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Date: 8th April 2021

The General Manager
Clarence Valley Council
Grafton, NSW, 2460

Submission to
DA 2020/0474 Extension of Woombah Woods Caravan Park

Introduction

The Clarence Environment Centre has had a long history of trying, unsuccessfully, to prevent Clarence Valley Council, and the former Maclean Shire Council, from approving the destruction of wildlife habitat on the Iluka peninsular. Koala habitat destruction in particular has been ongoing and virtually unchecked for over 30 years.

Commented [KN1]:

One of the most disappointing aspects over the years has been Council's acceptance of what we assert have been very poor environmental impact assessments and this latest is yet another of the same. However, in this instance, Council has taken their standards down to a whole new level, allowing the land to be cleared in 2019 under a 35-year-old approval by the former Maclean Shire Council, seemingly based, not on a legal opinion, but on a "town planning" opinion provided by a firm of planning consultants engaged by the proponent.

That opinion is reported on page 3 of the Donges REF as follows: *"**The owner then engaged Outline Planning Consultants Pty Ltd to provide a town planning opinion on the status of the various consents issued over the property, in particular the development footprint approved in 1984, and in respect of Council's advice of 18 September 2019. They concluded that the 1984 approved footprint as illustrated on Figure 2 of their report (reproduced at Appendix B of this report), still enjoyed valid development consent."***

We strongly believe that an independent legal opinion should have been sought, as surely there must be a 'sunset' clause for development application approvals, before becoming invalid, because 35 - 40 years is ridiculous

The Review of Environmental Factors (REF)

Almost 40 years after the only environmental impact assessment was undertaken (Note: we are assuming there was an environmental impact assessment, but were unable to find a copy.), it seems there is no longer any requirement to consider those impacts, as a word search of the REF failed to find key words like "flora, fauna, habitat, Koala, wildlife" etc.

As well, having allowed the land to be cleared under that ancient approval, concerns expressed in submissions opposing the development about koala habitat loss, for example, were answered as follows*: "Woombah is identified as a Koala Habitat Area in Council's Draft Koala Plan of Management. As there is no clearing proposed as part of this application and the development footprint generally occurs within the existing disturbed areas, it is unlikely that there will be any impact to the environment or conservation areas".* This, unfortunately, is typical of what we have become accustomed to in recent years, a develop at all costs approach which is driving koalas and other wildlife ever closer to extinction.

In short, now that the site has been partially cleared, a Review of Environmental Factors (REF) makes about as much sense as the park's name, Woombah Woods!

The pre-clearing image used in media reports might fit that name, but many of those trees have now been cleared, with the added explanation that the uncleared section that remains is still there, *"due to the presence of the existing* **(waste water)** *disposal system between trees. These* **(trees)** *will be removed when that system is decommissioned".* It seems clear that after the planned construction of the large number of homes is completed, there will be no room for 'woods', or wildlife.

A site appraisal by our ecologists on 9th April confirmed that a considerable number of trees have been bulldozed, and the entire area 'under-scrubbed'. However, a significant number of trees remain (see image below).

Bionet records show a number of threatened species occurring in very close proximity to the site, including Green-thighed Frog, Grey-crowned Babbler, Common Planigale, and of course Koala, but potential impact on those species hasn't been assessed by this DA. The site contains core Koala habitat, as described by SEPP 44, and there are still more than 10 koala feed trees, Grey Gum and Tallowwood, per hectare.

In fact, there is still habitat on site for all the above species, and the impact of removing it should, in our opinion, be fully assessed before approval is considered.

I suspect that Council will claim that a full fauna impact assessment was undertaken at the time of the historical approval close to 40 years ago. If so, we assert that simply isn't good enough. New threatened species listings have been added, and laws substantially changed in the interim.

The site is barely 3 hectares, and by the time the proposed 59 manufactured homes and community centre are completed, and with only an average 20m x 20m for each structure, there will be no room for trees. As a result, it would appear that there will be no future for those wildlife species that may still occur on the site.

Given the desperate need to retain native vegetation around the world to help slow the advance of global warming, the preference would be to dramatically reduce the number of structures, to enable the retention of all existing trees. Should the project be approved regardless, it is to be sincerely hoped that Council will insist on substantial off-setting to compensate for both the habitat that has been lost, as well as that which is still under threat.

We thank Council for this opportunity to comment. And hope our remarks result in some better outcomes for the biodiversity of the area.

Yours sincerely

John Edwards
Clarence Environment Centre

From: Clarence Valley Council
Sent: Fri, 23 Apr 2021 12:02:05 +1000
To: [redacted]
Subject: DA Submission - Development Applications advertised - Leonie Hill

Hi,

Thank you for your submission on Development Applications advertised via our online Development Application Submission form. Please find below the details of your submission for future reference:

Your Reference : S-2021-00088

Timestamp : Friday, April 23 2021 at 12:02:04 PM

Submission Details:
Item on public exhibition :
Development Applications advertised
Comments:

RE: **DA 2021/0184 ILUKA ROAD WOOMBAH**

I have been looking at this application and do not believe this development is complimentary with the village of Woombah. It is going to put great stress on already over stretched infastructure and services. Iluka Road/Middle Street has seen an increase in traffic which as resulted in several car crashes and increased wildlife deaths. The village of Woombah is a small rural village built on the edge of Bundjalung National Park and has a greater bush fire risk as seen by the bushfires of 2020. Building such housing and in such close proximity to each other will create a safety issue.Residents living near and around this development will be affected by noise of so many new residents and the smell of an onsite sewage treatment plant. Recent developments in the area require a wildlife corridor I have not seen this on this development and the developer has shown complete disregard to this, locals and the council by clearing the treees.I am not against development but do not believe this type of development is needed .We do need more afffordable housing but this is not appropriate. A more sympathetic devlopment to complement the rural atmosphere would be suitable

You have indicated you have not made a political donation or gift to a Clarence Valley Council employee o r councillor in the last 2 years.

P G Maslen
[redacted]
Gulmarrad. NSW. 2463
[redacted]

9th April 2021

Clarence Valley Council
Locked Bag 23
GRAFTON NSW 2460

Attention: Environment, Development & Strategic Planning Director

SUBJECT: DA2021/0184 - 54 ILUKA ROAD WOOMBAH SUBMISSION

Dear Sir,

This is a submission on application DA2021/0184 for Proposed manufactured housing. I oppose the application in its present form.

The council is to be complimented on ensuring the community can make submissions on this application although the period should be standard at 28 days. The community should be given the opportunity to have input to all information resulting from any council request for additional information or clarification of an application.

The proposal for 115 manufactured homes continues the destruction of the natural features of the site encouraged by council with its abrogation of responsibilities in permitting the uncontrolled expansion of the site resulting in prime kola habitat being destroyed. Expansion of use results as *death by 100 cuts* of valuable natural habitat which supported part of a viable koala population due to council's apparent inability to control development approval conditions. The application report depicts wooded area in west but not the case due to clearing and inability for council to enforce its draft koala management plan.

Existing Remnant Koala Food Trees

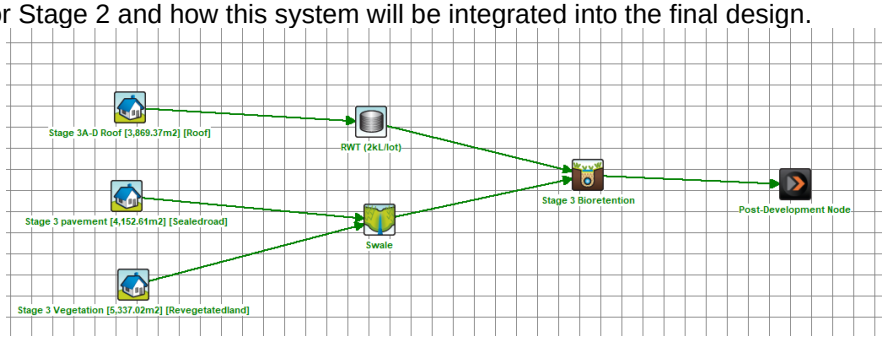
Council appears to have retrospectively approved expansion of the use under DA2017/0038 as well as dubiously permitting "lawful" clearing of koala habitat under DA83/464 contrary to koala management plan approved 2015 (still to be approved by the state). Koala habitat and food trees still exists on the property and if the council is serious regarding the implementation of its koala

management plan, it must protect the remaining habitat which is destined for removal by this proposal. All vegetation but for a token small area proposed as an ineffective buffer to the properties in the south, will be removed to cater for effluent disposal construction, resulting in a stark barren landscape for the overcrowded village lacking contemporary social planning features.

The proposal is a significant increase in developed area appearing to be an over development of site with a very cramped layout. There is no provision for parking/storage of vans and boats for residents. The nature of the proposal has a high probability of creating future social problems for the residents.

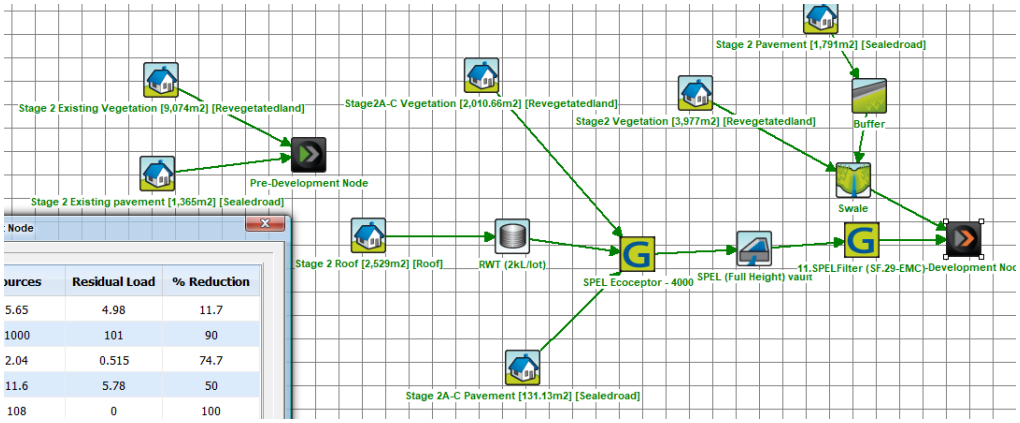
While the open space is stated as meeting the planning policy there is little practical open space available. The remnant wooded area on the other side of the effluent disposal area is not conducive to practical physical recreational. The 30m^2 per dwelling is token and is little more than provision for a small garden and not practical for any recreational purpose. While the pool area depicted in the stormwater report Figure 1 Site masterplan O'Donohue Hanna & Associates P/L 2020 may allow for some real recreation, the overall lack of recreation space will most likely result in residents having to leave their home base to achieve any real recreation.

The stormwater report is confusing with the schematic for Stage 2 showing Stage 3 sections with a Stage 3 bioretention system. This creates the question as to what the Stage 2 system will be, requiring clarification for Stage 2 and how this system will be integrated into the final design.



Stage 2 treatment train diagram

The Stage 3 schematic depicts a completely different system with no bioretention system implied for Stage 2 which infers this section of the complex has only a swale system prior to discharge to the receiving environment. The Drawing Number J1128_SK01 continues this confusion.



Stage 3 treatment train diagram

The Stage 3 main system appears comprehensive but needs to be verified by council. It is recommended that an electronic version of the applicants MUSIC model be obtained, to do this as it is known that input data may provide an apparently acceptable outcome which needs to be checked. The SPEL filter system will achieve good results if sized, operated and maintained correctly. In addition to general regular cleaning, the filter cartridges require replacement periodically to ensure the predicted performance is achieved continuously. Council should condition annual reports from an independent organisation such as SPEL or its local representative, to verify the appropriate maintenance of the system. If not cleaned appropriately as recommended by SPEL, the system will fail to produce the claimed outcome.

Although not completely clear from the application reports, the sewage treatment effluent disposal area is assumed to be in existing wooded area in west following removal of the remaining koala food trees shown in the above photograph. The capability of the clay soil to retain effluent is doubtful as the existing situation has waters seeping down the slope to the west toward the old Pacific Highway road. It is currently an issue as shown in the photograph below. While the existing situation follows an extended period of wet weather, there is doubt that the additional 40kL per day at the peak usage of the site will not result in unacceptable discharge from the site.

Existing seepage toward old Pacific Highway roadway

Waste management will need to be improved including the disposal of garden wastes and lawn mowing clippings. Currently the lawn clippings are dumped in the western verge. With the expansion of the site there will be less available space for this to occur. The submitted waste management plan does not address garden wastes and alternatives to the existing practice must be addressed in any approved conditions.

The classification of the bushland to the west as “rainforest” is interesting as it has negligible rainforest species and none of the features of rainforest which still burns given the appropriate conditions as was experienced in the 2019/20 fires. The area is unlikely to have any less potential for potential bushfire impacts than the wooded area to the north in normal high bushfire periods. The vegetation along the old Pacific Highway road is of no less potential bushfire risk than the remnant wooded vegetation to remain in the southwest corner of the site.

If council requests and receives additional information, I ask that I be given the opportunity to comment on that information prior to a council decision on the application.

It is requested that the above comments be seriously consider and that the application be refused at best or highly modified prior to any approval at worst.

