206 QUEEN STREET WEST SERVICING REPORT – J22172-6

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	DATE	DESCRIPTION	PREPARED BY
J22172-2	11 October 2022	Scheme plan update	Johan Ehlers
J22172-3	17 October 2022	Exec summary	Johan Ehlers
J22172-4	17 November 2022	20 Apartments	Johan Ehlers
J22172-5	18 November 2022	20 Apartments	Johan Ehlers
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1 Executive Summary

Infīr was engaged by Hastings District Council to prepare a 3-waters report for a proposed redevelopment of 206 Queen Street West, Hastings. The development will consist of two commercial tenancies and twenty apartments:

- 122m^2 Café/commercial tenancies
- 2 x 73m^2 2-bedroom apartments
- 2 x 75m^2 2-bedroom apartments
- 2 x 78m^2 2-bedroom apartments
- 14 x 56m^2 1-bedroom apartments

This report describes three-waters servicing for the proposed development. The level of information provided is appropriate for resource consent application purposes. A detailed design will be required for Building Consent and Engineering Approval. It is understood that the Client will lodge the application for resource consent to Hastings District Council together with all supporting information, including this report.

The report demonstrates:

- How stormwater quality and quantity is to be managed.
- That the site can be serviced, taking into consideration the capacity of the local networks and the requirements of Hastings District Council.
- That conformance to standards and codes can be achieved.

Stormwater

The redevelopment of the site will include the establishment of newly landscaped areas, resulting in a reduction of impervious coverage and stormwater runoff. However, the runoff coefficients will exceed Hastings District Plan requirements and attenuation will be required. It is proposed to attenuate stormwater runoff from the building roof and discharge to the DN750 main in King Street North via a new DN225 main.

The areas adjacent to the building will discharge to Queen Street West and stormwater runoff from sealed surfaces in the carpark west of the building will be discharged to King Street North.

The concept design aims to satisfy Rule 7.3.5L of the Hastings District Plan which gives the allowable runoff coefficient for the development during the 1 in 5-year (20% AEP) event as 0.8 and 0.8 during the 1 in 50-year (2% AEP) event. It is also proposed to limit discharge from the site during 1 in 100-year (1% AEP) event to the runoff rate associated with a 2% AEP rainfall intensity and 0.8 runoff coefficient.

Storage of 15m^3 in above-ground tanks and 1.2m^3 of ground storage for the attenuation of hardstand runoff (draining to King Street North) will be required to limit the overall site runoff to the District Plan stormwater limits.

Roof surfaces must be constructed of inert material or painted with no-metal based paint and maintained in good order, as required by the District Plan.

Wastewater

The calculated average daily dry weather flow (ADWF) for the development is 0.163L/s, and the estimated peak wet weather flow (PWWF) is 0.85L/s. The DN150 sewer main in the western part of the site drains in a northerly direction and discharges into a DN450 trunk sewer in Nelson Street North, 230m north of the site. HDC's GIS system shows that the portion of the DN150 main in the site was installed in 1915 so consideration should be given to replacing the main after the site has been cleared and before the new building is constructed because access will be unimpeded and reinstatement costs will be low. The site survey and scheme plan overlay show that the existing sewer main is 1.2m from the proposed building outline. This is within the easement width that would usually be required by Council, and it is therefore proposed that this pipeline be replaced on an alignment further away from the building.

Water Supply

The estimated average daily demand for the development is 21,430 litres per day, and the peak-hour flow rate is 3.27L/s. A DN50 meter and DN63 connection from the DN100 main in Queen Street West is proposed. It would also be possible to connect to mains in King Street North and Market Street North.

Firefighting water supply

It has not yet been determined whether the building will be fitted with a fire sprinkler system. Specialised advice from fire engineers should be sought regarding fire-fighting system requirements during detailed design stage to ensure compliance with the Building Code.

The water supply system can provide fire flows up to 54L/s at high residual pressure (700kPa). This corresponds with a fire water classification 3 (FW3) which provides for fire cells up to 599m^2 in multistorey un-sprinklered apartment blocks (Table 1 SNZ PAS 4509). If fire sprinklers are installed, the required fire-fighting water flow rate will be 25L/s from hydrants plus the flow rate the fire sprinkler system requires to operate.

It will therefore be possible to design a system to satisfy fire-fighting water requirements. On-site storage may be required, subject to fire cell size and floor areas and the final fire water classification of the building, which shall be determined by the fire engineer.

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2 Site Description

The site is located at 206 Heretaunga Street West, Hastings, occupying an area of 3,144m^2. This is the area that is relevant for drainage purposes. The existing site is shown on Figure 1.

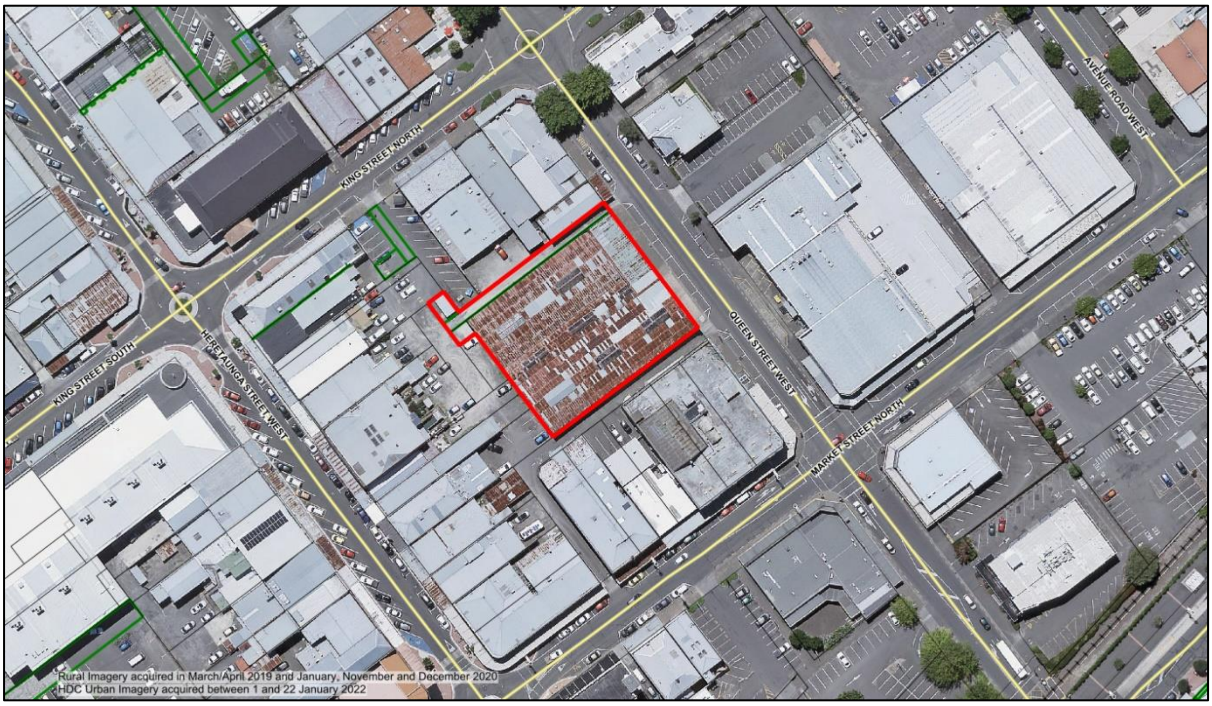


Figure 1 – Existing Site Plan

The site is within the Hastings District Council Central Commercial zone. Rule 7.3.5L of the Hastings District Plan requires the runoff coefficient from the site to not exceed 0.8 for the 1 in 5-year (20% AEP) and 1 in 50-year (2% AEP) events.

3 Proposed Development

The proposed development consists of a retail area, apartments, sealed areas for pedestrian and vehicular use, and landscaped areas. The development concept is shown on Figure 2.

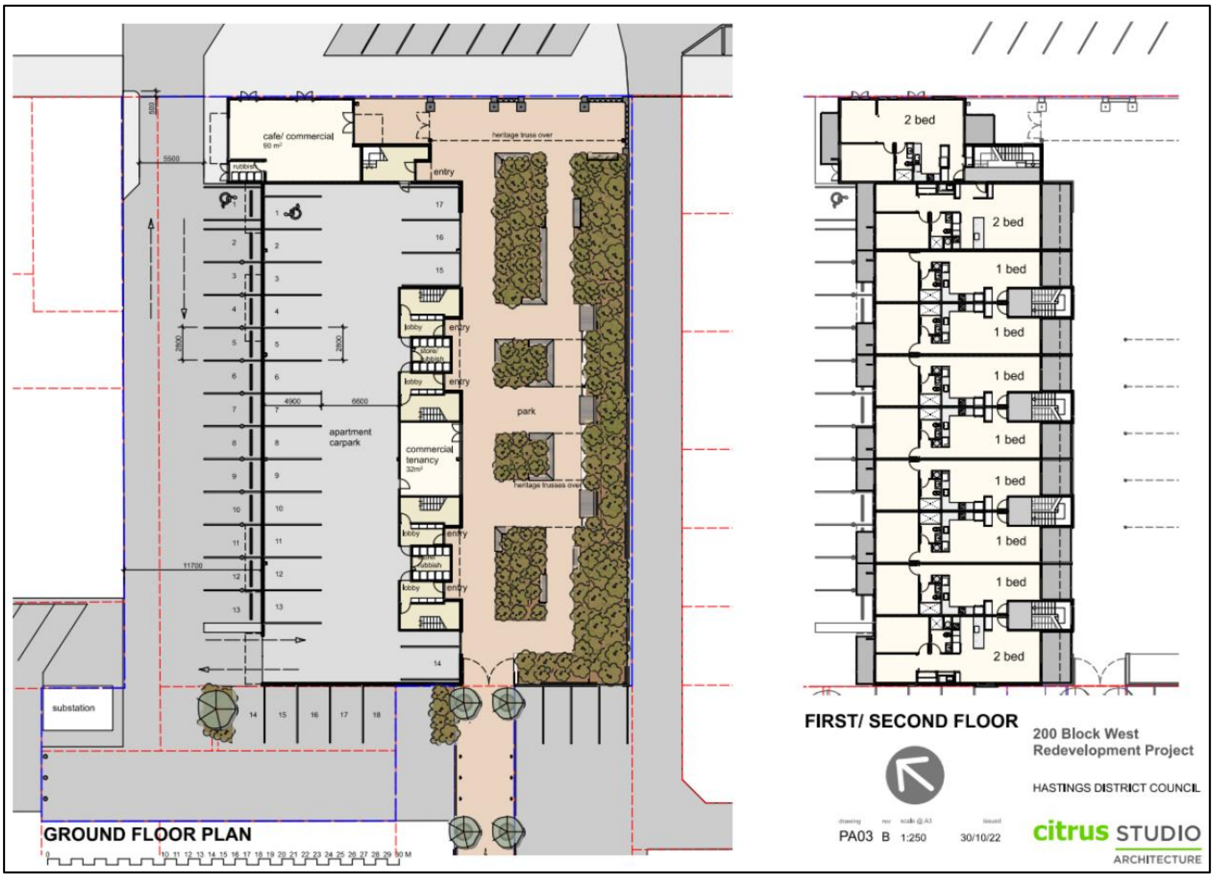


Figure 2 - Proposed Site Redevelopment Concept

The architectural concept drawings for the site redevelopment are contained in Appendix A.

