REF: 2383WW

VERSION [5.0]

FEBRUARY 5, 2021

SOIL & SITE ASSESSMENT FOR ONSITE WASTEWATER DISPOSAL

PROPOSED BAPS SWAMINARAYAN HINDU TEMPLE ON 230-242 ALDINGTON ROAD, KEMPS CREEK, NSW

LGA: Penrith City Council

Lot 18 DP 253503

C/-: Project manager, Jayesh Garach

HARRIS ENVIRONMENTAL CONSULTING
PO BOX 70, JAMBEROO, NSW, 2533
TEL: (02) 4236 0954
Info@harrisenvironmental.com.au

VERSION CONTROL

Title	Soil & Site Assessment for Onsite Wastewater Disposal			
Site address	230-242 Aldington Road, Kemps Creek, NSW			
DA	DA17/1247			
Description	Proposed BAPS Swaminarayan Hindu Temple			
Date Created	16/06/2017			
Version Number	**Modified By**	**Modifications Made**	**Date Modified**	**Status**
[1.0]	P.B.	Draft for client review	27/07/2017	Superseded
[1.1]	P.B.	Second submission for review	26/09/2017	Superseded
[1.2]	P.B.	Submission for DA	30/10/2017	Superseded
[2.0]	P.B.	Review of initial proposal	25/10/2018	Superseded
[3.0]	S.H.	Review of initial proposal	1/03/2019	Complete
[4.0]	S.H.	Review of initial proposal	14/06/2019	Complete
[5.0]	P.S.	Proposed security buildings. Modification Section 4.55(1). See Appendix – Site Plans	5/02/2021	Complete

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

OVERVIEW OF AMENDMENT

This *Amended Soil and Site Assessment for On-Site Wastewater Management (Version 5)* has been prepared to update the report issued 14/06/2019 (our Version 4). The current report, (Version 5) includes the changes to the proposed development which includes new proposed security buildings with toilet amenities. There is no effect on the other aspects of this report. The new security buildings will not generate additional wastewater.

Version 5 includes a new set of Site Plans as Appendix labelled Sheet 1, 2, & 3.

1. INTRODUCTION

This Site and Soil Assessment for On-site Wastewater was prepared by Harris Environmental Consulting at the request of Project manager, Jayesh Garach. It relates to the construction of a the (BAPS) Swaminarayan Hindu Temple on Lot 18 DP 253503 at 230-242 Aldington Road, Kemps Creek, NSW. The proposed center will include a community kitchen and dining hall, prayer and congressional hall, youth/sports center, community gardens, library, book store, traditional temple and offices.

Construction of the development will be undertaken in a staged approach over a period of several years which will include:

- **Stage-1:** Utilities, Dining Hall, Assembly Hall, Roads (entire sites), landscaping related to Assembly Hall and Dining Hall/at proposed sewer area (i.e monk residence area)
- **Stage-2:** Mandir (Temple) and landscape
- **Stage-3:** Monk Residence when main sewer is available

This assessment was undertaken for a proposal to install a commercial onsite Sewerage Management Facility (SMF) for wastewater treatment with subsurface irrigation for wastewater disposal. On site wastewater management will be required for Stage 1. stages two-and-three of the development the reticulated sewer network may be available for the development to connect to.

Field work was undertaken by a representative of Harris Environmental Consulting (HEC) on the 8th June 2017. This plan is based on the primary investigation of the soils, topography and hydrology of the site observed on the day of inspection. Soil samples and photos of the site were taken for further analysis.

2. ASSESSMENT CRITERIA

Harris Environmental Consulting was commissioned by the owner to undertake this Soil and Site Assessment for On Site Wastewater Management in accordance with:

- Penrith City Council's On-site Sewage Management and Greywater Reuse Policy;
- Environment and Health Protection Guidelines (1998) On-site Sewage Management for Single Households (Department of Local Government);
- Local Government Act 1993;
- AS/NZ 1547:2012 On-site wastewater management (Standards Australia, 2012);
- AS/NZS 3500 Plumbing and Drainage 2003 (Standards Australia, 2012);
- Sydney Catchment Authority (2012), Designing and Installing On Site Wastewater Systems. A Sydney Catchment Authority Current Recommended Practice; and
- Department of Environment and Conservation (2004) Environmental Guidelines Use of Effluent by Irrigation.

FIGURE 1 LOCATION OF LOT 18 DP 253503

Source: NSW SixMaps

3. GENERAL INFORMATION

Project manager	Project manager, Jayesh Garach E: Jayesh_Garach@hotmai.com M: 0405425601	
Size of property:	10.19 ha	
Legal title:	Lot 18 DP 253503	
Local Government:	Penrith City Council Council	
Water supply:	Town water supply	
Design wastewater load:	Flow regulated 9,000 L/d from collection tanks to proposed commercial Sewage Management Facility (SMF) and irrigation area	
Wastewater treatment	Commercial Sewage Management Facility. Food preparation area to be fitted with grease arresters.	
Wastewater disposal	Primary Effluent Management Area (EMA)	8423m^2 subsurface irrigation
	Reserve EMA	5035m^2
Date site assessed:	June 8, 2017 and October 8, 2018.	
Date report prepared:	February 5, 2021	
Site assessor:	[redacted] Sean Harris	Msc Env Science (UOW), Grad dip Nat Res (UNE), BscAppSc, Agriculture (HAC)

4. SITE ASSESSMENT

4.1 CLIMATE

The average annual rainfall recorded at the Orchard Hills Treatment Works Rainfall Station (7.4km away) is 843.8mm. Rainfall is higher during the first half of the year, with most occurring during major storms associated with the passage of cold fronts. The average annual evaporation recorded at Badgerys Creek is 1557mm.

TABLE 1 CLIMATE DATA

Median Monthly Rainfall												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
99.8	85.6	74.8	40.8	42.2	32.8	20.8	17.8	28.6	42	59.7	56.5	843.8
Median Monthly Evaporation												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
202	157	136	105	81	63	81	96	120	152	183	220	1557
Median Monthly Maximum Temperature												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
30.5	28.9	26.9	23.8	20.4	17.5	17.3	19.0	21.1	24.7	26.3	28.5	23.8
Median Monthly Minimum Temperature												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
17.8	17.7	16.1	12.9	9.1	7.2	5.8	6.4	9.2	11.6	14.5	16.2	12.1

4.2 GROUNDWATER BORES

In relation to DLG (1998), effluent disposal cannot occur within 100m of a domestic groundwater bore. The Bureau of Meteorology National Groundwater Information System (NGIS) indicates there are no known active groundwater bores immediately within the development site or within 100m surrounding the development.

4.3 VEGETATION

The property is not mapped on the Department of Environment Climate Change and Water (DECCW) Distribution of Cumberland Plan Woodland Map (VIS_ID:3785) as having any vegetative communities that are listed as Endangered Ecological Communities (EEC's) under the threated species conservation ACT. The site has been extensively cleared for agricultural use.

4.4 GEOLOGY

The site is characteristic of the soils and topography of the Wianamatta Group (Australian Government 1:100 0000 Scale Surface Geology of Australia, 2012).

4.5 SOILS

The soil and topography is characteristic of the Luddenham Soil Landscape. This material includes moderately expansive, low wet strength, localised impermeable and highly plastic subsoils (DECCW Soil Landscapes of Penrith 1:100,000).

These Red Podzolic Soils include a clear or abrupt textural B horizon and in which the major part of the upper 0.2m of the B2 Horizon (or the major part of the entire B2 horizon if it is less than 0.2m thick) is strongly acidic.

4.6 FLOOD POTENTIAL

The South Creek Floodplain Risk Management Study and Plan (Penrith Council 2015) does not identify the property as being flood prone land. Elevations onsite range between 92m and 53m AHD above sea-level (local relief 39m). All proposed wastewater treatment systems must be located above the 1 in 100-year flood level and the wastewater disposal areas located above the 1 in 20-year flood level. This presents a minor limitation for onsite wastewater disposal.

4.7 TOPOGRAPHY

The proposed development site exhibits slopes of up to 19% midway through the development site and as low as 2-3% on the upper and lower slopes. Site aspects are predominately west to north west with good solar and wind exposure across the site. This presents a minor limitation for onsite wastewater management.

5. SOIL ASSESSMENT

Three soil test pits were dug (BH01 to BH03) and the soil profiles examined across the locations shown in Appendices XVII. Soil assessments were carried out using the Northcote Textural Soil Method 1979 to determine the soil types to a depth of 1200mm. Soil test pits were excavated using an excavator and by hand using shovel and crowbar.

Subsurface soil conditions were logged and soil samples obtained for further testing at a NATA accredited laboratory. The soil tests pits were located to provide a representation of soil conditions across the soil landscape, transecting the upper and lower slopes. The test pit locations were logged using GPS and the soil texture to 1200mm were identified.

Soil profiles and conditions for the sample sites are described in Appendix I. The laboratory certificates are provided in Appendix XV for the three soil samples sent to the NATA Accredited ALS Environmental for further analysis. The DLG (1998) soil assessment ratings are presented in appendix IV for determine soil constraints.

5.1 SOIL TESTING

Three representative soil samples were sent to the NATA Accredited Australian Laboratory Services (ALS). Soil samples were tested for:

- Electrical Conductivity;
- pH;
- Exchangeable Cation Exchange Capacity;
- Emerson Aggregate Test; and
- Phosphorus Retention Index;
- Bulk Density

5.2 EMERSON AGGREGATE CLASS

The Emerson Aggregate Test (EAT) is used as a general guide to soil sodicity, dispersibility and structural stability. Soils are separated into classes based on the behavior of the soil colloids when immersed in water. Hazelton and Murphy (1992) have defined aggregate classes and interpretations of these classes, as shown in Table 2.

TABLE 2 SOIL ANALYSIS RESULTS: EMERSON AGGREGATE TEST

BH/Layer	Emerson Stability class	Comments
BH1/L1	Class 2	Moderate limitation
BH1/L2	Class 1	Major limitation
BH3/L3	Class 4	Minor limitation

DEC (2004) provides a better assessment of EAT classes for effluent irrigation systems than DLG (1998). DEC (2004) ranks Class 4,5,6,7 & 8 as a minor limitation, Class 2 & 3 as a moderate limitation and Class 1 as a major limitation. The results in Table 7 indicate a major limitation for the subsoil sample BH1/L2. Soil structure can be improved by applying gypsum.

5.3 ELECTRICAL CONDUCTIVITY

Measurement of electrical conductivity (EC) in a 1 to 5 soil/water extract were used to determine salt content as a measure of salinity. DLG (1998) ranks a soil EC (dS/m) <4 as a minor limitation, 4 to 8 as moderate limitation and more than 8 as a major limitation. The results shown in Table 3 for all samples were less than 4 dS/m when converted to ECe by soil texture, and therefore a minor limitation.

TABLE 3 SOIL ANALYSIS RESULTS: ELECTRICAL CONDUCTIVITY

BH/Layer	EC dS/m 1:5	Soil type	ECe dS/m 1:5	Comments
BH1/L1	0.115	Sandy clay (x8.6)	0.989	Minor Limitation
BH1/L2	0.260	Silty clay loam (x8.6)	2.236	Minor Limitation
BH3/L3	0.302	Clay loam (8.6)	2.597	Minor Limitation

5.4 PH

DLG (1998) ranks soil pH ($CaCl_2$) >6 as a minor limitation, 4.5 - 6 as a moderate limitation and less than 4.5 as a major limitation. The results obtained in Table 4 indicate pH is a moderate soil limitation in relation to the DLG (1998).

TABLE 4 SOIL ANALYSIS RESULTS: PH

BH/Lot	pH in water 1:5	Comments
BH1/L1	6.5	Minor limitation
BH1/L2	5.4	Moderate limitation
BH3/L3	8.4	Minor limitation

Acidity is only a moderate constraint, however problems associated with an acid soil include:

- Mineralisation of organic matter and release of other nutrients adversely affecting soils with a pH below 4.6 (slows microbial activity);
- Molybdenum, which is required by legumes to fix nitrogen and grasses for protein synthesis, is very insoluble and unavailable for plants in acid soils;
- Aluminium is elevated under acid conditions, which causes phosphorus to become immobilised within the plant and soil. For pH <5.5 Aluminium can be toxic to roots;
- Uptake of calcium and magnesium is restricted with very high levels of soluble aluminium.

