Fire & Rescue NSW

Deniliquin PFAS Investigation

Preliminary Site Investigation and Sampling & Analysis Quality Plan

August 2016

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1. Introduction

Fire and Rescue NSW (FRNSW) commissioned GHD Pty Ltd (GHD) to undertake a combined preliminary and detailed site investigation at the firefighting training site at Deniliquin Airport, NSW 2710 (the 'site').

The site is used for the training of firefighters, which has potentially included the use of aqueous film forming foams (AFFF). The AFFF used, may have contained perfluoro alkyl substances (PFASs) including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), which are potentially harmful to human health and the environment.

1.1 Background

The site is approximately 23 000 m^2 (2.3 hectares) and comprises Lot 48 DP 1189132. The approximate site boundaries are presented in Figure 1, Appendix A.

The site is owned by Deniliquin Council NSW. The site is currently used by FRNSW as a firefighting training facility and is part of Deniliquin airport (Figure 1, Appendix A). The site is bound by Deniliquin airport to the west, south and east, and Macknight Drive, then vacant land to the north.

GHD understands AFFF and other firefighting foams potentially containing PFASs have historically been used at a number FRNSW locations in NSW for firefighting training purposes. For this reason, PFAS may have been released to the environment, which may have resulted in contamination.

The NSW Environmental Protection Authority (NSW EPA) is currently undertaking an investigation program to assess the historical legacy of PFAS use across NSW. As part of this program of works, NSW EPA have identified impact in surface water and in soil leachate on or near the site and have requested further investigation be undertaken by FRNSW, to understand the potential extent of contamination, if any.

In response to the request by the EPA, GHD have conducted a desktop-based preliminary site investigation (PSI) and a site inspection to develop a preliminary conceptual site model (CSM) for contamination issues at the site (refer to Section 2.6). This information was used to develop a sampling analysis and quality plan (SAQP), for assessing the potential impacts and risks at the site (refer to Section 3).

This report documents the findings of the PSI and presents a preliminary CSM and SAQP. The SAQP has been prepared to assess potential impacts from the use of PFAS at the site and its potential impacts off-site. It is understood that the SAQP will be provided to the NSW EPA for consideration prior to implementation of the investigations at the site.

1.2 Objectives

The overall objective of the investigation is to characterise impacts and subsequently assess the potential risks to human health and the environment from historical firefighting training activities at the site and the likelihood of impacts off-site.

The specific objectives of this PSI and SAQP are to:

- Describe the site (including boundaries and title descriptions)
- Document the history of the site
- Identify potential on and off-site sources of contamination

- Characterise pathways for impact migration
- Identify potentially sensitive receptors/environment
- Develop a preliminary CSM using the preliminary investigation data to assess potential source, receptor linkages
- Develop a SAQP to define future intrusive investigations and obtain quantitative data on contamination.

1.3 Scope of work

The scope of works undertaken by GHD to address the project objectives is described below.

The works were completed in accordance with GHD proposal 214723 dated 30 March 2016, which was approved for completion by FRNSW on 16 May 2016.

Limitations associated with GHD's work are provided in Section 4.

1.3.1 Task 1 - Information and Data Review (PSI)

A detailed review of relevant information and data sources was undertaken to identify property details and potentially contaminating sources and activities.

The information reviewed was in general accordance with that recommended in *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (OEH, 2011) and included:

- Local Council (heritage register, LEPs, zoning and permissible land use).
- Department of Lands (aerial photographs).
- Office of Environment and Heritage (including notices under *Contaminated Land Management* (CLM) *Act 1997*, *Pollution of the Environment Operations* (POEO) *Act 1997* Environment Protection License Register, environmental incidents and State Heritage Register).
- NSW Department of Primary Industries (DPI) Water (local and regional groundwater information, including groundwater bore search).

Further to this, a review of historical investigation reports provided by FRNSW was completed. This included a review of the NSW EPA investigation at the site.

The data reviewed was used to:

- Characterise the environmental setting for the site (see Section 2.3) to understand potential contaminant migration pathways and sensitive receptors in the receiving environment.
- Understand the site history and potential sources of impact (see Section 2.4)
- Review regulatory information pertaining to previous contaminating activities undertaken at the site to characterise potential sources of impact (See Section 2.5)
- Develop a preliminary CSM highlighting the pollutant linkages between sources and receptors. This was used to inform development of the SAQP (see Section 2.6).

