BEFORE THE INDEPENDENT HEARINGS PANEL APPOINTED BY THE WESTERN BAY OF PLENTY DISTRICT COUNCIL

IN THE MATTER of the Resource Management Act 1991 (**RMA**)

AND

IN THE MATTER of Proposed Private Plan Change 95 to the Western Bay of Plenty District Plan First Review – Pencarrow Estate, Pongakawa

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STATEMENT OF EVIDENCE OF JAMES ABRAHAM ON BEHALF OF WESTERN BAY OF PLENTY DISTRICT COUNCIL IN RESPONSE TO QUESTIONS FROM HEARING COMMISSIONERS (WASTEWATER AND STORMWATER)

22 November 2024

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INTRODUCTION

1. My full name is James Abraham.

2. My involvement in relation to Private Plan Change 95 includes providing expert advice to Ms Mark as part of the preparation of the Section 42A report, and I have provided the following evidence to the Hearings Commissioners:

   (a) Summary Statement of Evidence dated 13 November 2024;

   (b) Notes of reply comments dated 14 November 2024.

3. I confirm my qualifications and experience as set out in my Summary Statement of Evidence dated 13 November 2024.

4. I also confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses, as contained in the Environment Court's Practice Note 2023. I confirm that this evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

5. I have prepared this Statement of Evidence in response to the questions from the Hearings Commissioners received on 20 November 2024.

Q1: Page 2, bullet point 3, dash 3: How many residential lots, using the Applicants proposed minimum and average lot sizes, would disposal fields of 75M^2 and 140M^2 yield within the Site? Further, what, in your view/experience, is required to ensure a perfectly maintained s/w device whether in a reserve or within individual lots?

6. In page 9 and 10 of the Engineering Service Report R7, the applicants suggest there are two different residential lot types, large lot and dwelling and small lot and dwelling. Table1 below represents what a development code compliant soakage device would be for each for these lot types. In summary:

   (a) To service a large lot and dwelling on a 450m² residential property the total area required for soakage per property would be 144m² or 32% of the site. Space is still required to fit the dwelling and wastewater tank on this property and appropriate setbacks from these structures.

   (b) To service a small lot and dwelling on a 300m² residential property the total area required for soakage per property would be 113m² or 37% of the site. Space is still

required to fit the dwelling and wastewater tank on this property and appropriate setbacks from these structures.

Table 1: Development Code Compliant Soakage Devices

Large Lot and Dwelling			
Description	**Value**	**Unit**	**Notes**
Soakage Rate	7	L/m2/hr	
Reduction factor	0.5		Required as per development code
Proposed Soakage Rate	3.5	mm/hr	
Assumed Lot Size	450	m2	
Catchment area	210	m2	160m2 dwelling and 50m2 hardstand provided by Lysaght
Runoff co-efficient	0.9		
Design Storm intensity	66.8	mm/hr	10yr 60 minute
Total Effective Area	144	m2	
Time to Drain	23.98	Hours	Drained in 24 hours
Percentage of site used for soakage	32.09	%	
Small Lot and Dwelling			
Description	**Value**	**Unit**	**Notes**
Soakage Rate	7	L/m2/hr	
Reduction factor	0.5		Required as per development code
Proposed Soakage Rate	3.5	mm/hr	
Assumed Lot Size	300	m2	
Catchment area	165	m2	120m2 dwelling and 45m2 hardstand provided by Lysaght
Runoff co-efficient	0.9		
Design Storm intensity	66.8	mm/hr	10yr 60 minute
Total Effective Area	113	m2	
Time to Drain	23.99	Hours	Drained in 24 hours
Percentage of site used for soakage	37.80	%	

7. With regards to maintenance Lysaght have specifically mentioned a rain smart system in Appendix 3 of the Engineer Servicing Report. This system is commonly used today. I have included below the inspection and cleaning procedures recommended by the manufacturer. The suggested procedure recommends inspection tasks are undertaken annually and after every heavy rainfall event these tasks include CCTV inspections, soakage testing and monitoring. Methods of flushing / cleaning require excavation around the soakage device, flushing and the use of a sucker truck or similar. In my experience these procedures require technical knowledge which is beyond the means of most homeowners. As the proposed

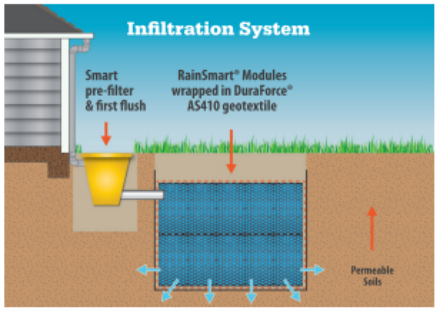
networks efficiency is reliant on these privately owned systems it is critical that these are maintained. This burden falls on Council. While Council have provisions in section 3.3 of its Stormwater Bylaw "*Council may require an owner/ occupier to fix or upgrade a private stormwater network, at the owner's cost, to meet original design specifications",* the Council does not currently resource the monitoring and enforcement required to ensure compliance.

Suggested procedure for inspection and maintenance

Inspection: After a period of time ascertained by the engineer, but not more than one year from initial installation, the module should be inspected to check sediment levels or performance. This can either be done with a CCTV camera or by monitoring the time taken for the system to empty after a storm event and comparing with design criteria. From this an indication can be gained as to the rate of sedimentation and further inspections scheduled.

Further inspections will be as deemed necessary by the engineer, but will be at least annually, and after every heavy rainfall event.

Flushing: When the tank is deemed to be ineffective the sediment can be flushed out. This requires identifying the exact location with a metal detector (assumes metallic tape at corners) or from as-built plans and digging a small access trench at each end of the module. This allows access for water to be pumped in at one end and suction cleaned at the other. After flushing the geotextile will need to be patched as per the installation instructions.