For acidic topsoils it will be necessary to apply lime on a regular basis and grow pasture species that are tolerant of these conditions.

5.5 EXCHANGEABLE CATIONS AND EFFECTIVE CATION EXCHANGE CAPACITY

The Effective Cation Exchange Capacity (ECEC) is the sum of the five most abundant exchangeable cations, which includes magnesium (Mg), sodium (Na), calcium (Ca), potassium (K) and in strongly acid soil, aluminum (Al).

The DLG (1998) ranks soil Cation Exchange Capacity >15% as a minor limitation, 5-15% as a moderate limitation and <5% as a major limitation. A low ECEC means the soil has a low resistance to changes in soil chemistry that are caused by land use. The results in Table 5 indicate a moderate limitation for layer BH1/L1 and BH3/L3.

Sodicity is measured by the Exchangeable Sodium Percentage (ESP), which is the portion of the CEC occupied by sodium (Na) cations. DLG (1998) ranks soil sodicity (ESP) <5% as a minor limitation, 5-10% as a moderate limitation and >10% as a major limitation. Sodic soils may impact plant growth and soil dispersion. Furthermore, Soils that are high in magnesium and sodium show more dispersion than soils that are high in sodium and calcium. Ca/Mg ratios <1 are Ca deficient, 1-4 are Ca Low, 6-4 are balanced, 6-10 are Mg low, and >10 are Mg high. Gypsum is needed to replace the sodium with calcium in sodic soils. The results in Table 5 indicate sodicity is a moderate to major limitation for onsite wastewater disposal.

TABLE 5 SOIL ANALYSIS RESULTS: EXCHANGEABLE CATION EXCHANGE

Exchangeable Cations and Effective Cation Exchange Capacity							
BH1 / L1	**Calcium**	**magnesium**	**Potassium**	**Sodium**	**Aluminium**	**ECEC**	**Ca/Mg**
Meq/100g	4.5	5.4	0.2	1.4	<0.1	11.5	0.8
% CEC	12	47	2.2	38.8 (ESP)	-	100	-
Level	Low	High	Low	High	-	-	-
Limitation	-	-	-	Major	-	Moderate	Ca Def
BH1 / L2	**Calcium**	**magnesium**	**Potassium**	**Sodium**	**Aluminium**	**ECEC**	**Ca/Mg**
Meq/100g	1.2	7.9	0.1	3.2	11.2	23.6	0.2
% CEC	25.4	63.5	1.1	10 (ESP)	-	100	-
Level	Very low	High	Very low	Very high	-	-	-
Limitation	-	-	-	Major	-	Minor	Ca Def
BH3/L3	**Calcium**	**magnesium**	**Potassium**	**Sodium**	**Aluminium**	**ECEC**	**Ca/Mg**
Meq/100g	**7.6**	**4.0**	**0.3**	**1.1**	**<0.1**	**13.1**	**1.9**
% CEC	58.01	30.53	2.29	8.5 (ESP)	-	100	-
Level	Moderate	High	Low-Mod	High	-	-	-
Limitation	-	-	-	Moderate	-	Moderate	Ca Low

5.6 PHOSPHORUS SORPTION

The phosphorus sorption capacity is used to predict the life of the site in terms of its ability to immobilise P. The Phosphorus Retention Index (PRI) is a measure of the capacity of the soil to sorb phosphorus, in order to differentiate between soils exhibiting high and low P retention. The results in Table 6 shows the PRI % is low to medium. DLG (1998) ranks phosphorus sorption, in kg/ha over a depth of 1000mm, as: 6000, minor limitation, 2000-6000, moderate limitation; and less than 2000, major limitation. P sorption is a minor limitation in regards to DLG (1998).

TABLE 6 SOIL ANALYSIS RESULTS: PHOSPHORUS RETENTION

BH/Lot	PRI (%)	PRI(mgP/kg)	PRI(kg/ha) to 1000mm	Limitation
BH1/L1	44 (medium)	739	14114.9	Minor
BH1/L2	77 (low)	1740	31313	Minor
BH3/L3	N/A	1880	52264	Minor

5.7 BULK DENSITY

Bulk density is the oven dry weight of the soil per unit volume. It affects porosity and soil strength. Bulk density is a measure of the density of a porous material that takes into account the density of solid material and the amount of porosity. The results in Table 7 indicate bulk density is a major

limitation in regards to DLG (1998), however this assessment expects the topsoil will be reworked to facilitate landscaping.

TABLE 7 SOIL ANALYSIS RESULTS: PHOSPHORUS RETENTION

BH/Lot	Bulk density (g/cm^3)	Comments
BH1/L1	1.91	Major limitation
BH1/L2	1.81	Na for subsoil
BH3/L3	2.78	Na for subsoils

5.8 GROUNDWATER

Groundwater was not encountered across any of soil test pits excavated on site (BH01-BH03). Minor white to grey mottling was evident in the lower slope medium/heavy clay subsoils for bore holes 1 & 2, which may indicate slow internal drainage. However, there was no evidence of water tolerant vegetation (rushes) that may indicate a permanently high water table. The assessment confirms that groundwater is more than 1.0m deep and therefore a minor limitation in accordance with DLG (1998).

6. SUMMARY OF SOIL AND SITE CONSTRAINTS

This report highlights those areas suitable for treated wastewater disposal across the site as well as highlighting any major soil or site constraints that may limit effluent disposal, highlighting the minimum setback distances required.

The site predominately faces west, merging with a dam and drainage depression that travel south west towards Kemps Creek 1.5km away. To the west and across drainage depression towards Aldington Road, the site faces predominately south-south east, again merging with the central drainage depression. Local relief is approximately 39m (92m-53m AHD).

Of the three soil samples sent to ALS for testing, which included Electrical Conductivity, pH, Exchangeable Cation Exchange Capacity, Emerson Aggregate Test; and Phosphorus Retention Index, the only major limitations included an elevated topsoil bulk density, an Emerson Aggregate Class 1 subsoil and an elevated ESP. Class 1 subsoils are almost certainly sodic, confirmed by the elevated ESP. For effluent disposal in sodic soils, gypsum is needed to replace the sodium with calcium and stablise the soil. When removing the topsoil on this site, care will need to be taken to mitigate the potential for erosion of the dispersible subsoil. This includes the stockpiling topsoil onsite for reuse, the use of sediment fencing and upslope stormwater diversion banks.

It is not expected the elevated topsoil bulk density will be an issue. Higher values of bulk density are an indication of poor permeability and restricted plant growth, however, it is expected the topsoil will be replaced to promote plant growth for landscaping. pH is a moderate constraint in the subsoil, which has elevated the aluminium levels in the subsoil. Applying lime with the topsoil will neutralise the acidity and promote plant growth. The clay loam to heavy clay soil profile has suitable phosphorus absorption properties for the application of secondary treated wastewater by subsurface irrigation. The presence of white subsoil mottling is indicative of a fluctuating or seasonably high water table and slow internal drainage, however, subsurface irrigation is ideal for low permeable heavy clay subsoils.

Effluent disposal will be carried out within land nominated as landscaping for the proposed development. The nominated effluent disposal areas are compliant with the buffers and setback distances required by Penrith City Council. Overland flows will be diverted using stormwater diversion banks and swales to minimise the impact of stormwater crossing the effluent disposal area and into receiving waters.

Further requirements including the buffers and setback distances must be in accordance with the DCP for Penrith City Council. Sections 7 of this report will discuss the design and installation of the proposed treatment and disposal measures in further detail.

Photo 1 Soil test pit 1 (BH1) at lower slope

Photo 2 Location of soil test pit 1 (BH1)

Photo 3 Soil test pit 1 (BH1) at lower slope

Photo 4 Location of soil test pit 2 (BH2)

Photo 5 Soil test pit 3 (BH1) at upper slope

Photo 6 Location of soil test pit 3 (BH3)

7. WASTEWATER TREATMENT AND DISPOSAL

7.1 DESIGN WASTEWATER LOAD

The proposed development includes the construction of:

- Community kitchen and dining hall
- Prayer and congregation hall
- Youth/sports centre
- Office
- Community garden
- Car Park
- Library book store
- Traditional temple (Mandir)

Table B1 of the Penrith City Council, On-site Sewage Management and Greywater Reuse Policy (2014) provides estimates for daily flows based on types of premises and the available water supply. Additionally, The NSW Health Department (2001) "Septic Tank & Collection Well Accreditation Guidelines" and AS/NZS 1547:2012 provide similar figures to support the Penrith method. An estimate of the expected population and design wastewater load is shown in Table 8 and is used to size the proposed irrigation area, treatment system and collection/pump-out tanks.

The design wastewater flow for the proposed development is dependent on typical rates of wastewater generation for the various sources and the occupancy rate. The calculations have been made for a normal week (47 weeks / year) and festival week (5 weeks/year).

The main difference between a normal and festival week is in visitor numbers. In a festival week, the maximum number of visitors increases from 600 (weekly congregation) to 800 visitors. The festival encompasses all other activities of the weekend. There is no weekly congregation on the same week as a festival.

Table 8 shows the weekly maximum volume of wastewater generated from a normal week (52,850L/week) and festival week (59,850L/week).

The wastewater treatment and disposal system have been designed for the volume generated from a week with a festival, which is 59,850L/week. **This considers the visitors from all the different facilities and activities within the center over the design week.**

A collection tank will store the week's wastewater with a flow regulated pump delivering 9,000L/d to the treatment system per day. The primary irrigation area has been sized to receive 9,000 L/d.

The calculations for the minimum sized collection tank is 24,050L (see Table 8). **However, the proposed buffer/collection tank will be 50,000L**. Furthermore, the 60,000L treated water storage tank has capacity to store treated wastewater as additional contingency for wet weather storage.

TABLE 8 WASTEWATER DESIGN LOAD BASED ON ESTIMATED POPULATION

NORMAL WEEK (47 WEEKS/YEAR)				
Wastewater source		**Persons**	**Wastewater load (L/p/d)**	**Volume (L/d)**
Prayer/meditation (Monday-Saturday) Twice per day		100	35	3,500
Congregation (Sunday)		600	35	21,000
Festival event (Saturday)		0	35	0
Monks residence (Permanent Occupants) (Mon-Sun)		5	150	750
Staff/workers (Mon-Sun)		20	40	800
Normal weekly Inflow (L/week)		**52,850**		
Total Annual Wastewater (L/Year)		**2,783,200**		
Flow regulated irrigation volume (L/day)		**7,800**		
Days	**In**	**Out**	**Balance**	**Cumulative**
Saturday	5,050	7,800	-2,750	-2,750
Sunday	22,550	7,800	14,750	12,000
Monday	5,050	7,800	-2,750	9,250
Tuesday	5,050	7,800	-2,750	6,500
Wednesday	5,050	7,800	-2,750	3,750
Thursday	5,050	7,800	-2,750	1,000
Friday	5,050	7,800	-2,750	0
		MINIMUM COLLECTION TANK SIZE (L)		**12,000**

FESTIVAL (5 WEEKS/YEAR)				
Wastewater source		**Persons**	**Wastewater load (L/p/d)**	**Volume (L/d)**
Prayer/meditation (Monday-Saturday) Twice per day		100	35	3,500
Congregation (Sunday)		0	35	0
Festival event (Saturday)		800	35	28,000
Monks residence (Permanent Occupants) (Mon-Sun)		5	150	750
Staff/workers (Mon-Sun)		20	40	800
Normal weekly Inflow (L/week)		**59,850**		
Total Annual Wastewater (L/Year)		**2,783,200**		
Flow regulated irrigation volume (L/day)		**9,000**		
Days	**In**	**Out**	**Balance**	**Cumulative**
Saturday	33,050	9,000	24,050	24,050
Sunday	1,550	9,000	-7,450	16,600
Monday	5,050	9,000	-3,950	12,650
Tuesday	5,050	9,000	-3,950	8,700
Wednesday	5,050	9,000	-3,950	4,750
Thursday	5,050	9,000	-3,950	800
Friday	5,050	9,000	-3,950	0
		MINIMUM COLLECTION TANK SIZE (L)		**24,050**

7.2 METHOD OF WASTEWATER TREATMENT

7.2.1 COMMERCIAL SEWERAGE MANAGEMENT FACILITY

A commercial Sewerage Management Facility is proposed to treat wastewater from the proposed development. The owner will need to lodge with council an application to install and operate a Sewage Management System under the Local government act 1993, Section 68. Council will require the owner to have selected a SMF manufacturer and provide Council with the necessary plans and specifications including tank dimensions and capacity, operation and maintenance details, plus the installers name, address, phone number and license number.

