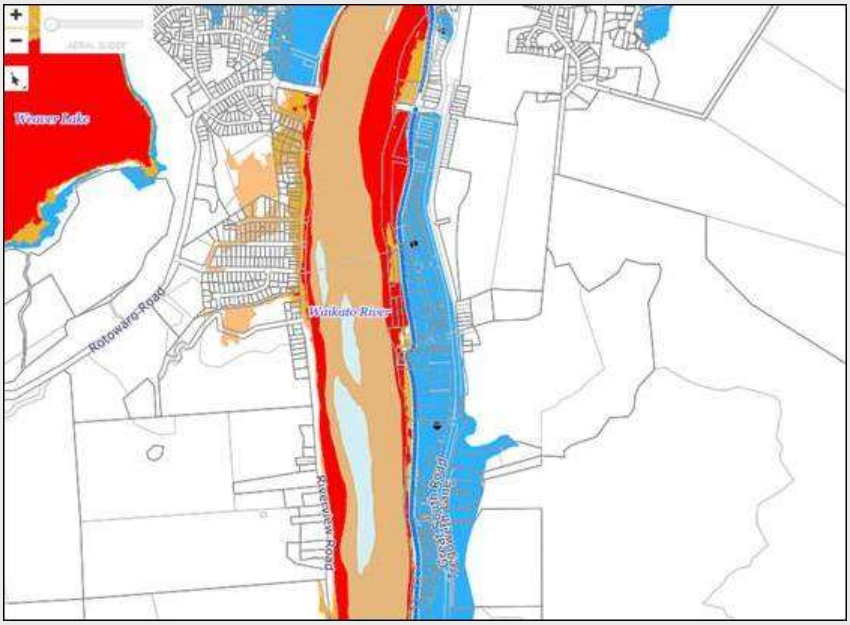
# PROPOSED PLAN CHANGE 22

## THREE WATERS ASSESSMENT

Builtsmart Property Partnership



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# CONTENTS

Appendix 12 WATER SUPPLY AND WASTEWATER PLAN

Appendix 13 CAPACITY CONFIRMATION LETTER - WAIKATO DISTRICT COUNCIL

# EXECUTIVE SUMMARY

Builtsmart Property Partnership is advancing a Private Plan Change to the Waikato District Plan. This plan change seeks to rezone land from Living Zone to light Industrial Zone to enable the expansion of the existing Buildsmart business into the neighbouring properties.

A key requirement to support the plan change is a Three Waters Assessment – particularly in respect of stormwater management, flooding and potential impacts on the Lower Waikato River Flood Scheme.

The site sits within the Huntly South Ponding Area. It is mostly undeveloped grass land with 3 existing residential dwellings. The plan change will introduce large new areas of impervious surface which could have potential adverse effects on local flood hazard and water quality in the Waikato River, if not managed appropriately.

The re-zoning and subsequent development associated with the Buildsmart expansion will also result in the reconfiguration of the current ponding area by way of filling and earthworks to create a platform for the development, as well as a new storage compensation basin along the northern and eastern boundary. The new hardstand and Finished Floor Level (FFL) will sit below the 100yr maximum design ponding level (11.7mRL) but above the estimated 2yr ponding level (10.9mRL). The 2yr estimated level is based on a local 2yr storm event combined with full pipe blockage, no soakage loss and high Waikato river levels (closing the floodgate preventing gravity drainage). Discussions with Builtsmart's founder Phillip Leather who has owned the site for more than 20 years suggests this 2yr level has never been reached, observed ponding levels in the order of ~10.2mRL (~500mm – 700mm depth) within the current paddock before soaking back into the ground or draining away via field catch pits and pipe network to the river.

The industrial activity lends itself to a flood resilient design that can tolerate inundation in the order of 700mm and 200mm flood depth during a 100yr and 10yr event respectively based on the proposed finished floor level. The ponding level estimates are considered worst case scenarios resulting from pump station failure (power failure of more than 2.5 hours), and no gravity drainage due to high river levels closing the flood gates. However, recent correspondence provided by WRC suggests a ponding level of 11.8mRL could be reached based on a 2080 climate scenario. The increase of ~100mm due to climate change above the design ponding level of 11.7mRL is not expected to change the flood risk assessment in this report – flood resilient construction remains largely the same but will need to account for this additional height.

The site is currently serviced by Waikato District Council Water, Waste and Stormwater networks. These networks will be diverted and reconnected as part of the Buildsmart expansion development. The stormwater network originates on the re-developed site (catch pits to drain the paddock) and will likely be upgraded in accordance with the RITS and rediverted within the proposed basin to avoid new hardstand areas.

The basin provides enough storage to attenuate post development flows to existing peak flows. A swale is one potential option currently proposed to provide water quality treatment. A simple flow control structure is also proposed with lower primary flow and raised spill level to drain the site during flood events (including a spill containment valve). The relatively large basin size is designed to provide level for level flood volume compensation as well as accommodate additional runoff from the site during local rain events.

The proposed solution mitigates directly on a level for level basis for the loss of ponding storage as a result of the development. The key aspects of the overall design are:

1. Mitigation to off-set loss of existing flood ponding volume using a direct 'level for level' replacement method within the boundary of the site;
2. Mitigation is not proposed by simply upgrading the pumps to allow the ponding area to reduce by infilling while attempting to maintain the same design ponding level by pump upgrade. This approach is not considered sustainable over the longer term compared to a

direct level for level compensation approach incorporating flood resilient design as we propose – with no net loss of storage volume;

3. Flood resilient design will be a key aspect for all new building infrastructure and material storage; and there will need to be emergency evacuation plan for staff and visitors prepared during a subsequent resource consent process;
4. Water quality treatment and on-site attenuation is based on existing peak flow estimate;
5. There is no retention or EDV requirement due to proximity of the site to the main Waikato River channel and due to the absence of sensitive watercourses requiring baseflow and/or erosion control; and
6. Accidental spill containment within the site (via oil separators and potentially a cut off valve at the basin outlet) will be provided in recognition of the proximity of the stormwater outlet upstream of the Huntly Water treatment plant.

Further details of the water treatment solution, outlet configuration to control flow and refinement of the flood risk assessment will be provided during the building consent and resource consent process (for the buildings, and earthworks/filling) and once the development layout is finalised. The purpose of this report to establish in principle that the site is suitable to be re-zoned from residential to light industrial activity.

To date this assessment has involved significant collaboration with WRC staff, and the technical experts working on behalf of WDC.

From a water supply and wastewater perspective, the development has low demand water and wastewater requirements of similar demand to a single residential dwelling i.e. 1-2 new toilets and 1-2 tap stands are required.

# 1.0 INTRODUCTION

## 1.1 BACKGROUND AND PURPOSE

Builtsmart Limited sees the modular/transportable home building industry as a key growth area in New Zealand. In this respect, the business wishes to accommodate such growth and needs to physically expand its existing operation (i.e. make the production facility larger). The expansion will allow for a significant increase in the number of transportable homes able to be constructed by Builtsmart.

At present the Operative Waikato District Plan Maps (Figure 1) show properties immediately to the north of the site as Living Zone. Industrial activity is prohibited in the Living Zone. In order to enable Builtsmart to expand, Builtsmart Property Partnership is advancing a Private Plan Change to the Operative Waikato District Plan. Further details on the plan change process are provided in the Plan Change documentation (prepared by Mitchell Daysh Limited).

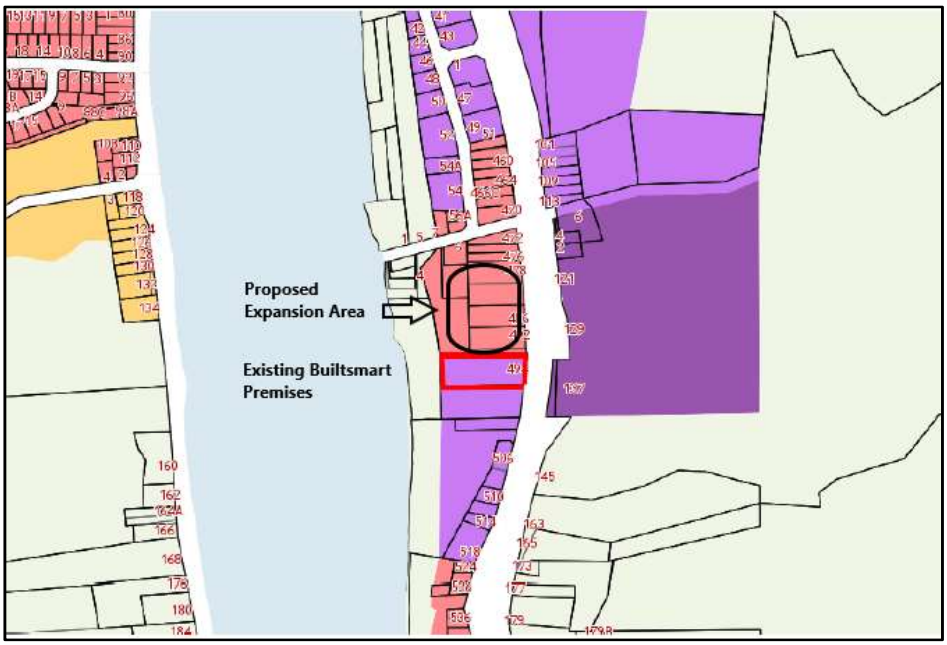



Figure 1: Existing (red rectangle) and Proposed Future Expansion Area

The purpose of this report is to establish, in principle, the ability to service the plan change area from a 3 waters perspective. Several constraints have been identified which will be addressed in this study as follows:

1. The site is within an existing ponding area ('Huntly South Assessment Area');
2. In times of flood, flows to the Waikato River outlet are regulated by pumping;
3. A change in land use will result in an increase in runoff volume and timing of peak flow; and
4. Discharge of contaminants from newly created hard surfaces.

The post development stormwater options to manage increase in peak flow, discharges to the existing pipe network and water quality treatment are not unique to this development. This report presents an indicative solution to manage stormwater runoff from the new development (Option D layout) which will be in accordance with the RITS and Waikato Regional Stormwater Management Guideline.

It is our view that there are several stormwater final design options which can be implemented and finalised during detailed design. The priority of this study is to establish in principle whether a zone change is appropriate, given the potential adverse effects from developing within the existing ponding area, referred as the 'Huntly South Assessment Area' in the Waikato District Plan. A flood risk assessment is required to establish

the appropriateness of the site for development. The assessment outlined in this report looks at risk both within the development and outside the development on neighbouring properties.

### 1.1.1 THE HUNTLY SOUTH ASSESSMENT AREA

The Huntly South Assessment 1 is a planning layer designed to safeguard flood capacity during high rainfall. The area represents ponding up to the 100yr event (Figure 2) which has historically been subject to infilling for development with, at times, limited assessment of the effects on flooding. Therefore, the Waikato Regional Council seeks to ensure appropriate investigations are undertaken that not only address loss of flood storage but also the implications of additional impervious coverage. Runoff from new development is thought to also contribute to increased ponding level.

The district plan rules for filling in the Huntly South Assessment area, result in any filling being a discretionary activity (rather than permitted). It is expected that the filling component will be assessed in more detail through a separate resource consent process. The purpose of this report is to assess the effects of the change from Living Zone to Light Industrial Zone which requires broad detail on the effects of filling.

A description of the assessment area from the operative Waikato District Plan is provided below in *italics*:

*Huntly South Assessment Area 1 covers a specified area in Huntly South between the state highway and the river where the ponding capacity of land has been seriously reduced by past filling. Tighter controls on further filling are necessary to maintain the remaining holding capacity.*

*The layer is intending to safeguard flooding capacity during high rainfall. The area identifies land that has been filled to raise property above flood levels which has in turn created a greater risk to neighbouring properties, i.e. the non-filled sites will be affected by displaced flood water.*

*Rules relate to building and earthworks. Relates to the implementation of the District Plan under the Resource Management Act (1991) and may be subject to various limitations and conditions. These features are a spatial representation of the policies and objectives of the Waikato District Plan and indicate where policies, overlays and District Plan rules apply*

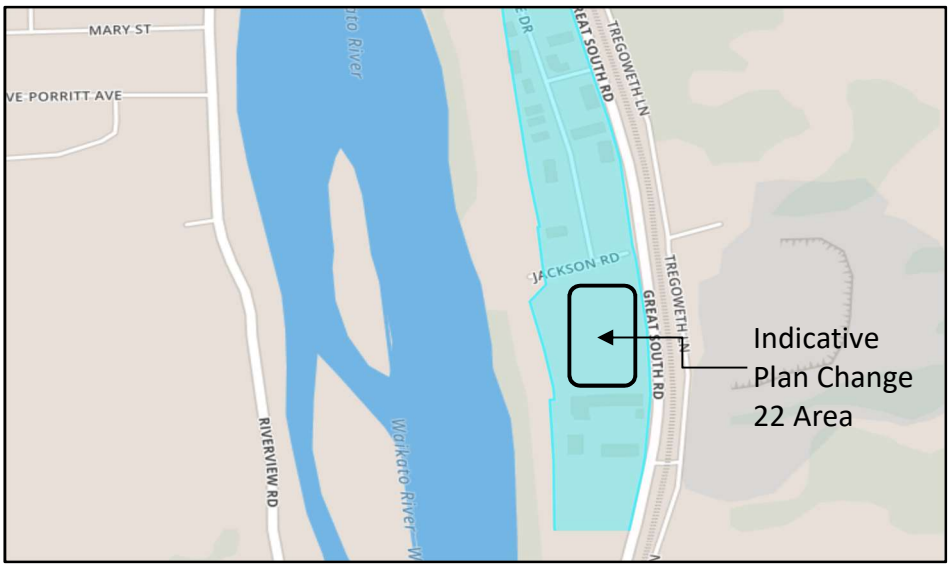



Figure 2: Showing a portion of the Ponding Zone within the Plan Change Area

In addition to the ponding zone in Figure 2, the planning maps of the Operative Waikato District Plan also show a "1% Design Flood Level" overlay as shown in Figure 3. The design level is 11.7mRL to the north of the site. This flood level links to the rule in the district plan that to be a permitted activity, non-habitable buildings need to be above the 1% AEP Flood Level. The 11.7mRL is consistent with the 11.7mRL provided in the WRC Huntly Flood Management Plan 1992/15 discussed further in this report.

It is worth noting the Proposed District Plan does not include any design flood levels as the natural hazards section of the PDP will be notified for submissions in the next few months.

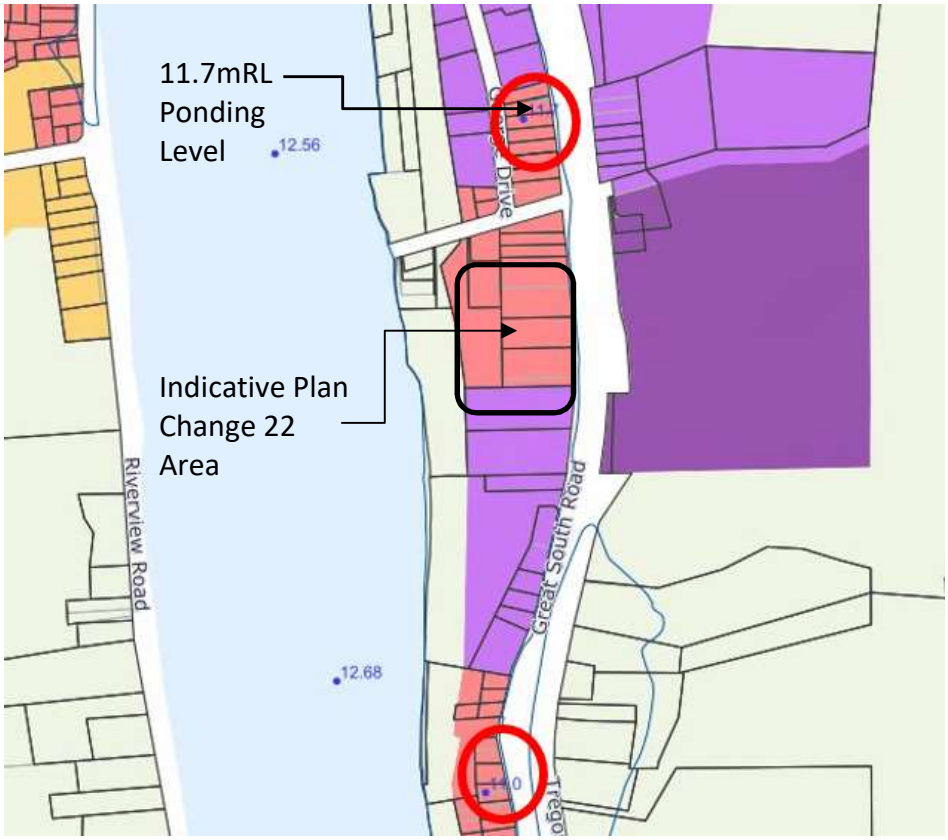



Figure 3: 1% Design Flood Ponding Level - Operative Waikato District Plan

**Key Points:** The Huntly South Assessment 1 Area is a WDC planning layer that is designed to safeguard the existing flood storage capacity and maintain the functional integrity of the ponding zone. The 1% design flood levels are shown on the Operative Waikato District Plan.

# 2.0
# EXISTING CATCHMENT DESCRIPTION

## 2.1 SITE VISIT

A site walkover and technical meeting was undertaken in April 2019. Site photos from different perspectives are provided in Appendix 1. The area to the north is currently grass paddock with 2 existing residential properties. A grass depression area is clearly shown approximately 2m deep at the lowest level compared to the adjacent road and footpath.

The technical meeting was with the client and the WDC review team. Several issues were raised during the meeting as summarised below:

1. Impact of infilling within the ponding area and potential adverse effects from loss of flood storage
2. Impact of development on current WRC pipe network leading to the pumps and outlet to the Waikato River
3. Ensuring integrity of the WRC stop bank to the west of the site
4. Proximity of the site to the Huntly Water Treatment Plant and risk of contaminant spill
5. Stormwater quality treatment measures

## 2.2 RECEIVING ENVIRONMENT

The existing stormwater network drains south to the Huntly South Pump Station 1. Limited information is available on the network based on discussions with WDC asset engineer and desk top GIS assessment. Therefore, a site survey was undertaken by Blue Wallace Ltd to pick up existing network features such as manholes levels and pipe alignment and invert (inlet/outlet). As well as site levels and current building footprints. The survey plans are shown in Appendix 9.

The survey shows the site is currently serviced by an existing stormwater pipeline (with several field grates within the paddock) to pick up ponded water. The pipeline is at a flat grade and picks up road runoff (via kerb inlets) prior to connecting to the Pump Station 1 inlet drain (concrete forebay channel). Flows then pass through a culvert under the stop bank to the Waikato River. Aerial imagery shows rock rip rap at the culvert outlet. The receiving environment is therefore the main Waikato River channel approximately 400m away. Waikato District Council hold consent from the Waikato Regional Council to discharge stormwater to the Waikato River.

## 2.3 GROUNDWATER

A search of the current WRC GIS revealed no information on groundwater levels. A broad analysis of Waikato River Levels throughout 2018 and 2019 http://www.waikatoregion.govt.nz/services/regional-services/river-levels-and-rainfall/ suggest 'normal' levels range between 7.0mRL and 9.0mRL with the annual event (1984-2017) at 9.9mRL..

Communication with Builtsmart which has occupied the site for ~20 years, indicate no occurrence of seasonal ponding (winter groundwater above existing ground level) within the depression area. This statement is supported by observations on site which show normal grass coverage with no apparent vegetation suited to seasonally wet conditions such as sedges (see site visit photo in Appendix 1).

The site is adjacent to the Waikato River and it could be expected that groundwater levels generally match with normal river levels. Based on the range of levels over the past two years, average groundwater could therefore be somewhere between 7.0mRL and 9.0mRL. The lowest ground level on site is ~9.6mRL in the vicinity of the field grates. It is anticipated that groundwater could possibly reach within 0.5m of the ground service. No water was observed in the field catch pits down to a sump depth of 8.35mRL at the time of the site visit in April 2019.