4 Earthworks

4.1 General

The extent of the earthworks will be limited to the removal of the existing building and its foundations within the site, preparing foundations for the new building, reworking the carparking area and landscaping. The average earthworks depth will be what is required for road pavements, building foundations and landscaping, which is estimated at 400mm deep on average. For the 3,144m^2 site area the earthworks volume is estimated at 1,250m^3 cut and fill.

Access to the site shall be provided off Queen Street West and King Street North.

Hours of operation for all stages should be limited to comply with District Plan rules and noise should be limited to the levels allowed by the District Plan.

Construction Management should be undertaken in accordance with an approved Construction Management Plan and Sediment Control Plan to be developed specifically for the site.

5 Stormwater

5.1 General

The site is currently almost entirely impervious. The redevelopment of the site would include the establishment of newly landscaped areas, which will correspond to a reduction in the impervious area, and the rate and volume of runoff.

Stormwater laterals from buildings are typically connected directly to HDC mains, rather than to kerb outlets.

Overland flows through the site are from the centre of the site outwards to King Street North (northerly flow direction), Queen Street West (easterly flow direction) and through a small alleyway draining to Market Street North (southerly direction). Drainage from the alleyway draining to Market Street North has been excluded from the calculations because whilst the development will use the alley for access, there will not be any change in runoff from this area.

5.2 Design Standard

Hastings District Council's Engineering Code of Practice (the Code) requires primary stormwater protection systems to be designed to cope with design storms with a 20% probability of occurring annually. This fits with Clause E1.3.1 of the Building Code which requires surface water, resulting from an event having a 10% probability of occurring annually and which is collected or concentrated by buildings or sitework, to be disposed of in a way that avoids the likelihood of damage or nuisance to other property.

The Code requires the combined capacity of primary and secondary stormwater protection systems to be designed to cope with design storms with a 2% probability of occurring annually for existing developments and a 1% AEP level for new developments. Since this is an infill development, it could be argued that the 2% AEP design level should apply, however – to remove any room for doubt – a 1% AEP design with provision for climate change has been adopted. The climate change scenario that has been used is RCP6 for 2081 to 2100.

Clause E1.3.2 of the Building Code (which applies only to Housing, Communal Residential and Communal Non-residential buildings) requires that surface water, resulting from an event having a 2% probability of occurring annually, to not enter buildings.

The design of the stormwater system is aimed at ensuring that the units within the development area will not be prone to flooding during the 1 in 50-year event but equally that post-development runoff during the 1 in 5-year event and 1 in 50-year events will not exceed flows associated with a coefficient of runoff of 0.8.

5.3 Stormwater Design Concept

The concept design aims to satisfy Rule 7.3.5L of the Hastings District Plan which gives the allowable runoff coefficient for the development during the 1 in 5-year (20% AEP) event as 0.8 and 0.8 during the 1 in 50-year (2% AEP) event. It is also proposed to limit discharge from the site during 1% AEP event to the runoff rate associated with a 2% AEP rainfall intensity and 0.8 runoff coefficient.

Storage of 15m^3 in above ground tanks for the attenuation of roof runoff and 1.2m^3 of ground storage surface for the attenuation of hardstand runoff (draining to King Street North) will be required to limit the overall site runoff to the District Plan stormwater limits.

5.4 Rational formula

Stormwater runoff can be calculated with the rational formula which can be expressed as:

$$Q = \frac{ciA}{3600}$$

Where:

Q = Runoff (L/s)
c = Runoff coefficient
i = Rainfall intensity (mm/hr)
A = Surface area (m^2)

5.4.1 Runoff coefficients

The runoff coefficients that have been used for the purposes of this report are shown on

Table 1 - Runoff coefficients

Surface type	20%AEP runoff coefficient ($C_{20\%}$)	2%AEP runoff coefficient ($C_{2\%AEP}$)	1%AEP runoff coefficient ($C_{1\% AEP}$)
Permeable	0.3	0.5	0.5
Roofs	0.95	0.95	0.95
Asphalt and concrete	0.9	0.9	0.9

5.4.2 Rainfall depths

Rainfall depths for RCP6.0 for the period 2081 to 2100 were obtained from NIWA through their HIRDS4 system, shown in Table 2.

Table 2 - HIRDS rainfall depths (mm)

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	6.21	8.87	11	15.7	22.3	37.3	50.2	66	83.9	94.8	103	109
2	0.5	7.02	10	12.3	17.7	25	41.5	55.8	72.9	92.4	104	113	119
5	0.2	**10**	14.1	17.3	24.5	34.3	56.3	74.8	96.7	121	137	147	155
10	0.1	**12.4**	17.4	21.3	29.9	41.6	67.6	89.2	114	143	160	172	180
20	0.05	15.1	21	25.6	35.8	49.4	79.5	104	133	165	183	196	206
30	0.033	16.8	23.3	28.3	39.4	54.2	86.7	113	144	178	197	211	221
40	0.025	18	25	30.2	42	57.7	92	120	152	187	208	221	232
50	0.02	**19.1**	26.3	31.9	44.2	60.6	96.1	125	158	194	215	230	240
60	0.017	19.9	27.4	33.2	45.9	62.8	99.6	129	163	200	222	236	247
80	0.013	21.3	29.3	35.3	48.8	66.6	105	136	171	209	232	247	258
100	0.01	**22.4**	30.7	37	51	69.5	109	141	177	217	239	255	266
250	0.004	27.1	36.9	44.3	60.5	81.8	127	163	203	245	270	286	298

A time of concentration of 10 minutes has been adopted for the site.

5.5 Allowable runoff

The maximum runoff rates that may be discharged from the 3,144m^2 site are shown in Table 3.

Table 3 - Maximum allowable discharge rates

C: Runoff coefficient	%AEP: Storm annual exceedance period	($i_{10\ minute}$): 10-minute storm rainfall intensity (mm/hr)	Q: Maximum allowable discharge rate (L/s)
0.8	20	60	41.9
0.8	2	114.6	80.1
0.8	1	134.4	93.9

Note that the attenuation has been designed to limit discharge from the site during 1% AEP events to the runoff rate associated with a 2% AEP rainfall intensity and 0.8 runoff coefficient.

5.6 Non-attenuated runoff

Runoff rates from the developed site for the 20% AEP event are shown on Table 4. The allowable discharge rate for the 20% AEP event is exceeded by 4.1L/s. Attenuation is therefore required. The areas are shown on the drawings.

Table 4 - 20% AEP non-attenuated runoff

Sub-catchment	c: Runoff coefficient	Rainfall depth	Area	cA	Runoff rate
		mm	*m^2*	*m^2*	*L/s*
Area 4	0.9	10	787	708	11.8
Area 1	0.95	10	884	840	14.0
Area 2	0.3	10	187	56	0.9
Area 3	0.9	10	1,286	1,158	19.3
Total	**0.88**		**3,144**	**2,762**	**46.0**

Runoff rates from the developed site for the 2% AEP event are shown on Table 5. The allowable discharge rate for the 2% AEP event is exceeded by 9L/s. Attenuation is therefore required.

Table 5 - 2% AEP non-attenuated runoff

Area	c	Rainfall depth	A	cA	Runoff rate
		mm	*m^2*	*m^2*	*L/s*
Area 4	0.9	19.1	787	708	22.5
Area 1	0.95	19.1	884	840	26.7
Area 2	0.5	19.1	187	94	3.0
Area 3	0.9	19.1	1,286	1,157	36.8
Total	**0.89**		**3,144**	**2,799**	**89.1**

Runoff rates from the developed site for the 1% AEP event are shown on Table 6. The allowable discharge rate for the 1% AEP event is exceeded by 10.6L/s. Attenuation is therefore required.

Table 6 - 1% AEP non-attenuated runoff

Area	c	i	A	cA	Q
		mm	*m²*	*m²*	*L/s*
Area 4	0.9	22.4	787	708	26.4
Area 1	0.95	22.4	884	840	31.4
Area 2	0.5	22.4	187	94	3.5
Area 3	0.9	22.4	1,286	1,157	43.2
Total	**0.89**		**3,144**	**2,799**	**104.5**

5.7 Attenuation for 20% AEP events

It is proposed to attenuate stormwater runoff from the building roof by draining all the roof runoff into above ground tanks with a total volume of 15m^3, and discharge stormwater from the tanks at a rate of 9L/s. This configuration will operate as follows during 20% AEP events:

Time	*minutes*	10	20	30	60	120
I: Rainfall depth	*mm*	10	14.1	17.3	24.5	34.3
A: Area	*m²*	884	884	884	884	884
C: Runoff coefficient		0.95	0.95	0.95	0.95	0.95
Q_{runoff}	*L/s*	14.0	9.9	8.1	5.7	4.0
$Q_{discharge}$	*L/s*	9	9	9	9	9
$Q_{directed\ to\ storage}$	*L/s*	5.0	0.9	-0.9	-3.3	-5.0
$V_{storage}$	*m³*	3.0	1.0	-1.7	-11.8	-36.0

During 20% AEP 10-minute duration events the roof attenuation tanks will reduce the total discharge rate from site by 5L/s, from 46L/s to 41L/s. This is slightly below the maximum allowable discharge rate of 41.9L/s. The tanks will fill to a maximum volume of 3m^3. The additional capacity is needed for more intense rain events as described below.