NB: For maintainable systems with access ports refer sections 2 and 3 of this guide.

If any questions or concerns are not covered by these instructions please contact Cirtex on **0800 247 839** or email **sales@cirtex.co.nz**

CIRTEX

RAINSMART® SUGGESTED MAINTENANCE PROCEDURES

8. In 2023, Hamilton City Council (HCC) published a paper named "ON-LOT STORMWATER…A LOT TO LEARN". I have attached a copy of this paper to this statement as **Attachment A**. This paper outlines the increasing reliance on on-lot stormwater management systems, such as soakage devices, and how long-term functionality is imperative to achieving the long-term health of waterways and is reliant on maintenance by homeowners. HCC found that the condition, compliance and effectiveness of soakage devices in particular were difficult to assess largely due to the devices being buried, "*of the 23 soakage devices assessed, 17 (all in the same area) weren't* able to be assessed due to the lack of access chambers for any of the assets. This was further reiterated by discussions with the residents who were present during the assessments, most of whom had no idea that there was a soakage device within their property."*

Q2: Page 3, bullet point 3: What programme of soakage testing is needed to satisfy your concern here? Please provide the numbers of test wells needed, how long they need

to be monitored for an provide and an indicative cost estimate for this monitoring programme. Further, from the perspective of the WBoPDC, what happens if a proposed development does not comply with BOPRC development guidelines? Do the guidelines provide for innovative/different approaches? If so, are you able to give examples?

9. Council accepts falling head soakage tests to measure soakage rates. This is a simple test method and commonly used around the country.

10. Geological conditions can vary significantly over a short distances. Therefore where multiple devices are to be used, it is recommended in R156 (CIRIA,1996), to adopt a testing spread. That means 1 test per device or every 25 m x 25 m. (Construction Industry Research and Information Association (CIRIA) (1996) 'Infiltration Drainage – Manual of Good Practice', Report R156.)

11. I would estimate this work could be completed in a week or less by experienced practitioners. However, cost estimates are not my expertise.

12. One of the four objectives of the BOPRC stormwater management guidelines is "*to minimise adverse environmental effects of stormwater discharges*". In my opinion non-compliance with the guideline could result in poor outcomes for the environment and downstream properties.

13. Lysaght have recommended innovative best practice approaches, with soakage devices, treatment swales and a wetland for further treatment and detention. However, in my opinion, due to the limitations of the site including ground water tables, susceptibility to flooding and potentially poor soakage rates (yet to be tested) methods for stormwater discharge are limited and potentially not practical.

Q3: Page 2, Point 1: Can you please highlight, on a plan, the location that you consider Overland Flow Path 3 should go?

14. Overland flow path three is proposed to cut through the wastewater irrigation field. There is no issue with this so long as appropriate setbacks are considered and this area is accounted for in the overall sizing calculations of the irrigation field. The evidence provided by the applicant to date suggests this has not been considered.

15. During the hearing, Kirstin Brown stated the overland flow path can be diverted elsewhere. However, this is not consistent with the proposed structure plan and the effects of moving the overland flow path have not been assessed. In my opinion, the effects of this change should be considered now before the structure plan is adopted. This would be alongside

the other factors which I do not consider have been appropriately considered which in my opinion may have a cumulative impact resulting in the irrigation field being significantly undersized.

16. As requested I have prepared a map showing the limitations of the wastewater irrigation field which have not been assessed as part of the sizing calculations, in my opinion addressing these limitations could result in a significant deviation from the structure plan. A copy of this map is attached to this statement as **Attachment B**.

Q4: Page 4, Point 2: What is the width of your proposed setback from the residential area and wastewater irrigation field within PPC95? Is this something that can be addressed in stage 2? if not, please provide an explanation why. Further, can a staged approach accommodate your w/w concerns re: size of field, fill placed in field, access to treatment plant, and adding to the device in the future?

17. Based on Council's experience with the Maketu wastewater irrigation field a 20m buffer from the residential area would be sufficient. Attached to this statement as **Attachment C** is a plan showing the buffer zone required in that situation.

18. It is my opinion that a staged approach cannot satisfy the concerns regarding the sizing of the irrigation field:

    (a) The cumulative issues already mentioned in my previous evidence regarding the sizing of the irrigation field and highlighted in the map (at Attachment B) suggest the irrigation field is significantly undersized, however an appropriately sized irrigation field could be a major deviation from the proposed structure plan.

    (b) To increase the size of the irrigation field would result in the irrigation field extending further into the floodable area (identified in the attachment map) where conditions are less favourable, and the effect of this has not yet been assessed. In my opinion, for these reasons an appropriately sized irrigation field which considers all limiting factors should be provided prior to the adoption of the structure plan.

Q5: Page 4, Point 7: What specific changes are needed to the proposed structure plan to address your concern? Please highlight any additional rules, amendments to the rules, and/or changes to the plans accompanying and forming part of the structure plan; think about the role of each stage to

19. I do not have specific suggested changes to allow provisions in the structure plan at this stage, as in my opinion there is insufficient evidence to suggest that the current draft

structure plan is viable. As outlined in paragraphs 18(a) and (b) above, the irrigation field is significantly undersized, and expanding the field would push it further into flood-prone areas, which has not been adequately assessed. A detailed assessment of the irrigation field size, considering all relevant factors, needs to be conducted prior to the adoption of the structure plan. Until these critical concerns are addressed, particularly regarding the sizing of the field and its location relative to flood risks, it is difficult to recommend any provisions that would make the structure plan viable.