The closest WRC bore is located approximately 1000m to the north as shown in Figure 4. The bore log shows a series of sands and gravels to a depth of 6.5m. This is typical for river terrace deposits and is what is expected following discussion with WRC staff on the design and construction of the clay stop banks on sand/gravel

foundation requiring a need for clay ballast (~30m width) along much of the stop bank alignment through Huntly.

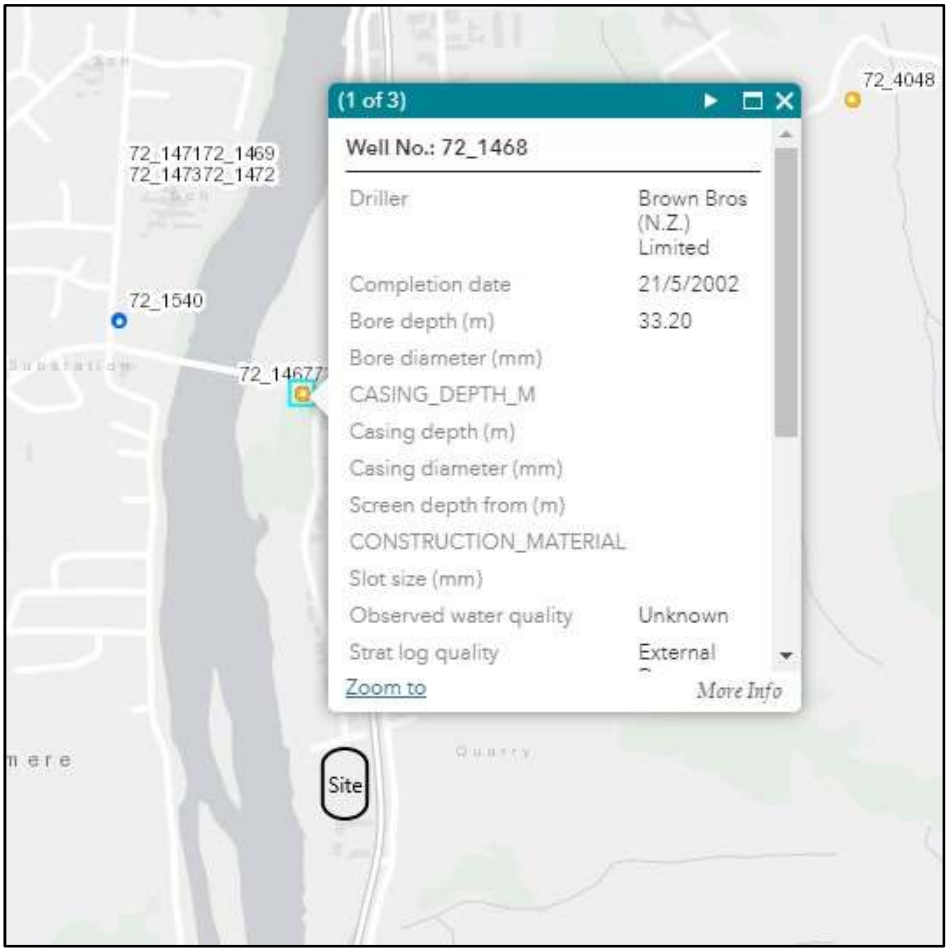



Figure 4: Closest WRC Bore Approximately 1km to the North

## 2.4 SOILS

Landcare Research 'S map' does not cover the site or contributing catchment area. The WRC GIS shows the catchment to the east (225ha – Figure 5), which generates local runoff to the ponding area, is made up of the Mangatawhiri Soil Series (imperfectly drained) most likely alluvial and colluvium.

The site itself is likely to be underlain by sand/gravel deposits with potentially some thin layers of Taupo pumice (AD 186) laid down either side of the river. There could also be some poorly drained Group C soils in the lowest areas within the overall Huntly South assessment area. Discussions with Builtsmart indicates the site drains freely following a rain event and we expect sand and gravel is dominant considering the bore log to the north.

Based on the above, for the purposes of estimating ponding levels and the pre and post development runoff (analysis presented later in this report), a soil type B (CN = 61) is used for the site and for the overall contributing catchment.

Further geotechnical and soil investigation will be undertaken in the next phase of design to determine the soil characteristics.

## 2.5 GEO-TECHNICAL

The initial geotechnical results were not available prior to the completion of this report.

**Key Points**

Low hills to the east and flat sandy/gravel river terrace (low density urban) contribute runoff to the ponding area. There is no groundwater data currently available for the site, but anecdotal evidence suggests the winter high level remains below the existing ground level. The receiving environment for the existing stormwater system is the Waikato River.

# 3.0 HUNTLY SOUTH PONDING AREA

The site is protected from flooding inundation from the main Waikato River channel by the lower Waikato flood control scheme. A stop bank runs along the western boundary which is designed to protect up to the 100yr event. The plan change area is located between model cross-sections 124 and 124A on the Waikato River. The 100yr flood level between these cross sections has been estimated by WRC to be approximately 12.2mRL (refer to Technical Report – Series 2013/27; Lower Waikato Flood Protection Service Level Review for further details). The stop bank crest level is approximately 13.3mRL.

Although protected from river flooding, the site is within a ponding area. The source of ponded water is runoff from local catchments both urban and rural (S.2.2 and Map 1: Huntly Flood Management Plan, 1992/15).

Discussions with both WDC staff and WRC staff have provided a better understanding of the nature of the ponding area and pump controls which drain the ponding areas during a flood event. A summary of the discussions and consultation timeline is provided in Appendix 10. The maximum ponding design levels for the 10yr, 50yr and 100yr events are presented in the 1992/15 Huntly Flood Management Report (s 3.2.2 and Map 1) and shown in Table 1. Correspondence with WRC suggest a 2080 climate adjusted estimate of 11.8mRL (see letter correspondence in Appendix 11).

Limited information is provided in the report on the catchment runoff assumptions as to how the levels were derived, although recent correspondence with WRC suggests these levels have been “surveyed and recorded” by WRC staff at the time of the 1992/15 report development. Notably the frequent 2yr event level is not provided. The ponding levels are generated by local storm, pump failure (power outage > 2.5hrs), pipe blockage and river floodgate closure (high river levels) preventing gravity drainage. A simple water balance approach is likely to have been used based on total catchment runoff volume filling the depression area. This was confirmed by WRC in a telephone conversation with Russell Lamb.

Following discussion with BBO reviewer, we undertook a similar ’water balance’ assessment using the TP 108 SCS catchment runoff graphical method and HIRDS V4.0, to attempt to match (within reason) the ponding levels shown in the 1992 report as well as provide an estimate of the ponding level for a 2yr event (including upper limit climate change scenario RCP 6.0 2081-2100).

A ponding volume table (based on existing depression storage within the entire Huntly South ponding area) was developed in 12D software using LiDAR, (see Map SK-002 Rev in Appendix 4). For comparison the design levels reported in the 1992/15 Huntly Flood Management report are also listed against the estimated depression storage volume. The runoff volumes from the TP 108 runoff analysis are listed according to storm event (last column).

| **TABLE 1**: DEPRESSION STORAGE (PONDING), FLOOD LEVEL AND TP 108 RUNOFF VOLUME | | | | |
|---|---|---|---|---|
| DEPRESSION STORAGE VOLUME (M3) | DESIGN LEVEL FROM 1992 REPORT RL (M) | STORM EVENT CORRESPONDING TO DESIGN LEVEL (1992 REPORT) | ESTIMATED TOTAL RUNOFF VOLUME (TP 108) | STORM EVENT (TP 108) |
| 161,336 | 11.7 | 100yr | 171,521 | 100yr |
| 138,740 | 11.6 | 50yr | 142,048 | 50yr |
| 118,400 | 11.5 | | | |
| 100,407 | 11.4 | | | |
| 84,545 | 11.3 | 10yr | 84,892 | 10yr |
| 70,498 | 11.2 | | | |
| 58,139 | 11.1 | | | |
| 47,320 | 11.0 | | 49,500 | 2yr+cc |
| 37,936 | 10.9 | | 40,823 | 2yr |

Table 1 shows the available storage volumes at each ponding level match reasonably well with the estimated runoff volumes for the same storm event using TP 108.

There is a good match between the estimated ponding volume (from LIDAR) at each ponding level and the estimated runoff volume to fill to that ponding depth. For example, the 10yr level of 11.3m RL (from the Huntly Flood Management Plan) corresponds to ~84.545m$^3$ of storage, likewise the 10yr storm event (TP 108 graphical) generates 84,892m$^3$ of runoff volume.

There are obvious errors to be considered (such as LIDAR accuracy, catchment runoff assumptions and rainfall) however the simple storage volume assessment provides a useful correlation between ponding volume and design event and provides confidence particularly in the estimation of the 2yr maximum ponding level at 10.9mRL. The 2yr level is useful to assist with the flood risk assessment presented later in the report. The climate adjusted 2yr scenario also indicates maximum levels to be below the proposed building floor level.

The TP 108 spreadsheets are provided in Appendix 8. The assumptions are: CN = 61 (Soil Type B), catchment area from LIDAR, % impervious and pervious from aerial GIS, HIRDS V4.0 historic rainfall totals (no climate change).


Figure 5: 225ha Contributing Catchment to the Ponding Area (green) - see Plan SK-010, Appendix 4.

## 3.1 HUNTLY SOUTH PUMP STATION 1

Pump station 1 is one of 3 pump stations servicing the Huntly South Ponding Area. The pump station is closest the project site and the existing WDC stormwater network within the site drain to this station and then to the river via culvert under the stop bank (Figure 6).

Information regarding the make, model and impellor size for pump station was obtained from the 2009 SKM Level of Service Report. The pump capacity was determined based on pump curve information in the MacEwans pump brochure. When determining the capacities from pump curves, SKM used a conservative approach by following the lower bound capacity.

### 3.1.1 PUMP CAPACITY

The pump station capacity is provided via 2 x 0.9 $m^3/s$ pumps (combined 1.8$m^3/s$). The performance measure to meet the level of service is a 10yr 72hrs following a 24hr storm event (SKM, 2009). This service level is based on surrounding property floor levels and the Building Act to protect floor levels up to the 50yr event.

The pump capacity over 72hrs is 466,560$m^3$. 72hrs is the maximum duration of inundation allowable and hence the 24hr 10yr storm volume needs to be pumped in 72hrs.

It appears that generally the Huntly Flood Protection Scheme has worked well and a new design standard for flood protection works in the Lower Waikato should retain a similar level of performance (SKM, 2009). The pump station 1 capacity currently exceeds its design criteria according to Table 15 in the SKM report (refer to Design Criteria 6 – 10yr 24hr event).

Communication with WRC technical staff indicate that the pump trigger level is ~500mm below the bank level of the inlet drain to Pump 1. The idea is to initiate pumping sometime prior to levels reaching top of bank. As stated above, the pump capacity is based on 50yr (Building Code) level of protection to floor levels

Pumps work when the river flood gates are closed (high river levels) or when a local storm event raises level within the drain. They can operate whenever the trigger level is reached irrespective of actual design event. Pumps also operate if flood gates are open (river levels are low) but local storm events result in water levels rising exceeding the gravity outlet capacity thereby backing up within the drain.

During a regional event, it is likely runoff from the site will reach the river prior to the floodgate closing. The 1992 study states that ponded areas will drain over the period of a few days. Prolonged flooding may result from pump failure. The ponding levels are based on local runoff and there is a margin of error associated with these levels.

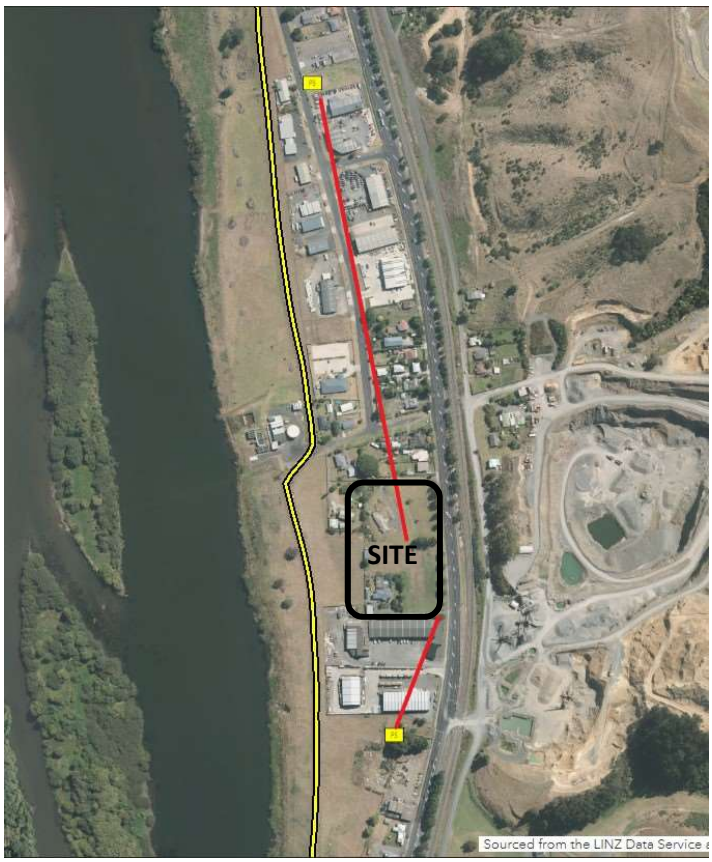



Figure 6: Pump Station 1 (South) Closest to the site and Pump Station 2 (North)

**Section 3.0 Key Points**: The maximum design ponding levels (1992 WRC report) are based on a simple water balance assessment with catchment runoff volume filling the estimated depression storage areas based on LiDAR. Similar levels (addition of the 2yr+cc) have been estimated using a simple TP 108 graphical method. The site drains to Pump station 1 which is designed with a 50yr level of service and has enough capacity to accommodate the land use change that Proposed Plan Change 22 will enable.

# 4.0 FLOOD RISK ASSESSMENT

The Operative Waikato District Plan rules state that a site-specific assessment is required (at Resource Consent) for development within the Huntly South Assessment 1 Area to address specific issues relating to the susceptibility to flooding and ponding. An extract from the plan is provided in the box below which highlights controls to maintain the holding capacity.

> Filling - Flood Risk Areas
> These rules implement policies on natural hazards. Flood Risk Areas are shown on the planning maps. Flood risk areas have an important function in mitigating the adverse effects of floods by holding water temporarily during and after flood events. This function is lost if ponding areas are filled in. Huntly South Assessment Area 1 areas where ponding capacity of land in the area has been seriously reduced by past filling. Tighter controls on further filling are necessary to maintain the remaining holding capacity.
> Waikato Section » Part 2 Rules » Other Activities: Land use - effects

## 4.1 FLOOD RISK ASSESSMENT OBJECTIVES

A risk assessment is a key means to identify and understand risk and to determine which aspects of risk can be managed through appropriate development methods.

Overall, we take the view that the Builtsmart expansion can be designed to be flood resilient (tolerant to inundation) including climate change without raising existing ponding levels. In terms of land use planning, there is a risk reduction in changing the land zoning from residential to industrial.

1. The risks of adverse effects from infilling the ponding area to people, buildings, infrastructure and the environment (within or outside the site) .
2. Risk are not increased overall and where practicable are reduced.
3. Safely maintain the ponding storage function.
4. Practical direct methods to maintain storage are preferred over mechanical (floodgates/valves) or pumping upgrade options which rely on electricity or complex operational procedures which are vulnerable to failure during a flood event.

Specific assessment is provided under each of the following headings. It is noted that the solutions and mitigation measure provided below will be confirmed and agreed at detailed design, working with WDC and WRC during the resource consent process. For plan change, it is considered the measures are reasonable and practical to implement using existing industry technologies and materials.

1. **Not raising ponding levels**

The development will not raise ponding levels because like for like storage volumes are being retained within the site. Volumes are achieved within a basin and partial inundation across the site which is made up of hardstand and covered roof lots. If lost storage is not compensated this could result in floodwater being diverted elsewhere, leading to third party detriment. The detriment caused by a small encroachment on the ponding area may not be significant, or even measurable, when taken in isolation but the cumulative effect of many such encroachments will be significant to use 'another brick in the bathtub analogy' eventually causing a spill. Flood volume compensation is discussed in more detail in Section 4.2 – equivalent ponding areas and volume table for the proposed layout is shown in Plan SK-006 Rev A in Appendix 5.

2. **The type of activity being undertaken and its vulnerability to flood events**

The Builtsmart activity is light industrial and will predominantly operate within business working hours. There will also be house removal activity during the night when homes are ready for transport. However, the activity is not considered to occur over 24hr, 7 days a week and the activity will not be occurring during flood events. There will be no habitable floors, nor residential living within the Buildsmart expansion area (residential activities being one of the most sensitive land uses).

Employees are not likely to be exposed to flood events which result in ponding above the basin height across the hardstand area. The ponding areas will fill slowly, and pump failure must occur over several hours for level

stop rise above hardstand level during which time staff will be aware of the flooding issues and will not be entering the site.

3. **The consequences of a flood event in relation to the proposed activity**

The consequences of ponding water are potentially high with a 100yr level of 11.7mRL. (or 11.8mRL accounting for climate change). An event of this magnitude would result in depths in the order of 700mm across the site. This depth is considered high risk (associated with close to zero velocity) and would be difficult to wade through for pedestrians or drive through in an average sized vehicle in order to exit the site.

A site-specific flood management plan is recommended to be developed following the plan change (and submitted as part the resource consent required for the buildings and filling/earthworks) to ensure all staff and visitors are aware of the risk and, for example, the procedures for exiting or entering the site when it is inundated by flood water. A 700mm flood depth, noting in such an event that there would be other deeper areas on site (>2.5m within the basin), poses a risk to humans if not managed.

In relation to other consequences, the design and construction of buildings and structures will need to be such in order to mitigate the effects of flood inundation potentially over several hours or days.

The proposed development and activity provide the ability to design, construct and maintain the buildings so that they are resilient to flood damage impacts. The hardstand will be concrete and each row of lots will be open along one entire side to allow ponding water to fully occupy the site. Material use is likely to be coloursteel with no plaster board or wood framing like a large elongated steel fabricated car port. The walls will need to provide weather proofing for the modular home construction. Permeable fencing is recommended for the boundary security fence to allow floodwater to flow into the site to occupy the storage area as currently occurs. Ground levels at the site boundary will not change to allow ponding.

At detailed design and through the building consent process, measures such as use of water-resistant materials and flood-proof utility connections (i.e. setting electrical outlets above the 100yr level) will be confirmed to increase resilience to flood damage. Best practice reference material will be used such as the UK CIRIA flood resilient guidance.

4. **Accelerating or exacerbating the flood hazard and/or its potential impacts**

Level for level compensation will not exacerbate the ponding by not increasing levels within the site or outside the site. Adverse flood impacts on neighbouring properties and the wider environment are not anticipated as the storage volumes will be retained at the correct level within the site.

The development will result in more stormwater runoff volumes compared to existing, due to the creation of additional impervious coverage. The proposed basin area in the north of the plan change area provides more than adequate storage capacity to attenuate flows to existing levels, to match the pipe capacity. As outlined under the stormwater management options section of this report, the post development runoff volume is relatively minor (see Table 4) compared to the storage required on site to match existing 100yr ponding volume. Managing post development flows, although important, is not considered a constraint to the development.

5. **Access and exit during a flood event**

Builtsmart staff or their suppliers and visitors will not be entering the site if the operational areas (hardstand, lots, stock show home area) are inundated and Builtsmart has shut down the site. Maximum inundation of the ponding area is not expected to be rapid (in the order of hours not minutes) and not of a timeframe to take people within the site by surprise. This is because the basin will need to fill completely first, and the pumps will need to fail (>2.5hrs). Given these precursors it is highly unlikely people will still be wanting to access or exit the site. However, developing a site safe evacuation procedure should be considered as part of an emergency management plan that could be developed for building consent, or as a condition of the plan change. Access will be provided to the basin for maintenance and inspection following a flood event

## 4.2 LEVEL FOR LEVEL FLOOD VOLUME COMPENSATION

### 4.2.1 BACKGROUND

In general, flood storage compensation works can be divided into direct and indirect. These terms come from UK CIRIA report C624 "Development and flood risk – guidance for the construction industry (2004)".

