

# **Attachment 6: Infrastructure Report**



**ENVELOPE ENGINEERING**

LAND  
STRUCTURE  
MANAGE

# Infrastructure Report

Proposed Gabites Block Plan Change

October 2021

Overall page number 484

# DOCUMENT CONTROL RECORD

CLIENT	Maymorn Developments Limited
PROJECT	Proposed Gabites Block Plan Change
PROJECT NO.	1594-01
DOCUMENT TYPE	Infrastructure Report
DATE ISSUED	October 2021
ADDRESS FOR SERVICE	Envelope Engineering Limited Level 1, 68 Dixon Street Wellington
CONTACT	Alan Blyde, Director <a href="mailto:alan@envelope-eng.co.nz">alan@envelope-eng.co.nz</a> +64 21 390 304

# ISSUE AND REVISION RECORD

DATE OF ISSUE	20 October 2021
STATUS	Final
ORIGINATOR	 Andrew Jackson – Director - Civil Engineering
REVIEWED	 Paul James – Senior Civil Designer
APPROVED FOR ISSUE	 Andrew Jackson – Director - Civil Engineering



# CONTENTS

1.0	INTRODUCTION .....	1
1.1	Site Description .....	1
1.2	Proposed Rezoning and Subsequent Development .....	2
1.3	Site Considerations .....	2
2.0	EARTHWORKS .....	3
2.1	Design Approach to Earthworks.....	3
2.2	Erosion and Sediment Control .....	3
3.0	ROADING .....	4
3.1	Existing Roads .....	4
3.2	Proposed Roads .....	4
4.0	WASTEWATER .....	4
4.1	Existing Wastewater.....	4
4.2	Proposed Wastewater.....	4
5.0	STORMWATER .....	6
5.1	Existing Stormwater .....	6
5.2	Proposed Stormwater Flows .....	6
6.0	WATER SUPPLY .....	7
6.1	Existing Water Supply.....	7
6.2	Proposed Water Supply.....	7
7.0	POWER SUPPLY.....	7
8.0	TELECOMMUNICATIONS.....	7
9.0	CONCLUSIONS .....	7
10.0	LIMITATIONS .....	8

## APPENDICES

Appendix 1	Development Area Structure Plan
------------	---------------------------------



## 1.0 INTRODUCTION

### 1.1 SITE DESCRIPTION

The 'Gabites Block' is a largely undeveloped parcel of land located to the north and east of Maymorn Rd, Upper Hutt. The legal description for the site is Lot 2, DP356697 and Pt Sec 299 SO 10985. In total the site is approximately 74Ha and is currently zoned either Rural Valley or Rural Hill. The approximate extent of the site is shown in figure 1 below:



**Figure 1. Site Plan**

Currently the site accommodates pastoral purposes with a single farmhouse existing and several ancillary sheds scattered across the farm. The site has been split into paddocks with numerous walking and vehicle tracks providing access. The site rises from west to east with elevations rising from around RL 110 to RL 195.

Lower, flatter parts of the site are in pasture, across the hill parts of the site there is a variety of vegetation including some areas of mature and/or regenerating native bush. Bioresarches (Babbage Consultants Ltd) have undertaken an Ecological assessment of the site and their report includes a more detailed description of existing vegetation and current land use.

Some preliminary geotechnical investigations have been carried out. The soils on the hill parts of the site are predominantly highly weathered greywacke. The flatter parts of the site contain silty material close to the surface underlain by river gravels. Engeo are currently preparing a geotechnical assessment of the site.

The site is bounded by Maymorn Rd along most of the western boundary, residential properties to the north, forestry to the east and the Wellington-Napier railway line to the south. Maymorn Station is located on the opposite side of Maymorn Road.



## 1.2 PROPOSED REZONING AND SUBSEQUENT DEVELOPMENT

The purpose of this report is to assess the engineering aspects associated with rezoning the site for residential development. The intention is that this information is used in support of the site being included for re-zoning to appropriate zoning(s) as part of a private Plan Change process.

To date several activities have been carried out to determine appropriate development concepts for the site. Assessments were then undertaken by experts from several disciplines against these concepts. A brief summary of these activities is listed below:

- Multiple visits to site have been undertaken by members of the consultant experts/ design team. Constraints and opportunities and site-specific design considerations were viewed and discussed collaboratively across all disciplines on-site.
- Meetings, discussions and workshops with Development and Engineering staff from Upper Hutt City Council and Wellington Water about infrastructure servicing, stormwater management issues and earthworks, environmental and construction management issues.

