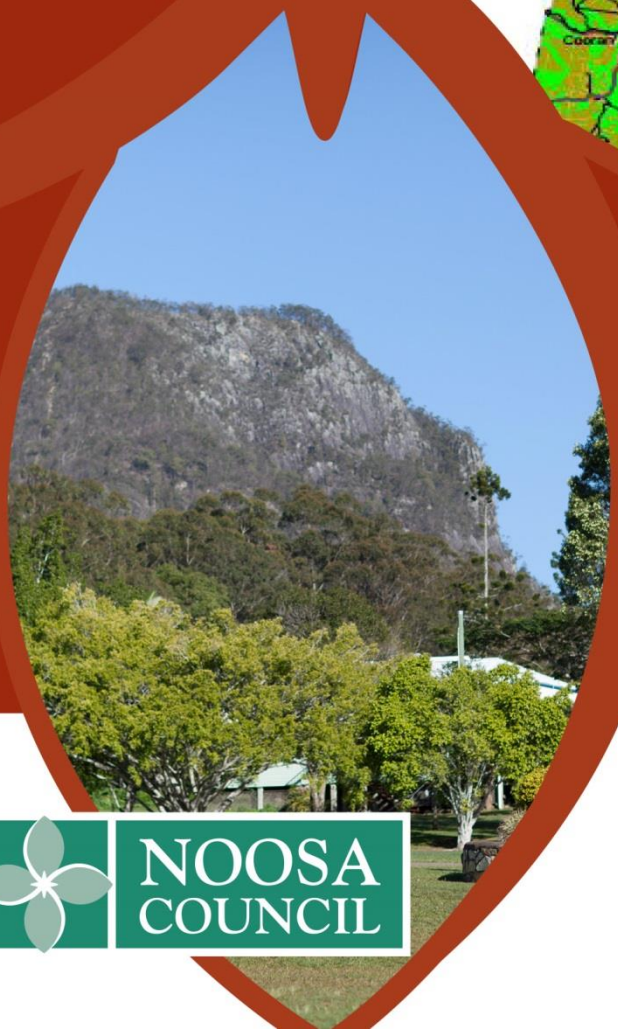
On-site effluent disposal in Noosa Shire 2016



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1. Executive Summary

Our developed world offers a variety of lifestyles and places to live, work and play. Always though, lying in the background is a vital system of pipes and plant that deal with our liquid wastes. In our urbanised places the collection and disposal of liquid effluent is on an industrial scale with a sophisticated network of pipes, pump stations and advanced treatment plants. For other places such as smaller settlements and rural situations, domestic effluent is predominantly disposed of on-site.

We have these systems because our generated liquid wastes can be harmful to human health and to the environment. Human illnesses associated with failed on-site treatment can be caused by E. coli, Giardia, Hepatitis A, Cryptosporidium and salmonellae.

Noosa Shire is no different in respect to liquid waste and has features typical to regional Australia with a mix of sewerage systems and on-site disposal. Several towns and settlements are unsewered with on-site disposal methods utilised, as is also the case in all rural localities. The key aspects of on-site disposal are a holding tank, a treatment process and the release of treated liquid to the ground at surface or sub-ground levels. The released liquid can have differing levels of contaminants depending on the system. The receiving environment is also variable such that the cumulative impacts of released waters from a multiplicity of systems can have the potential to cause deleterious effects on local ecosystems including waterways. The system installed should best reflect the needs of the individual circumstances.

The installation and management of an on-site waste water treatment system is regulated by Queensland legislation (Plumbing and Drainage Act 2002) and implemented by Noosa Council. A substantial study of on-site wastewater treatment in Noosa Shire was undertaken in 1995-97 as part of the background investigations that lead to the Noosa Shire Strategic Plan 1997. With a new Planning Scheme proposed by Noosa Council, it is timely to again consider the circumstances of on-site disposal. Technological improvements have taken place since the mid-1990s and this study considers whether there are any implications for managing development in unsewered localities.

This study concludes that while there have been advances in the technology available with treatment systems, they generally require a degree of management by the homeowner to deliver the predicted standards of the effluent discharged. That standard of management is variable in practice, lessening the average standard of discharge and the reliance that can be placed on such systems in vulnerable circumstances. Where there are potential risks to human health and environmental values, caution is warranted. In addition, the Queensland Government is currently investigating options that will lead to an improvement in the operation of existing on-site systems. What is also highlighted herein is the universal lack of comprehensive testing and research into the travel of discharge across and below the varied types of receiving environments.

2. Introduction

2.1 Preparing for the 1997 Strategic Plan

In 1995 Noosa Council was preparing a new Strategic Plan, a statutory plan under the *Local Government (Planning and Environment) Act 1980*. Strategic Plans undertook long term considerations leading to guidance on land use and other forms of development and were a component of the Council's Town Planning Scheme. Key features of a Strategic Plan were maps showing preferred dominant land uses and written material expressing objectives and implementation provisions.

As a prelude to preparing the 1997 Strategic Plan Council commissioned a series of planning studies that collected and analysed bio-physical data. The studies were assisted by a range of state and local policy inputs. Relevant background to informing the Strategic Plan included:-

- Flood risk
- Vegetation types and values
- Slope and landslip risk
- Bushfire occurrence
- Soil types
- Geology
- Agriculture
- Climate
- Catchments
- Landscape Networks
- Waterways

In the mid-1990's the population of Noosa Shire was expanding and was passing 30,000. Tourists added to that number. Concerns about the pace of growth and the apparent inevitability of development and its impacts on the local environment, were evident in the community and within Council. This resulted in a close examination of the suitability of land for future development and the capacity of infrastructure networks.

2.2 Previous Planning Study 1997

A Planning Study *On-site Effluent Disposal & Water Quality in Noosa Shire* was completed in February 1997. The project had two aims: –

1. To assess the suitability of the Shire's land for on-site disposal of effluent, based on a strategic mapping assessment and the maintenance of water quality within the Shire's waterways; and
2. To develop guidelines for on-site effluent disposal consistent with the findings of the mapping assessment.

The study focused on the two principal types of on-site disposal, absorption trenches and domestic treatment plants. The study also drew upon other investigations of land use, geology/soils, topography/slope, vegetation and flooding. Three types of guidelines were requested: –

1. Densities of allotments appropriate to varying land classes
2. The design and layout of allotments and associated house site areas
3. Soils testing criteria.

Peter Edmiston of Bio-track undertook the study and a draft of his report was reviewed by several technical staff of Council. Noosa Council endorsed the project's findings in March 1997 and the finalised Planning Study was publicly released.