Yours faithfully,

[redacted]

Peter G Maslen BE BSc

Carmen Landers

From: Clarence Valley Council <noreply@clarence.nsw.gov.au>
Sent: Thursday, 22 April 2021 6:51 AM
To: [redacted]
Subject: DA Submission - Development Applications advertised - Emma Mills
Attachments: IMG20200415073914.jpg; IMG20200410102423.jpg; Screenshot_2020-08-16-16-53-38-95.jpg; IMG20200118095337.jpg

Categories: Lucy

Hi,

Thank you for your submission on Development Applications advertised via our online Development Application Submission form. Please find below the details of your submission for future reference:

Your Reference : S-2021-00087

Timestamp : Thursday, April 22 2021 at 6:50:50 AM

Submission Details:
Item on public exhibition :
Development Applications advertised
Comments:

Da 2021/0184

This Da us for stage 2/3 both these stages require huge upgrades to all services at the park, loss of even more endangered birds / Koala habitat.. The total loss of our privacy and amenity to continue to live the lifestyle we bought where we did... We have an autistic son and his bedroom is at the front of the property which will now be lit 24/7 so his sleep routine will be disrupted. 13 c abins point out direction, the intense clearing required to sustain the extensive sewerage system upgrade and bushfire requirements would mean our property will be hotter in summer as these trees not only supply homes for kookaburras(nest) possums, gliders , and the many babblers that nest and call them home. I have tried to submit a document that really shows how much your descion will change my families lives but no words can portray the loss we are feeling. Have already endured... This Da places 13 lots facing our home... A road way to be lit... Sewerage soakage pits to drain towards our block... Not one benefit or even consideration given to our property value of lives. This DA is wrong for woombah . The services are not yet here to support a small city jammed into a large lot residential block and area!!! The intersection is a nightmare now add in at least 120 new cars there will be accidents... I know I am only one ... But this will be come a problem on going

for many ... CVC included... I will attach what we are loosing (our view.. our neighbours as it was... And storm water as it is now) we have concerns that with added waste water the ground quickly becomes sodden and lays on the top(already does) when it rains this grey water will run directly our direction(already does) under our home across our block in several areas... What measures are in place to protect us??? A DA should not cost its neighbour so much!!! What privacy screening will be put in place ??? What noise and light measures will be put in place.. why aren't the large lot residents adjacent getting compensation for the total loss of amenity they will most definitely suffer if this monstrous DA is approved (which I have no doubt it will ... And makes my submission pointless .. but none the less)... I don't want to live adjacent to a city in a tiny bush setting village.. I didn't buy that dream I bought a large lot private residence!!!.

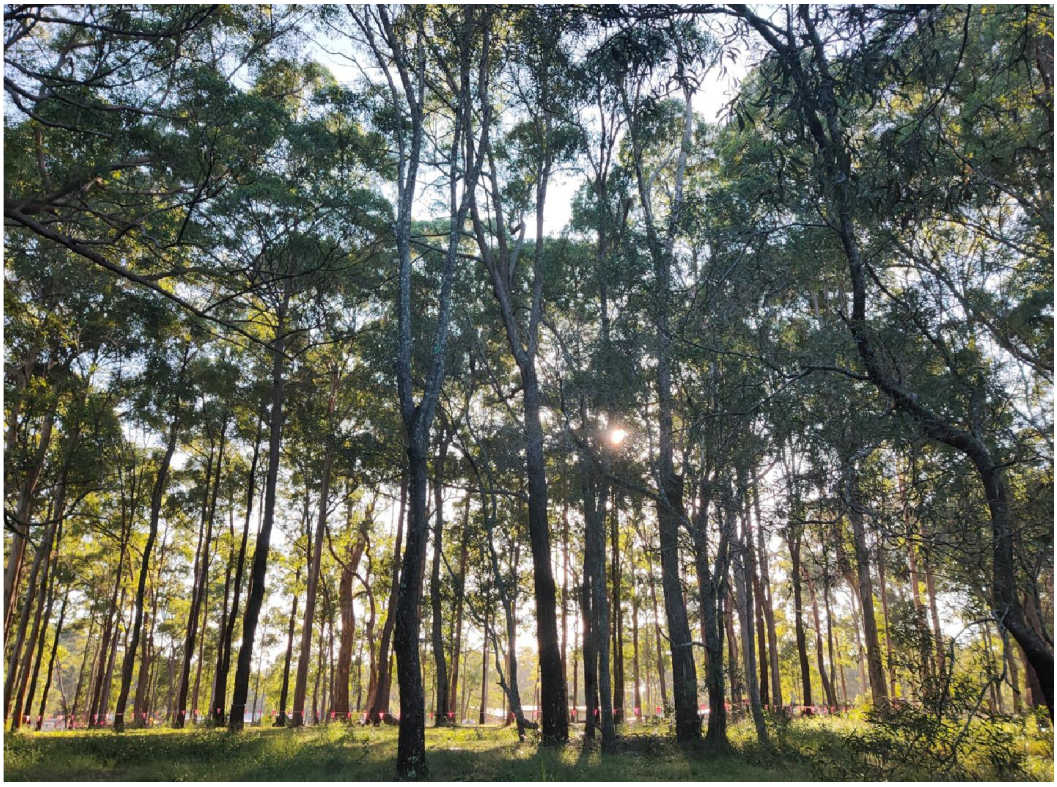
< p>Jason and Emma Mills

You have indicated you have not made a political donation or gift to a Clarence Valley Council employee or councillor in the last 2 years.

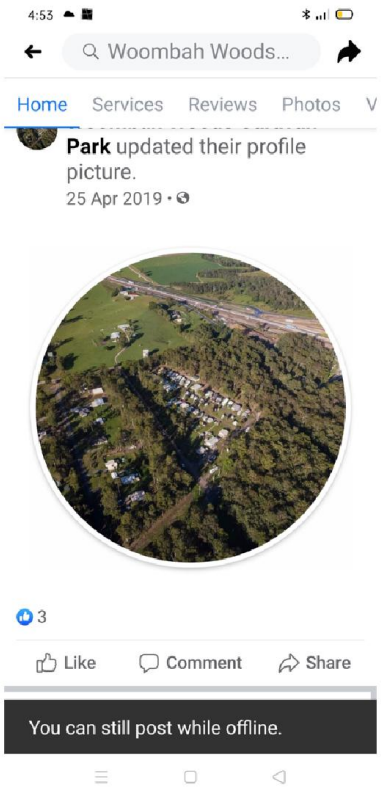
Contact details:
Name: Emma Mills
Email: [redacted]
Contact number: [redacted]
Address:
[redacted]

Additional supporting documents:
Additional supporting document-1 : IMG20200415073914.jpg
Additional supporting document-2 : IMG20200410102423.jpg
Additional supporting document-3 : Screenshot_2020-08-16-16-53-38-95.jpg
Additional supporting document-4 : IMG20200118095337.jpg

DA2021/0184 - Photos attached to Jason and Emma Mills Submission



DA2021/0184 - Photos attached to Jason and Emma Mills Submission



Carmen Landers

From: Kanora [redacted]
Sent: Wednesday, 16 June 2021 4:44 PM
To: Council Email
Subject: Re: Woombah Woods campground development

Categories: Ashleigh

To whom it may concern,

We have come to the awareness that the place currently known as 'Woombah Woods campgrounds' (located at 54 Iluka rd, Woombah) is being developed into an over 55's community.
We have been made aware that the developers are considering removing all of the trees on the property.

Can you confirm if these details are correct?

Yours faithfully

Kane

--
Please consider the environment before printing this email.

Stage 2 bioretention basin with 150m² filter media area. Shape, siting and dimensions subject to detailed design.

Existing pond to be decommissioned

Grass roadside swale

2kL min. capacity rainwater tank on each stage 2 lot

6.5kL min. capacity rainwater tank on each stage 3 lot

SPEL 4000 Ecoceptor and SPEL vault with 11 filter cartridges (all underground)

Grass roadside swale

STAGE 1 – LONG TERM SITES	57
STAGE 1 – CARETAKER SITE	1
STAGE 2 – LONG TERM SITES	38
STAGE 3 – LONG TERM SITES	19
TOTAL NUMBER OF PROPOSED SITES	115

NB. ALL MEASUREMENTS & AREAS ARE SUBJECT TO FINAL FIELD SURVEYS & MAY DEPEND UPON THE NATURAL & BUILT FEATURES OF THE LAND.

SITE 55 & 56 – DUPLEX SITE
SITE 76 – TRIPLE CABIN SITE

This is a Stage 2 ard 3 concept design only to demonstrate feasibility for DA purposes. All sizes, locations and depths to be confirmed as part of detailed design. Only stormwater infrastructure relating to Water Sensitive Urban Design (WSUD) is shown.

Stage 1 design subject to a separate application.

SITE PLAN
1:1000 @ A3

DIAL BEFORE YOU DIG www.1100.com.au

NOT FOR CONSTRUCTION

REV:	DESCRIPTION:	DATE:	DRAWN:	REVIEWED:	APPROVED:
A	**Concept WSUD layout**	**10/2/21**	**MK**		

APPROVED BY:
Michiel Kamphorst, MSc, BSc, RPEng, RPEQ, NER

Signed: Date:

Ingen Consulting Pty Ltd
ACN: 623 948 112
a: Alstonville, NSW
p: +614 1726 4987
e: michiel@ingenconsulting.com.au
w: www.ingenconsulting.com.au

CLIENT:
Horisen Lifestyle Communities
54 Iluka Road
Woombah NSW 2469

PROJECT:
Staged over 55's manufactured home estate at 54 Iluka Road in Woombah, NSW

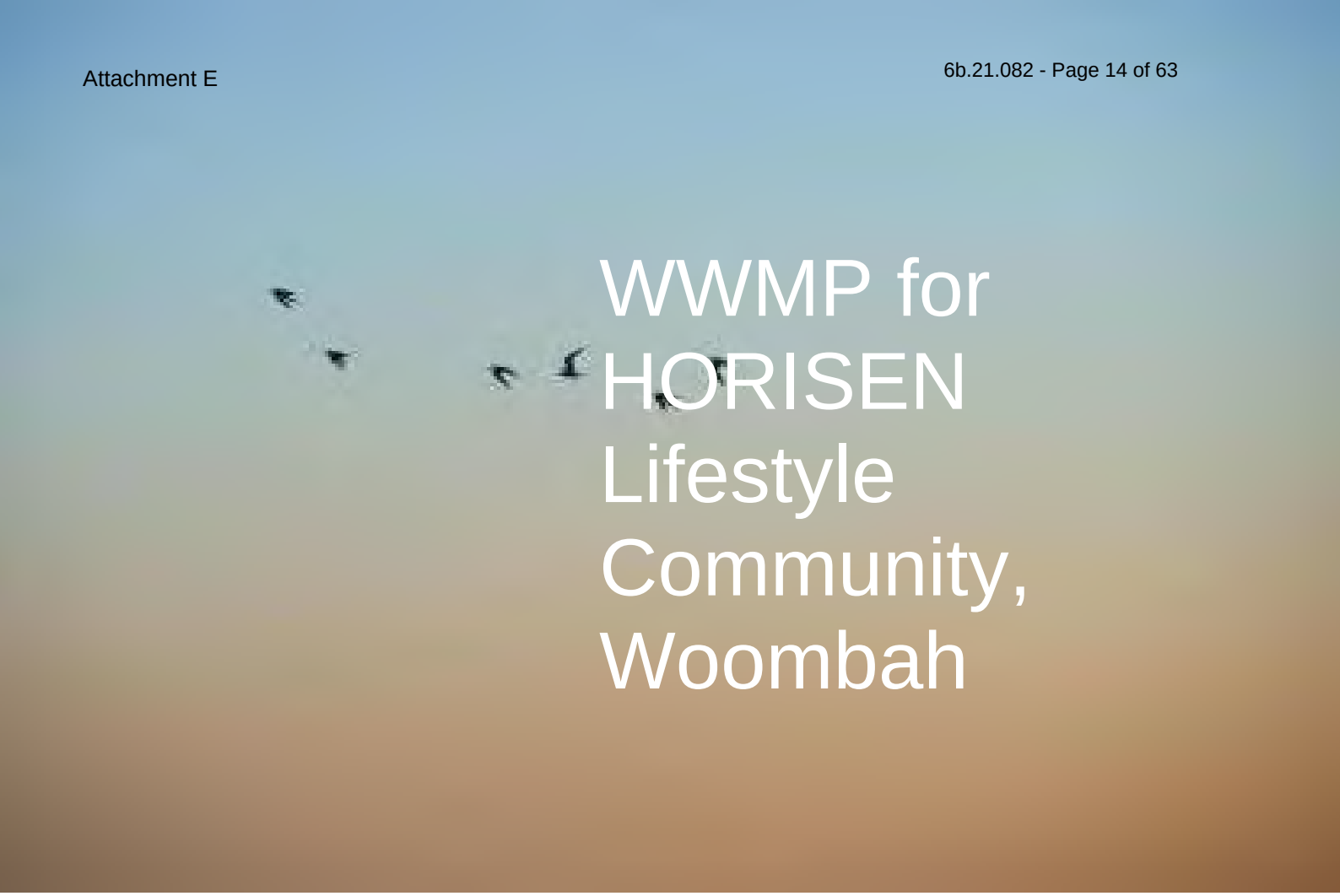
DRAWING TITLE:
Concept WSUD layout stages 2 and 3

PROJECT NUMBER: **J1128**

ORIGINAL SIZE: **A3**

DRAWING NUMBER: **J1128_SK01**

REVISION: **A**



WWMP for HORISEN Lifestyle Community, Woombah

5 January 2021

For: Coffs Harbour Plumbing: Stephen Simpson

Authored by: Strider Duerinckx

Ref	Ver	Date	Distribution
2021-107-02	A	23/12/20	CHP, Horisen
	b	5/1/21	CHP, Horisen

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1 Introduction

Earth Water Consulting Pty Limited (EWC) were engaged by Stephen Simpson to undertake a Wastewater Management Plan for the upgrades of the OSMS at 54 Iluka Road, Woombah (the 'Site'), as shown on Figure 1.