The Proposed Development Area Structure Plan identifies areas over the site which will allow for the development of rural-residential lots, with the majority being lots of around 1,000m<sup>2</sup>-2,000m<sup>2</sup> or larger. There are a smaller number of larger lifestyle type lots ranging from 10,000m<sup>2</sup> upwards with an average size of 30,000m<sup>2</sup>.

A small part of the site, the Northwest Area, has been identified as being suitable for lots with an average size of 600m<sup>2</sup>, and down to a minimum of 400m<sup>2</sup>.

This report investigates the available options for stormwater and wastewater servicing that will enable development of the site.

The number of lots being proposed will be finalised at Resource Consent stage but variations in number are not expected to change the commentary and recommendations contained within this report.

For the above development to occur, land developments works will be required on site including bulk earthworks, installation of infrastructure services, the creation of stormwater management areas, and construction of roads and accessways. This report addresses these engineering matters.

A Development Area Structure Plan is included in Appendix 1. While any future land development works will be subject to resource consent approvals processes under both GWRC and UHCC, in order to undertake a robust assessment of the potential effects associated with the rezoning of the site, high-level indicative design work has been undertaken. This design work has assisted in determining indicative road alignments and longitudinal gradients, and to identify the approximate location of bulk infrastructure.

No detailed layouts for infrastructure have been designed as this will be undertaken when development proposals are further determined.

## 1.3 SITE CONSIDERATIONS

Generally, the site consists of some flat land adjacent to Maymorn Rd before climbing up at varying slopes into the hills above. There is an approximate 85m vertical height difference from the lowest point on the site beside Maymorn Rd to the highest point.

The Western part of the site, containing the lower flatter ground near Maymorn Rd, is mostly very gently sloping and ideally suited to development of smaller lots. The Valley Flats, Station Flats, and previously mentioned Northwest Areas are located in this part of the site.

The central portion of the site contains the steepest land on the site, and the Hillside Area proposed will contain the largest lots with a minimum lot size of 1.0 ha, and an average size of 2.5 ha average.

On the upper parts of the site the topography is not as steep, within the Hilltops Area a minimum lot size of 2000m<sup>2</sup> is proposed.

Within the northeast corner of the site there is a basin containing gently sloping land, this is the Hilltop Basin Area and a minimum lot size of 1000m<sup>2</sup> is proposed.



## 2.0 EARTHWORKS

Some areas that have been identified for development in the draft Development Area Structure Plan are moderately sloping. In order to develop in these areas some earthworks will be required in order to provide suitable building platforms for houses and acceptably graded roads for access.

Access throughout the site to the proposed development areas will be by a new network of public roads. The movement network identified on the draft Development Area Structure Plan has been designed to allow roads to follow the existing contours wherever possible, limit the need for significant earthworks, and minimise effects on areas of the site where significant ecological values have been identified. The number of stream crossings for proposed roadways has been minimised, with three crossings proposed.

Earthworks and land modification are necessary for the following reasons:

- Land topography. The varying steepness of the site, sharply incised gullies, and undulations within the hilltops.
- Provision of allotments based on existing lot design expectations to achieve an efficient use of the land resource and minimisation of secondary earthworks to construct dwellings.
- Road standards – provision of adequate site access.
- Flood mitigation – earthworks required to form attenuation ponds, rain gardens, and other measures such as culvert upgrades, that will reduce the risk of flooding to downstream properties.

### 2.1 DESIGN APPROACH TO EARTHWORKS

The plan change will include provisions to restrict earthworks within proposed Gabites Block Natural Areas (GBNAs) and other areas identified for ecological restoration and enhancement works. These areas are proposed to be retained as features of the development.

The general approach to earthworks provisions and roading layout includes:

- Encouraging a cut and fill balance (i.e. no excess or import)
- Minimising earthworks within (GBNAs)
- Controlling gradients and rehabilitation of batter slopes
- Requiring bulk earthworks proposals to be accompanied by subdivision plans so that all land development works can be considered together.

#### 2.1.1 Geotechnical description

The geotechnical nature of this site will be covered in detail in a separate report being prepared by Engeo Ltd. That report confirms the suitability of the site for the proposed development along with a number of recommendations.