5.8 Attenuation for 1% AEP events

It is proposed to attenuate runoff during 1% AEP events to the runoff rate for 2% AEP rainfall intensities and a runoff coefficient of 0.8. The permissible discharge rate from the site for 1% AEP events is therefore set at 89.1L/s.

During the onset of a 1% AEP event the roof attenuation tank will be discharging at 9L/s until the tank volume reaches 3m^3. The tank storage volume is set at 15m^3 to provide space for the balance of the rain event, as shown on Table 7.

Table 7 - 1% AEP event roof runoff attenuation

Time	*minutes*	10	20	30	60	120
i	*mm*	22.4	30.7	37	51	69.5
A	*m^2*	884	884	884	884	884
c		0.95	0.95	0.95	0.95	0.95
Q_{runoff}	*L/s*	31.4	21.5	17.3	11.9	8.1
$Q_{discharge}$	*L/s*	9	9	9	9	9
$Q_{into\ storage}$	*L/s*	22.4	12.5	8.3	2.9	-0.9
$V_{storage}$	*m^3*	13.4	15.0	14.9	10.4	-6.4

The tanks will reduce the 1% AEP 10-minute duration event runoff by 22.4L/s, from 31.4L/s to 9L/s. The tanks will reach their maximum volume of 15m^3 twenty minutes into the rain event and will empty out after two hours.

The roof attenuation tank will reduce runoff from the site during the 1% AEP event from 104.5L/s to 82.1L/s, a reduction of 22.4L/s. To reduce the discharge rate to the 2% AEP permissible rate of 80.1L/s a further reduction of 2.0L/s is required.

It is proposed to form a depression in the carparking / vehicle manoeuvring area as shown on the drawings to provide at least 1.2m^3 surface storage. During 1% AEP events the surface storage will operate as shown on Table 8.

Table 8 - Surface attenuation storage operation

Time	*minutes*	10	20
i	*mm*	*22.4*	*30.7*
cA Area 4		708	708
cA Area 2		94	94
cA Area 3		1157	1157
cA Total		1,959	1,959
Q_{runoff}	*L/s*	73.1	50.1
$Q_{discharge}$	*L/s*	71.1	71.1
$Q_{into\ storage}$	*L/s*	2.0	-21.0
$V_{storage}$	*m3*	1.2	-25.2

The surface storage will reduce the discharge rate by a further 2L/s during 10-minute duration 1% AEP events. The total discharge from site will be:

- Attenuated roof discharge: 9L/s
- Attenuated surface discharge: 71.1L/s
- Total discharge from site: 80.1L/s
- Maximum 2% AEP discharge rate: 80.1L/s
- Maximum 1% AEP discharge rate: 80.1L/s

The attenuation system will therefore ensure that the runoff coefficient for the site during 2% AEP and 1% AEP events will not exceed 0.8.

It is noted that specific design will be required for the on-ground attenuation storage area. The flow rate at which stormwater is released from the basin will be a function of the size of the area draining into it. The larger the area that drains into it, the larger the release rate can be.

The key point is that the basin must hold 1.2m^3 of water at the end of a 1% AEP 10-minute duration event. Allowing for a minimum release rate of 1L/s (to keep orifice sizing practicable) an area with a total runoff of 3L/s must drain to the on-ground attenuation storage area. At 134.4mm/hr rainfall intensity (22.4mm rain depth over 10 minutes) and a runoff coefficient of 0.9 this equates to an area of 60m^2. A minimum of 60m^2 sealed area should drain to the on-ground attenuation storage area.

5.9 Stormwater Treatment

An initial assessment of the risks posed to the environment from the various activities to be undertaken on the site is presented below.

Table 9 - Site risk assessment

ACTIVITY	POTENTIAL CONTAMINANTS	LIKELIHOOD	CONSEQUENCE	RISK OF CONTAMINATION
Roof drainage	Silt	Low	Low	Low
Roof drainage	Heavy metals	Low*		
Parking	Hydrocarbons, heavy metals and sediments	Medium	Low	Low

**Roof surfaces are to be constructed of inert material or painted with no-metal based paint and are to be maintained in good order.*

Table 3.1 of the 'Hawke's Bay Waterway Guidelines – Industrial Stormwater Design' provides a means of identifying what the potential source of contaminants from the site may be based on the site's core activity. However, this table has not been considered in this instance as it does not provide a match for the type of activity that this site will be used for.

The greatest risk that the site presents to the contamination of the environment is from loading and unloading activities, and from stormwater runoff from parking areas. It is considered that the site will present a low risk of contamination to the environment.

It is proposed to fit sumps with inserts to capture litter, debris and other pollutants larger than the screening bag aperture size. Sumps will be provided with silt pits for settling of sediments. Given the relative levels between the carpark finished surface and the kerb connection there is very limited scope to provide treatment of stormwater runoff.

It will be possible to fit a stormwater treatment device such as a Filterra units at the sump that will drain the 1.2m^3 surface attenuation area if a higher treatment standard is desired, but the limited site ground elevation would pose technical challenges for similar devices where piped connections are not available. The capacity of the DN225 stormwater main in Queen Street West is very limited and is therefore not considered to be a point of connection for discharge from a stormwater treatment device.

5.10 Flood Assessment

The Hawke's Bay Regional Council hazard portal shows that the site is not within an identified flood risk area. The buildings are exempt from clause E1.3.2 (which requires surface water, resulting from an event having a 2% probability of occurring annually to not enter buildings) as this clause applies only to housing, communal residential and communal non-residential buildings.

No changes are proposed to the existing floor levels which are at 3.33m (NZVD 2016).

The perimeter level of the building is currently practically flush with the existing hardstand yard area. This general arrangement will need to be preserved to ensure that the new carpark area is able to drain to the kerb outlet under gravity. Suitable building perimeter treatments (including concrete nibs and level threshold drains) may need to be employed for compliance with E2 (External Moisture) of the New Zealand Building Code.

A summary of the level differences from finished floor level to road centreline, top of kerb and boundary levels are provided in Table 10 below.

Table 10 - Relative level differences from finished floor level

DESCRIPTION	REDUCED LEVEL (NZVD 2016)	LEVEL DIFFERENCE FROM FINISHED FLOOR LEVEL
Road centreline	3.25m – 3.28m	0.05m – 0.08m
Top of kerb	3.03m	0.30m
Boundary level	3.19m	0.14m

A level difference of 150mm above road centreline is required by compliance document E1 for housing, communal residential and communal non-residential buildings. However, as these buildings will be for office use this requirement does not apply.

If the building floor level was raised to 150mm above the road centreline level (which is currently at between 50mm and 80mm above the road centreline) this would reduce the flood risk to the buildings. However, the risk of surface water entering the buildings is still considered to be low for the following reasons:

- Wave action from carpark surface ponding entering the buildings is low given that vehicle speeds will be low.
- A freeboard of 140mm from finished floor level to the boundary level is provided.
- Falls away from the building at 1:40 and 1:50 grades will be provided.

6 Wastewater

6.1 Existing Public Wastewater Network

DN150 sewer mains run along the northern and southern boundaries of the site. The HDC GIS system shows that the southern main is at a depth of approximately 2 metres. This is deep enough to service the site, but it also implies that the main should be shifted further from the proposed building.

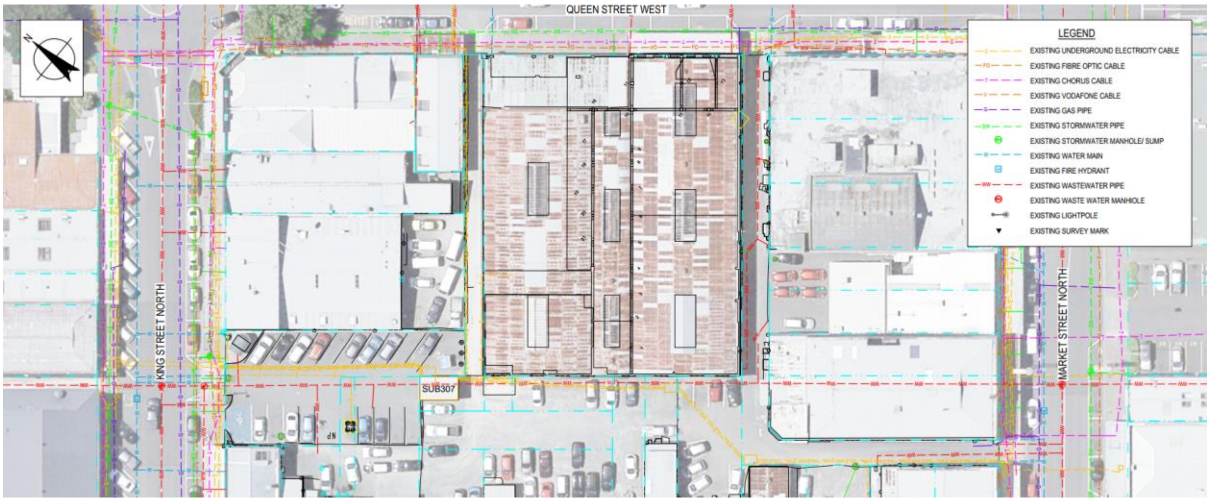


Figure 3 – Sewer main locations shown in red

6.2 Wastewater Design Flow Rates - Domestic

Schedule E, Clause 5.3.5.1 of the HDC ECoP provides the basis for the determination of the design flow for domestic discharges using the method outlined in NZS4404:2010.

6.2.1 Average Dry Weather Flow (ADWF)

The average dry weather flow calculated in accordance with the HDC ECoP which specifies that the average dry weather flow can be calculated as either 250L/p/EP or 0.0029L/s/EP.

Using Average Dry Weather Flow (ADWF) = 0.0029L/s/EP, where:

ADWF = 0.0029 x EP (L/s)

EP = Number of lots x equivalent population per lot

= 14 x 2 + 6 x 3.5 = 49 people

Note: HDC ECoP gives an equivalent population per lot as 3.5 for the general Hastings Region. This development consists of 14 one-bedroom and 6 two-bedroom apartments. Allowing for two persons per one-bedroom apartment and 3.5 persons per two-bedroom apartment, the design population for domestic purposes is 49 people.