The purpose of the WWMP is to provide upgrade details for the damaged OSMS at the property, and additional OSMS components to service the expanded Horisen Lifestyle Community (HLC) development.

2 Proposed Development

Based on plans of the proposed redevelopment layout (Ref: O'Donohue Hanna & Associates, dated: 21/10/20), it is understood that the HLC is proposed to be reconfigured in 3 stages (Figure 2 and **Table 1**).

Table 1: Development Configuration

Stage	Lot Ids	No. of Lots	No. of Cabins
1	39-68, 71-97 + caretaker cabin	58	60 + caretaker
2	1-38	38	38
3	69-70, 98-114	19	19
Total		114 + caretaker	118
Lot 55 & 56 duplex cabin, and Lot 76 triple cabin			

2.1 Regulatory Environment

HLC services a population >10EP, beyond the scope of AS/NZS1547:2012 and DLG (1998) standards and guidelines, but <2,500EP and so less than licensing requirements covered by the NSW EPA under the POEO Act. As such, there are minimal guidelines and standards that cover the commercial on-site sewage management system (OSMS) operating at HLC.

Any wastewater treatment and land application system operating at the Site must still comply with the Local Government (General) Regulation 2005, specifically under Clause 44, whereby: "A system of sewage management must be operated in a manner that achieves the following performance standards:

(a) the prevention of the spread of disease by micro-organisms,

(b) the prevention of the spread of foul odours,

(c) the prevention of contamination of water,

(d) the prevention of degradation of soil and vegetation,

(e) the discouragement of insects and vermin,

(f) ensuring that persons do not come into contact with untreated sewage or effluent (whether treated or not) in their ordinary activities on the premises concerned,

(g) the minimisation of any adverse impacts on the amenity of the premises and surrounding lands, and

(h) if appropriate, provision for the re-use of resources (including nutrients, organic matter and water)".

And under Clause 45(3): "A sewage management facility used in the operation of the system must not discharge into any watercourse or onto any land other than its related effluent application area".

Department of Primary Industries: Office of Water (2015) guidelines "Recycled Water: Guidance Document: Recycled Water Management Systems", are guideline for assessing the risks of land application of treated wastewater that is generated during wastewater recycling schemes. These include treating wastewater at a Council STP then transporting offsite for managed public reuse of effluent as a resource say in garden, oval or golf course irrigation, toilet flushing, or cooling tower water in >10EP enterprises. As the effluent will generated, treated and land applied onsite in a dedicated field without any direct reuse applications, these guidelines do not apply.

As effluent generated on-site will not be irrigated, the DEC (2004) guidelines for *Use of Effluent by Irrigation* also do not directly apply, though they provide useful guidance on assessment and design of effluent application systems for non-domestic systems in NSW.

Given the lack of alternative guidance, the investigation and report presented herein has utilised a process of conservative site assessment derived from DLG (1998) and AS/NZS1547:2012 standards and guidelines, Council's On-site Sewage Management Strategy (2013) along with a risk assessment procedure derived from the DPI (2015) guideline.

3 Scope of Work

The study was undertaken by Strider Duerinckx of EWC. Fieldwork was undertaken on 16 January 2020 by others. The study methodology included:

- Review of previous collected data;
- Review of available recent park water meter and irrigation flow meter data; and
- Discussions with the Site manager to confirm modifications of the existing OSMS since the last audit;
- An assessment of site features including landform, slope, aspect, drainage, flooding and proximity to sensitive environmental issues; and;
- Estimating likely wastewater loads (quantity and quality) based om current records, applicable guidelines and standards;
- Identify an appropriate revised location and configuration for the Package Treatment Plant (PTP) and Effluent Management Area (EMA) and providing a concept design of this;
- Outlining any park operation, general land improvement works or mitigation measures required to address particular constraints in the EMA;

- Providing this Wastewater Management Plan report (WWMP) detailing performance criteria, site plans, and schematic designs of the treatment and application areas to enable signoff from relevant sections of Council.

4 Site Description

HLC is located along the southern side of Iluka Road, on the western edge of Woombah. The Site is Lot 61 in DP802939, at No.54, and is about 6.49ha in size (Figure 1). The HC was previously a caravan park, which slowly developed into permanent residential with some short term caravan locations.

The Site straddles a north-south ridgeline spur, off a dominant east wet ridgeline located along the southern boundary. Surface slopes are down to the northeast, north and northwest from the ridgeline location.

The Old Pacific Highway is located along the western boundary, the new highway route is further west.

Surface runoff from the existing and proposed land application area of wastewater would be Mororo Creek, about 409m to the west. Mororo Creek drains a further 900m south to Back Channel of the Clarence River.

5 Existing OSMS

5.1 Design OSMS

The OSMS was upgraded in 2017 based on a detailed upgrade design report by Australian Wetlands Consulting Pty Ltd (AWC). The design OSMS based on a 20kL/day wastewater generation was for:

- Ongoing treatment in the existing septic tanks and facultative pond; then
- Polishing in a 200m^2 reed bed consisting of 4 parallel 50m^2 pods; with
- Land application into a 6,667m^2 Subsurface Irrigation Field (SSI). The SSI field design included 10 zones over a 7500m2 footprint with 2 x 5 port indexing valves. The control shed housed the dual alternating irrigation pumps (Grundfos multistage variable hydro MPC-E CRIE5-5), control system including liquid chlorine dosing, pressure tank and 120um filter.

The actual installed configuration and location of tanks, reed beds and SSI field differs slightly to the design.

5.2 OSMS Inspection

The OSMS was inspected initially on 16 January 2020. At the time it was noted that the OSMS consisted of (Figure 3):

- A single larger 18kL concrete septic tank near the amenities block (T1);
- Then gravity flow through to a large facultative pond (2 phase) of about 600m^2 area in the northwestern corner of the Site (P1)
- A second smaller ~2.4kL concrete septic tank (T2) near the lower amenities and swimming pool that drains down to a concrete pumpwell (T3) before lifting back up to the pond;
- An ~2.4kL concrete septic tank (T4) near the office that drains to the pumpwell (T3);

- An ~9kL dump point tank and adjacent ~5kL hold tank (T5 and T6);
- A concrete lift well (T7) adjacent to the pond to dose an 203m^2 reed bed system (R1); and
- A concrete irrigation pumpwell (T8) that lifts treated effluent to the land application area of about 5,555m^2.

A number of sullage pickup points are present in the short term camping sites.

Photograph 1. Amenities septic tank (T1).

Photograph 2. Smaller swimming pool amenities septic tank (T2) (PW6).

Photograph 3. View of pumpwell (T3)

Photograph 4. View of sullage pickup location.

`Photograph 5. View of pond 1.

Photograph 6. View of dump point tanks T5 & T6.

Photograph 7. View of lift well T7 after pond.

Photograph 8. View of reed bed. Control shed on RH of photograph.

5.3 Existing Effluent Management Area

Effluent is pumped to an adjacent subsurface irrigation (SSI) field. The mapped extents of the SSI field are about 5,555m^2, but given its subsurface nature the exact dimensions and extents are uncertain and could be up to 7,500m^2. A number of indexing valves in irrigation boxes are located along the eastern margin, and a series of gate valves along the western for manual flushing control.

It is understood that during recent tree clearing works the majority of the SSI field has been destroyed. The final extents of working SSI field is uncertain as well as the ongoing operability of the distribution system. As such a replacement pressure dosed absorption bed field will be installed to repair the land application. At that time, a final audit of the SSI field will be undertaken to confirm if any portions are reusable, thereby minimizing the number of additional beds installed.

Photograph 9. View of indexing valve.

Photograph 10. View of SSI field amongst trees prior to their removal. Looking northwest. Reed bed is in the background.

Photograph 11. View of flush valves and vacuum release valves in irrigation boxes.

5.4 Existing Wastewater Quality

No current wastewater quality data is available for the Site. In general though it is expected that wastewater will have standard domestic characteristics.

6 Site Constraints Analysis

6.1 Site Constraints

Table 2 summarises the Site constraints for the upgraded Effluent Management Area (EMA (Figure 4). The constraints are discussed in terms of the degree of limitation they present (i.e. minor, moderate or major limitation) for on-site effluent application. Reference is made to the rating scale described in Table 4 of DLG (1998). Site features are presented in Figure 3.

Table 2: Site Constraints

Constraint	Degree of Limitation
Climate: The Site experiences a sub-tropical-temperate climate, typical of north-eastern NSW.	Minor
Landform: The proposed EMA is situated on a waxing planar crest and upper slope.	Minor
Vegetation: Coastal forest to west, grass at EMA.	Minor
Exposure: Good open exposure.	Minor
Slope: The proposed EMA has a slope of approximately 2-4% to the northwest.	Minor
Stormwater run-on and upslope seepage: The proposed EMA is located on the upper slope and crest with minimal runon.	Minor
Erosion Potential: The erosion potential is low given the slope.	Minor
Surface Waters: The nearest drainage line is Mororo Creek about 400m to the west.	Minor
Fill: None noted in the EMA.	Minor
Groundwater: (NSW Office of Water: Groundwater Bore Search) Groundwater was not encountered during the Site investigation and a groundwater bore search indicates no licensed bores are located within 500m of the Site. **Groundwater vulnerability?** Low given the location of the Site and distance to bores.	Minor

Constraint	Degree of Limitation
Flood Potential: The Site is located on an elevated position well above any flooding.	Minor
Rocks and Rock Outcrops: No surface outcrops were noted in the EMA and would not be expected	Minor
Available Effluent Application Area The lot has sufficient area available for the application of effluent. A reserve EMA is not available	Moderate

6.2 Soil Survey and Description

6.2.1 Soil Landscape

The Site is mapped as being underlain by the New Italy Soil Landscape. This soil type is located on undulating rises and low hills overlying the Walloon Coal Measures.

Soils are moderately deep (1m-1.5m) imperfectly drained grey or yellow kurosols. These are strongly acid and hardsetting soils that can be dispersive.

6.2.2 Site Soils

The soils across the Site were observed by drilling of two boreholes by AWC (Figure 4), and four boreholes by Whitehead & Associates (WA). Borehole logs are included in Appendix A. The soils typically comprised:

- Approximately 200-300mm of clay loam, dark brown, dry; overlying
- Approximately 700-800mm of greyish red, light clay, with orange and grey mottles increasing with depth well structured.

Bedrock or groundwater was not encountered in any of the boreholes drilled to 1-1.2m depth.

The key soil physical constraints are summarised Table 3. Reference is made to the rating scale described in Table 6 of DLG (1998).

Table 3: Soil Physical Constraints

Constraint	Degree of Limitation
Soil Depth: The boreholes were drilled to 1.2m depth. Bedrock was not encountered or expected.	Minor
Depth to watertable: The depth of the vadose zone (i.e. non-saturated soil material above watertable) is greater than 1.2m. Based on ground surface height, regional groundwater is expected below 15m depth.	Minor

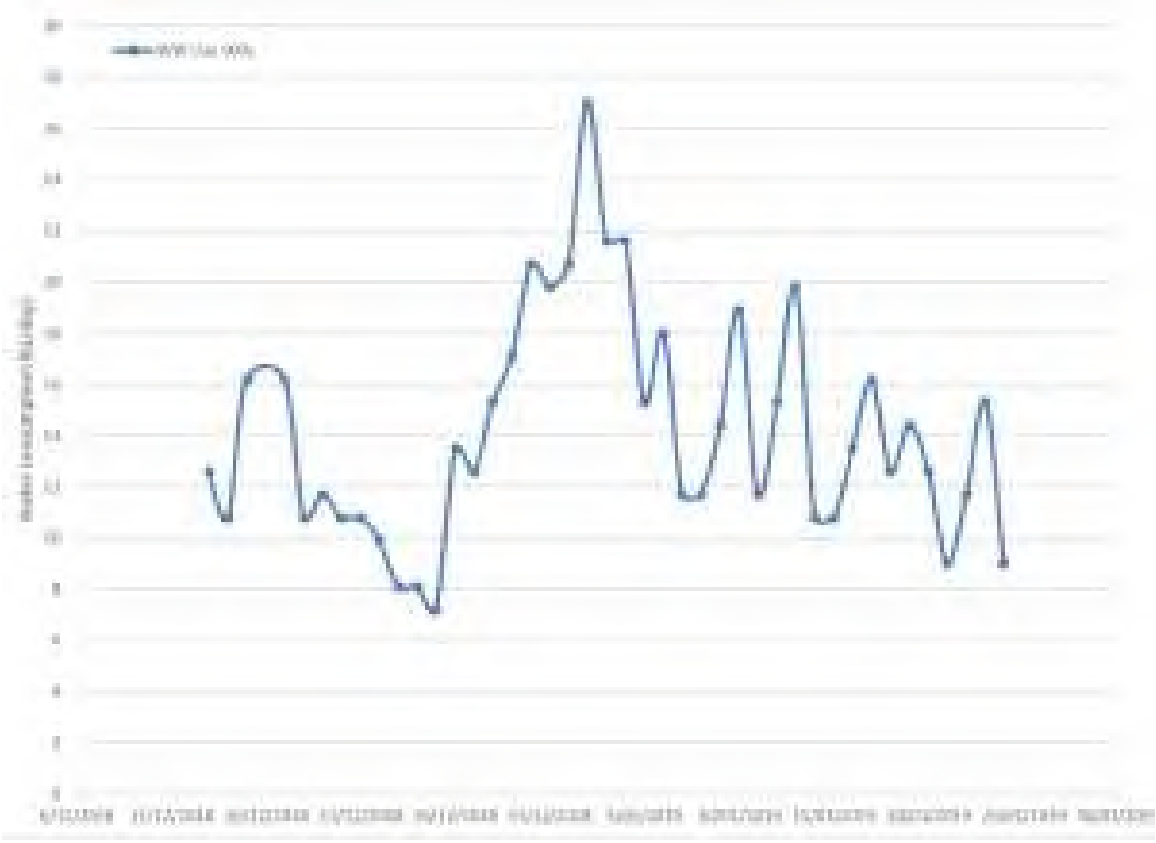
Coarse Fragments (%): No fill and up to 40% fine grained ironstone in the topsoil. This is not a limitation.	Minor
Soil Permeability and Design Loading Rates: Soil permeability was not directly measured but inferred from soil texture analysis. For a Category 5a well structured light clay soil, AS/NZS1547:2012 indicates that would have a Design Loading Rate (DLR) of between 8-12mm/day depending on effluent treatment standard.	Moderate

7 Wastewater Generation

7.1 Existing Wastewater Generation

Given changes in occupancy and park management recently, and that the pond and reed beds receive additional rainfall input, recent water meter and irrigation meter data was not considered reliable nor provided to EWC.

