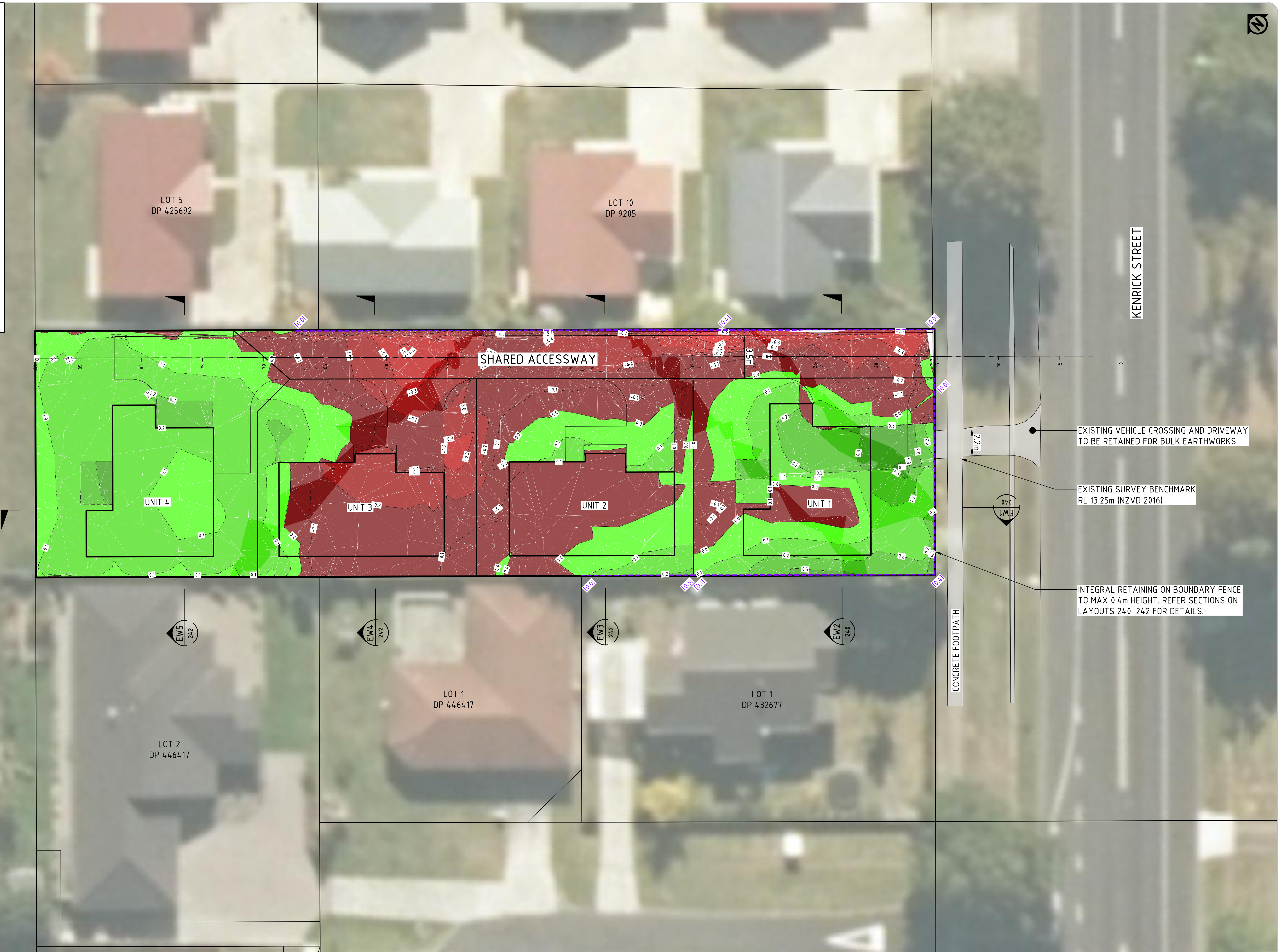
[0.3] PROPOSED RETAINING HEIGHTS

TOTAL EARTHWORKS AREA =1,470m^2
BULK IN-SITU CUT = 99m^3
BULK IN-SITU FILL = 96m^3

Surface Analysis:
Elevation Ranges

Number	Color	Minimum Elevation (m)	Maximum Elevation (m)
1		-0.800	-0.700
2		-0.700	-0.600
3		-0.600	-0.500
4		-0.500	-0.400
5		-0.400	-0.300
6		-0.300	-0.200
7		-0.200	-0.100
8		-0.100	0.000
9		0.000	0.100
10		0.100	0.200
11		0.200	0.300
12		0.300	0.400
13		0.400	0.500

FILL | CUT



Sustain R

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PO Box 228, RAGLAN, NEW ZEALAND - 3265

Rev.	AMENDMENT DESCRIPTION	DATE
A	ORIGINAL RELEASE	05/09/2023

NOTES:

1) SITE SURVEY LEVELS COURTESY OF ELEVATIONS SURVEYORS LTD.

CLIENT: KENWYN TRUST

PROJECT: 70 KENRICK STREET, TE AROHA, 3320

EARTHWORKS PLAN

SCALE: 1:150(A1) / 1:300(A3) 0 4.5 9 Meters
ORIGINAL SHEET SIZE: A1

STATUS: CONSENTING

JOB-DRAWING No. 1056-210

REVISION A

LEGEND:

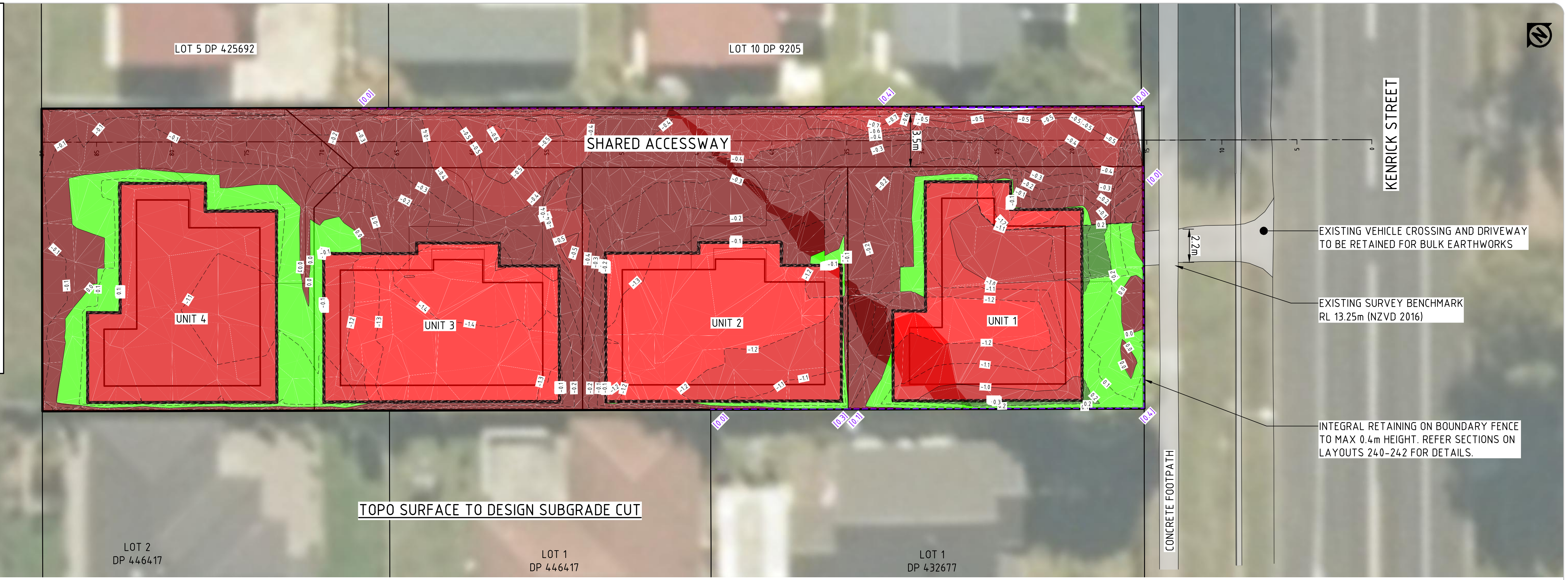
45.0 — MAJOR CONTOURS (0.5m CONTOURS)
42.5 - - - MINOR CONTOURS (0.1m CONTOURS)
INTEGRAL FENCE/RETAINING
[0.3] PROPOSED RETAINING HEIGHTS

