

Statement of Environmental Effects

Proposed Dual Occupancy 88-89 Nepean Gorge Drive, Mulgoa October 2017 Peter & Samantha Sayer



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1 Introduction

1.1 Overview

Stimson & Baker Planning has been engaged by Peter and Samantha Sayer to prepare a Statement of Environmental Effects in relation to a proposed dual occupancy and pool house on the property known as 88-89 Nepean Gorge Drive, Mulgoa.

The area of the site on which the development is proposed is zoned *E3 Environmental Management* under *Penrith Local Environmental Plan 2010* with the proposal being permissible with consent. It is noted that a larger portion of the site is zoned E2 Environmental Conservation.

The proposal is defined as *development* in Section 4 of the *Environmental Planning and Assessment Act 1979* (EPA Act). Section 76A of the EPA Act stipulates that the development must not be carried out on the subject site until consent has been obtained. Furthermore, the application does not trigger any of the 'integrated development' provisions of the Act and so no third party approvals are required.

This report describes the proposed development and subject site in detail and undertakes an assessment of the proposal against the relevant aims, objectives and development provisions of Council's LEP and DCP, and Section 79C(1) of the EPA Act.

1.2 Report Structure

This Statement of Environmental Effects is structured as follows:

- Section 1: Introduction provides an overview of the proposal, planning history for the site and background to the application.
- Section 2: The Site and Surrounds provides an analysis of the subject site, development within the locality and a consideration of the local and regional context.
- Section 3: Development Proposal provides a detailed description of the proposed development and its characteristics.
- Section 4: Statutory Context provides for consideration of the proposal against the specific planning instruments and policies that are applicable.
- Section 5: Section 79C Assessment provides an assessment against section 79C of the EPA Act.
- Section 6: Conclusion and Recommendation summarises the report and presents a recommendation.

1.3 Supporting Documentation

The proposal is accompanied by the following documentation:

Documentation	Prepared By
Architectural drawings	Kleyn Creations



Hydraulic Report/ Stormwater Concept Design	Kleyn Creations
Survey Plan	RHCO
Landscape Concept Plan	Monaco Designs
BASIX/NatHERs Certificate	Benchmark Certifiers
Waste Management Plan	Stimson & Baker Planning

1.4 Legislation, Environmental Planning Instruments and Policies to be considered

- Penrith Local Environmental Plan 2010
- Penrith Development Control Plan 2014
- State Environmental Planning Policy No 55 Remediation of Land
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004
- Sydney Regional Environmental Plan No 20 Hawkesbury Nepean River

1.5 Consent Authority

The consent authority for this application is Penrith City Council.



2 The Site and Surrounds

2.1 The Subject Site and Surrounds

The site is located at the northern end of Nepean Gorge Drive. The site is known as 88-89 Nepean Gorge Drive and is legally described as Lot 31 DP 237163. The property is an irregular shaped allotment and has an area of 66.9 hectares.



Figure 1 Subject site and surrounds

Topography

The site is relatively level particularly that part of the site where the development is proposed with a gradual fall from the rear of the property to the street.

Vehicular Access

There is direct vehicular access to the site from Nepean Gorge Drive along a lengthy access handle. There is currently an unformed driveway that provides access to the larger portion of the site.

Pedestrian Access and Public Transport

There is no pedestrian pathway across the frontage of the site nor is there a pedestrian pathway anywhere along Nepean Gorge Drive given the rural nature of the locality.

Utilities and Services

There is no existing reticulated sewer or water to the site however, there are existing electricity services to the site.



Vegetation

The site consists of dense vegetation patches as well as some large cleared areas. The vegetation is largely mature species. The site has a bio-banking agreement in place which is discussed further in this report.

2.2 Existing Development

The property is currently vacant land.

The site is surrounded by dense bushlands as well as normal rural residential dwellings and associated buildings.



Figure 2 Existing Cadastre

2.3 Site Constraints

The majority of the site is burdened by an executed Biobanking Agreement (ID No 190) with the NSW Office of Environment and Heritage. This agreement manages the portion of the site zoned E2, and is quite separate from the portion of the site that is subject to this application.

The proposed development is located away from the bio-banked land and as such, there will be no negative impacts arising as a result of the proposal on that land.

An extract of the agreement is appended to this report.

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3 Development Proposal

3.1 Objectives of the Proposal

This application seeks consent for the construction of a dual occupancy development with associated pool house.



Figure 3: Site Plan

3.2 Details of the Proposal

Detailed elements of the proposal

The main dwelling consists of a single storey dwelling containing four bedrooms, bathroom, laundry, powder room, family room, theatre room, dining area, living room, kitchen with butlers pantry, study and master bedroom. The master bedroom has an ensuite as well as a walk-in-wardrobe. An alfresco area is provided that connects to the pool area. The main dwelling has a triple garage.

The second dwelling consists of two bedrooms, study, bathroom, laundry, butlers pantry, kitchen, dining room and living area. The master bedroom has an ensuite and a walk-in-wardrobe. There is an alfresco area that also connects to the pool area.

The pool house is located north east from the main dwelling and consists of bathroom, storage room and veranda.



Design Principles

The design of the development is intended to maximise its environmental efficiencies. The house will be 'off the grid' with its own sustainable electricity generation, and of course on-site sewer management.

Land Uses

The proposal being a dual occupancy is permissible under the LEP.

Landscaping and Open Space

A Landscape Plan accompanies the application and demonstrates high quality landscaping outcomes for this large site. The detailed landscaping will complement the setting of the buildings.

Stormwater Drainage

A stormwater drainage concept plan accompanies the application. Stormwater will be directed to large storage tanks with the overflow being directed to absorption trenches, details of which can be provided at construction certificate stage.

Utilities

The site is proposed to be 'off the grid', with the use of solar power being the main producer of energy for the building. Power will not be provided from the network system. The system proposed to be utilized is appended to this report.

Waste Management Strategy

Waste will be collected as per Council collection regime.

Contamination

The location of the proposed dual occupancy and pool house is proposed on currently cleared land and open paddocks. Then property has been this way for a significant number of years. There is unlikely to be contamination on the site given its previous use. SEPP 55 is addressed below.

National Construction Code Compliance

All works will be carried and comply with the National Construction Code (now incorporating the BCA). A Construction Certificate will be required in relation to the proposal and it is expected that Council will require matters relating to NCC compliance.

Tree removal

No major vegetation has to be removed to accommodate the proposal.

Vehicular Access

Vehicular access will be provided via the long 'handle' at the end of Nepean Gorge Drive. The driveway will be built up to accommodate the overland flow through this area. The appended design plan shows those proposed works.





Figure 4 Perspective



4 Statutory Context

The following section provides an assessment of the proposed development against the relevant planning instruments and policies.

4.1 State Environmental Planning Policy No 55 – Remediation of Land

Under Clause 7(1)(A) the consent authority must not consent to a development application unless consideration has been given to whether the land is contaminated. Although there has not been any site investigations directly testing contamination, the previous and current use of the site and surrounding area for residential development would make it unlikely that the site is contaminated.

4.2 State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

A BASIX assessment accompanies the development application demonstrating that the proposal is committed to environmental sustainable measures. The architectural drawings have been certified with these commitments.

4.3 Sydney Regional Environmental Plan No 20 – Hawkesbury Nepean River

The aim of SREP 20 is to protect the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context.

Appropriate conditions of consent would normally be applied to any approval to ensure the health of the river system is not compromised by way of sediment or erosion from the works or use.

4.4 Penrith Local Environmental Plan 2010

The LEP is the primary environmental planning instrument relating to the proposed development. The objectives of the LEP are as follows:

- (a) to provide the mechanism and planning framework for the management, orderly and economic development, and conservation of land in Penrith,
- (b) to promote development that is consistent with the Council's vision for Penrith, namely, one of a sustainable and prosperous region with harmony of urban and rural qualities and with a strong commitment to healthy and safe communities and environmental protection and enhancement,
- (c) to accommodate and support Penrith's future population growth by providing a diversity of housing types, in areas well located with regard to services, facilities and transport, that meet the current and emerging needs of Penrith's communities and safeguard residential amenity,
- (d) to foster viable employment, transport, education, agricultural production and future investment opportunities and recreational activities that are suitable for the needs and



skills of residents, the workforce and visitors, allowing Penrith to fulfil its role as a regional city in the Sydney Metropolitan Region,

- (e) to reinforce Penrith's urban growth limits by allowing rural living opportunities where they will promote the intrinsic rural values and functions of Penrith's rural lands and the social well-being of its rural communities,
- (f) to protect and enhance the environmental values and heritage of Penrith, including places of historical, aesthetic, architectural, natural, cultural, visual and Aboriginal significance,
- (g) to minimise the risk to the community in areas subject to environmental hazards, particularly flooding and bushfire, by managing development in sensitive areas,
- (h) to ensure that development incorporates the principles of sustainable development through the delivery of balanced social, economic and environmental outcomes, and that development is designed in a way that assists in reducing and adapting to the likely impacts of climate change.

It is submitted that the proposed development is not inconsistent with these objectives.

The land on which the proposed development is to be situated is zoned *E3 Environmental Management.* The objectives of the zone listed in the LEP are:

- To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values.
- To provide for a limited range of development that does not have an adverse effect on those values.
- To minimise conflict between land uses within the zone and land uses within adjoining zones.
- To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities.
- To preserve and improve natural resources through appropriate land management practices.

The proposed development is consistent with the objectives in that:

- The development is located in a part of the site that will not impact upon areas with special ecological, scientific, cultural or aesthetic values.
- The development minimises conflict between land uses within adjoining zones by allowing the development within the permissible zone resulting in the adjoining zone accommodating permissible development that will satisfy the objectives of that zone.
- The development has been designed in regard to the topography and environmental constraints of the site to ensure that the development does not adversely impact upon the environmental capabilities of the land and does not increase the demand for public services or facilities.





Figure 5 Land zoning

The Land Use Table of the LEP nominates *Dual Occupancy* as a permissible form of development in the zone. The Dictionary definition of *dual occupancy* is:

dual occupancy means a dual occupancy (attached) or a dual occupancy (detached).

The following relevant clauses have also been considered in respect of this development proposal.