The SMF will be installed and maintained in accordance with Section 5 of the guidelines “Use of Effluent by Irrigation, DEC (2004). Upon approval from Penrith City Council, the owner is to enter into a servicing contract with an approved servicing agent for the life of the system and begin a thorough environmental monitoring program. Copies of the written service and monitoring reports should be lodged with Council following each service and following environmental monitoring.

Penrith City Council council is the approving authority, with the Department of Water and Energy (DWE) and NSW Health acting in an advisory role (to council) for processing section 68 approvals. Division 4 of The Local Government (General) Regulation 2005 provides details for the approval to operate as well as the broad performance standards and other criteria for approvals relating to the management of waste.

Components of Aquacell

An Aquacell wastewater treatment system is proposed for installation. Penrith City Council has requested the following information on the *size of the septic **and** collection well components prior to effluent being pumped into the treatment system, sizing of all tanks etc.*

The attached quote includes the following components:

- Buffer tank 50kl
- Sludge tank 30kl
- Treated water storage tank 30kl (increased to 60kl)

The *50,000L buffer tank* is not a conventional collection tank. All wastewater drains to an aerobic buffer tank, as opposed to an anaerobic (septic) tank. This is a single-chamber tank. The effluent is pumped from the aerobic buffer tank, into the treatment system. ‘

The size of the buffer tank is almost twice the peak volume of wastewater generated from a festival (28,000L) and 2.5 times larger than the normal peak volume of wastewater generated from a congregation (21,000L).

The Aquacell quote proposes a *30,000L treated water storage* tank. The size of treated water storage tank will be increased to 60,000L to provide additional capacity for wet weather storage. Therefore, in wet weather when it is not possible to irrigate, the 60,000L tank can hold wastewater for 6.6 days (60,000/9,000L/day).

An overview of the proposed wastewater volumes and components of the treatment system are shown in Figure 2.

Location of tanks and access for sludge removal

Penrith City Council has requested the locations for the wastewater tanks are to be provided on the site plan with consideration given to location to allow for maintenance, servicing, desludging by tanker sized vehicles etc

Locations for the wastewater tanks are shown on the site plan. The location allows for truck access for maintenance, servicing and desludging by tanker sized vehicles. The tanks will need to be de-sludged periodically, usually once every 3-6 months is sufficient. In emergencies, sludge can be pumped back into the buffer tank for re-circulation through the system. The sludge pump-out will usually be done by connecting the truck to a camlock connection at the corner of the shed. This makes it simple and efficient to do the sludge pump-outs. However, in instances of emergency, there may be a requirement for the buffer tank to be pumped out so there is access for the truck to be able to come within close proximity to the sludge tank and to the buffer tank.

Design specifications

Council has requested further details about this system are to be provided including*; system design specifications, effluent quality data, monitoring and maintenance schedule, system testing, documentation of current operating installations of the proposed system etc.*

The manufacturer has provided the specifications for the proposed treatment system and water quality to be produced shown in Figure 3 below, which is an extract from the quote attached ion Appendices.

FIGURE 2 CONCEPT SYSTEM FLOW CHART

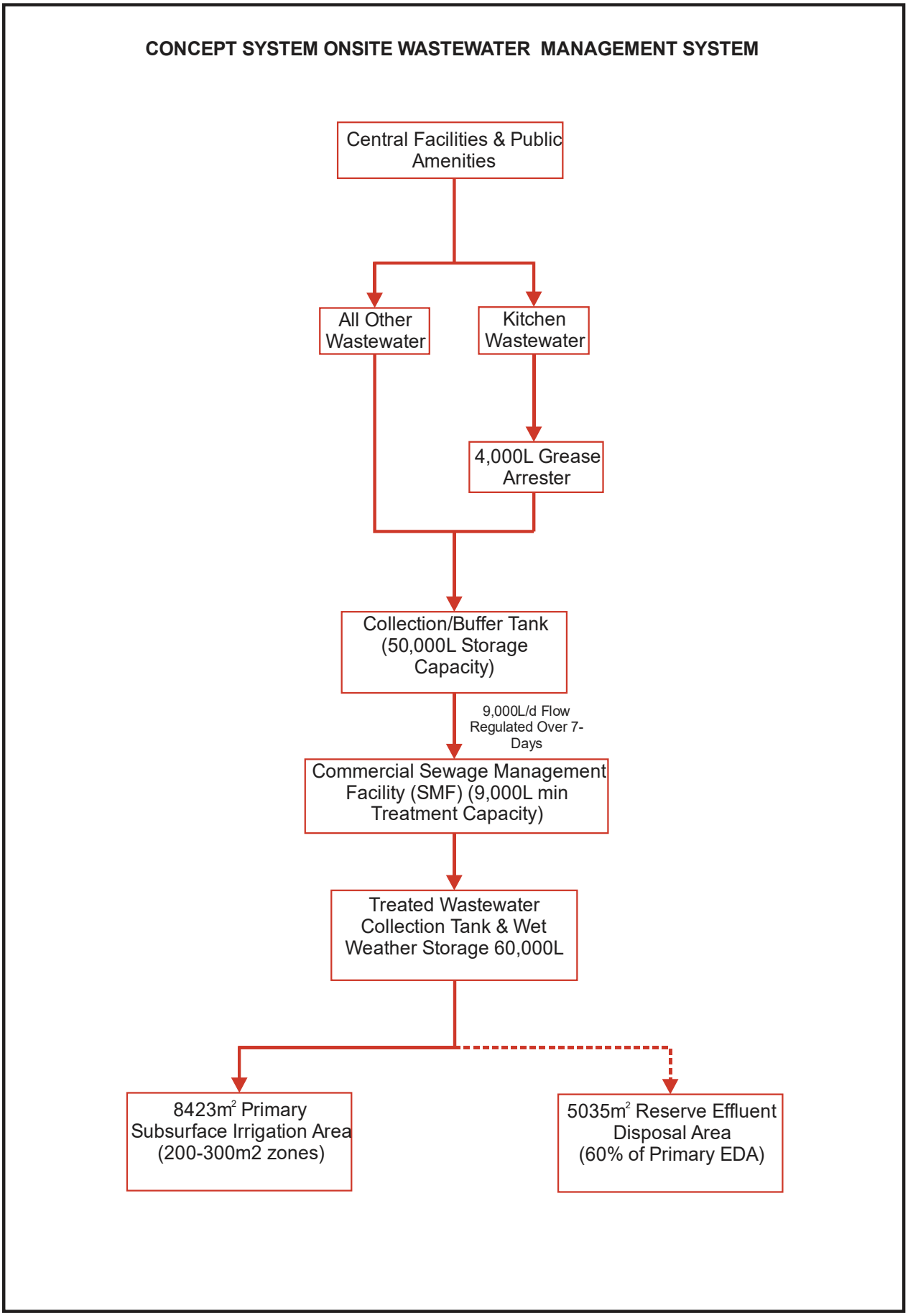


Figure 3 Aquacell water quality performance

Specifications and Performance

Model	**Aquacell**	**S10**
Nominal capacity	**Kilolitres/day**	**9**
Wastewater Source		**Irrigation**
Water Quality Rating		**Toilet flush quality –to EPA/DHS standards**
Power consumption	**3 phase supply with backup power**	**4.5KWH/M3**

Typical Water Quality Produced

Parameter	**Influent Water quality**	**Treated Water quality**
Biochemical Oxygen demand (BOD), mg/l	400	<10
Suspended solids, mg/l	400	<10
pH	6.5-8.5	6.5-8.5
Oil and grease	<50mg/l	<1mg/l
Faecal coliforms cfu/100ml	10^6 - 10^8	<10
E. Coli, organisms/100ml	10^6-10^8	<10
Total Nitrogen	~100mg/l	<25

Photo 7 Example of treatment plant constructed inside shed

Photo 8 Example of buried sludge storage tanks

Photo 9 Example of treatment plant installed outdoors

7.2.2 RISK ASSESSMENT

The treated wastewater will be applied via subsurface irrigation to the subsoil. Wastewater will not be re-used for any other purpose. The proposed SMF will provide secondary and tertiary treatment. After wastewater is applied by subsurface irrigation, there is a low risk of human contact and it is consistent with the DWE definition of a **low level** of risk (DWE, 2008). A low exposure risk level is proposed as the end uses have a low level of human contact. This includes:

a) Urban irrigation with enhanced restricted access and application irrigation, which assumes:

- no access after irrigation (1-4 hours or until dry);
- minimum buffer zones to the nearest point of public access;
- spray drift controls; or

b) Agricultural irrigation.

The commercial SMF will be designed to meet and exceed the effluent compliance values for low level risk, which includes the compliance values listed in Table 9:

TABLE 9 EFFLUENT COMPLIANCE VALUES FOR LOW LEVEL RISK EXPOSURE (DWE, 2008)

E.coli	<1000cfu/100ml
BOD	<20mg/L
SS	< 30mg/L
pH	6.5-8.5
Disinfection (if used) *	Cl:0.2-2.0 mg/L residual UV (TBA)

7.2.3 EFFLUENT QUALITY

Further to DWE (2008) compliance values for low risk effluent, the DEC (2004) sets out the classification of effluent for environmental management based on strength, shown in Table 10 & 11. The commercial sewerage management facility will be designed to meet the DEC (2004) compliance values for Low strength effluent. Where these values are in conflict with the DWE (2008) compliance values, the lesser value is to be used to assess the effluent. Exceeding these values will require corrective action and further environmental management controls.

TABLE 10 CLASSIFICATION OF EFFLUENT FOR ENVIRONMENTAL MANAGEMENT. DEC (2004)

	Strength (Average concentration mg/L)[1]		
Constituent	**Low[2]**	**Medium**	**High**
Total Nitrogen	<50	50-100	>100
Total Phosphorus	<10	10-20	>20
BOD_5	<40	40-1,500	>1,500
TDS[3]	<600	600-1,000	>1,000-2,500
Other pollutants	Effluent with more than five time[4] the ANZECC and ARMCANZ (2000) long-term water quality trigger values for irrigation waters must be considered high strength for the purpose of establishing a strength class for runoff and discharge controls and will require close examination to ensure soil is not contaminated.		
Grease & Oil	Effluent with more than 1,500mg/L of grease and oil must be considered high strength and irrigation rates and practices must be managed to ensure soil and vegetation is not damaged.		

TABLE 11 CLASSIFICATION OF EFFLUENT FOR ENVIRONMENTAL MANAGEMENT. DEC (2004)

Metal	Total concentration (mg/L)	Comments
Aluminum	5.0	High toxicity in acid soils. Not a concern if pH of soils is >6.5
Arsenic	0.1	
Beryllium	0.1	
Cadmium	0.01	Higher toxicity in acid soils
Chromium VI	0.1	
Cobalt	0.05	
Copper	0.2	
Iron	0.2	
Lead	2	
Lithium	2.5	Citrus: 0.075mg/L
Manganese	0.2	
Mercury	0.002	
Molybdenum	0.01	
Nickel	0.2	
Selenium	0.02	
Zinc	2.0	1 mg/L recommended for sandy soil pH 6
Source	ANZECC and ARMCANZ (2000) (refer to any current Australian Water Quality Guidelines as they are updated and endorsed for use in NSW)	
Note:	Trigger values should only be used in conjunction with information on each individual element and the potential for offsite transport of contaminants (See ANZECC & ARMCANZ (2000) Volume 3, section 9.2.5) See also short-term use trigger values (Up to 20 years) and cumulative contaminant loading limit triggers in ANZECC & ARMCANZ (2000), Volume 1, Table 4.2.10.	