TOTAL EARTHWORKS AREA =1,470m^2
BULK IN-SITU CUT = 912m^3
BULK IN-SITU FILL = 12m^3

Surface Analysis:
Elevation Ranges

Number	Color	Minimum Elevation (m)	Maximum Elevation (m)
1		-1.600	-1.400
2		-1.400	-1.200
3		-1.200	-1.000
4		-1.000	-0.800
5		-0.800	-0.600
6		-0.600	-0.400
7		-0.400	-0.200
8		-0.200	0.000
9		0.000	0.200
10		0.200	0.400

CUT
FILL



TOPO SURFACE TO DESIGN SUBGRADE CUT

LEGEND:

45.0 — MAJOR CONTOURS (0.5m CONTOURS)
42.5 - - - MINOR CONTOURS (0.1m CONTOURS)
INTEGRAL FENCE/RETAINING
[0.3] PROPOSED RETAINING HEIGHTS

TOTAL EARTHWORKS AREA =1,470m^2
BULK IN-SITU CUT = 0m^3
BULK IN-SITU FILL = 896m^3

Surface Analysis:
Elevation Ranges

Number	Color	Minimum Elevation (m)	Maximum Elevation (m)
1		-0.200	0.000
2		0.000	0.200
3		0.200	0.400
4		0.400	0.600
5		0.600	0.800
6		0.800	1.000
7		1.000	1.200
8		1.200	1.400
9		1.400	1.600

CUT
FILL

ESTIMATED CONSTRUCTION VOLUMES	
COMPACTION FACTOR (ASSUMED)	0.85
DESCRIPTION	IN-SITU VOL (m^3)
GAP 65 SUBGRADE IMPROVEMENT LAYER (0.4m DEPTH)	244m^3
RE-USE SITE WON SAND (BULK) (0.8m DEPTH)	506m^3
RE-USE CUT VOLUME (EXPANDED)	595m^3
BALANCE - EXISTING CUT TO WASTE	317m^3
BALANCE - IMPORTED CLEAN FILL (TOPSOIL, PAVEMENT, CONCRETE - BULK)	146m^3
TOTAL EXPORTED (IN SITU)	317m^3
TOTAL IMPORTED (IN SITU)	390m^3

DESIGN SUBGRADE SURFACE TO FINISHED DESIGN LEVEL FILL

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Rev.	AMENDMENT DESCRIPTION	DATE
A	ORIGINAL RELEASE	05/09/2023

NOTES:

1) SITE SURVEY LEVELS COURTESY OF ELEVATIONS SURVEYORS LTD.
2) REFER TO HDGEO GAR, APPENDIX D (18/10/2023) FOR FOUNDATION SUBGRADE IMPROVEMENT LAYER DETAILS.

CLIENT: KENWYN TRUST

PROJECT: 70 KENRICK STREET, TE AROHA, 3320

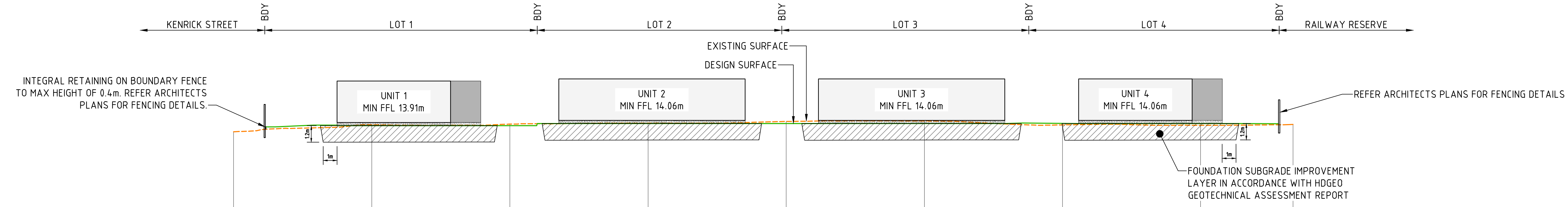
EARTHWORKS PLAN - DETAILS

SCALE: 1:150(A1) / 1:300(A3)
ORIGINAL SHEET SIZE: A1
0 4.5 9 Meters

STATUS: CONSENTING

JOB-DRAWING No. 1056-212

REVISION A

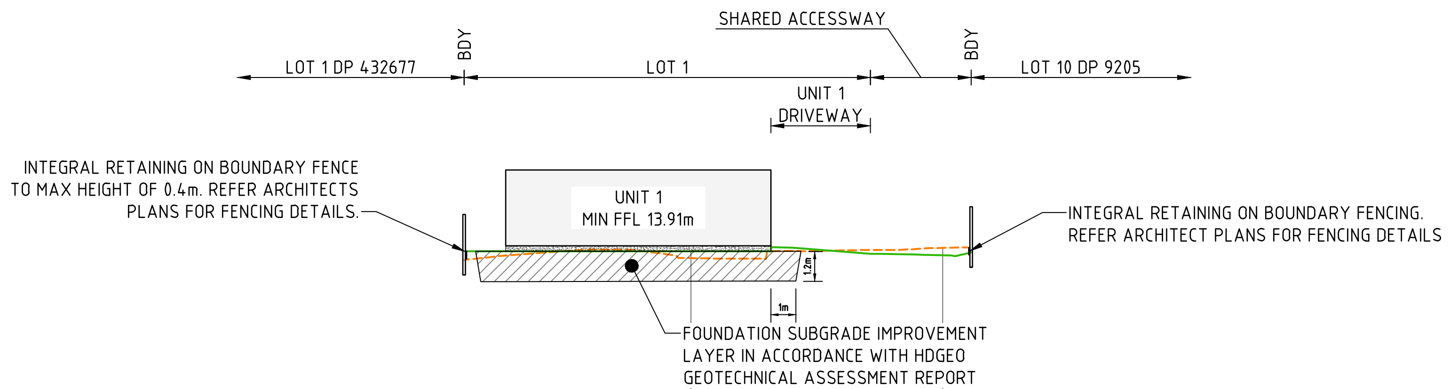


VERT EXAG 1:1
Datum 5.000

DESIGN LEVELS		13.640	13.720	13.685	13.685	13.685	13.685	13.685	13.685	13.685	13.830	13.835	13.835	13.835	13.835	13.835	13.835	13.835	13.835
EXISTING LEVELS	13.397	13.475	13.530	13.605	13.749	13.708	13.700	13.706	13.706	13.797	13.822	13.829	13.855	13.857	13.856	13.857	13.858	13.877	13.935
DEPTH		-0.165	-0.191	-0.080	0.064	0.023	0.015	0.021	0.021	0.112	-0.009	-0.006	0.020	0.022	0.021	0.022	0.023	0.042	0.100
CHAINAGE	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20.000	22.000	24.000	26.000	28.000	30.000	32.000	34.000	36.000	38.000

DESIGN LEVELS	13.832	13.835	13.835	13.835	13.835	13.835	13.835	13.835	13.840	13.863	13.845	13.835	13.835	13.835	13.835	13.835	13.834	13.826	
EXISTING LEVELS	13.983	14.012	14.031	14.034	14.032	14.022	13.998	13.898	13.796	13.719	13.737	13.769	13.786	13.724	13.712	13.708	13.714	13.729	13.751
DEPTH	0.152	0.177	0.196	0.199	0.197	0.187	0.163	0.063	-0.043	-0.144	-0.108	-0.066	-0.049	-0.111	-0.123	-0.127	-0.120	-0.097	
CHAINAGE	40.000	42.000	44.000	46.000	48.000	50.000	52.000	54.000	56.000	58.000	60.000	62.000	64.000	66.000	68.000	70.000	72.000	74.000	76.000

EW1 LONG SECTION



VERT EXAG 1:1
Datum 5.000

DESIGN LEVELS		13.685	13.685	13.685	13.685	13.685	13.685	13.826	13.677	13.575	13.535		
EXISTING LEVELS		13.457	13.620	13.754	13.704	13.416	13.399	13.700	13.722	13.740	13.823		
DEPTH		-0.228	-0.065	0.069	0.019	-0.269	-0.286	-0.126	0.045	0.165	0.289		
CHAINAGE	0.000	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20.000	22.000	22.127

EW2 LONG SECTION

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Rev.	AMENDMENT DESCRIPTION	DATE
A	ORIGINAL RELEASE	05/09/2023
B	GEOTECH SIL DETAILS INCLUDED	11/12/2023

NOTES:
1) SITE SURVEY LEVELS COURTESY OF ELEVATIONS SURVEYORS LTD.