Q6: Page 5, Point 10: Please mark, on a plan, the 13% of the disposal field that would be within the floodable (in a 1-in-100-year flood)?

20. This area has been shown in the map attached as Attachment B. The floodable area in the north is most prominent where it is contiguous with the Puanene stream. In my opinion a flood assessment should be undertaken to assess whether the minimum 20-metre setback required by BOPRC is sufficient to protect the Puanene stream from contamination in a flood event.

21. The attachment map also highlights overland flow path three and other farm drains which intersect the irrigation field. No clear method of how these are to be managed has been provided or any setback suggested. These are also tributaries to the Puanene Stream and eventually the Waihi Estuary, this environmental risk has not been considered and highlights the risk this irrigation field poses to the receiving environment.

22. In my opinion this is part of the wider assessment required to support the viability of irrigation field and provide evidence that adverse effects to the receiving environment can be avoided. Insufficient evidence to suggest this and support the structure plan has been provided to date.

Q7: Page 5, Point 11: If a 20 metre setback is inadequate, what setback width would be needed to mitigate environmental and cultural risk?

23. See response above.

Q8: Page 5, Point 12: Is an residential / public / stocking / farming exclusion area needed to avoid this eventuality? If yes, how large is the exclusion area and where should it be (please mark the area on a plan).

24. In my opinion a buffer zone is required for the reasons in paragraph 17 above. This is shown in the plan attached as Attachment B.

James Abraham
22 November 2024

Attachment “A”

ON-LOT STORMWATER…A LOT TO LEARN

A. Phillips and N. Young (Hamilton City Council) & S.Joyce and S.Farrant (Morphum Environmental Ltd)

ABSTRACT

Across New Zealand, as councils and communities respond to the need to protect our precious freshwater resources and reflect the principles of Te Mana o te Wai, there is increasing emphasis on stormwater management within private properties. Land use faces unprecedented pressure; stormwater management directly competes with housing, roads and recreational demands. The space needed to manage stormwater in the public realm simply may not be available. Whether it is on-lot rainwater tanks, soakage devices or raingardens, these devices are designed and constructed to provide long term water quality and quantity improvements. Long-term functionality is increasingly imperative to achieving the long-term health of waterways and is reliant on maintenance by homeowners.

A Hamilton City Council (HCC) District Plan rule requiring on lot stormwater management through a water efficiency measure took effect from 2014 and was implemented from 2016. As a result, on-lot stormwater devices are now being recorded against the Building Consent. HCC now has over 1,500 recorded devices, mostly on residential properties. The device type can be mandated through catchment plans or must meet the District Plan rule, which is currently being updated through a plan change to propose 10mm retention for all residential properties. High risk or high contaminant sites are required to do more.

HCC identified the need for an on-lot auditing process to be developed to ensure that the intended water quality and quantity outcomes were realised over the lifecycle of these private assets as well as to provide assurance to Waikato Regional Council (WRC) that the assets are providing environmental protection in accordance with HCC's comprehensive stormwater discharge consent (CSDC) conditions. Further, future infill development across existing urban areas (intensification) may require widespread use of on-lot measures due to limited space in the public realm to manage stormwater from increased impervious surfaces. If this is the case the reliance on on-lot devices to provide robust water quality/quantity performance is likely to increase.

HCC and Morphum Environmental worked together to develop a city wide on-lot audit programme with robust data structure. This programme included:

- Update the process to record, assess and report on devices
- Spatially map devices
- On-lot audit schemas with specific requirements for each device type
- A pilot audit of an initial 63 properties
- A semi-automated system for results, follow up actions and reporting
- Engagement with property owners through calling cards and subsequent summary letters
- Development of educational brochures detailing how to resolve the typical issues.

The pilot audit was undertaken in mid-2022 over the course of three days and found:

- Valuable for assessors to have information on-hand while on site (i.e., as-built plans)
- A clear need to educate residents on what assets they have on their property and maintenance requirements.

- Devices constructed in-line with current design requirements were easy to inspect and were generally operating well.
- Raingardens had a much higher number of non-compliant assessments when compared to tanks and soakage devices that were able to be assessed. This highlighted the complexities associated rain gardens.

100 devices are being audited in April/May 2023.

KEYWORDS

Stormwater Management; on lot; Water sensitive design; WSD; audit; water quality

PRESENTER PROFILE

Andrea Phillips has worked at Hamilton City Council for 17 years. Her current role is in the strategic planning stormwater space, working towards Councils vision 'to improve the wellbeing of Hamiltonians', and the vision of Te Ture Whaimana '"A future where a healthy Waikato River sustains abundant life and prosperous communities who, in turn, are all responsible for restoring and protecting the health and wellbeing of the Waikato River, and all it embraces, for generations to come."

1 INTRODUCTION

On lot stormwater management devices have been required throughout Hamilton City Council (HCC) for decades. These were traditionally soakage devices but have evolved to other devices such as rainwater reuse, detention, bio-retention and permeable pavement solutions. Managing stormwater at source is an important part of the stormwater system, as growth drives increased impervious surfaces, which means existing networks and receiving environments cannot cope. Water Sensitive Design (WSD) promotes the management of stormwater runoff as close to source as possible. This provides for the retention and infiltration of stormwater throughout a catchment, and thereby reduces the potential for lower catchment stormwater effects. These outcomes need to be balanced with lifecycle costs and maintenance considerations including the ability for homeowners to undertake routine maintenance on devices within lots.

A District Plan rule requiring on lot stormwater management through a water efficiency measure took effect from 2014 (Operative in Part Hamilton District Plan 2014) and was implemented from 2016. On lot stormwater devices are being recorded against the Building Consent within the Property, Regulatory and Financial system, Authority. Details of device options are found within the 'Three Waters Management Practice Notes' on the Council website.