1.3.2 Task 2 – Preparation of SAQP

The CSM developed from the PSI was used to prepare a SAQP. The SAQP outlines the strategy for assessing the nature and extent of contamination at the site.

The SAQP includes the following:

- Data Quality Objectives (DQO'S) which have been prepared in accordance with Appendix IV of the *Guidelines for the NSW Site Auditor Scheme* and the National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (as amended 2013 – NEPM, 2013) to ensure that field investigations and analyses are undertaken in a way that enables the collection and reporting of reliable data on which to base the site assessment and remediation requirements (if required) – See Section 3.1.
- The basis of the assessment including details of the guidelines, policies and legislation that the investigation has been developed for (See Section 3.2).
- The requirements for sampling and assessment at the site (see Section 3).
- Assessment of potential sources of contamination and contaminants of concern including presentation of the preliminary CSM (see Section 2.6).
- Assessment of potential groundwater impacts (see Section 3).
- Proposed sampling and analytical program (see Section 3).
- Proposed sampling methodology (see Section 3).
- Quality Assurance and Control protocols (see Sections 3).

1.3.3 Reporting

GHD has prepared this report to present the preliminary site investigation and SAQP

1.4 Report Structure

The report includes the following key sections:

- Section 2 – Preliminary Site Investigation
- Section 3 – Sampling and analytical program

1.5 Limitations

GHD's limitations to the assessment are provided in Section 4.

2. Preliminary site investigation

2.1 Site identification

A summary of site identification details is provided in Table 1. The site location is presented in Figure 1 of Appendix A.

Table 1 – Site identification summary

Information	Details
Street Address	The firefighting training site at Deniliquin Airport, NSW 2710
Lot and DP number	Lot 48 Deposited Plan 1189132
Site Area	Approximately 23 000 m^2 (2.3 ha) , with a perimeter of approximately 610 m.
Local Government Area	Deniliquin Council
Local Land Use Zoning	IN1 – General Industrial
Current Land Use	Training site.
Surrounding Land Use	Deniliquin airport to the west, south and east, and Macknight Drive, then vacant land to the north.

2.2 Site inspection

Prior to undertaking site investigations, a questionnaire was issued to FRNSW staff to prompt collation of relevant information from appropriate personnel prior to the site visit.

The site inspection was completed on 13 July 2016 by an experienced environmental professional from GHD's contamination and environmental management team. The investigation area inspection included a site walkover with site staff to identify areas of potential contamination based on surface conditions and evidence of current or former potentially contaminating activities or site operations.

The site inspection works provided the following information. The site features discussed are presented in Figures 2 and 3, Appendix A. Selected photographs depicting the site are provided as Plate A.

- FRNSW obtained the site in 1996 from Department of Defence. The site used AFFF in a portion of site in the southern area. Foam historically drained to the left of the training area (Photograph 5, Plate A), down a drain to bunded area (Photograph 4, Plate A). Foam use ceased approximately 12 years ago when maintenance training was cut due to reduced budget.
- The site is located adjacent to the Deniliquin airport. In the past, the NSW rural fire service has conducted training at the airport, for a period of 4-5 years. A Rice mill is located across the road from the site with adjacent Defence land rented out for grazing. Site drainage flows to a dam which is council owned and run.
- A former diesel AST (no longer operational since approximately 2000) and water tank are present on the eastern portion of the concrete hardstand (Photograph 13, Plate A).
- There is a drain located at the northern end of the fire training ground that drains towards the eastern boundary of the site. This drain continues offsite and goes underneath Macknight Drive where the drain goes towards the west for approximately 70 m before going north and flowing into a dam.

The findings of the investigation area inspection are summarised in **Table 2**.