Part 4 Principal Development Standards:								
Standa	rd	Permitted	Proposed	Comment				
4.1	Minimum subdivision lot size:	N/A	N/A	N/A				
4.1A	Minimum lot sizes for dual occupancies, multi dwelling housing and residential flat buildings	N/A	N/A	N/A				
4.1AA	Minimum subdivision lot size for community title schemes	N/A	N/A	N/A				
4.1AB	Minimum subdivision lot size for strata plan schemes in certain rural, residential and environment protection zones	N/A	N/A	N/A				
4.2	Rural Subdivision:	N/A	N/A	N/A				
4.2A	Residential development and subdivision prohibited in certain rural, residential and environment protection zones	N/A	N/A	N/A				
4.3	Height of Buildings:	N/A	N/A	No height limit has been applied to the subject site				
4.4	Floor Space Ratio	N/A	N/A	No FSR has been applied to the subject site				
4.5	Calculation of Floor Space Ratio and site area	N/A	N/A	N/A				
4.6	Exceptions to development standards	N/A	N/A	N/A				

Part 5 Miscellaneous Provisions						
Provisi	on	Comment				
5.1	Relevant acquisition authority	N/A				
5.2	Classification and reclassification of public land	N/A				
5.3	Development near zone boundaries	This clause does not apply to the site as it does not apply to land in the E2 Environmental Conservation zone or E3 Environmental Management zone				
5.4	Controls relating to miscellaneous permissible uses	N/A				
5.5	Development within the coastal zone	N/A				
5.6	Architectural roof features	There is no maximum height limit for the subject site and as such this clause does not apply				
5.7	Development below mean high water mark	N/A				
5.8	Conversion of fire alarms	N/A				
5.9	Preservation of trees and vegetation	No existing trees are proposed to be removed at this stage				
5.9AA	Trees or vegetation not prescribed by development control plan	N/A				



5.10	Heritage conservation	The subject site does not contain any heritage items or is within a heritage conservation area. Adjacent to the site are two heritage items being Table Rock Lookout (Local significance) and Fernhill (State significance) No impacts are expected to arise as a result of the proposal.
5.11	Bush fire hazard reduction	N/A
5.12	Infrastructure development and use of existing buildings of the Crown	N/A
5.13	Eco-tourist facilities	N/A
5.14	Siding Spring Observatory— maintaining dark sky	N/A
5.15	Defence communications facility	N/A
Part 6	Urban release areas	
Provis	ion	Comment
6.1	Arrangements for designated State public infrastructure	N/A
6.2	Public utility infrastructure	N/A
6.3	Development control plan	N/A
6.4	Relationship between Part and remainder of Plan	N/A
6.5–6.	19 (Repealed)	N/A
Part 7	Additional Local Provisions	
Provis	ion	Comment
7.1	Earthworks	N/A
7.2	Flood planning	N/A
7.3	Development on natural resources sensitive land	The subject site is not natural resources sensitive land
7.4	Sustainable Development	The proposed development has regard to sustainable design as demonstrated by the BASIX certificate and design
7.5	Protection of scenic character and landscape values	The subject site is not land with scenic and landscape values
7.6	Salinity	N/A
7.7	Servicing	N/A
7.8	Active street frontages	N/A
7.9	Development of land in flight path of proposed Second Sydney Airport	N/A
7.10	Dual occupancies and secondary dwellings in certain rural and environmental zones	Lot is greater than 2 hectares. The accompanying OSSM report confirms the suitability of the site in this regard.
7.11	Penrith Health and Education Precinct	N/A
7.12	Maximum gross floor area of commercial premises	N/A
7.13	Exhibition homes limited to 2 years	N/A
7.14	Cherrywood Village	N/A
7.15	Claremont Meadows	N/A



7.17	Dwelling houses on certain land in Castlereagh, Cranebrook, Llandilo, Londonderry, Kemps Creek and Mulgoa	N/A
7.18	Mulgoa Valley	The proposed development is of a scale and bulk that will not negatively impact on the Mulgoa locality. It has been designed to sit comfortably within the landscape. As a result, the proposal satisfies this clause.
7.19	Villages of Mulgoa and Wallacia	N/A
7.20	Orchard Hills	N/A
7.21	Twin Creeks	N/A
7.22	Waterside Corporate	N/A
7.23	Location of sex services premises and restricted premises	N/A
7.24	Sydney Science Park	N/A
Part 8	Local provisions—Penrith City Centre	
Provisi	on	Comment
8.1	Application of Part	N/A
8.2	Sun access	N/A
8.3	Minimum building street frontage	N/A
8.4	Design excellence	N/A
8.5	Building separation	N/A
8.6	Serviced apartments	N/A
8.7	Community infrastructure on certain key sites	N/A
Part 9	Penrith Panthers site	
Provis	ion	Comment
9.1	Objectives of Part	N/A
9.2	Application of Part	N/A
9.3	Density of retail premises (including outlet premises)	N/A
9.4	Minimum lot size for outlet centres for community title schemes or strata plan	N/A
9.5	Campus style office development	N/A
9.6	Development control plan for land to which this Part applies	N/A

There are no other clauses relevant to the proposal.



4.5 Penrith Development Control Plan 2014

Development Control Plans contain finer grain planning controls in respect of specific development types. The following Part of the DCP is the most relevant in the case of the proposed dual occupancy.

	Part D1 Rural Land Uses-1.2.	5. Dual Occupancy Dwellings
Con	trol	Comment
<pre>con 1) D a) b) c) d) e) f) g) h)</pre>	 esign Dual occupancies should be designed in accordance with the policies in this DCP for dwellings and dwelling design. The second dwelling should take into account the principles in the sections on 'Site Planning and Design Principles', 'Vegetation Management' and 'Landscape Design' (with particular attention to protecting existing trees and vegetation on the site) of this DCP. The second dwelling should be located within the curtilage (proximity) of the existing dwelling house on the same lot (and preferably within its garden area). The second dwelling must be located behind the building line of the existing dwelling house. The preference is for the second dwelling to be detached from the first dwelling with a minimum separation of 10m. If the dwellings are attached then the second dwelling should be located behind the existing dwelling house (approximately 50% in floor area). Consideration, however, will be given to varying this control where the existing house has a floor area of less than 200m2. The development should be designed so that the dwellings complement each other and the rural character. In this regard, external finishes should be 	 Comment The proposed development satisfies this DCP clause in that: a) Dwellings designed in accordance with DCP. b) The second dwelling is located in a cleared area thus not requiring the removal of any existing trees on the site. c) The second dwelling is located within the curtilage of the main dwelling. d) The second dwelling is located in line with the main dwelling. e) A separation of some 8m is proposed which is considered acceptable given the scale of the site. f) The dwellings are not attached. g) The second dwelling is 50% in floor area (324.48sqm) when compared to the main dwelling (644.39sqm). h) Both dwellings have been designed to complement each other in terms of building materials and colours.
2) A a) A di b) A si ea c) Ti	the existing dwelling where considered necessary. ccess, Parking and Services Access to dual occupancies is to be via a common riveway to both dwellings. At least one accessible and covered off-street parking pace shall be provided on site behind the building line for ach dwelling. here should only be one electricity line and meter on the roperty servicing both dwellings.	 The proposed development satisfies this DCP clause in that: a. Common driveway provided to access both dwellings. b. Ample covered parking is provided. c. The development will be 'off the grid' and will not require meter servicing.
114	Part E - Key Precinc	ts-E9 Mulgoa Valley
Con	trol	Comment
9.1.	1 Heritage Items and Vistas	Proposed development is not located in the view corridor linking Cox's Cottage, St Thomas's Church and Fernhill. Proposed development will not be viewed from heritage items and is not located within any heritage vistas.
9.1.	2 Siting	Proposed development is not located on any ridges. Proposed development is setback 30m from public road. Both dwellings are grouped to minimise any visual impacts.
9.1.3	Building Form, Materials and Colours	Both dwellings are single storey as is the pool house. Pitched roofs proposed. Both dwellings are stepped to break up large flat surfaces. Both dwellings designed with a horizontal emphasis. Windows have a vertical emphasis. Roof is metal sheeting.
9.1.4	4 Planting	Ample planting is proposed as is demonstrated in the accompanying Landscape Plan.



9.1.5	Access, Parking and Services	An appropriate level of parking and services are proposed.
9.1.6	Fences and Entrances	An appropriate entrance is proposed, mindful of the lengthy access handle enjoyed by the subject site.
9.1.7	Signage	Not applicable to the proposal.

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There are no other aspects of the DCP that are specifically relevant to the proposal or that require detailed consideration.



5 Section 79C Assessment

An assessment of the proposal has been undertaken in accordance with the statutory requirements of the EPA Act. The following assessment against Section 79C of the EPA Act has been undertaken.

5.1 Section 79C(1)(a)(i) – Any Environmental Planning Instruments

The relevant environmental planning instruments have been considered earlier in this report.

The proposal is permissible with consent and is considered satisfactory when assessed against the relevant requirements.

5.2 Section 79C(1)(a)(ii) – Any Draft Environmental Planning Instrument

There are no known relevant draft Environmental Planning Instruments applicable to the subject site.

5.3 Section 79C(1)(a)(iii) – Any Development Control Plan

Compliance against the relevant DCP's has been considered earlier in this report.

5.4 Section 79C(1)(a)(iiia) – Any Planning Agreement or Draft Planning Agreement entered into under Section 93f

There are no known planning agreements that apply to the site or development.

5.5 Section 79C(1)(a)(iv) – The Regulations

There are no sections of the regulations that are relevant to the proposal at this stage.

5.6 Section 79C(1)(b) – The Likely Impacts of the Development

The following impacts have been considered in the preparation of this development proposal.

5.6.1 Flora and Fauna

Some trees are proposed to be removed as part of this application however these are not considered significant in the context of the overall site. It is also notes that the bio-banking arrangements on the site will ensure a high value biodiversity outcome is maintained on the site in perpetuity.



5.6.2 Stormwater and Flooding

A stormwater concept plan has been submitted with the development application demonstrating compliance with Council's requirements in this regard and is consistent with the discussions held with Council's Development Engineers prior to lodgement.

5.6.3 Erosion and Sediment Control

It is expected that Council would impose appropriate conditions of consent to ensure that erosion and sediment control measures were installed on the site prior to construction commencing.

5.6.4 Traffic Generation and Parking

The proposed development will not generate any unacceptable levels of traffic generation or parking.

5.6.5 Noise Impacts

Whilst there will be some noise associated with the construction of the development, longer term there is not expected to be any noise impacts above and beyond what might normally be associated with a rural residential environment. No unacceptable impacts are expected.

5.6.6 Heritage Issues

There are no unacceptable impacts expected as a result of the development on the site or the nearby Fernhill site.

5.6.7 Services

The site could be serviced for the development however it is proposed to be 'off the grid' and thus not requiring such services.

5.6.8 Social and Economic

There are no economic or social impacts considered relevant to the proposal.

5.6.9 Waste Management

Appropriate waste management measures would be put in place on the site that are consistent with Council's residential collection services in the area.

5.7 Section 79C(1)(c) – The Suitability of the Site

The proposal is generally consistent with the planning controls that apply in this zone. Moreover, the objectives of the zone have been satisfied, ensuring that the proposed development would not result in any unacceptable impact on any adjoining landowners or buildings.

For the reasons outlined in this report the site is considered suitable for this development proposal.



5.8 Section 79C(1)(d) – Any Submission Made

Council will undertake a notification process in accordance with its controls and policies. We welcome the opportunity to provide additional information in response to those.

5.9 Section 79C(1)(e) – The Public Interest

Given the type of development, its general compliance with the planning controls, how the objectives are satisfied and the suitability of the site it is considered that the public interest would not be jeopardised as a result of this development.