Average Dry Weather Flow (ADWF) = 12,250L/s = 0.142L/s

6.2.2 Peak Dry Weather Flow (PDWF)

In accordance with NZS4404:

$$PDWF = ADWF\ x\ PF_{dry\ weather\ diurnal}$$

Where:

$PF_{dry\ weather\ diurnal}$ is a dry weather diurnal peaking factor, given as 2.5 from NZS4404 section 5.3.5.1(a)

$$PDWF = 0.142\ x\ 2.5$$

Peak Dry Weather Flow (PDWF) = 0.354L/s

6.2.3 Peak Wet Weather Flow

$$PWWF = PDWF\ x\ PF_{dilution/infiltration}$$

Where:

$PF_{dilution/infiltration}$ is a wet weather peaking factor, given as 2 from NZS4404 section 5.3.5.1(a)

$$PWWF = 0.354\ x\ 2$$

Peak Wet Weather Flow (PWWF) = 0.709L/s

6.3 Wastewater Design Flow Rates - Commercial

Table 5.1.3 of Chapter 5 (wastewater) of Watercare's Code of Practice for Land Development and Subdivision shows a design flow of 15 litres per day per net m^2 of floor area (including kitchen and dining areas) for wet retail such as restaurants. The peaking factor for Peak Dry Weather Flow is 2.0 and the peaking factor for Peak Wet Weather Flow is 6.7.

The restaurant area will be 90m^2 in size. It is not known what the use of the 32m^2 inner city tenancy will be. The highest use would be another food premise. Design flow rates for wastewater discharge from the restaurant and another food premise with a combined area of 122m^2 is as follows:

- Commercial area 122 m^2
- Discharge per unit per day 15 L/day/m^2
- Total discharge per day 1,830 L
- ADWF 0.021 L/s
- Peak factor 2
- PDWF 0.042 L/s
- Peak factor 6.7
- PWWF 0.142 L/s

6.4 Total wastewater discharge

The sum of domestic and commercial wastewater discharge from the development is shown on below.

- Total discharge per day: 14,080 L
- Average Dry Weather Flow: 0.163 L/s
- Peak Dry Weather Flow: 0.397 L/s
- Peak Wet Weather Flow: 0.851 L/s

The average discharge in any 2-hour period is less than one litre per second.

7 Water Supply

7.1 Existing Public Water Supply Network

The public water supply network of:

- South of the site: A DN150 water main in Market Street North.
- East of the site: A DN100 main in Queen Street West.
- North of the site: A DN100 main in King Street North.
- Mains west of the site in Heretaunga Street West isn't accessible but the DN300 provides capacity.

7.2 Design Flow Rates – Domestic demand

Water supply demand for the development has been estimated using the parameters provided in the HDC ECoP and the methodology provided in section 6.3.5.3 of NZS4404: 2010.Note that Part 4 of HDC ECoP requires that a daily consumption of 400L/p/day be adopted rather that 250L/p/day as stated in NZS4404: 2010.

In lieu of demand information or peaking factors from Hastings District Council, the following peaking factors to be applied to the average day demand have been adopted:

- Peak Day Demand Peaking Factor = 2 (for populations below 2,000)
- Peak Hourly Demand = 5 (for populations below 2,000)

Design flows are presented below for the purposes of accessing the potential impact of the development on the water supply network.

7.2.1 Minimum Water Demand

Based on the number of apartments and occupancy rates described in section 6.2.1 the water supply system will service 49 residents.

The minimum water demand calculated in accordance with the HDC ECoP which specifies 400L/EP/day is provided below:

$$49\ people\ x\ \frac{400\ L/person/day}{86{,}400\ seconds/day} = 0.227L/s$$

7.2.2 Peak Day Demand

Using a peaking factor (PF) of 2 from section 6.3.5.3 of NZS4404: 2010;

$$0.227L/s\ x\ 2 = 0.45L/s$$

7.2.3 Peak Hourly Demand

Using a peaking factor (PF) of 5 from section 6.3.5.3 of NZS4404: 2010;

$$0.45L/s\ x\ 5 = 2.27L/s$$

7.3 Design Flow Rates – Commercial demand

Table 6.1c of Chapter 6 (water) of Watercare's Code of Practice for Land Development and Subdivision shows a design flow of 15 litres per day per net m^2 of floor area (including kitchen and dining areas) for wet retail such as restaurants. The peaking factor for Peak Dry Weather Flow is 2.0 and the peaking factor for Peak Wet Weather Flow is 6.7.

The restaurant area will be 90m^2 in size. It is not known what the use of the 32m^2 inner city tenancy will be. The highest use would be another food premise. Design flow rates for wastewater discharge from the restaurant and another food premise with a combined area of 122m^2 is as follows:

- Commercial area 122 m^2
- Demand per unit per day 15 L/m^2/day
- Total demand per day 1,830 L

Instantaneous maximum demand can be determined by looking at the fixtures that will be installed in the restaurant, and the number of fixtures that will operate simultaneously. Typical flow rates as per Table 3.2.1 of NZS3500.1 for various fixtures are listed below.

Even with three basin taps and a dishwasher running simultaneously the instantaneous flow rate will not exceed 0.5L/s per commercial site. The total instantaneous flow rate from two restaurant sites will be less than 1L/s.

Table 11 - Table 3.2.1 from AS/NZS 3500.1

TABLE 3.2.1

FLOW RATES AND LOADING UNITS

Fixture/appliance	Flow rate L/s	Flow rate L/min	Loading units
Water closet cistern	0.10	6	2
Bath	0.30	18	8
Basin (standard outlet)	0.10	6	1
Spray tap	0.03	1.8	0.5
Shower	0.10	6	2
Sink (standard tap)	0.12	7	3
Sink (aerated tap)	0.10	6	2
Laundry trough	0.12	7	3
Washing machine/dishwasher	0.20	12	3
Mains pressure water heater	0.20	12	8
Hose tap (20 nom. size)	0.30	18	8
Hose tap (15 nom. size)	0.20	12	4

7.4 Total design flow rate for commercial and domestic demand

The simultaneous demand for domestic and commercial water is likely to be less than the sum of the two. However, the commercial flow rate is relatively small, and it is a conservative assumption to simply add the flow rates together. The design flow rates are therefore as shown on Table 12.

Table 12 - Water demand

	Domestic	Commercial	Total
Daily volume (L)	19,600	1,830	21,430
Average day (L/s)	0.227	0.021	0.248
Peak day (L/s)	0.45		
Peak hour (L/s)	2.27	1.0	3.27

A DN50 water meter will have sufficient capacity for the development. A DN63 PE connection is generally sufficient for flow rates of this magnitude but the pipe size may have to be increased if the run lengths are long. This can be finalised at building consent stage. It will also be necessary to consider pipe sizing inside the building in conjunction with pipe sizing outside the building to ensure that minimum pressure is maintained.

It is noted that a new DN150 water main in the western berm of Queen Street West from Market Street North to King Street North will provide capacity for domestic and fire demand to no less than the capacity of the existing system. The advantage is that the points of supply will be at the development's frontage. This is especially advantageous for the fire-fighting water supply.

7.5 Firefighting requirements

Hastings District Council has advised that the following flow rates have been measured in the vicinity of the development.

Table 13 - Fire flows and pressure

	Flow rate	Flow pressure	Static pressure
	L/s	kPa	kPa
105 Market Street	54	700	850
Intersection Market & Queen	54	700	850
211 Queen St West	42.1	700	850
Intersection King & Queen	48.8	700	850
107 King St Nth	48.8	700	850

The New Zealand Fire Service Fire Fighting Water Supplies Code of Practice (SNZ PAS 4509:2003) classifies fire-fighting water supplies required for buildings on a scale from W1 to W8, depending on fire-fighting water supply requirements.

7.5.1 Sprinklered building

If a building is sprinklered then it is always classified as W3 and the fire-fighting water supply to the building must be sufficient to drive the fire sprinkler system, in conjunction with providing fire-fighting water for fire-fighters. The fire-fighting water that is required for fire-fighters can be provided in the form of 45m^3 of storage available within 90m of the fire risk and sufficient for 30 minutes, or 25L/s from a maximum of two fire hydrants within a radial distance of 270m with at least one within 135m, flowing at a minimum of 12.5L/s each. The fire-fighting storage can also be a combination of on-site storage and reticulated supply.

The required flow rate, minimum pressure and duration of sprinkler supply is best determined during detailed design. 25L/s capacity from the reticulated system is reserved for flows from fire hydrants, some capacity must be reserved for domestic demand in the area and the balance will be available for supply to the fire sprinkler system. The Building Code prescribes test methodologies to determine the flow rate that is available for fire sprinkler systems from the reticulated supply.

The flow rates that were observed by Hastings District Council and the fact that a DN300 main is within the immediate vicinity of the development show that it will be possible to meet the development's fire-fighting requirements for a sprinklered building. If the fire sprinkler system demand is very high, it may be necessary to provide some on-site storage and pumping.

Advice should be sought from specialist fire engineers regarding sprinkler requirements.

7.5.2 Non-sprinklered building

If a multi-storey apartment building is not fitted with fire sprinklers, firefighting water requirements is determined using factors such as the fire cell size and floor area. The minimum firefighting water supply classification is expected to be W3.

Advice should be sought from specialist fire engineers regarding the fire cell size and floor area that will apply. The relevant tables from SNZ PAS 4509:2003 are shown below.