Table 2 – Site inspection summary

Items		Comments
General	Site use	The site is used intermittently as a training facility for FRNSW. Fire training is generally restricted to: • converted shipping containers (in the approximate centre of the Site) (shipping container visible in Photograph 1 & Photograph 2) • asphalt hardstand (in the centre of the Site) (Photograph 3), and • the former underground pool which has been converted to an enclosed space training area (north of the hardstand area). Fire training in these areas has been and continues to be restricted to application of water only for extinguishing of fires. A bunded pit (Photograph 4 and 5) is located in the south western corner of the concrete hardstand. This area was historically the only area which used AFFF in the extinguishing of fires. Foam use ceased in approximately 2004. There is a corrugated metal fence on the southern and western sides of the bunded area. It is unclear when this fence was erected, however GHD were advised by the Site contact that this fence was constructed a number of years after training with foam in that area had commenced. The area behind the fence is unsealed ground with grass cover (Photograph 6 to 8). The brick structure to the east of the foam training area was used by the air force during WWII and has not been used since. Fire training was conducted by FRNSW on the canister in front of the structure (Photograph 9). A small steel box is still currently used by NSW Police to burn illicit substances (i.e. marijuana). This area is bunded and contained. (Photograph 10) The site offices are located on the eastern portion of the Site. This area is also used to store new and discontinued firefighting foam. The shed is sealed with no apparent cracks or leaks of chemicals observed. (Photograph 11 and 12). This area also stored uniforms. A former diesel AST (no longer operational since approximately 2000) and water tank are present on the eastern portion of the concrete hardstand (Photograph 13).
	Fencing	The site is fenced by approximately 2 m high cyclone fencing, with a lockable gate in the north eastern portion of the Site leading to Macknight Drive.
Ground surface	Ground cover:	The centre of the site is covered with hardstand asphalt. The majority of the remainder of the site is comprised of grass cover.
	Topography	The site is relatively flat.
	Vegetation	Grass of generally good health was present across the Site with mature trees, predominantly around the perimeter of the Site and west of the concrete hardstand.
	Surface water	An area of pooled water was present east of the bricked training area in the southern portion of the Site (Photograph 14 and 15). Historically some foam may have run off during training into the bunded area to the west. Mr Muirhead advised this area was historically bunded by a green tarp material (Photograph 14). Sealed drainage lines are located through the centre of the Site in an east-westerly direction and along the southern border of the Site in a south-west to north-east direction (Photograph 1 and 16).

Items		Comments
Evidence of contamination	Litter	A small area containing burnt material, including wood and drums was located on the grass in the eastern portion of the Site (Photograph 17). Plastic sheets, rusting chairs and metal boxes were located north east of the corrugated fence. A former shade structure is located west of the corrugated fence (Photograph 7).
	Waste drums or bulk storage facilities	Four waste drums were located behind the corrugated fencing in the southern portion of the Site. Based on the labels, the drums previously contained firefighting foam. The drums were empty at the time of the site inspection (Photograph 6). A small former diesel AST is located on the eastern portion of the hardstand area, however this has been empty and not operational since approximately 2000 (Photograph 13).
	Fill	There were no obvious signs of fill across the site.

Plate A – Photographic record

▲**Photograph 1:** Shipping container used for fire training. Drainage Line running east-west direction.

▲**Photograph 2:** Shipping containers used for fire training

▲**Photograph 3:** Centre of hardstand area looking south. Bricked training area and former bunded foam training area visible.

▲ **Photograph 4:** Bunded pit previously used for AFFF training.

▲**Photograph 5:** Bunded pit previously used for AFFF training.

▲**Photograph 6:** Grassed area north of bunded pit, behind corrugated fence. Waste drums visible on grass.

▲**Photograph 7:** Grassed area north west of bunded pit, behind corrugated fence.

▲**Photograph 8:** Grassed area south of bunded pit, behind corrugated fence

▲**Photograph 9:** Brick structure used by air force in WWII and canister used for fire training.

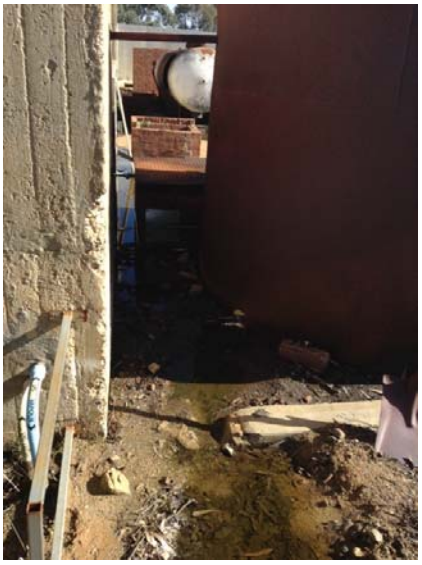
▲**Photograph 10:** Metal structure used by NSW Police for burning of illicit substance.