6 Conclusion and Recommendation

The proposed development has been assessed against the requirements of the Penrith LEP and DCP and is considered to represent a form of development that is acceptable.

The proposed dual occupancy would not result in any unacceptable impact on the locality.

The site is considered quite suitable for a use of this nature and is consistent with nearby and adjoining development.

An assessment against section 79C of the EPA Act has not resulted in any significant issues arising.

Accordingly, it is recommended that the proposed development at 88-89 Nepean Gorge Drive, Mulgoa be approved.



Appendix A

Biobanking Agreement Extract

Biodiversity Banking and Offsets Scheme BioBanking agreement ID number 190	BioBanking agreement under Part 7A Division 2 of the Threatened Species Conservation Act 1995	This agreement made on the day of between the Minister for the Environment of the State of New South Wales, being the Minister currently administering the <i>Threatened Species Conservation Act 1995</i> (' the Minister ', which expression shall where the context admits, be deemed to include his or her successors in office) on the one part and Angas Securities Limited (ABN 50 091 942 728) (' the landowner ') of Level 14, 26 Flinders Street Adelaide, SA 5000, on the other part.	BACKGROUND	A The landowner is the owner of those parcels of land being:	Lot 31 in Deposited Plan 237163, known as Fernhill North West biobank ('the land').	B The biobank site that is the subject of this agreement forms part of the land and is shown on <i>Figure 1 Site boundary; Fernhill North West biobank</i> . The biobank site covered by this agreement consists of 65.40 hectares.	C The landowner has requested the Minister to enter into a BioBanking agreement under clause 14 of the BioBanking Regulation for the purpose of designating the biobank site on the land.	D The Minister and landowner recognise that the landowner will receive biodiversity credits determined in accordance with the BioBanking Assessment Methodology (and set out in Annexure B) relating to the impact or likely impact of the management actions required to be carried out under Clause 3 and Annexure C of this agreement regarding the biodiversity values listed in Annexure B.	E The landowner and the Minister recognise that the biobank site contains the following known Aboriginal objects and/or Aboriginal places as defined by the <i>National Parks</i> and <i>Wildlife Act 1974</i> :	Not Applicable	Note: This BioBanking agreement only recognises the existence of known Aboriginal objects and/or Aboriginal places. It does not provide for the protection of Aboriginal objects of Aboriginal places. The protection of Aboriginal objects and Aboriginal places is the National Parks and Wildlife Act 1974. This agreement does not authorise any person to damage or to cause or permit damage to an Aboriginal object or Aboriginal place in, on or under the biobank site land (see clause 2.2).	F The landowner and the Minister recognise that this BioBanking agreement is being entered into for the purposes of the BioBanking Scheme established under Part 7A of the Act.	G The landowner agrees to undertake the management actions and implement the management plans to improve the biodiversity values of the biobank site as set out in Annexure C.	H The landowner agrees to undertake monitoring, reporting and record keeping as set out in Annexure D.	I Accordingly, the parties hereby enter into the following BioBanking agreement upder section 127D of the Act.	Page 2 of 73
	Biodiversity Banking and Offsets Scheme	BioBanking agreement	ID number: 190			Under the Threatened Species Conservation Act 1995	for	Angas Securities Limited for Fernhill North West biobank Lot 31 in Deposited Plan 237163	Office of	Level Environment	GOVERNMENT & Heritage					Version 1.3 June 2011

Biodiversity Banking and Offsets Scheme BioBanking agreement	Now this agreement witnesses:	1. Interpretation	1.1 In this agreement, unless the contrary intention appears:	the 'Act ' means the <i>Threatened Species Conservation Act 1995</i> and any regulations from time to time in force thereunder	'adaptive management' means a process for improving management where the outcomes of monitoring indicate that minor alterations to the management actions or management plans are required to improve biodiversity values	'agreement' means this BioBanking agreement entered into by the Minister and the landowner under section 127D of the Act for this biobank site	'animal' has the same meaning as in section 4 of the Act	'Annexure A' means Annexure A to this agreement entitled 'Maps of the biobank site'	'Annexure B' means Annexure B to this agreement entitled 'BioBanking Agreement Credit Report'	'Annexure C' means Annexure C to this agreement entitled 'Management actions and management plans'	'Annexure D' means Annexure D to this agreement entitled 'Monitoring, reporting and record keeping requirements'	'Annexure E' means Annexure E to this agreement entitled 'Payment schedules'	'annual report' means the annual report to be prepared by the landowner in accordance with item 2 of Annexure D	'authorised officer' means a person appointed under section 156B of the National Parks and Wildlife Act 1974	'biobank site' means that part of the land shown as the "biobank site" on the biobank site boundary map	'biobank site boundary map' means the map entitled Figure 1, Site boundary; Fernhill North West biobank, dated 08/03/2016 and included in Annexure A	'BioBanking Agreement Credit Report ' means the report contained in Annexure B generated by a BioBanking Assessor for the biobank site using the BioBanking Assessment Methodology and the BioBanking Credit Calculator which includes the number and type of biodiversity credits to be created on the biobank site	'BioBanking agreements register' means the register of biobank sites kept by the Chief Executive under Part 7A of the Act	'BioBanking Assessment Methodology ' means the rules established under section 127B of the Act	Page 4 of 73
Biodiversity Banking and Offsets Scheme ID number 190	J The Minister has delegated the power to enter into this BioBanking agreement to the Chief Executive of the Office of Environment and Heritage.	K Under section 127L of the Act, any person may bring proceedings in the Land and Environment Court for an order to remedy or restrain a breach of this agreement.	Armong other things, the Minister may ask the Court to award damages against the landowner for certain breaches of this agreement.	L The Minister may, by order under section 127N of the Act, direct the landowner to carry out at their cost such work or actions as the Minister considers necessary to	rectify any breach of this agreement. If the landowner does not comply with the order, the Minister may enter the land and cause the work or actions set out in the order to be carried out and may recover the costs of complying with the order from the landowner.	M Where a person contravenes this agreement, the Minister may apply to the Land and Environment Court under socior 1970 of the Act for or other the ford the	curvernment, ocur, under section 1270 or the Act for all order that the land be conveyed or transferred to the Minister or to another person or body nominated by the Minister.													Page 3 of 73

Σ



Appendix B

Off Grid – Comprehensive System

Document Set ID: 7883530 Version: 1, Version Date: 18/10/2017

Securing your power and your future





Highly advanced ac-coupled technology offers a high level of flexibility for most large applications - including minigrids. Systems can consist of multiple decentralised units, centralised units, or a combination.





Reliability High quality components; dependable grid-quality electricity, day & night



Simplicity of use Pre-programmed, userfriendly, automated "set & forget" operation



Low Maintenance Low maintenance sealed gel or lithium-ion batteries



Easily expand with

modular design

& ac-coupling



Safe **Exceeds applicable safety** standards; concealed wiring; sealed batteries

+100kWh/day System - Perfect for

and even small communities.

businesses, multiple buildings, stations,



Monitoring Options to monitor the system and usage locally or remotely

The **Comprehensive System** is available for the following applications:

40kWh/day System - Perfect for the larger family home, with no compromise on lifestyle. Sized to power loads such as fridges, air conditioners, pumps, entertainment systems, larger kitchen appliances, and all other appliances.





Document Set ID: 7883530 Version: 1, Version Date: 18/10/2017 50-100kWh/day System - Perfect for a large luxury estate, or multi-building property.













www.offgridenergy.com.au



1300 334 839

Comprehensive System Specifications



On digital brochure - Further product information can be found by clicking the document icon.



80kWh/day - 3 PHASE -Selectronic SP PRO 3 x Selectronic SP = PRO 11kW Battery 30kW Battery Inverter/Charger Inverter/Chargers BAE PVV2090 Sealed BAE PVV2470 Sealed == **VRLA Batteries VRLA Batteries** = (248kWh@120V) (240kWh @ 48V) 108 x Trina 270W 108 x Trina 270W Solar Modules Solar Modules (29.16kW) (29.16kW) 3 x Fronius Primo 8.0 3 x Fronius Primo 8.0 == Solar Inverters Solar Inverters Selectronic Quick Selectronic Quick == View PC Monitoring View PC Monitoring Standard Installation Standard Installation Includes: Commercial-grade Includes: Commercial-grade load centre switchboard and load centre switchboard and battery racking. battery racking. \$141,000* \$148,000*

The Comprehensive System will be tailored to your unique requirements. <u>Please contact us to discuss your project.</u>

Customised Extras can include:

- > Alternative solar mount options, including:
 - winter optimised roof tilt frames
 - ground mount array frames
- > System monitoring displays and remote communications
- > Automated 'smart' load control
- > Containerised enclosures with climate control
- > Hard wired backup diesel generators
- > Wind turbine and micro-hydro generators
- > Compatibility with selected Lithium-ion & ZCell batteries

* All prices include GST and applicable rebates or incentives. Indicative finance repayments are only a guide, and are subject to approval through Off-Grid Energy's preferred finance lender. Surcharges may apply for additional freight, travel, accommodation, cable distances >10m, non standard site requirements. STC discount value calculations are for Zone 3 only (Zone 4 customers in TAS and southern WA and VIC will receive a reduced discount). A backup generator is highly recommended by Off-Grid Energy and is important for battery health, contingencies, and correct system operation. Off-Grid Energy strongly recommends customers complete a Load Profile to determine exact energy requirements prior to choosing a system. All system and upgrade prices are subject to final quotation and approval from Off-Grid Energy.