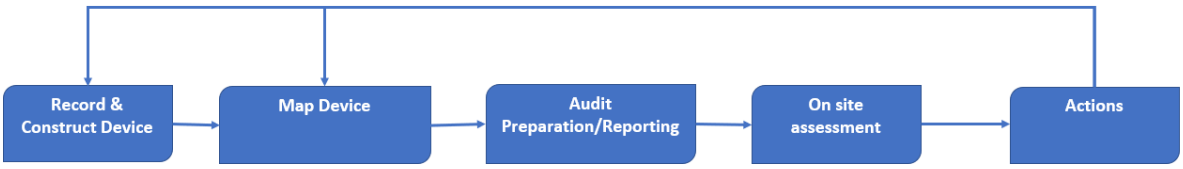
The on-lot auditing process is now being developed to ensure that the intended water quality and quantity outcomes are realised over the lifecycle of private assets and provide assurance to Waikato Regional Council (WRC) that these private assets are providing environmental protection in accordance with comprehensive stormwater discharge consent (CSDC) conditions. Further, future infill development across existing urban areas (intensification) may require widespread use of on lot measures due to limited space in the public realm to manage stormwater from increased impervious surfaces. If this is the case the reliance on on-lot devices to provide robust water quality/quantity performance is likely to increase.

2 AUDIT SETUP

The intent of the project was to create a process that provided sufficient confidence to WRC that the level of on-lot asset monitoring met their regulatory requirements, but also provides HCC with a process that doesn't look to replace Authority as the key location for compliance monitoring but aligns with it and ensures the outputs can be integrated back in if required.

A project team including members from HCC City Waters, 3 Wates Uni, Information Services, GIS, Planning Guidance and Building teams across Council and external consultants, Morphum Environmental, developed an on-lot stormwater device process. Figure 1 below, provides a high-level outline of the five key steps that now form the process, with brief details of each step provided below

Figure 1: Key steps in On-Lot Stormwater Management Devices



The below further explains the five key steps.

2.1 RECORD & CONSTRUCT DEVICE

HCC have developed a Stormwater Requirements GIS layer which details any specific on lot requirements at a catchment scale, usually informed through the development of Integrated Catchment Management Plans (ICMPs).

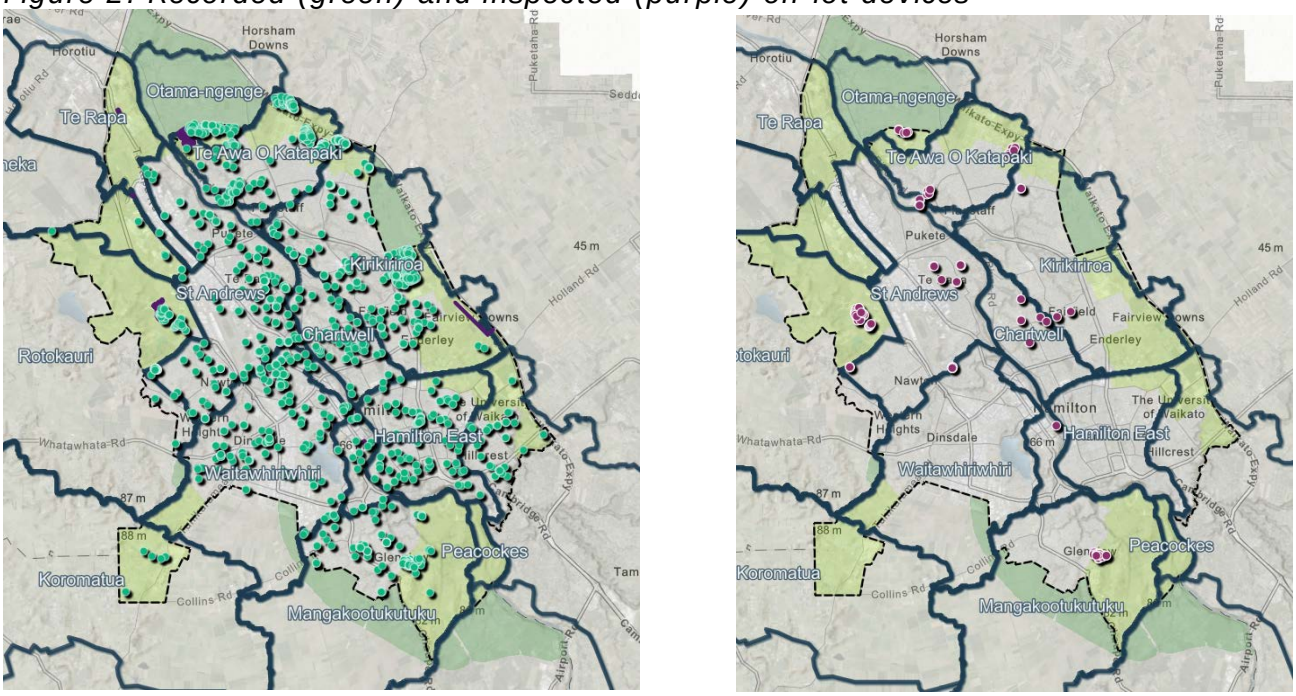
The existing Authority processes has remained in place, which includes HCC planners recording an Authority Stormwater Device checklist as new building consents are received.

2.2 MAP DEVICE

An on-lot asset GIS layer was created and became the current point-of-truth for the on-lot assessment process. This layer has been created based on asset data exported directly from Authority and maintains the Authority naming conventions and structures to ensure compatibility.