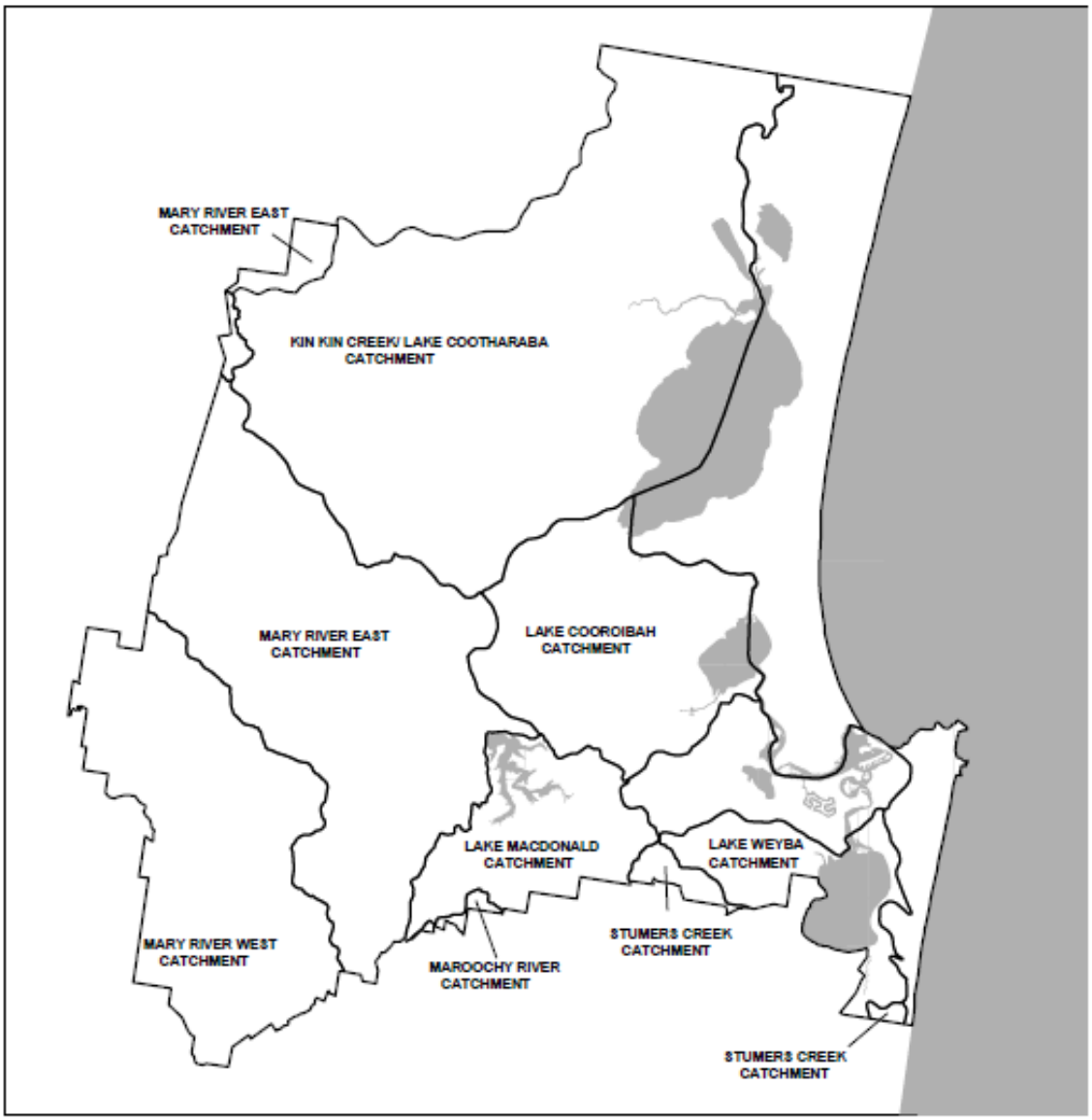
The study found there was a large body of water quality sampling results, but that the absence of a methodology behind collection and testing prevented any useful interpretation of long term changes in water quality. With 'little information' for much of the shire, a conservative approach was adopted. Recommendations about future water testing of key areas were included. (P.8)

A further significant challenge arose in the resolution of 'acceptable' run-off quality – defined in the study as 'sustainable, conservative and practical'. This is broad terminology and does not offer specific parameters for determining preferred actual outputs for differing terrain.

The Shire was divided into 8 catchments (refer Figure 1). Run-off from these catchments was modelled using a daily time-step water balance for a number of defined land uses for each catchment. Estimates of runoff (with an allocated nutrient export rate) were performed for each catchment. Separate studies referred to above were important inputs to support this work. Predicted water quality accounted for residential use together with various rural uses existing in the catchments.

The modelling results suggested Lake Macdonald, Maroochy and Stumers catchments already had more dwellings than was desirable. Lake Weyba was close to a recommended maximum. Kin Kin, Mary River East and Lake Weyba had a reliance on off-site dilution to achieve suitable stream water quality. The remaining catchments Cooroibah and Mary River West exhibited sustainability of water quality. (P.3&4)

Figure 1 - Division into Catchments



2.3 Planning Scheme Review

The Noosa Plan 2006 has a horizon year of 2015. While it has been amended a few times it is due for comprehensive review and replacement. The 2006 plan was prepared under the *Integrated Planning Act*. That act was replaced by the *Sustainable Planning Act 2009*. New legislation (*Planning Act 2016*) was assented to in May 2016.

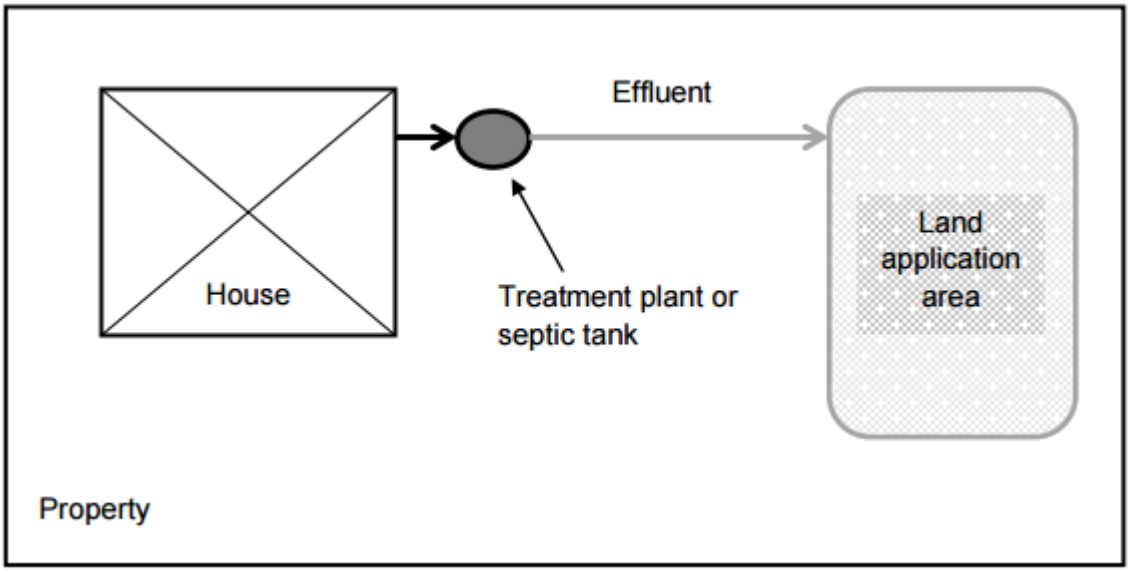
Council has commenced work on a new Planning Scheme for Noosa Shire. This planning study is intended to assist Council when considering development potential in unsewered areas.