## 2.2 EROSION AND SEDIMENT CONTROL

### 2.2.1 Requirement for Erosion and Sediment Control

Any disturbance to existing ground removes the existing vegetative cover and potentially allows erosion of the bare ground to occur. Hilly sites are particularly prone to this during high rainfall events and without adequate controls in place sediment can be mobilized. This sediment can damage the environment downstream of the site by covering the ground surface including streams beds with silt and clay and



directly damaging aquatic life. The risk of generating erosion is proportional to the surface area exposed, the duration of earthworks, and the rainfall occurrences during the earthworks process.

### 2.2.2 Good Practice Erosion Sediment Control

Best practice principles of Erosion and Sediment control that will be applied include:

- Completing all works within the minimum time practicable
- Segmentation of catchments
- Stabilisation of exposed areas as soon as practicable
- Perimeter controls for the diversion of clean water

These are the fundamental elements of good practice that should be common to all sites. These limit the opportunity for erosion. It is equally important to put in place control measures to contain, collect, and manage any sediment that is generated before it can leave the site. The recently issued GWRC guideline document "*Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Wellington Region 2021*" details control measures and is widely used as the appropriate standard for management of erosion and sediment control in the Wellington Region. These guidelines will be utilised to design erosion and sediment control measures on the site which will be included in Resource Consent applications to UHCC and GWRC at the time of earthworks and subdivision. In any grant of consent UHCC and GWRC can impose appropriate conditions of consent at the time of land development.

## 3.0 ROADING

### 3.1 EXISTING ROADS

There are three existing access points to the site from Maymorn Rd. Within the site there is an existing network of unsurfaced tracks facilitating vehicular access to most parts of the property.

### 3.2 PROPOSED ROADS

The indicative roading layout proposed is shown on the appended Development Area Structure Plan. There are also three intersections with Maymorn Rd identified, the existing crossings will be removed once the new road intersections have been formed.

Typical roading typologies are included as an appendix to the Integrated Transport Assessment prepared by Stantec.

## 4.0 WASTEWATER

### 4.1 EXISTING WASTEWATER

There is currently no existing public wastewater drainage within the site, but there is a DN225 public main within Maymorn Road immediately adjacent to the site.

Following meetings with Council's development engineers and Wellington Water staff, the following is understood:

- The existing public wastewater reticulation located downstream of the site, has capacity constraints during wet weather.
- During dry weather conditions the network has spare capacity and could accommodate additional flows from the site.

Wastewater discharge from the site could not connect to the existing public downstream reticulation without the current wet weather capacity issues being addressed. Wastewater disposal options for the site are discussed below.

### 4.2 PROPOSED WASTEWATER

We have considered on-site disposal of wastewater. However, the geotechnical investigations have identified that ground permeability is poor within the hilly parts of the site. Poor permeability will result in large treatment beds being required which, on the sloping ground, are likely to be costly to construct. The





lower, flatter part of the site is underlain by gravels which are typically free-draining, however, a relatively high-water table less than 2 metres below the existing ground level complicates the design of the required treatment beds.

In summary, while there may be isolated parts of the site, particularly on larger lots, where on-site disposal would be viable, in general our recommended approach for discharge of wastewater is by connection to the existing **public** network located adjacent to the site.

#### 4.2.1 Development Reticulation

Due to the sloping nature of the site and based on our concept design we believe most of the development can be serviced with a gravity-based wastewater reticulation network. This would mean that each new house site, etc would have access to a gravity connection for wastewater. Generally, this pipework would be relatively shallow (1-2m depth).

There may be isolated parts of the site that will be difficult to get a gravity connection to. In these locations a small wastewater pump station or localised low-pressure network will be required to get the flows into the gravity network.

We are proposing 2 new connections to the existing public network. One of these would be at the Northwest Area, with the other further down Maymorn Rd at the Valley Flats Area.

#### 4.2.2 Flow Mitigation Options

The current off-site reticulation system has existing capacity constraints, which are believed to be caused by a combination of pump station constraints, pipe sizing and condition, and infiltration problems.

Some of the options that have been discussed with Wellington Water for servicing of the site, include:

- i) **Centralised Network Control of Peak Flows** - Controlling peak flows from the site could be done by providing detention storage with discharge to existing reticulation at off-peak periods. Storage would be via a series of tanks which do not all need to be in one place. Storage equipment could be installed progressively to suit the development.
- ii) **Private Peak Flow Control** - One further option for controlling wastewater peak flows has been discussed with Wellington Water. This option involves the use of a comprehensive low-pressure wastewater system. This involves individual pumps with an on-site small storage chamber to be located on each individual residential lot. From the pump chamber a pressurised reticulation network is directed towards the downstream public council wastewater network. Peak flows are controlled on each site within the small storage tank.