The data is made available to HCC staff through the internal Stormwater Masterplan viewer. All existing on-lot devices are represented by symbols for asset types, and colour coding to show the status of each asset (for example, due for annual inspection, due for recall inspection). Figure 2 below shows all recorded on-lot devices (green) and those that have been inspected (purple).

Figure 2: Recorded (green) and inspected (purple) on-lot devices



2.3 AUDIT PREPARATION/REPORTING

An annual list of properties to assess is prepared by taking a selection of the devices mapped out of Authority. The initial pilot study (see below) included a list of 70 assets, but a current assessment in April/May 2023 is targeting 100 properties to be assessed.

Selecting properties for each audit has focused on assessing clusters of assets within neighbourhoods to optimise travel time for assessors but can take other risk priorities or monitoring outcomes into account, as well any properties to be reassessed due to issues with access or remediation works having been requested.

Prior to undertaking the assessments, as-built plans are sourced from Council's Content Manager system, which provides any correspondence, reports and plans associated with each property. The as-built plans are used (where available) to pinpoint on the GIS map the exact (or expected) location of each asset within the property, along with any additional detailed provided such as size and asset type. All available information, including a copy of the as-built is made available to the field assessor through the Field Maps application, as detailed below.

The final step in the audit preparation process is to send an introduction letter to both residents and property owners (if different) to inform them of the assessment and give them the opportunity to respond with any access issues. This is also a required step through HCC's Stormwater Bylaw should this result in further action later on.

2.4 ON SITE ASSESSMENT

On site, auditors seek to gain access to each property on the assessment list and undertake the on-lot audit utilising Field Maps application, available on smart phones and tables. The audit forms utilise conditional formatting to allow the assessor to select the type of asset being assessed, and then only answer the relevant questions relating to it.

Assessed assets are categorised into one of the following groups:

- Compliant
- Minor non-compliance

- Non-compliant
- Not assessed.

Criteria for compliant, minor non-compliance and non-compliant are asset specific. Further details can be found below. Any asset that is unable to be assessed due to locked gates, buried asset etc are recorded as “Not Assessed”. Recommendations for rectification works based on issues identified by the assessor are communicated to the property owner and resident, as detailed in the section below.

All properties visited receive a calling card in the letterbox or direct to the resident (if home) informing the resident that the assessment is complete and providing contact details of any follow up questions.

2.5 ACTIONS

Upon completion of the audit, all the assessment data is run through a series of quality assurance checks, before being used to generate site specific letters to property owners and residents (if different). A combination of GIS processes and mail merges are used to generate the letters, which help to the recipient of the findings of the assessment including any recommended rectification tasks.

The site findings are also reflected in an on-lot GIS map, with inspection status, recall date (if applicable) or elevated action required recorded. HCC is currently exploring a suite of enforcement options with the aim to have clear enforcement outcomes that will include positive enforcement actions such as awarding consistent compliance through to court prosecution for repeated non-compliance.

3 PILOT STUDY

To test the process, a pilot audit of 63 devices was completed in mid-2022 over the course of three days. The intent of the first day of the pilot study was to test the process and make modifications prior to undertaking the remaining assessments.

3.1 PILOT STUDY RESULTS

Table 1 summarises the results of the audit:

Table 1: Summary results from 2022 Pilot Study Audit

Asset Type	Compliant	Minor non-compliance	Non-Compliant	Not Assessed	Total
Raingardens	7	10	5	0	22
Tanks	9			5	14
Soakage	3		1	23	27
Total					**63**

The following section relate specifically to the findings for each of the three different asset types assessed during the pilot assessment.

3.1.1 RAINGARDENS

Raingardens were the most complicated assets both from an assessment and a maintenance perspective.

In order for different assessors to consistently assess rain gardens across different auditing periods, a scoring criteria was developed based on the ten attributes assessed on site for each rain garden.

Using this scoring criteria, each rain garden was classified into one of the following categories:

- Compliant
- Minor non-compliance
- Non-compliant
- Not assessed

Examples of each of status are shown in figures 3-8 below from the pilot audit:

Compliant

Figure 3: Compliant rain garden with good vegetation

Figure 4: Compliant rain garden in concrete surround

Minor non-compliance

Figure 5: Rain garden with improved plant density required

Figure 6: Rain garden with improved plant density required

Non compliant

Figure 7: non-compliant raingarden with no vegetation

Figure 8: Non-compliant raingarden with no vegetation

It was particularly evident from the assessments, as well as discussions with residents, that there was limited understanding of the purpose and benefits of raingardens on private properties.

In order to assist with this, all standard issues identified for each asset were listed in individual letters sent to the residents, informing them of specific areas for improvement to their assets. Below are some examples:

Figure 9: Examples of raingarden issues identified and communicated to property owners

During our visit we found the following issues with the raingarden:

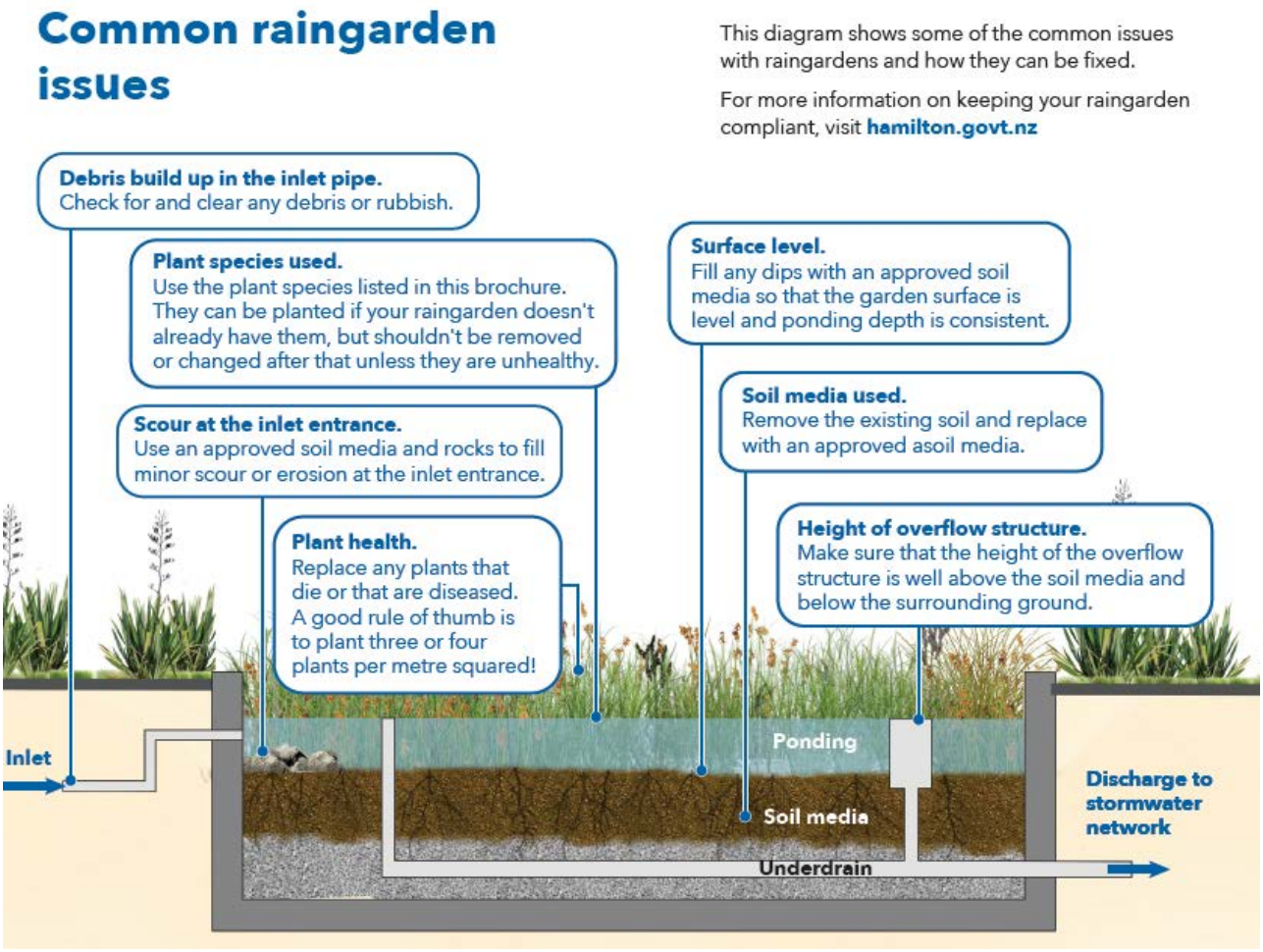
- Incorrect plant selection
- Not enough plants
- The media (soil) isn't level across the whole rain garden
- Wrong media has been used
- Height of the overflow is too low

During our visit we found the following issues with the raingarden:

- Not enough plants
- The media (soil) isn't level across the whole rain garden
- Height of the overflow is too low

This was then further supported by the educational brochures sent with the letters, which outlined how residents were able to rectify these issues. Figure 10 shows an extract from the raingarden educational brochure:

Figure 10: Example from the rain garden educational brochure



3.1.2 SOAKAGE

It was evident from the assessment that soakage assets installed prior to the recent updates to HCC Practice Notes were very difficult to find and/or access due largely to:

- Buried soakage devices with no easy inspection point; or
- Poor workmanship around manhole lids

Of the 23 soakage devices assessed, 17 (all in the same area) were able to be assessed due to the lack of access chambers for any of the assets. This was further reiterated by discussions with the residents who were present during the assessments, most of whom had no idea that there was a soakage device within their property.

These findings have been conveyed to HCC's building officers to reiterate the importance of ensuring access to all private assets is maintained. They will ensure the designs are in accordance with the practice notes at the time of approving consents.

3.1.3 RAINWATER TANKS

All rainwater tanks that were able to be assessed were found to be compliant. Where owners were present during the assessments, they were aware of the relevance of their tank and its function.

Tanks that couldn't be assessed were largely due to being buried and didn't have visible access points. As identified above with soakage assets, it is essential that all underground assets have a clear and maintained access point.