3. About On-site Wastewater Treatment

3.1 Overview

Figure 2 (courtesy Building Codes Queensland) is a simple representation of the main elements of on-site wastewater treatment.

Figure 2 - On-site wastewater treatment



The following overview is an extract from a Discussion Paper to support a review of the *Plumbing and Drainage Act 2002* prepared by Building Codes Queensland and released in June 2014.

> *The non-sewered areas of Queensland are most commonly serviced by septic tanks or on-site sewage treatment plants. The resulting effluent is either treated and diverted for re-use (greywater only) or applied to land application areas.*
>
> *The function of an on-site sewage treatment plant is to receive and to treat domestic sewage by means of aerobic and/or anaerobic processes and, where required, disinfection so as to produce an effluent appropriate to the land application area.*
>
> *An on-site sewage treatment plant must protect public health by minimising the risks associated with the treatment of sewage and its ultimate discharge to the environment. On-site sewage facilities that are appropriately designed, sited and maintained can provide satisfactory waste management solutions. However, anecdotal reports suggest that many systems are underperforming (60 – 80%) and, as a result, pose an increased risk to public and environmental health.*
>
> *Environmental impacts caused by the discharge of poorly treated sewage may include pollution of groundwater, streams and waterways along with degradation of soil and vegetation. Apart from the environmental effects caused by poorly or untreated wastewater, failing systems also pose a health risk through direct human contact. This can not only lead to upset stomachs, they can also lead to more serious conditions caused by bacteria and viruses. Children are particularly at risk when they play in areas that are polluted by the discharge from poorly serviced or maintained on-site sewerage* [sic] *treatment plants. Failing on-site sewerage systems can have the following adverse impacts to both the occupants of the property and public in general:*
>
> - *spread of infectious bacteria, viruses and other organisms in the wastewater*
> - *cause odours*

- *attract pests (mosquitoes, flies and rodents)*
- *contribute to the pollution of groundwater, streams and waterways*
- *cause degradation of soil and vegetation.*

Owners/occupiers play a crucial role in ensuring that on-site sewage treatment plants are regularly maintained and that the system continues to effectively treat the waste water. The failure of on-site sewerage systems is generally attributed to one of three factors:

- *operation of the system (loading rates, mechanical malfunctions, pump failure)*
- *maintenance (lack of regular servicing, maintenance and testing)*
- *siting and design issues (soil types, subsurface water entering system during flooding events)*

3.2 Types of Systems

In Queensland the two most common types of on-site wastewater treatment systems are: –

- Primary systems - septic systems where biological processes treat waste which is subsequently discharged below ground
- Secondary systems - on-site plant employing mechanical, biological and filtration processes to treat waste with discharge either above or below ground.

Advanced treatment systems are less common. For legislative purposes the secondary systems are classified into subgroups of secondary quality, advanced secondary and advanced secondary with nutrient removal. All secondary systems require the prior approval of the Queensland government before they can be released to the market. Each system must be accompanied by manufacturer's specifications, with compliance with the specifications being a condition of approval for installation.

Figure 3 - Sand Filtration System

The government, as at April 2016, had approved many systems. Secondary -35, advanced secondary - 25 and advanced secondary with nutrient removal - 7.

For this Planning Study, the above systems are of primary interest. The use of holding tanks, common collection systems, greywater treatment or chemical, composting, incinerating or waterless toilets are not considered due to their lesser potential for adverse impacts.

Figure 4 - Aerated treatment plant

3.3 Environmental Impacts

The primary purpose of on-site wastewater treatment is to enable the safe use of land for housing and other purposes in circumstances where there is no sewerage for collection of unwanted liquid wastes. Those liquids entering the treatment system primarily contain contaminants of nitrogen, phosphorus and faecal coliforms. Both nitrogen and phosphorus are potentially adverse to the receiving environment being nutrients. Faecal coliforms are dangerous to human health.

On-site wastewater treatment is an effective means of dealing with these potentially hazardous wastes provided the conditions are suitable. Inappropriate discharging is unfortunately far more common than would be desirable. Given the range of factors that can impact on satisfactory operations, including occurrence of adverse weather conditions, it is not the case that all systems can be made to work all the time.

Understanding the potential impacts of the systems on the receiving environment is a complex and evolving issue. Treatment systems can be audited and an understanding of their failings is currently possible. However, the effects of failing systems on receiving environments are another matter entirely. Studies and the technical understanding of these impacts are limited and potentially quite varied depending on the local circumstances of soil, weather, terrain and vegetation.

Various studies have been published following investigations around Australia. These mainly relate to assessing areas which are predominantly employing septic tanks. This planning study does not propose an overview of those efforts. What is clear though is that there is a variety of findings and conclusions in attempting to determine the general suitability of on-site treatment systems. More research and sampling will contribute to an improvement to a technical understanding of the issue. Modelling capability is also progressing as demonstrated by some initiatives in south east Queensland that are attempting to predict water quality processes throughout an entire catchment.

It is plain that on-site wastewater treatment systems will be in use for a long time into the future. A principal objective for regulating bodies should be to encourage the satisfactory operation of installed systems in all except obviously adverse circumstances (for example, flooding and extended power failures) A secondary objective should be to support further studies into the external effects of these systems.

Figure 5 - Sub-surface irrigation system

Figure 6 - Mulched land application area associated with surface irrigation

THE GREAT BARRIER REEF

The Great Barrier Reef is widely acknowledged as suffering adverse effects from differing causes that include land-based activities. Marine and coastal ecosystems can be damaged by poor water quality associated with sediment, nitrogen, phosphorus and pesticides from rural and urban sources, coastal development, marine activities and most significantly, climate change.

This has led to the Australian government and Queensland government endorsing a Reef Water Quality Protection Plan in 2003 and its update in 2009 and 2013. This plan sets targets for improved water quality and actions to improve that quality particularly through land management practices. The Australian government has funded six regional plans to assist in achieving the desired outcome for the Great Barrier Reef. Of interest here is the Water Quality Improvement Plan for the Burnet Mary Region which includes the Mary Basin. This plan was prepared by the Burnett Mary Regional Group and consultants Natural Decisions.

The Mary Basin at 930,000 ha is the second largest catchment within the Burnet Mary Region and poses the greatest risk within the region to coral reefs and seagrass through degraded water quality arising from sediment, nitrogen and phosphorus. Just over half of the catchment is used for grazing and it has the highest population and greatest area of urban land uses including the towns of Maryborough and Hervey Bay. The Water Quality Improvement Plan proposes three delivery mechanisms in the form of incentives (stewardship payments), skills development for landholders and further research. One of the research priorities is to "improve understanding of catchment hydrological processes and relationship between land management practices and water quality".

On-site effluent disposal systems are not highlighted in the Water Quality Improvement Plan. The main attention is to broad hectare grazing and the more significant urban settlements. However the concerns expressed about the Mary Basin's adverse contributions to the health of the Great Barrier Reef and the expressed priority for further research into understanding catchment hydrological processes lend some small weight to the policy positions recommended in this planning study.