Previously obtained data from Dec 2018- Jan 2019 was compiled and reviewed. Allowing for 10% usage in garden watering, car washing, leakage etc, daily water consumption and inferred wastewater production for HLC ranged from 7-27kL/day with an average 15.1kL/day



Graph 1: Manual water meter readings over peak 2018-2019.

It must be noted that this is form peak holidays when HLC was operating more as a caravan park, than permanent living. Permanent living is expected to have more uniform wastewater production and at slightly lower rates given the lower per person occupancy at lots.

7.2 Future Wastewater Generation

Maleleuca Group undertook a review of water consumption and wastewater production for Stage 1 of the proposed development (2020). This review concluded that:

- Wastewater production of 130-133L/p/day (= 1 manufactured home EP) is expected for Stages 1-3;
- A 1 bedroom manufactured home dwelling would be expected to have an occupancy of 1.2person,s and a 2 bedroom 1.8 persons.

AS/NZS1547:2012 allows for wastewater generation of 130L/p/day for campgrounds on reticulated water supply (including sullage), and 150L/day for standard residential. Based on this, the adopted-1150L/p/day is considered reasonable and conservative. The modelled wastewater generation rates predicted for HLC in Stages 1 through 3 are provided in Table 4.

Table 4: Predicted Wastewater Generation

Site Facility	Typical Wastewater Allowance (L/p/day)	No. of Sites	Wastewater Generation per Lot (L/day)	Total Wastewater Generation (kL/day)
Stage 1				
Site Manager's Residence	150	1	300	0.3
1 bedroom	150	13	180	2.3
2 bedroom	150	47	270	12.7
Sub-Total				15.3
Stage 2				
2 bedroom	150	38	270	10.3
Stage 3				
2 bedroom	150	19	270	5.1
Total Wastewater Generation				**30.7**
Based on 1 bedroom manufactured home dwelling 0.5ET, and 2 bedroom 0.75ET, where 1ET = 2.4EP, and 150L/EP/day.				

8 Recommended Wastewater Management System

8.1 OSMS System Options

A number of improved wastewater management options have been assessed for the Site and are presented in Table 5.

Table 5: Wastewater Options

Option	Description	Pros	Cons
1	Retain pond - reed bed and SSI OSMS and expand to	Reuse of existing infrastructure.	SSI has been damaged already and repair could be problematic.

Option	Description	Pros	Cons
	suit additional wastewater flows.	Low irrigation rate applied over a large footprint.	The existing OSMS combination requires a very large footprint which is unavailable.
2	Install a package treatment plant to treat to a secondary level with disinfection, and reconstruction of the SSI field to 10,100m^2 to meet hydraulic requirements.	Reduced treatment footprint means that the SSI field can be expanded.	SSI has been damaged already and repair could be problematic. The upgraded SSI field would be too large for the available area without further tree clearing or increasing the DIR. Increasing DIR could lead to surface expression given clay soils.
3	Install a package treatment plant to treat to a secondary level with disinfection, and construction of a 2417m^2 EMA consisting of pressure dosed absorption beds	Reduced treatment footprint means that the EMA field can be expanded. Beds are robust with good wet weather storage, and relatively small footprint.	Cost of installation.

Installation of pressure dosed absorption beds (Option 3) and a new PTP was considered the best of the options. The PTP will not suffer from rainfall additional wastewater loading, and will be serviced quarterly to ensure operation. Absorption beds:

- Will be robust and simple to maintain;
- Use of an arch style construction would limit the requirement of expensive gravel importation;
- There is almost no risk of human contact;
- There is limited risk of surface runoff; and
- Wet weather storage ins improved with problematic rain sensors.

This preferred option is suggested as it creates multiple barriers to reduce the environmental and public health risk from on-site effluent land application. As the beds would be hydraulically sized (but not nutrient sized) some nutrient export would still be expected. Further details are provided in the following sections.

8.2 Treated Effluent Quality

It is recommended to install a secondary treatment system. The design calculations have assumed the following effluent discharge parameters (Table 6).

Table 6: Effluent Quality

Quality	Units	Expected Influent Value	Expected Effluent Quality
BOD	mg/L	200-400	<45
TSS	mg/L	200-300	<30
Faecal coliforms	cfu/100ml	10,000,000	<30
Total N concentration	mg/L	20-100	40
Total P concentration	mg/L	10-25	10

8.3 Upgraded Wastewater Collection

As part of the HLC redevelopment, all interim septic tanks and pumpwells will be removed and the wastewater collection will operate on a purely gravity flow. This will improve maintenance as no forgotten septics to pump out or stormwater ingress weakness locations.

8.4 Upgraded Wastewater Treatment System

It is proposed to retain the existing pond and reed bed configuration in Stage 1, but install a treatment system for 40kL in Stage 2.

Engineering design of a wastewater treatment system is beyond the scope of this WWMP. Graf (Germany) have undertaken process engineering on behalf of Coffs Harbour Plumbing. The schematic layout and engineering calculations for a modular concrete tank Graf SBR system capable of treating 40kL/day are present in Appendix B.

Disinfection would include chlorine disinfection via liquid storage and peristaltic pump dosing into the contact chamber.

8.5 Upgraded Land Application Area

It is proposed to upgrade the existing EMA to meet hydraulic load sizing requirements by the construction of a new pressure dosed arch absorption bed field. A conceptual location and layout of the upgraded absorption field is presented in Figure 5.

For Stage 1 where possible the existing SSI field will be retained and supplemented by additional pressure dosed beds. This will be subject to a final audit and inspection. It may be that the SSI field is deemed irreparable and will be fully replaced.

8.5.1 Land Application Sizing

Water balance modelling was undertaken to determine sustainable effluent application rates, and from this estimate the necessary size of the EMA required for effluent to be applied from a secondary treatment system to absorption beds. The procedures used the CVC model, adjusted for the site-specific flow rates, and AS/NZS1547:2012 DLR.

The input data for modelling are presented in Table 7, and calculation sheets in Appendix C.

Table 7: Data Used in Modelling

Data Parameter	Units	Value	Comments
Hydraulic Load	kL/day	15.3-30.7	Average monthly flows utilised for land application calculations.
Soil info	Woombah Clay		
Depth to water table	m	5	Based on local conditions
Depth to bedrock	m	2	Based on local conditions
Treatment system	unitless	AWTS	20% nitrogen removal
LAA	unitless	Absorption beds	
Design Loading Rate (DLR)	mm/day	12	AS/NZS1547:2012 recommended rate, based on clay subsoils and secondary treated effluent.

Though the CVC model undertakes a nutrient balance, the absorption bed basal areas were based on hydraulics only. This is in accordance with AS/NZS1547:2012 which requires only hydraulic loading to be considered. The Site is located well away from any sensitive receptors, and nutrient loading is not considered significant.

The results of modelling for required absorption beds in each stage are presented in **Table 8**. A reserve EMA has been allocated for partial bed replacement in case of future operational issues.

Table 8: Staged EMA Construction

Stage	Type of Field	Basal Area	No. of Beds	Bed Dimensions
Stage 1	SSI & Beds	1208m^2	18	28m x 2.4m
Stage 2	Beds	2009m^2	30	28m x 2.4m
Stage 3	Beds	2417m^2	36	28m x2.4m
Reserve (all stages)	Beds	3520m^2	Available	

8.5.2 Pressure Dosed Absorption Bed Construction

The new pressure dosed arch absorption beds will be constructed in accordance with the schematic presented in Figure 6. It is recommended that:

- By Stage 3 thirty-six (36) new pressure dosed beds of 2.4m width, 28m length and 0.6m depth will be constructed;
- Each bed will have two distribution tunnels with gravel beside and over;
- The beds will be sequentially fed by a master 6 port indexing valve and 6 slave 6 port indexing valves, and distribution within each bed by a gate valve.

The application system should be installed by a plumber experienced in wastewater ensuring that effluent is evenly distributed across the entire area serviced.

9 Buffers

Buffer distances from the EMA are required to minimise risk to public health, maintain public amenity and protect sensitive environments. Any OSMS must be shown to pose a negligible pathogen risk to the contamination of surface and groundwaters.

Environmental buffers for absorption beds (disinfected secondary treated effluent) based on NSW DLG (1998) have been adopted and are:

- 40 metres from intermittent watercourses and dams;
- 100 metres from permanent waterways;
- 250 metres from a domestic groundwater bore;
- 6 metres from downslope property boundaries and buildings;
- 3 metres from upslope property boundaries and buildings; and
- 1.5m to driveways as adopted from Table R1 of AS/NZS1547:2012 for low risk application.

The recommended pressure dosed bed in Figure 5 meets the buffer requirements.

10 Monitoring and Review

In accordance with DEC (2004) and DPI (2015), regular monitoring and review is an important aspect of any OSMS. **Table 9** below presents the recommended minimum monitoring regime for the Site to provide assurance of continued operation.

Table 9: Monitoring Regime

Item	Description	Timing	Responsibility
OSMS	Preparation of an Operation & Monitoring Plan (O&M Plan) that includes details of the installed system,	With installation	Contractor or Manufacturer.

Item	Description	Timing	Responsibility
	maintenance and monitoring schedule, failure indicators and emergency contact phone numbers.		
Treatment Plant	The treatment tanks will collect inorganic solids and settleable sludges that pass through the treatment system. Dosing lines, pumps and air blowers are susceptible to clogging and wear/tear.	Annual inspection of the PTP for sludge and scum levels. Desludging as required. Quarterly inspection and maintenance or as per manufacturer's requirements.	Scheduled contractor. Scheduled contractor.
Irrigation tank	The irrigation tank will collect fine inorganic solids and settleable sludges that pass through the treatment system. The irrigation pump is susceptible to clogging and wear/tear.	Annul inspection of chamber to assess sludge levels and pump-out biosolids as required. The pump will require inspection and maintenance as per manufacturer's requirements.	Scheduled contractor. Scheduled contractor.
Effluent quality and quantity	To ensure that effluent quality meets the parameters as specified previously, regular water quality monitoring will be required. Flow meter installed on the irrigation line.	Quarterly in first year as the system stabilizes then annually. Faecal coliforms, BOD, TSS and residual chlorine. Quarterly recording of water meter.	Scheduled contractor or consultant. Scheduled contractor or consultant.
Absorption Field	The bed may be susceptible to failure if overloaded, or during heavy rain events. The application area requires a good vegetative cover that is well maintained.	Annual inspections. Mowing to maintain suitable vegetative cover and for vegetative removal	Scheduled contractor. Park staff.

Item	Description	Timing	Responsibility
	Pressure lines may clog with fine sediment and biofilm.	in winter and summer months Quarterly inspection and at least annual flushing of lines.	Scheduled contractor.

11 Conclusion

The existing OSMS at HLC is in need of an upgrade, with failure of the SSI field due to vehicular traffic. As part of the redevelopment of the Site, staged upgrade of the OSMS is recommended including:

- In Stage 1 retention of the existing septic tanks, pumpwells and pond-reed bed treatment system, but upgrade of the EMA with the installation of up to 18 new absorption beds;
- In Stage 2 decommissioning of all older septic tanks and pumpwells, and installation of a new PTP capable of treating 40kL/day;
- In Stage 2 installation of an additional 12 absorption beds; and
- In Stage 3 installation of an additional 6 absorption beds.

Further calculations are required to confirm the irrigation pump requirements, plus drawings of gravity sewer alignments for each stage of development. It is expected that this would be undertaken by the suppliers as part of tendering and commissioning.