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Appendix C

Culvert Crossing Concept Plan



Version: 1, Version Date: 18/10/2017

	otech	APPROVED ON BEHALF OF ENVIROTECH PTY. LTD Logan Starkey		
	DWG No.	SCALE.		
7-5218	1 of 1	1:120 @ A3		

Culvert	Design	Calcu	lations
---------	--------	-------	---------

Hydrological Information

(Austroads 2008, 'Guide to Road Design Part 5: Drainage Design)



Contact Details Phone Numbers

 NSW Head Office
 1300 888 324

 Level 1, 1/23 Rowood Rd,

 Prospect, NSW 2148
 (02) 98961568

Fax (02) 8834 0760

Email info@envirotech.com.au

Site Information						
Project:	Culvert - Residential Driveway over Overland Flow Route	Job No.:	17-5218			
Address:	88-89 Nepean Gorge Drive, Mulgoa, NSW	Ver.:	A-1			
Flood-safe A	ccess: No (1Yr ARI Design Storm; Flood-safe acess route at north of property)	Designer:	R.S			
Location:	North-South Battleaxe access way from Nepean Gorge Drive	Date:	17/08/2017			
	(82.59m Chainage North from Nepean Gorge Drive termination)					

Uplsope Catchment area:		128.5553 h	а		Catchme	nt Simulatio	on Methodolo	gy:	Runoff Routi	ing (RORB V6.	18)
Catchment Fraction Impervious	(Avg.):	0.03			(See App	endix A: RO	RB-17-5218-A	[Electonic (Copy Only])		
Reach Type:		Natural			Sub-Catc	hments Spe	cified:	5			
Design Event:		1* Y	ear ARI		Paramete	er Specificat	tion				
*Effect of Surcharge - Overland	Flow:				IL	37.	5 (mm)				
Small Impact in Low Desity Area	(AS3500.3:20	003 [Table 5.1])		CL	2.	7 (mm/h)				
Critical Storm Event:		9 H	Ir		Кс	1.3	7 (Eastern NS	W [Kleemol	a]-Eqn 3.20	ARR[Bk.V])	
Time to Peak:		6.5 H	lr		m	8	0				
Volume:		1.65E+04 n	n³								
Q (Peak Discharge):		1.692 n	n³/s								
Culvert Design											
Road Width:	0.	3 m		Culvert Le	ngth (L)	4.	8 m				
Raised Road Height:	N.G.L + 0.	7 m		Allowable	HW:	0.	7 m				
So	0.01	4		Culvert Ty	pe:	Concrete	RCP				
				Entrance 1	Гуре:	Groove E	nd Projecting				
Culvert Description		Inlet C	Control				Outle	t Control			
Culvert No. Q _{Eqiv.} (m ³ /s)	Size (m)	HW _i /D*	нw	K _e	H**	h _c	(hc+D)/2	тw	h _o	LSo	нw。

0.2

0.4

0.35

0.3625

0.35

Culvert No. Q_{Eqiv.} (m²/s) 8 0.2115

0.375

1.65

0.619

Comments Outlet Controlled 8xØ375 RCP Adequate * Fig.A2 Austroads, Part 5(2008)

0.0672

0.695

0.3625

** Fig.A6 Austroads, Part 5(2008)



Appendix D

Wastewater Assessment Report

Document Set ID: 7883530 Version: 1, Version Date: 18/10/2017



WASTEWATER ASSESSMENT REPORT

Lot 31 Nepean Gorge Road, Mulgoa

Prepared by: EnviroFit Pty Ltd Client: Mr Peter Sayer Date: 23rd September 2017 Report No. ENVF17-1090

EnviroFit Pty Ltd North Richmond NSW 0428 236 829

Document Set ID: 7883530 Version: 1, Version Date: 18/10/2017 0

Report Author:

Adrian Estreich

B. Applied Science (Environmental Health)

MEHA

Principle Consultant – EnviroFit Pty Ltd

Report Details:

Report Ref: ENVF17-1090 Completed: 23rd September 2017 Version: A

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Effluent Management Site Plan	19
Recommendations	20

1. Executive Summary

Wastewater Load					
Main dwelling and pool house	820L/day (based on tank water and PCC Policy)				
Caretakers Residences	480L/day (based on tank water and PCC Policy)				
Tank Selection					
2 x Accredited AWTS (secondary treatme	ent) System				
Accredited septic for pool house to drain	n to AWTS				
Disposal Areas					
Main Dwelling and Pool House	684 sqm surface irrigation				
Caretakers Cottage	401 sqm surface irrigation				
Site Limitations					

No 88b restrictions apply to this property

One moderate limitation was identified as part of the site and soil assessment. This was:

• Heavy Clay Soils (category 5 and 6 soils)

Site Plan



1. Introduction

EnviroFit Pty Ltd has been commissioned by Warwick Stimson from Stimson and Baker Planning on behalf of the property owners to conduct a site and soil assessment and to prepare a wastewater report for the proposed development of two dwellings (main residence and caretakers cottage).

Site Information

Address: Lot 31 Nepean Gorge Drive, Mulgoa

Local Government Area: Penrith City Council

Water Supply: Tank water

Proposed Development: Two dwellings (main residence and caretakers cottage).



2. Site Assessment

A site inspection encompassing an assessment of the sites physical features as well as intrusive soil sampling was conducted on 18th September 2017. The following information is based on the results of this inspection as well as a desktop review of the site.

Flood Potential and Overland Flow

It is best to locate all the components of on-site systems above the 1 in 100 year probability flood contour, but the 1 in 20 year probability contour may be used as a limit for land application areas.

Electrical components, vents and inspection openings of wastewater treatment devices should be sited above the 1 in 100 year probability flood contour.

Site Specific Comments

The site is not subjected to mainstream flooding or overland flow

Sun Exposure

Sun and wind exposure on land application areas should be maximised to enhance evaporation. Factors affecting exposure include the geographical aspect of the area, and vegetation and buildings near the proposed application area. Evaporation may be reduced by up to two-thirds in some locations by a poor aspect or overshadowing and sheltering by topography, buildings or vegetation.

Site Specific Comments

The site presents with good sun exposure in the disposal area.

Slope

Low Limitation

Low Limitation

Excessive slope might pose problems for installing systems and create difficulties in evenly distributing the treated wastewater to land, resulting in run-off from surface land application areas. The recommended maximum slope will vary depending on the type of land application system used and the site and soil characteristics.

Site Specific Comments

The slope of the land in the area that the dwellings and effluent disposal area (EDA) are located is no more than 5%.

Run on and Upslope Seepage

Low Limitation

Run-on of precipitation on to the land application area from up-gradient areas should be avoided. Run-on should be diverted around any land application area by using earthworks or a drainage system approved by the local council.

Upslope seepage can be at least partly controlled by installing groundwater cut-off trenches, provided the lowest level of the trench is above the level at which effluent can enter the land application area.

Site Specific Comments

The site is not subjected to run on or upslope seepage.

Surface, Shallow and Bed Rock

Low Limitation

The presence of rock outcrops usually indicates highly variable bedrock depths, and can be associated with preferential pathways (short-circuits) for effluent to flow along rock fissures and surface elsewhere.

The presence of rocks can limit evaporation and interfere with drainage. Rocks can also interfere with trench and pipe installations. Cobbles and larger stones can collapse into installations, causing problems with even effluent distribution

Site Specific Comments

No bedrock or rocky outcrops experienced on the site.

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Fill Material

Low Limitation

Fill can be described as soil resulting from human activities that have led to modification, truncation or burial of the original soil or the creation of new soil parent material by a variety of mechanisms. Fill often has highly variable properties, such as permeability. Fill can be prone to subsidence, and could contain material that might not be suitable for plant growth or for constructing land application systems. Fill can be removed, but if this is not possible a detailed assessment of the fill might be needed. Fill less than 0.3 metres deep could be suitable, depending on the nature of the material and the suitability of the underlying soil.

Site Specific Comments

There was no evidence of fill located where the dwellings and EDA are located

Erosion Potential

On-site systems should not be put on land that shows evidence of erosion, or that has potential for mass movement or slope failure.

Site Specific Comments

The proposed effluent disposal presents with a very low potential for erosion.

Surface water, dams and drainage channels

Surface water can be considered a river, lake, stream, or wetland that may be permanently or intermittently flowing. Surface water also includes water in the coastal marine area and water in manmade drains, channels, and dams unless these are to specifically divert surface water away from the land application area.

Note: Different buffer distances may apply depending on the type of surface water.

The discharge of nutrients (N, P) from an on-site system at levels higher than the soil and vegetation can assimilate, would in the longer term result in excess nutrients reaching the adjacent watercourses

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Low Limitation

either in surface run-off or, indirectly, in the groundwater. Nitrogen and phosphorus are particularly significant in their ability to cause eutrophication of receiving water bodies.

The discharge of high levels of bacteria from on-site systems also poses a health risk to humans and animals.

Site Specific Comments

There is no identified waterways or drainage easements within 40 metres of the proposed OSSM system and effluent disposal area

Landform

The landform in terms of convex, concave side slopes, foot slopes, hill crests and plains can have an impact on the lands drainage patterns. Consideration needs to be given to the landform particularly when considering surface irrigation.

Landforms that present moderate to major limitations (such as drainage plans and concave side slopes) need to be carefully considered as part of the any site and soil assessment.

Site Specific Comments

The landform is a slight convex side slope and poses no limitation.

Groundwater

Groundwater is the water contained within rocks and sediments below the ground's surface in the saturated zone. Groundwater occurs everywhere below the ground but the ability to get the water out of the ground and the salinity of the water can vary widely depending on the geology and the amount of recharge a groundwater system receives.

Poorly designed and operated on-site sewage management systems can pose a risk to groundwater. This is due to potential of contamination via nutrients, pathogens and viruses

Attention needs to be given to groundwater protection, particularly if the groundwater is used or may be used for potable or irrigation water supplies.

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Minimum depths from the treated wastewater infiltrative surface to the minimum periodic watertable and/or gravel layer in a floodplain adjoining a river or stream are recommended to maintain aerobic conditions in the soil, prevent surface ponding and prevent contamination of groundwater. These minimum depths will vary, depending on the type of application system proposed and the site and soil characteristics of the site

Site Specific Comments

NSW Office of Water shows that there is no groundwater bore located within 250 metres from the proposed OSSM system.

Vegetation

Areas that consist of native vegetation are to be avoided. The effluent disposal area is to be situated in an existing cleared area or an Asset Protection Zone (APZ) to the extent possible, whilst observing the appropriate buffer distances. Where this is not possible the impact on native vegetation is required to be considered.

Site Specific Comments

There was native vegetation within the proposed disposal area however this is due to be cleared via the development application for the dwellings.

Available Land for effluent disposal

Small lots can create situations where there is reduced space or land that can be used for the disposal of effluent. During the planning stages of a subdivision consideration should be given to the land required for the management of effluent for each lot.

In terms of single lots which have minimal space for effluent management detailed site and soil assessment needs to consider all available options to ensure that effluent can be managed without impact the environment or public health.

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Site Specific Comments

There is sufficient land available on the property for the disposal of effluent

Low Limitation

Buffer Distances			Low Limitation
Feature	Criteria	Assessment Outcome	Comments
Property Boundaries	3-6 metres dependant on slope	\checkmark	
Waterways (creeks, dams)	40-100 metres	\checkmark	
Drainage depression	40m	\checkmark	
Flooding and overland flow	Council Specific	\checkmark	
Groundwater Wells	250 metres from proposed system	\checkmark	
Dwellings/Buildings	15 metres	\checkmark	
Swimming Pools	6 metres	\checkmark	
Driveways	3-6 metres	\checkmark	

3. Soil Assessment

During the site inspection on the 18th September 2017 soil sampling was carried out on site. These were taken in the same location as the proposed effluent disposal area. An analysis of the site soil properties was conducted in accordance with Appendix E of AS/NZS 1547:2012.

The results are presented in the following table.