Whether a **centralised** system of tanks and pumps is proposed; or **individual** smaller tanks for each dwelling in combination with a low-pressure reticulation system, either option can provide the required peak flow control which would allow the proposed development to connect to downstream reticulation network without affecting capacity issues. There would be no requirement for Council to undertake immediate wholesale upgrades to the downstream reticulation system.

#### 4.2.3 Public Peak Flow Control

Further to the above consideration of options we have had more detailed discussions with Wellington Water and Council to determine the storage requirements. We have been advised that storage of wastewater flow equivalent to 24 hours of average dry weather flow (ADWF) is required. This level of storage is required to mitigate the peak flows to a level that can be accommodated by the existing downstream network.

We have carried out a preliminary design of these storage devices and can confirm that this level of storage can be provided on-site using either of the options described above.



## 5.0 STORMWATER

### 5.1 EXISTING STORMWATER

There is an existing stream that bisects the site. This stream is a tributary of the Mangaroa River, the stream travels northwards through the site and joins another tributary just beyond the site before passing underneath Maymorn road in a culvert and then joining the Mangaroa River.

### 5.2 FLOOD HAZARD

We understand Wellington Water are in the process of modelling the stormwater catchment containing the site and have identified that parts of the proposed Valley Flats Area may be at risk of flooding during a 1% AEP rain event. Our initial assessment is that this is caused by an undersized existing culvert crossing the stream within the site. As the culvert is undersized, water within the stream is predicted to overtop the culvert during large rain events. This culvert is proposed to be upgraded or replaced to accommodate the proposed road crossing of the stream in this location. To confirm the flood risk is alleviated at the time of subdivision, a flood hazard assessment should be completed. This would include a detailed topographical study of the upstream catchment and stream banks.

### 5.3 PROPOSED STORMWATER FLOWS

This Section of the report has been divided into two, firstly considering the stormwater associated with the developed roads and secondly the stormwater associated with the residential lots.

#### 5.3.1 Road Stormwater

Most of the roads across the site are expected to be vested to Council as public roads. Stormwater assets within the road lot would therefore become public assets.

On the steeper parts of the site there is a greater need to control the runoff velocity of road-based stormwater and there may be more kerb and channel used. These channels would drain into roadside sumps which are likely to be connected to short, piped networks within the road. These piped networks would discharge to existing gullies. On the lower, flatter parts of the site we do not anticipate much kerbing and stormwater runoff is expected to be controlled by roadside swales.

##### a) Stormwater Quality

We propose that stormwater treatment be provided, and we anticipate this would be met with either rain gardens or constructed wetlands. Swales may also be used on the flatter parts of the site.

##### b) Stormwater Attenuation

The low-density nature of the proposed development ensures that only limited changes in the volume and intensity of runoff will be observed. However, due to the downstream constraints there is a need to provide attenuation of peak runoff rates to ensure hydraulic neutrality. This could be achieved by constructing ponds at or close to the discharge points.

##### c) Stormwater Discharge

Discharge will be into existing gullies with suitable erosion control. As noted above the discharge is likely to include or be preceded by treatment/attenuation devices.

#### 5.3.2 On-Lot Stormwater

Roof water would be collected to rain tanks adjacent to each house which will serve as the primary source of potable water for the houses. There will be overflow connections from the rain tank passing to the downstream disposal point. The discharge point will vary depending on the location of the house site within the lot, the terrain of the lot, and whether there is a piped system available within the road.

Lots below the road would typically discharge to gully areas via a designed outfall structure with energy dissipation and scour protection.



Some lots that are close to the road where a piped system is present may discharge to the piped network provided that this has been included in the attenuation calculations at subdivision stage.

## 6.0 WATER SUPPLY

### 6.1 EXISTING WATER SUPPLY

There are existing public water mains parallel to the site boundary along Maymorn Rd. One of these, a DN200 mPVC pipe, lies partly within the site and the other, a DN 150 AC pipe, is on the opposite side of the road.