CLIENT: KENWYN TRUST

PROJECT: 70 KENRICK STREET, TE AROHA, 3320

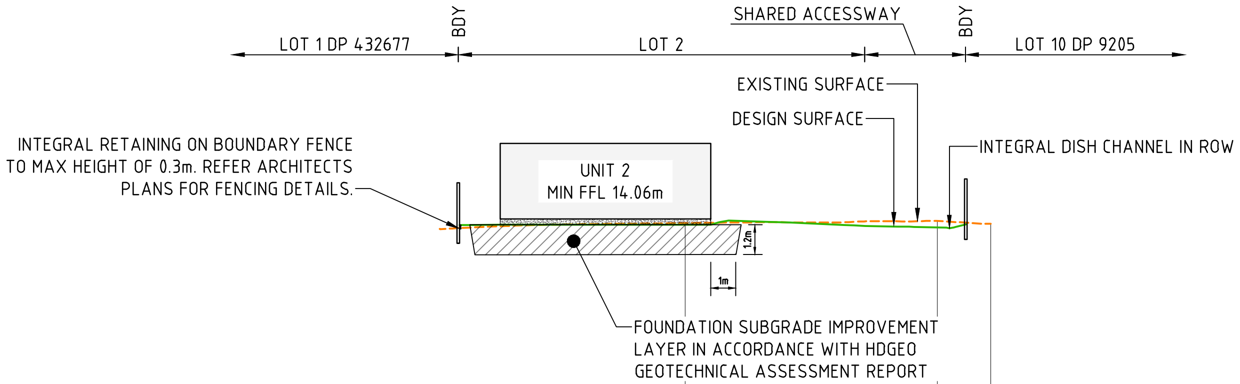
EARTHWORKS SECTIONS 1 OF 2

SCALE: 1:150(A1) / 1:300(A3)
ORIGINAL SHEET SIZE: A1
0 4.5 9 Meters

STATUS: CONSENTING

JOB-DRAWING No. 1056-240

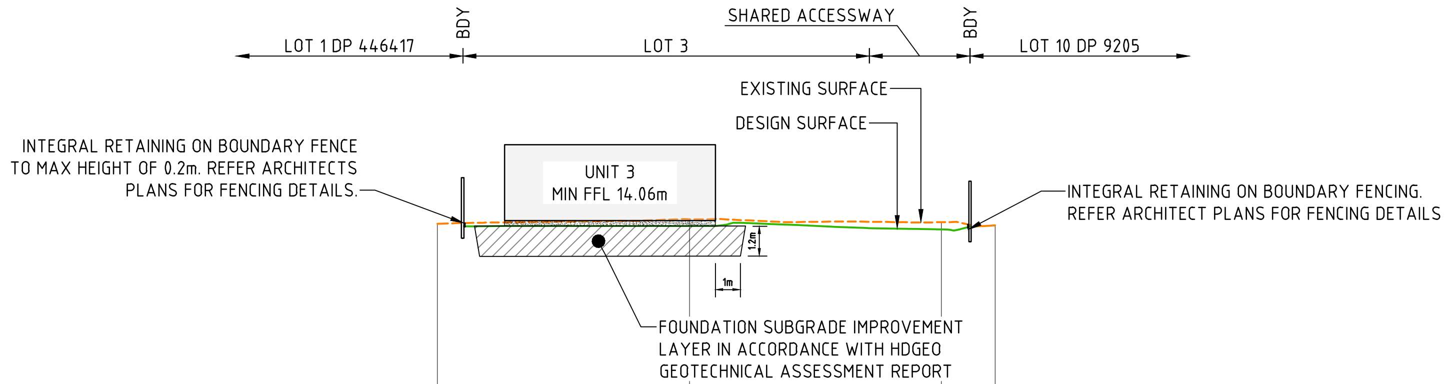
REVISION B



VERT EXAG 1:1
Datum 5.000

DESIGN LEVELS		13.829	13.835	13.835	13.835	13.835	13.984	13.923	13.835	13.768	13.728	
EXISTING LEVELS		13.743	13.817	13.851	13.873	13.895	13.918	13.927	13.920	13.973	13.979	13.867
DEPTH		-0.086	-0.018	0.016	0.038	0.060	-0.067	0.004	0.085	0.205	0.251	
CHAINAGE	0.000	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20.000	22.000

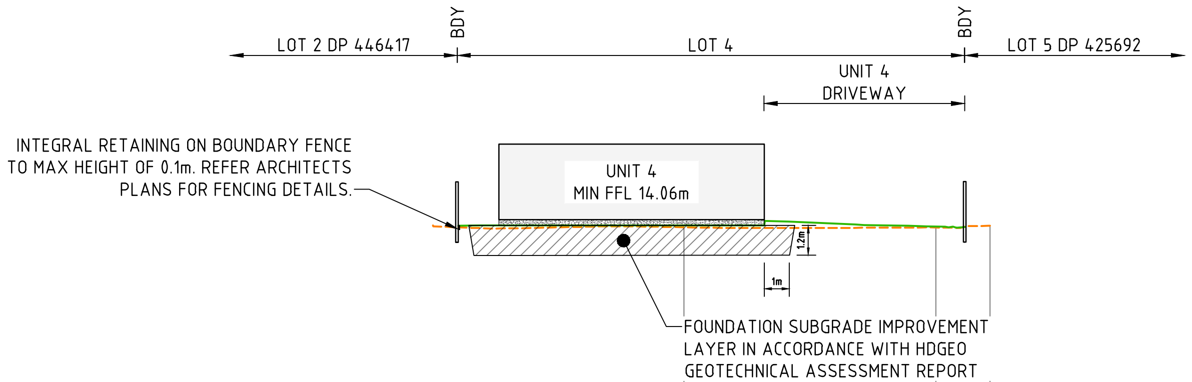
EW3 LONG SECTION



VERT EXAG 1:1
Datum 5.000

DESIGN LEVELS	13.829	13.835	13.835	13.835	13.835	13.961	13.891	13.791	13.738	13.698	
EXISTING LEVELS	13.974	14.002	14.028	14.044	14.110	14.075	13.990	14.017	13.995	13.988	13.857
DEPTH	0.145	0.167	0.193	0.209	0.275	0.114	0.099	0.226	0.257	0.291	
CHAINAGE	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20.000	22.000

EW4 LONG SECTION



VERT EXAG 1:1
Datum 5.000

DESIGN LEVELS		13.829	13.835	13.835	13.835	13.835	13.835	13.989	13.901	13.832	13.792	
EXISTING LEVELS		13.721	13.732	13.774	13.793	13.758	13.725	13.727	13.732	13.741	13.747	13.812
DEPTH		-0.108	-0.103	-0.061	-0.042	-0.077	-0.110	-0.262	-0.169	-0.091	-0.045	
CHAINAGE	0.000	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20.000	22.000

EW5 LONG SECTION

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Rev.	AMENDMENT DESCRIPTION	DATE
A	ORIGINAL RELEASE	05/09/2023
B	GEOTECH SIL DETAILS INCLUDED	11/12/2023

NOTES:
1) SITE SURVEY LEVELS COURTESY OF ELEVATIONS SURVEYORS LTD.