Bore Hole A	A						
Depth to be	drock	>1m	>1m				
Depth to hig	sh soil watertable	Not experienced. No	mottling or free water				
Soil Landsca	pe	Blacktown – Shallow mottled texture contr grading to yellow poo	to moderately deep (>10 rast soils, red and brown dzolic soils on lower slope	0 cm) hard setting podzolic soils on crests es and in drainage lines.			
Soil layer	Depth (mm)	Colour	Structure	Texture			
Layer 1	0-100	Brown	Moderate	Loam			
Layer 2	100-400	Red/Brown	Moderate	Medium Clay			
Layer 3	400-600	Red/Brown	Moderate	Medium Clay			
Layer 4	600-1000	Red/Brown	Moderate	Medium Clay			
	SE . L. I @ 196°	150 100 210 S (T) 33°49'46''S, 150°3:	240 7'3"E ±16.4ft ▲ 565ft				

4. Disposal Area Calculations and Justification

Several disposal area designs and types were considered for this site. The disposal option proposed as part of the wastewater report is for surface irrigation from two AWTS. The design of the disposal area has been completed in accordance with Australian Standard 1547:2012 and Council's Policy.

System One – Main Dwelling and Pool

Wastewater Load						
Wastewater load	5 Bedroom secondary dwelling (including study) In accordance with Penrith City Council's OSSM Policy Plus 100 litres for use of the pool house	820 litres/day				

	Irrigation Disposal Area Sizing
Design	The proposed effluent disposal area consists of a medium clay soil.
Irrigation Rate	Under Table M1 of AS1547:2012 the appropriate design irrigation rate for category 6 soils receiving secondary treated effluent is 2mm/day.
	Wastewater Load = 820 L/d
Hydraulic	DIR = 2mm/day
Calculations	Area Required = Wastewater Load/DIR
	AR = 410 sq. metres.
	25 mg/L Nutrient loading
	(Based on NSW Environment and Health Protection Guidelines for OSSM for single households)
Nitrogen	33mg/L Nutrient uptake
Calculations	(Based on Appendix 1 of the Sydney Catchment Authority Guidelines)
	Area Required = TN Loading X Wastewater Load/Nitrogen uptake
	AR = 25 x 820/33
	AR = 621 Sq. metres
	12 mg/L Nutrient loading
	(Based on NSW Environment and Health Protection Guidelines for OSSM for single households)
Phosphorus	3mg/L Nutrient uptake
Calculations	(Based on Appendix 1 of the Sydney Catchment Authority Guidelines)
	Phosphorus Sorption Capacity
	Weighted Sorption Calculations based on Sydney Catchment Authority 'Designing and Installing On-site Sewage Management Systems' Guidelines.

P sorption = 6295 kg/ha (weighted average based on 4 horizons) Area Required = Pgenerated (kg)/ (Pabsorbed + Puptake)					
	AR = 273.75Kg / (0.198+0.05475) AR = 684 sq. metres.				
Designated et	ffluent disposal area	584 sq. metre irrigation area			

System Two – Caretakers Cottage

Wastewater Load		
Wastewater load	3 Bedroom secondary dwelling In accordance with Penrith City Council's OSSM Policy	480 litres/day

	Irrigation Disposal Area Sizing
Design	The proposed effluent disposal area consists of a medium clay soil.
Irrigation Rate	Under Table M1 of AS1547:2012 the appropriate design irrigation rate for category 6 soils receiving secondary treated effluent is 2mm/day.
	Wastewater Load = 480 L/d
Hydraulic	DIR = 2mm/day
Calculations	Area Required = Wastewater Load/DIR
	AR = 240 sq. metres.
	25 mg/L Nutrient loading
	(Based on NSW Environment and Health Protection Guidelines for OSSM for single households)
Nitrogen	33mg/L Nutrient uptake
Calculations	(Based on Appendix 1 of the Sydney Catchment Authority Guidelines)
	Area Required = TN Loading X Wastewater Load/Nitrogen uptake
	AR = 25 x 480/33
	AR = 364 Sq. metres
	12 mg/L Nutrient loading
Phosphorus	(Based on NSW Environment and Health Protection Guidelines for OSSM for single households)
Calculations	3mg/L Nutrient uptake
	(Based on Appendix 1 of the Sydney Catchment Authority Guidelines)
	Phosphorus Sorption Capacity

 Weighted Sorption Calculations based on Sydney Catchment Authority 'Designing and Installing On-site Sewage Management Systems' Guidelines.

 <u>P sorption = 6295 kg/ha (weighted average based on 4 horizons)</u>

 Area Required = Pgenerated (kg)/ (Pabsorbed + Puptake)

 AR = 273.75Kg / (0.198+0.05475)

 AR = 401 sq. metres.