▲**Photograph 11:** Site Storage

▲**Photograph 12:** Inside Site Storage. AFFF new (blue containers) and old (red and black containers).

▲**Photograph 13:** Former diesel AST and water tank to right of photograph.

▲**Photograph 14:** Pooled water with tarp bunding formerly linking pooled area visible in forefront.



▲**Photograph 15:** Water draining from bunded former foam training area to pooled water visible in Photograph 14.

▲**Photograph 16:** Drainage line leading off site (north of eastern boundary)

▲**Photograph 17:** Burnt rubble in grassed area on western portion of Site.

2.3 Environmental Setting

2.3.1 Topography

The investigation area lies approximately 96 m Australian Height Datum (AHD), according to NSW Land and Property Information. The regional topography appears to be mostly flat, with a slight fall from south east to north west.

The general topography of the area is presented in Figure 3, Appendix A.

2.3.2 Soils

General

According to eSPADE from Office of Environment & Heritage, the site is within the brown Chromosols landscape. The brown Chromosols landscape is found in sites with average rainfall between 0.35 m and 1.4 m. The soils have moderate agricultural potential, chemical fertility and soil drainage. The upper horizons are described as dark brown with up to 10% orange mottles silty clay loam, grading into a dark brown medium heavy clay.

Acid Sulphate Soils

The acid sulphate soil class in the investigation area is Class B4 (ASRIS, 2013) and the works would have a low probability of encountering acid sulphate containing soils. There are no other soil classes located within 500 m of the investigation area.

2.3.3 Hydrology

Surface water flow is expected to follow the local topography on-site and flow generally north and eastwards.

The closest natural water body is Aljoes Creek located 2.5 km east of the site. Aljoes Creek discharges to Edward River located approximately 2.8 km to the east and north of the site.

An irrigation channel, Mulwala Canal, runs approximately 800 m to the east and north of the site. It is the largest irrigation channel in the southern hemisphere. It starts at Lake Mulwala (over 130 km to the south-east of the site) and diverts water from the Murray River across the southern Riverina plain to the Edward River at Deniliquin and beyond.

It is understood that stormwater from the site was originally diverted to an unlined drain that ran approximately eastwards towards Edward River. At some point, stormwater has been diverted to the north of the site to an off-site dam approximately 150 m from the site. The general catchment hydrology and slope is presented in Figure 3, Appendix A. Dial before you dig underground utilities information presented in Appendix E did not provide an indication of stormwater or other service infrastructure through the site.

Stormwater originating from the site is not expected to travel to either the Edward River or Mulwala Channel. Water that does not reach the off-site dam is likely to seep into the ground.

2.3.4 Geology

The 1:250,000 scale Deniliquin geological map indicated the site is situated on the Shepparton Formation. The Shepparton Formation is described as unconsolidated to poorly consolidated, mottled, variegated clay, silty clay with lenses of polymictic, coarse to fine sand and gravel; partly modified by pedogenesis, includes intercalated red-brown palaeosols. The regional geology of the area is described in ASRIS (2013) as constituting 35% clay loam, sandy or silty clay loam.

GHD conducted a review of existing geological logs for groundwater bores in the area using the NSW Department of Primary industries, Office of Water, groundwater database in August 2016. The geological logs for bores GW503702 and GW503704 located on the Deniliquin Airport, adjacent to the site suggest that Clays are predominant to depths of approximately 14 m bgl with a sand lense between approximately 9.5 and 13.5 m bgl. The bore log for well GW501823 located approximately 2 km west extends to depths of 234 m bgl and suggests that there is intermingled layers of unconsolidated clays and that there is sands present to depths greater than 140 m bgl. Below these depths, layers of coal are reported to be intersected.

2.3.5 Hydrogeology

The site is located on Quaternary aged, Shepparton Formation, which is expected to form the primary water bearing aquifer unit in this area.