CLIENT: KENWYN TRUST

PROJECT: 70 KENRICK STREET, TE AROHA, 3320

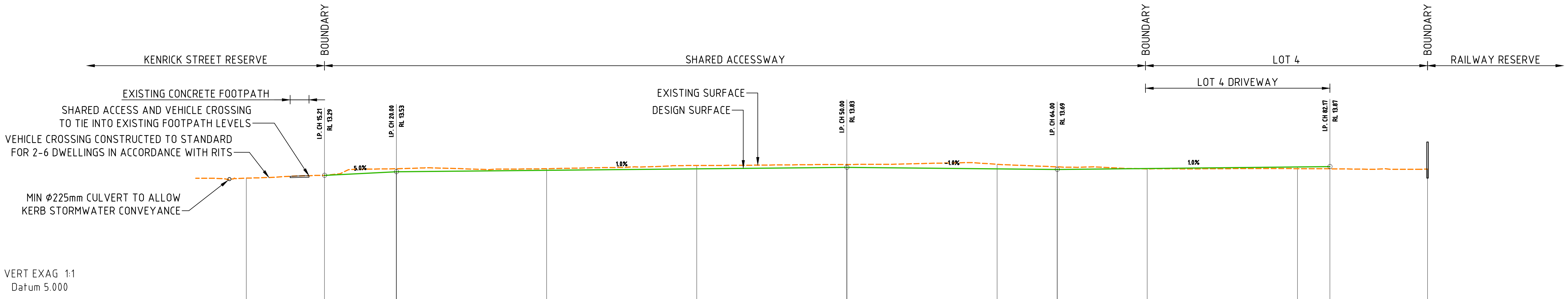
EARTHWORKS SECTIONS 2 OF 2

SCALE: 1:150(A1) / 1:300(A3)
ORIGINAL SHEET SIZE: A1
0 4.5 9 Meters

STATUS: CONSENTING

JOB-DRAWING No. 1056-242

REVISION B

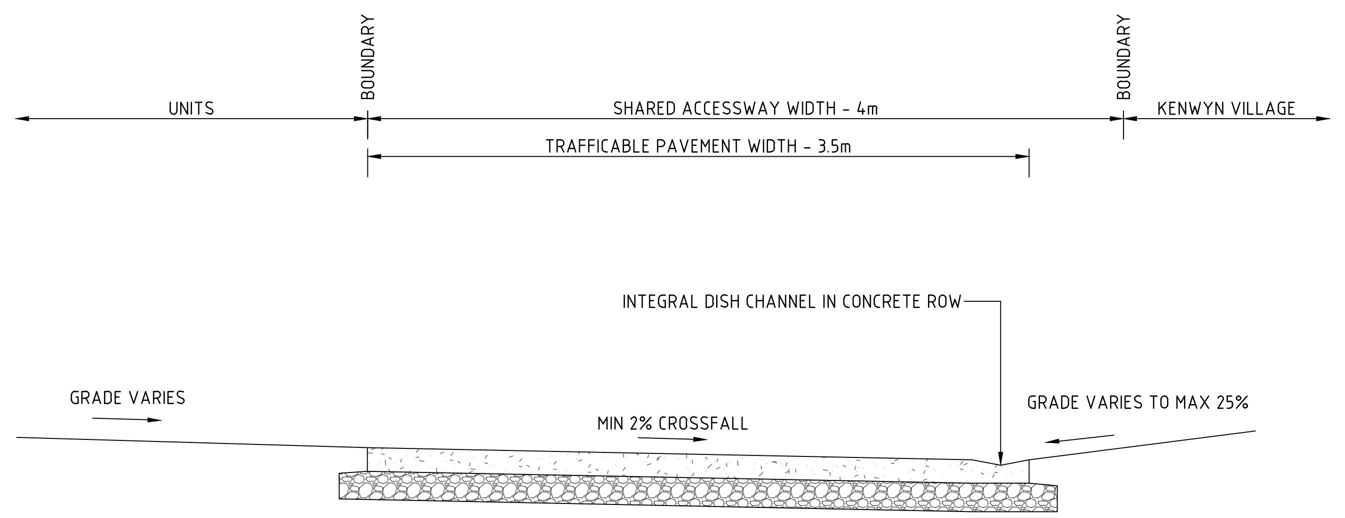


DESIGN LEVELS									13.290 / 13.329	13.429	13.529	13.549	13.569	13.589	13.609
EXISTING LEVELS					13.092	13.107	13.176	13.260	13.371	13.705	13.732	13.792	13.745	13.677	13.713
DEPTH									0.042	0.276	0.203	0.243	0.176	0.088	0.104
CHAINAGE	0.000	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20.000	22.000	24.000	26.000	28.000

DESIGN LEVELS	13.629	13.649	13.669	13.689	13.709	13.729	13.749	13.769	13.789	13.809	13.829	13.809	13.789	13.769	13.749
EXISTING LEVELS	13.736	13.773	13.808	13.850	13.908	13.947	13.956	13.972	13.990	14.008	14.017	14.024	14.053	14.101	14.141
DEPTH	0.107	0.124	0.139	0.161	0.199	0.218	0.207	0.203	0.201	0.199	0.188	0.216	0.264	0.332	0.392
CHAINAGE	30.000	32.000	34.000	36.000	38.000	40.000	42.000	44.000	46.000	48.000	50.000	52.000	54.000	56.000	58.000

DESIGN LEVELS	13.729	13.709	13.689	13.709	13.729	13.749	13.769	13.789	13.809	13.829	13.849	13.869	13.871		
EXISTING LEVELS	14.030	13.939	13.858	13.847	13.782	13.725	13.733	13.730	13.742	13.748	13.738	13.728	13.708	13.715	13.698
DEPTH	0.301	0.230	0.169	0.138	0.053	-0.024	-0.036	-0.059	-0.067	-0.081	-0.111	-0.141			
CHAINAGE	60.000	62.000	64.000	66.000	68.000	70.000	72.000	74.000	76.000	78.000	80.000	82.000	84.000	86.000	88.000

ROW LONG SECTION



TYPICAL SHARED ACCESSWAY CROSS-SECTION
SCALE 1:20 (A1) / 1:40 (A3)

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Rev.	AMENDMENT DESCRIPTION	DATE
A	ORIGINAL RELEASE	05/09/2023

NOTES:

CLIENT: KENWYN TRUST

PROJECT: 70 KENRICK STREET, TE AROHA, 3320

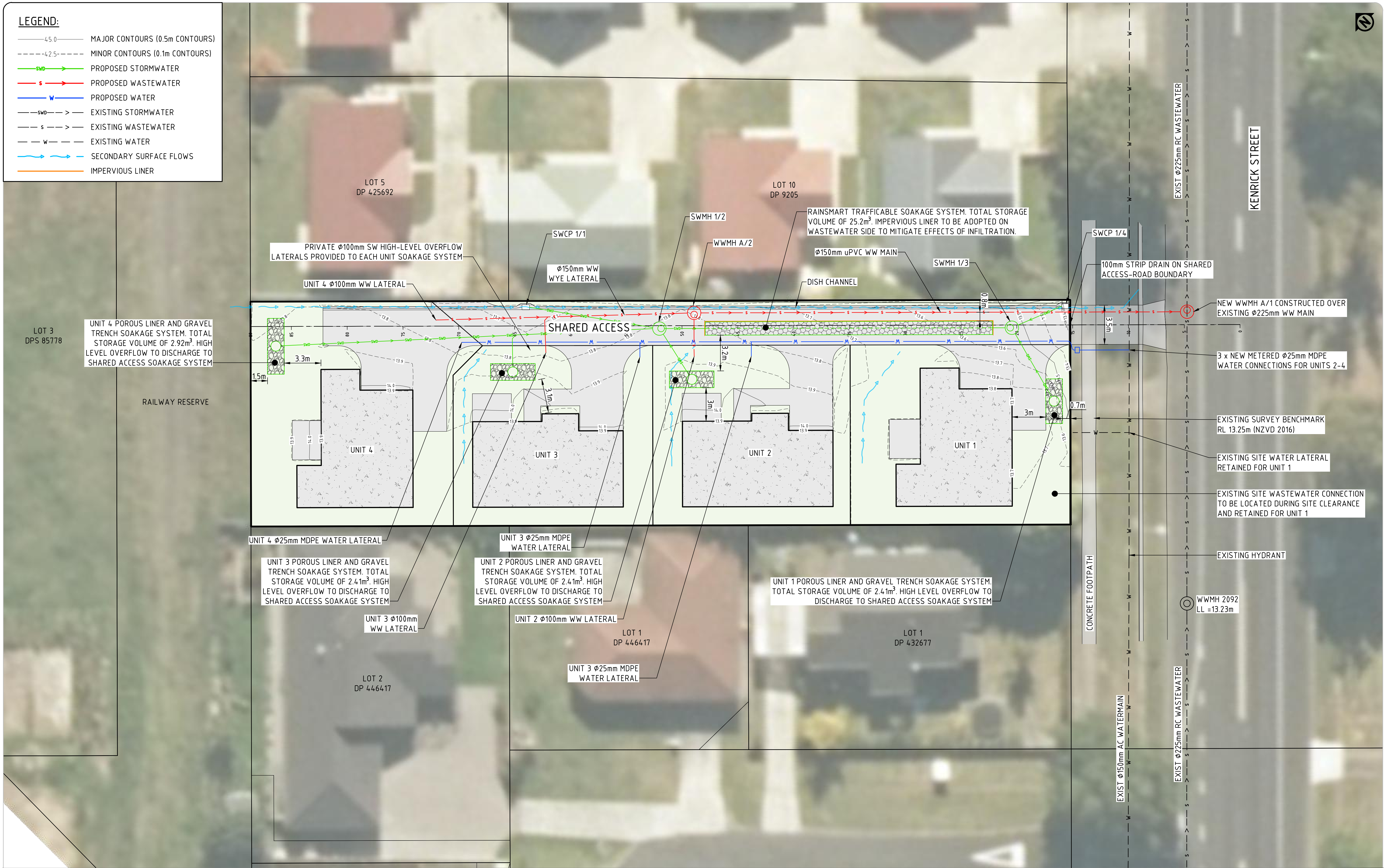
SHARED ACCESSWAY PROFILE AND SECTION

SCALE: 1:150(A1) / 1:300(A3)
ORIGINAL SHEET SIZE: A1
0 4.5 9 Meters

STATUS: CONSENTING

JOB-DRAWING No. 1056-310

REVISION A



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Rev.	AMENDMENT DESCRIPTION	DATE
A	ORIGINAL RELEASE	05/09/2023

NOTES:

1) SITE SURVEY LEVELS COURTESY OF ELEVATIONS SURVEYORS LTD.

CLIENT: KENWYN TRUST

PROJECT: 70 KENRICK STREET, TE AROHA, 3320

3 - WATERS SERVICING PRELIMINARY PLAN

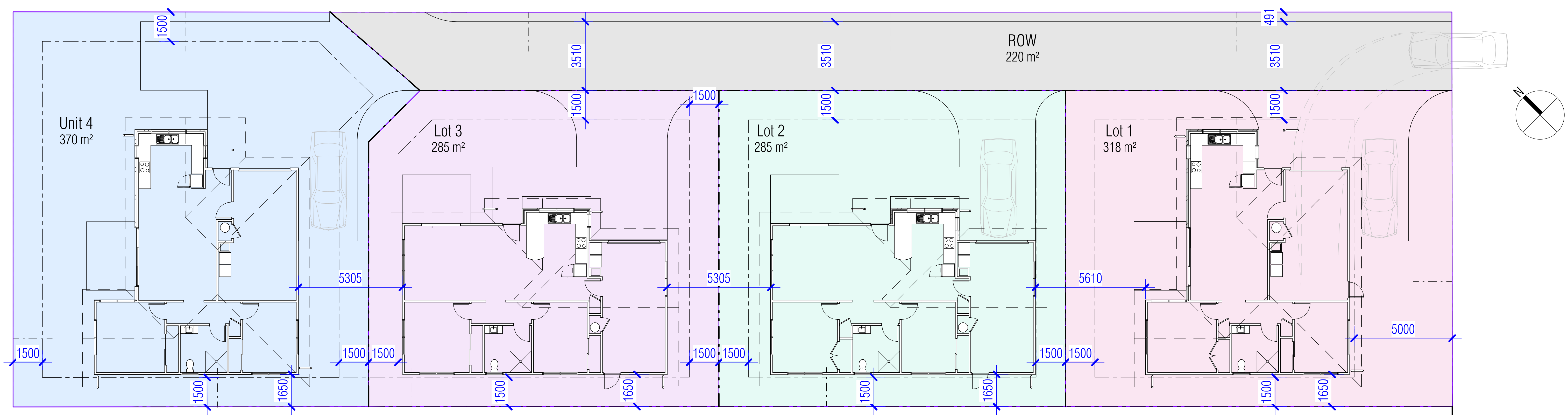
SCALE: 1:150(A1) / 1:300(A3)

ORIGINAL SHEET SIZE: A1

STATUS: CONSENTING

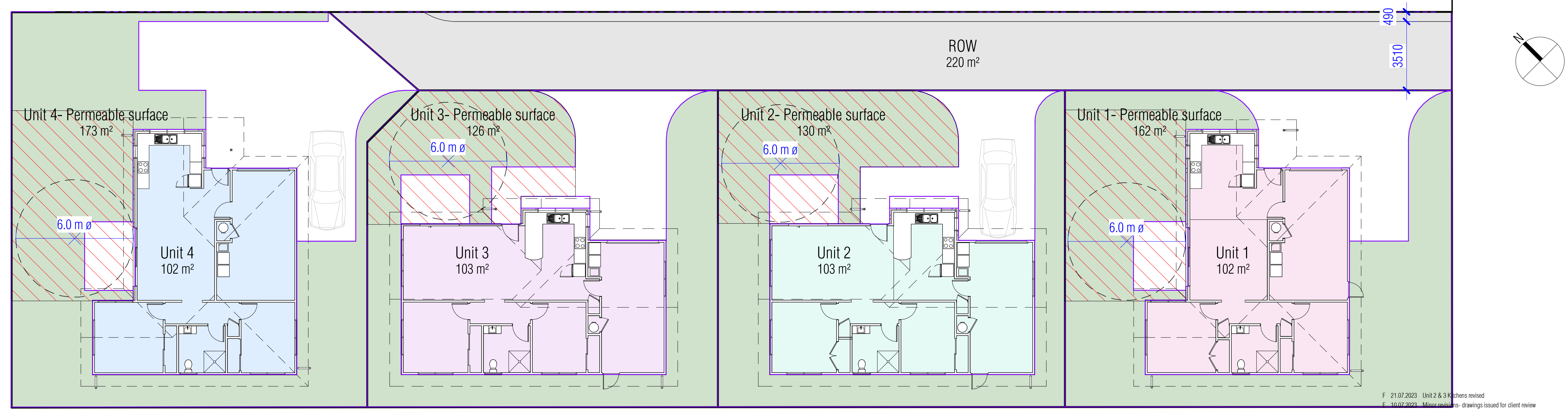
JOB-DRAWING No. 1056-400

REVISION A



INDICATIVE PROPERTY BOUNDARIES

SCALE 1 : 200



Building Coverage 45% max.	166m²
Proposed Coverage	102m²
Permeable surface 20% min.	74m²
Proposed Permeable Surface	173m²
Household Recreational Space	60m² min.
Proposed HRS	60m²

Building Coverage 45% max.	128m²
Proposed Coverage	103m²
Permeable surface 20% min.	57m²
Proposed Permeable Surface	126m²
Household Recreational Space	60m² min.
Proposed HRS	60m²