 Designated effluent disposal area

5.1 Proposed disposal area



5.2 Water Balance and Climate Assessment

Main Residence and Pool House

Property	Lot 31 Nepe	ean Gorge D	rive											
Wastewater Load (L/D)	840													
DIR (mm/day)	2													
Design Disposal Area Size (sq. metres)	684													
BOM Site (percipitation)	Badgery's C	reek												
BOM Site (Evapotranspiration)	Badgery's C	reek												
WET WEATHER STORAGE CALCULATIONS														
Percolation Rate	mm/week	14												
Parameter		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Days in month	days	31	28	31	30	31	30	31	31	30	31	30	31	365
Precipitation	mm/month	75.4	62.8	71.4	38.4	31.3	30.1	19.8	27.4	33.8	43.8	61.6	50.8	582.3
Evaporation	mm/month	182.9	151.2	139.5	105	65.1	51	65.1	93	120	145.7	171	204.6	1436.9
Crop Factor		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
INPUTS														
Parameter		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Parameter Precipitation	mm/month	Jan 75.4	Feb 62.8	Mar 71.4	Apr 38.4	May 31.3	Jun 30.1	Jul 19.8	Aug 27.4	Sep 33.8	Oct 43.8	Nov 61.6	Dec 50.8	TOTAL 546.6
Parameter Precipitation Effluent irrigation	mm/month mm/month	Jan 75.4 38.07	Feb 62.8 34.39	Mar 71.4 38.07	Apr 38.4 36.84	May 31.3 38.07	Jun 30.1 36.84	Jul 19.8 38.07	Aug 27.4 38.07	Sep 33.8 36.84	Oct 43.8 38.07	Nov 61.6 36.84	Dec 50.8 38.07	TOTAL 546.6 448.25
Parameter Precipitation Effluent irrigation Inputs	mm/month mm/month mm/month	Jan 75.4 38.07 113.47	Feb 62.8 34.39 97.19	Mar 71.4 38.07 109.47	Apr 38.4 36.84 75.24	May 31.3 38.07 69.37	Jun 30.1 36.84 66.94	Jul 19.8 38.07 57.87	Aug 27.4 38.07 65.47	Sep 33.8 36.84 70.64	Oct 43.8 38.07 81.87	Nov 61.6 36.84 98.44	Dec 50.8 38.07 88.87	TOTAL 546.6 448.25 994.84561
Parameter Precipitation Effluent irrigation Inputs	mm/month mm/month mm/month	Jan 75.4 38.07 113.47	Feb 62.8 34.39 97.19	Mar 71.4 38.07 109.47	Apr 38.4 36.84 75.24	May 31.3 38.07 69.37	Jun 30.1 36.84 66.94	Jul 19.8 38.07 57.87	Aug 27.4 38.07 65.47	Sep 33.8 36.84 70.64	Oct 43.8 38.07 81.87	Nov 61.6 36.84 98.44	Dec 50.8 38.07 88.87	TOTAL 546.6 448.25 994.84561
Parameter Precipitation Effluent irrigation Inputs OUTPUTS	mm/month mm/month mm/month	Jan 75.4 38.07 113.47	Feb 62.8 34.39 97.19	Mar 71.4 38.07 109.47	Apr 38.4 36.84 75.24	May 31.3 38.07 69.37	Jun 30.1 36.84 66.94	Jul 19.8 38.07 57.87	Aug 27.4 38.07 65.47	Sep 33.8 36.84 70.64	Oct 43.8 38.07 81.87	Nov 61.6 36.84 98.44	Dec 50.8 38.07 88.87	TOTAL 546.6 448.25 994.84561
Parameter Precipitation Effluent irrigation Inputs OUTPUTS Parameter	mm/month mm/month mm/month	Jan 75.4 38.07 113.47 Jan	Feb 62.8 34.39 97.19 Feb	Mar 71.4 38.07 109.47 Mar	Apr 38.4 36.84 75.24 Apr	May 31.3 38.07 69.37 May	Jun 30.1 36.84 66.94 Jun	Jul 19.8 38.07 57.87 Jul	Aug 27.4 38.07 65.47 Aug	Sep 33.8 36.84 70.64 Sep	Oct 43.8 38.07 81.87 Oct	Nov 61.6 36.84 98.44 Nov	Dec 50.8 38.07 88.87 Dec Dec	TOTAL 546.6 448.25 994.84561 TOTAL
Parameter Precipitation Effluent irrigation Inputs OUTPUTS Parameter Evapotranspiration	mm/month mm/month mm/month mm/month	Jan 75.4 38.07 113.47 Jan 182.90	Feb 62.8 34.39 97.19 Feb 151.20	Mar 71.4 38.07 109.47 Mar 139.50	Apr 38.4 36.84 75.24 Apr 105.00	May 31.3 38.07 69.37 May 65.10	Jun 30.1 36.84 66.94 Jun 51.00	Jul 19.8 38.07 57.87 Jul 65.10	Aug 27.4 38.07 65.47 Aug 93.00	Sep 33.8 36.84 70.64 Sep 120.00	Oct 43.8 38.07 81.87 Oct 145.70	Nov 61.6 36.84 98.44 Nov 171.00	Dec 50.8 38.07 88.87 Dec 204.60	TOTAL 546.6 448.25 994.84561 TOTAL 1494.10
Parameter Precipitation Effluent irrigation Inputs OUTPUTS Parameter Evapotranspiration Percolation	mm/month mm/month mm/month mm/month mm/month	Jan 75.4 38.07 113.47 Jan 182.90 62.00	Feb 62.8 34.39 97.19 Feb 151.20 56.00	Mar 71.4 38.07 109.47 Mar 139.50 62.00	Apr 38.4 36.84 75.24 Apr 105.00 60.00	May 31.3 38.07 69.37 May 65.10 62.00	Jun 30.1 36.84 66.94 Jun 51.00 60.00	Jul 19.8 38.07 57.87 Jul 65.10 62.00	Aug 27.4 38.07 65.47 Aug 93.00 62.00	Sep 33.8 36.84 70.64 Sep 120.00 60.00	Oct 43.8 38.07 81.87 Oct 145.70 62.00	Nov 61.6 36.84 98.44 Nov 171.00 60.00	Dec 50.8 38.07 88.87 Dec 204.60 62.00	TOTAL 546.6 448.25 994.84561 TOTAL 1494.10 730.00
Parameter Precipitation Effluent irrigation Inputs OUTPUTS Parameter Evapotranspiration Percolation Outputs	mm/month mm/month mm/month mm/month mm/month mm/month	Jan 75.4 38.07 113.47 Jan 182.90 62.00 244.90	Feb 62.8 34.39 97.19 Feb 151.20 56.00 207.20	Mar 71.4 38.07 109.47 Mar 139.50 62.00 201.50	Apr 38.4 36.84 75.24 Apr 105.00 60.00 165.00	May 31.3 38.07 69.37 May 65.10 62.00 127.10	Jun 30.1 36.84 66.94 Jun 51.00 60.00 111.00	Jul 19.8 38.07 57.87 Jul 65.10 62.00 127.10	Aug 27.4 38.07 65.47 Aug 93.00 62.00 155.00	Sep 33.8 36.84 70.64 Sep 120.00 60.00 180.00	Oct 43.8 38.07 81.87 Oct 145.70 62.00 207.70	Nov 61.6 36.84 98.44 Nov 171.00 60.00 231.00	Dec 50.8 38.07 88.87 Dec 204.60 62.00 266.60	TOTAL 546.6 448.25 994.84561 TOTAL 1494.10 730.00 2224.10
Parameter Precipitation Effluent irrigation Inputs OUTPUTS Parameter Evapotranspiration Percolation Outputs	mm/month mm/month mm/month mm/month mm/month	Jan 75.4 38.07 113.47 Jan 182.90 62.00 244.90	Feb 62.8 34.39 97.19 Feb 151.20 56.00 207.20	Mar 71.4 38.07 109.47 Mar 139.50 62.00 201.50	Apr 38.4 36.84 75.24 Apr 105.00 60.00 165.00	May 31.3 38.07 69.37 May 65.10 62.00 127.10	Jun 30.1 36.84 66.94 Jun 51.00 60.00 111.00	Jul 19.8 38.07 57.87 Jul 65.10 62.00 127.10	Aug 27.4 38.07 65.47 Aug 93.00 62.00 155.00	Sep 33.8 36.84 70.64 Sep 120.00 60.00 180.00	Oct 43.8 38.07 81.87 Oct 145.70 62.00 207.70	Nov 61.6 36.84 98.44 Nov 171.00 60.00 231.00	Dec 50.8 38.07 88.87 Dec 204.60 62.00 266.60	TOTAL 546.6 448.25 994.84561 TOTAL 1494.10 730.00 2224.10
Parameter Precipitation Effluent irrigation Inputs OUTPUTS Parameter Evapotranspiration Percolation Outputs Storage	mm/month mm/month mm/month mm/month mm/month mm/month mm/month	Jan 75.4 38.07 113.47 Jan 182.90 62.00 244.90 -131.43	Feb 62.8 34.39 97.19 Feb 151.20 56.00 207.20 -110.01	Mar 71.4 38.07 109.47 Mar 139.50 62.00 201.50 -92.03	Apr 38.4 36.84 75.24 Apr 105.00 60.00 165.00 -89.76	May 31.3 38.07 69.37 May 65.10 62.00 127.10 -57.73	Jun 30.1 36.84 66.94 Jun 51.00 60.00 111.00 -44.06	Jul 19.8 38.07 57.87 Jul 65.10 62.00 127.10 -69.23	Aug 27.4 38.07 65.47 Aug 93.00 62.00 155.00	Sep 33.8 36.84 70.64 Sep 120.00 60.00 180.00 -109.36	Oct 43.8 38.07 81.87 Oct 145.70 62.00 207.70 -125.83	Nov 61.6 36.84 98.44 Nov 171.00 60.00 231.00 -132.56	Dec 50.8 38.07 88.87 Dec 204.60 62.00 266.60 -177.73	TOTAL 546.6 448.25 994.84561 TOTAL 1494.10 730.00 2224.10
Parameter Precipitation Effluent irrigation Inputs OUTPUTS Parameter Evapotranspiration Percolation Outputs Storage Cumulative storage	mm/month mm/month mm/month mm/month mm/month mm/month mm/month mm/month	Jan 75.4 38.07 113.47 Jan 182.90 62.00 244.90 -131.43	Feb 62.8 34.39 97.19 Feb 151.20 56.00 207.20 -110.01	Mar 71.4 38.07 109.47 Mar 139.50 62.00 201.50 -92.03	Apr 38.4 36.84 75.24 Apr 105.00 60.00 165.00 -89.76	May 31.3 38.07 69.37 May 65.10 62.00 127.10 -57.73	Jun 30.1 36.84 66.94 Jun 51.00 60.00 111.00 -44.06	Jul 19.8 38.07 57.87 Jul 65.10 62.00 127.10 -69.23	Aug 27.4 38.07 65.47 Aug 93.00 62.00 155.00 -89.53	Sep 33.8 36.84 70.64 Sep 120.00 60.00 180.00 -109.36	Oct 43.8 38.07 81.87 Oct 145.70 62.00 207.70 -125.83	Nov 61.6 36.84 98.44 Nov 171.00 60.00 231.00 -132.56	Dec 50.8 38.07 88.87 Dec 204.60 62.00 266.60 -177.73	TOTAL 546.6 448.25 994.84561 TOTAL 1494.10 730.00 2224.10 0.00
Parameter Precipitation Effluent irrigation Inputs OUTPUTS Parameter Evapotranspiration Percolation Outputs Storage Cumulative storage	mm/month mm/month mm/month mm/month mm/month mm/month mm/month mm/month	Jan 75.4 38.07 113.47 Jan 182.90 62.00 244.90 -131.43	Feb 62.8 34.39 97.19 Feb 151.20 56.00 207.20 -110.01	Mar 71.4 38.07 109.47 Mar 139.50 62.00 201.50 -92.03	Apr 38.4 36.84 75.24 Apr 105.00 60.00 165.00 -89.76	May 31.3 38.07 69.37 May 65.10 62.00 127.10 -57.73	Jun 30.1 36.84 66.94 Jun 51.00 60.00 111.00 -44.06	Jul 19.8 38.07 57.87 Jul 65.10 62.00 127.10 -69.23	Aug 27.4 38.07 65.47 Aug 93.00 62.00 155.00 -89.53	Sep 33.8 36.84 70.64 Sep 120.00 60.00 180.00 -109.36	Oct 43.8 38.07 81.87 Oct 145.70 62.00 207.70 -125.83	Nov 61.6 36.84 98.44 Nov 171.00 60.00 231.00 -132.56	Dec 50.8 38.07 88.87 Dec 204.60 62.00 266.60 -177.73	TOTAL 546.6 448.25 994.84561 TOTAL 1494.10 730.00 2224.10 0.00
Parameter Precipitation Effluent irrigation Inputs OUTPUTS Parameter Evapotranspiration Percolation Outputs Storage Cumulative storage	mm/month mm/month mm/month mm/month mm/month mm/month mm/month mm/month	Jan 75.4 38.07 113.47 Jan 182.90 62.00 244.90 -131.43	Feb 62.8 34.39 97.19 Feb 151.20 56.00 207.20 -110.01	Mar 71.4 38.07 109.47 Mar 139.50 62.00 201.50 -92.03	Apr 38.4 36.84 75.24 Apr 105.00 60.00 165.00 -89.76	May 31.3 38.07 69.37 May 65.10 62.00 127.10 -57.73	Jun 30.1 36.84 66.94 Jun 51.00 60.00 111.00 -44.06	Jul 19.8 38.07 57.87 Jul 65.10 62.00 127.10 -69.23	Aug 27.4 38.07 65.47 Aug 93.00 62.00 155.00 -89.53	Sep 33.8 36.84 70.64 Sep 120.00 60.00 180.00 -109.36	Oct 43.8 38.07 81.87 Oct 145.70 62.00 207.70 -125.83	Nov 61.6 36.84 98.44 Nov 171.00 60.00 231.00 -132.56	Dec 50.8 38.07 88.87 Dec 204.60 62.00 266.60 -177.73	TOTAL 546.6 448.25 994.84561 TOTAL 1494.10 730.00 2224.10 0.000
Parameter Precipitation Effluent irrigation Inputs OUTPUTS Parameter Evapotranspiration Percolation Outputs Storage Cumulative storage STORAGE	mm/month mm/month mm/month mm/month mm/month mm/month mm/month mm/month	Jan 75.4 38.07 113.47 Jan 182.90 62.00 244.90 -131.43	Feb 62.8 34.39 97.19 Feb 151.20 56.00 207.20 -110.01	Mar 71.4 38.07 109.47 Mar 139.50 62.00 201.50 -92.03	Apr 38.4 36.84 75.24 Apr 105.00 60.00 165.00 -89.76	May 31.3 38.07 69.37 May 65.10 62.00 127.10 -57.73	Jun 30.1 36.84 66.94 Jun 51.00 60.00 111.00 -44.06	Jul 19.8 38.07 57.87 Jul 65.10 62.00 127.10 -69.23	Aug 27.4 38.07 65.47 Aug 93.00 62.00 155.00 -89.53	Sep 33.8 36.84 70.64 Sep 120.00 60.00 180.00 -109.36	Oct 43.8 38.07 81.87 Oct 145.70 62.00 207.70 -125.83	Nov 61.6 36.84 98.44 Nov 171.00 60.00 231.00 -132.56	Dec 50.8 38.07 88.87 Dec 204.60 62.00 266.60 -177.73	TOTAL 546.6 448.25 994.84561 TOTAL 1494.10 730.00 2224.10 0.00