According to the 'Deniliquin' 1:250,000 scale Hydrogeological Map (Geoscience Australia, 1993), the total dissolved solids (TDS) in the groundwater beneath the site is likely to be in the order of 1000 to 1500 mg/L (which is suitable for stock, domestic and some irrigation purposes), bore yields of 0.5 to 5 L within the sand aquifer sand hydraulic conductivities between 5 to 10 m/day. Fresher water is likely to be located closer to the township of Deniliquin and the Edward River where several production bores are located.

The bore log for GW503702 (NSW Department of Primary industries, Office of Water, groundwater database, 2016) located on the Deniliquin Airport indicates that locally the salinity approximates 4200 mg/L. This is above recommended Australian drinking (NHMRC & NRMMC, 2011) and stock water criteria (ANZECC, 2000), which indicates that shallow groundwater is of limited beneficial use potential in this area.

The NSW Department of Primary industries, Office of Water, groundwater database, 2016 indicates that there is a large number of wells screened within slightly deeper zones of the Shepparton Formation (generally deeper than 30 m bgl) at distances greater than 1.7 km to the east of the site near to the Edward River. The bore records for these wells indicate that their salinities are less than the 1000 mg/L with yields above 1 L/s indicating that the aquifer is potentially of high beneficial use. The large number of wells in and around Edward River used for water supply purposes supports this interpretation. The depth to groundwater is generally ranges between 7 and 12 m bgl in these wells.

Based on the topography and the location of Edward River, groundwater flow is likely to be towards the east and north in the area off the site. However, the Deniliquin Hydrogeological map indicated a generally westerly groundwater flow in the shallow aquifer which might suggest the Edward River is generally a losing river and flow is more dominant towards the Murray River to the west.

The Deniliquin Hydrogeological map also indicates the depth to the water table near the site is in the order of 5 to 10 m. However, this level may have changed since the map was produced in 1993.

Existing Groundwater Bores

GHD conducted a review of existing groundwater borehole records using the NSW Department of Primary industries, Office of Water, groundwater database in August 2016. The search was conducted to identify registered groundwater boreholes in close proximity and to record information such as use and standing water level. No bores were located on the site but two groundwater bores were identified within a 500 metre radius of the site and were located on the adjoining Deniliquin Airport to the south of the site (summarised in Table 3). Details of the groundwater borehole search are presented in Appendix B.

As noted above there is a large number of water supply wells located > 1.7 km to the east of the site near to Edward River which are screened within slightly deeper units of the Shepparton Formation. A number of water supply wells screened in the Shepparton Formation are also located to the west at distances of > 2 km.

Table 3 – Review of existing groundwater data

Borehole ID	Purpose	Depth (m)	Screen (m)	Standing Water Level (m)	Approx. Distance from Site	Drillers Log
GW503702	Monitoring Bore	14.50	12.5-13.5	No details	400 m south east	Topsoil underlain by clayey loam and sand grains. Screen in brown sand
GW503704	Monitoring Bore	11	9-10	No details	500 m south east	Topsoil underlain by clayey loam and sand grains. Screen in brown sand

2.4 Site history

2.4.1 Summary of previous investigations

A previous investigation was undertaken by the EPA on 11 February 2016 to investigate the potential of significant amounts of PFASs to have been released to the environment, as a consequence of historic firefighting training activities. A sample of surface water from a stormwater drainage channel on site and five samples of soil from foam usage locations on site were collected for laboratory analysis. A letter detailing the investigation is provided in Appendix C

Due to the absence of guidelines at the time of the investigation, the EPA applied scientific studies for the minimum threshold of 0.1 µg/L of PFOS in surface water and groundwater leaving site and 10 µg/L in surface water and groundwater on site.

Laboratory analysis showed a PFOS concentration of 3.7 µg/L in the surface water and the highest concentration of 1.2 mg/kg in soil samples. Soil samples were also tested using the Australian Standard Leaching Procedure (ASLP) to assess the leaching potential of soils into nearby water receptors. The highest concentration of PFOS in leachate was 30.3 µg/L

The EPA study recommended further investigation into the nature, extent, fate and transport of PFAS on the site and off-site.