Building Coverage 45% max.	128m²
Proposed Coverage	103m²
Permeable surface 20% min.	57m²
Proposed Permeable Surface	130m²
Household Recreational Space	60m² min.
Proposed HRS	60m²

Building Coverage 45% max.	143m²
Proposed Coverage	102m²
Permeable surface 20% min.	63m²
Proposed Permeable Surface	162m²
Household Recreational Space	60m² min.
Proposed HRS	60m²

MATAMATA PIAKO DISTRICT PLAN CHECK

SCALE 1 : 200

F	21.07.2023	Unit 2 & 3 Kitchens revised
E	10.07.2023	Minor revisions- drawings issued for client review
D	30.05.2023	Drawings issued for client review.
C	26.05.2023	Minor revisions
B	24.05.2023	Concept updated
A	01.03.2023	Amended Unit 13 to Unit Type 1 & Unit 14 to Unit Type 2

EDWARDSWHITE

REGISTERED ARCHITECTS

PROJECT
KENWYN VILLAGE
KENRICK STREET
TE AROHA

REF
254-05

original sheet size A3

SHEET
INDICATIVE PROPERTY BOUNDARIES &
DISTRICT PLAN CHECK

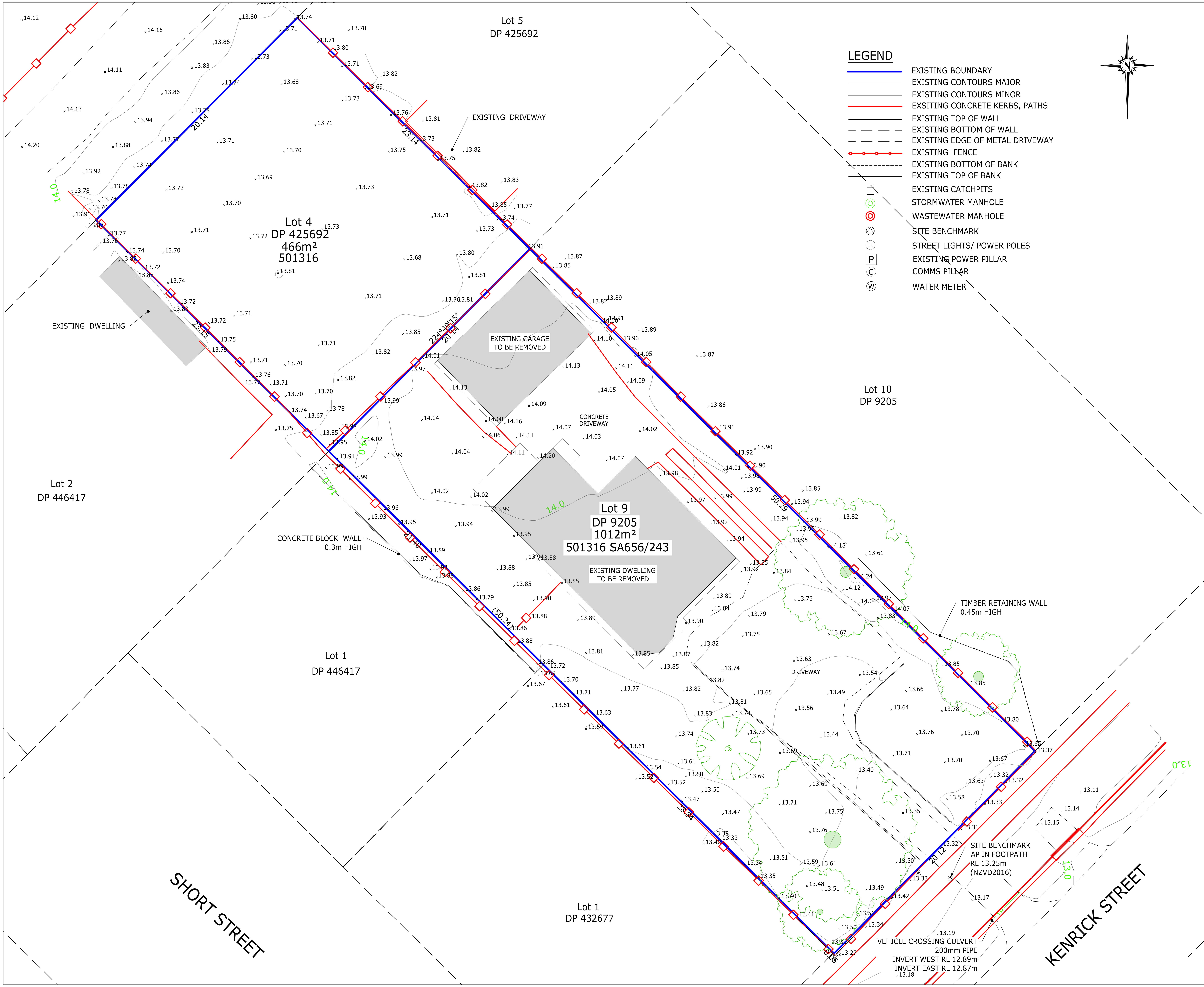
Scale: 1 : 200

CONCEPT 21.07.2023

Sk2

REV
F

Level 3 The Riverbanks 286 Victoria Street Hamilton NZ (07) 839 0095



NOTES

1. LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM
   ORIGIN OF LEVELS
   SS 62 SO 23608
   RL 13.011m
   (FROM LINZ GEODETIC DATABASE 27.02.23)
2. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT 2000
   ORIGIN OF COORDINATES
   SS 62 SO 23608
   675210.496 mN
   482891.082 mE
3. CONTOURS ARE AT 0.2m INTERVALS. CONTOURS SHOWN ON THIS PLAN HAVE BEEN ELECTRONICALLY COMPUTED FROM SPOT HEIGHT DETERMINATIONS AND MAY NOT REPRESENT THE TRUE GROUND LEVELS. ANY CRITICAL HEIGHTS SHOULD BE CHECKED ON SITE PRIOR TO DESIGN AND CONSTRUCTION COMMENCING.
4. THIS PLAN HAS BEEN CARRIED OUT TO TOPOGRAPHICAL STANDARDS. ALL LEVELS SHOWN ARE CORRECT AT TIME OF SURVEY. CRITICAL DIMENSIONS AND LEVELS SHOULD BE VERIFIED.
5. BOUNDARIES SHOWN ON THIS PLAN HAVE BEEN ADOPTED FROM UNDERLYING SURVEY PLANS ARE FROM LAND INFORMATION NZ DCDB AND HAVE NOT BEEN SURVEYED. A BOUNDARY DEFINITION SURVEY SHOULD BE CARRIED OUT TO ESTABLISH EXACT BOUNDARY POSITIONS ON SITE.
6. ALL EASEMENTS, COVENANTS AND OTHER LEGAL INSTRUMENTS ASSOCIATED WITH THIS SITE MAY NOT BE SHOWN ON THIS PLAN. AN INVESTIGATION OF THE MOST CURRENT LEGAL RECORDS SHOULD BE UNDERTAKEN PRIOR TO DESIGN AND CONSTRUCTION COMMENCING.
7. SERVICES POSITIONS AND ALIGNMENT MAY HAVE BEEN OBTAINED FROM THIRD PARTY RECORDS AND SHOULD BE VERIFIED ON SITE PRIOR TO CONSTRUCTION COMMENCING. ELEVATION SURVEYORS DOES NOT IN ANY WAY GUARANTEE THE ACCURACY OF ANY UNDERGROUND SERVICE SHOWN ON THIS PLAN.
8. THIS PLAN MAY NOT PROVIDE ENOUGH INFORMATION FOR HEIGHT TO BOUNDARY CALCULATIONS. WHERE ANY PROPOSED BUILDING OR PART THEREOF IS REQUIRED TO MEET COUNCIL'S HEIGHT IN RELATION TO BOUNDARY CONTROLS, ELEVATION SURVEYORS SHOULD BE CONSULTED.
9. THESE NOTES ARE AN INTEGRAL PART OF THIS PLAN.
10. THIS PLAN IS ISSUED FOR A SPECIFIC PROJECT AND MAY NOT BE ALTERED OR USED FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF ELEVATION SURVEYORS.
11. LEGAL DESCRIPTION
    LOT 9 DP 9205
    COMPRISED IN RT SA656/243
    TOTAL AREA 1012m²