Table 14 - SNZ PAS 4509 Water Supply classification (Table 1)

All other structures (characterised by fire hazard category(1)), examples of which are given below	Water supply classification (see table 2)														
	Floor area of largest firecell of the building (m^2)														
	0-199(10)	200-399	400-599	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599	2600-2799	> 2800
FHC 1(2)	FW3	FW3	FW3	FW4	FW4	FW4	FW5	FW5	FW5	FW5	FW5	FW5	FW5	FW5	FW6
FHC 2(3)	FW3	FW3	FW4	FW5	FW5	FW5	FW6	FW6	FW6	FW7	FW7	FW7	FW7	FW7	FW7
FHC 3(4)	FW3	FW4	FW5	FW5	FW6	FW6	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7
FHC 4(5)	FW4	FW6	FW6	FW6	FW6	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7
For special or isolated hazards not covered in above categories (9)	FW7														

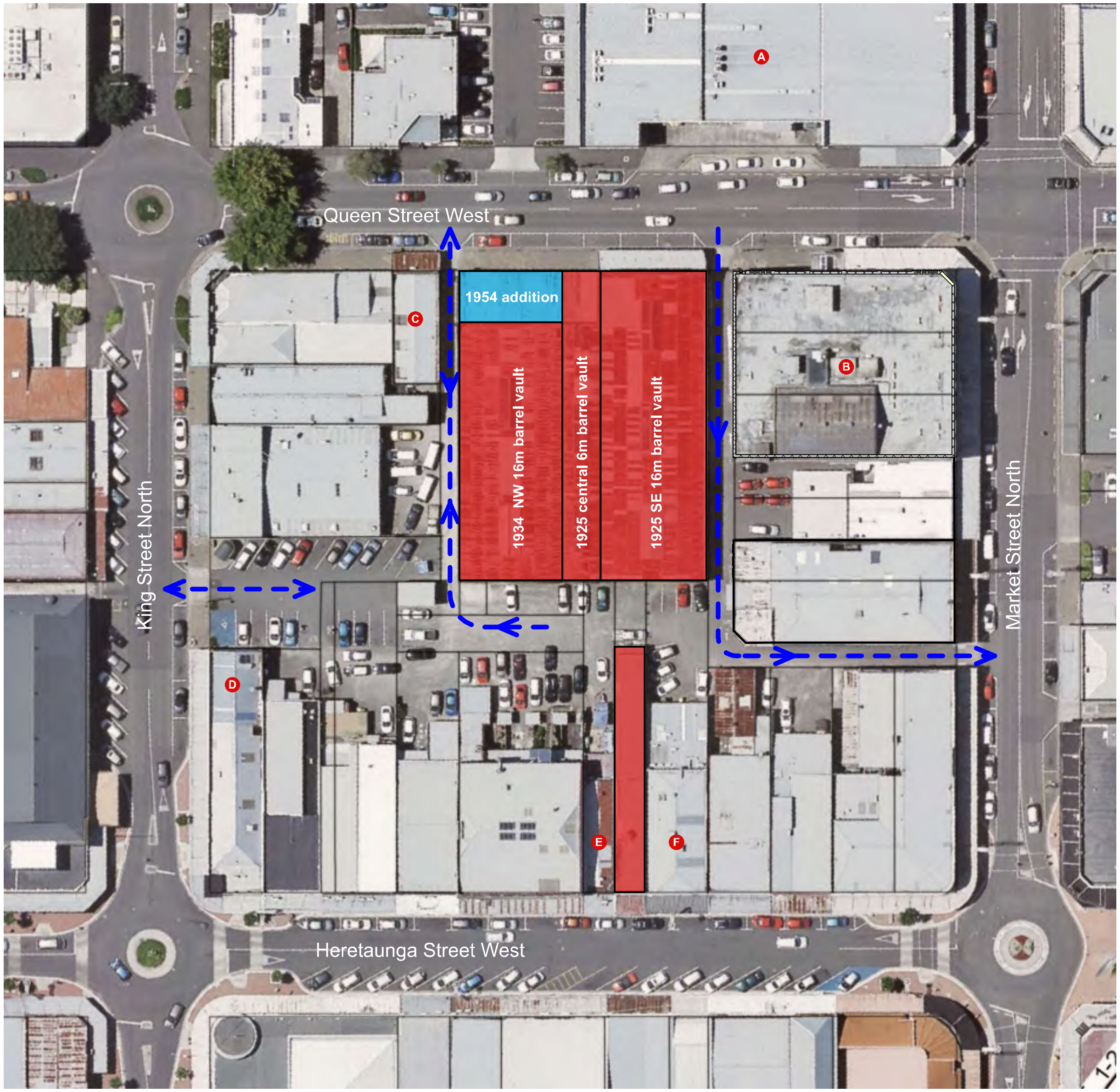
NOTE –
(1) Fire hazard category as defined in the compliance documents for the New Zealand Building Code, Acceptable Solution C/AS1.
(2) FHC 1 is sleeping activities including care facilities, motels, hotels, hostels; crowd activities of <100 people including cinemas, art galleries, community halls, lecture halls, churches; working/business/storage activities processing non-combustible materials such as wineries, cattle yards, horticultural products; multistorey apartment blocks.

Table 15 - SNZ PAS 4509 Water Supply requirements (Table 2)

	Reticulated water supply			Non-reticulated water supply	
Fire water classification	**Required water flow within a distance of 135 m**	**Additional water flow within a distance of 270 m**	**Maximum number of fire hydrants to provide flow**	**Minimum water storage within a distance of 90 m** (see Note 8)	
				Time (firefighting) (min)	**Volume** (m^3)
FW1	450 L/min (7.5 L/s) (See Note 3)	–	1	15	7
FW2	750 L/min (12.5 L/s)	750 L/min (12.5 L/s)	2	30	45
FW3	1500 L/min (25 L/s)	1500 L/min (25 L/s)	3	60	180
FW4	3000 L/min (50 L/s)	3000 L/min (50 L/s)	4	90	540
FW5	4500 L/min (75 L/s)	4500 L/min (75 L/s)	6	120	1080
FW6	6000 L/min (100 L/s)	6000 L/min (100 L/s)	8	180	2160
FW7	As calculated (see Note 7)				

NOTE –
(1) Table 1 lists the minimum requirements for firefighting water supplies. In developing towns' main reticulation systems, a water supply authority needs to cater for domestic/industrial water usage in addition to the above. This procedure is outlined in Appendix K.
(2) Special or isolated fire hazards which have higher requirements in an area of lower water supply classification must determine measures to mitigate the hazard or increase the water supply (see 4.4).
(3) Where houses have a sprinkler system installed to an approved Standard, the distance to a fire hydrant or alternative water supply may be negotiated by agreement with the Fire Region Manager.
(4) The water requirements for fire protection systems must be considered in addition to the firefighting water supplies, as detailed in table 1 (FW2), the fire protection system demand plus 1500 L/min (25 L/s) at 1 bar residual pressure.
(5) The minimum flow from a single hydrant must exceed 750 L/min (12.5 L/s), except for those cases where a home sprinkler is installed, in which case the minimum is 450 L/min (7.5 L/s) while the maximum design flow, for safety reasons, is limited to 2100 L/min (35 L/s).

Appendix A Architectural Drawings

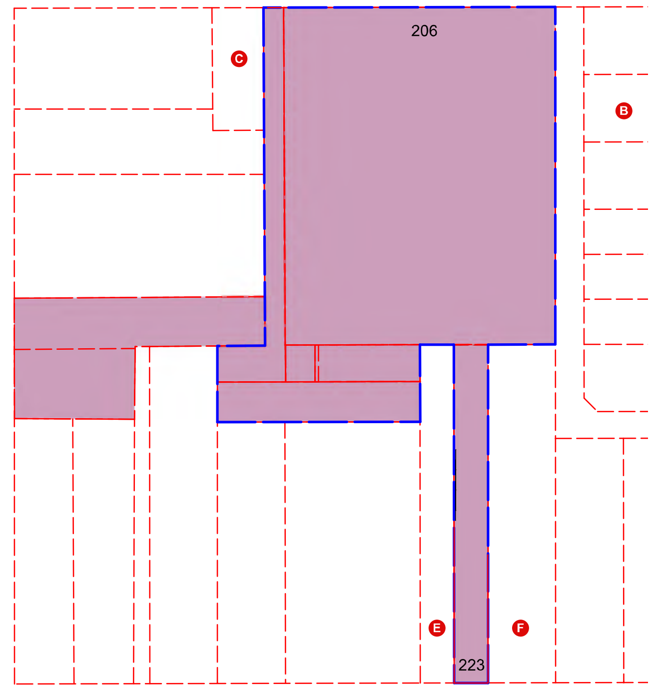


shared vehicle/ pedestrian access lanes

A Kiwibank
B IMS building
C Morphosis
D Sutto
E Michael Hill
F SCM fashion/ Pascoes

EXISTING SITE PLAN

0 10 20 30 40 50 60 70 80 90 100 M



SITE BOUNDARY PLAN

land in HDC ownership

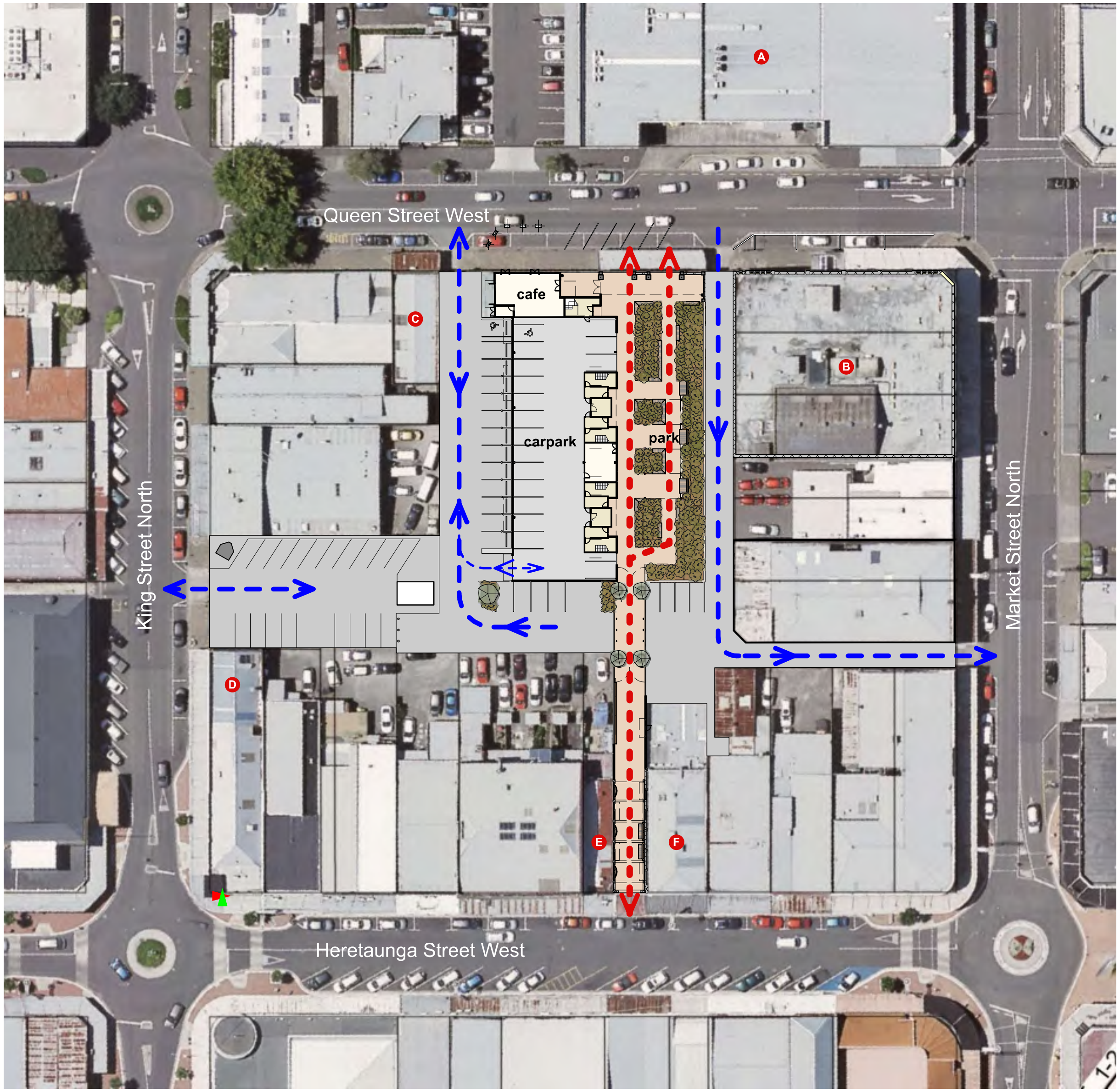
development boundary for resource consent