4. Policy Context

4.1 Queensland Legislation

The design, approval, installation and management of on-site wastewater treatment systems are primarily the responsibility of the Queensland government. The Plumbing and Drainage Act 2002 sets out the legislative framework. The Act is supported by the Standard Plumbing and Drainage Regulation 2003 and the Queensland Plumbing and Wastewater Code. The Act regulates the plumbing and drainage industry and the management of on-site sewerage facilities. Its objectives relate to protecting the environment, public health and safety. Provisions within the Act cover:–

- Plumbing and drainage functions performed by the Queensland Building and Construction Board and the Commissioner of the Queensland Building and Construction Commission
- Audit programs
- Licensing of plumbers and drainers
- Disciplinary actions
- Assessing plans
- Chief Executive approvals (relating to on-site sewage treatment or greywater treatment plants not exceeding 20 persons)
- Investigation and enforcement by Local Governments

The Act provides for the technical standards for plumbing and drainage to be set out in a regulation. The 2003 Regulation specifies the requirements for plumbing work and drainage work to be undertaken by licensed persons. The regulation sets out the qualifications and practical experience required for a licence and scope of work. The regulation also provides that on-site sewerage work must comply with the Queensland Plumbing and Wastewater Code which includes that the installed wastewater plant be maintained in accordance with the manufacturer's specifications.

The Queensland Plumbing and Wastewater Code describes performance solutions to meet the statutory requirements of the Act. The Code has a tabular format with columns for Performance Criteria and the relevant Acceptable Solutions. Under the Code, on-site wastewater systems must be designed, constructed, installed and maintained in such a manner as to –

a) protect public health by ensuring that risks associated with the dispersal of wastewater to the land application area are minimised; and
b) protect the environment by ensuring-
    i. surface and ground water are not polluted;
    ii. soil productivity is maintained or enhanced; and
c) minimise the impacts on and maintain and enhance amenity by ensuring it has no adverse impact on-
    i. the built environment, and
    ii. persons on and nearby the premises,

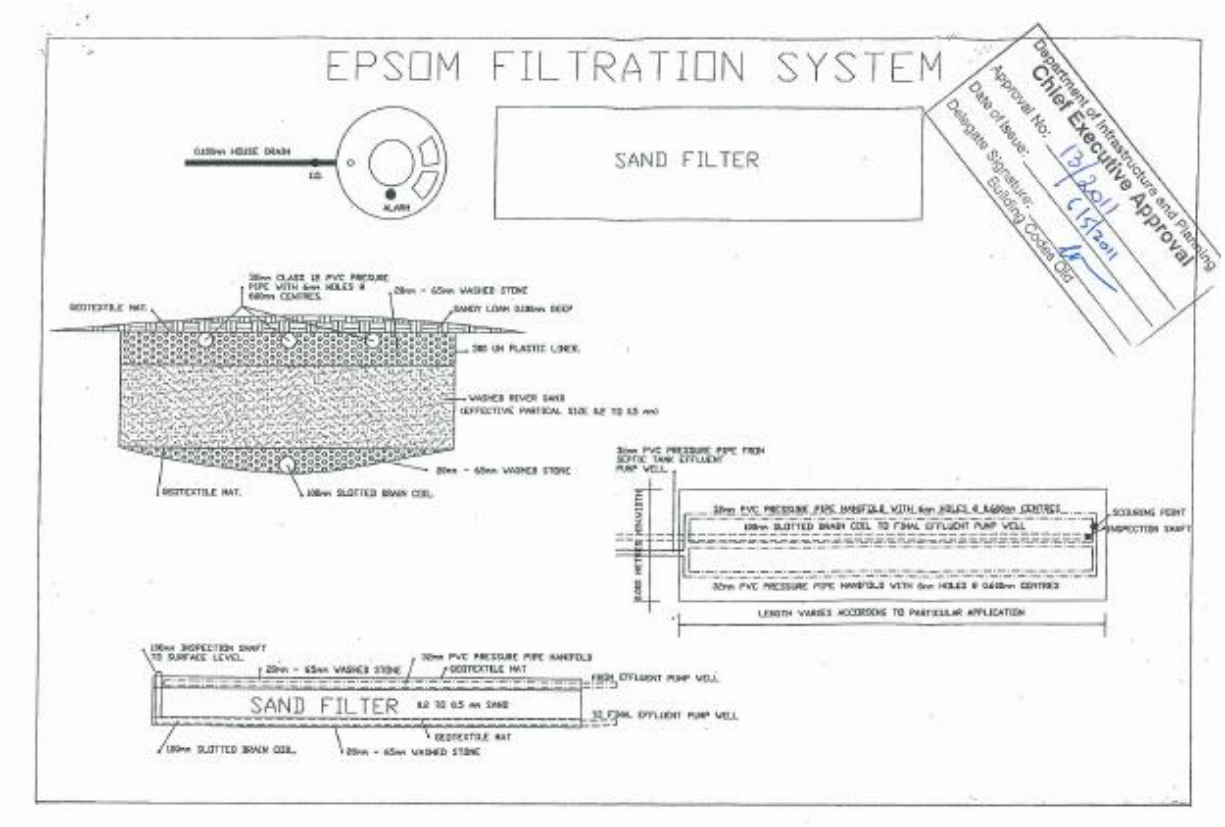
    for the design life of the facility.

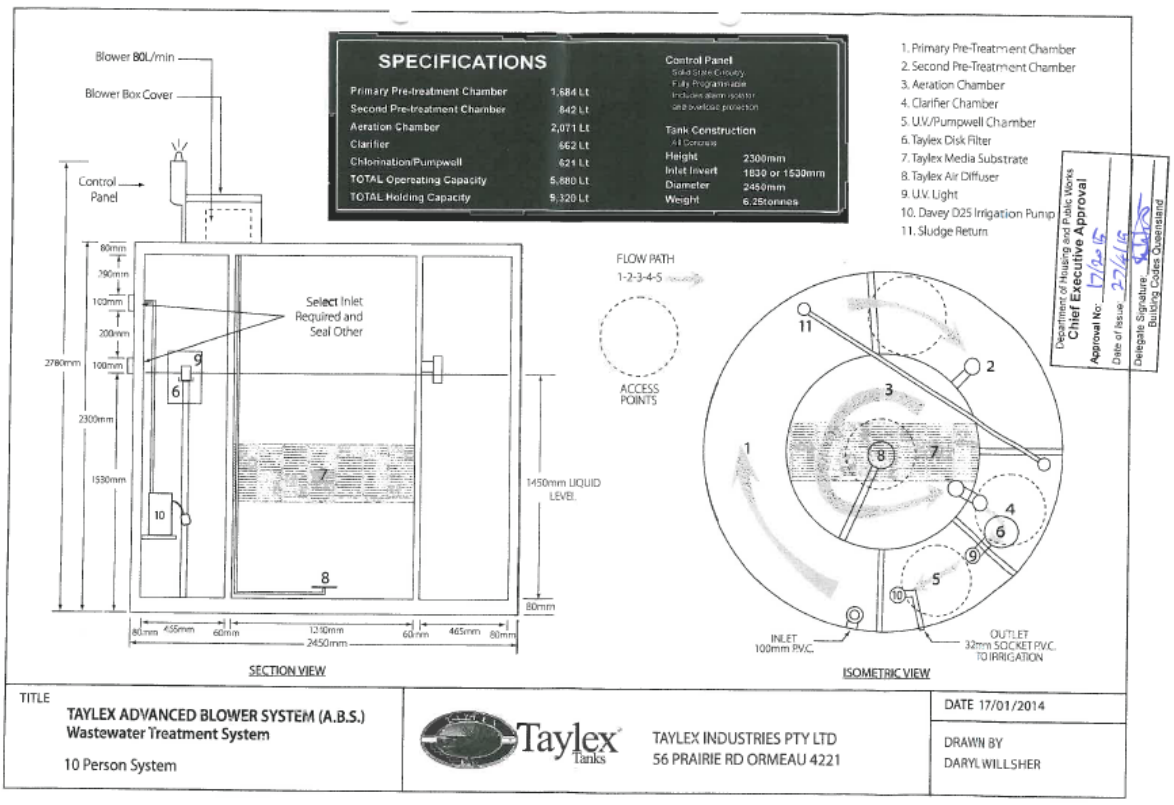
There are obligations on property owners and service agents. The property owner must take reasonable steps to properly maintain the on-site wastewater system. Service agents must provide Council and the property owner with a report on the condition of the system within a month of servicing it.