### 6.2 PROPOSED WATER SUPPLY

#### 6.2.1 Site Excluding Northwest Area

We have liaised with Wellington Water and discussed the proposed development. Despite the proximity of existing infrastructure, Wellington Water have advised that there is currently no spare capacity to be utilised within the development. Infrastructure upgrades, such as a new reservoir and rising main upgrades, have been proposed but are not yet confirmed or programmed. Therefore, development of this site has been considered on the basis that each developed lot will be required to contain its own water collection and storage system to supply the lot with potable water utilising a tank collection of roof rainwater. We believe this is feasible. Each lot will also need to have a dedicated firefighting water supply available.

#### 6.2.2 Northwest Area

The proposed size of these lots (average 600m<sup>2</sup>, down to a minimum of 400m<sup>2</sup>) means it is more difficult to satisfactorily integrate the required storage with any proposed house design. For this reason, we propose that subdivision below 1000m<sup>2</sup> only be carried out when a suitable public water supply is available.

## 7.0 POWER SUPPLY

We have discussed the development plans with network operator, Wellington Electricity. Wellington Electricity have advised that network upgrades would be required for the proposed development to be fully developed. We note that this is not unusual for developments of this scale. Further detailed discussions are ongoing with Wellington Electricity to determine the timing of the upgrade.

At least one new power substation will be required within the site. The timing and location for this will be worked through with Wellington Electricity.

Based on our investigation and discussions, we see no problem with the ability for power to be supplied to the proposed development from existing surrounding infrastructure networks.

## 8.0 TELECOMMUNICATIONS

Access to the fibre network is available close to the site. We have liaised with Chorus who have confirmed the development can be serviced. Based on our investigations we see no problem with the ability for telecommunications to be supplied to the proposed development.

## 9.0 CONCLUSIONS

Based on our assessment of the existing infrastructure, our investigations on-site, our discussions with Council and other service providers, and our preliminary design, we are satisfied that the development enabled via rezoning of the site and inclusion of the Development Area Structure Plan and accompanying provisions within Council's District Plan can be adequately serviced in terms of roading, stormwater, wastewater, potable water, electricity, and telecommunications as outlined above.

The design of the Development Area Structure Plan has been undertaken by a multi-discipline team. Overall, the layout of Areas, roads, earthworks and services has been undertaken to achieve the sustainable management of the natural and physical resources of the site to provide housing supply in a manner that is appropriate to the amenity values and natural features of the site and locality including existing vegetation/ streams/ sensitive environments and visual impacts.



## 10.0 LIMITATIONS

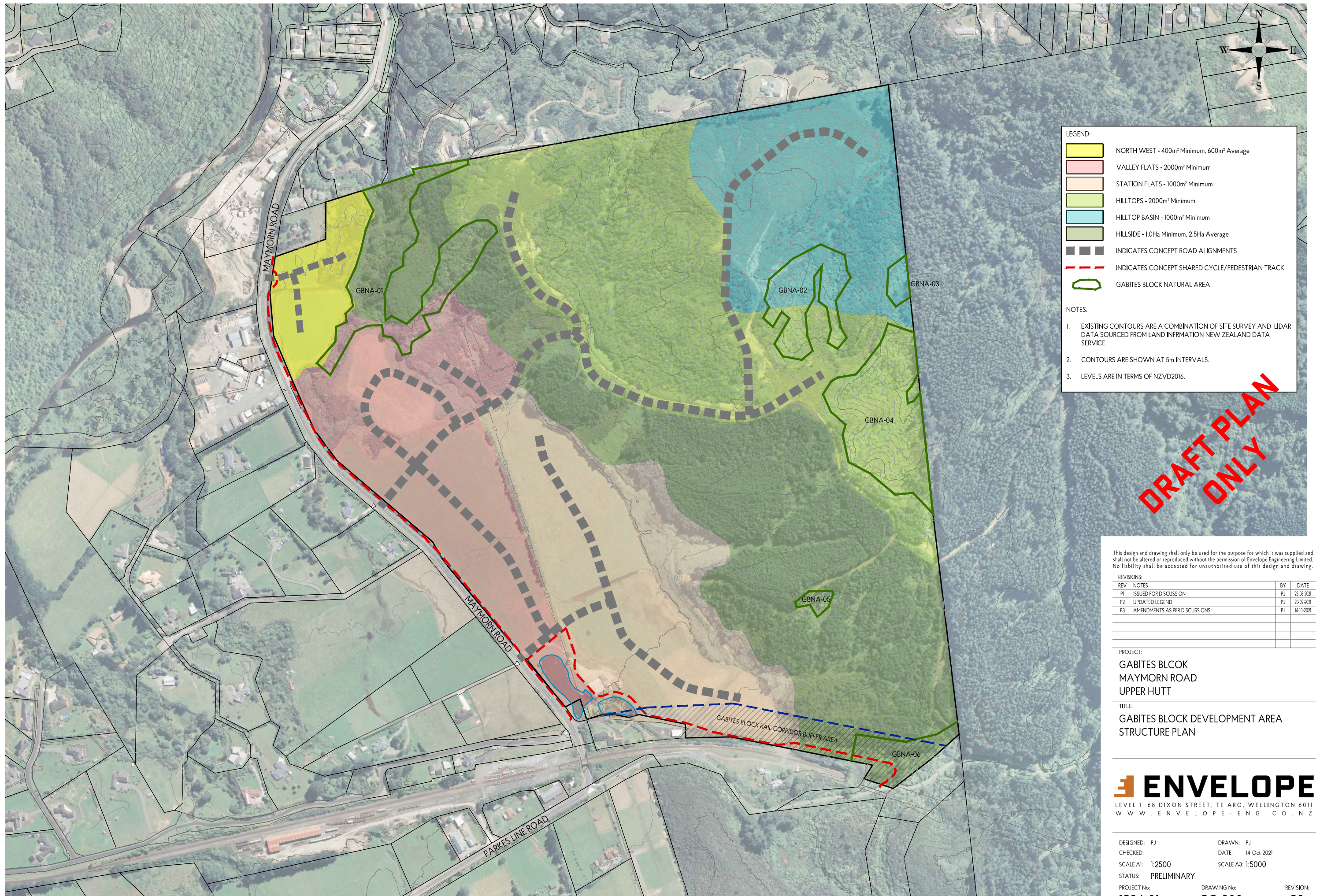
This report is for the use by Maymorn Developments Limited and Upper Hutt City Council only for a private plan change application and should not be used or relied upon by any other person or entity or for any other purpose.