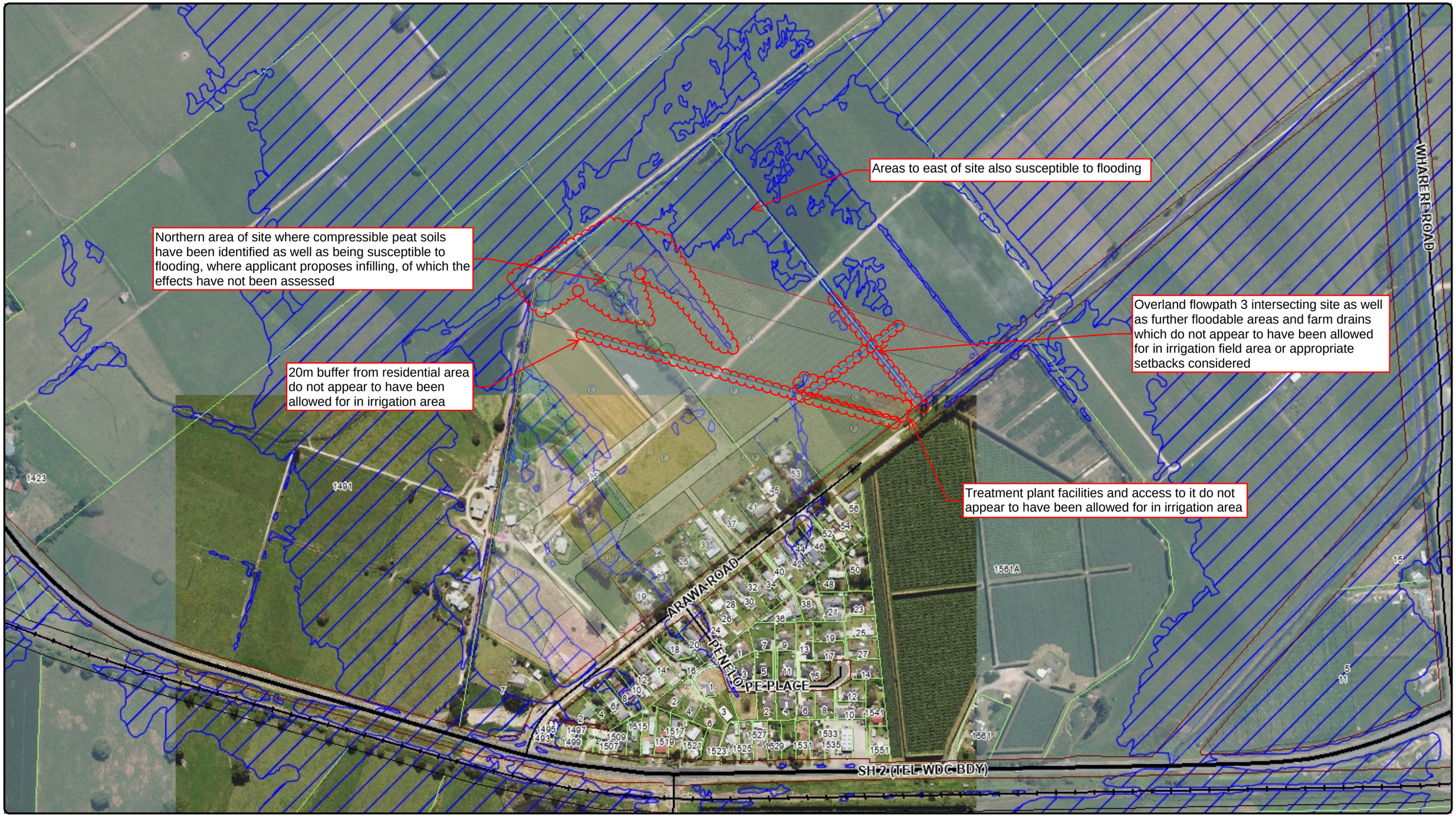
4 CONCLUSIONS

Overall process improvements that were identified from the pilot assessment included:

- It is more efficient to assess all on lot assets in a neighbourhood, than selecting individual assets spread across the city.
- It is important for assessors to have as much information as possible on-hand while on site (i.e. as-built plans) to assist in identifying and assessing assets efficiently.
- Based on discussions with residents and findings of the assessments, there is a clear need to keep educating residents on what assets they have on their property and what they should be doing to maintain them. As a result, the following key communication tools were developed through the course of the project:
    - *Initial letter to resident* - An introduction letter was developed, informing all affected residents and property owners that a site visit was to be undertaken, and provided contact details for any issues including access. Any feedback received from residents was then conveyed to field assessors through the data capture tool. This ensured they were aware of any access issues they were likely to experience on site (i.e. dogs, locked gates etc).
    - *Calling card* - A brief calling card was developed which included space for assessors to hand-write any key findings or discussion points from the assessment. Where residents were home, this was hand delivered and discussed at the time of the assessment. Where residents were out, the calling card was placed in the letterbox and included contact details for any follow up questions.
    - *Summary Letter* - As detailed above, property specific letters were sent to inform residents and property owners the findings of the assessment for their specific asset (raingarden, soakage or tank), any recommended tasks to be undertaken, and whether the assessor would be back to reassess the asset. The letter was generated through a combination of GIS processes and a mail merge. Each letter reflected the content of the Educational Pamphlets, as detailed below.
    - *Educational Pamphlets* - Three educational pamphlets (raingarden, soakage and tank) were created to provide simple instructions to residents on how to remediate their asset(s), if required, as well as details on recommended on-going maintenance. The pamphlets were designed to be read and understood by property owners, but also reflective of detailed content available to technical experts in HCC's three waters practice notes.

A subsequent audit of 100 assets is currently in process, at time of writing. Results from the audit, including any new recommendations will be included in the conference presentation.

Attachment “B”