Caretakers Cottage

Property	Lot 31 Nepe	ean Gorge D	rive											
Wastewater Load (L/D)	480													
DIR (mm/day)	2													
Design Disposal Area Size (sq. metres)	401													
BOM Site (percipitation)	Badgery's C	reek												
BOM Site (Evapotranspiration)	Badgery's C	reek												
WET WEATHER STORAGE CALCULATIONS														
Percolation Rate	mm/week	14												
Parameter		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Days in month	days	31	28	31	30	31	30	31	31	30	31	30	31	365
Precipitation	mm/month	75.4	62.8	71.4	38.4	31.3	30.1	19.8	27.4	33.8	43.8	61.6	50.8	582.3
Evaporation	mm/month	182.9	151.2	139.5	105	65.1	51	65.1	93	120	145.7	171	204.6	1436.9
Crop Factor		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
INPUTS														
Parameter		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Precipitation	mm/month	75.4	62.8	71.4	38.4	31.3	30.1	19.8	27.4	33.8	43.8	61.6	50.8	546.6
Effluent irrigation	mm/month	37.11	33.52	37.11	35.91	37.11	25.01	37.11	27.11	25 01	07.44	25.01	37.11	436.91
Inputs	mm /month						33.51	31.11	57.11	33.51	37.11	22.91	27.11	450.51
	minymonth	112.51	96.32	108.51	74.31	68.41	66.01	56.91	64.51	69.71	80.91	97.51	87.91	983.50773
	minymonen	112.51	96.32	108.51	74.31	68.41	66.01	56.91	64.51	69.71	37.11 80.91	97.51	87.91	983.50773
OUTPUTS		112.51	96.32	108.51	74.31	68.41	66.01	56.91	64.51	69.71	80.91	97.51	87.91	983.50773
OUTPUTS Parameter	innymontin	112.51 Jan	96.32 Feb	108.51 Mar	74.31 Apr	68.41 May	66.01 Jun	56.91 Jul	64.51	69.71 Sep	37.11 80.91 Oct	97.51 Nov	87.91 Dec	983.50773 TOTAL
OUTPUTS Parameter Evapotranspiration	mm/month	112.51 Jan 182.90	96.32 Feb 151.20	108.51 Mar 139.50	74.31 Apr 105.00	68.41 May 65.10	66.01 Jun 51.00	Jul 65.10	64.51 Aug 93.00	69.71 Sep 120.00	37.11 80.91 Oct 145.70	97.51 Nov 171.00	87.91 Dec 204.60	983.50773 TOTAL 1494.10
OUTPUTS Parameter Evapotranspiration Percolation	mm/month mm/month	112.51 Jan 182.90 62.00	96.32 Feb 151.20 56.00	108.51 Mar 139.50 62.00	74.31 Apr 105.00 60.00	68.41 May 65.10 62.00	33.91 66.01 Jun 51.00 60.00	Jul 65.10 62.00	Aug 93.00 62.00	53.51 69.71 Sep 120.00 60.00	37.11 80.91 Oct 145.70 62.00	97.51 Nov 171.00 60.00	07.11 87.91 Dec 204.60 62.00	983.50773 70TAL 1494.10 730.00
OUTPUTS Parameter Evapotranspiration Percolation Outputs	mm/month mm/month mm/month	112.51 Jan 182.90 62.00 244.90	96.32 Feb 151.20 56.00 207.20	108.51 Mar 139.50 62.00 201.50	74.31 Apr 105.00 60.00 165.00	68.41 68.41 65.10 62.00 127.10	33.31 66.01 Jun 51.00 60.00 111.00	Jul 65.10 62.00 127.10	64.51 Aug 93.00 62.00 155.00	69.71 Sep 120.00 60.00 180.00	37.11 80.91 Oct 145.70 62.00 207.70	97.51 97.51 Nov 171.00 60.00 231.00	07.11 87.91 Dec 204.60 62.00 266.60	983.50773 TOTAL 1494.10 730.00 2224.10
OUTPUTS Parameter Evapotranspiration Percolation Outputs	mm/month mm/month mm/month	Jan 182.90 62.00 244.90	96.32 Feb 151.20 56.00 207.20	108.51 Mar 139.50 62.00 201.50	74.31 Apr 105.00 60.00 165.00	68.41 May 65.10 62.00 127.10	Jun 51.00 60.00 111.00	Jul 65.10 62.00 127.10	Aug 93.00 62.00 155.00	53.51 69.71 Sep 120.00 60.00 180.00	37.11 80.91 0ct 145.70 62.00 207.70	97.51 97.51 Nov 171.00 60.00 231.00	07.11 87.91 Dec 204.60 62.00 266.60	983.50773 TOTAL 1494.10 730.00 2224.10
OUTPUTS Parameter Evapotranspiration Percolation Outputs Storage	mm/month mm/month mm/month mm/month	112.51 Jan 182.90 62.00 244.90 -132.39	96.32 Feb 151.20 56.00 207.20 -110.88	108.51 Mar 139.50 62.00 201.50 -92.99	74.31 Apr 105.00 60.00 165.00 -90.69	68.41 68.41 65.10 62.00 127.10 -58.69	Jun 51.00 60.00 111.00 -44.99	Jul 65.10 62.00 127.10 -70.19	Aug 93.00 62.00 155.00	69.71 69.71 5ep 120.00 60.00 180.00 -110.29	37.11 80.91 Oct 145.70 62.00 207.70 -126.79	97.51 97.51 171.00 60.00 231.00 -133.49	07.11 87.91 Dec 204.60 62.00 266.60 -178.69	983.50773 983.50773 TOTAL 1494.10 730.00 2224.10
OUTPUTS Parameter Evapotranspiration Percolation Outputs Storage Cumulative storage	mm/month mm/month mm/month mm/month	112.51 Jan 182.90 62.00 244.90 -132.39	96.32 Feb 151.20 56.00 207.20 -110.88	108.51 Mar 139.50 62.00 201.50 -92.99	74.31 Apr 105.00 60.00 165.00 -90.69	68.41 May 65.10 62.00 127.10 -58.69	Jun 66.01 51.00 60.00 111.00 -44.99	Jul 65.10 62.00 127.10 -70.19	Aug 93.00 62.00 155.00 -90.49	53.51 69.71 120.00 60.00 180.00 -110.29	0ct 145.70 62.00 207.70 -126.79	97.51 97.51 171.00 60.00 231.00 -133.49	07.11 87.91 204.60 62.00 266.60 -178.69	983.50773 TOTAL 1494.10 730.00 2224.10 0.00
OUTPUTS Parameter Evapotranspiration Percolation Outputs Storage Cumulative storage	mm/month mm/month mm/month mm	112.51 Jan 182.90 62.00 244.90 -132.39	96.32 Feb 151.20 56.00 207.20 -110.88	108.51 Mar 139.50 62.00 201.50 -92.99	74.31 Apr 105.00 60.00 165.00 -90.69	68.41 May 65.10 62.00 127.10 -58.69	Jun 51.00 60.00 111.00 -44.99	Jul 65.10 62.00 127.10 -70.19	Aug 93.00 62.00 155.00 -90.49	53.51 69.71 120.00 60.00 180.00 -110.29	0ct 145.70 62.00 207.70 -126.79	97.51 97.51 171.00 60.00 231.00 -133.49	07.11 87.91 204.60 62.00 266.60 -178.69	983.50773 TOTAL 1494.10 730.00 2224.10 0.00
OUTPUTS Parameter Evapotranspiration Percolation Outputs Storage Cumulative storage	mm/month mm/month mm/month mm	112.51 Jan 182.90 62.00 244.90 -132.39	96.32 Feb 151.20 56.00 207.20 -110.88	108.51 Mar 139.50 62.00 201.50 -92.99	74.31 Apr 105.00 60.00 165.00 -90.69	68.41 May 65.10 62.00 127.10 -58.69	Jun 51.00 60.00 111.00 -44.99	56.91 56.91 65.10 62.00 127.10 -70.19	Aug 93.00 62.00 155.00 -90.49	53.51 69.71 120.00 60.00 180.00 -110.29	0ct 145.70 62.00 207.70 -126.79	97.51 97.51 171.00 60.00 231.00 -133.49	87.91 Dec 204.60 62.00 266.60 -178.69	983.50773 70TAL 1494.10 730.00 2224.10 0.00

5.3 Options Considered

As stated previously as part of this assessment two options were considered for the effluent disposal area. These included:



Two surface irrigation areas. One being 684 sq. metres and the other being 401 sq. metres.

Option Two Unsuitable

As part of the assessment for this new development, passive options such as evapotranspiration beds were considered. However due to the category 5 and 6 soils experienced on site, it was deemed that these types of systems would be unsuitable for long term sustainable management of wastewater.

5.4 Site Plan

Area of the lot subject to the assessment



5.5 Effluent Management Site Plan



Site Plan: Proposed Irrigation Area (1:1000)

	Surface irrigation disposal area
	Proposed buildings
	Proposed location of AWTS for main dwelling and pool house
•	Proposed location of AWTS for care takers cottage
	Proposed location of septic tank for pool house
	Proposed driveways
	Bore hole

6. Recommendations

In consideration to the site and soil assessment undertaken for the proposed development, the following recommendations are provided:

- Installation of 2 NSW Accredited secondary treatment systems (AWTS).
- The AWTS will need to be powered by the main 'off grid' power supply or its own solar panel and battery system. This will need to be determined by the owner once the type of system has been selected.
- A backup power supply should also be considered.
- Install an accredited septic tank with a minimum of 2000L to service the pool house. This is to be connected to the main residence AWTS via gravity or pump. This tank may require to be weighted/anchored due to the limited use.
- Establish a 684 sq. metre surface irrigation area for the main residence and pool house in accordance with Section 4 of this Report.
- Establish a 401 sq. metres reserve area for the care takers cottage in accordance with section 4 of this report.
- Although unlikely, if the effluent disposal area is subject to overland flow, the irrigation area is to be converted to sub-surface irrigation.
- Distribution line between the AWTS tank and disposal area is to be buried to a depth of 300mm, unless they go beneath driveways and traffic areas, in which case they are to be buried to a depth of 600mm.
- Stormwater is to be diverted away from the disposal area using methods approved by Council.
- The semi fixed surface irrigation set up is to achieve at minimum the following and any conditions of approval provided by Council:
 - All movable irrigation lines and sprinklers are not to have the ability to be moved outside the EDA
 - The distribution line is to be buried
 - spray irrigation shall only use low pressure, low volume spray heads which are not capable of producing aerosols. The spray shall have a maximum plume height 400mm and a plume radius of not more than 2 metres

- The owner and occupiers are to manage sodium inputs into the system.
- The dwellings are to employ water conservation measures. This may include the use of water saving devices within the kitchen, bathroom and laundry of the dwelling.
- The two AWTS are to be serviced in accordance with their NSW Accreditation.

References

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

Department of Local Government 1998, On-site Sewage Management for Single Households

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

Sydney Catchment Authority 'Designing and Installing On-site Sewage Management Systems' Guidelines.

Appendix A – Irrigation Guide

This irrigation diagram is provided as a conceptual plan for surface irrigation. The client may choose to install another type of surface irrigation however, it must meet the following:

- All movable irrigation lines and sprinklers are not to have the ability to be moved outside the EDA.
- The distribution line is to be buried
- Spray irrigation shall only use low pressure, low volume spray heads which are not capable of producing aerosols. The spray shall have a maximum plume height 400mm and a plume radius of not more than 2 metres.





Appendix B – Operation Guide

ON-SITE SEWAGE MANAGEMENT SYSTEMS

If you live in or rent a house that is not connected to the main sewer then chances are that your yard contains an on-site sewage management system. If this is the case then you have a special responsibility to ensure that it is working as well as it can.

The aim of this pamphlet is to introduce you to some of the most popular types of on-site sewage management systems and provide some general information to help you maintain your system effectively. You should find out what type of system you have and how it works.

More information can be obtained from the pamphlets:

Your Septic System Your Aerated Wastewater Treatment System Your Composting Toilet Your Land Application Area

You can get a copy of these pamphlets from your local council or the address marked on the back of this pamphlet.

It is important to keep in mind that maintenance needs to be performed properly and regularly. Poorly maintained on-site sewage management systems can significantly affect you and your family's health as well as the local environment.

What is an on-site sewage management system?

A domestic on-site sewage management system is made up of various components which - if properly designed, installed and maintained - allow the treatment and utilisation of wastewater from a house, completely within the boundary of the property.

Wastewater may be blackwater (toilet waste), or greywater (water from showers, sinks, and washing machines), or a combination of both.

Partial on-site systems - eg. pump out and common effluent systems (CES) - also exist. These usually involve the preliminary on-site treatment of wastewater in a septic tank, followed by collection and transport of the treated wastewater to an offsite management facility. Pump out systems use road tankers to transport the effluent, and CES use a network of small diameter pipes.