The Queensland Government also issues information bulletins about plumbing related matters and on 4 November 2014 issued Building and Plumbing Newsflash 534 - *On-site sewerage facility requirements*. This newsflash sets out a basic overview of how to obtain the necessary approvals

for on-site wastewater treatment systems. The material is intended to assist understanding of the regulations by the general public.

Figure 7 - Extracts from Chief Executive Officer approvals





4.2 Review of Queensland Legislation

On 15 June 2014 the Queensland Government released a discussion paper and held information sessions in regard to a review of the Plumbing and Drainage Act. The consultation period ended on 25 July 2014.

The review focused on:

- streamlining requirements to reduce the regulatory burden on industry, without compromising public health and safety, and
- reducing red tape, time delays and associated costs for housing providers, plumbing licensees, local governments and homeowners.

The government has considered feedback from the review and is currently finalising its response with a new Act anticipated before the end of 2016.

4.3 Review of Queensland Legislation – Discussion Paper, June 2014

The Discussion Paper 'Review of the *Plumbing and Drainage Act 2002'* contained suggestions by the Queensland government for improvements to the regulation of plumbing and drainage work. On-site sewage treatment plants and Chief Executive approvals were specifically addressed. Section 4.1 is informative to current circumstances of on-site treatment. It contains clear statements of concern over gaps and shortcomings in the operation and management of installed systems, particularly secondary treatment. The following extracts from the discussion paper are important to this Planning Study.

> *With increasing awareness about the impacts and consequences of poorly performing systems there is a growing concern from local governments about how to manage these systems. The current standards are also coming under scrutiny as to whether they can ensure adequate treatment performance.*
>
> *Local governments are currently obliged to maintain service information (recordkeeping only) for on-site sewage facilities and greywater facilities. They have advised that these notifications are simply stored and don't offer any value.*
>
> *Also, many maintenance providers do not supply the required service certificates which leave local governments in the position of following up a document they place limited value on. These issues result in significant cost and administrative burden on local governments.*
>
> *It has also been identified that there are gaps in the legislation covering the recording, inspection, auditing and monitoring of the systems. As the current regime is not mandated, local governments are reluctant to charge a fee for service and they have competing demands and limited financial resources. The resource burden for inspecting these systems can be considerable as they are often placed in geographically diverse locations. This often results in local governments not having the trained resources to monitor these activities and they generally only inspect properties following a complaint.*
>
> *On-site sewage facilities that are appropriately designed, sited and maintained can provide satisfactory waste management solutions. However, anecdotal reports suggest that many systems are underperforming (between 60 and 80%) and, as a result, pose an increased risk to public and environmental health.*

In response to the several concerns set out above the Discussion Paper proposes four potential improvements to the regulatory framework:-

1. *Service persons required to only provide notification to local government on failed systems*
2. *Impose minimum testing requirements for on-site sewerage systems – Local Government to inspect/audit/monitor*
3. *Local government providing reports to provide for data analysis of on-site systems and greywater systems*
4. *Undertake a comprehensive review of on-site sewage systems*

In support of improvement 4 above, it was further explained that such a review is in part warranted by a lack of relevant scientific data or supporting analysis of the performance of on-site systems. In consequence anecdotal evidence is the best available. The review as proposed is intended to deliver a standardised framework and undertake an evaluation of the current methods for testing and approving systems. The following areas for investigation were nominated:-

- *A thorough examination of the evidence to determine the potential causes of failure of the systems.*
- *Whether the current testing standards adequately represent the conditions that the system will be exposed to when installed and whether this is responsible for the failure of the system.*
- *Considering provisions that permit the cancellation of approvals where it is found that a particular type of system has failure rates beyond acceptable standards.*
- *How innovative systems are approved where there is no specific testing process.*
- *Investigating options to improve Australian Standards to remove the need for Queensland specific testing standards.*

For Chief Executive approvals, the discussion paper proposed the assessments could be undertaken by accredited bodies.

4.4 Noosa Council

Plumbing responsibilities of Noosa Council are dealt with by Building and Plumbing Services. This Branch performs all functions required by the Plumbing and Drainage Act 2002. The Branch employs several licensed and experienced plumbers to perform these roles.

Noosa Council also performs town planning functions and The Noosa Plan 2006 zones all properties for various land uses including residential, rural residential and rural. The Noosa Plan also sets the standards for subdivision of allotments.

Figure 8 - Example of zoning within the Noosa Plan

Subdivision of land is addressed under Division 23 Reconfiguring a Lot Code which establishes the allowable allotment sizes and specifies many other detailed requirements. An overall outcome of the code is that allotments *will avoid significant adverse effects on the natural environment and landscape and minimise the risk of hazards for people and property*.

The table below is an extract from the Reconfiguring a Lot Code and sets out the minimum allotment sizes for the residential zones of Detached Housing and Semi - attached Housing.

Table 14-68—Minimum Allotment Areas[39]

Locality / Zone[40]	Boreen Point, Kin Kin & Cootharaba	Cooroibah	Cooroy, Lake Macdonald (except in Lake Macdonald Water Supply Catchment Area)	Cooroy, Lake Macdonald (within Lake Macdonald Water Supply Catchment Area)	Eastern Beaches	Mary River Catchment
Detached Housing	2,000m²	1000m²	600m² or 800m² for rear or battleaxe lots[41]	No further subdivision permitted	600m² or 800m² for rear or battleaxe lots[485]	2,000m² or 1000m² if connected to Council's sewerage reticulation
Semi-attached Housing	N/A	N/A	800m²	No further subdivision	800m²	2,000m² or 1000m² if connected to Council's sewerage reticulation

In Cooroy, where there is sewerage available, the minimum allotment size can be 600 m². Pomona and Cooran have a minimum allotment size of 2,000 m² which can be reduced to 1,000 m² if a connection to sewerage reticulation is available. That reduction will only apply to Pomona as Cooran will remain unsewered due to Unitywater having no plans to install a scheme due to a lack of feasibility. Boreen Point and Kin Kin have a minimum allotment size of 2,000 m². The small settlement of Cooroibah is set at 1,000 m². Cooroibah is sewered and in any event has no further potential for subdivision.