200 Block West Redevelopment Project

HASTINGS DISTRICT COUNCIL

drawing	rev	scale @ A3	issued
PA01		1:750	30/10/22

citrus STUDIO ARCHITECTURE



pedestrian link

shared vehicle/ pedestrian access lanes

A Kiwibank
B IMS building
C Morphosis
D Sutto
E Michael Hill
F SCM fashion/ Pascoes

PROPOSED SITE PLAN

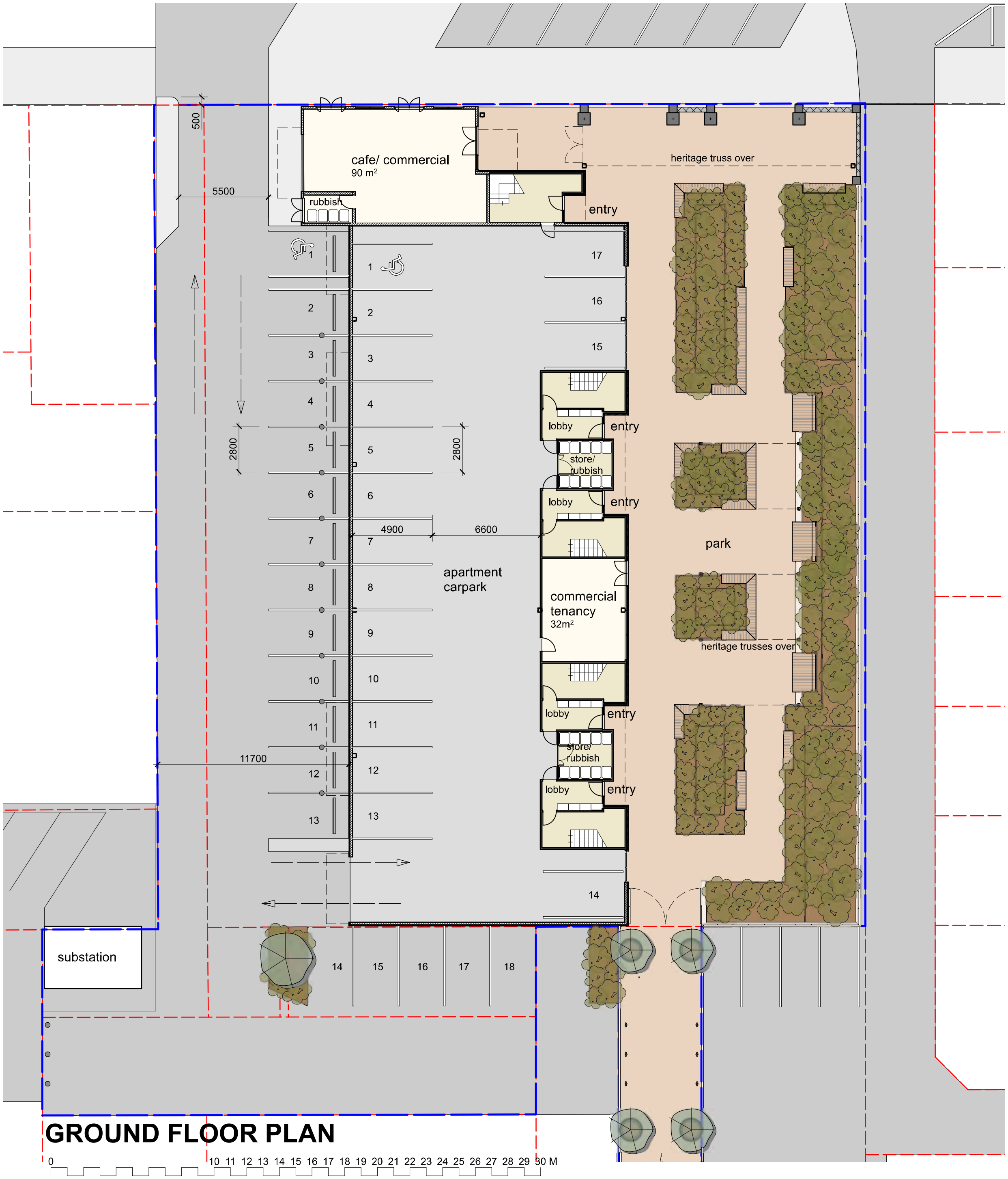
0 10 20 30 40 50 60 70 80 90 100 M

200 Block West Redevelopment Project

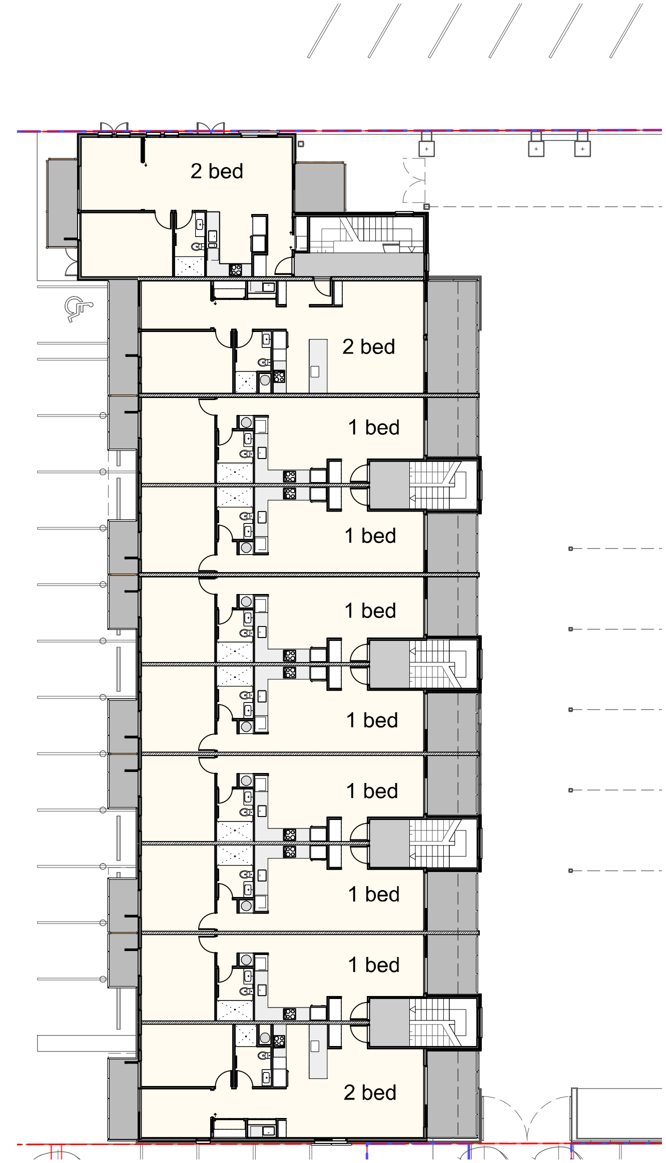
HASTINGS DISTRICT COUNCIL

drawing	rev	scale @ A3	issued
PA02	B	1:750	30/10/22

citrus STUDIO ARCHITECTURE



GROUND FLOOR PLAN



FIRST/ SECOND FLOOR

200 Block West Redevelopment Project

HASTINGS DISTRICT COUNCIL

drawing	rev	scale @ A3	issued
PA03	B	1:250	30/10/22

citrus STUDIO
ARCHITECTURE

Appendix B Survey

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
A	ISSUED FOR DISCUSSION	SG	-	-	12.03.19