    LOT 4 DP 425692
    COMPRISED IN RT 501316
    TOTAL AREA 466m²

REF	REVISIONS	BY	DATE
A	CLIENT ISSUE		02-03-2023

elevation surveying · construction · management

CLIENT:

KENWYN TRUST

TITLE:

TOPOGRAPHICAL SURVEY
70 KENRICK STREET
TE AROHA

CREATED BY	DATE:	SIGNATURE:
DRAWN BY:	DATE:	SIGNATURE:
REVIEWED:	DATE:	SIGNATURE:
VERIFIED:	DATE:	SIGNATURE:

ISSUE: CLIENT INFORMATION

JOB No: ES-0336.00 1:125 SCALE (A3): 1:250 (A3)

DRAWING NUMBER: ES-0336.00 TS 01

REV: A

Sustain R

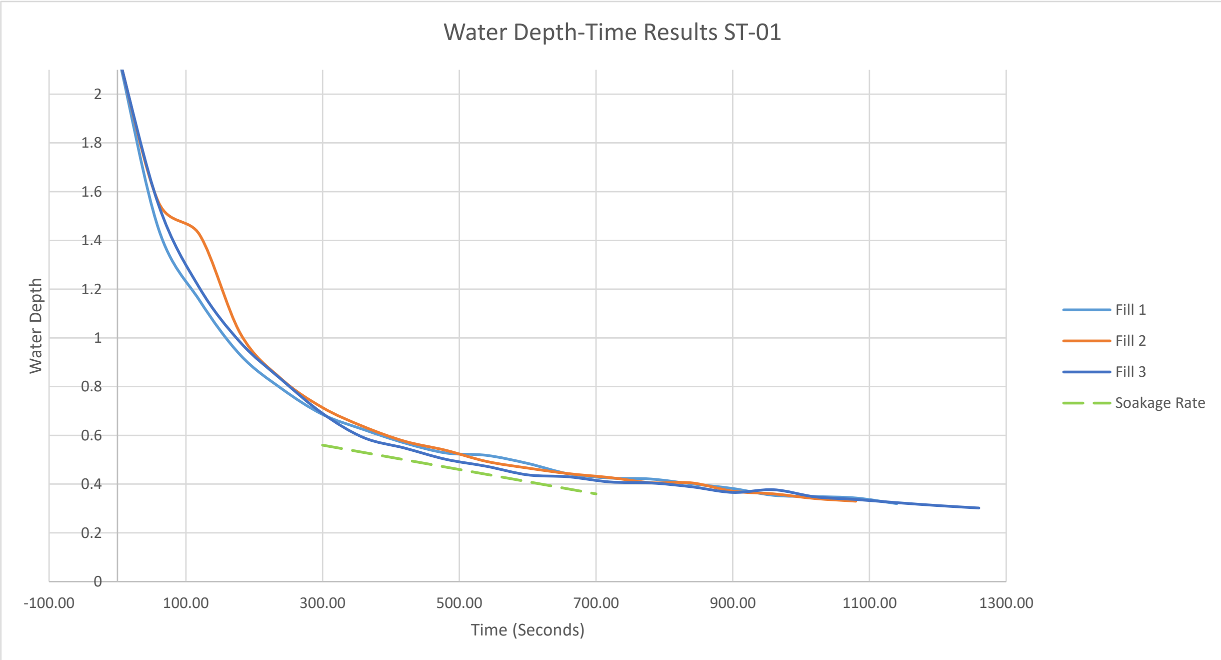
Soils Soakage Assesment

Client	Kenwyn Trust	Testing Completed by:	AM
Site	70 Kenrick Street, Te Aroha	Company:	Sustain R
Date Assesed	3/02/2023	Testing Completed on:	3/02/2023

This sheet details the results of the soakge testing carried out in general accordance with NZBC E1 - Surface Water.

Notes:

1) Total Hole depth of 2.175m
2) Overcast & light rain, following 2 x atmospheric river events



Calculation of Soakage Rate: ST-01

	Start	End
Water Depth (m)	0.56	0.36
Time (Seconds)	300	700

Soakage Rate	1800 mm/hr	
Adopted Rate[1]	**900 mm/hr**	**ST-01**

[1] Rate reduced by 50% in accordance with RITS to allow for performance reduction over time.

Soils Log

Depth BGL (m)	Description
0	Dark brown organic topsoil. Dry
0.3 0.5	Tan clayey SILT, orange mottles. Forms 10mm ribbons, Dry
0.7	Transition to grey SILTS. Weak structure, Dry
1.1	SILTS with fine sand. Light grey. No structure, Dry
1.7	SAND fine, with light grey silts. Dry
1.8	Orange stains at 1.8m BGL. Dry
2.175	Coarse light grey SAND. Dry.

Image

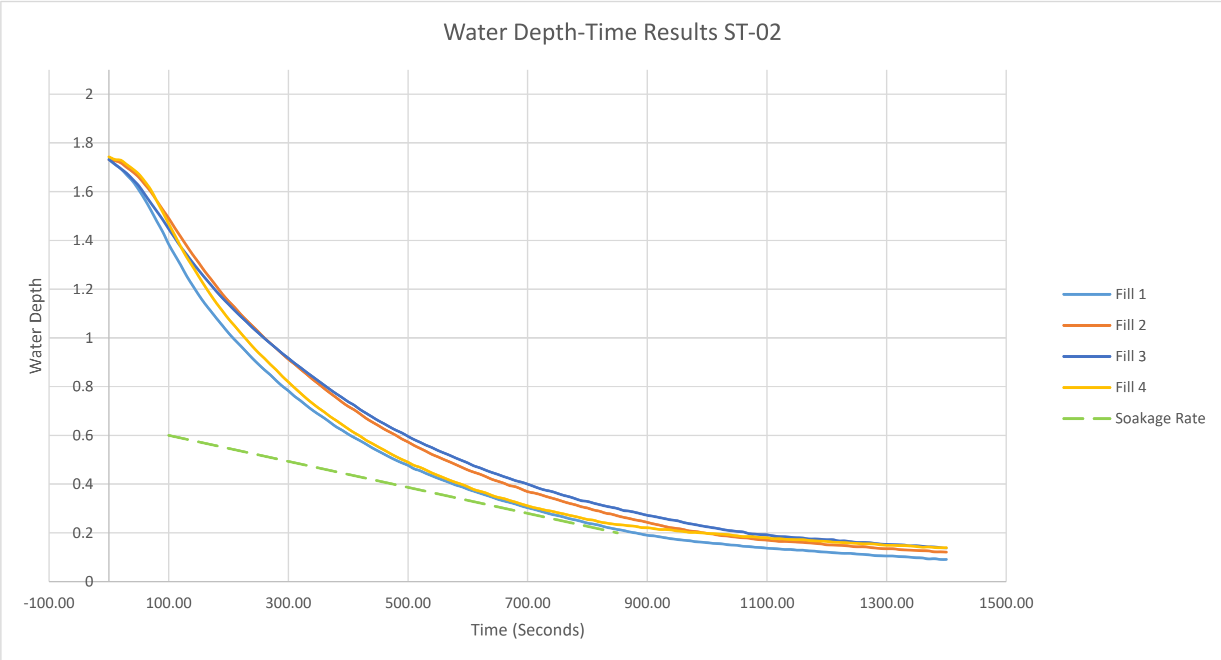
Soils Soakage Assesment

Client	Kenwyn Trust	Testing Completed by:	RR
Site	70 Kenrick Street, Te Aroha	Company:	HD Geo
Date Assesed	11/09/2023	Testing Completed on:	15/02/2023

This sheet details the results of the soakge testing carried out in general accordance with NZBC E1 - Surface Water.