With Pomona now having a complete sewerage scheme, some of the larger existing lots may be capable of subdivision.

With Cooran having no prospects of sewerage being installed, the future minimum allotment size in the next planning scheme could be specified at 2,000 m².

4.5 Seqwater

Seqwater has responsibility for providing a drinkable water supply to South East Queensland. Associated responsibilities include flood mitigation, catchment management and managing recreation facilities. Seqwater also provides irrigated water to farmers. In Noosa Shire Seqwater controls Lake Macdonald and the water treatment plant situated adjacent the lake and the water intake from Mary River. The catchments of these water sources are also of importance.

Water quality within storages is a critical issue for Seqwater and it takes an active interest in land use planning within its water supply catchments. This issue is also of 'State Interest' under the State Planning Policy. Seqwater has published Development Guidelines for Water Quality Management in Drinking Water Catchments. Section 3 requires that all land uses, development and activities (includes on-site effluent disposal systems) carried out in drinking water catchments be located not less than 50m from an intermittent watercourse and 100m from a permanent watercourse. Seqwater defines watercourse in the diagram below-

Watercourse	The area of land between the high banks of a natural channel—whether artificially improved or not—in which water flows permanently or intermittently, and that is represented as: a) A creek, stream, river or watercourse on the most recent 1:25 000 Queensland Department of Natural Resources and Water topographic map in the local government areas of Brisbane, Caboolture, Caloundra, Gold Coast, Logan, Maroochy, Noosa, Pine Rivers, Redcliffe and Redland, excluding Key Resource Areas; or b) A creek, stream, river or watercourse on the most recent 1:100 000 Geoscience Australia topographic map in all other local government areas or in Key Resource Areas; or c) A creek, stream, river or watercourse on the most recent 1:250 000 Geoscience Australia topographic map in all other local government areas or in Key Resource Areas where there is no 1:100 000 Geoscience Australia topographic map available.	Regional Vegetation Management Code: Southeast Queensland Bioregion 20 November 2006

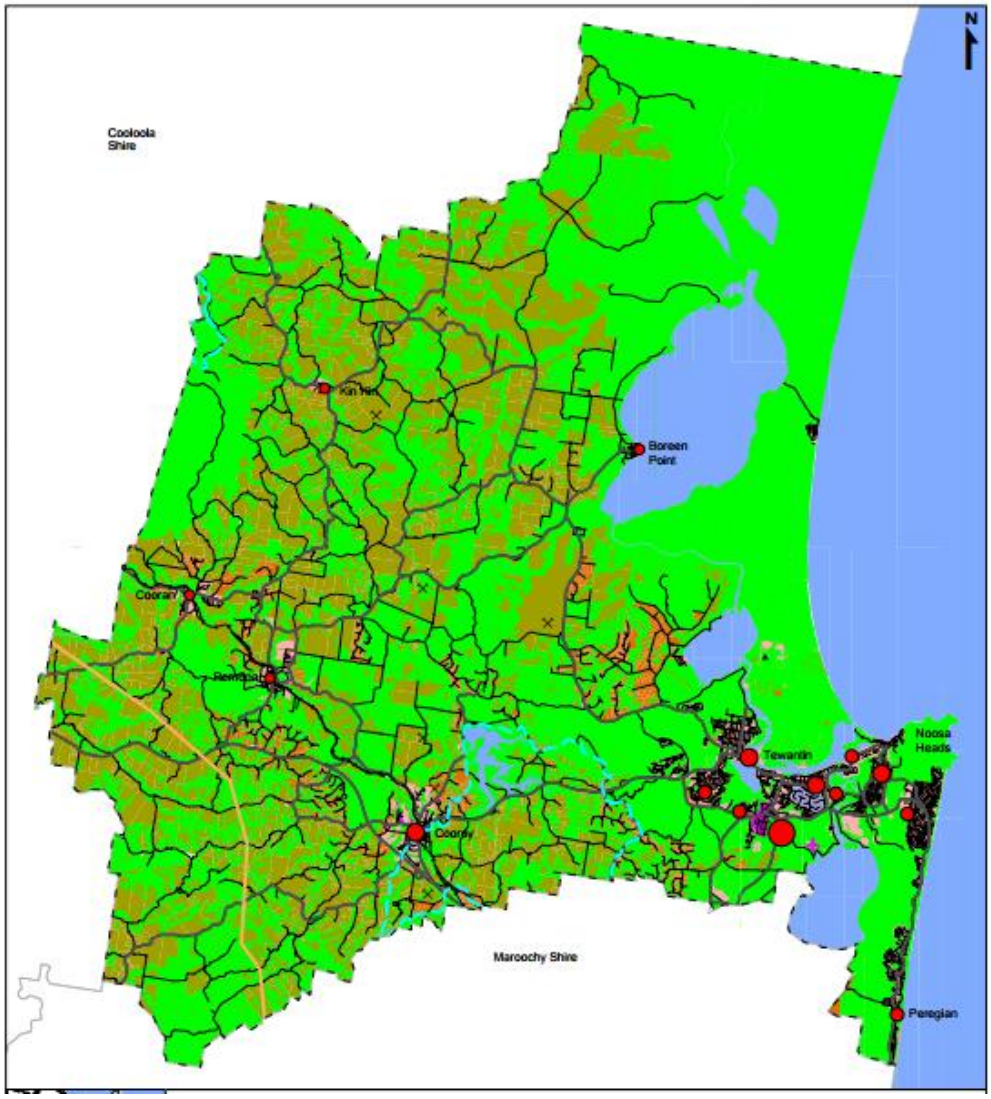
The Development Guidelines also contain specific outcomes for on-site wastewater treatment and effluent disposal in drinking water catchments. Section 4.2 contains specifications on:-

- Site evaluation
- Wastewater treatment system
- Treated effluent characteristics
- Treated effluent application areas
- Application area location
- Treatment system management
- Treatment system monitoring

5. On-site Wastewater Treatment in Noosa Shire

Figure 9 is a map of Noosa Shire. At 85,000 ha it is comprised of mostly rural areas with urban development in a scattering of towns and villages and also in coastal communities from Tewantin to Peregian Beach. Approximately 35% of Noosa Shire has a tenure that protects environmental values.

Figure 9 - Noosa Shire



5.1 The Noosa Plan

The Noosa Plan 2006 includes all land in zones for the purpose of applying particular development regulations. The zones have land use descriptors and those zones of particular interest to this study are as follows: –

- Rural - applied to broad rural holdings
- Rural Settlement - for rural land subdivided into lots of an average around 1 ha intended for rural homesite purposes
- Detached Housing - for individual house sites in urban areas
- Village Mix – commercial centres in the towns and villages.