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A3 Scale 1: 4,341
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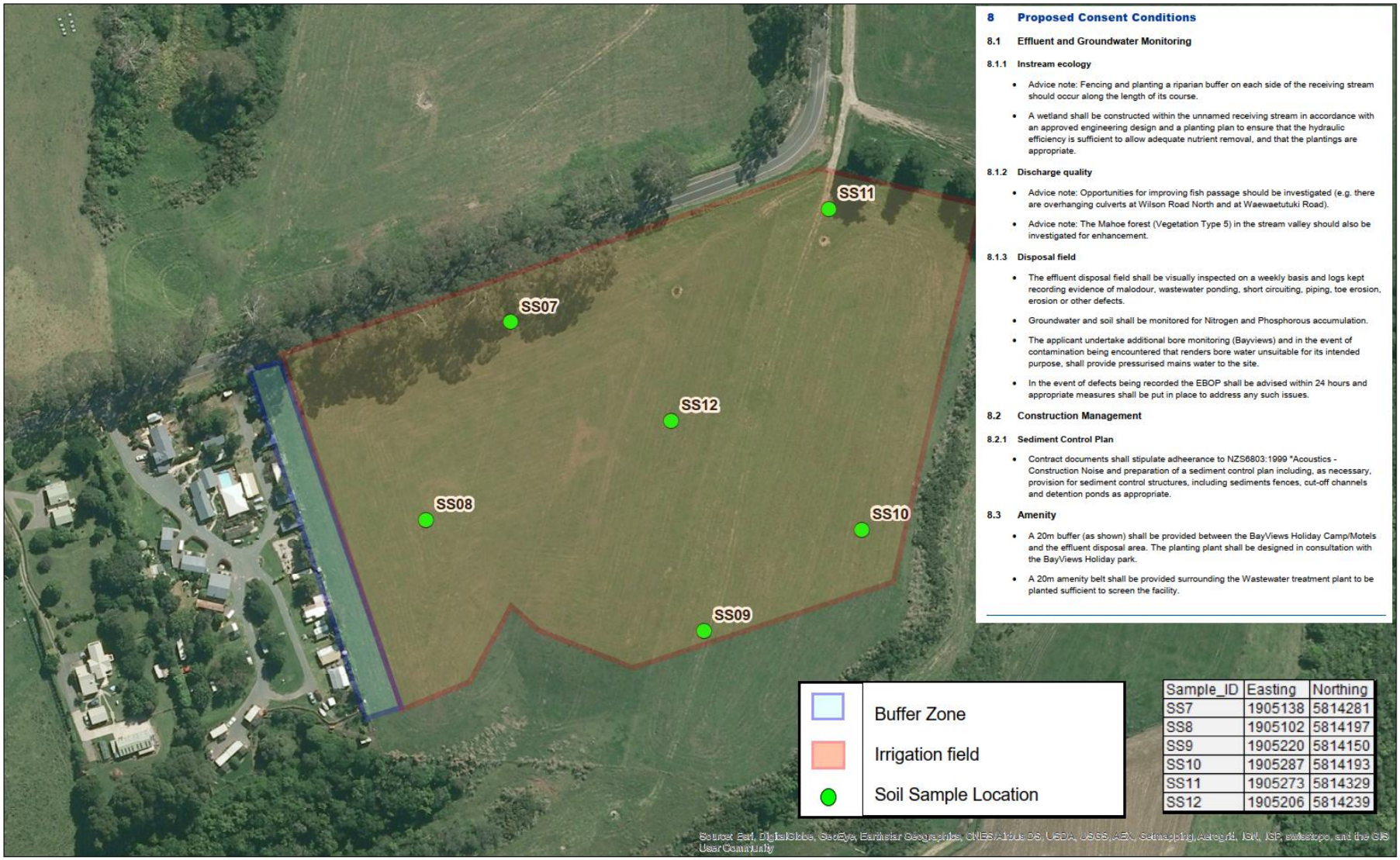
Western Bay of Plenty District Council | For our people

Attachment “C”



Sample_ID	Easting	Northing
SS7	1905138	5814281
SS8	1905102	5814197
SS9	1905220	5814150
SS10	1905287	5814193
SS11	1905273	5814329
SS12	1905206	5814239

8 Proposed Consent Conditions

8.1 Effluent and Groundwater Monitoring

8.1.1 Instream ecology

- Advice note: Fencing and planting a riparian buffer on each side of the receiving stream should occur along the length of its course.
- A wetland shall be constructed within the unnamed receiving stream in accordance with an approved engineering design and a planting plan to ensure that the hydraulic efficiency is sufficient to allow adequate nutrient removal, and that the plantings are appropriate.

8.1.2 Discharge quality

- Advice note: Opportunities for improving fish passage should be investigated (e.g. there are overhanging culverts at Wilson Road North and at Waewaetutuki Road).
- Advice note: The Mahoe forest (Vegetation Type 5) in the stream valley should also be investigated for enhancement.

8.1.3 Disposal field

- The effluent disposal field shall be visually inspected on a weekly basis and logs kept recording evidence of malodour, wastewater ponding, short circuiting, piping, toe erosion, erosion or other defects.
- Groundwater and soil shall be monitored for Nitrogen and Phosphorous accumulation.
- The applicant undertake additional bore monitoring (Bayviews) and in the event of contamination being encountered that renders bore water unsuitable for its intended purpose, shall provide pressurised mains water to the site.
- In the event of defects being recorded the EBOP shall be advised within 24 hours and appropriate measures shall be put in place to address any such issues.

8.2 Construction Management

8.2.1 Sediment Control Plan

- Contract documents shall stipulate adheerance to NZS6803:1999 *Acoustics - Construction Noise and preparation of a sediment control plan including, as necessary, provision for sediment control structures, including sediments fences, cut-off channels and detention ponds as appropriate.

8.3 Amenity

- A 20m buffer (as shown) shall be provided between the BayViews Holiday Camp/Motels and the effluent disposal area. The planting plant shall be designed in consultation with the BayViews Holiday park.
- A 20m amenity belt shall be provided surrounding the Wastewater treatment plant to be planted sufficient to screen the facility.

Map features depicted in terms of NZTM2 projection.

Data Sources:
Topographical/Road Features - LINZ NZ National Topo Dataset 2013.
Cadastral Boundaries - LINZ NZ Cadastral Dataset 2013.

Approved	AK	Date	4/05/2016
Designed	SG	Checked	AK
Drawn	SG		

AECOM

Client: WESTERN BAY OF PLENTY DISTRICT COUNCIL

Project: Maketu WWTP Compliance Monitoring

Title: Soil sample Locations

Scale: 1:1,500 (A3)

0 0.01 0.02 0.04 0.06 0.08 Km