Direct or 'level for level' schemes re-grade the land at the same level as that taken up by the development. Direct schemes therefore provide a direct replacement for the lost storage volume. Indirect methods rely on water entering a new storage area via culvert or engineered structure and can be some distance from the infill area. Indirect schemes are less preferred because they more vulnerable to failure.

A direct scheme is proposed for the site whereby level for level and volume for volume compensation is provided to replicate ponding volumes lost by the development, such that the same volume is available at every flood level and ponded water can freely access (fill and drain) as currently occurs. In other words, in order to mirror the existing situation for a flood, each stage or level (say at 0.2 metre vertical intervals for example) is provided with the same storage volume. Cut and fill must equate as closely as possible on a level for level basis.

This will be achieved within the Builtsmart expansion area, by recontouring the site to provide basin storage (at no deeper level than existing) and by allowing – at a higher level - operational areas of the site to flood with appropriate flood resilient design and construction. A multifunctional, flood tolerable design is proposed (see Appendix 5).

The compensatory volume must be at the same level (within reasonable working limits) as the lost storage. In general, level for level compensation should only be applied in areas where flood water is stored; and flood flow routes should be protected as is the case for Builtsmart – i.e. there is no swift flowing frequently accruing floodplain to consider, as is the case for the Builtsmart expansion area.

A provision to maintain current flood flow from the northern boundary of the property should be made to make sure the design will not obstruct any flows coming from existing residential areas.

### 4.2.2 DEVELOPMENT OPTIONS

Several options were tested in consultation with Builtsmart Property Partnership. Each option looked at different combinations of basin storage (shape and position) combined with setting FFL and hardstand levels according to various flood depths. One option proposed extending basin excavation to within 10m of the WRC stop bank toe. This option was discounted following a meeting with WRC due to geo-technical risk (piping/seepage failure) and the level of assessment and mitigation measures required.

The existing ponding volume within the site is provided in Table 2 (and shown in Appendix 4). This is the storage table that needs to be replicated in order to provide level for level compensation. Table 2 is also represented by the blue 'existing' and yellow 'Option D' line in Figure 7.

| TABLE 2: EXISTING AND PROPOSED FLOOD STORAGE VOLUME | | |
|---|---|---|
| GROUND LEVEL (MRL) | EXISTING CUMULATIVE VOLUME (M3) | OPTION D CUMULATIVE VOLUME |
| 9.20 | 0 | 630 |
| 9.45 | 0 | 1,496 |
| 9.70 | 182 | 2,450 |
| 9.95 | 889 | 3,494 |
| 10.20 | 2,042 | 4,629 |
| 10.45 | 3,708 | 5,838 |
| 10.70 | 5,930 | 7,488 |
| 10.95 | 8,818 | 10,285 |
| 11.20 | 12,525 | 14,759 |
| 11.45 | 17,006 | 20,762 |
| 11.70 | 23,030 | 28,167 |

Table 2: Existing and Proposed Ponding Volume within the site – also shown on Plan SK 002-Rev B (Appendix 4) and SK 006-Rev A (Appendix 5).

The final preferred Option 'D' provides the optimal combination balancing basin area and operational area while the FFL of the lots is set at 11.1mRL. This level is above the estimated 2yr level (in the event of pump failure) but within the 10yr and 100yr level. The existing ponding depth and proposed ponding depth (Option D) with corresponding level/volume tables are shown in Drawing Numbers SK 002 and SK 006 in the Appendix 4 Appendix 5.

The Existing and Option D storage curves are shown in Figure 6. The graph shows some level of over attenuation at lower depth to account for post development runoff volume, which is in the order of 1,100m$^3$. Overall Option D volumes are above existing up to the 100yr level (11.7mRL) this is to provide some contingency and flexibility for any changes to site layout during detailed design.

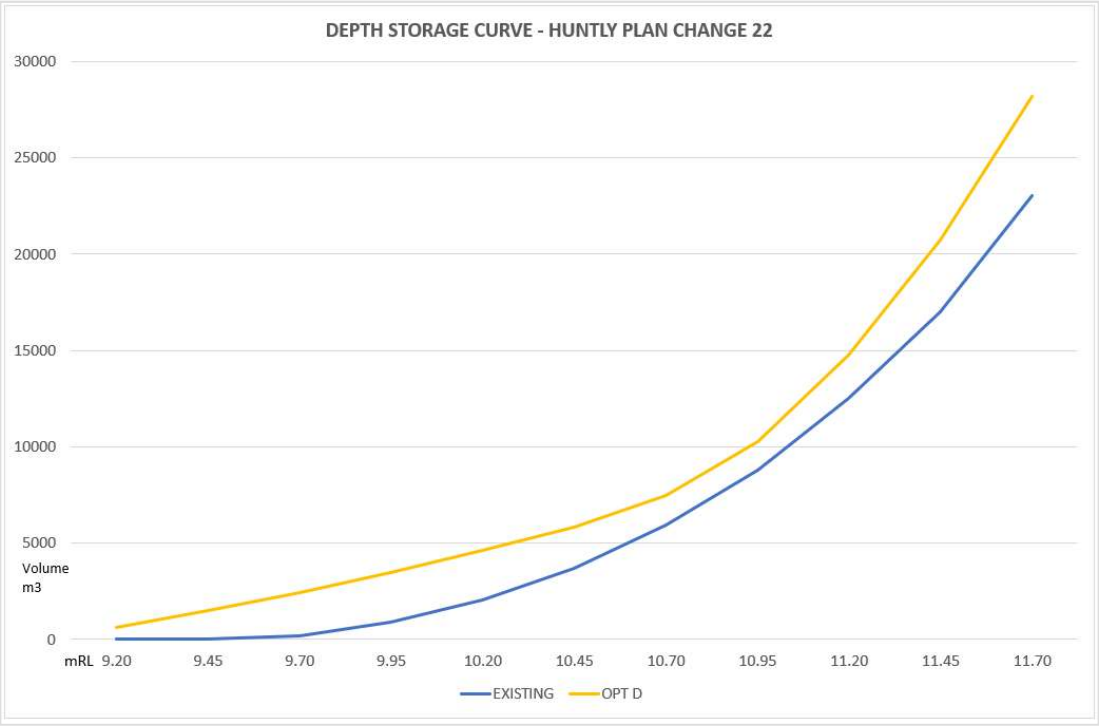



Figure 7: Existing and Proposed (Option D – Plan SK 006 Rev A) Storage Curves

## 4.3 STORAGE AND CONTAINMENT OF HAZARDOUS SUBSTANCES

Thought will need to be given to management of hazardous substances, given the proximity of the site to the Huntly Water Treatment Plant. The location, design and management of facilities where hazardous substances are stored, used or disposed shall be provided at resource consent stage. Discussion with Builtsmart suggests paint materials are the only likely hazardous contaminant associated with modular home construction. Management of painting materials and equipment will need to consider both the ponding depths in extreme events as well as accidental spill to the stormwater network.

The integrity of the storage method must not be compromised in a flood event. Examples include storage in water-tight containers, bunded areas, above ground secured containers.

Permanent storage (~>1mth) of other goods and materials related to house building also needs to be considered. They must not reduce ponding storage capacity or pose a threat should flood depths reach a point where these material leak or become buoyant creating a safety hazard being shifted by floodwater. Material at risk of floating, shifting or leaking during inundation shall be contained and secured in order to minimise movement in times of flood.

More detail will be provided, and a hazardous substance management plan confirmed once the proposed layout is finalised during resource consent. We recommend the site layout design avoids risk of hazardous and floatable materials, including cars and other stored items, being carried off the site. The final design measure must also consider the probability of inundation to maximum ponding depths and the likelihood of pump failure and/or pipe blockage combined with floodgates closed against what can be practically implemented on site and work with the day to day operations.

As shown in the indicative stormwater plan, the extent of public health hazard and contamination of the receiving environment can be reduced or avoided if the basin can be isolated with a shut off valve at the outlet point. This measure is over and above the normal stormwater quality treatment measures that will be implemented in accordance with the RITS, including devices such as oil separators and GPTs prior to outlet to the basin.

### 4.3.1 RESIDUAL RISK

**Lower Waikato Defended Areas**

The existing Builtsmart site and the expansion area is within a defended area - defended from river flooding by stop banks and localised flooding by pumps and floodgates. Although this area is defended from river flooding up to the 100yr event, it still has the potential to flood. The site may flood due to a larger than design event, e.g. an event greater than the 100yr + cc whereby the Waikato River may overtop the stop bank. The area may also flood due to failure of the stop bank defence. These scenarios are unlikely but can still happen.

This risk that remains - once a defence is in place - is known as "residual risk". The Waikato Regional Policy Statement includes policies and methods about residual risk, including that residual risk zones shall be identified in District Plans. Currently the Waikato District Plan does not show this area as at residual risk of flooding due to a failure in the defence (rather, it identifies this area as at risk from localised ponding).

A stop bank breach, failure, collapse or overtopping event adjacent to the site could potentially result in rapid inundation of the site. The modelled 100yr + cc maximum level is ~12.2mRL as shown by main channel cross section results close to the site (WRC review feedback). This level is more than 1m above proposed hardstand areas and likely to be associated with higher velocities depending on the nature of failure.

Residual risk is difficult to design and prepare for. WRC has no modelling information on the impact of breach or overtopping scenarios. In worst cases, while river levels are high, there may be little time to evacuate if the failure occurred without warning while people were at work. Residual risk is ideally managed at a strategic level in setting aside areas for future development. This site is currently zoned for residential development. Changing zoning to a less vulnerable activity such as light industrial does considerably reduces the residual risk.

**Section 4.0 Key Points:** The site layout provides for level for level flood storage compensation to mitigate for loss of storage by infilling to create hardstand and floor areas. The proposed layout activity is suited to a flood resilient design and operation.

# 5.0
# STORMWATER MANAGEMENT APPROACH

In addition to the existing ponding volume level for level compensation and flood risk assessment, the site will also need to manage runoff from a range of locally generated storm events in accordance with district and regional guidance. This is a requirement for all new developments. There are several options that could be implemented on site to address water quality and pre and post development flow attenuation. A toolbox of options is typically provided for plan change areas where the development detail is not known.

A proposed layout has been developed for the site to provide Builtsmart with a degree of confidence that its operation is feasible given storage constraints. The proposed layout - described as Option D earlier in the report – is shown in Plan Number C-0010 Rev E in Appendix 6. The indicative stormwater plan has been developed based on this layout and is shown in Plan Number C-0012-REV B in Appendix 6, also screen shot in Figure 8.

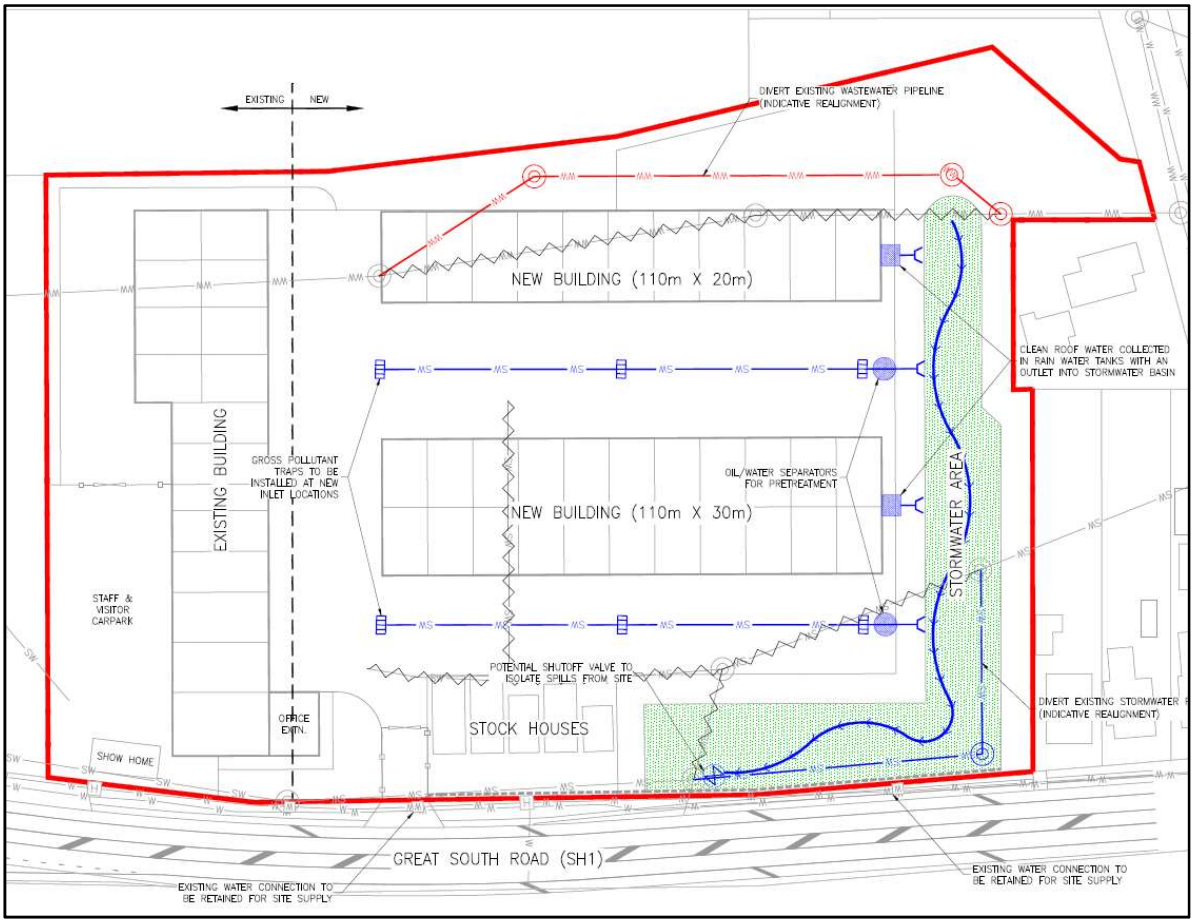



Figure 8: Screen shot of indicative stormwater plan – detailed plan ref C-0012- Rev B

The overall stormwater approach is not “set in stone”. There is flexibility and further opportunities to refine the design during the resource consent process for the building and the earthworks/filling. Notwithstanding, the current approach is summarised below:

1. Central concrete dish channel or similar with grate inlets to capture primary runoff from hardstand areas.

2. End of line pre-treatment device such as GPT/filter strip or similar (i.e. CDS/filters). Potential also to install oil separator to reduce adverse impacts of any accidental spills such as truck oil leak etc prior to outlet to treatment swale.
3. Treatment swale within basin.
4. Secondary flows from south to north following channel alignment.
5. Clean roof runoff outlet directly to the basin.
6. Basin 1 in 4 planted sides, retaining wall along State Highway road frontage. Grass swale base.
7. Outlet configuration to incorporate primary flow (no EDV requirement) at basin invert level with high level spill for flows above the 10yr.
8. The ultimate flow control during a 'region' wide 10yr or 100yr event that generates significant ponding will be the pump station. During local events flows will be controlled by the outlet configuration and pipe capacity.
9. The existing 300mm diameter pipe along the road is estimated to have a 100l/s capacity. The existing network is therefore unlikely to have enough capacity to accommodate the post development 10yr or 2yr flow and may need to be upgraded to accommodate the flows from the developed Buildsmart expansion area.
10. The volume differences between pre and post development are provided in Table 4 (calculation sheets including catchment parameters are provided in Appendix 8.
11. Approximately 1134m$^3$ of additional runoff volume is generated during a 24hr 100yr event, which equates to 13l/s additional constant flow over 24hrs.
12. Further discussions are required with WRC as to whether an increase of 13l/s in constant flow over 24rs is significant when compared to the existing pump station 1 capacity of 1800l/s. The 10yr volume increase represents an increase of 10l/s constant flow over 24hrs.

The stormwater from the site will connect into the existing WDC stormwater system. In terms of the discharge, the stormwater will be discharged to the Waikato River in accordance with the resource consents already held by WDC. Therefore, it is not anticipated that any consents specifically relating to stormwater discharge to the Waikato River will be required because of the development within the Buildsmart expansion area.

TABLE 3: PRE AND POST DEVELOPMENT PEAK FLOW (L/S)

| EVENT | PRE | POST | $QP_{EAK}$ DIFF |
|---|---|---|---|
| 2YR | 80 | 192 | 112 |
| 10YR | 171 | 316 | 145 |
| 100YR | 350 | 526 | 176 |

TABLE 4: PRE AND POST DEVELOPMENT TOTAL RUNOFF VOLUME (M$^3$)

| HISTORIC EVENT (NO CC) | PRE | POST | VOL DIFF | CONSTANT FLOW INCREASE OVER 24HRS |
|---|---|---|---|---|
| 2YR | 450 | 1087 | +638 | 7.4 l/s |
| 10YR | 931 | 1801 | +870 | 10.1 l/s |
| 100YR | 1876 | 3011 | +1134 | 13.1 l/s |

## 5.1 SENSITIVITY CHECKS

Based on review comments from WRC, several sensitivity checks have been undertaken to check the impact of post development runoff volume on Pump station 1. Upper and lower limit sensitivity checks are provided in Table 5 and 6 based on soil type and climate change variability. These uncertainties change the volume difference between existing and post development and therefore the degree of constant flow increase over 24hrs at the pump station.

The checks give a range of constant flow increases. The greatest constant flow increase occurs assuming a very porous existing soil type A (CN= 39) with no groundwater within 0.5m of the surface and no climate change under existing conditions, compared with RCP 8.5 100yr climate change scenario for post development resulting in a constant flow over 24hrs of 26 l/s.

| TABLE 5: RUNOFF VOLUME (M3) | | | | |
|---|---|---|---|---|
| 100yr Historic rainfall (156mm/24hr) | PRE | POST | Vol Diff | CONSTANT FLOW INCREASE OVER 24HRS |
| CN = 39 | 1150 | 2736 | 1586 | 18.4 l/s |
| CN = 61 | 1876 | 3011 | 1135 | 13.1 l/s |
| CN = 74 | 2392 | 3206 | 814 | 9.4 l/s |

| TABLE 6: RUNOFF VOLUME (M3) | | | | |
|---|---|---|---|---|
| 100yr RCP 8.5 2031-2100 rainfall (189mm/24hr) | PRE | POST | Vol Diff | CONSTANT FLOW INCREASE OVER 24HRS |
| CN = 39 | 1150 | 3401 | 2251 | 26.1 l/s |
| CN = 61 | 1876 | 3748 | 1872 | 21.7 l/s |
| CN = 74 | 2392 | 3978 | 1586 | 18.4 l/s |

| TABLE 7: HIRDS V4.0 HISTORIC RAINFALL | |
|---|---|
| EVENT | 24HR TOTAL |
| 100YR | 156mm |
| 50YR | 138mm |
| 10YR | 100mm |
| 2YR | 65mm |

## 5.2 STORMWATER PERFORMANCE CRITERIA

The future design requirements for development within the plan change area are summarised in Table 8

| TABLE 8 STORMWATER MANAGEMENT PROVISIONS FOR THE PLAN CHANGE AREA | | |
|---|---|---|
| STORM EVENT (ARI) | PROVISION | GUIDANCE |
| All events | First flush – pre-treatment | Regional SW Guidance |
| 1/3 2yr | Water Quality Treatment | TP 10, RITS and SW guidance |
| 10yr | Primary drainage conveyance through the site | RITS |
| 10yr | Peak flow attenuation to match existing pipe capacity | RITS + WRC Lower Waikato Flood Pump Control |
| 100yr | Secondary conveyance through the site – no people or property at risk | RITS and Regional rainfall runoff guidance |
| 100yr | Level for Level Floodplain Compensation within the site | WRC RPS Policy Statement |

We are of the view that the solution presented above confirms that the stormwater and ponding generated from the Buildsmart expansion area development that will result from the plan change process can be appropriately managed.