Within the Rural and Rural Residential Zones there are over 6,000 privately owned properties ranging in size from under 1 hectare to over 80 hectares. Houses are or can be built on these properties. Extensive urban areas are zoned Detached Housing but it is the unsewered towns and villages that are of relevance to this study. In Cooran, Kin Kin and Boreen Point there are hundreds more privately owned properties that rely on onsite effluent disposal for houses and other forms of development.

Unitywater has principal authority to plan future sewerage networks. Cooroy and Pomona have sewerage schemes. Sewerage is not found elsewhere outside of the coastal communities, except for the rural residential estate of Swift Park at Cooroy and the settlements of Cooroibah and Noosa Banks, north-west of Tewantin. Along with all the rural areas, Cooran, Kin Kin and Boreen Point are also without sewerage. Unitywater has no endorsed plans to take sewerage to any of these towns.

In terms of future development potential outside sewered areas:-

- Future development opportunities in the unsewered areas amount to a few small pockets remaining in Cooran,
- Land included in the Rural Zone in almost all instances cannot be further subdivided, and
- No new areas of Rural Settlement land can be planned due to restrictions in the SEQ Regional Plan. There may be some limited subdivision potential in these rural settlement areas.

Planning Scheme Policy #24 – Effluent Disposal gives guidance to applications for development that require the installation of on-site wastewater treatment systems.

The purpose of this Policy is to—

a) ensure that where development is not served by reticulated sewage infrastructure, there is no adverse impact on ground and surface water quality, human health and amenity as a consequence of the on-site disposal of effluent;
b) ensure that land use decisions favour the protection of ground and surface water quality where there is doubt regarding the likely impacts of on-site disposal of effluent; and
c) provide guidance to the public, developers and Council staff to assist in assessing development applications.

Each effluent disposal system is required to be sited —

a) at least 15m from any potable water supply tank;
b) above the 1% AEP (1:100 ARI) flood level; and
c) *more than 40m horizontally from the level of the Highest Astronomical Tide (HAT)*

(The Qld Plumbing & Wastewater Code in Table T5 also specifies setbacks to dwellings & recreation areas at 10m, property boundaries and paths at 2m and swimming pools at 6m.)

5.2 Managing On-site Wastewater Treatment Systems in Noosa Shire

Council's Building and Plumbing Branch has authority for oversight of on-site wastewater treatment systems. They receive applications, undertake assessments, grant approvals, inspect premises and maintain records. These responsibilities also cover conducting audits and responding to individual site issues whether arising from audits, complaints or unsatisfactory maintenance reports.

Figure 10 - A secondary treatment system serving a small dwelling

5.3 Noosa Council On-Site Domestic Wastewater Treatment Plant Audit Program

In October 2014, Council endorsed a program to conduct a formal audit of wastewater facilities in Noosa Shire. At that time there were 3109 septic installations, 2161 secondary or advanced secondary systems and a further 86 properties relying on holding tanks.

Consequently Council received approximately 8000 service reports from contractors and conducts an average of 100 inspections annually. Normal audit practices involved a desk top study of service reports submitted by contractors and to investigate issues as identified.

The principal aims of the endorsed audit program are to –

1. Allow Council and system owners to identify potentially failing systems, and
2. Audit service reports to test accuracy.

The program has provision for up to 50 detailed analysis tests to be submitted to a NATA approved laboratory. The program will additionally test new software applications and equipment.
The audit reviews domestic on-site wastewater treatment plants and their land disposal systems. The focus of the program is on Secondary, Advanced Secondary and Advanced Secondary systems with Nutrient Reduction.

Council inspectors assess the land disposal system and the treatment plant for faults and record the results on a report loaded onto a mobile app. The app records the sludge level, total suspended solids (TSS), PH and dissolved chlorine content of the treated effluent. Comments on the land disposal system are added to the app. There is provision for testing which will involve sending samples to a NATA approved laboratory to check for levels of nutrients and thermo-tolerant coliforms.

A review of 100 audit results demonstrated 41 systems were found to be not compliant.
Test results showed:-

- 9 plants had total suspended solids levels greater than the permitted range,
- 4 plants had PH levels out of the recommended range,
- 8 plants required pump outs due to high sludge levels,

- 6 plants had insufficient chlorine levels, and
- 7 mechanical faults were found. (broken air blowers, pumps and alarm systems)

For land application areas 16 were defective. The issues were overgrown vegetation and inappropriate ground coverage, signs not being in place and faulty sprinklers. There was no record of failures to subsurface irrigation although anecdotal instance and past complaints suggest that failures are common over the life of the system (15 years).

There was one treatment plant which had a sand filter that had completely failed and needed replacement.

Audit Conclusions

The audit reveals there are extensive faults with on-site waste water treatment plants and their land disposal systems. The issues vary in seriousness and most faults can be prevented or fixed if the correct servicing procedures are adhered to and proper maintenance of systems is carried out. Some owners and renters of properties do not maintain their treatment plants properly. During trials to obtain a Chief Executive approval the influent into treatment plants is meant to be within certain parameters to ensure the system is working at its optimal level. The influent from private households is not always within the correct parameters. Products such as bleach, dishwashing liquid, hair dyes and certain medications can have a negative impact on bacterial growth within the plant. Overloading from high water usage or over population of dwellings can also have a detrimental effect on the systems.

Faults regarding surface irrigation are usually minor and can be rectified at minimal cost but if there are faults with subsurface irrigation it can be costly and hard to fix. High total suspended solid levels are a major cause of the failure. (It is rare to find a system that disposes of treated effluent from treatment plants into trench systems.)

Faults regarding the treatment plants can be costly and hard to fix depending on the system. Pumps and blowers (blowers are in aerated treatment plants) have a lifespan and will eventually fail. Overworking of pumps from blocked land application areas or high work rates due to high flows into the treatment facility are some common reasons for failure. Sand filter systems can get blocked and are very costly to repair. High suspended solid levels is the main reason for failure and this can occur when systems are not pumped out when the sludge levels are high or an overloading of the system occurs (e.g. too many people residing in the residence, greater than 10 equivalent people)

Causes

- Residents and owners of properties are not aware of the maintenance requirements for treatment plants,
- Owners of properties are under financial pressure and are not able to fix problems with treatment plants,
- Service agents are not servicing the treatment plants properly or are under pressure from owners due to owners not having enough money to fix problems, and
- Some systems are not favourable for certain areas and require a different approach to future systems in such areas.

Solutions

- Acknowledge new plumbing legislation is likely in 2016 and prepare to respond as necessary,
- Consult with industry to discuss requirements and possible solutions to issues,
- Continue with on-going audit program to monitor treatment plants and use the opportunity to inform owners of the risks and their obligations,
- Provide information to the Queensland government on the performance of treatment plants to assist in policy development,
- Implement local policies to try to improve the situation and reduce current risks, and

- Development applications should be accompanied by a rigorous site and soil evaluation to better advise the type of system necessary where the soil conditions are marginal, as well as preferred building envelopes and lot sizes, in the case of subdivision proposals.