How does an on-site sewage management system work?

For complete on-site systems there are two main processes:

1. treatment of wastewater to a certain standard 2. its application to a dedicated area of land.

The type of application permitted depends on the quality of treatment, although you should try to avoid contact with all treated and untreated wastewater, and thoroughly wash affected areas if contact does occur.

Treatment and application can be carried out using various methods:

Septic Tank

Septic tanks treat both greywater and blackwater, but they provide only limited treatment through the settling of solids and the flotation of fats and greases. Bacteria in the tank break down the solids over a period of time. Wastewater that has been treated in a septic tank can only be applied to land through a covered soil absorption system, as the effluent is still too contaminated for above ground or near surface irrigation.

AWTS

Aerated wastewater treatment systems (AWTS) treat all household wastewater and have several treatment compartments. The first is like a septic tank, but in the second compartment air is mixed with the wastewater to assist bacteria to break down solids. A third compartment allows settling of more solids and a final chlorination contact chamber allows disinfection. Some AWTS are constructed with all the compartments inside a single tank. The effluent produced may be surface or sub-surface irrigated in a dedicated area.

Composting Toilets

Composting toilets collect and treat toilet waste only. Water from the shower, sinks and the washing machine needs to be treated separately (for example in a septic tank or AWTS as above). The compost produced by a composting toilet has special requirements but is usually buried on-site.

These are just some of the treatment and application methods available, and there are many other types such as sand filter beds, wetlands, and amended earth mounds. Your local council or the NSW Department of Health have more information on these systems if you need it.

Regulations and recommendations

The NSW Department of Health determines the design and structural requirements for treatment systems for single households. Local councils are primarily responsible for approving the installation of smaller domestic septic tank systems, composting toilets and AWTSs in their area, and are also responsible for approving land application areas. The NSW Environment Protection Authority approves larger systems.

The design and installation of on-site sewage management systems, including plumbing and drainage, should only be carried out by suitably qualified or experienced people. Care is needed to ensure correct sizing of the treatment system and application area.

Heavy fines may be imposed under the Clean Waters Act if wastewater is not managed properly.

Keeping your on-site sewage management system operating well

What you put down your drains and toilets has a lot to do with how well your system performs. Maintenance of your sewage management system also needs to be done well and on-time. The following is a guide to the types of things you should and should not do with your system.

DO

- Learn how your sewage management system works and its operational and maintenance requirements.
- Learn the location and layout of your sewage management system.
- Have your AWTS (if installed) inspected and serviced four times per year by an approved contractor. Other systems should be inspected at least once every year. Assessment should be applicable to the system design.
- Keep a record of desludgings, inspections, and other maintenance.
- Have your septic tank or AWTS desludged every three years to prevent sludge build up, which may 'clog' the pipes.
- Conserve water. Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.
- Discuss with your local council the adequacy of your existing sewage management system if you are considering house extensions for increased occupancy.

DON'T

- Don't let children or pets play on land application areas.
- × Don't water fruit and vegetables with effluent.
- Don't extract untreated groundwater for cooking and drinking.
- Don't put large quantities of bleaches, disinfectants, whiteners, nappy soakers and spot removers into your system via the sink, washing machine or toilet.
- Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- Don't put fats and oils down the drain and keep food waste out of your system.
- Don't install or use a garbage grinder or spa bath if your system is not designed for it.

Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your septic system. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system contaminating groundwater or a nearby waterway.

Your sewage management system is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained sewage management systems are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your management system you can do your part in helping to protect the environment and the health of you and your community.

For more information please contact:

Managing Wastewater In Your Backyard



EnviroFit Pty Ltd North Richmond NSW 0428 236 829

SEPTIC SYSTEMS

In unsewered areas, the proper treatment and reuse of household wastewater on-site is critical in ensuring minimal impact to public health and the environment. Septic systems have been developed as a way of achieving this.

What is a septic system?

A septic system consists of a septic tank combined with a soil absorption system and/or transpiration beds or pump out connections. The system enables people living in unsewered areas to treat and disperse their sewage.

A septic tank is a structurally sound watertight tank used for the treatment of sewage and liquid wastes from a single household or multiple dwellings.

How does a septic system work?

All the wastewater from a household enters the tank. Most of the solids settle to the bottom and are retained in the tank forming a sludge layer, whilst fats and greases collect at the top in a scum layer.



Bacteria in the septic tank break down the solid matter in the sludge and scum layers. Material that cannot be fully broken down gradually builds up in the tank and must be pumped out periodically. There are three ways to handle septic tank effluent:

On-site application. The effluent flows from the septic tank to transpiration and/or absorption trenches. Here the effluent is mainly absorbed into the soil and partly evaporated by the sun and used by vegetation.

Such application systems have the potential to contaminate groundwater and are not recommended in sensitive locations or in higher density developments. Further treatment followed by subsurface irrigation should be considered.



Pump out. The effluent flows from the septic tank into a collection well or holding tank. At regular periods, a tanker pumps out the holding tank and transports the effluent to an off-site management facility.

Common effluent system (CES). The treated wastewater is transported to an off-site management facility through a network of small diameter pipes.

Regulations and recommendations

An on-site septic system requires approval from the local council before it is put in place. The regulations that apply to single household systems differ from those for multiple dwellings. The Environment Protection Authority (EPA) is responsible for approving septic tanks used to treat wastes generated by multiple dwellings like caravan parks and commercial and industrial premises. The NSW Department of Health determines the design and structural requirements for septic tanks and collection wells. Local councils have the authority to approve systems certified by the NSW Department of Health for individual properties and ensure the systems do not have adverse impacts on health and the environment. Local councils are responsible for ensuring that the approved system is installed according to specifications and any special conditions, and is maintained and serviced correctly. You should consult your local council on the regulations that apply to you.

Care of the septic tank is only a part of the maintenance of your septic system. Management of the treated wastewater from your septic system is your responsibility and is discussed in the pamphlet "Your Land Application Area". Heavy fines may be imposed if the effluent is managed improperly.

Maintaining your septic system

The effectiveness of the system will, in part, depend on how it is operated and maintained. The following is a guide on how to achieve the most from your system.

DO

- Have your septic tank desludged every three years to prevent sludge build up, which may 'clog' the pipes and absorption trenches.
- Have your septic tank serviced annually by contractors to check scum and sludge levels, and the presence of blockages in the outlet and inlet pipes.
- Have your grease trap (if installed) cleaned out at least every two months.
- Keep a record of pumping, inspections, and other maintenance.
- Learn the location and layout of your septic system and land application area.
- Check household products for suitability for use with a septic tank.
- Use biodegradable liquid detergents, such as concentrates with low phosphorous.
- Ensure your tank is mosquito-proofed.
- ✓ Conserve water.

DON'T

- Don't put large quantities of bleaches, disinfectants, whiteners, nappy soakers and spot removers into your septic tank via the sink, washing machine or toilet.
- Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- Don't use more than the recommended amounts of detergents.
- Don't put fats and oils down the drain and keep food waste out of your system.
- Don't install or use a garbage grinder or spa bath if your system is not designed for it.

Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your septic system. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system contaminating groundwater or a nearby river, creek or dam.

Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.

Your septic system is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

Warning signs

You can look out for a few warning signs that signal to you that there are troubles with your septic tank. Ensure that these problems are attended to immediately to protect your health and the environment. Look out for the following warning signs:

- A Water that drains too slowly.
- Drain pipes that gurgle or make noises when air bubbles are forced back through the system.
- Sewage smells, this indicates a serious problem.
- B Water backing up into your sink which may indicate that your septic system is already failing.
- A Wastewater surfacing over the land application area.

Trouble shooting guide

If there are odours check the following areas:

- Λ Greasetrap (if installed), is it full or blocked?
- Λ Absorption field, is it wet or soggy?
- Λ Has there been recent heavy rain?

Odour problems from a vent on the septic system can be a result of slow or inadequate breakdown of solids. Call a technician to service the system.

HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained septic tanks are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your septic system you can do your part in helping to protect the environment and the health of you and your family.

If you would like more information please contact:

Your Septic System







EnviroFit Pty Ltd North Richmond NSW 0428 236 829





Bushfire Attack Level Assessment

Document Set ID: 7883530 Version: 1, Version Date: 18/10/2017



P. Sayer Unknown 16th September, 2016

Re: Bushfire Attack Level Assessment Lot 31 DP 237163 88-89 Nepean Gorge Road, Mulgoa NSW 2745

Dear Chris,

Further to the site inspection conducted on the 14th September, 2016 of the above noted address please find below my comments and assessment relating to the Bushfire Attack Level (BAL) effective on the above noted site for potential construction of a Class 1a dwelling on this allotment.

It must be noted that the proposed dwelling location is restricted to be within an allowable building allocation within the southernmost extent of the subject allotment.

The bushfire hazardous vegetation has been identified to be within four locations relative to the potential building platform as indicated within figure 1 and these areas are either within the area of the site designated for Bio Banking or upon adjoining allotments.

As discussed and indicated during the site inspection the potential building platform was identified and this is shown upon figure (see over) together with the areas of bushfire hazardous vegetation.

On basis of endeavouring to achieve a maximum of Bushfire Attack Level (BAL) 12.5 the required distances of separation are shown below.

<u>Area A</u>

- Woodland vegetation to north with an effective upslope
- Separation distance 33.0 metres

<u>Area B</u>

- Woodland vegetation to east with an effective downslope of 0 to < 5 degrees
- Separation distance 41.0 metres

<u>Area C</u>

- Forest vegetation to east with an effective downslope of 0 to < 5 degrees
- Separation distance 57.0 metres

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<u>Area D</u>

• Woodland vegetation to east with an effective downslope of 0 to < 5 degrees

2

• Separation distance 41.0 metres



Figure 1; Bushfire Attack Vegetation Areas

It must be understood that the waypoint above indicating the proposed dwelling location is a single point and actual dwelling platform is to be significantly larger.

However at present (as best as can be estimated) the following separation distances to that single point would be currently achieved;

- To the north 27.0 metres
- To the east 59.0 metres
- To the southeast 95.0 metres
- To the southwest 81 metres



So the next point of evaluation would be to estimate the dimension of the proposed dwelling and determine if this can be positioned to actually achieve BAL 12.5. Without knowing the dwelling dimension I cannot progress further but clearly to achieve BAL 12.5 the building platform will need to move at least in a southerly direction to provide for the 33.0 metre clearance from the vegetation to the north.

In a broad comment though I can say that on the basis of the site inspection, the subsequent desktop analysis and our previous discussion it is highly likely that at most a BAL 19 may result from the locating of a dwelling within the general area of the subject allotment

Please do not hesitate to contact me with any questions and clarifications. I look forward to being of further assistance.

Yours faithfully

Craig Burley Grad Dip Design in Bushfire Prone Areas FPA Australia BPAD – Level 3 Certified Practitioner