7.3 KITCHEN WASTEWATER

7.3.1 GREASE ARRESTER

Wastewater from restaurants and other commercial food service facilities differs significantly from residential wastewater. In addition to higher surge volumes during busy periods, and generally-higher temperatures, restaurant wastewater is typically higher in strength than residential wastewater. This is due to higher levels of oil, grease and foods which cause a higher biochemical oxygen demand (BOD). Oil and grease frequently cause problems for both on-site sewage disposal systems and public sewer systems. The problem occurs when oil and grease liquefy at the high water temperatures used to wash dishes and later solidify in sewer lines or sensitive soil interfaces in the effluent disposal area (EDA) of onsite systems. The problem is exacerbated when highly efficient detergents are used to emulsify the oil and grease, keeping them in suspension until they enter the SMF and EDA. Although conventional grease traps are supposed to prevent grease from entering the SMF/EDA, high grease loads, emulsified grease, and surge wastewater loadings often cause grease to bypass the grease trap and enter the downstream SMF and EDA. When grease reaches the EDA it can physically clog the soil pores preventing both water infiltration and the free transfer of oxygen necessary to digest waste.

The high BOD present in grease also promotes excessive bacterial growth which causes the formation of a thick anaerobic biomat that has less ability to actually treat the waste. The result is

premature failure of the EDA. Data suggests that if the EDA at restaurants are to function in the long term, design modifications must be made which take into account the much higher wastewater strength, flow variations, and oil and grease constituents found in restaurant wastewater. The SMF manufacturer should be contacted to ensure their system can effectively treat kitchen wastewater.

7.3.2 SIZING GREASE ARRESTER

Grease arresters are sized in accordance with Sydney Waters Guidelines – Plumbing for retail food businesses, Table 12. The grease arrester is sized based on the commercial process and number of seats/beds proposed for the development. For this development a **4000L grease arrester** is proposed for the central facilities building with in-floor and in-sink pre-screening devices fitted in all food preparation areas.

TABLE 12 MINIMUM GREASE ARRESTER SIZE

Commercial Process[1]	Seat/beds	Minimum Grease Arrester size[2]	In floor and in sink bucket
Restaurant/functions	1-69	1000 L	Yes
Restaurant/functions	70-199	1500 L	Yes
Restaurant/functions	200-399	2000 L	Yes
Restaurant/functions	400-599	3000 L	Yes
Restaurant/functions	600-799	4000 L	Yes
Restaurant/functions	800-1000	5000 L	Yes

NOTES
[1] For other commercial uses see source.
[2] Arrestors have a minimum hydraulic capacity equivalent to discharges from one hour of peak use. Additional capacity may be required to moderate high temperatures or for other reasons.
Source: Sydney Water – Plumbing for retail food businesses.

7.4 REQUIRED IRRIGATION AREA

7.4.1 SIZING OF IRRIGATION AREA

A) The required irrigation area has been sized for the proposed development based on the following design parameters:

- The use of a Commercial Sewerage Management Facility;
- Effluent treated to a secondary quality;
- Town (reticulated) water supply; and,
- Medium to heavy clay subsoils.

B) The irrigation area needed to manage **9,000L/d** was calculated using a monthly water and nutrient balance, following the method described in DLG (1998). Soil texture classification for Design Irrigation Rate are from AS/NZ 1547(2012), shown in appendix VIII.

C) The ***water balance*** irrigation areas are based on the following variables:

- Orchard Hills Treatment Works median monthly rainfall;
- Badgerys Creek monthly average evaporation;
- Application rates of 2mm/day for medium-heavy clay subsoils; and,
- Crop factors of 0.4-0.7 for pastures and runoff coefficient of 0.9.

D) The ***nitrogen balance*** irrigation areas are based on the following variables:

- SMF will reduce Total Nitrogen to **25mg/L**; and,
- Crop uptake rate of 78kgN/ha/year **(27mgN/m^2/d)** for **unmanaged pastures**.

E) The ***phosphorus balance*** irrigation areas are based on the following variables:

- SMF will reduce Total Phosphorus to **12mg/L;**
- Crop uptake rate of 12kgP/ha/yr (**3mg/m^2/d**) for **unmanaged pastures**;
- Soils will be effective to retain 0.3% of predicted sorption for a soil depth of 1m;
- P-sorption of 400mg/kg for clay subsoils; and Bulk density of 1.5g/cm^2 for intermediate soils. Equating to a P-Sorption of **600,000 mgP/m^2**; and,
- 50-year design life of system.

Table 13 summarizes the results of the monthly water and nutrient balances to size the proposed irrigation areas. The largest of the three methods (**most limiting**) is required for onsite wastewater disposal. For this site **8395m^2** of subsurface irrigation is required to manage 9,000L/d.

Copies of the spread sheets used to determine the size of the effluent management areas are attached in Appendices VII, VIII and IX of this report.

TABLE 13 SUMMARY OF CALCULATED IRRIGATION AREA

Irrigation Area			
Design Flow	**Water Balance**	**Nitrogen Balance**	**Phosphorus Balance**
9,000L/day	4589.5m^2	**8423m^2**	8213m^2

7.4.2 RESERVE EFFLUENT DISPOSAL AREA

A reserve wastewater disposal area provides the opportunity for increasing the irrigation area if it is required at some point in the future. A 60% reserve area is available that meets the hydraulic balance area of **5035m^2**. The reserve area has the same buffer requirements as the primary area.

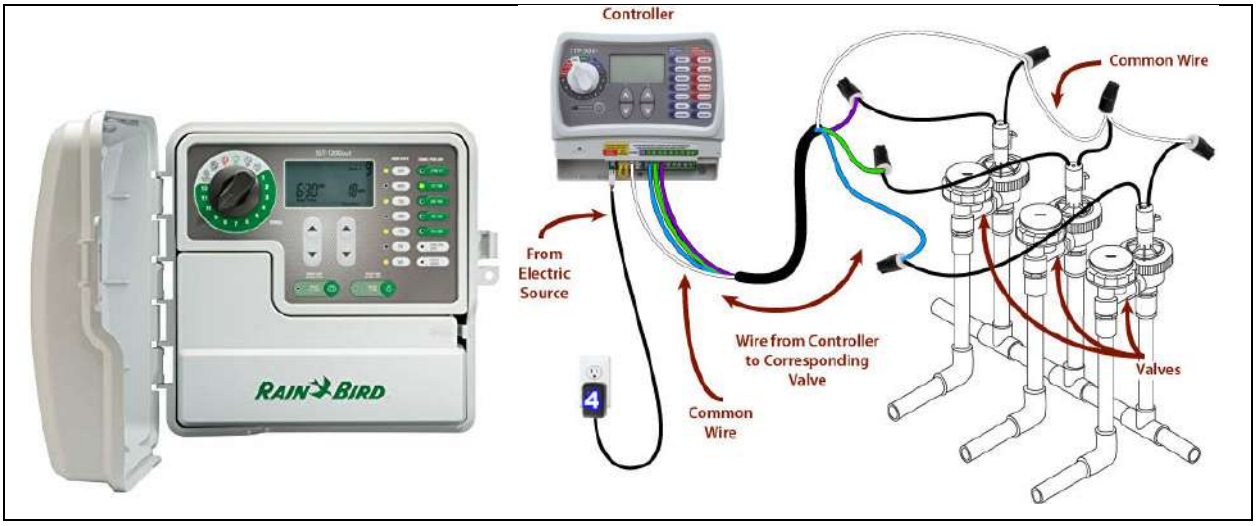
7.4.3 MANAGEMENT OF IRRIGATION ZONES

The 8423m^2 irrigation area will be managed within zones that are sized to receive the design loading rate that is proportional to the volume of wastewater being produced at any one time. Each zone cannot receive more than the design wastewater load. The management of these zones will be controlled by an automated irrigation control system.

An irrigation specialist will be needed to design and install the subsurface irrigation system, control valves (solenoids) and automated control system. The size of the irrigation zones will be calculated based on specific pump sizes and pump wells for effective distribution of wastewater within the management zone. The attached Site Plan conceptually shows 10 management zones.

The irrigation system will be automated, with wet weather sensors that over ride the disposal of wastewater to the irrigation area during wet weather for storage in the 60kL treated storage tank. A concept of how the automated irrigation system would be set up is shown in Figure 4.

FIGURE 4 CONCEPT FOR IRRIGATION ZONE MANAGEMENT CONTROL



7.5 SITE ACCESS AND SIGNAGE

Public access will be restricted from the proposed irrigation area to prevent direct contact with effluent. The irrigation area will be fenced and sign posted. In all areas where the wastewater treatment or pipes run within areas of public access, all pipes and taps must be colour coded and/or signs marked, for example: 'EFFLUENT - NOT FOR DRINKING'. International diagram signs for non-English speakers will be necessary. Childproof taps should be used to prevent children from drinking non-potable water. Signs should be visible from the main point of access advising the type of reuse and any relevant restrictions to the public. Australian Standard, AS 1319–1994, Safety Signs in the Occupational Environment (Standards Australia 1994) should be referred to.

7.6 BUFFER DISTANCES

Table 14 shows the buffer distances in accordance Section 4 of the DEC (2004) for commercial irrigation schemes and the DLG (1998) for domestic systems. These are consistent with the buffers and setback distances specified in Table 3 of the Penrith City Council On-Site Sewage Management and Greywater Reuse Policy (April 2014), Appendix III.

The proposed wastewater disposal area is compliant with the relevant DLG (1998) buffer distances and DEC (2004) specified buffers for low effluent strength. Effluent quality criteria for low risk treated sewage is described in section 7.2.

TABLE 14 RECOMMENDED BUFFER DISTANCES

RECOMMENDED BUFFER DISTANCES DEC (2004) COMMERCIAL SYSTEMS		
	Low effluent strength	**High effluent strength**
Where spray irrigation gives rise to aerosols near houses, schools, playing fields, public open spaces and water bodies.	50m*	50m
Natural water bodies (e.g. rivers and lakes)	50m	50m
Other waters (e.g. artificial water with beneficial uses, small streams, intermittent streams, water distribution, drainage channels and dams)	Site-specific	Site-specific
Others sensitive areas (e.g. waters in drinking water catchments, aquatic ecosystems with high conservation value, wetlands, native stands for vegetation)	Site-specific	250m
Domestic well used for household water supply	Site-specific	250m
To town water supply bores	Site-specific	1000m
RECOMMENDED BUFFER DISTANCES DLG (1998) DOMESTIC SYSTEMS		
Domestic groundwater well	100 metres	
Permanent surface waters (e.g. rivers, creeks, streams, lakes etc.)	100 metres	
Other waters (e.g. dams, intermittent water courses, overland flow paths etc.)	40 metres	
In-ground water tank	15metres	
Drip line of native trees and shrubs	1 metre	
Buildings, driveways and property boundaries	6 metres if area up-slope and 3 metres if area down-slope	

* Recommended in ARMCANZ, ANZECC and NHMRC (2000) for spray application of reclaimed water from sewerage systems.

8. MONITORING REQUIREMENTS

Monitoring will be conducted in accordance Section 5 of DEC (2004). Monitoring results will assist in demonstrating due diligence and include:

- Validation and verification that the system design and equipment is adequate for the necessary treatment;
- Confirmation of the ongoing operational performance of the treatment system to protect human health and the environment; and
- Detection of any potential or actual failures on the treatment system and implement the appropriate corrective actions.

8.1 MONITORING PROGRAM

An effluent, soil & groundwater monitoring program will report on the performance of the effluent irrigation scheme for the life of the system. This will be prepared in consultation with Council.

Effluent samples will be taken directly from the outlet of the sewerage management facility to ensure it meets the requirements for low strength and low risk effluent. A guide to the frequency and constituents to be tested are presented as follows within Tables 15.

The owner shall arrange for the wastewater treatment system and effluent irrigation area to be inspected by an employee at least once a week to look for signs of failure, which could include ponding of effluent or odors. Appropriate action is to be taken to rectify any faults, complaints or non-conformance as soon as practically reasonable.

8.2 CONFIRM PERFORMANCE

Monitoring will occur monthly for the first year of operation to ensure the design of the SMF and surface water management procedures are effective in both wet and dry seasons. The results will be provided to Council and used to confirm performance and whether any adjustments are required. After this, monitoring will be conducted on an annual or event-only basis, the results will be provided to Council and used to confirm performance and whether any adjustments are required. See Table 16. In addition to effluent sampling, soil and groundwater monitoring would be a component of the Operation Environment Management Plan. The methodology for this would be determined post installation. See Tables 16 & 17.