6. Future Policy Direction for Noosa Shire

Reference has been made to a previous Planning Study *On-Site Effluent Disposal & Water Quality in Noosa Shire 1997*. The context of the study remains relevant today.

Noosa Shire is located within a sensitive but rapidly growing part of coastal Queensland. A significant proportion of future development within the Shire will be located in areas where reticulated sewerage systems are unlikely to be developed. On-site wastewater treatment and disposal is an important town planning, health and environmental issue.

Future planning aims for sustainable development. It is important to incorporate wastewater treatment and disposal within town planning guidelines at an early stage to avoid costly errors. Listed below are a number of important issues relating to domestic wastewater disposal.

1. Water quality must be maintained at its present standard as the minimum acceptable water quality.
2. Significant areas of the Shire are devoted to National Parks and nature reserves that must be maintained in pristine condition.
3. The Shire has an extensive system of rivers and lakes with extended residence periods. These systems are considered sensitive to increases in nutrient loading.
4. The Shire is dependent upon tourism for a significant portion of its revenue and this industry will be threatened by a deterioration in environmental standards. This particularly applies to ecotourism, fishing and other aquatic recreation.
5. The Shire has undergone a rapid increase in population in the hinterland region where there is no provision of reticulated wastewater collection. Significant expansion of the existing wastewater collection system into these areas is not considered likely due to the very high cost of infrastructure development and maintenance.
6. The Shire will be faced with increased demands for housing as the population of South East Queensland rises.
7. Whilst a large body of water quality information exists for the Shire, the data has largely been collected on an ad hoc basis with little uniformity in collection or testing methodology. It is difficult to use this data to infer long term changes in water quality.
8. Knowledge of the response of local streams and lakes systems to nutrient, pathogen and sediment loadings is rudimentary and largely based upon inference from other Australian or overseas studies.
9. The rainfall/run-off behaviour is highly variable and water quality factors (stream flow, depth, light transmission, sediment load, nutrient load, dissolved oxygen, etc.) are likely to change by an order of magnitude during different periods of any one year.
10. It is considered difficult, expensive and time consuming to undertake remedial activities in most catchments or water bodies to correct mistakes that occur. In particular, permitting urban development to proceed in areas where reticulated wastewater collection is impractical, will result in increases in nutrient export that are extremely difficult (if not impossible) to control.
11. Should dwellings be permitted in any area it is almost impossible to remove them. Urban development is considered essentially an irreversible process that has highly variable effects on the general environment.

In light of the above, the previous Planning Study concluded a conservative approach towards development in unsewered locations is justified until further information emerges. The information gaps identified in 1997 are still largely present today. Additional water quality testing has occurred but there is still no more certain understanding of the likely environmental effects of on-site wastewater treatment systems in Noosa Shire along with other regions. Our countryside is varied with differing slopes, geology and soil characteristics. The movement of sediment and pollutants across ground can be estimated but in the absence of extensive local monitoring, predictions are best guesses at this time. The situation is similar for sub-surface movement but estimation is an even less certain process. It is therefore difficult to accurately quantify the effects of sediment and pollutants on the environment within a broad catchment. The amount of pollutants and sediment present in waterways can be tested but as to estimating how and what caused it is a much more difficult matter. There have been recommendations for more research to be supported in the documents supporting this planning study.

Technology and the options for on-site wastewater treatment systems have progressed significantly since 1997. A wide range of secondary treatment systems have emerged and been brought to the market. Due to the improved outcomes anticipated, these systems have been popular. However widespread shortcomings have evolved with the ongoing operation of the systems. The Queensland government is currently investigating measures to improve on the operational aspects of secondary treatment systems. Tertiary systems have a better reputation but due to their extraordinary costs currently, very few are installed in Noosa Shire.

Improvements in the technology are acknowledged but the shortcomings around maintenance do not yet convincingly offer any degree of confidence that secondary treatment systems can be safely employed in marginal locations.

The following specific policy positions are recommended for endorsement by Council: –

1. Catchment wide environmental effects of on-site wastewater treatment systems are not well understood. Further research into these effects is supported in principle in conjunction with a water quality monitoring framework.
2. Secondary level on-site wastewater treatment systems have the capability to work well locally. However there is widespread failure associated with the maintenance of the systems. Positive action including audits and community engagement, is necessary for improving the outcomes for secondary systems. These measures to be considered when the current plumbing legislation is reviewed.
3. In respect to future development in unsewered localities, a precautionary approach be adopted.
4. Notwithstanding 3 above, development in unsewered localities that complies with the intent of the applicable zone of The Noosa Plan is assessed in the normal manner, but with greater consideration to the operation of the approved on-site wastewater treatment plant.
5. For Cooran the 2000 m^2 minimum allotment size remains appropriate, noting that sewerage is not planned to be provided.

7. Recommendations for the new Noosa Planning Scheme

The preceding chapters have highlighted the current circumstances of on-site effluent disposal across Noosa Shire. Traditional primary systems involving a septic tank are declining in use when landowners are considering available options. Most new development is employing secondary level systems. However concerns have been identified with the operation of secondary systems. The effects of these failures on the environment are not well understood and this is unsatisfactory.

Policy measures to improve this situation are recommended in Chapter 5 and 6. In addition the Queensland government is likely to introduce new plumbing legislation in the later part of 2016 that will bring a stronger enforcement of compliance with the manufacturer's specifications for secondary treatment systems.

There are many vacant and under-developed allotments in the unsewered localities of Noosa Shire. Most of these are intended for a dwelling house with others intended for alternate forms of development. The recommended policy position in Chapter 5 is to allow for development to continue where it is in accordance with the intent of the zone under The Noosa Plan. However greater attention is recommended towards the operation of the approved treatment system.

Recommendations for the new Noosa Planning Scheme

1. A precautionary approach is applied to proposals for more intensive activities that rely on on-site wastewater treatment disposal. The desired outcome in The Noosa Plan to *avoid significant adverse effects on the natural environment and landscape and minimise the risk of hazards for people and property* remains current but is not being delivered by a significant proportion of installations using secondary treatments.

2. This Planning Study also supports the continuation of the limited potential for further subdivision of rural and rural residential land and for further subdivision of residential land in unsewered township localities.

8. References

- On-Site Effluent Disposal & Water Quality in Noosa Shire – Noosa Council, February 1997
- Plumbing & Drainage Act 2002
- Review of the *Plumbing and Drainage Act 2002* Discussion Paper – Building Codes Queensland, June 2014
- Queensland Plumbing and Wastewater Code – Building Codes Queensland
- B&P Newsflash 534
- The Noosa Plan 2006
- Planning Scheme Policy – Effluent Disposal, February 2006
- Water Quality Improvement Plan for the Burnett Mary Region 2015 – Burnett Mary Regional Group and Natural Decisions
- Are On-site Systems Environmentally Sustainable? E Gardner, A Vieritz and C Beal, On-site ’05 Conference, Armidale, September 2005