Notes:

1) Total Hole depth of 2.0m



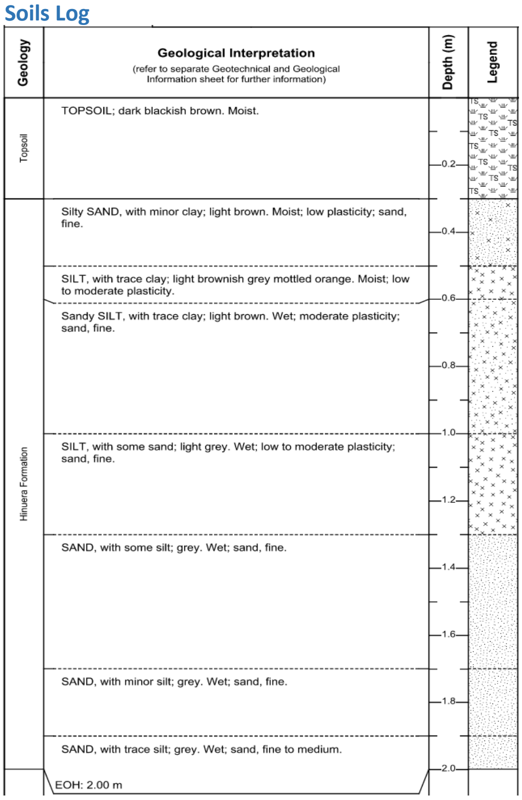
Calculation of Soakage Rate: ST-01

	Start	End
Water Depth (m)	0.6	0.2
Time (Seconds)	100	850

Soakage Rate	1920 mm/hr	
Adopted Rate[1]	960 mm/hr	ST-01

[1] Rate reduced by 50% in accordance with RITS to allow for performance reduction over time.

Soils Log



Image

Date:	15.02.23
Logged By:	SW
Checked By:	RR

Stormwater Catchment Breakdown

Client	Kenwyn Trust		
Site	70 Kenrick Street, Te Aroha		
Date	1/09/2023	Status:	Consenting

This sheet details the catchment breakdown of the subject site
Data Source = CAD plan

Existing Site:			Developed Site:						
Catchment Type			**Lot 1**	**Lot 2**	**Lot 3**	**Lot 4**	**Shared Access**	**Total**	**C-Factor***
Roof	147		133	131	131	134		529	0.95
Garage	61							0	0.95
Driveway			35	36	40	78	195	384	0.85
Concrete Path/Patio			8	7	7	7		29	0.85
Pervious Connected**			84	45	46	132	0	307	0.25
Pervious Disconnected***			58	66	61	19	25	229	0.25
Total	1478		318	285	285	370	220	1478	0.67
% Impervious	14%		55%	61%	62%	59%	89%	64%	

* NZBC E1 run off coeficients for Rational Method Assesments
** Pervious area captured with on-lot yard sumps
*** Pervious area grading to Shared Accessway and captured in the Shared Accessway management system

Upslope catchment:

A minor pervious catchment area is sited upslope of the development site. Refer CAD plans for details.

Catchment Type	**Area (m^2)**	**C-Factor***	**100-yr ARI Peak Flow (L/s)**
Pervious (Lawn)	195	0.25	2.86
Gravel Access	85	0.7	3.49
		Total	**6.34**

This catchment will be required to be conveyed through the subject site during the 100-year ARI event and greater

Preliminary Design Soakage Calculations

Soakage calculations have been performed in accordance with RITS Section 4 - Stormwater and NZBC E1/VM1 - Surface water
MPDC Stormwater Soakage Manual and Stormwater Bylaw requires that the site is to manage the 100 year ARI event within property boundaries.
Based on suitably available space the system will need to be distributed across the site.

Soakage System Catchment

Serviced Area	1478	m^2
Catchment averaged C-factor	0.67	
Soakage Rate	900	mm/hr

(Average soakage rate adopted for preliminary calculations, reduced by 50% in accordance with the RITS)

Soakage System Sizing - Cirtex Rainsmart Trafficable System

	Unit Dim	# Units	Total	
Length	0.715	36	25.74	m
Width	0.4	3	1.2	m
Depth	0.44	2	0.86	m
Additional units				
Total number of units	216			
Porosity	0.95			
Basal Infiltration Area	30.9			m^2
Total Effective Storage Volume	25.2			m^3

Distributed System:

Porous Liner	Dims	
Diameter	0.9	m
Depth	0.9	m
Total number of units	1	
Porosity	1	
Basal Area	0.636	m^2
Effective Storage Volume	0.6	m^3

Gravel Filled Trench	Unit 1	Unit 2	Unit 3	Unit 4	
Width	1.5	1.5	1.5	1.5	m
Length	4	4	4	5	m
Depth	0.9	0.9	0.9	0.9	m
Porosity	0.38	0.38	0.38	0.38	
Basal Area	6	6	6	7.5	m^2
Effective Storage Volume	2.05	2.05	2.05	2.57	m^3
Total Storage Volume	2.41	2.41	2.41	2.92	m^3

Total Combined System Basal Area	**56.4**	**m^2**
Total Combined System Storage Volume	**35.4**	**m^3**

Storage Volume Assesment:

Duration Event (min)	10	20	30	60	120	360	720	1440	2880	4320
Rainfall intensity (mm/hr) *	211	150	123	87	60	31	20	11.8	6.9	4.9
Incoming Volume (m^3)	34.7	49.4	60.7	85.5	117.9	184.3	232.3	279.7	325.2	346.3
Outgoing Volume (m^3)	8.5	16.9	25	50.7	101.5	184.3	232.3	279.7	325.2	346.3
Storage Volume Required	26	32	35.4	35	16	0	0	0	0	0
Percentage of storage provided	135%	109%	100%	102%	215%					
Time to Empty after Storm (hrs)	0.52	0.64	0.7	0.69	0.32	0	0	0	0	0

Governing Event =>

* Data from HIRDs V4 adopting
RCP 8.5 for the period 2081-2100

GEO

LEGEND

Hand Auger (HA)

Soakage Test (ST)

PROJECT: 70 Kenrick Street, Te Aroha	
PROJECT No: HD2771	
CLIENT: Kenwyn Trust	
TITLE: Site investigation plan	
SCALE: N/A	
Drawing No: 01	
Drawing By: RR	
Rev no:	
1	initial

INVESTIGATION LOG

Client: Kenwyn Trust		**Job No.:** HD2771
Project: 70 Kenrick Street, Te Aroha		**No.:** ST01
Location: NW of existing house - Lot 4.		**Date:** 15.02.23
Co-ordinates: 1838813mE, 5840866mN		**Logged By:** SW
Elevation: Ground		**Checked By:** RR

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Topsoil	TOPSOIL; dark blackish brown. Moist.	0.0 – 0.3
Hinuera Formation	Silty SAND, with minor clay; light brown. Moist; low plasticity; sand, fine.	0.3 – 0.5
Hinuera Formation	SILT, with trace clay; light brownish grey mottled orange. Moist; low to moderate plasticity.	0.5 – 0.6
Hinuera Formation	Sandy SILT, with trace clay; light brown. Wet; moderate plasticity; sand, fine.	0.6 – 1.0
Hinuera Formation	SILT, with some sand; light grey. Wet; low to moderate plasticity; sand, fine.	1.0 – 1.3
Hinuera Formation	SAND, with some silt; grey. Wet; sand, fine.	1.3 – 1.7
Hinuera Formation	SAND, with minor silt; grey. Wet; sand, fine.	1.7 – 1.9
Hinuera Formation	SAND, with trace silt; grey. Wet; sand, fine to medium.	1.9 – 2.0
	EOH: 2.00 m	2.0

Legend

Scala Penetrometer (Blows / 100 mm): 2 4 6 8 10 12 14 16 18

Vane Shear Strength (kPa) Vane: 50 100 150 200 250

Water: Groundwater Not Encountered

Photo

Remarks

End of HA at 2.0m_ Target depth achieved.

Shear Vanes	Water	Investigation Type
Peak	Standing Water Level	☐ Hand Auger
Remoulded	Out flow	☐ Investigation Pit
	In flow	☑ Machine Borehole

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