**Section 5.0 Key Points**: There several options to manage post development runoff in terms of attenuation volume and water quality treatment. The basin area has adequate capacity to manage post development flows (which require relatively small amount of volume compared to the volume provided in the basins). Water quality treatment will be provided by way of pre-treatment devices at the end of the pipeline as well as a swale within the basin. Other options can be considered at detailed design. Post development runoff attenuation and treatment is not considered a constraint to development of the site. A detailed design has not been presented yet noting this report is for plan change but an indicative solution is presented to show there is a viable solution.

# 6.0 WATER SUPPLY

## 6.1 EXISTING NETWORK

There are two existing 150mm diameter principal WDC water mains that run along the property road frontage; one on either side of Great South Road (State Highway 1). A third 355mm diameter WDC bulk water main is located on the eastern side of the road which serves a catchment to the south. These existing pipelines are supplied by the nearby Huntly Water Treatment plant located on Jackson Street. The proposed plan change area is currently serviced by three standard water connections supplying the existing properties at 478, 486 and 492 Great South Road.

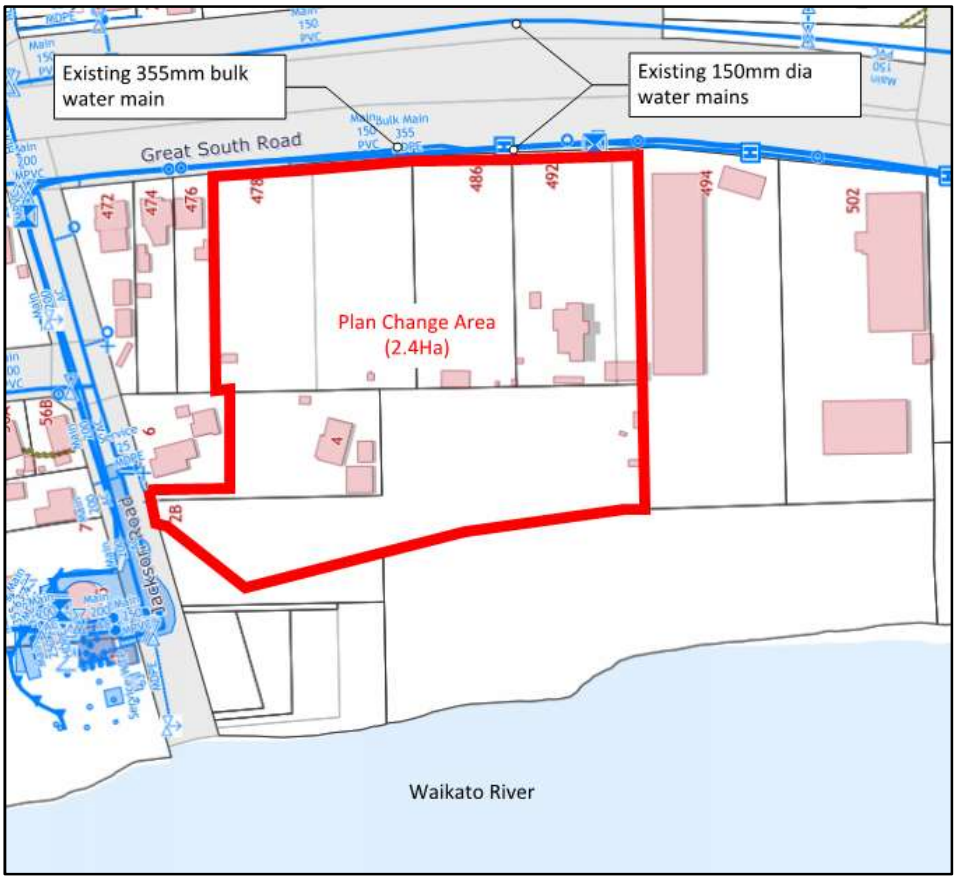



Figure 8 Existing Water Supply Network

## 6.2 DESIGN FLOWS

The current zoning of the plan change area, 'Living', allows for the provision of water supply to the site to service residential dwellings with a minimum net lot area of 2,500m2 (based on the Operative Waikato District

Plan subdivision rules). This allowance results in an average water supply design flow for the current site of 0.03/l/s/ha (based on an estimated density of 10.8 persons per hectare).

The proposed zoning for the site as part of the plan change is 'light Industrial'. Applying the standard water supply requirements from the RITS for the site for light industrial zoning results in an estimated average water supply demand of 0.14L/s/ha as outlined in the RITS (based on 45 persons per hectare). Table 9 summarises the estimated design flows for the site noted above.

**TABLE 9:** DESIGN WATER FLOWS FOR THE PLAN CHANGE AREA

| DESCIPTION | AREA | DENSITY | AVERAGE FLOW | TOTAL DAILY VOUME |
|---|---|---|---|---|
| EXISTING ZONING 'LIVING' | 2.45Ha | 10.8 persons per ha | 0.03L/s/ha | 6,700L/day |
| PROPOSED ZONING 'INDUSTIRAL' | 2.45Ha | 45 persons per ha | 0.14L/s/ha | 28,700L/day |

While the proposed change in zoning represents a significant increase in the average daily flow for the site, due to the size of the site it will only result in a moderate increase in daily supply volume requirements for the existing WDC network of 22m3/day. It is noted however that the proposed activities for the site are 'dry' activities that are expected to use less than this requirement. An initial estimate for average water usage for the proposed development is approximately 1-2m3/day based on planning activities[1].

## 6.3 CAPACITY ASSESSMENT

A desktop review of the local water supply network was completed to provide Waikato District Council with an assessment of the increased capacity required to service the plan change area under the proposed zoning. Table 10 below summarises the assessment completed (refer to drawing 19015-SK-008 in Appendix 12 for further details).

**TABLE 10:** DESKTOP ASSESSMENT OF EXISTING LOCAL WATER SUPPLY NETWORK CAPACITY REQUIREMENTS

| DESCIPTION | AVERAGE DAILY FLOW |
|---|---|
| EXISTING SUB-CATCHMENT ZONING | 61.7m3/day |
| PROPOSED SUB-CATCHMENT ZONING (PLAN CHANGE) | 83.5m3/day |
| % CHANGE | +35% |

Waikato District Council has confirmed that the existing water supply network has adequate capacity to accommodate the proposed private plan change (refer to email from Waikato District Council dated 2nd September 2019, Appendix 13).

## 6.4 FIRE FIGHTING DEMAND

The RITS requires that the standard design of the Council water reticulation network "meets FW2 firefighting requirements at the street boundary for residential and provides for FW3 in other zones". While this has not been tested as part of this assessment the proximity to the nearby water treatment plan suggests that this level of service will be easily met in this location (i.e. sufficient network pressure). The existing network adjacent to the site there are three hydrants within 135m of the site with a layout that allows for access to two hydrants within 135m/270m (in accordance with PAS NZS 4509:2008).

The provision of FW2 will meet the fire requirements of any proposed buildings that require sprinklers within the new development area while also providing enough flow within the network for any attending fire

[1] Estimate based on proposed activities for the site only requiring a minor amount of water to run exterior hose connections and staff amenities.

appliances. Any proposed buildings that need a higher level of fire supply classification will require water storage and associated private infrastructure to meet these additional requirements. It is noted that the buildings proposed within the plan change area are not expected to be sprinklered nor require any additional fire design requirements and therefore are adequately provided for by the existing WDC water network.

# 7.0 WASTEWATER

## 7.1 EXISTING NETWORK

An existing 225mm diameter wastewater gravity main passes through the eastern part of the site which is part of a network that outlets into a nearby WDC wastewater pump station on George Drive to the north (approximately 400m north of the plan change area). There are currently two wastewater connections within the plan change area servicing the existing residential dwellings within the site.

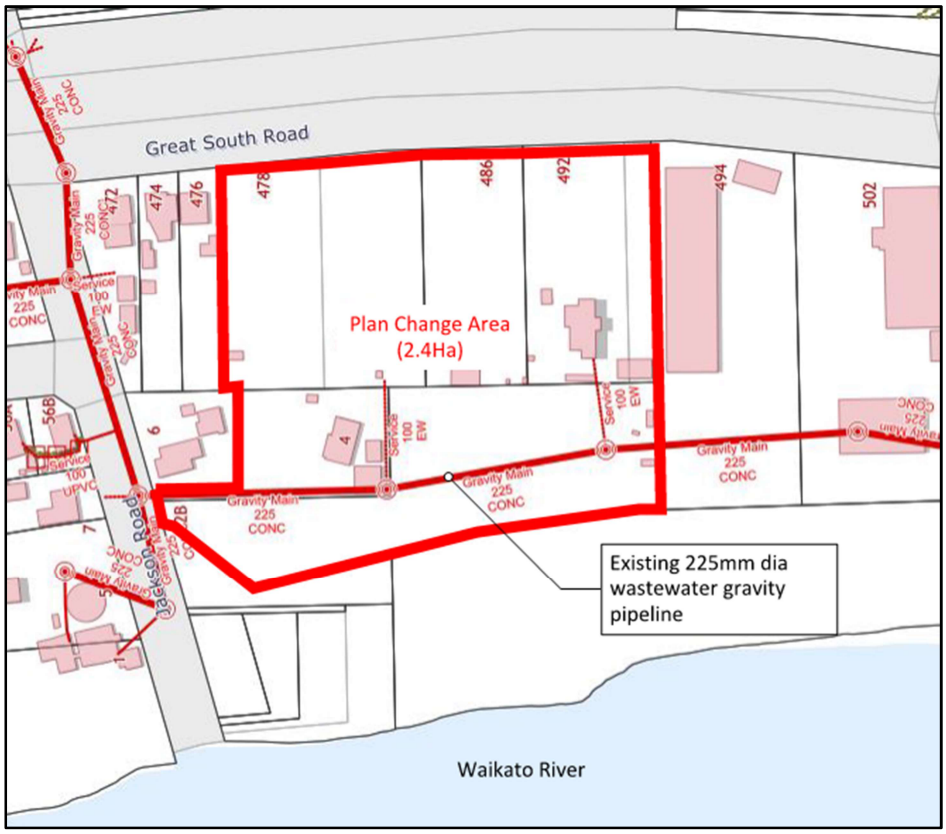



Figure 9: Existing Wastewater Network

## 7.2 DESIGN FLOWS

As noted in Section 4 the current zoning of the plan change area, 'Living', allows for the discharge of wastewater flows from the site to service residential dwellings with a minimum net lot area of 2,500m$^2$. This allowance results in an estimated average daily design wastewater flow for the site of 5.2m$^3$/day (based on 10.8 persons per hectare).

The standard wastewater supply requirements from the RITS require a population equivalent of 45 people per hectare to be used for industrial zoning. Applying this standard design requirement on the proposed plan change area results in an estimated average daily design wastewater flow of 21.6m3/day (based on 45 persons per hectare). Table 11 summarises the design flows noted above.

| TABLE 11: DESIGN WASTEWATER FLOWS FOR THE PLAN CHANGE AREA | | | | | |
|---|---|---|---|---|---|
| DESCIPTION | AREA | DENSITY | AVERAGE DAILY FLOW | PEAK DAILY FLOW | PEAK WET WEATHER FLOW |
| EXISTING ZONING 'LIVING' | 2.4Ha | 10.8 persons per ha | 5.3m3/day | 0.6L/s | 1.1L/s |
| PROPOSED ZONING 'LIGHT INDUSTIRAL' | 2.4Ha | 45 persons per ha | 22.1m3/day | 1.1L/s | 1.7L/s |

The change in zoning represents an increase in the average daily wastewater flow forecast for the plan change area. However due to the size of the site it will result is only a moderate increase in daily wastewater discharge volumes into the WDC network of 17m$^3$/day. As previously noted, the proposed activities for the site are 'dry' activities and expected to discharge significantly less than this amount. An initial estimate for average wastewater discharge for the proposed development is approximately 1-2m$^3$/day based on planning activities[2].

## 7.3 CAPACITY ASSESSMENT

A desktop review of the local wastewater network was completed to provide Waikato District Council with an assessment of the increased capacity required to service the plan change area under the proposed zoning in relation to the existing network demands. Table 12 below summarises the assessment completed (refer to drawing 19015-SK-007 in Appendix X for further details).

| TABLE 12: DESKTOP ASSESSMENT OF EXISTING LOCAL WASTEWATER NETWORK CAPACITY REQUIREMENTS | | | |
|---|---|---|---|
| DESCIPTION | AVERAGE DAILY FLOW | PEAK DAILY FLOW | PEAK WET WEATHER FLOW |
| EXISTING SUB-CATCHMENT ZONING | 100.0m3/day | 4.7L/s | 10.2L/s |
| PROPOSED SUB-CATCHMENT ZONING (PLAN CHANGE) | 116.7m3/day | 5.0L/s | 10.5L/s |
| % CHANGE | +17% | +7% | +3% |

Waikato District Council has confirmed that the existing wastewater network has adequate capacity to accommodate the proposed private plan change (refer to email from Waikato District Council dated 2nd September 2019, Appendix 12).

[2] Estimate based on proposed activities for the site only generating a minor amount of wastewater discharge through staff amenities and minor washdown facilities.

# 8.0 CONCLUSIONS

**Stormwater**

The Builtsmart Expansion area (the Plan Change 22 area) is identified as being within the Huntly South Assessment 1 Area under the Operative Waikato District Plan. This area is defended by stop banks from Waikato River flooding, but it is in a ponding zone with runoff generated locally. The site is mostly undeveloped grassland with 3 existing residential homes. The receiving environment is the Waikato River.

The development has the potential to adversely impact people, property and the environment both within and outside the site due to:

1. Infilling and loss of flood storage capacity (ponding volume) displacing and exacerbating flood hazard elsewhere.
2. Increasing runoff volume and peak flows due to large increases in impervious surfaces which could impact on local flood hazard and the current pump station 1 capacity.
3. Water quality from contaminant runoff from hard surfaces.

Post development stormwater runoff and ponding volumes need to be managed in an appropriate manner to prevent or mitigate these adverse impacts.

The following conclusion can be made:

a. The proposed management solution provides level for level storage compensation through a combination of basin storage and higher-level storage across the site. Level for level compensation is considered the best practical option and a more sustainable and resilient option than for example infilling the site and relying on pump upgrades. The proposed light industrial activity lends itself to appropriate flood resilient design and construction which will be finalised at building consent based on further discussion with council staff and Builtsmart. Builtsmart however is aware of the flood risks and wishes to proceed with the development proposals.

b. Ponding levels from the 1992 WRC Huntly Flood Management Plan were matched closely with runoff volumes using TP 108 and HIRDS V4.0 rainfall totals. Notwithstanding the margin of error with this simple approach, a good correlation provides reasonable confidence in the ponding levels presented in the 1992 report and therefore by extrapolation the estimate for the 2yr level at ~10.9mRL. The 2yr level was not reported in the 1992 study but it useful to inform the flood risk assessment. It is noted that no soakage losses were included in the analysis which is conservative. A climate adjusted level (out to 2080) was provided by WRC (ref WDC letter from 2007) at 11.8mRL

c. A 2yr ponding depth would be expected to occur on regular basis, however discussion with Builtsmart indicates occasional ponding to approximately 0.5m depth (in the order of ~10mRL) before soaking away into what is likely to be sand/gravel terrace. This observation makes some sense, as a regular 2yr flow would ordinarily drain by gravity via the existing pipe network, through the pump housing and into the river via a culvert underneath the stop bank.

d. The maximum ponding levels are based on the total catchment runoff volume filling a depression area (simple water balance). It therefore assumes no losses from the depression area by pumping (pump failure) during a 24hr storm event. However, the existing Pump Station 1 is designed to a 50yr level of service and capacity is not exceeded during a 24hr 10yr storm event.

e. The development will generate additional runoff volume from increased impervious surfaces. This additional volume equates to an increase in constant flow in the order of 13l/s on average over 24hrs for the 100yr event and 10l/s for the 10yr event. This may place some additional pressure on the pumping capacity. Whether this is a significant increase is a matter to be discussed with WRC.

f. An indicative stormwater scheme has been developed to service the preferred stormwater management option layout. The design includes treatment within the basin as well as pre-treatment at the pipe outlet using GPT's (or similar such as CDS unit/filters) and/or oil separators to contain

accidental spills. A shut off valve could also be installed at the basin outlet. Some form of spill containment is prudent given the proximity of the site outlet to the Huntly Water Treatment Plant. There are a range of pre-treatment options which can be agreed in the future, as part of the resource consent process, including rainwater re-use from roof areas. The proposed site layout does not show any obvious constraints to implementing a robust stormwater design. There is ample room for example within the basin to provide for flow attenuation as well as treatment options with amenity planting.

g. EDV and retention is not considered relevant nor useful for this site given the outlet is direct to the Waikato River – there is no sensitive stream receiving environment.

**Water Supply**

Waikato District Council has confirmed that, based on assessment completed, the existing wastewater network has adequate capacity to accommodate the proposed private plan change.

**Wastewater**

Waikato District Council has confirmed that, based on assessment completed, the existing wastewater network has adequate capacity to accommodate the proposed private plan change.

# 9.0 LIMITATIONS

## 9.1 GENERAL

This report is for the use by Builtsmart Property Partnership for submission to Waikato District Council and should not be used or relied upon by any other person or entity or for any other project.

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 Te Miro Water Limited. No responsibility is accepted by Te Miro Water 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.

# 10.0 REFERENCES

Huntly Flood Management Plan – Waikato Regional Council Technical Publication No 1992/15.

Opus Ltd: Huntly Urban Pump Station/Floodgate Sites – Waikato Regional Council; March 2016.

Proposed Auckland Unitary Plan Decision Version 19 August 2016 Rules: E36 Natural hazards and flooding

SKM Ltd: Lower Waikato Flood Protection Zone Stage One: Pump Station Service Level Review – Report Prepared for Environment Waikato; Final Draft February 2009.