8.3 NON-CONFORMANCE AND COMPLAINTS

Any non-compliance, complaints or incidents will be handled in accordance non-compliance and complaints procedures. This includes recording the informants name, contact details, details of the event including cause, who received the complaint and follow up action taken. There is a duty to report pollution incidents under Section 148 of the ***Protection of the Environment Operations Act 1997*** **(POEO Act)**. Pollution incidents causing or threatening material harm to the environment must be notified. A 'pollution incident' includes a leak, spill or escape of a substance, or circumstances in which this is likely to occur. 'Material harm to the environment' is defined in Section 147. Material harm includes on-site harm, as well as harm to the environment beyond the premises where the pollution incident occurred. For further information, see https://www.epa.nsw.gov.au/reporting-and-incidents/incident-management/duty-to-notify-pollution-incidents

TABLE 15 RECOMMENDED EFFLUENT SAMPLING STRATEGY

	Frequency of sampling		
Constituent	**Low Strength**	**Medium Strength**	**High Strength**
TSS	Quarterly	Quarterly	Monthly
Oil and grease	Biannually	Quarterly	Quarterly
Total P	Biannually	Quarterly	Quarterly
Total N	Biannually	Quarterly	Quarterly
BOD_5	Quarterly	Quarterly	Monthly
pH	Quarterly	Quarterly	Monthly
EC (dS/m); TDS	Quarterly	Quarterly	Monthly
Cations	Quarterly	Quarterly	Quarterly
SAR (√(meq/L))	Quarterly	Quarterly	Quarterly
Metals	yearly	Yearly[2]	Yearly[2]
Ocs	Yearly	Yearly[2]	Yearly[2]
Herbicides	Yearly	Yearly[2]	Yearly[2]
Thermotolerant coliforms (cfu/100ml)	Use specific[3]	Use specific[3]	Use specific[3]
Flow rate (L/d)	Monthly	Monthly	Monthly
Other	Advice should be sought from the Department of Environment and Conservation or local council[4]	Advice should be sought from the Department of Environment and Conservation or local council[4]	Advice should be sought from the Department of Environment and Conservation or local council[4]
Notes:	1. Units are in mg/L unless otherwise stated. 2. Higher frequencies will be required where these constituents are the constituents that determine the medium or high strength classification 3. Other effluents may not require monitoring for thermotolerant coliforms. Obtain advice from NSW-Health and/or NSW Department of Primary Industries. 4. Seek advice from the appropriate regulatory authority 5. BOD_5 may be replaced by tests such as chemical oxygen demand provided the relationship between the two measures is established.		

TABLE 16 RECOMMENDED SOIL MONITORING STRATEGY

	Frequency of sampling	
Constituents[1]	**Surface soil**	**Soil profile at four depth increments**
pH	Yearly	Yearly
EC (dS/m)	Yearly	Yearly
Nitrate-N	Yearly	Yearly
Total N	After 3 years	N/A
Available P	Yearly	N/A
Total P	After 3 years	After 3 years
Exchangeable sodium % (ESP)	Yearly	After 3 years
Heavy Metals and pesticides.	After 10 years[3]	N/A
P sorption capacity[2] (kg/ha)	After 3 yea (site-specific)	After 3 yea (site-specific)
Notes:	1. Units are in mg/L unless otherwise stated 2. As recommended by an accredited laboratory or soil specific 3. Or more frequently if any are identified/calculated as a risk factor.	

TABLE 17 RECOMMENDED GROUNDWATER MONITORING STRATEGY

Constituents[1]	Frequency of sampling[1,2]
Groundwater height	Quarterly
pH	Quarterly
EC (dS/m)	Quarterly
Cations (mg/L)	Yearly
Nitrate-N	Yearly
Total N	Yearly
Available P	Yearly
Total P	Yearly
Notes:	1. Groundwater need only be monitored if it is within 10m of ground surface and/or if existing groundwater quality at risk from the effluent irrigation scheme. 2. Groundwater sampling should occur on the established enterprises before crop planting, during the middle of the crop growth and quarterly/yearly thereafter (as above).

9. SUMMARY

This assessment was prepared to address the relevant soil and site assessment criteria for on-site wastewater management. The specific recommendations of this report can be summarized as follows:

- The wastewater assessment has been sized to account for the maximum volume of wastewater generated from a week hosting a festival on one day of the weekend, which would have 800 guests. The maximum volume of wastewater from the festival is estimated to be 28,000L/day. Over the 7 day week which includes a festival, the facility would generate up to 59,850L. This is equivalent to an average of 8,550/day (rounded up to 9,000L/day).

- The property has 13,458 available for wastewater disposal, of which 8,423m^2 will be installed with subsurface irrigation and the remaining 5035m^2 of land is allocated for reserve wastewater disposal. The 8423m^2 subsurface irrigation area has the capacity to receive 9,000L/day.

- The specified Aquacell Commercial Aerated Wastewater Treatment System has the capacity to treat at least 9,000L of wastewater per day. This will reduce Total Nitrogen to less than 25mg/L and Total Phosphorus to less than 12mg/L.

- The manufacturer of this treatment system has proposed the following tanks and sizes as part of the specification:

  - Buffer tank 50kl
  - Sludge tank 30kl
  - Treated water storage tank 30kl

- The size of the treated wastewater storage tank will be increased from 30kl to 60kl to provide wet weather storage.

- The 50,000L buffer collection tank will be used to hold effluent prior to treatment in the sewage management facility and provide additional storage for peak flows during festivals that are expected to occur 5 times a year.

- All tanks will be buried and accessible for truck access to maintain and remove sludge.
- Install a 4,000L grease arrester for the central facilities building with in-floor and in-sink pre-screening devices fitted in all food preparation areas.
- Install 8,423m^2 of subsurface irrigation to dispose of treated wastewater from the sewage management facility, as described in the Appendix and shown on the Site Plan.
- Install stormwater diversion banks to increase overland flow paths and minimise stormwater run on to the proposed effluent disposal area.
- Treat slightly acidic soils with lime on a regular basis and pasture species tolerant of these conditions are grown; and
- Treat sodic soil with gypsum to replace the sodium with calcium and improve soil structure and drainage.

10. REFERENCES

Department of Local Government (1998) On-site Sewage Management for Single *Households*. NSW Government.

Standards Australia (2012) Australian/New Zealand Standard 1547:2012 *On-site* domestic wastewater management. Standards Australia.

NSW Health Septic Tank Accreditation Guidelines (2001).

Hazelton, P.A and Murphy, B.W ed. (1992) What Do All the Numbers Mean? A Guide for the Interpretation of Soil Test Results. Department of Conservation and Land Management (incorporating the Soil Conservation Service of NSW), Sydney.

Designing and Installing On Site Wastewater Systems. A Sydney Catchment Authority Current Recommended Practice (May 2012).

Penrith City Council's On-site Sewage Management and Greywater Reuse Policy

NSW Agriculture (July 1999) Pastures and Acid Soils, pamphlet in a series on Acid Soil Management, prepared for the New South Wales Acid Soil Action Program by Mick Duncan, Acid Soils Specialist, Armidale, July 1999

Department of Environment and Conservation (2004) Environmental Guidelines Use of Effluent by Irrigation

APPENDIX I SOIL TEST PIT LOG

ONSITE SOIL ASSESSMENT				
Site Location: 230-242 ALDINGTON ROAD, KEMPS CREEK, NSW				
Soil assessment method: Northcote textual			Date of assessment: 08/06/2017–8/10/2018	
Method of excavation: Excavator/Shovel/crowbar			Assessor: Sean Harris	
Number of bore holes: Two (2)				
Bore Hole Location	Lower slope		**GPS Latitude**	
Bore Hole Number	BH 1		**GPS Longitude**	
	Layer 1	**Layer 2**	**Layer 3**	**Layer 4**
Depth	0-300mm	300-1200mm		
Texture	Clay loam	Heavy clay		
Color	Brown	Orange/red		
Structure	Well	Massive		
Coarse fragments	No	No		
Water observation	No	No		
Mottling	No	No		
Fill material	No	No		
Site Features	**Flood potential**	Above 1 in 20 AEP	**Exposure**	Western aspect
	Frost Potential	Minor	**Slope**	5-6%
	Erosion potential	Moderate	**Landform**	Uniform side slope
	Comments	Soil test pit located at the lower constraints of the site, adjacent to Aldington road. Site is partially vegetated, full sun and wind exposure. Landscape used for agricultural purposes, evidence of disturbed soil and clay capping adjacent to soil test pit. Site assessed 08/06/2017.		
Bore Hole Location	Lower slope		**GPS Latitude**	
Bore Hole Number	BH2		**GPS Longitude**	
	Layer 1	**Layer 2**	**Layer 3**	**Layer 4**
Depth	0-150mm	150-500mm	500-700mm	700-1200mm
Texture	Medium clay	Gravely loam	Heavy clay	Heavy clay
Color	Light brown	Brown	Orange/red	Dark red
Structure	Well	Moderate	Massive	Massive
Coarse fragments	0-5%	5-10%	No	No
Water observation	No	No	No	No
Mottling	No	No	No	No
Fill material	Yes- Clay cap	No	No	No
Site Features	**Flood potential**	Above 1 in 20 AEP	**Exposure**	West Aspect
	Frost Potential	Minor	**Slope**	5-6%
	Erosion potential	Minor	**Landform**	Uniform side slope
	Comments	Soil test put located at lower constraint of the site, centre of site adjacent to Aldington road. Site is partially vegetated, full sun and wind exposure. Landscape used for agricultural purposes, Site has been disturbed for agricultural purposes. Topsoil is a clay capping. Site assessed 08/10/2018.		
Bore Hole Location	Upper slope		**GPS Latitude**	
Bore Hole Number	BH3		**GPS Longitude**	
	Layer 1	**Layer 2**	**Layer 3**	**Layer 4**
Depth	0-300mm	300-650mm	650-1200mm	
Texture	Gravely Clay loam	Clay loam	Medium Clay	
Color	Dark brown	Brown	Tan	
Structure	Weak	Well	Massive	
Coarse fragments	5-10% coal wash	0-5%	No	
Water observation	No	No	No	
Mottling	No	No	No	
Fill material	Yes – Coal wash	No	No	
Site Features	**Flood potential**	Above 1 in 20 AEP	**Exposure**	Western aspect
	Frost Potential	Minor	**Slope**	4-5%
	Erosion potential	Minor	**Landform**	Hill crest
	Comments	Soil test pit located up upper constraints of the site, towards the hill crest adjacent to existing dwelling and within turning circle for access. Site fully grassed, full wind and sun exposure. Evidence of soil fill material, likely coal wash top soil. Site assessed 08/10/2018.		

APPENDIX II SUBSURFACE IRRIGATION

i) Irrigation zones can be controlled by either electric solenoid valves or hydraulic sequencing valves (ie water rotor). In a hydraulic system, the controller and valves are connected via small plastic tubes approximately 4 mm (¼ in) in diameter, connected to the valve, allowing that valve to open. The electromechanical or electronic controllers are connected to an electrical circuit that operates a solenoid attached to each valve (solenoid valve). When the solenoid is actuated, the water above the diaphragm is relieved and the valve opens.

ii) Each zone is to receive an even proportion of wastewater.

iii) Immediately after the SMF, a disc filter or a 100 to 150-micron filter is to be installed (ie, before the sequencing valve or distribution manifold). The filter must be cleaned regularly (at least every 3 months).

iv) The distribution pipe from the SMF to the distribution manifold shall consist of a 32mm uPVC or polythene pipe, buried 300mm underground. Where vehicles pass over the line, it should be 450mm for light traffic and 500mm for heavy traffic.

v) Pressure compensating subsurface drip line is used with emitters and laterals at approximately 800mm spacing's (min 600mm, maximum of 1000mm depending on soil type) and buried to a depth of 100mm – 150mm below finished ground level (in accordance with ASNZ1547:2012).

vi) The drip line is to be impregnated with root inhibitor or include a tech filter that dispenses a root inhibitor (a chemical injector assembly or impregnated emitter tube) to protect drip line from root ingress.

vii) Air release valves should be located at the highest point and flush valves at the lowest point of each sub-surface zone and shall be contained within a durable protective housing with a lilac lid to indicate wastewater.

viii) Additional air/vacuum valves, pressure-reducing valves and non-return / tube non-leakage valves are to be included into the design as needed. ie., where the effluent irrigation area is located above the treatment system or pump well, a non-return valve.

ix) The system must have capacity to enable flushing to remove any suspended solids and organic growth that may accumulate.

x) The effluent irrigation system should be tested to ensure there is uniform effluent delivery to all parts of the irrigation area.

xi) The effluent management area must be fenced off from livestock and vehicles.

xii) The irrigation area should be vegetated with grass before commissioning. The grass within the irrigation should be mown on a regular basis and dispose of clippings outside the irrigation area. The vegetation in such areas should be suitably tolerant of high water and nutrient loads.