HASTINGS DISTRICT COUNCIL

0 2.5 5 7.5 10 12.5m
SCALE 1:250 AT ORIGINAL SIZE

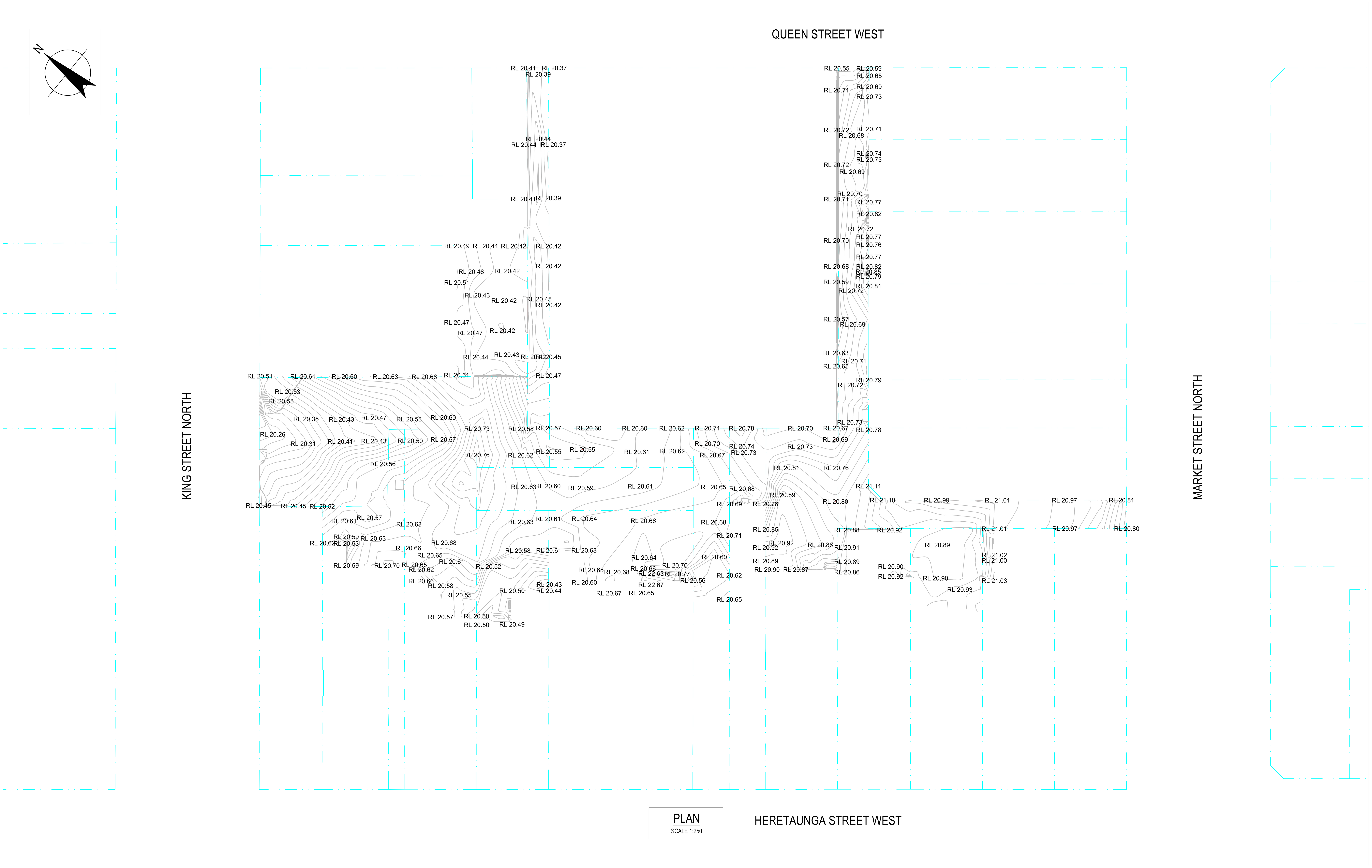
CivilTEC

	NAME	DATE
SURVEYED	ZORN SURVEYING	16.09.18
DESIGNED	-	-
DRAWN	S GREEN	01.03.19
REVIEWED	-	-
APPROVED	-	-

HASTINGS DISTRICT COUNCIL
206 HERETAUNGA STREET WEST
SURVEY SPOT HEIGHTS PLAN

STATUS: **PRELIMINARY**
DATE: 12.03.2019
SCALE AT A1: 1:250
DRAWING NO. **17-060-SK001**
REV **A**

12/03/2019 4:56:45 PM



REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
A	ISSUED FOR DISCUSSION	SG	-	-	12.03.19

HASTINGS DISTRICT COUNCIL

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SCALE 1:250 AT ORIGINAL SIZE

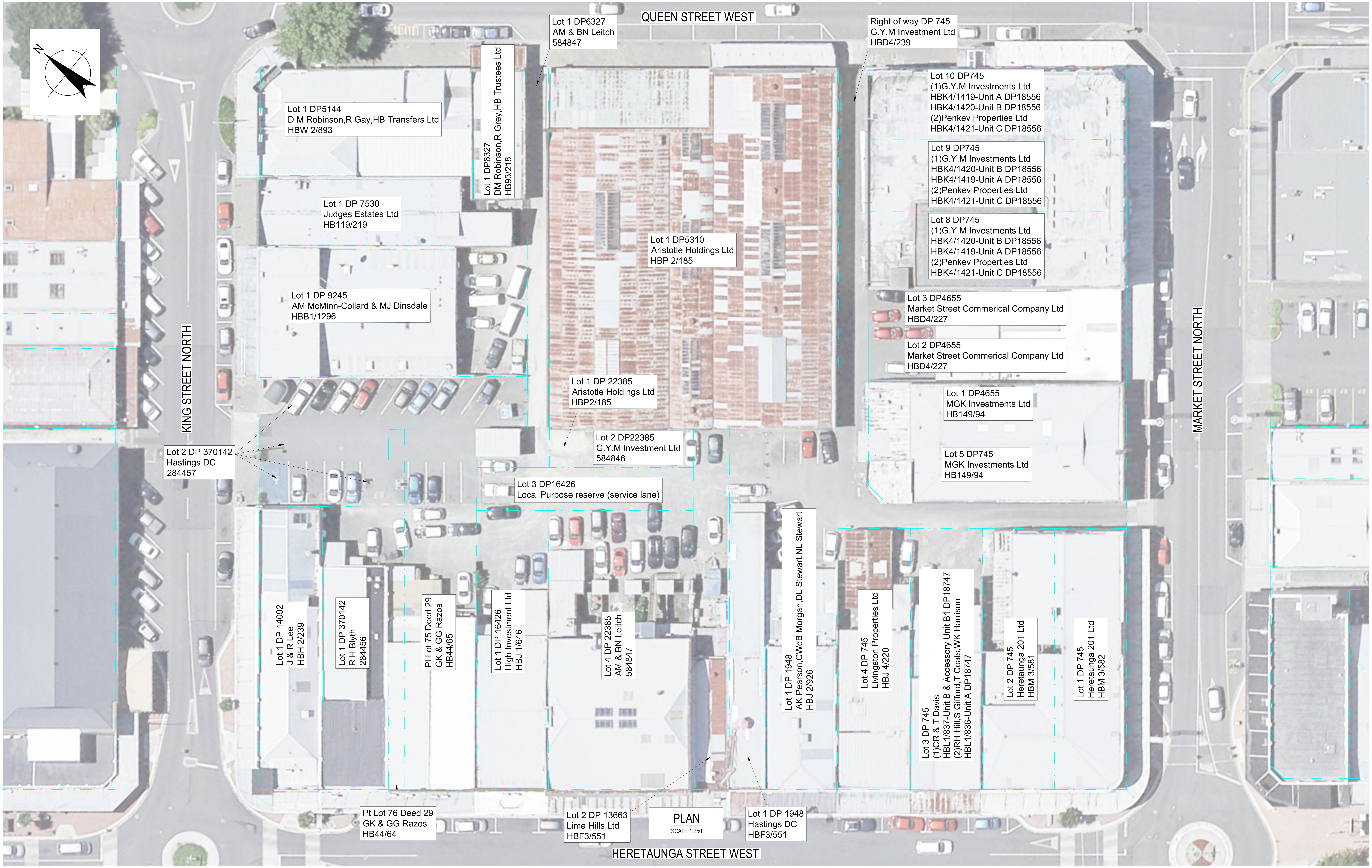
CivilTEC

	NAME	DATE
SURVEYED	ZORN SURVEYING	16.09.18
DESIGNED	-	-
DRAWN	S GREEN	01.03.19
REVIEWED	-	-
APPROVED	-	-

HASTINGS DISTRICT COUNCIL
206 HERETAUNGA STREET WEST
SURVEY SPOT HEIGHTS AND CONTOUR PLAN

STATUS: **PRELIMINARY**
DATE: 12.03.2019
SCALE AT A1: 1:250
DRAWING NO. **17-060-SK002**
REV **A**

12/03/2019 4:56:49 PM



PLAN
SCALE 1:250

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
A	ISSUED FOR DISCUSSION	SG	-	-	12.03.19

HASTINGS DISTRICT COUNCIL

0 2.5 5 7.5 10 12.5m
SCALE 1:250 AT ORIGINAL SIZE

CivilTEC

	NAME	DATE
SURVEYED	ZORN SURVEYING	16.09.18
DESIGNED	-	-
DRAWN	S GREEN	01.03.19
REVIEWED	-	-
APPROVED	-	-

HASTINGS DISTRICT COUNCIL
206 HERETAUNGA STREET WEST
PROPERTY OWNERS PLAN

STATUS: **PRELIMINARY**
DATE: 12.03.2019
SCALE AT A1: 1:250
DRAWING NO. **17-060-SK003**
REV **A**

12/03/2019 4:56:50 PM

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
A	ISSUED FOR DISCUSSION	SG	-	-	12.06.19