12 References

Australian Wetland Consulting (2016) *Woombah Woods Caravan Park, On-Site Sewage Management Strategy*. Project 1-16795_1b, dated 13/1/2017, Rev C.

Clarence Valley Council (2013) *On-Site Wastewater Management Strategy*

Department of Environment & Conservation (2004). *Use of Effluent by Irrigation*.

Department of Local Government *et al.* (1998). *Environment & Health Protection Guidelines: On-site Sewage Management for Single Households.*

Department of Primary Industries: NSW Office of Water (2015) *Recycled Water: Guidance Document: Recycled Water Management Systems*.

Melaleuca Group Pty Ltd (2020) *On-Site Wastewater Management for Stage 1 of proposed redevelopment of Woombah Woods Caravan Park (Lot 61 DP802939, 54 Iluka Road, Woombah, NSW, 24769)*. Dated 24 September 2020.

Standards Australia / Standards New Zealand (2012). AS/NZS 1547:20120 *On-site Domestic-wastewater Management. SAI Global.*

FIGURES

0 160 240 320

Horizontal Scale (metres) 1:8000

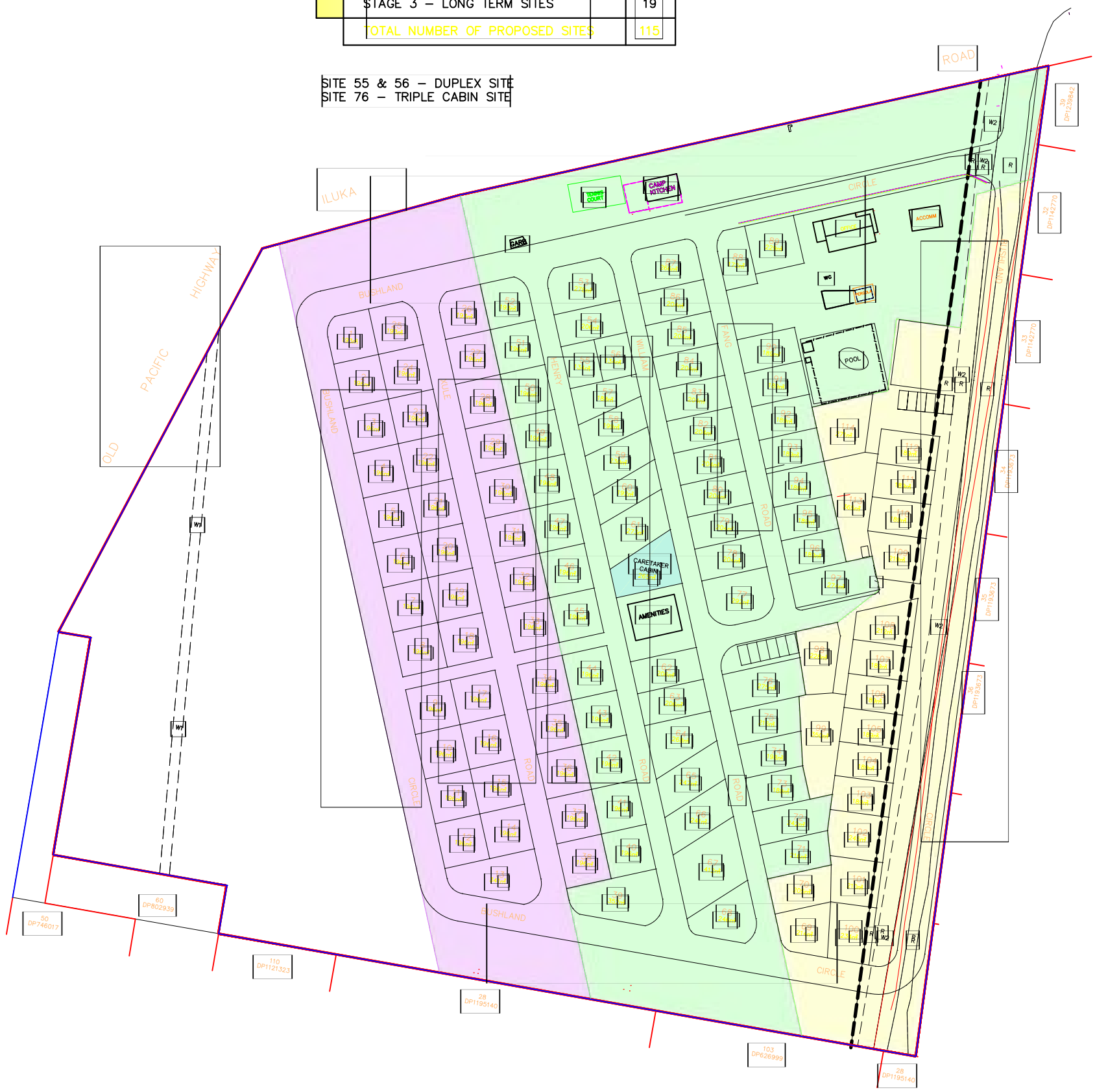
LEGEND

- Property Boundary
- Contour (10m)
- Drainage Alignment
- Proposed Building

TITLE: Site Location	PROJECT: WWMP for Horisen Lifestyle Community, 54 Iluka Rd	CLIENT: Coffs Harbour Plumbing			
FIGURE: Figure 1					
SHEET: 1 OF 1	ISSUE: A	AUTHOR: SD	DATE: 22/12/20	SCALE: 1:8000	PROJECT: 2021-107

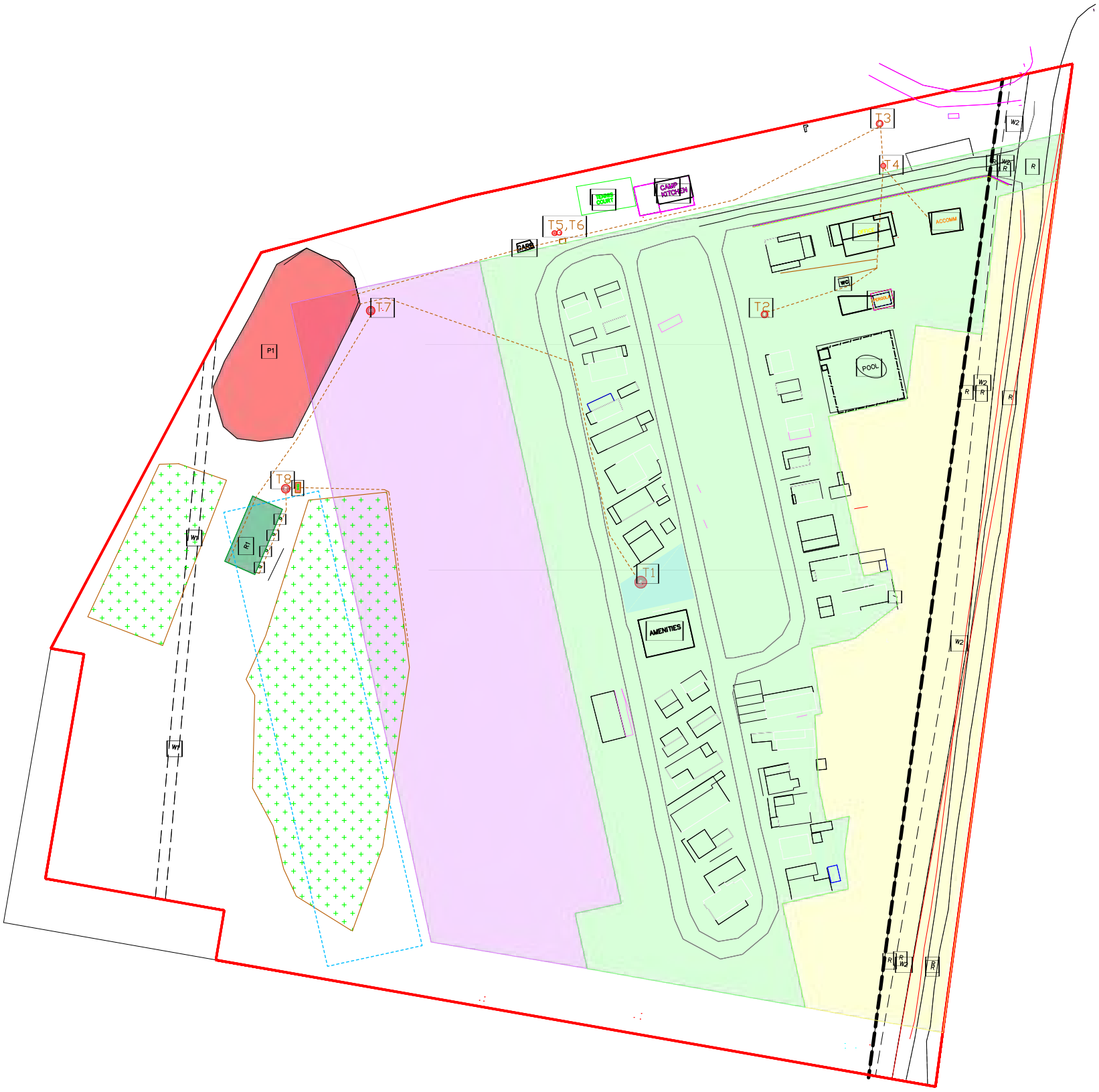
	STAGE 1 – LONG TERM SITES	57
	STAGE 1 – CARETAKER SITE	1
	STAGE 2 – LONG TERM SITES	38
	STAGE 3 – LONG TERM SITES	19
	TOTAL NUMBER OF PROPOSED SITES	115

SITE 55 & 56 – DUPLEX SITE
SITE 76 – TRIPLE CABIN SITE



0 30 45 60
Horizontal Scale (metres) 1:1500

TITLE: Proposed Development Layout			FIGURE: Figure 2
			SHEET: 1 OF 1 / ISSUE: A
PROJECT: WWMP for Horisen Lifestyle Community, 54 Iluka Road			CLIENT: Coffs Harbour Plumbing
AUTHOR: SD	DATE: 22/12/20	SCALE: 1:1500	PROJECT: 2021–107



0 30 45 60

Horizontal Scale (metres) 1:1500

LEGEND

- Property Boundary
- Drainage Alignment
- Stage 1 Development
- Stage 2 Development
- Stage 3 Development
- Existing Tank
- Existing Pond
- Existing Reed Bed
- Approximate sewer Line
- Existing SSI Field
- Recommended EMA

TITLE: Existing OSMS Layout	FIGURE: Figure 3	
	SHEET: 1 OF 1	ISSUE: B
PROJECT: WWMP for Horisen Lifestyle Community, 54 Iluka Road	CLIENT: Coffs Harbour Plumbing	
AUTHOR: SD	DATE: 5/1/21	SCALE: 1:1500
		PROJECT: 2021-107

0 30 45 60

Horizontal Scale (metres) 1:1500

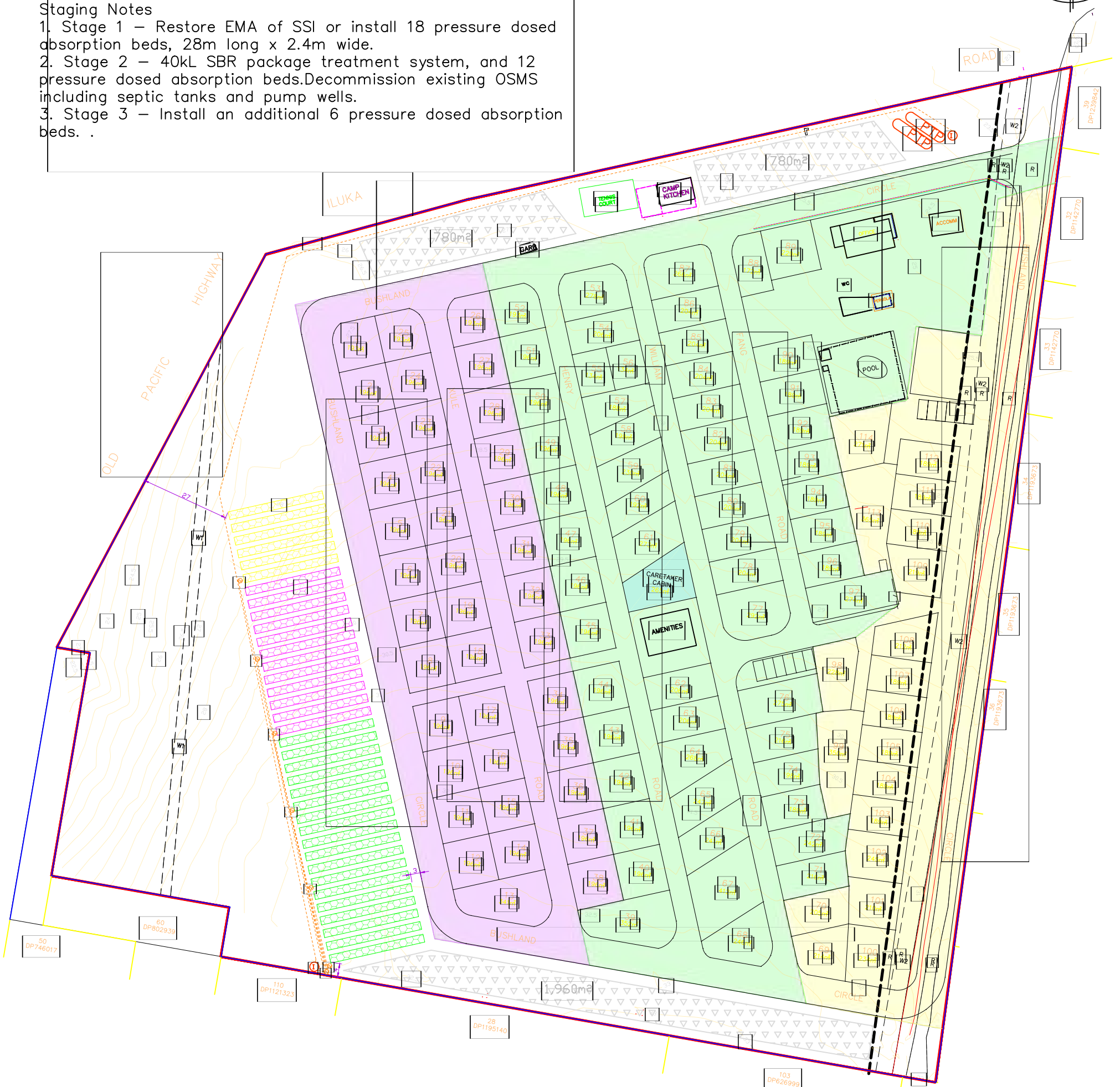
LEGEND

- Property Boundary
- Contour Line (0.5m)
- Drainage Alignment
- Stage 1 Development
- Stage 2 Development
- Stage 3 Development
- Borehole Location
- Slope Direction
- Recommended EMA