Appendix iii **Extract from Penrith DCP - Buffers And Setback Distances**

System	Buffer Distances
All OSSM systems (including tank)	• 250 metres to domestic groundwater well • 100 metres to permanent surface waters (e.g. rivers, creeks, streams, lakes etc) • 40 metres to other waters (e.g. dams, stormwater easements, overland flow paths, intermittent waterways and drainage areas etc) • 15 metres from an in-ground water tank • 1 metre from the drip line of native trees and shrubs • For tank – minimum 1.5 metres from dwelling
Surface spray irrigation	• 15 metres to dwellings • 6 metres if area up-slope and 3 metres if area down-slope of buildings, driveways and property boundaries • 3 metres to paths and walkways • 6 metres to swimming pools and recreational areas
Surface drip and trickle irrigation	• 6 metres if area up-slope and 3 metres if area down-slope of dwellings, swimming pools, property boundaries, driveways and buildings
Subsurface irrigation	• 6 metres if area up-slope and 3 metres if area down-slope of dwellings, swimming pools, property boundaries, driveways and buildings
Absorption system	• 12 metres if area up-slope and 6 metres if area down-slope of property boundaries and dwellings • 6 metres if area up-slope and 3 metres if area down-slope of swimming pools, driveways and buildings

Notes: (1) Additional buffer distances may be required as identified during Council's assessment of the development proposal.

APPENDIX IV SOIL ASSESSMENT: RATING FOR ONSITE SYSTEMS

Property	Relevant System(s)	Limitation			Restrictive feature
		None/minor	Moderate	Major[1]	
Depth to bedrock or hardpan (m)	Surface & subsurface irrigation	>1.0	0.5-1.0	<0.5	Restricts plant growth (trees), excessive runoff, waterlogging
	Absorption system	>1.5	1.0-1.5	<1.0	Groundwater pollution hazard resurfacing hazard
Depth to high episodic/seasonal watertable (m)	Surface & subsurface irrigation	>1.0	0.5-1.0	<0.5	Groundwater pollution hazard resurfacing hazard
	Absorption system	>1.5	1.0-1.5[2]	<1.0	Potential for groundwater pollution
Soil permeability category [3]	Surface & subsurface irrigation	2b, 3 and 4	2a, 5	1 and 6	Excessive run-0ff, waterlogging, percolation
	Absorption system[4]	3 and 4		1,2,3 and 6	
Course fragments (%)	All land application systems	0-20	20-40	>40	May restrict plant growth, affect trench installation
Bulk density (g/cm^3) sandy loam Loam & clay loam Clay	All land application systems	 <1.8 <1.6 <1.4	-	 >1.8 >1.6 >1.4	Restricts plant growth, indicator of permeability
pH (CaCl)	All land application systems	>6.0	4.5-6.0	-	Reduces optimum plant growth
Electrical conductivity (dS/m)	All land application systems	<4	4-8	>8	Excessive salt may resist plant growth
Sodicity (Exchangeable sodium percentage)[5]	Surface & subsurface irrigation (0-40cm) Absorption system (0-1.2m)	<5	5-10	>10	Potential for structural degradation
Cation exchange capacity (cmol+/kg) (0-40cm)	Surface & subsurface irrigation	>15	5-15[6]	<5	Unable to hold plant nutrients
Phosphorus sorption (kg/ha) (0-100cm for irrigation)	All land application systems	>6000	2000-6000	<2000	Unable to immobilise any excess phosphorus
Modified Emerson Aggregate Test (dispersiveness)[7]	All land application systems	Class 4,5,6,7,8	Class 2,3	Class 1	Potential for structural degradation

Notes:

1. Sites with these properties are generally not suitable.
2. Presence of soil water might indicate soil conditions that favor movement of nutrients and other contaminants into the ground water.
3. See table 8 of DLG (1998).
4. Rate of application should not exceed 2-5mm/day for soil absorption systems.
5. Because of the elevated levels of sodium in domestic wastewater, gypsum should be put on application areas each year. Soil absorption systems should also be dosed on a regular basis.
6. Soil is likely to become more acidic with effluent irrigation.
7. DLG (1998) displays incorrect values for EAT, Modified based on DEC (2004) recommendations.

APPENDIX V Site assessment: Rating for onsite systems

Site Feature	Relevant System(s)	Limitation			Restrictive feature
		None/minor	Moderate	Major[1]	
Flood potential	All land application systems	Rare, above 1 in 20 year flood contour		Frequent, below 1 in 20 year flood contour	Transport of wastewater off-site
	All treatment systems	Vents, openings and electrical components above 1 in 100 year flood contour		Vents, openings and electrical components below 1 in 100 year flood contour	Transport of wastewater off-site. System failure and electrocution hazard
Exposure	All systems	High sun and wind exposure		Low sun and wind exposure	Poor evapotranspiration
Slope %	Surface irrigation	0-6	6-12	>12	Run-off, erosion
	Sub-surface irrigation	0-10	10-20	>20	Run-off, erosion
	Absorption systems	0-10	10-20	>20	Run-off, erosion
Landform	All land application systems	Hill crests, convex side slopes and plains	Concave side slopes and foot slopes	Drainage plains and incised channels	Groundwater pollution hazard resurfacing hazard
Run-on and upslope seepage	All land application systems	None-low	Moderate	High, diversion not practicable	Transport of wastewater off-site
Erosion potential	All land application systems	No signs of erosion potential present		Sign of erosion, eg rills, mass movement and slope failure, present	Soil degradation and transport, system failure.
Site drainage	All land application systems	No visible signs of surface dampness		Visible signs of surface dampness, such as moisture-tolerant vegetation (Sedges and ferns) and seepages, soaks and springs.	Groundwater pollution hazard resurfacing hazard
Fill	All systems	No fill	Fill present		Subsidence. Variable permeability
Buffer distance	All systems	(see table 5 DLG 1998)			Health and pollution risk
Land area	All systems	Area is available		Area is not available	Limits system performance
Rocks and rock outcrops (% of land surface containing rocks >200mm diameter)	All land application systems	<10%	10-20%	>20%	Groundwater pollution hazard.
Geology/regolith	All land application systems			Major geological discontinuities, fractures or highly porous regolith.	

Source: DLG 1998

APPENDIX VI Comments from PCC on HEC SUMMARY REPORT (29/1/2019)

From: Paul Anzellotti <paul.anzellotti@penrith.city>
Sent: Wednesday, 13 February 2019 11:20 AM
To: Warwick Stimson <warwick@stimsonandbaker.com.au>
Subject: environmental comments for DA17/1247

Hello Warwick

In Janes absence (Jane is on leave until the 25 February) please find below comments returned by Council's Environmental Management section (provided in red below) in relation to the recent amendments to the on-site waste water relating to the proposal.

Clarification of any comments should be directed to Kirk Ryan (Senior Environmental Health Officer) directly on 4732 7696 or email Kirk.Ryan@penrith.city

Cheers

Paul

A review has been conducted of the 'Summary of Proposed Amended On Site Wastewater Management Application' (2383 WW V3.0) for 230-242 Aldington Road Kemps Creek prepared by Harris Environmental Consulting dated 29/1/2019. The following comments are provided.

- *The concept summary is generally satisfactory, however, a number of issues require further detail or clarification to be provided in the full amended report.*
- *The deletion of the Monks Quarters increases the available effluent disposal area significantly. The full amended report will need to clearly show all buffer distances and show no landscaped areas over the fenced-off, sub-surface effluent disposal areas.*
- *The litres/person figures provided are satisfactory.*
- *The proposed balance tank to regulate flows to the treatment system is supported. The current figures outlined in the above report for the balance tank are not supported. The balance tank must be suitably sized to receive all wastewater in the worst case scenario times. This will be during the festivals with 800-900 visitors plus the permanent occupants and staff. The sizing is to be recalculated to address this and a sludge allowance.*
- *Further details are to be provided on the proposed wastewater system treatment train e.g. inclusion of septic **and** collection well components prior to effluent being pumped into the treatment system, sizing of all tanks etc.*
- *Locations for the wastewater tanks are to be provided on the site plan with consideration given to location to allow for maintenance, servicing, desludging by tanker sized vehicles etc and ensuring all infrastructure is located outside of flood affected land.*
- *The proposed wastewater treatment system is an Aquacell. Further details about this system are to be provided including; system design specifications, effluent quality data, monitoring and maintenance schedule, system testing, documentation of current operating installations of the proposed system etc.*
- *Proposed effluent disposal area sizing appears satisfactory, being 11,910m^2. Penrith City Council would recommend this entire area be established into manageable zones which will allow for even distribution of effluent over the entire effluent disposal area.*

- *Page 5 of the above report shows two nitrogen balances with both showing results for phosphorous uptake. Clarification on this is required.*

Based on the above comments and review of the proposal, the proposed application is unsatisfactory. Prior to further assessment by the Environment Team, the above matters must be addressed by the applicant in an amended on site wastewater assessment. Please refer back to the Environment team when the issues raised above have been fully addressed.

Paul Anzellotti
Principal Planner

E paul.anzellotti@penrith.city
T +612 4732 8606 | F | M
PO Box 60, PENRITH NSW 2751
www.visitpenrith.com.au
www.penrithcity.nsw.gov.au

PENRITH
CITY COUNCIL

Follow us

APPENDIX VII WATER BALANCE

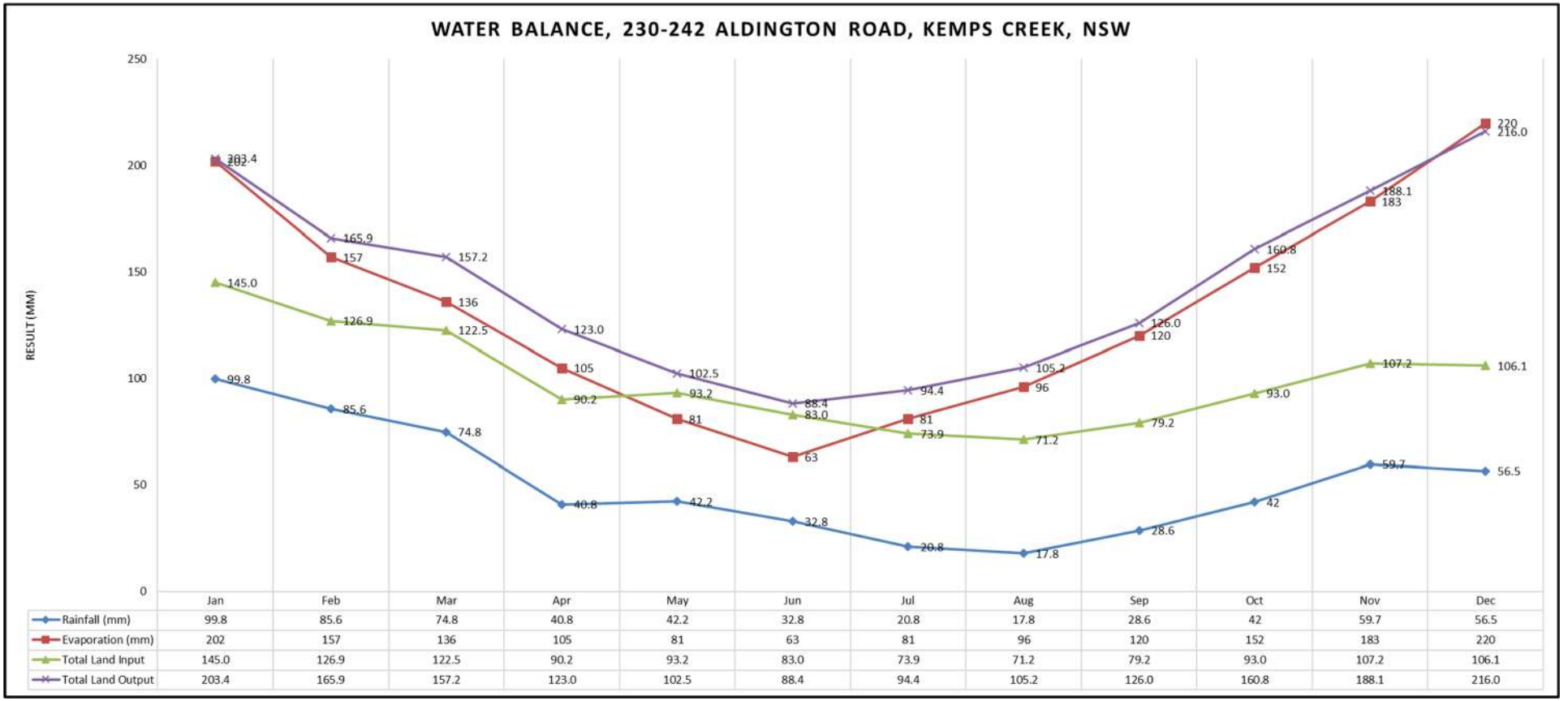
Minimum Area Water Balance & wet Weather Storage Calcs