# APPENDIX 1 SITE PHOTOS

Photo 1: Plan Change Area- Existing Greenfield – Looking North

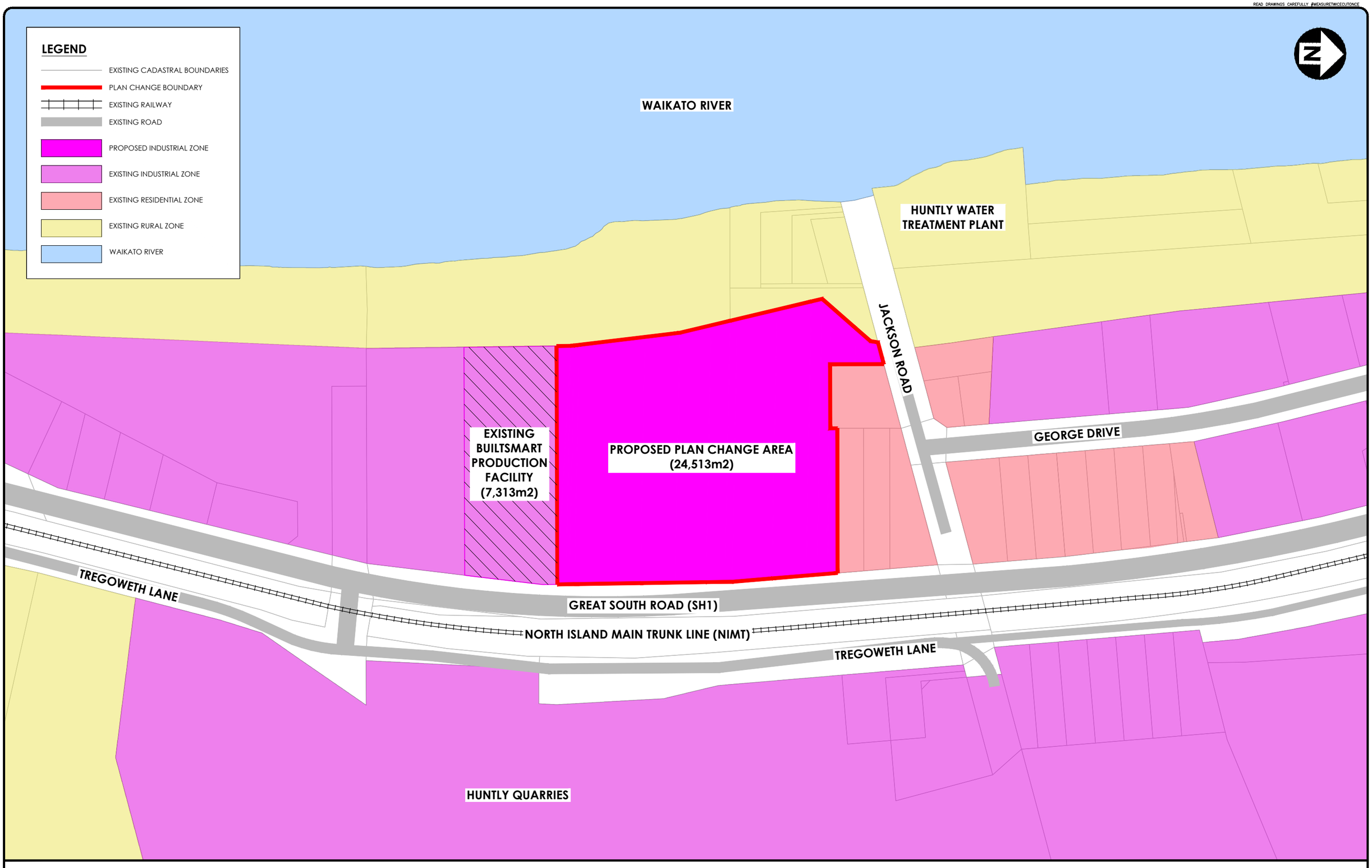
Photo 2: Road catchpit – Proposed Plan Change site right side

Photo 3: Stormwater Field Grate within Greenfield Area

Photo 4: Plan Change Area- Existing Greenfield – Looking South

# APPENDIX 2 PLAN CHANGE AREA

READ DRAWINGS CAREFULLY // MEASURETWICECUTONCE




# PROPOSED PLAN CHANGE TO THE WAIKATO DISTRICT PLAN
# BUILTSMART PRODUCTION FACILITY

# PROPOSED RE-ZONING

DRAWING REVISION: B

DATE PRINTED: 4 September 2019 FILE NAME: 19013-C-0001.dwg

# APPENDIX 3 GENERAL ARRANGEMENT

READ DRAWINGS CAREFULLY // MEASURETWICECUTONCE

WAIKATO RIVER

PLACEMAKERS HUNTLEY

EXISTING | NEW

25m

MATERIAL STORAGE AREA

MATERIAL STORAGE AREA

11 12 9 10 7 8 5 6 4 3

LUNCH ROOM / TOILETS

2 1

NEW STORE

EXISTING STORE

EXISTING OFFICES

OFFICE EXTN.

STAFF & VISITOR CARPARK

18 PARKING SPACES

18 PARKING SPACES

SHOW HOME

LOADING SPACE

13 14 15 16 17 18 STORE 40 41 42 43

NEW BUILDING (110m X 20m)

ADDITIONAL PARKING AREA
56 PARKING SPACES (UNMARKED)

30m

STORE 23 22 21 20 19 35 36 37 38 39

24 25 26 27 28 29 30 31 32 33 34

NEW BUILDING (110m X 30m)

CONCRETE HARDSTAND AREA (9,000m2 TOTAL)

22m

STORMWATER AREA

VISUAL / NOISE BUFFER (TBC)

10m

STOCK HOUSES

BIKE PARKING/RACKS (9 TOTAL)

MAIN ENTRANCE

NEW TRADE ENTRANCE (22m SETBACK FROM ROAD)

GREAT SOUTH ROAD (SH1)

RETAINING STRUCTURE ALONG ROAD FRONTAGE (VARIES – UP TO 2.4m HIGH)

GEORGE DRIVE

JACKSON ROAD

NORTH ISLAND MAIN TRUNK LINE (NIMT)

DRAWING SCALE BAR (IN MILLIMETRES) 0 2 4 6 8 10 20 30 40 50 60 70 80 90 100

## LEGEND

- EXISTING CADASTRAL BOUNDARIES
- BUILDING (EXISTING)
- BUILDING (NEW)
- PAVEMENT AREA (ASPHALT)
- PAVEMENT AREA (CONCRETE)
- PAVEMENT AREA (UNSEALED)
- VEGETATION (PLANTING/GRASS)
- ENVIRONMENTAL BUFFER
- STORMWATER AREA
- RETAINING STRUCTURE
- SITE FENCING

## NOTES:

1. CONCEPT LAYOUT, FOR DISCUSSION PURPOSES ONLY
2. STORMWATER AREAS SHOWN ARE INDICATIVE ONLY AND SUBJECT TO CONFIRMATION
3. BASED ON INITIAL SITE CONCEPT PROVIDED BY BUILTSMART (APRIL 2019)

| REV | DESCRIPTION | BY | DATE |
|---|---|---|---|
| E | FOR INFORMATION | LPM | 27.06.19 |
| D | FOR INFORMATION | LPM | 20.06.19. |
| C | FOR INFORMATION | LPM | 30.05.19 |
| B | FOR INFORMATION | LPM | 09.05.19 |

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY: – DATE: –

DRAWN BY: L. MCCAFFREY DATE: 24.04.19

APPROVED BY: – DATE: –

CLIENT NAME: BUILTsmart Advanced Transportable Homes™

PROJECT NAME: BUILDSMART PRIVATE PLAN CHANGE

DRAWING TITLE: SITE MASTER PLAN GENERAL ARRANGEMENT

PRODUCED BY: TE MIRO WATER

DATE PRINTED: 27 June 2019

DRAWING SCALE: 1:1000

REVISION No.: E

DISCIPLINE: CIVIL ENGINEERING

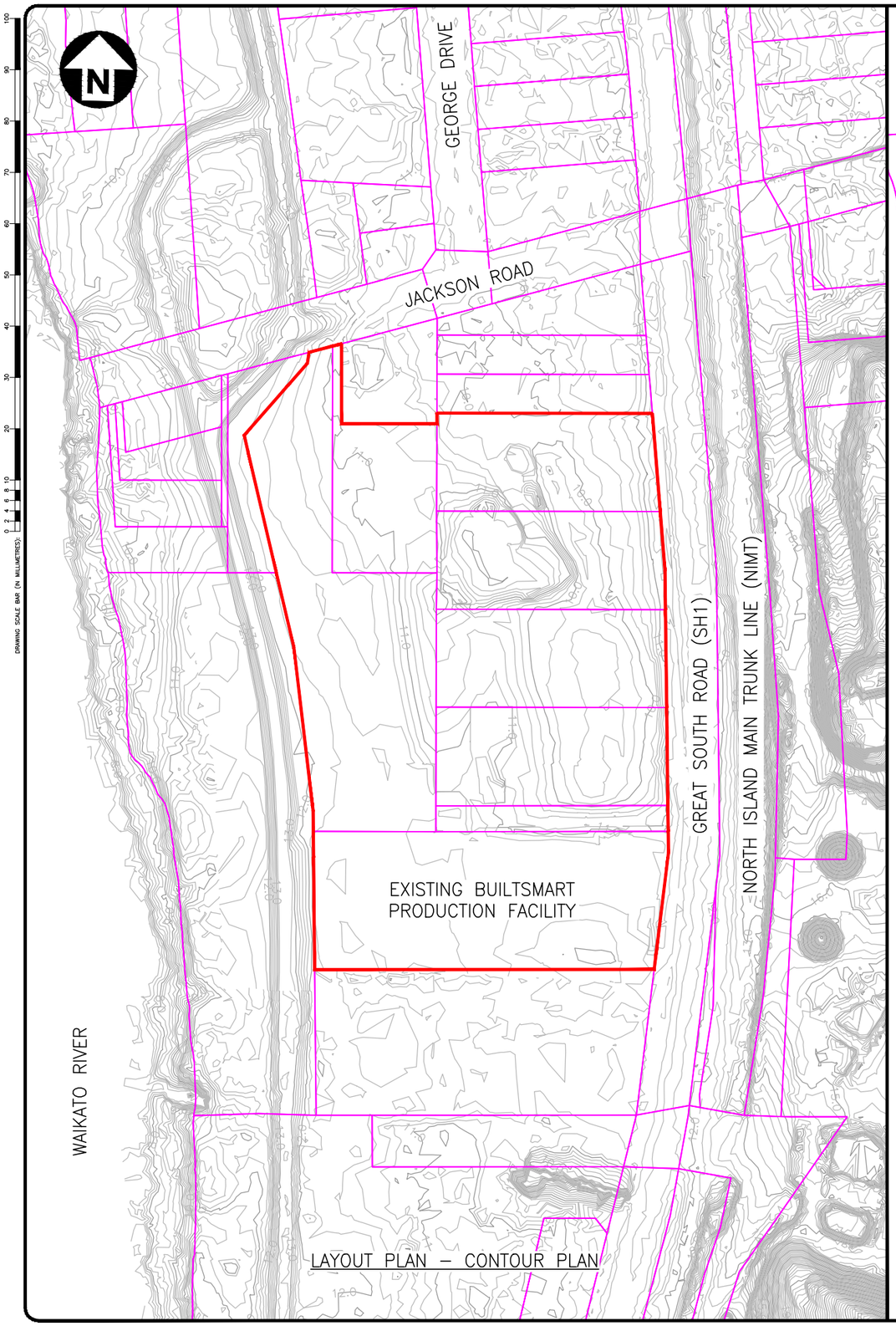
DRAWING No.: 19013–C–0010

FILE NAME: 19013–C–0010.dwg

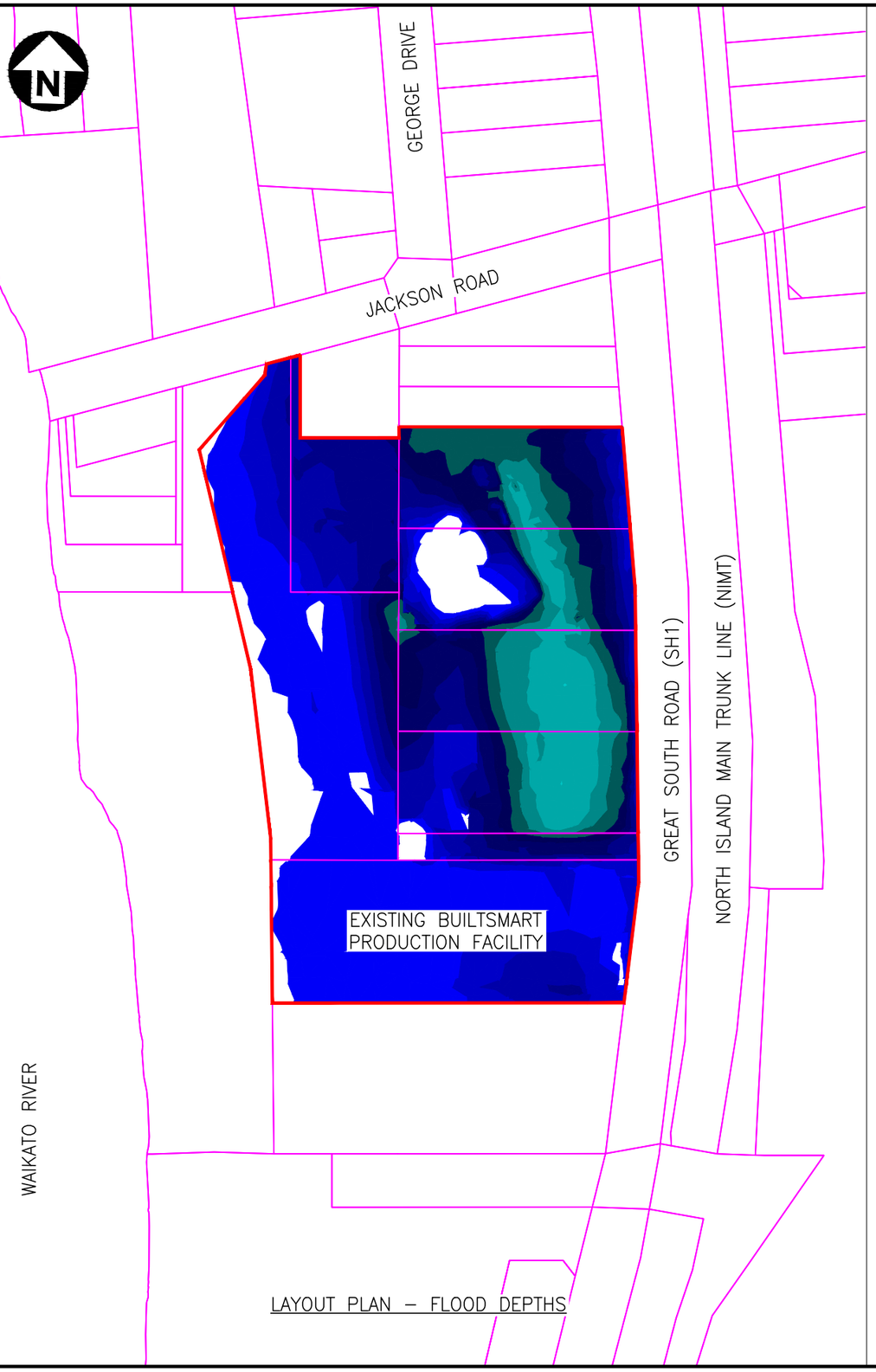
# APPENDIX 4 EXISTING PONDING LEVELS

READ DRAWINGS CAREFULLY #MEASURETWICECUTONCE

DRAWING SCALE BAR (IN MILLIMETRES) 0 2 4 6 8 10 20 30 40 50 60 70 80 90 100




LAYOUT PLAN – CONTOUR PLAN




LAYOUT PLAN – FLOOD DEPTHS

## LEGEND

- EXISTING CADASTRAL BOUNDARIES
- SITE BOUNDARY
- 10.0 — CONTOUR (MAJOR) 1.0m INTERVAL
- 10.8 — CONTOUR (MINOR) 0.2m INTERVAL

ESTIMATE FLOODING DEPTH (RL=11.7m)

- 0m TO 0.25m DEPTH
- 0.25m TO 0.50m DEPTH
- 0.50m TO 0.75m DEPTH
- 0.75m TO 1.00m DEPTH
- 1.00m TO 1.25m DEPTH
- 1.25m TO 1.50m DEPTH
- 1.50m TO 1.75m DEPTH
- 1.75m TO 2.00m DEPTH
- 2.00m TO 2.25m DEPTH
- 2.25m TO 2.50m DEPTH
- >2.50m DEPTH

## NOTES:

1. FLOOD EXTENTS AND VOLUMES SHOWN ARE BASED AREA WITHIN THE SITE EXTENTS
2. FLOOD DEPTHS ARE BASED ON PRELIMINARY 1% AEP FLOOD LEVEL OF RLm=11.7m PROVIDED BY WAIKATO REGIONAL COUNCIL and operative Waikato District Plan Map
3. EXISTING CONTOURS SHOWN ARE BASED SITE TOPOGRAPHICAL SURVEY COMPLETED BY BLUE WALLACE SURVEYORS WITHIN THE SITE (10.06.19). THIS HAS ALSO BEEN SUPPLEMENTED IN SURROUNDING AREAS WITH WRC LIDAR INFORMATION (2007/2008)

| FLOOD LEVEL (RLm) | CUMULATIVE VOLUME (m3) |
|---|---|
| 9.20 | 0 |
| 9.45 | 0 |
| 9.70 | 182 |
| 9.95 | 889 |
| 10.20 | 2042 |
| 10.45 | 3708 |
| 10.70 | 5930 |
| 10.95 | 8818 |
| 11.20 | 12525 |
| 11.45 | 17006 |
| 11.70 | 23030 |

| REV | DESCRIPTION | BY | DATE |
|---|---|---|---|
| | | | |
| | | | |
| B | FOR INFORMATION – SITE SURVEY UPDATE | LPM | 04.09.19 |
| A | FOR INFORMATION | LPM | 27.05.19 |

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY: – DATE: –

DRAWN BY: L. MCCAFFREY DATE: 27.05.19

APPROVED BY: – DATE: –

CLIENT NAME: BUILTsmart Advanced Transportable Homes™

PROJECT NAME: BUILDSMART PRIVATE PLAN CHANGE

DRAWING TITLE: FLOOD STORAGE ASSESSMENT

EXISTING SITE

PRODUCED BY: TE MIRO WATER

DRAWING SCALE: 1:2000

REVISION No.: B

DISCIPLINE: CIVIL ENGINEERING

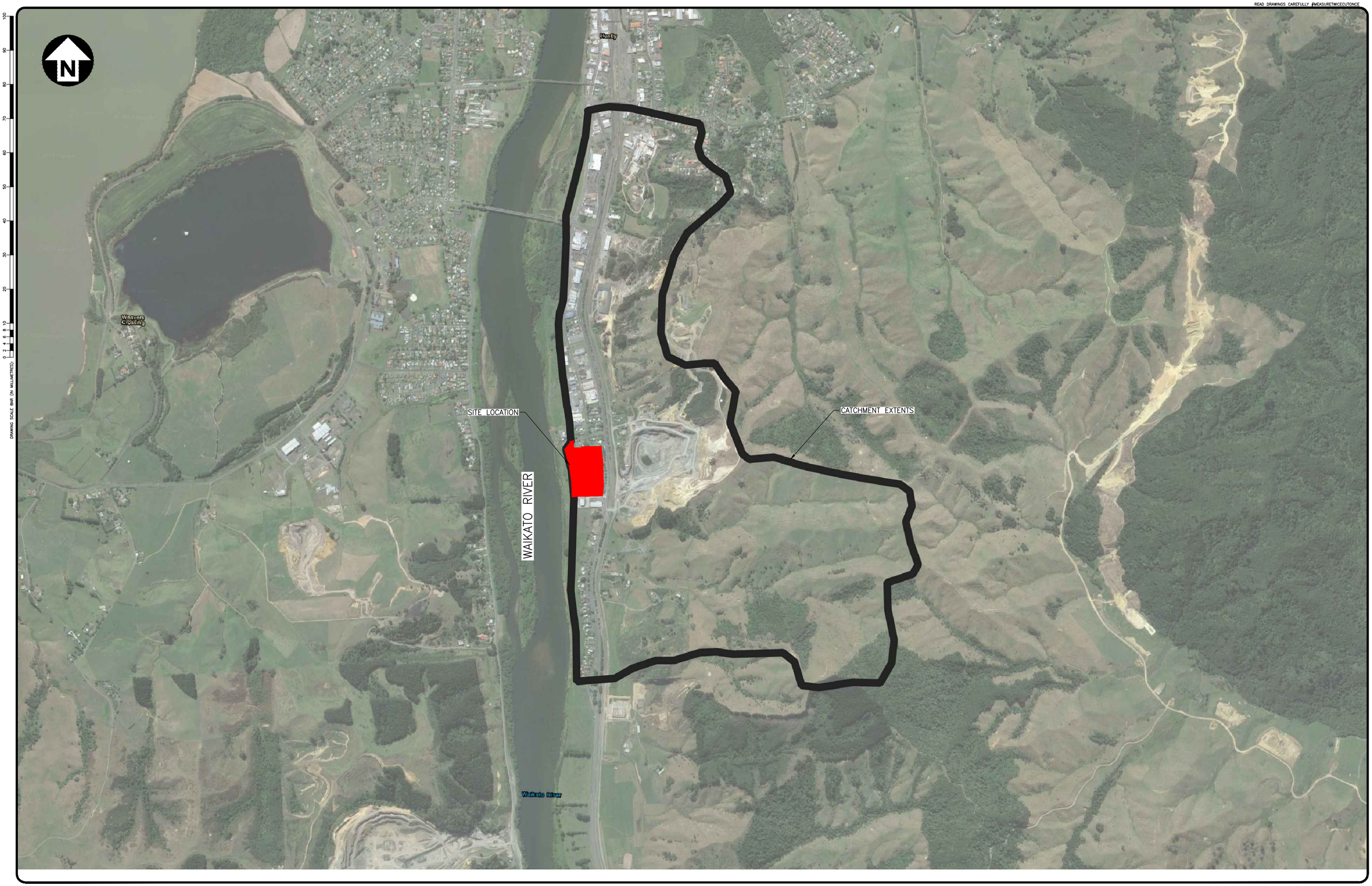
DRAWING No.: 19013–SK–002

DATE PRINTED: 4 September 2019

FILE NAME: 19013–SK–002.dwg

READ DRAWINGS CAREFULLY // MEASURE TWICE CUT ONCE

DRAWING SCALE BAR (IN MILLIMETRES) 0 2 4 6 8 10 20 30 40 50 60 70 80 90 100




| REV | DESCRIPTION | BY | DATE |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| A | FOR INFORMATION | LPM | 09.09.19 |