EARTH WATER CONSULTING

TITLE: Existing Site Layout			FIGURE: Figure 4
			SHEET: 1 OF 1 ISSUE: B
PROJECT: WWMP for Horisen Lifestyle Community, 54 Iluka Road			CLIENT: Coffs Harbour Plumbing
AUTHOR: SD	DATE: 5/1/21	SCALE: 1:1500	PROJECT: 2021-107

Staging Notes
1. Stage 1 – Restore EMA of SSI or install 18 pressure dosed absorption beds, 28m long x 2.4m wide.
2. Stage 2 – 40kL SBR package treatment system, and 12 pressure dosed absorption beds.Decommission existing OSMS including septic tanks and pump wells.
3. Stage 3 – Install an additional 6 pressure dosed absorption beds. .



0 25 50
Horizontal Scale (metres) 1:1250

LEGEND

- Property Boundary
- Contour Line (0.5m)
- Drainage Alignment
- Stage 1 Development
- Stage 2 Development
- Stage 3 Development
- Package Treatment Plant
- Irrigation Tank
- Plumbing Pipework
- Indexing Valve
- Stage 1 Dosed Beds
- Stage 2 Dosed Beds
- Stage 3 Dosed Beds
- Reserve EMA

TITLE: Recommended OSMS Layout			FIGURE: Figure 5
			SHEET: 1 OF 1 ISSUE: B
PROJECT: WWMP for Horisen Lifestyle Community, 54 Iluka Road			CLIENT: Coffs Harbour Plumbing
AUTHOR: SD	DATE: 5/1/21	SCALE: 1:1250	PROJECT: 2021-107

Pressurised Bed Construction

A The base of the bed must be level to ensure even distribution of effluent (check with a dumpy / laser level).

B 25-32mm uPVC PN9 pipe with 6mm holes drilled (deburred) at 400mm centres.

C Graf 130 Infiltration Tunnel.

D 20-40mm distribution aggregate.

E Geotextile filter cloth.

F 100mm Clean local or imported topsoil (sandy loam to clay loam).

G Grass must be established across the bed as soon as possible.

H Inspection port one per bed. Made from 50-100mm PVC pipe with perforations in the aggregate level of the bed.

I Individual flush points for each lateral. May be a screw cap fitting on a 90 -degree elbow level with the surface or a pressure controlled flush valve (such as those used for subsurface irrigation systems) inside an irrigation control box.

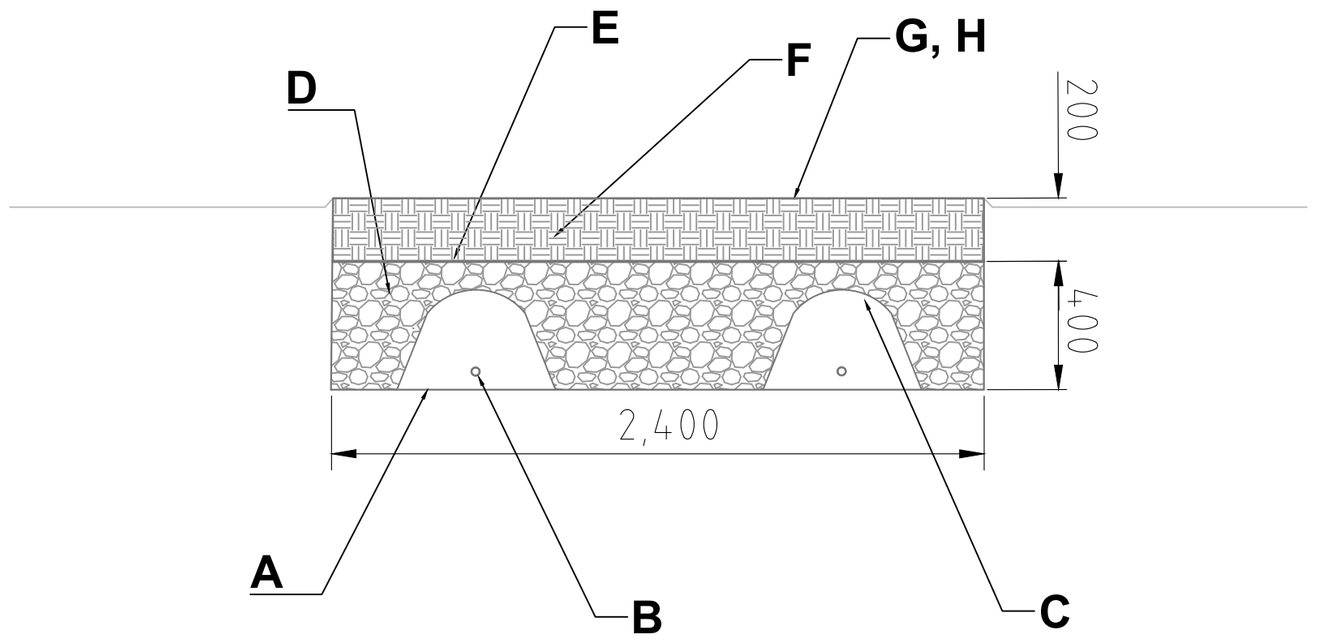
J Pump dosed effluent from treatment system. The pump must be capable of delivering the total flow rate required for all laterals whilst providing a 1.5m residual head (i.e. squirt height) at the highest orifice (with no more than 15% variation in squirt height across the whole bed). A flow rate of about 4 L/min/lineal metre is assumed.

K Upslope stormwater diversion drain.

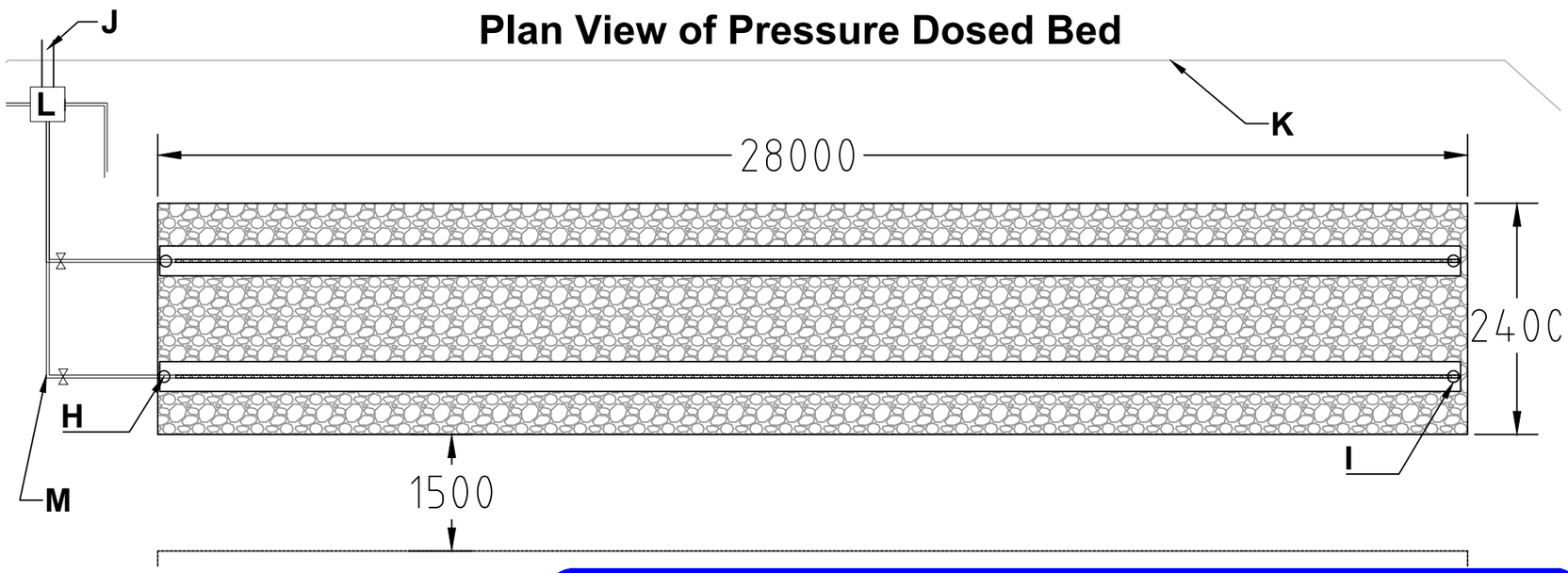
L Indexing valve.

M 25-32mm polyethylene or PVC dosing manifold with gate valves.

Cross-Section of Retained Bed



Plan View of Pressure Dosed Bed



TITLE: Pressure Dosed Bed Schematic			FIGURE: Figure 6
			SHEET: 1 OF 1 ISSUE: A
PROJECT: WWMP for Horisen LIfestyle Community, 54 Iluka Road			CLIENT: Coffs Harbour Plumbing
AUTHOR: SD	DATE: 23/12/20	SCALE: NTS	PROJECT: 2021–107

APPENDIX A

2.3 Soils

An assessment of the soils of the site was undertaken. Soil Landscapes of the Woodburn 1:100 00 Sheet (Morand 2001) shows the site to be located on the New Italy Soil Landscape. A summary of the information provided, relevant to this assessment is provided below:

New Italy (ne) Erosional Landscape

Landscape: *undulating rises and low hills separated by broad drainage depressions on the Walloon Coal Measures. Slopes 2-10%: relief 30-40m; elevation 5-50m. Partially cleared, tall eucalypt forest.*

Soils: *Moderately deep (100-150cm), poorly/imperfectly drained Grey Kurosols (Gleyed Podzolic Soils) and moderately deep (100-150cm), imperfectly drained Yellow Kurosols (Yellow Podzolic Soils) throughout hillslopes and crests.*

The soils encountered on the site generally reflect those of the New Italy Soil Landscape although they are variable across the site. Two boreholes to 1.0m depth were made in the location of the proposed disposal area (refer to Table 2-1). One was taken at the approximate crest of the site while the other was made downslope. Both boreholes showed fine grey clay loam topsoil overtop reddish grey clay with orange mottling at depth, the only difference being that deeper topsoil was present in the downslope borehole. The soils showed good structure when dry. The location of the boreholes is shown on the proposed wastewater management plan provided in Appendix A.

The soils found at the site are compared with the soil categories in AS1547:2012 and are consistent with light clays which form soil category 5. This will be used to determine the effluent application rate and subsequently the proposed effluent disposal area. Refer to Section 3.4 for further details.

Table 2-1 Soil borelog

Borehole	Depth (m)	Soil/comment
Borehole #1	0-0.2	Fine grey topsoil, unconsolidated (dry), clay loam.
	0.2-1.0	Greyish red light clay gradually becoming more clayey with depth. Orange and grey mottles with depth. Well structured, pedal when dry.
Borehole #2	0-0.3	Fine grey topsoil, unconsolidated (dry), clay loam.
	0.3-1.0	Greyish red light clay gradually becoming more clayey with depth. Orange and grey mottles with depth. Well structured, pedal when dry.