Site Address: **230-242 Aldington Road, Kemps Creek NSW**

INPUT DATA			
Design Wastewater Flow	Q	9,000	L/day
Design DIR (from AS/NZ 1547,2000)	DIR	14	mm/week
Daily DIR		2.0	mm/day
Crop Factors (Pastures)	C	0-4-0.70	Unitless
Runoff Coefficient	RC	0.9	Unitless
Nominated Land Application Area	L	5052.7	m sq
Rainfall Data	Orchard Hills Treatment Works		
Evaporation Data	Badgerys Creek		

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D	\	days	31	28	31	30	31	30	31	31	30	31	30	31	**365**
Rainfall	R	\	mm/month	99.8	85.6	74.8	40.8	42.2	32.8	20.8	17.8	28.6	42	59.7	56.5	**601.4**
Evaporation	E	\	mm/month	202	157	136	105	81	63	81	96	120	152	183	220	**1596**
Crop Factor	C	\		0.70	0.70	0.70	0.60	0.50	0.45	0.40	0.45	0.55	0.65	0.70	0.70	
INPUTS																
Precipitation	(P)		mm/month	89.82	77.04	67.32	36.72	37.98	29.52	18.72	16.02	25.74	37.8	53.73	50.85	**601.4**
Effluent Irrigation	(W)	(Q x D) / L	mm/month	55.2	49.9	55.2	53.4	55.2	53.4	55.2	55.2	53.4	55.2	53.4	55.2	**650.14745**
Inputs		(P+W)	mm/month	145.0	126.9	122.5	90.2	93.2	83.0	73.9	71.2	79.2	93.0	107.2	106.1	**1191.4**
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	141	110	95	63	41	28	32	43	66	99	128	154	**1000.85**
Percolation	B	(DIR/7)xD	mm/month	62.0	56	62.0	60.0	62.0	60.0	62.0	62.0	60.0	62.0	60.0	62.0	**730.0**
Outputs		ET+B	mm/month	203.4	165.9	157.2	123.0	102.5	88.4	94.4	105.2	126.0	160.8	188.1	216.0	**1730.9**
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Storage	S	(P+I)-(ET+B)	mm/month	-58.4	-39.0	-34.7	-32.8	-9.3	-5.4	-20.5	-34.0	-46.8	-67.8	-80.9	-109.9	
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Largest M	**(V)**		mm	**0.00**												
		(V x L)/1000	m^3	**0.0**												
LAND AREA REQUIRED FOR ZERO STORAGE			m^2	2456	2836	3104	3129	4324	4589	3687	3129	2693	2268	2009	1689	

MINIMUM AREA REQUIRED FOR ZERO STORAGE: **4589.5** m^2



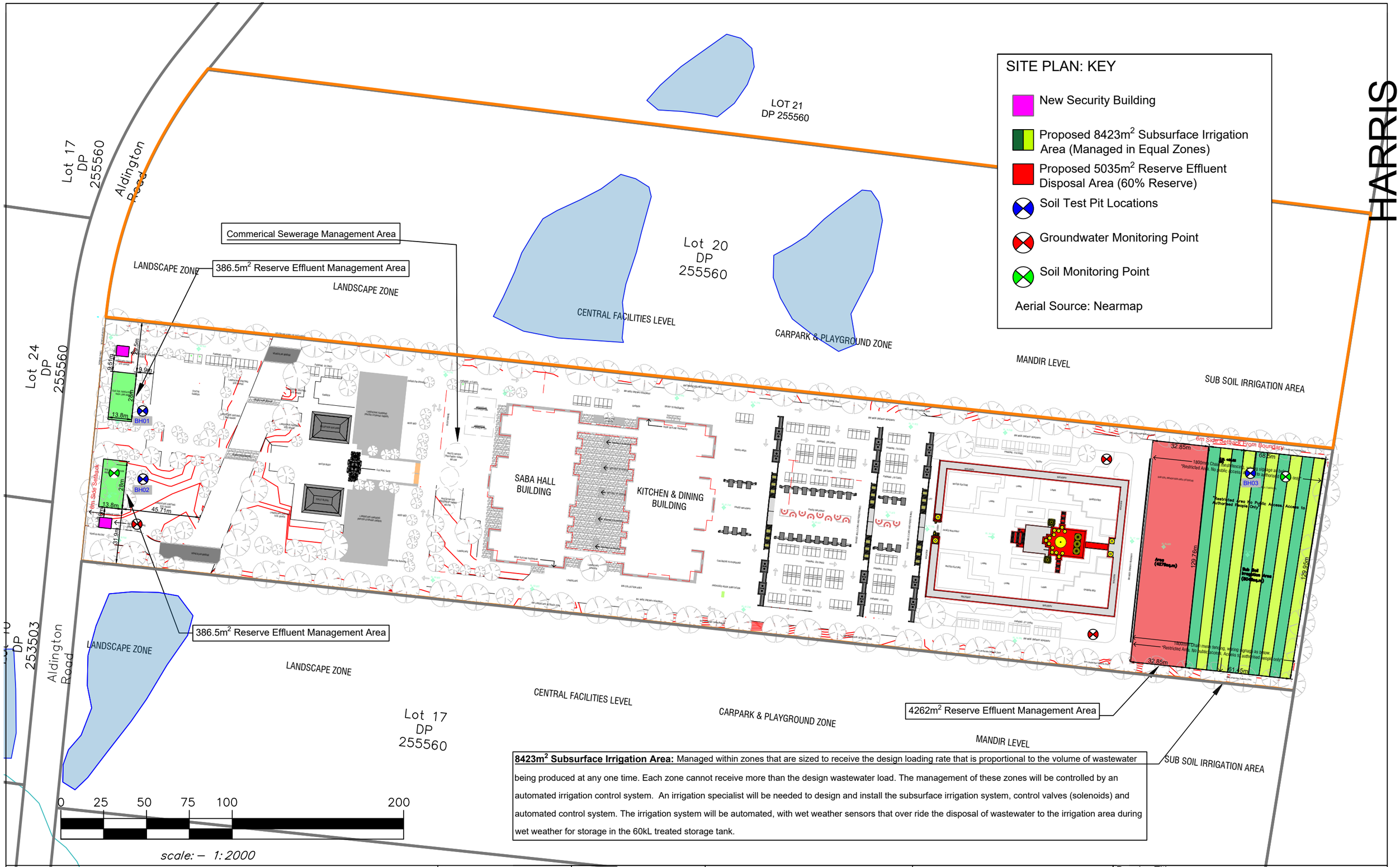
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	99.8	85.6	74.8	40.8	42.2	32.8	20.8	17.8	28.6	42	59.7	56.5
Evaporation (mm)	202	157	136	105	81	63	81	96	120	152	183	220
Total Land Input	145.0	126.9	122.5	90.2	93.2	83.0	73.9	71.2	79.2	93.0	107.2	106.1
Total Land Output	203.4	165.9	157.2	123.0	102.5	88.4	94.4	105.2	126.0	160.8	188.1	216.0

APPENDIX VIII Nitrogen Balance

	NITROGEN BALANCE				
	SITE ADDRESS	**230-242 Aldington Road, Kemps Creek NSW**			
	1. DETERMINE THE DAILY N LOAD				
(a)	Effluent Concentration (TN)	25	mgN/L		
(b)	Daily Hydraulic Load	9000	L/day		
(c)	(a) x (b) =	225,000	mg/day		
	2.DETERMINE THE ANNUAL N LOAD				
(d)	(c) x 365 days	82,125,000	mgN		
	3. ALLOW 20% LOSS THROUGH DENITRIFICATION, VOLATIZATION, MICROBIAL ATTACK ETC				
	(d) x 0.8	65,700,000	mgN/yr		
(e)	Annual N Load	65,700	kgN/yr		
	4. ALLOW FOR PLANT UPTAKE	**Managed Pastures**		**Unmanaged Pastures**	
(f)	Vegetation N Uptake	520	kgN/ha/yr	78	kgN/ha/yr
(g)	(L_n) Critical Loading Rate (c) / (h)	178.0821918	$mgN/m^2/day$	26.71232877	$mgN/m^2/day$
	5. DIVIDE THE ANNUAL N LOAD X APPLICATION RATE				
(g)	(e) / (f)	0.1263	ha	0.842307692	ha
	MINIMUM AREA FOR N UPTAKE	**1263**	**m^2**	**8423**	**m^2**

APPENDIX IX Phosphorus Balance

PHOSPHORUS BALANCE								
SITE ADDRESS	230-242 Aldington Road, Kemps Creek NSW							
Daily hydraulic load	9000	L/day						
Effluent P Concentration (TP)	12	mgP/L						
Design Life of System	50	years						
Crop P Uptake **(Unmanaged Lawns)**	12	kgP/ha/yr	which equals	3.29	$mg/m^2/day$	Critical Loading Rate (L_p)		
P-Sorption of Soils								
P-Sorption Result	400	mgP/kg_{Soil}	which equals	6,000	kgP/ha			
			which equals	600,000	mgP/m^2			
Soil Bulk Density	1.5	g/cm^2						
Depth of soil	1	m						
% of Predicted P-sorp	0.3	Decimal						
Nominated EMA	8213	m^2						
P Generated from Wastewater	0.1080	kgP/day	→	Phosphorus generated over life of system			1971	kgP/m^2
Vegetation Daily Uptake of P	0.027	kgP/day	→	Phosphorus vegetative uptake for life of system			0.060	kgP/m^2
Soil Sorption Capacity of P	0.6	kgP/m^2						
Predicted P-Sorbed by Soil	0.180	kgP/m^2	→	Phosphorus adsorbed in 50 years			0.180	kg/Pm^2
P-Sorption Capacity of Irrigation Area	1,478.25	kgP	→	Desired Annual P Application Rate			29.6	kgP/yr
MINIMUM AREA FOR P UPTAKE	**8213**	m^2						



8423m² Subsurface Irrigation Area: Managed within zones that are sized to receive the design loading rate that is proportional to the volume of wastewater being produced at any one time. Each zone cannot receive more than the design wastewater load. The management of these zones will be controlled by an automated irrigation control system. An irrigation specialist will be needed to design and install the subsurface irrigation system, control valves (solenoids) and automated control system. The irrigation system will be automated, with wet weather sensors that over ride the disposal of wastewater to the irrigation area during wet weather for storage in the 60kL treated storage tank.