This report has been prepared for the project described to us and its extent is limited to the scope of work agreed between the client and Envelope Engineering Limited. No responsibility is accepted by Envelope Engineering Limited or its directors, servants, agents, staff or employees for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.



# APPENDICES

APPENDIX 1  
DEVELOPMENT AREA STRUCTURE PLAN



**LEGEND:**

- NORTH WEST - 400m<sup>2</sup> Minimum, 600m<sup>2</sup> Average
- VALLEY FLATS - 2000m<sup>2</sup> Minimum
- STATION FLATS - 1000m<sup>2</sup> Minimum
- HILLTOPS - 2000m<sup>2</sup> Minimum
- HILLTOP BASIN - 1000m<sup>2</sup> Minimum
- HILLSIDE - 1.0Ha Minimum, 2.5Ha Average
- INDICATES CONCEPT ROAD ALIGNMENTS
- INDICATES CONCEPT SHARED CYCLE/PEDESTRIAN TRACK
- GABITES BLOCK NATURAL AREA

**NOTES:**

1. EXISTING CONTOURS ARE A COMBINATION OF SITE SURVEY AND LIDAR DATA SOURCED FROM LAND INFORMATION NEW ZEALAND DATA SERVICE.
2. CONTOURS ARE SHOWN AT 5m INTERVALS.
3. LEVELS ARE IN TERMS OF NZVD2016.

DRAFT PLAN ONLY

This design and drawing shall only be used for the purpose for which it was supplied and shall not be altered or reproduced without the permission of Envelope Engineering Limited. No liability shall be accepted for unauthorised use of this design and drawing.

**REVISIONS:**

REV	NOTES	BY	DATE
P1	ISSUED FOR DISCUSSION	PJ	28-08-2021
P2	UPDATED LEGEND	PJ	20-09-2021
P3	AMENDMENTS AS PER DISCUSSIONS	PJ	14-10-2021

**PROJECT:**  
 GABITES BLCOK  
 MAYMORN ROAD  
 UPPER HUTT

**TITLE:**  
 GABITES BLOCK DEVELOPMENT AREA  
 STRUCTURE PLAN



DESIGNED: PJ	DRAWN: PJ
CHECKED:	DATE: 14-Oct-2021
SCALE A1: 1:2500	SCALE A3: 1:5000
STATUS: PRELIMINARY	
PROJECT No: 1594-01	DRAWING No: PC-900
	REVISION: P3