Whitehead & Associates
Environmental Consultants

Key to Soil Borelogs

Symbols

W	Watertable depth	**S**	Sample collected
X	Depth of refusal		

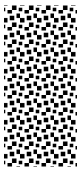
Moisture condition

D	Dry
SM	Slightly moist
M	Moist
VM	Very moist
W	Wet / saturated

Graphic Log and Textures

S - Sand
LS - Loamy sand
CS - Clayey sand

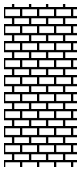
SCL - Sandy clay loam
FSCL - Fine sandy CL
CL - Clay loam
SiCL - Silty clay loam



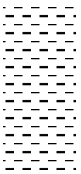
Gravel (G)

SL - Sandy loam

LC - Light clay
SC - Sandy clay
SiC - Silty clay



Parent material (stiff)



L - Loam
LFS - Loam fine sandy
SiL - Silty loam

MC - Medium clay
HC - Heavy clay

Parent material (weathered)

SOIL BORE LOG

Whitehead & Associates
Environmental Consultants

Project	2405	**Borehole No.:**	**WABH1**
Client:	William Hu	Logged by:	SD
Site:	Woombah Caravan Park	Excavation method:	Hand Auger
Loc:	54 Iluka Rd	Date:	16 January 2020

PROFILE DESCRIPTION

Samples	Depth (m)	Graphic Log	Texture	Structure	Colour	Mottles	Coarse Fragments	Moisture	Comments
S	0.1 0.2 0.3 0.4 0.5		Gravelly Sandy Loam	Moderate	Grey Brown	Nil	Up to 40% fine ironstone gravel	D	Topsoil
	0.6 0.7 0.8 0.9		Light Clay	Strong	Green Brown	Red Brown	Nil	D	Residual
	1.0 1.1 1.2		Light Clay / Medium Clay	Strong	Grey	Red Brown	Nil	SM	Residual
	1.3 1.4 1.5		Borehole terminated @ 1.2m depth						

SOIL BORE LOG

Whitehead & Associates
Environmental Consultants

Project	2405	**Borehole No.:**	**WABH2**
Client:	William Hu	Logged by:	SD
Site:	Woombah Caravan Park	Excavation method:	Hand Auger
Loc:	54 Iluka Rd	Date:	16 January 2020

PROFILE DESCRIPTION

Samples	Depth (m)	Graphic Log	Texture	Structure	Colour	Mottles	Coarse Fragments	Moisture	Comments
	0.1		Sandy Loam	Moderate	Brown	Nil	Up to 15% fine ironstone gravel	D	Topsoil
	0.2								
	0.3								
S	0.4		Light Clay	Strong	Green Brown	Red Brown	Nil	SM	Residual
	0.5								
	0.6								
	0.7								
	0.8								
	0.9								
	1.0								
	1.1		Light Clay / Medium Clay	Strong	Grey	Red Brown	Nil	SM	Residual
	1.2								
	1.3		Borehole terminated @ 1.2m depth						
	1.4								
	1.5								

SOIL BORE LOG

Whitehead & Associates
Environmental Consultants

Project	2405	**Borehole No.:**	**WABH3**
Client:	William Hu	Logged by:	SD
Site:	Woombah Caravan Park	Excavation method:	Hand Auger
Loc:	54 Iluka Rd	Date:	16 January 2020

PROFILE DESCRIPTION

Samples	Depth (m)	Graphic Log	Texture	Structure	Colour	Mottles	Coarse Fragments	Moisture	Comments
	0.1		Sandy Loam	Moderate	Brown	Nil	Up to 15% fine ironstone gravel	D	Topsoil
	0.2								
	0.3								
	0.4		Light Clay	Strong	Green Brown	Red Brown	Nil	SM	Residual
	0.5								
	0.6								
	0.7								
	0.8								
	0.9								
	1.0								
	1.1		Light Clay / Medium Clay	Strong	Grey	Red Brown	Nil	SM	Residual
	1.2								
	1.3		Borehole terminated @ 1.2m depth						
	1.4								
	1.5								

APPENDIX B

Technical data sheet for EPro wastewater treatment plant

Graf Australia Pty Ltd
Unit 2, 8 Piper Street
Caboolture QLD 4510
Tel. +61 1300 131 971
Email: info@grafaustralia.com.au

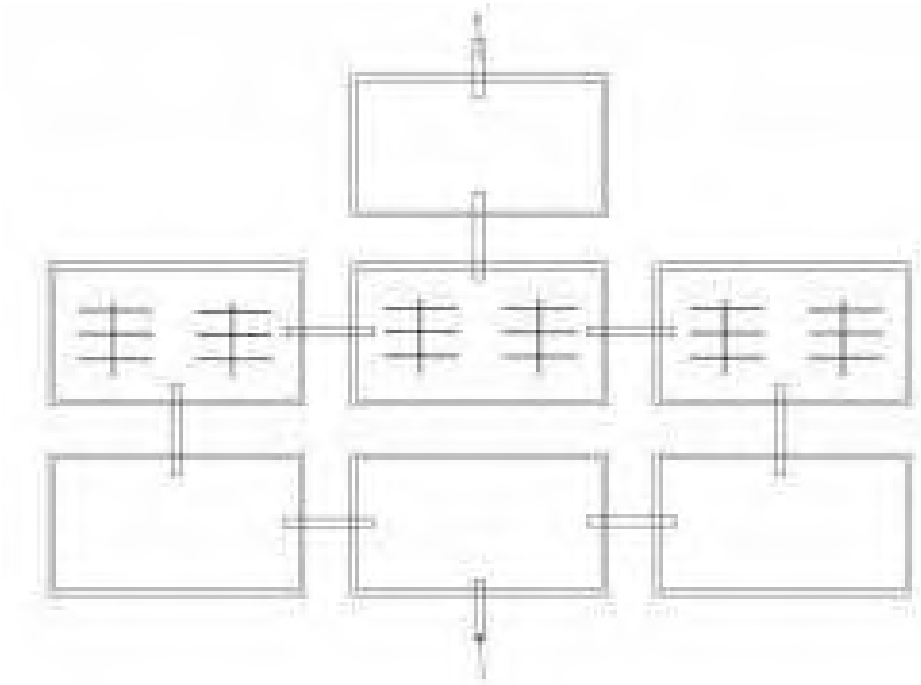
Plant size 203 EP

Maximum hydraulic load	Qd	40.60	kl/d
Maximum organic load	Bd	14.21	kg/d

Effluent values:

	BOD_5	COD	SS	NH_4N	Ntot	Ptot	colif. germs
<	20 mg/l		30 mg/l				10 CFU / 100 ml

Total tank capacity:				135.8	kl
Air compressor	Type:	Rotary vane		KDT 3.100	
	Installed motor power			5.50	kW
	Power consumption at 0,3 bar			3.40	kW
	Motor design		1 bar 50 Hz 3~	380	V
Calculated maximum daily operating time				12.9	h/d



Symbolic representation

Stage	Number	Container, material	Diameter Width [m]	Length [m]	Maximum water depth [m]	Maximum volume [kl]
SS + PT + B	3	Rectangular, Concrete	2.20	4.20	2.10	58.2
SBR	3	Rectangular, Concrete	2.20	4.20	2.10	58.2
Chlorine	1	Rectangular, Concrete	2.20	4.20	2.10	19.4

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Version: 1, Version Date: 19/03/2021

Basic data / project data

Customer	Graf Australia Pty Ltd	Date	*18/11/2020*
Project	Woombah Woods Home Estate	Editor	Lavinia Borra
Type of waste water:	domestic		
Particularities			

Base of calculation

	BOD_5	COD	SS	NH_4N	Ntot	Ptot	colif. germs
Outlet	**< 20 mg/l**		**< 30 mg/l**				**10 CFU / 100 ml**

Population equivalent				203	EP
Wastewater	at Q_{EP}		200 l / (EP x d)	40.6	kl/d
Infiltration water			0 %	0.0	kl/d
Total daily inflow		Q_d		40.6	kl/d
Daily peak factor				10	h/d
Hourly volume of wastewater				4.1	kl/h
Waste load BOD_5		B_d	70 g/(EP x d)	14.21	kg/d
Waste load BOD_5 After primary treatment		B_d	47 g/(EP x d)	9.47	kg/d
Cleaning cycles per day				4	

1. Stage: sludge storage, pre-treatment and buffer

Type of container			Rectangular	
Number of containers / proportion of chambers			300%	
Width			2.20	m
Length			4.20	m
Water depth			2.10	m
Total area			27.72	m²
Sludge storage (SS)				
Specific sludge storage volume			292	l / (EP x a)
Removal interval			6.5	months
Required volume	203 EP x 292 l / (EP x a) x 6.5 / 12 months	=	32.11	kl
Required water depth			1.16	m
Primary treatment (PT)				
Retention period	(58.21 kl - 32.11 kl - 19.54 kl) / 4.1 kl/h	=	1.62	h
Required volume			6.09	kl
Required water depth			0.22	m
Overall (SS + PT)				
Required water depth			1.37	m
Selected water depth			1.39	m
Buffer (B)				
Percentage of daily load			48%	
Required volume	48% x 40.6 kl/d	=	19.49	kl
Required water depth			0.71	m
Selected water depth			0.71	m
Selected volume	48% Total daily inflow	=	19.54	kl
Overall (SS + PT + B)				
Required volume	32.1 kl + 6.1 kl + 19.5 kl	=	57.69	kl
Existing total volume			58.21	kl
Required water depth	1.16 m + 0.22 m + 0.71 m	=	2.08	m

Basic data / project data

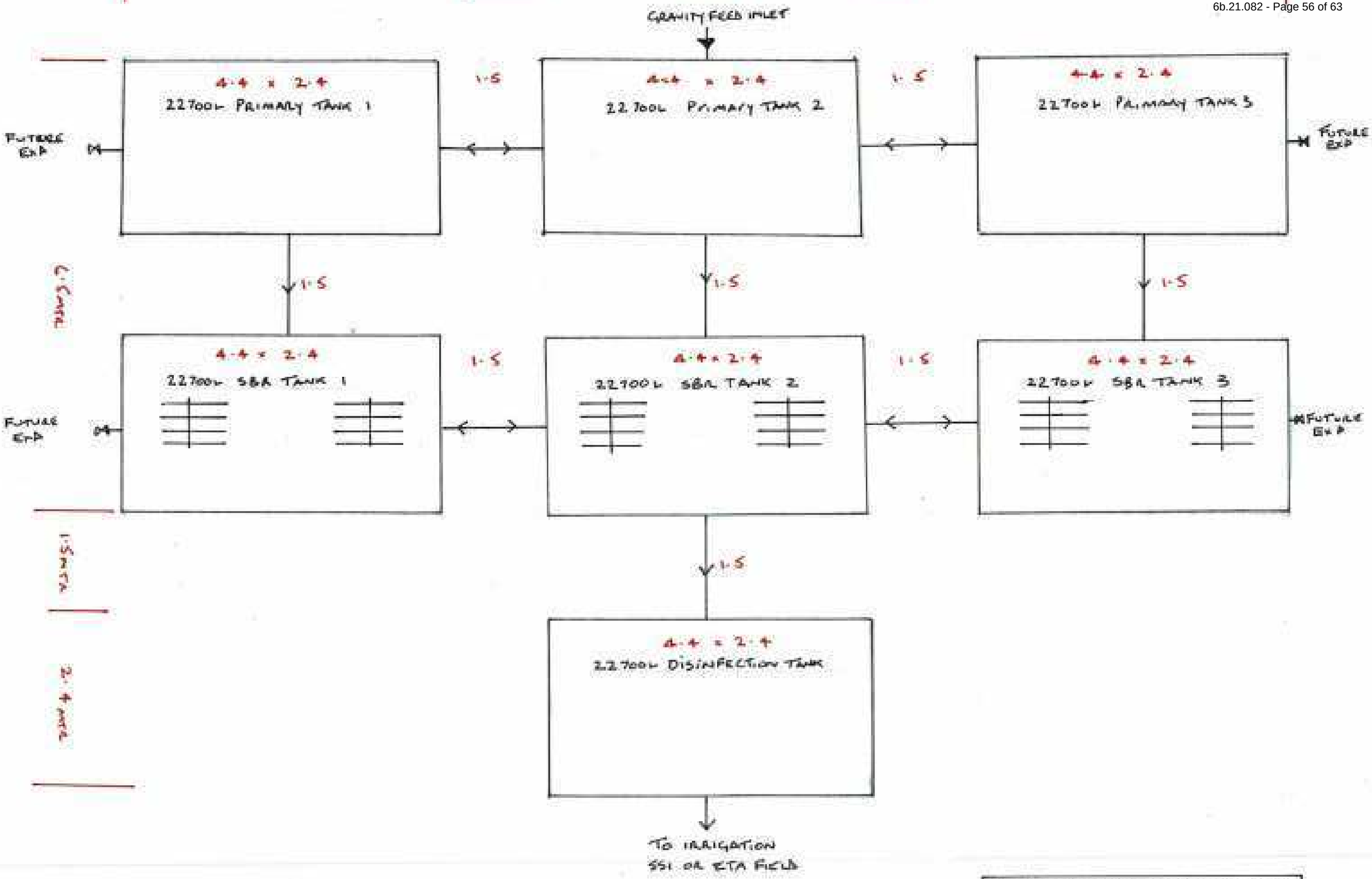
Customer	Graf Australia Pty Ltd	Date	*18/11/2020*
Project	Woombah Woods Home Estate	Editor	Lavinia Borra
Type of waste water:	domestic		
Particularities			

2. Stage: biological treatment (SBR)

Type of container			Rectangular	
Number of containers / proportion of chambers			300%	
Width			2.20	m
Length			4.20	m
Water depth		Wd max =	2.10	m
Total area			27.72	m²
Required volume		9.47 kg/d / 0,2 kg/(d*kl) =	47.37	kl
Required water depth			1.70	m
Volume load BOD_5	Br	9.47 kg/d / 58.21 kl =	0.16	kg / (kl x d)
BOD Sludge loading	B_{TS}	≤	0.05	kg/(kg x d)
Sludge index	ISV		100.00	ml/g
Total solids	TS_{BB}	≤	4.00	kg/kl
Oxygen concentration	C_O	≥	2.00	mg/l
Selected water depth Before loading phase		Wd max - 33% x 40.6 kl/d =	1.61	m
Water depth After loading phase		Wd min + 25% x 40.6 kl/d =	1.97	m
Existing total volume			58.21	kl