Issue:	Description:	Date	Drawn	Approved
C	Issue for DA submission	30/10/17	PB	SH
D	Amendments following DA sumbission	28/02/19	PB	SH
E	Amended site plan	12/06/19	PS	SH
F	Amended site plan	5/02/21	PS	SH

North

Client:
C/- JAYESH GARACH
BAPS PROJECT TEAM
E: Jayesh_Garach@hotmail.com
M: 0405 425 601

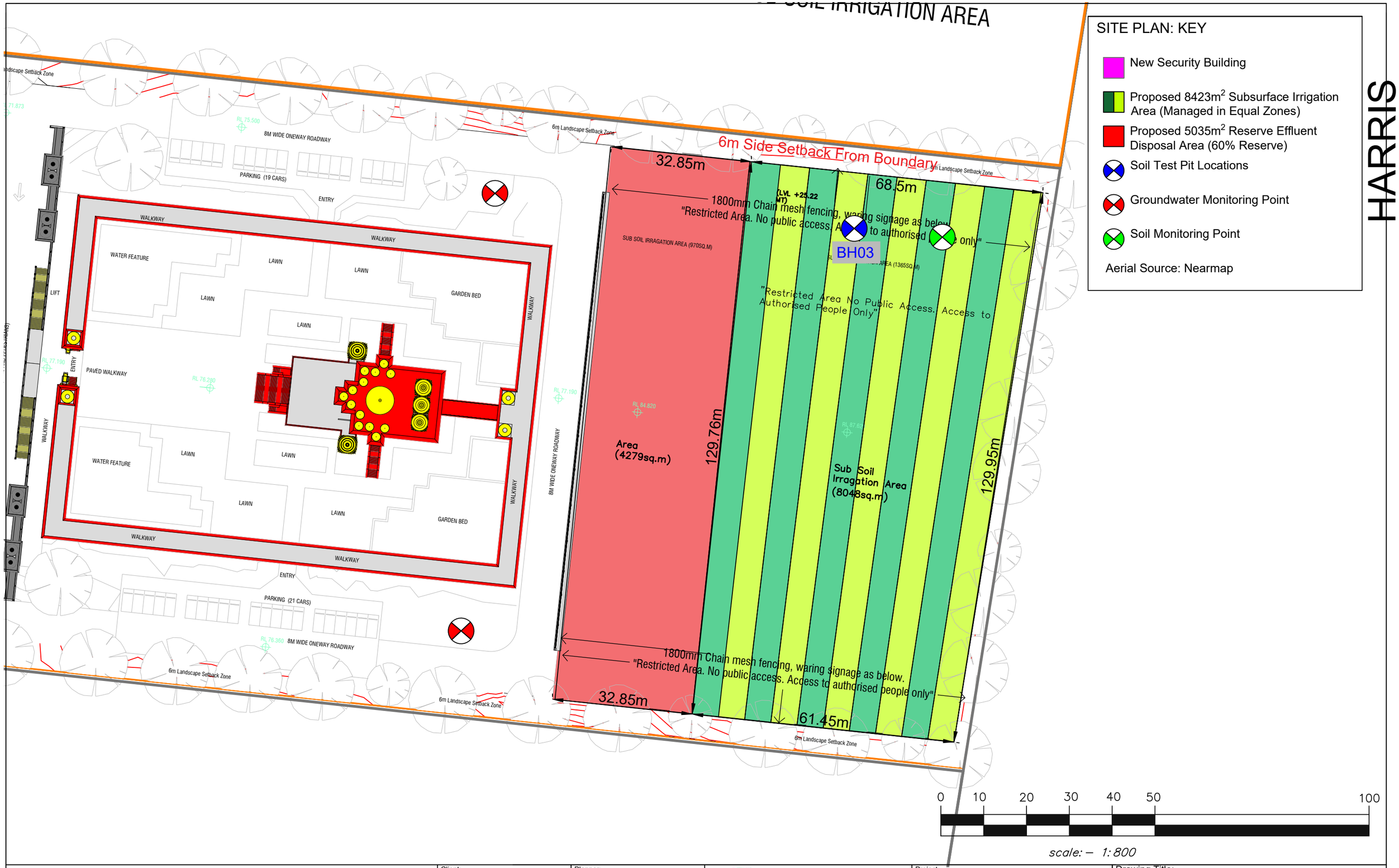
Planner:
WARWICK STIMSON
STIMSON & BAKER PLANNING
Suite 5, 488 High Street, Penrith, NSW
E: warwick@stimsonandbaker.com.au
P: (02) 4731 2730

Harris environmental CONSULTING
Harris Environmental Consulting
13 Macquarie Street,
Jamberoo, NSW, 2533
T: +61 2 4236 1410
E: office@harrisenvironmental.com.au
ABN: 6156 3609 153
Wastewater | Bushfire | Stormwater

Project:
BAPS SWAMINARAYAN HINDU TEMPLE
LOT 18 DP 253503
230-242 ALDINGTON ROAD, KEMPS CREEK
LGA: PENRITH

Drawing Title:
WASTEWATER MANAGEMENT PLAN SITE DETAIL

Drawn:	Date:	Paper Size:	Q.A. Check: Date:	
PB	5/02/21	ISO Expand A3	Not Checked	5/02/21
Designed:	Our reference:	Scale:	Dwg. No.	Issue:
PB	2812WW	1:2000	#1	F



SITE PLAN: KEY

- New Security Building
- Proposed 8423m^2 Subsurface Irrigation Area (Managed in Equal Zones)
- Proposed 5035m^2 Reserve Effluent Disposal Area (60% Reserve)
- Soil Test Pit Locations
- Groundwater Monitoring Point
- Soil Monitoring Point

Aerial Source: Nearmap

HARRIS

Issue:	Description:	Date	Drawn	Approved
C	Issue for DA submission	30/10/17	PB	SH
D	Amendments following DA sumbission	28/02/19	PB	SH
E	Amended site plan	12/06/19	PS	SH
F	Amended site plan	5/02/21	PS	SH

North

Client:
C/- JAYESH GARACH
BAPS PROJECT TEAM
E: Jayesh_Garach@hotmail.com
M: 0405 425 601

Planner:
WARWICK STIMSON
STIMSON & BAKER PLANNING
Suite 5, 488 High Street, Penrith, NSW
E: warwick@stimsonandbaker.com.au
P: (02) 4731 2730

Harris Environmental Consulting
13 Macquarie Street,
Jamberoo, NSW, 2533
T: +61 2 4236 1410
E: office@harrisenvironmental.com.au
ABN: 6156 3609 153
Wastewater | Bushfire | Stormwater

Project:
BAPS SWAMINARAYAN HINDU TEMPLE
LOT 18 DP 253503
230-242 ALDINGTON ROAD, KEMPS CREEK
LGA: PENRITH

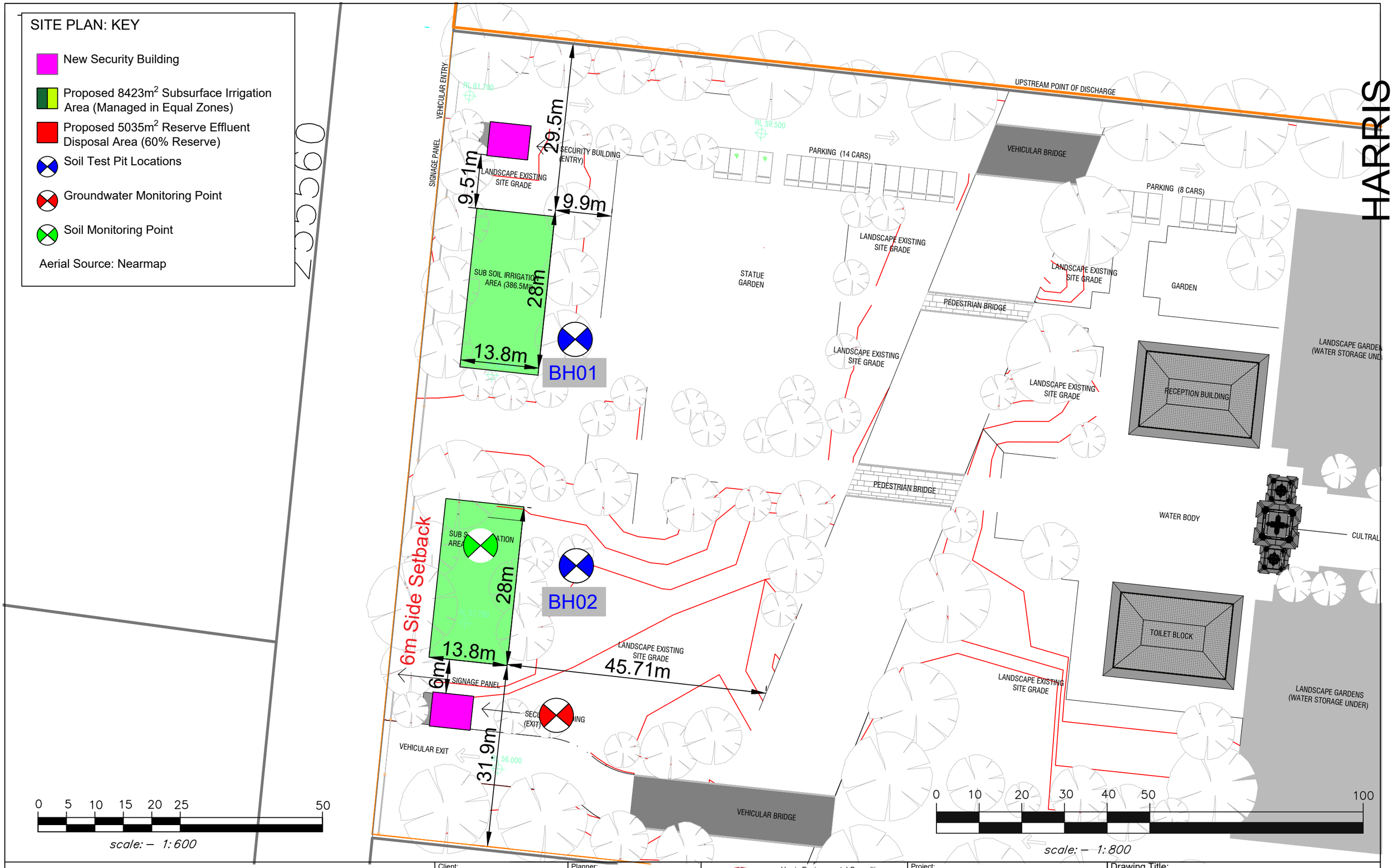
Drawing Title:
WASTEWATER MANAGEMENT PLAN SITE DETAIL

Drawn:	Date:	Paper Size:	Q.A. Check: Date:	
PB	5/02/21	ISO Expand A3	Not Checked	5/02/21
Designed:	Our reference:	Scale:	Dwg. No.	Issue:
PB	2812WW	1:800	#2	F

SITE PLAN: KEY

- New Security Building
- Proposed 8423m^2 Subsurface Irrigation Area (Managed in Equal Zones)
- Proposed 5035m^2 Reserve Effluent Disposal Area (60% Reserve)
- Soil Test Pit Locations
- Groundwater Monitoring Point
- Soil Monitoring Point

Aerial Source: Nearmap



Issue:	Description:	Date	Drawn	Approved
C	Issue for DA submission	30/10/17	PB	SH
D	Amendments following DA sumbission	28/02/19	PB	SH
E	Amended site plan	12/06/19	PS	SH
F	Amended site plan	5/02/21	PS	SH

North

Client:
C/- JAYESH GARACH
BAPS PROJECT TEAM
E: Jayesh_Garach@hotmail.com
M: 0405 425 601

Planner:
WARWICK STIMSON
STIMSON & BAKER PLANNING
Suite 5, 488 High Street, Penrith, NSW
E: warwick@stimsonandbaker.com.au
P: (02) 4731 2730

Harris environmental CONSULTING
Harris Environmental Consulting
13 Macquarie Street,
Jamberoo, NSW, 2533
T: +61 2 4236 1410
E: office@harrisenvironmental.com.au
ABN: 6156 3609 153
Wastewater | Bushfire | Stormwater

Project:
BAPS SWAMINARAYAN HINDU TEMPLE
LOT 18 DP 253503
230-242 ALDINGTON ROAD, KEMPS CREEK
LGA: PENRITH

Drawing Title:
WASTEWATER MANAGEMENT PLAN SITE DETAIL

Drawn:	Date:	Paper Size:	Q.A. Check:	Date:
PB	5/02/21	ISO Expand A3	Not Checked	5/02/21
Designed:	Our reference:	Scale:	Dwg. No.	Issue:
PB	2812WW	1:600	#3	F