APPROVAL STATUS: FOR INFORMATION

| | |
|---|---|
| DESIGNED BY: — | DATE: — |
| DRAWN BY: L. MCCAFFREY | DATE: 09.09.19 |
| APPROVED BY: — | DATE: — |

CLIENT NAME: BUILTsmart Advanced Transportable Homes™

PROJECT NAME: BUILDSMART PRIVATE PLAN CHANGE

DRAWING TITLE: LOCAL PONDING CATCHMENT MAP

PRODUCED BY: TE MIRO WATER

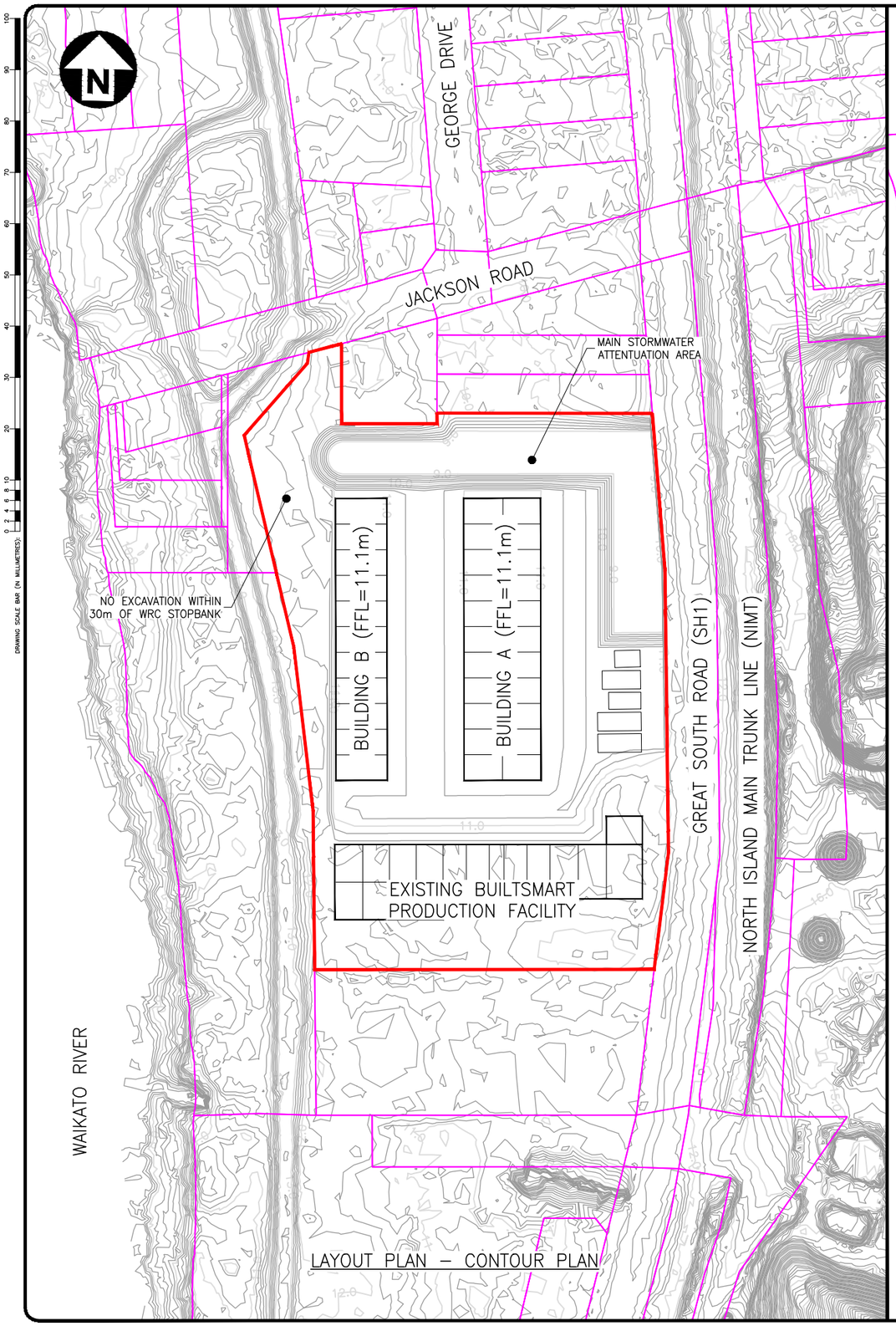
DATE PRINTED: 9 September 2019

| | |
|---|---|
| DRAWING SCALE: 1:15000 | REVISION No.: A |
| DISCIPLINE: CIVIL ENGINEERING | |
| DRAWING No.: 19013-SK-010 | |

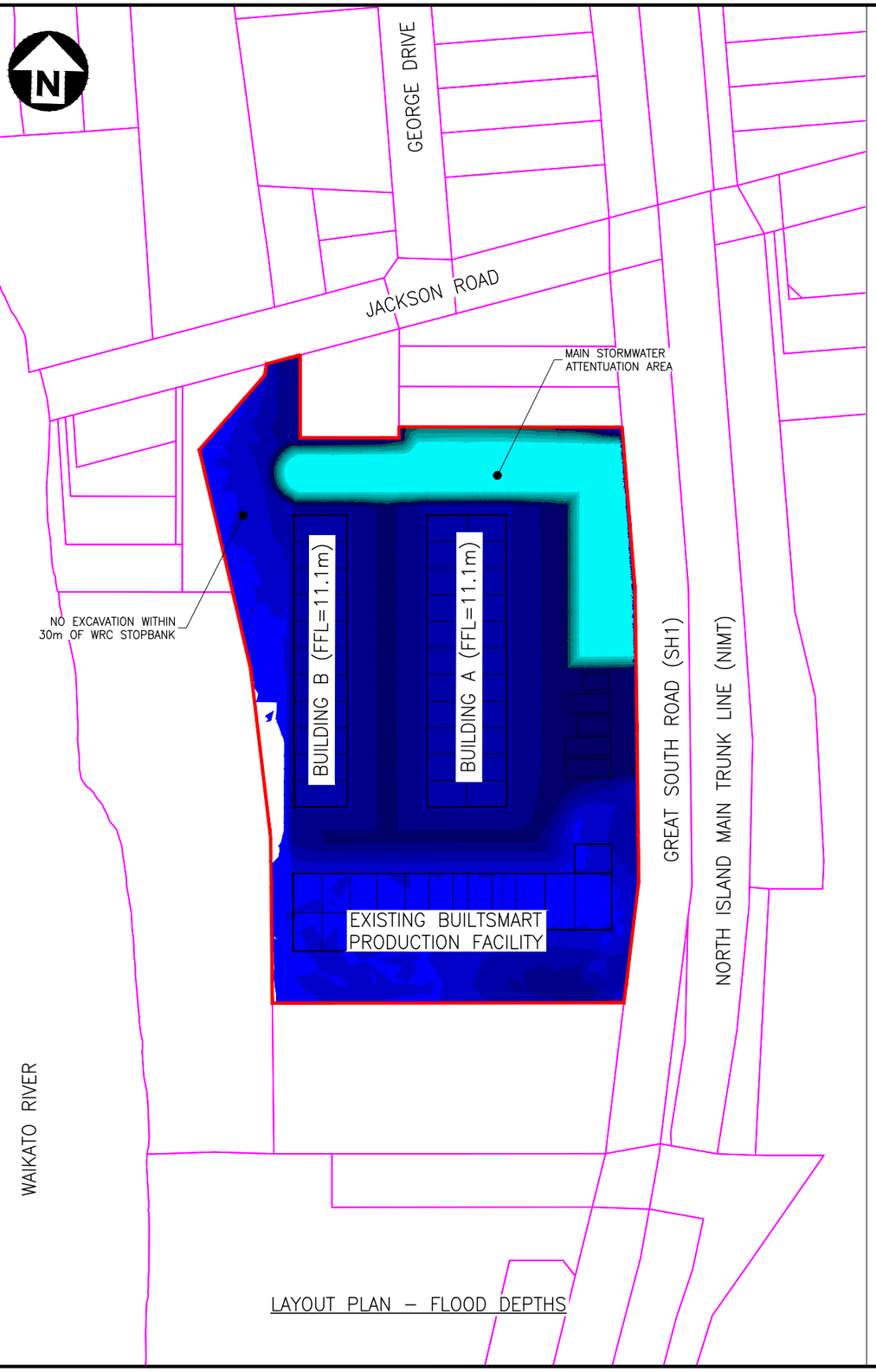
FILE NAME: 19013-SK-010.dwg

# APPENDIX 5 PROPOSED PONDING LEVELS

READ DRAWINGS CAREFULLY #MEASURETWICECUTONCE




LAYOUT PLAN – CONTOUR PLAN




LAYOUT PLAN – FLOOD DEPTHS

## LEGEND

- EXISTING CADASTRAL BOUNDARIES
- SITE BOUNDARY
- 10.0 CONTOUR (MAJOR) 1.0m INTERVAL
- 10.8 CONTOUR (MINOR) 0.2m INTERVAL

ESTIMATE FLOODING DEPTH (RL=11.7m)

- 0m TO 0.25m DEPTH
- 0.25m TO 0.50m DEPTH
- 0.50m TO 0.75m DEPTH
- 0.75m TO 1.00m DEPTH
- 1.00m TO 1.25m DEPTH
- 1.25m TO 1.50m DEPTH
- 1.50m TO 1.75m DEPTH
- 1.75m TO 2.00m DEPTH
- 2.00m TO 2.25m DEPTH
- 2.25m TO 2.50m DEPTH
- >2.50m DEPTH

## NOTES:

1. FLOOD EXTENTS AND VOLUMES SHOWN ARE BASED ON THE AREA WITHIN THE SITE EXTENTS ONLY
2. FLOOD DEPTHS ARE BASED ON PRELIMINARY 1% AEP FLOOD LEVEL OF RLm=11.7m PROVIDED BY WAIKATO REGIONAL COUNCIL (STILL TO BE CONFIRMED)
3. EXISTING CONTOURS SHOWN ARE BASED ON WRC LIDAR INFORMATION (2007/2008)

| FLOOD LEVEL (RLm) | CUMULATIVE VOLUME (m3) |
|---|---|
| 9.20 | 630 |
| 9.45 | 1496 |
| 9.70 | 2450 |
| 9.95 | 3494 |
| 10.20 | 4629 |
| 10.45 | 5838 |
| 10.70 | 7488 |
| 10.95 | 10285 |
| 11.20 | 14759 |
| 11.45 | 20762 |
| 11.70 | 28176 |

| REV | DESCRIPTION | BY | DATE |
|---|---|---|---|
| A | FOR INFORMATION | LPM | 27.06.19 |

APPROVAL STATUS: FOR INFORMATION

| | | | |
|---|---|---|---|
| DESIGNED BY | L. MCCAFFREY | DATE | 27.06.19 |
| DRAWN BY | L. MCCAFFREY | DATE | 27.06.19 |
| APPROVED BY | – | DATE | – |

CLIENT NAME: BUILTsmart Advanced Transportable Homes™

PROJECT NAME: BUILDSMART PRIVATE PLAN CHANGE

DRAWING TITLE: FLOOD STORAGE ASSESSMENT PROPOSED SITE GRADING OPTION D

PRODUCED BY: TE MIRO WATER

DATE PRINTED: 28 June 2019

| DRAWING SCALE | REVISION No. |
|---|---|
| 1:2000 | A |
| DISCIPLINE: CIVIL ENGINEERING | |
| DRAWING No.: 19013–SK–006 | |

FILE NAME: 19013–SK–006.dwg

# APPENDIX 6 INDICATIVE STORMWATER PLAN

READ DRAWINGS CAREFULLY #MEASURETWICECUTONCE

DRAWING SCALE BAR (IN MILLIMETRES) 0 2 4 6 8 10 20 30 40 50 60 70 80 90 100

WAIKATO RIVER

EXISTING | NEW

DIVERT EXISTING WASTEWATER PIPELINE (INDICATIVE REALIGNMENT)

NEW BUILDING (110m X 20m)

NEW BUILDING (110m X 30m)

EXISTING BUILDING

PLACEMAKERS HUNTLEY

STAFF & VISITOR CARPARK

SHOW HOME

OFFICE EXTN.

STOCK HOUSES

GROSS POLLUTANT TRAPS TO BE INSTALLED AT NEW INLET LOCATIONS

OIL/WATER SEPARATORS FOR PRETREATMENT

POTENTIAL SHUTOFF VALVE TO ISOLATE SPILLS FROM SITE

CLEAN ROOF WATER COLLECTED IN RAIN WATER TANKS WITH AN OUTLET INTO STORMWATER BASIN

STORMWATER AREA

DIVERT EXISTING STORMWATER PIPELINE (INDICATIVE REALIGNMENT)

EXISTING WATER CONNECTION TO BE RETAINED FOR SITE SUPPLY

EXISTING WATER CONNECTION TO BE RETAINED FOR SITE SUPPLY

GREAT SOUTH ROAD (SH1)

JACKSON ROAD

NORTH ISLAND MAIN TRUNK LINE (NIMT)

## LEGEND

EXISTING CADASTRAL BOUNDARIES
PLAN CHANGE BOUNDARY

EXISTING SERVICES

SERVICE TO BE REMOVED
STORMWATER PIPE
WASTEWATER PIPE
WATER PIPE
MANHOLE
CATCHPIT / INLET
HYDRANT

NEW SERVICES

STORMWATER PIPE
WASTEWATER PIPE
TREATMENT SWALE
STORMWATER MANHOLE
STORMWATER INLET
WASTEWATER MANHOLE

## NOTES:

1. CONCEPT DESIGN ONLY. SUBJECT TO FURTHER DESIGN AND APPROVAL FROM RELEVANT AUTHORITIES
2. STORMWATER AREA SHOWN IS INDICATIVE ONLY AND SUBJECT TO CONFIRMATION
3. BASED ON INITIAL SITE CONCEPT PROVIDED BY BUILTSMART (APRIL 2019)

| REV | DESCRIPTION | BY | DATE |
|---|---|---|---|
| B | FOR INFORMATION – SITE SURVEY UPDATE (SW) | LPM | 09.09.19 |
| A | FOR INFORMATION | LPM | 03.07.19 |
| | | | |
| | | | |

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY: – DATE: –
DRAWN BY: L. MCCAFFREY DATE: 03.07.19
APPROVED BY: – DATE: –

CLIENT NAME: BUILTsmart Advanced Transportable Homes™

PROJECT NAME: BUILDSMART PRIVATE PLAN CHANGE

DRAWING TITLE: THREE WATERS CONCEPT GENERAL ARRANGEMENT

PRODUCED BY: TE MIRO WATER

DATE PRINTED: 9 September 2019

DRAWING SCALE: 1:1000
DISCIPLINE: CIVIL ENGINEERING
DRAWING No.: 19013-C-0012
REVISION No.: B

FILE NAME: 19013-C-0012.dwg

# APPENDIX 7 EXISTING CONTOURS

READ DRAWINGS CAREFULLY #MEASURETWICECUTONCE

WAIKATO RIVER

EXISTING BUILTSMART PRODUCTION FACILITY

GREAT SOUTH ROAD (SH1)

NORTH ISLAND MAIN TRUNK LINE (NIMT)

JACKSON ROAD

GEORGE DRIVE

DRAWING SCALE BAR (IN MILLIMETRES)

## LEGEND

- EXISTING CADASTRAL BOUNDARIES
  SITE BOUNDARY
- PLAN CHANGE BOUNDARY
- EXISTING CONTOUR (MAJOR)
  1.0m INTERVAL
- EXISTING CONTOUR (MINOR)
  0.2m INTERVAL

## NOTES:

1. PLAN CHANGE BOUNDARY SHOWN IS INDICATIVE ONLY AND SUBJECT TO CONFIRMATION
2. EXISTING CADASTRAL BOUNDARIES SOURCED FROM LINZ DATA SERVICE (https://data.linz.govt.nz/)
3. EXISTING CONTOURS SHOWN ARE BASED ON WRC LIDAR INFORMATION (2007/2008)

| REV | DESCRIPTION | BY | DATE |
|---|---|---|---|
| A | FOR INFORMATION | LPM | 24.04.19 |

APPROVAL STATUS: FOR INFORMATION

| | |
|---|---|
| DESIGNED BY: — | DATE: — |
| DRAWN BY: L. MCCAFFREY | DATE: 24.04.19 |
| APPROVED BY: — | DATE: — |

CLIENT NAME: BUILTsmart Advanced Transportable Homes™

PROJECT NAME: BUILDSMART PRIVATE PLAN CHANGE

DRAWING TITLE: EXISTING SITE CONTOURS

PRODUCED BY: TE MIRO WATER

DATE PRINTED: 24 April 2019

| | |
|---|---|
| DRAWING SCALE: 1:1000 | REVISION No.: A |
| DISCIPLINE: CIVIL ENGINEERING | |
| DRAWING No.: 19013-SK-001 | |

FILE NAME: 19013-SK-001.dwg

# APPENDIX 8 TP 108 CALCULATION SPREADSHEETS

# TP 108 Graphical Runoff Calculation

## Builtsmart Plan Change - Huntly

### Summary Sheet - Local Ponding Catchment

**DATE:** 28 June 2019

**TMW PROJECT NUMBER:**

**Input**

| | ARI (yr) | 2 | 10 | 100 | WQ | ED |
|---|---|---|---|---|---|---|
| **Design Rainfall (mm)** | | 65 | 100 | 156 | 21.7 | 34.5 |

| | | CN | Ia (mm) | Tc (hr) |
|---|---|---|---|---|
| PRE | Pervious | 61 | 5 | 0.167 |
| | Impervious | 98 | 0 | 0.167 |
| POST | Pervious | 61 | 5 | 0.167 |
| | Impervious | 98 | 0 | 0.167 |

**Catchment Area (ha)**

| | PRE | POST |
|---|---|---|
| Pervious | 215.0000 | 0.0000 |
| Impervious | 10.0000 | 0.0000 |
| Total | 225.0000 | 0.0000 |

**Output**

**WQV ($m^3$)** 0.00

**EDV ($m^3$)** 0.00

**Flow Attenuation - Volume of Runoff ($m^3$)**

| | 2YR | 10YR | 100YR |
|---|---|---|---|
| PRE | 40823.10 | 84892.74 | 171521.97 |
| POST | 0.00 | 0.00 | 0.00 |
| Vol. Difference | -40823.10 | -84892.74 | -171521.97 |

**Flow Attenuation - Peak Flow ($m^3/s$)**

| | 2YR | 10YR | 100YR |
|---|---|---|---|
| PRE | 7.3490 | 15.6577 | 32.0502 |
| POST | 0.0000 | 0.0000 | 0.0000 |
| $Q_{peak}$ Difference | -7.3490 | -15.6577 | -32.0502 |

# TP 108 Graphical Runoff Calculation

## Builtsmart Plan Change - Huntly

### Summary Sheet - Project Site Catchment

**DATE:** 28 June 2019

**TMW PROJECT NUMBER:**

**Input**

| | ARI (yr) | 2 | 10 | 100 | WQ | ED |
|---|---|---|---|---|---|---|
| **Design Rainfall (mm)** | | 65 | 100 | 156 | 21.7 | 34.5 |

| | | **CN** | **Ia (mm)** | **Tc (hr)** |
|---|---|---|---|---|
| PRE | Pervious | 61 | 5 | 0.167 |
| | Impervious | 98 | 0 | 0.167 |
| POST | Pervious | 61 | 5 | 0.167 |
| | Impervious | 98 | 0 | 0.167 |