HASTINGS DISTRICT COUNCIL

0 2.5 5 7.5 10 12.5m
SCALE 1:250 AT ORIGINAL SIZE

CivilTEC

	NAME	DATE
SURVEYED	ZORN SURVEYING	16.09.18
DESIGNED	-	-
DRAWN	S GREEN	12.06.19
REVIEWED	-	-
APPROVED	-	-

HASTINGS DISTRICT COUNCIL
206 HERETAUNGA STREET WEST
SERVICES PLAN

STATUS: **PRELIMINARY**
DATE: 12.06.2019
SCALE AT A1: 1:250
DRAWING NO. **17-060-SK004**
REV **A**

12/06/2019 9:16:57 AM

Appendix C Drawings

HASTINGS DISTRICT COUNCIL

INFRASTRUCTURE SOLUTIONS
PROJECT MANAGEMENT
PO Box 7335, Taradale 4141
Phone : 06 650 5565 Email : admin@infir.nz
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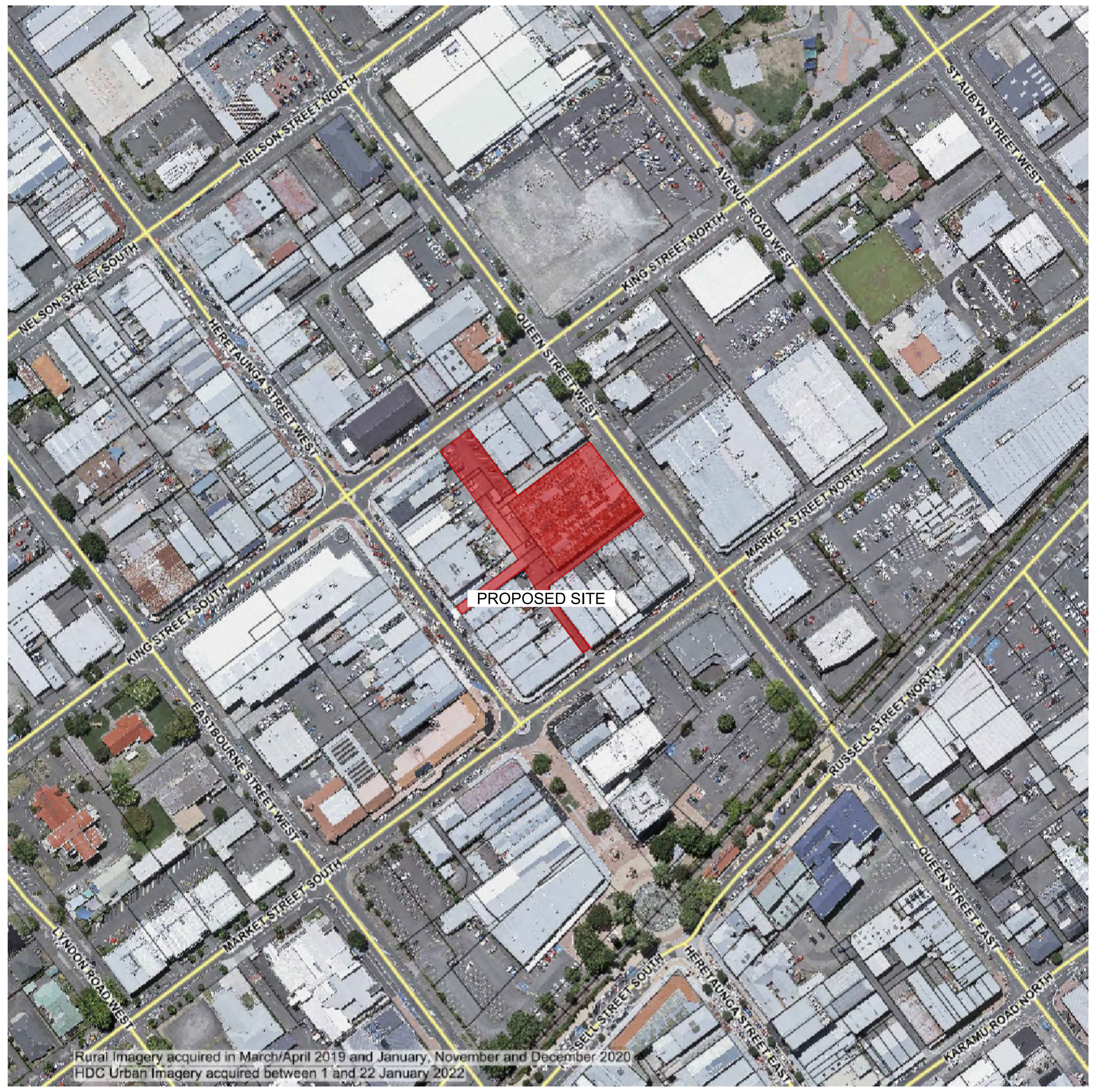
3-WATERS SERVICING REPORT
206 QUEEN STREET WEST
HASTINGS



SITE LOCATION PLAN
(NOT TO SCALE)

FOR RESOURCE CONSENT

REV	DESCRIPTION TO REVISION	REV BY	DATE
1	SCHEME PLAN	JE	11.10.2022
0	ORIGINAL	TK	10.06.2022

NOTES :

CLIENT
HASTINGS DISTRICT COUNCIL

PROJECT
3-WATERS SERVICING REPORT
206 QUEEN STREET WEST
HASTINGS

INFRASTRUCTURE SOLUTIONS || PROJECT MANAGEMENT
PO Box 7335, Taradale 4141
Phone : 06 650 5565 Email : admin@infir.nz

DRAWING TITLE
SCHEME PLAN
SITE DEVELOPMENT

PROPOSAL CHECKED : JPE	CAD CHECKED : JPE	PROPOSAL APPROVED : JPE	CLIENT APPROVED : -	ENGINEER APPROVED : JPE
DRAWN BY : TK	A1 DWG SCALE : 1:250	PROJ / DWG / SHEET : J22172 / 010		REVISION : 1

INFIR SIMPLIFY COMPLEXITY
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REV	DESCRIPTION TO REVISION	REV BY	DATE
0	ORIGINAL	TK	10.06.2022

NOTES :

CLIENT
HASTINGS DISTRICT COUNCIL

PROJECT
3-WATERS SERVICING REPORT
206 QUEEN STREET WEST
HASTINGS

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Phone : 06 650 5565 Email : admin@infir.nz

DRAWING TITLE
EXISTING GROUND CONTOURS (EGL)

PROPOSAL CHECKED :	JPE	CAD CHECKED :	JPE	PROPOSAL APPROVED :	JPE	CLIENT APPROVED :	-	ENGINEER APPROVED :	JPE
DRAWN BY :	TK	A1 DWG SCALE :	1:200	PROJ / DWG / SHEET :	J22172 / 100			REVISION :	0

INFIR SIMPLIFY COMPLEXITY
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2	20 APARTMENTS	JPE	18.11.2022
1	SCHEME PLAN	JE	11.10.2022
0	ORIGINAL	TK	10.06.2022
REV	DESCRIPTION TO REVISION	REV BY	DATE

NOTES :

CLIENT

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PROJECT

3-WATERS SERVICING REPORT
206 QUEEN STREET WEST
HASTINGS

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Phone : 06 650 5565 Email : admin@infir.nz

DRAWING TITLE

SERVICES
OVERALL SERVICES PLAN

PROPOSAL CHECKED :	JPE	CAD CHECKED :	JPE	PROPOSAL APPROVED :	JPE	CLIENT APPROVED :	-	ENGINEER APPROVED :	JPE
DRAWN BY :	TK	A1 DWG SCALE :	1:200	PROJ / DWG / SHEET :	J22172 / 300			REVISION :	2

INFIR SIMPLIFY COMPLEXITY
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REV	DESCRIPTION TO REVISION	REV BY	DATE
3	20 APARTMENTS	JE	18.11.2022
2	ABOVE GROUND STORAGE	JE	12.10.2022
1	SCHEME PLAN	JE	11.10.2022
0	ORIGINAL	TK	10.06.2022

NOTES :

CLIENT: HASTINGS DISTRICT COUNCIL

PROJECT: 3-WATERS SERVICING REPORT
206 QUEEN STREET WEST
HASTINGS

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PO Box 7335, Taradale 4141
Phone : 06 650 5565 Email : admin@infir.nz
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DRAWING TITLE: STORMWATER
OVERALL STORMWATER PLAN

PROPOSAL CHECKED :	JPE	CAD CHECKED :	JPE	PROPOSAL APPROVED :	JPE	CLIENT APPROVED :	-	ENGINEER APPROVED :	JPE
DRAWN BY :	TK	A1 DWG SCALE :	1:200	PROJ / DWG / SHEET :			J22172 / 400	REVISION :	3

SURFACE AREAS		AREA SIZES
1	Roof draining to Queen Street West	884m^2
2	Permeable draining to Queen Street West	187m^2
3	Impermeable ground are draining to Queen Street West	1,286m^2
4	Impermeable ground are draining to King Street	787m^2
	TOTAL AREA:	3,144m^2

FOR RESOURCE CONSENT

REV	DESCRIPTION TO REVISION	REV BY	DATE
2	20 APARTMENTS	JE	18.11.2022
1	SCHEME PLAN	JE	11.10.2022
0	ORIGINAL	TK	10.06.2022

NOTES :

CLIENT
HASTINGS DISTRICT COUNCIL

PROJECT
3-WATERS SERVICING REPORT
206 QUEEN STREET WEST
HASTINGS

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Phone : 06 650 5565 Email : admin@infir.nz
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DRAWING TITLE
STORMWATER
SITE SURFACE AREAS

PROPOSAL CHECKED :	JPE	CAD CHECKED :	JPE	PROPOSAL APPROVED :	JPE	CLIENT APPROVED :	-	ENGINEER APPROVED :	JPE
DRAWN BY :	TK	A1 DWG SCALE :	1:200	PROJ / DWG / SHEET :			J22172 / 401	REVISION :	2

REV	DESCRIPTION TO REVISION	REV BY	DATE
2	20 APARTMENTS	JE	18.11.2022
1	SCHEME PLAN	JE	11.10.2022
0	ORIGINAL	TK	10.06.2022

NOTES :

CLIENT: HASTINGS DISTRICT COUNCIL

PROJECT: 3-WATERS SERVICING REPORT
206 QUEEN STREET WEST
HASTINGS

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Phone : 06 650 5565 Email : admin@infir.nz

DRAWING TITLE: WASTEWATER
OVERALL WASTEWATER PLAN

PROPOSAL CHECKED :	JPE	CAD CHECKED :	JPE	PROPOSAL APPROVED :	JPE	CLIENT APPROVED :	-	ENGINEER APPROVED :	JPE
DRAWN BY :	TK	A1 DWG SCALE :	1:200	PROJ / DWG / SHEET :			J22172 / 500	REVISION :	2

INFIR SIMPLIFY COMPLEXITY
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FOR RESOURCE CONSENT

REV	DESCRIPTION TO REVISION	REV BY	DATE
2	20 APARTMENTS	JE	18.11.2022
1	SCHEME PLAN	JE	11.10.2022
0	ORIGINAL	TK	10.06.2022

NOTES :

CLIENT
HASTINGS DISTRICT COUNCIL

PROJECT
3-WATERS SERVICING REPORT
206 QUEEN STREET WEST
HASTINGS

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DRAWING TITLE
WATER SUPPLY
OVERALL WATER SUPPLY PLAN

PROPOSAL CHECKED :	JPE	CAD CHECKED :	JPE	PROPOSAL APPROVED :	JPE	CLIENT APPROVED :	-	ENGINEER APPROVED :	JPE
DRAWN BY :	TK	A1 DWG SCALE :	1:200	PROJ / DWG / SHEET :	J22172 / 600			REVISION :	2