3. Stage: E Chlorination

Chlorine contact volume	Percentage of daily load		25.0%	
	Safety coefficient		1.2	
	Required volume	25% x 40.6kl/d x 1.2 =	12.18	m³
Type of container			Rectangular	
Number of containers / proportion of chambers			100%	
Width			2.20	m
Length			4.20	m
Water depth			2.10	m
Total area			9.24	m²
	Required water depth		1.31	m
	Existing volume		19.40	m³
Chlormodul			1	item
Wanted total residual chlorine (TRC) after 30 min			0,5 bis 2,0	mg/l
Initial chlorine dosage (as available Cl_2)			5	g/m³
Chlorine concentration in NaOCl-solution		12 % =	120	g/l
Dosing ratio (NaOCl / treated water)			42	ml/m³
NaOCl-solution demand		1692 ml/d =	51	l/month
Dosing pump			Compact	
Flow of dosing pump adjusted to			21.1	ml/min



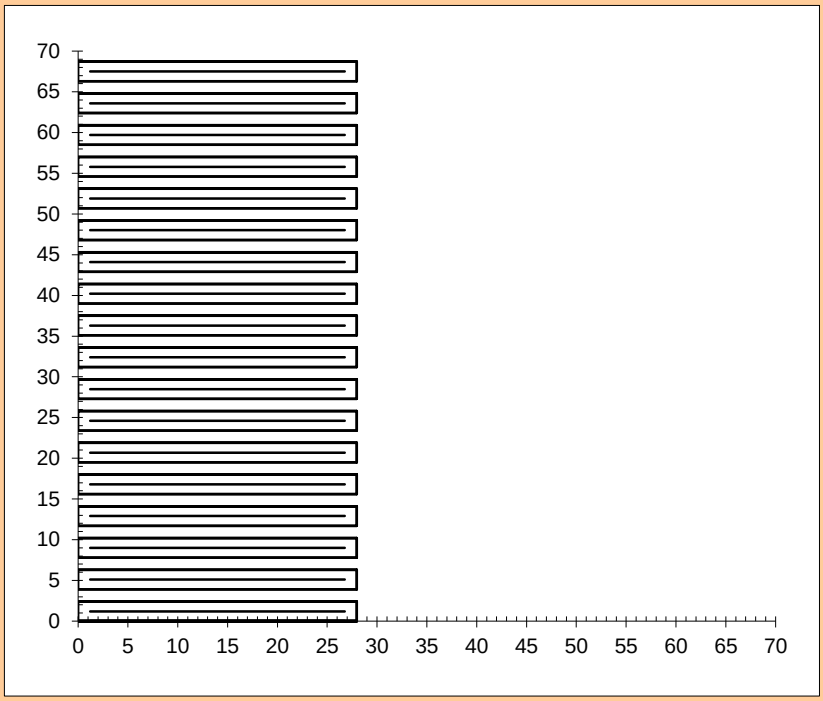
GRAF CHP 200 EP 40 KL / DAY ATWS
WOOMBAH WOODS OVER 55's
SCALE 1 : 50 A3

APPENDIX C

CVC On-site Wastewater Model (Single Rural Households)

			Default	User-defined
1 Client	Coffs Harbour Plumbing			
2 Address	Horisen Lifestyle Community - Stage 1			
3 User info	○ Simplified (casual user) ◉ Advanced (consultants)			
4 Site	Block size (m2)			10000
	Buffer (m) from land application area to	River (permanent)	>100	
	Water (L/p.d) from	Reticulated + std. water saving devices	145	133
	Bedrooms			77
5 Wastewater components	Toilet	☑		
	Bathroom	☑		
	Laundry	☑		
	Kitchen	☑		
	Total wastewater flow (L/d) [needs caution if user-defined]		15361.5	
6 Soil info	[illegible] Clay Bundamba Group ... [illegible]			
Likely dispersive soil	Phosphorus sorption (kg/ha.m) calc. from Morand 2001 data		7780	12000
	Depth to water table (m) reference Morand 2001		1.0	5.0
	Depth to bedrock (m) reference Morand 2001		0.7	2.0
	Light clays - strongly structured	DLR (mm/d)	12.0	12.0
7 Treatment system	Secondary AWTS			
	Nitrogen removal % (default gives BOD 20mg/L treatment)		20%	
8 Land application system	Septic absorption trench			
	Depth of trench (mm)		600	
9 Land Application Area required	Hydraulic area (m2)*		1208.3	
	Nitrogen area (m2)		0.0	
	Phosphorus area (m2)		1386.0	
	Required land application area (LAA) (m2)		**1386.0**	
	Land application area including area of trench separation (m2)		1921.06	

Rectangular Trench Layout



	Default	User defined
Land Application Area (LAA) (m2)	1386.0	1208.0
Number of trenches	18	

> 3 trenches: special design features needed

This configuration gives trench length > 20m: special design features needed

Trench width (m)	0.6	2.4
Trench separation (m) (default = trench width)	1.5	

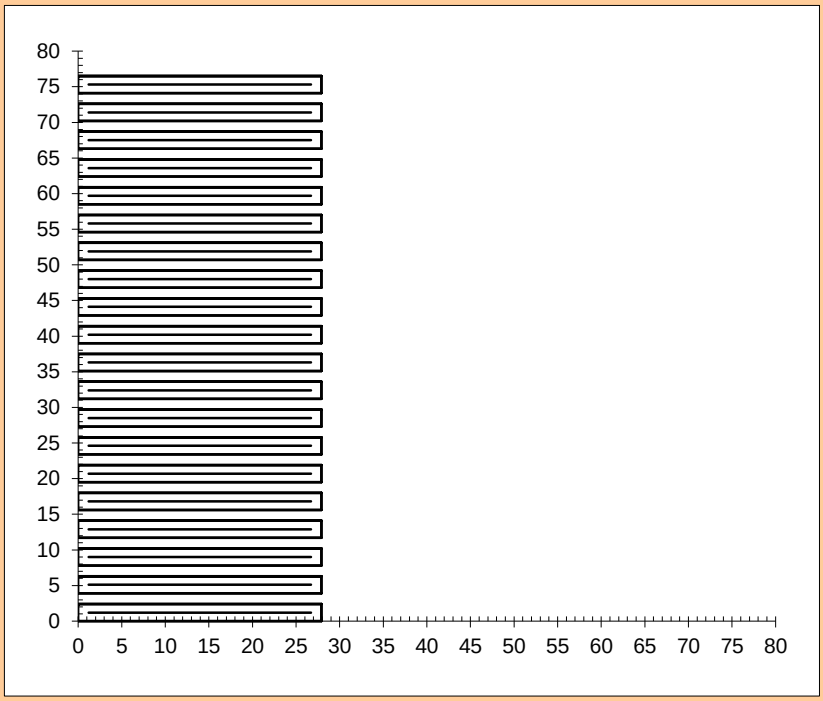
List of dimensions

Trench length (m)	28.0
Trench width (m)	2.4
Number of trenches	18
Trench separation (m)	1.5
Trench area / LAA (m2)	1208.0
LAA including trench separation: length (m)	as for trench length
LAA including trench separation: width (m)	68.7
LAA including trench separation: area (m2)	1921.1

CVC On-site Wastewater Model (Single Rural Households)

		Default	User-defined
1 Client	Coffs Harbour Plumbing		
2 Address	Horisen Lifestyle Community - Stage 2		
3 User info	○ Simplified (casual user) ◉ Advanced (consultants)		
4 Site	Block size (m2)		10000
	Buffer (m) from land application area to [River (permanent)]	>100	
	Water (L/p.d) from [illegible]	115	133
	Bedrooms		128
5 Wastewater components	Toilet ☑		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	25536	
6 Soil info	[illegible]		
Likely dispersive soil	Phosphorus sorption (kg/ha.m) calc. from Morand 2001 data	7780	12000
	Depth to water table (m) reference Morand 2001	1.0	5.0
	Depth to bedrock (m) reference Morand 2001	0.7	2.0
	[Light clays - strongly structured] DLR (mm/d)	12.0	12.0
7 Treatment system	[Secondary AWTS]		
	Nitrogen removal % (default gives BOD 20mg/L treatment)	20%	
8 Land application system	[Septic absorption trench]		
	Depth of trench (mm)	600	
9 Land Application Area required	Hydraulic area (m2)*	2008.7	
	Nitrogen area (m2)	0.0	
	Phosphorus area (m2)	2304.0	
	Required land application area (LAA) (m2)	**2304.0**	
	Land application area including area of trench separation (m2)	2134.56	

Rectangular Trench Layout



	Default	User defined
Land Application Area (LAA) (m2)	2304.0	2009.0
Number of trenches	30	

> 3 trenches: special design features needed

This configuration gives trench length > 20m: special design features needed

Trench width (m)	0.6	2.4
Trench separation (m) (default = trench width)	1.5	

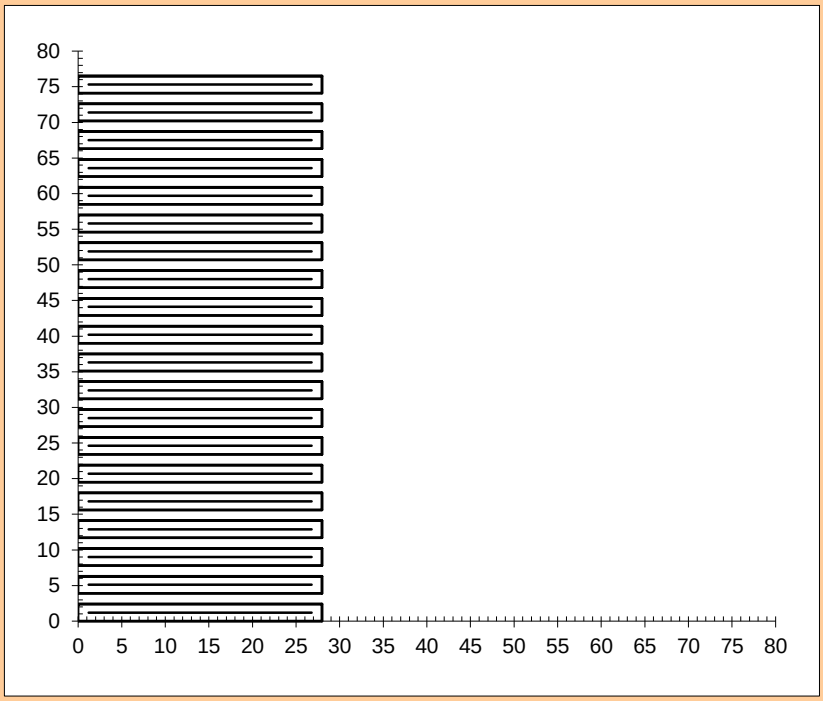
List of dimensions

Trench length (m)	27.9
Trench width (m)	2.4
Number of trenches	30
Trench separation (m)	1.5
Trench area / LAA (m2)	2009.0
LAA including trench separation: length (m)	as for trench length
LAA including trench separation: width (m)	76.5
LAA including trench separation: area (m2)	2134.6

CVC On-site Wastewater Model (Single Rural Households)

			Default	User-defined
1 Client	Coffs Harbour Plumbing			
2 Address	Horisen Lifestyle Community - Stage 3			
3 User info	○ Simplified (casual user) ◉ Advanced (consultants)			
4 Site	Block size (m2)			10000
	Buffer (m) from land application area to	River (permanent)	>100	
	Water (L/p.d) from	Reticulated + std. water saving devices	145	133
	Bedrooms			154
5 Wastewater components	Toilet	☑		
	Bathroom	☑		
	Laundry	☑		
	Kitchen	☑		
	Total wastewater flow (L/d) [needs caution if user-defined]		30723	
6 Soil info	[illegible] Clay Bundamba Group ... Gulmarrad/Woombah			
Likely dispersive soil	Phosphorus sorption (kg/ha.m) calc. from Morand 2001 data		7780	12000
	Depth to water table (m) reference Morand 2001		1.0	5.0
	Depth to bedrock (m) reference Morand 2001		0.7	2.0
	Light clays - strongly structured	DLR (mm/d)	12.0	12.0
7 Treatment system	Secondary AWTS			
	Nitrogen removal % (default gives BOD 20mg/L treatment)		20%	
8 Land application system	Septic absorption trench			
	Depth of trench (mm)		600	
9 Land Application Area required	Hydraulic area (m2)*		2416.7	
	Nitrogen area (m2)		0.0	
	Phosphorus area (m2)		2772.0	
	Required land application area (LAA) (m2)		**2772.0**	
	Land application area including area of trench separation (m2)		2139.79	

Rectangular Trench Layout



	Default	User defined
Land Application Area (LAA) (m2)	2772.0	2416.7
Number of trenches	36	

> 3 trenches: special design features needed

This configuration gives trench length > 20m: special design features needed

Trench width (m)	0.6	2.4
Trench separation (m) (default = trench width)	1.5	

List of dimensions

Trench length (m)	28.0
Trench width (m)	2.4
Number of trenches	36
Trench separation (m)	1.5
Trench area / LAA (m2)	2416.7
LAA including trench separation: length (m)	as for trench length
LAA including trench separation: width (m)	76.5
LAA including trench separation: area (m2)	2139.8