**Catchment Area (ha)**

| | PRE | POST |
|---|---|---|
| Pervious | 2.3300 | 0.8800 |
| Impervious | 0.1200 | 1.5700 |
| Total | 2.4500 | 2.4500 |

**Output**

**WQV ($m^3$)** 288.15

**EDV ($m^3$)** 510.81

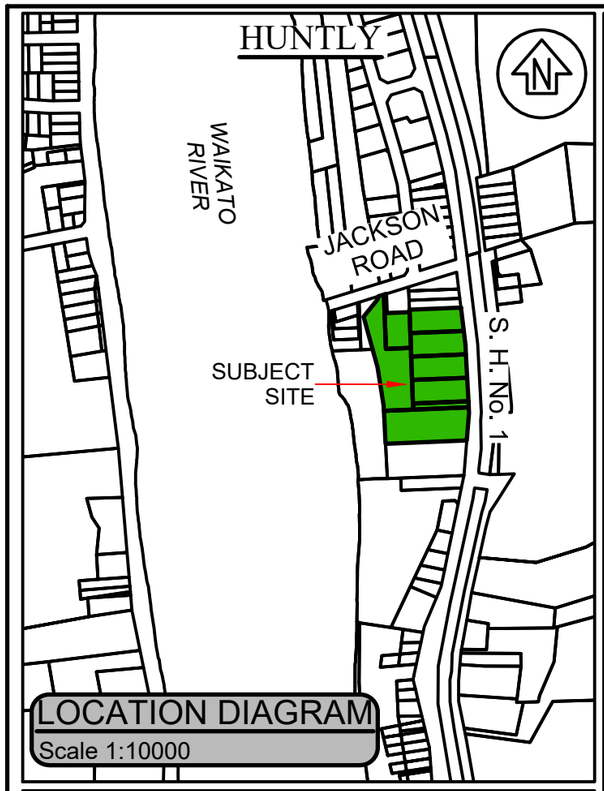
**Flow Attenuation - Volume of Runoff ($m^3$)**

| | 2YR | 10YR | 100YR |
|---|---|---|---|
| PRE | 449.41 | 931.06 | 1876.38 |
| POST | 1087.58 | 1801.18 | 3011 |
| Vol. Difference | 638.17 | 870.13 | 1134.30 |

**Flow Attenuation - Peak Flow ($m^3/s$)**

| | 2YR | 10YR | 100YR |
|---|---|---|---|
| PRE | 0.0809 | 0.1716 | 0.3503 |
| POST | 0.1928 | 0.3163 | 0.5267 |
| $Q_{peak}$ Difference | 0.1119 | 0.1447 | 0.1764 |

# APPENDIX 9 SURVEY




ORIGIN OF COORDINATES
DATUM : NZGD 2000
Mt EDEN CIRCUIT COORDINATES
ORIGIN : MOUNT EDEN 800,000mN 400,000mE

BM BB 61 (Bench Mark) 722753.70mN
(Geo. Code: AGC7) 434914.71mE

ORIGIN OF HEIGHTS
BM BB 61
(Geo. Code: AGC7)
(SS Pin set in Concrete Block - Under Cast Iron Cover)
RL. 11.23m
ALL HEIGHTS ARE IN TERMS OF MOTURIKI VERTICAL HEIGHT DATUM 1953

ON-SITE BENCH MARK/DATUM
New IS 3 722541.70mN
(0.2 Down in Grass) 434840.96mE
RL. 11.68m
CONTOUR INTERVAL: MAJOR - 1.0m MINOR - 0.2m

NOTE:

1) ALL AREAS AND DIMENSIONS SUBJECT TO FINAL SURVEY AND APPROVAL FROM THE WAIKATO DISTRICT COUNCIL

2) LEGAL DESCRIPTION:

| | | |
|---|---|---|
| LOTS 7 & 8 DP 875 AREA: 6652m2 (CT. SA86/276) | LOT 9 DP 875 AREA: 3427m2 (CT. SA18D/508) |
| LOT 10 DP 875 & LOT 1 DPS 39041 AREA: 4349m2 (CT. SA35B/191) | LOT 1 DPS 62317 AREA: 7311m2 (CT. SA50C/543) |
| SEC 1 SO 53946 AREA: 7583m2 (CT. SA40B/884) | LOT 1 DP 33424 AREA: 2484m2 (CT. SA1092/81) |

3) TOTAL AREA: 3.1806 ha.

4) ZONE: LIVING
LIGHT INDUSTRIAL (affects LOT 1 DPS 62317)
HUNTLY SOUTH ASSESSMENT 1 OVERLAY

5) AERIAL PHOTO SUBJECT TO DISTORTION

6) ALL LEVELS ARE IN TERMS OF MOTURIKI VERTICAL DATUM 1953

SCHEDULE OF EXISTING EASEMENTS

| PURPOSE | SERV. TENE. | SHOWN | CREATED BY |
|---|---|---|---|
| RIGHT OF WAY | LOT 1 DPS 62317 | A | EC. B082924.4 |

SCHEDULE OF EXISTING APPURTENANT EASEMENTS

| PURPOSE | SERV. TENE. | SHOWN | CREATED BY |
|---|---|---|---|
| RIGHT OF WAY | LOT 2 DPS 62317 | B | EC. B082924.4 |

JACKSON ROAD LEGAL ROAD (20.12 WIDE)
WAIKATO RIVER
S. H. No. 1 LEGAL ROAD (20.12 WIDE)
N. I. M. T. Railway
EXISTING VEHICLE CROSSING

SEC 1 SO 429528
LOT 2 DP 33424
LOT 1 DP 34512
LOT 2 DP 34512
LOT 3 DP 34512
LOT 1 DP 33424 2484m2 (CT. SA1092/81) PFL TRUSTEE COMPANY LTD.
LOT 7 DP 875 3263m2 (CT. SA86/276) BJ. LINDSAY, JJ. PARSONSON, SM. PALMER, WD. ANDERSON, PFL TRUSTEE COMPANY LTD.
LOT 8 DP 875 3389m2 (CT. SA86/276) BJ. LINDSAY, JJ. PARSONSON, SM. PALMER, WD. ANDERSON, PFL TRUSTEE COMPANY LTD.
LOT 9 DP 875 3415m2 (CT. SA18D/508) BJ. LINDSAY, JJ. PARSONSON, SM. PALMER, WD. ANDERSON, PFL TRUSTEE COMPANY LTD.
SEC 1 SO 53946 7583m2 (CT. SA40B/884) THE HUNTLY BOROUGH COUNCIL
LOT 10 DP 875 3440m2 (CT. SA35B/191) BJ. LINDSAY, JJ. PARSONSON, SM. PALMER, WD. ANDERSON, PFL TRUSTEE COMPANY LTD.
LOT 1 DPS 39041 910m2 (CT. SA35B/191) BJ. LINDSAY JJ. PARSONSON, SM. PALMER, WD. ANDERSON, PFL TRUSTEE COMPANY LTD.
SEC 1 SO 429539
LOT 1 DPS 62317 7311m2 (CT. SA50C/543) PFL TRUSTEE COMPANY LTD.
LOT 2 DPS 62317
HOUSE1

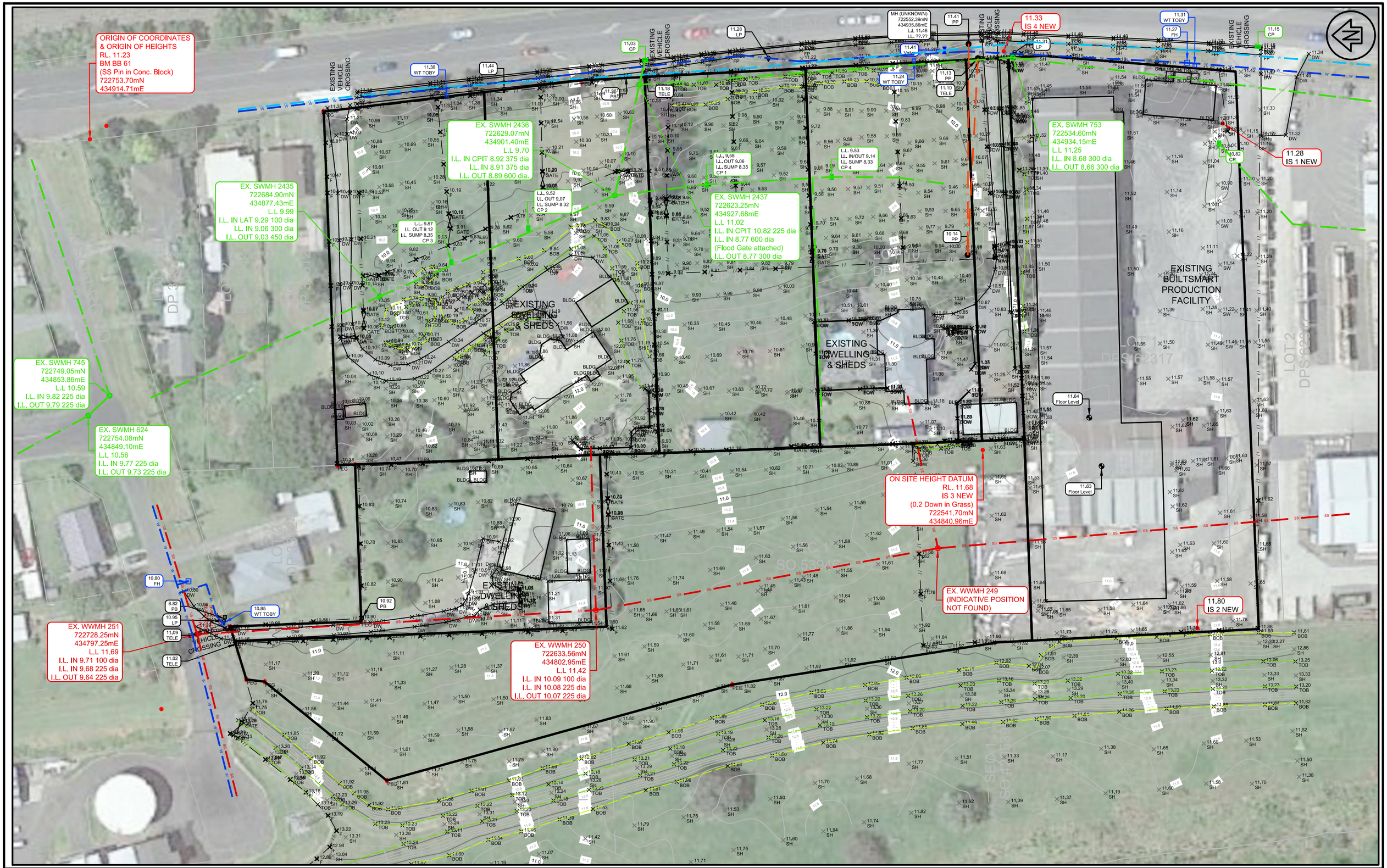
| | | | | | |
|---|---|---|---|---|---|
| SCALE: 1:1250 @A3 | | | DATE: MAY 2019 | | |
| No. | Amendment | Init. | Date. | Designed. WAB | |
| 1 | TOPO SCHEME #A | WAB | 05/19 | Drawn. WAB | 27 MAY 2019 |
| 2 | | | | Checked. | |
| 3 | | | | Approved. | |

S:\2018\18056\3. SURVEYING\3. TOPO\18056-00-PL-100-A TOPO.DWG

# TOPOGRAPHICAL SITE PLAN ON LOTS 7 - 10 DP 875, LOT 1 DP 33424, LOT 1 DPS 39041, LOT 1 DPS 62317 & SEC 1 SO 53946 S. H. No. 1 & JACKSON ROAD - HUNTLY
PREPARED FOR: PLB CONSTRUCTION GROUP LTD.

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38
Hamilton Central, HAMILTON.
Phone (07) 839 7799
Email office@bluewallace.co.nz

Drawing Reference: 18056-00-PL-100
Revision: A




SCALE: 1:1250 @A3

DATE: MAY 2019

| No. | Amendment | Init. | Date. |
|---|---|---|---|
| 1 | TOPO SCHEME #A | WAB | 05/19 |
| 2 | | | |
| 3 | | | |

Designed. WAB

Drawn. WAB 27 MAY 2019

Checked.

Approved.

S:\2018\18056\3. SURVEYING\3. TOPO\18056-00-PL-100-A TOPO.DWG

# TOPOGRAPHICAL SITE PLAN ON LOTS 7 - 10 DP 875, LOT 1 DP 33424, LOT 1 DPS 39041, LOT 1 DPS 62317 & SEC 1 SO 53946 S. H. No. 1 & JACKSON ROAD - HUNTLY

## PREPARED FOR: PLB CONSTRUCTION GROUP LTD.


Blue Wallace Surveyors Ltd.

25 Harwood Street, P O Box 38
Hamilton Central, HAMILTON.
Phone (07) 839 7799
Email office@bluewallace.co.nz


Drawing Reference: 18056-00-PL-100

Revision: A

# APPENDIX 10 COMMUNICATION TIMELINE

| | |
|---|---|
| 6 May | Email to WDC planner (Sam Foster) and WDC Engineer reviewer (Eugene Vodjansky) requesting details on the WRC pump station arrangements and outlets to the river. Sam put me in touch with Betty Connolly |
| 7 May | Senior Planner at WDC (Betty Connolly) provided details of the WDC asset engineer (Pranavan Kasipillai) and Stephen Howard Water Policy Planner who might be able to provide |
| 9 May | Spoke to Pranavan and Stephen Basically we don't have a lot of information on the network and there is no formal 'operational arrangement' between WDC and WRC that they are aware of relating to the sw reticulation and how it operates with the pumps. Stephen/Pranavan however will endeavour to do some digging to find any useful archive information such as the 'Huntly Flood Management Plan' file 65 11 02 and Ponding Levels Reports contained in 'Policy Committee Agenda dated 13 Oct 1997 (held in ref library in Records) which make specific reference to this ponding area |
| 9 May | Email sent to Sarah Lealand at WRC (Lower Waikato Zone Manager) asking who my primary contact would be. Sarah is going to discuss with WRC technical, operational and regulatory infrastructure team for comment. |
| 9 May | Email sent to WDC and WRC thanking for inputs to date and noting a need to continue discussion with Rick Liefting at WRC |
| 14 May | Senior Planner WDC provided details on DP rules related to infilling the ponding area |
| 14 May | Met with Rick Liefting (Team Leader \| Regional Flood Coordinator \| Regional Hazards) at WRC offices. Rick confirmed he was my primary contact on the project. Rick noted that area has been a concern for WRC in the past with development/fill in the ponding zone, so are keen to ensure appropriate investigations are undertaken. Rick emailed internally to make enquires as to:<br>1. 1% AEP flood level (and other frequencies if possible).<br>2. Pump(s) information (capacity) and how they operate (constrains).<br>3. Huntly South Pump Station/Floodgates 1 and 2<br>Rick also provided a copy of the Huntly Flood Management Plan 1992, which was also provide at similar time by WDC as below. |
| 15 May | Stephen Howard from WDC provided the key document - Huntly Flood Management Plan 1992" which contained the ponding level map as well as levels (100yr = 11.7m RL) |
| 23 May | Russell Lamb (Regional Flood Liaison Officer) from WRC replied in response to Rick's internal request. Russell confirmed the final ponding level (as earlier maps shows 100yr level 1 m lower at 10.7mRL). But no information provided on pump operation ie. how quickly ponding levels can be reduced? |
| 31 May | Email query sent to Rick and his team requesting more information:<br>1. Are the 1%, 2% and 10% Huntly South local ponding levels in s3.2.2 of the Huntly Flood Management Plan the best numbers to use still? The levels greatly impact on the proposed storage mitigation design and layout so I want to be as sure as I can be. |

| | |
|---|---|
| | 2. Is there any information on Huntly South Pump 1 + 2 operation? Ponding drain down times, trigger levels etc which can help with the flood risk assessment. Again, really important to gain some understanding.<br><br>3. Are there any assumptions from the Lower Waikato model build related to: how 1% local runoff was calculated for the Huntly South ponding catchment – as shown in Map 1?<br><br>4. Is there a GIS map of Map 1? |
| 7 June | Further email sent to Rick at WRC requesting additional information in relation to<br><br>1. Pump operation – capacity and ponding drain down times as this impact on the Builtsmart design and flood risk management approach<br><br>2. Ponding runoff assumptions in the model and contributing catchment area |
| 25 June | Meeting with Ghassan Basheer (Principal Technical Advisor) at WRC office to discuss pump operational procedures and receive SKM LOS document |
| 26 June | Meeting with Constantinos Fokianos at BBO office. I provided Constantinos with an overview of the proposed stormwater management approach and flood volume compensation. Good comments were received which have helped inform this assessment. |
| 2 July | Following review of reports, Phone conversation with Ghassan to clarify operational procedures for pump according to river floodgate control. |
| 3 July | 2 emails from Ghassan Basheer. The 1st with attached letter from WDC dated 2007 outlining consideration now taken by WDC engineers for climate change in relation to pump station upgrades and removal of some private land from infilling restrictions.<br><br>The 2nd email provided a letter attachment outlining Ghassan's reply to WDC confirming the approach to reduce ponding area by infilling while maintaining same design ponding level by pump upgrade. |
| 22 August | Received peer review of the Three Waters Assessment by BBO. Final Three Waters Report and Plans updated to reflect review comments. |
| 23 August | Peer review of the Three Waters Assessment by WRC – email received from Lisette Balsom and follow up from Anderson Aimusu. Review comments incorporated into the final report. |

# APPENDIX 11 WRC/WDC LETTER CORRESPONDENCE

File No: Z15 F200
Document No: 1149306
Enquiries to: Ghassan Basheer

12 February 2007

Rodney Bayly
Waikato District Council
15 Galileo Street, Ngaruawahia
Private Bag 544
Ngaruawahia 3742

Dear Rodney

**Huntly South Ponding (Your Reference 55 07 11)**

Thanks for your letter dated 30 January 2007 in regard to your proposal to upgrade the Jackson Road Pump Station south of Huntly.

We understand that the purpose of the upgrade is to reduce the ponding area within the Huntly South compartment of the Lower Waikato flood protection scheme, while maintaining the same design ponding level within the area.

This is to confirm that the general approach taken in establishing the pumping needs is sound and has been peer reviewed by OPUS consultants. However, we believe that due to the increased reliance on the pumps to provide flood protection within the area, some redundancy should be built in the design to ensure that existing buildings will not be subject to flooding in the case of power failure and/or malfunction of one of the pumps during an event.

Other aspects to be considered in the design include the implications of the likely future development within the catchment and the medium term implications of climate change in respect to increased rainfall on the overall ponding requirements.

I suggest that we meet at your office to go through the design assumptions and calculations and agree on final design and process for the pump station upgrade.

To confirm a meeting date please contact me on 07 8590761 or Ghassan.Basheer@ew.govt.nz.

Yours faithfully

Ghassan Basheer
**Technical Services Manager, Rivers and Drainage**

Waikato
DISTRICT COUNCIL

[redacted]

District Office
15 Galileo Street, Ngaruawahia 3720
Private Bag 544, Ngaruawahia 3742
New Zealand
Ph 07 824 8633
Fax 07 824 8091
Call free 0800 492 452
www.waikatodistrict.govt.nz

Area Offices
Huntly Ph 07 828 7551
Raglan Ph 07 825 8129

| Your Ref | In reply please quote | If calling, please ask for |
|---|---|---|
| | 55 07 11 | Rodney Bayly |

29 May 2007

Ghassan Basheer
Environment Waikato
P O Box 4010
HAMILTON EAST

Dear Ghassan

**HUNTLY SOUTH PONDING**

Further to our previous correspondence relating to our proposal to upgrade the flood/drainage pumps at Huntly South and remove some private land from restrictions on filling we have now considered the effects of global warming and power outage.

For the proposed upgrade (same frame as existing, upgrade impellers and stators, new motors and power supply), the predicted worse case temperature rise (and hence rain intensity) to 2030 leads to a ponding level of RL 11.6 and that to 2080 leads to a ponding level of RL 11.8. The design ponding level for the area is RL 11.7, which means that the proposed upgrade is adequate for predicted conditions to 2030, but may not be for 2080. The projected effect of global warming is likely to be an over estimate for the distant time of 2080, and the pumps will probably need replacing about 2040. At this stage required capacity should be reviewed and appropriate pumps chosen.

The critical need for pumping arises from an intense local storm while the Waikato River is high. Under these circumstances a power failure of more than 2.5 hours could lead to local ponding exceeding the design level of RL 11.7. WEL advises that they expect to be able to restore power within an hour. If one of the main pumps is out of action for the duration of the event, the ponding level rises to RL 11.84, which means that in a major event operation of the pumps needs to be monitored so that supplementary pumps can be brought in if needed.

The proposed upgrade covers present needs with some redundancy to cover the effects of future trends in rainfall, or pump failure. We therefore seek your approval, and allocation of Project Watershed funds to subsidise the work.

Yours sincerely

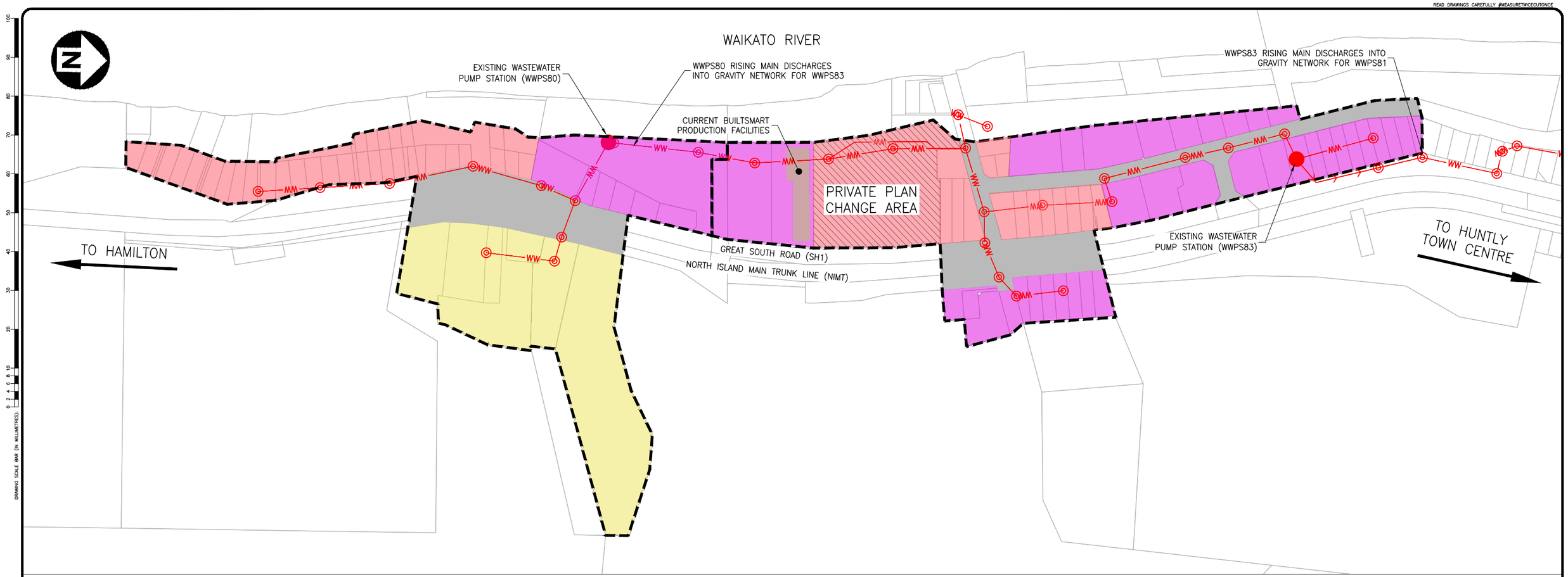
R L Bayly

R L Bayly
**ENVIRONMENTAL ENGINEER**

RB\7052901KCB

# APPENDIX 12 WATER SUPPLY AND WASTEWATER PLANS

READ DRAWINGS CAREFULLY #MEASURETWICECUTONCE




## EXISTING WASTEWATER NETWORK – LAYOUT PLAN

SCALE = 1:5000

| PARAMETER | EXISTING CATCHMENT | PROPOSED PRIVATE PLAN CHANGE | % CHANGE |
|---|---|---|---|
| RESIDENTIAL 'LIVING ZONE' AREA (Ha) | 6.9 | 4.4 | –35% |
| ASSUMED RESIDENTIAL 'LIVING ZONE' DENSITY (ppl/Ha) | 10.8 | 10.8 | – |
| INDUSTRIAL AREA (Ha) | 9.0 | 11.5 | +27% |
| ASSUMED INDUSTRIAL DENSITY (ppl/Ha) | 45.0 | 45.0 | – |
| RURAL AREA (Ha) | 5.5 | 5.5 | – |
| RURAL Lots (No.) | 7 | 7 | – |
| ASSUMED RURAL DENSITY (ppl/Lot) | 2.7 | 2.7 | – |
| ROAD RESERVE AREA (Ha) | 4.4 | 4.4 | – |
| NETWORK CAPACITY ASSESSMENT UPSTREAM OF WWPS80 (BASED ON ZONING PROVISIONS) | | | |
| AVERAGE DAILY FLOW (m3/day) | 100.0 | 116.7 | +17% |
| PEAK FLOW (L/s) | 4.7 | 5.0 | +7% |
| PEAK WET WEATHER FLOW (L/s) | 10.2 | 10.5 | +3% |

### NOTES:

1. EXISTING NETWORK INFORMATION AND ZONING HAS BEEN TRANSPOSED FROM WAIKATO DISTRICT COUNCIL ONLINE MAPS
2. ESTIMATED WASTEWATER FLOWS ARE BASED ON STANDARD DESIGN PARAMETERS TAKEN FROM WAIKATO LASS REGIONAL TECHNICAL INFRASTRUCTURE SPECIFICATION, SECTION 5

### LEGEND

- EXISTING CADASTRAL BOUNDARIES
- PLAN CHANGE BOUNDARY

EXISTING ZONING

- PRIVATE PLAN CHANGE AREA
- EXISTING INDUSTRIAL ZONE
- EXISTING RESIDENTIAL 'LIVING ZONE'
- EXISTING RURAL ZONE

WASTEWATER NETWORK

- WW — WASTEWATER PIPE
- WASTEWATER RISING MAIN
- WASTEWATER MANHOLE
- WASTEWATER PUMP STATION

| REV | DESCRIPTION | BY | DATE |
|---|---|---|---|
| | | | |
| | | | |
| A | FOR INFORMATION | LPM | 29.08.19 |

APPROVAL STATUS: FOR INFORMATION

| DESIGNED BY | DATE |
|---|---|
| L. MCCAFFREY | 29.08.19 |
| DRAWN BY | DATE |
| L. MCCAFFREY | 29.08.19 |
| APPROVED BY | DATE |
| – | – |

CLIENT NAME: BUILTsmart Advanced Transportable Homes™

PROJECT NAME: BUILDSMART PRIVATE PLAN CHANGE

DRAWING TITLE: WDC WASTEWATER NETWORK DESKTOP ASSESSMENT

PRODUCED BY: TE MIRO WATER

DATE PRINTED: 30 August 2019

DRAWING SCALE: 1:5000

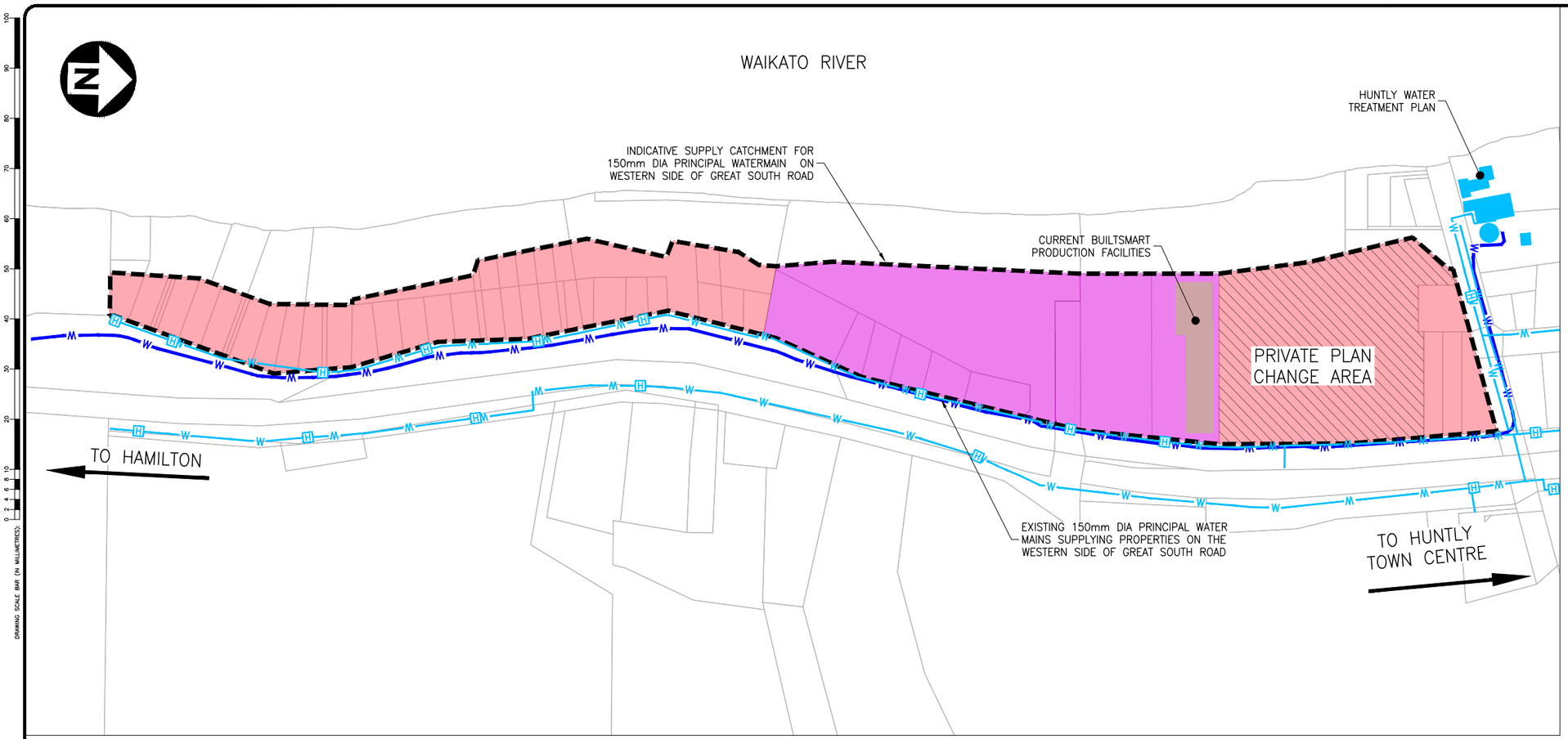
REVISION No.: A

DISCIPLINE: CIVIL ENGINEERING

DRAWING No.: 19013–SK–007

FILE NAME: 19013–SK–007.dwg

READ DRAWINGS CAREFULLY #MEASURETWICECUTONCE




## LEGEND

- EXISTING CADASTRAL BOUNDARIES
- PLAN CHANGE BOUNDARY

EXISTING ZONING

- PRIVATE PLAN CHANGE AREA
- EXISTING INDUSTRIAL ZONE
- EXISTING RESIDENTIAL 'LIVING ZONE'
- EXISTING RURAL ZONE

WATER SUPPLY NETWORK

- PRINCIPAL WATERMAIN
- BULK WATERMAIN
- HYDRANT

## NOTES:

1. EXISTING NETWORK INFORMATION AND ZONING HAS BEEN TRANSPOSED FROM WAIKATO DISTRICT COUNCIL ONLINE MAPS
2. ESTIMATED WATER SUPPLY VOLUMES BASED ON STANDARD DESIGN PARAMETERS TAKEN FROM WAIKATO LASS REGIONAL TECHNICAL INFRASTRUCTURE SPECIFICATION, SECTION 6

## EXISTING WATER SUPPLY NETWORK – LAYOUT PLAN

SCALE = 1:4000

| PARAMETER | EXISTING CATCHMENT | PROPOSED PRIVATE PLAN CHANGE | % CHANGE |
|---|---|---|---|
| RESIDENTIAL 'LIVING ZONE' AREA (Ha) | 5.9 | 3.4 | -42% |
| ASSUMED RESIDENTIAL 'LIVING ZONE' DENSITY (ppl/Ha) | 10.8 | 10.8 | - |
| INDUSTRIAL AREA (Ha) | 3.8 | 6.3 | +63% |
| ASSUMED INDUSTRIAL DENSITY (ppl/Ha) | 45.0 | 45.0 | - |
| NETWORK CAPACITY ASSESSMENT FOR 150mm PRINCIPAL WATERMAIN (BASED ON ZONING PROVISIONS) | | | |
| AVERAGE DAILY FLOW (m3/day) | 61.7 | 83.5 | +35% |

| REV | DESCRIPTION | BY | DATE |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| A | FOR INFORMATION | LPM | 29.08.19 |

APPROVAL STATUS: FOR INFORMATION

DESIGNED BY: L. MCCAFFREY — DATE: 29.08.19

DRAWN BY: L. MCCAFFREY — DATE: 29.08.19

APPROVED BY: – — DATE: –

CLIENT NAME: BUILTsmart Advanced Transportable Homes™

PROJECT NAME: BUILDSMART PRIVATE PLAN CHANGE

DRAWING TITLE: WDC WATER SUPPLY NETWORK

DESKTOP ASSESSMENT

PRODUCED BY: TE MIRO WATER

DATE PRINTED: 30 August 2019

DRAWING SCALE: 1:4000

REVISION No.: A

DISCIPLINE: CIVIL ENGINEERING

DRAWING No.: 19013-SK-008

FILE NAME: 19013-SK-008.dwg

# APPENDIX 13 CAPACITY CONFIRMATION LETTER- WDC

**Postal Address**
Private Bag 544, Ngaruawahia 3742
New Zealand

**0800 492 452**
**www.waikatodistrict.govt.nz**

2nd September 2019

Liam McCaffrey
(by email: liam@meconsultants.co.nz.co.nz)

Dear Liam

**Re: Builtsmart Private Plan Change Huntly - capacity assessment (Wastewater/Water)**

Thanks for meeting with the Waikato District Council (WDC) Service Delivery Water Asset Department reps recently, which enabled an engineering discussion in respect to the above.
As a follow up agreed action, you have sent your investigation summaries (messages dated 30/08/2019- attached) for review and final comment.
I can confirm that the WDC Water Assets Department consider that:

- Both the existing WDC water and wastewater supply networks have adequate capacity to accommodate the proposed BuiltSmart plan change.

Please let me know if additional information is needed.

Kind regards

S. Howard

Stephen Howard
WDC Snr Planner (Waters)

(cc Sam Foster (sfoster@bbo.co.nz) and Abbie Fowler (abbie.fowler@mitchelldaysh.co.nz))

From: Liam McCaffrey <liam@meconsultants.co.nz> Sent: Fri 30/8/2019 11:39 A
To: Pearl McFall; Richard Pullar
Cc: sfoster@bbo.co.nz; Constantinos Fokianos (cfokianos@bbo.co.nz); Abbie Fowler; Stephen Howard; Pranavan Kasipillai
Subject: RE: Builtsmart Private Plan Chnage Huntly - capacity assessment (Wastewater)

Message 19013-SK-007-REVA.pdf (291 KB)

Hi Richard/Pearl,

Thanks again for meeting with us on Wednesday this week to discuss water and wastewater supply for the proposed BuiltSmart Private Plan Change area.

Regarding **Wastewater Supply**, the following is a summary of the assessment work completed for your consideration;

- Estimation of wastewater design flows for the plan change area (based on zoning only);
  - Based on the current/proposed zoning the following table summarises the change in design flow requirements for the site;

**TABLE 8:** DESIGN WASTEWATER FLOWS FOR THE PLAN CHANGE AREA

| DESCIPTION | AREA | DENSITY | AVERAGE DAILY FLOW | PEAK DAILY FLOW | PEAK WET WEATHER FLOW |
|---|---|---|---|---|---|
| **EXISTING ZONING** 'LIVING' | 2.4Ha | 10.8 persons per ha | 5.3m3/day | 0.6L/s | 1.1L/s |
| **PROPOSED ZONING** 'INDUSTIRAL' | 2.4Ha | 45 persons per ha | 22.1m3/day | 1.1L/s | 1.7L/s |

  - As discussed at the meeting this assessment is based off the RITS design assumption of 200L/person/day which is expected to be conservative based on the expected site density/proposed activities (i.e. light industrial)
  - In comparison an initial estimate of expected wastewater generation for the proposed BuiltSmart activities is between 1-2m3/day; this estimate based on client requirements (i.e. requirement for staff amenities and external hoses fittings only)
- Attached is a desktop assessment of the local WDC wastewater networks showing the estimated effect on capacity requirements as a result of the proposed change in zoning. As above; this assessment is based on based off the RITS design assumption of 200L/person/day and is expected to be conservative.

**Based on the above information can you please confirm the existing Waikato District Council wastewater network has adequate capacity to accommodate the proposed BuiltSmart plan change.**

Please give me a call on 021 270 1277 if you have any questions or would like to discuss further.

Cheers,

**Liam McCaffrey**
Principal Civil Engineer (Director)
M: 021 270 1277

Image 1: Wastewater Investigation Detail

From: Liam McCaffrey <liam@meconsultants.co.nz> Sent: Fri 30/8/2019 11:40
To: Pearl McFall; Richard Pullar
Cc: sfoster@bbo.co.nz; Constantinos Fokianos (cfokianos@bbo.co.nz); Abbie Fowler; Stephen Howard; Pranavan Kasipillai
Subject: RE: Builtsmart Private Plan Chnage Huntly - capacity assessment (Water Supply)

Message 19013-SK-008-REVA.pdf (191 KB)

Hi Richard/Pearl,

Further to my last email; regarding **Water Supply**, the following is a summary of the assessment work completed for your consideration;

- Estimation of water supply design flows for the plan change area (based on zoning only);
  - Based on the current/proposed zoning the following table summarises the change in design flow requirements for the site;

**TABLE 7:** DESIGN WATER FLOWS FOR THE PLAN CHANGE AREA

| DESCRIPTION | AREA | DENSITY | AVERAGE FLOW | TOTAL DAILY VOLUME |
|---|---|---|---|---|
| **EXISTING ZONING** 'LIVING' | 2.45Ha | 10.8 persons per ha | 0.03L/s/ha | 6,700L/day |
| **PROPOSED ZONING** 'INDUSTIRAL' | 2.45Ha | 45 persons per ha | 0.14L/s/ha | 28,700L/day |

  - As discussed at the meeting this assessment is based off the RITS design assumption of 260L/person/day which is expected to be conservative based on the expected site density/proposed activities (i.e. light industrial)
  - In comparison an initial estimate of expected water usage for the proposed BuiltSmart activities is between 1-2m3/day; this estimate based on client requirements (i.e. requirement for staff amenities and external hoses fittings only)
- Attached is a desktop assessment of the local WDC wastewater networks showing the estimated change in capacity requirements as a result of the proposed change in zoning. As above; this assessment is based on based off the RITS design assumption of 260L/person/day and is expected to be conservative.

**Based on the above information can you please confirm the existing Waikato District Council water supply network has adequate capacity to accommodate the proposed BuiltSmart plan change.**

Please give me a call on 021 270 1277 if you have any questions or would like to discuss further.

Cheers,

**Liam McCaffrey**
Principal Civil Engineer (Director)

Image 2: Water Investigation Detail