2.4.2 Aerial photographs

A selection of historical aerial photographs was examined in order to assess past activities and land uses in the investigation area. A review of historical aerial photography is provided in Table 4.

The aerial photographs are presented in Appendix D.

Table 4 – Review of historical aerial photographs

Year	Site	Surrounds
1961 (black and white)	The investigation area appeared to consist primarily of vacant land. Two small buildings were visible in the north eastern and south western section of site. A lane passed through the site from the north eastern boundary to the south western boundary.	North and south of site was vacant land. A road, a vacant lot and other smaller roads were visible to the east of site. An airport runway and vacant land were visible to the west of site.

Year	Site	Surrounds
1976 (black and white)	No substantial changes were observed in the investigation area other than the lane passing through site in the 1961 photo which was not visible in this photo.	The site was bounded by trees along the eastern boundary. No other substantial changes were observed in the surrounding area since the previous aerial photograph.
1991 (black and white)	The buildings within the investigation area appear to have been demolished. The site surface appeared to asphalt in the southern portion of site.	The site was bound by an asphalt road and then vacant land to the south. No other substantial changes were observed in the surrounding area since the previous aerial photograph.
2003	The investigation area appeared to be bound by trees along the north, west and east boundary. An Asphalt surface and road appeared in the south portion of site. Construction appeared to have taken place in the central and south portion of site.	No substantial change occurred other than increased development to the north of the investigation area.
2016	No substantial changes were observed within the investigation area since the previous aerial photograph.	No substantial change occurred other than increased development to the south of the investigation area.

In summary, the following observations were made:

- Up to 1991, the site consisted primarily of vacant land and small developments.
- Sometime between 1991 and 2003, the site underwent development and has remained unchanged. The development includes a number of buildings and asphalt surfaces in the central and southern portion of the property, and trees along the north, west and east boundary.
- The areas surrounding the site remained primarily vacant, excluding the west which remained as an airplane runway, and the south which underwent development after 2003.

2.5 Regulatory information review

2.5.1 Overview

As part of the desk based review, information was obtained from a number of sources to enable a greater understanding of historical land use at the site, including former site practices which may have the potential to cause contamination. The desk based review included the following sources of information:

- Council information including land zoning and permissible use.
- NSW EPA contaminated sites register (notifications or incidents.
- NSW EPA Protection of the Environment Operations (POEO) licence register.

2.5.2 Council information

Local Environment Plan (LEP)

The site is located in the Deniliquin Council LEP area. Reference to the Deniliquin Local Environment Plan 2013 indicates that the site is zoned as 'IN1 – General Industrial'.

2.5.3 Environment Protection Authority

GHD reviewed datasets maintained by the NSW EPA including notices under *Contaminated Land Management Act 1997*, POEO Environment Protection License Register and State

Heritage Register. Results are presented in Appendix B where applicable and summarised below.

Contaminated sites register

A site will be on the Contaminated Land: Record of Notices only if the EPA has issued a regulatory notice in relation to the site under the *Contaminated Land Management Act* 1997. GHD undertook a search of the register on 17 June 2016. No contaminated lands records are listed for the site. The search did not list any premises within a one kilometre radius of the site.

POEO environment protection license register

GHD undertook a search of the register on 21 June 2016.

No record was found for the site:

The search did not show any premises within a 500 metre radius of the site.

List of NSW contaminated sites notified to EPA

Any sites appearing on the EPA "List of NSW contaminated sites notified to the EPA" indicate that the notifiers consider that the sites are contaminated and warrant reporting to EPA

However, the contamination may or may not be significant enough to warrant regulation by the EPA. The EPA needs to review information before it can make a determination as to whether the site warrants regulation.

GHD undertook a search of the listing on 17 June 2016. The search did not show any premises within a one kilometre radius of the site.

State heritage register

GHD undertook a search of the register on 28 June 2016. The search did not show any premises within a one kilometre radius of the site.

2.6 Preliminary conceptual site model (CSM)

Based on the current information, the following CSM has been developed for the site.

The primary contaminants of potential concern (CoPC) are PFAS, notably PFOS and PFOA, which were components of AFFF. Other CoPCs include components of fuels and oils used as ignition sources such as total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and toluene (BTEX), polycyclic aromatic hydrocarbons (PAHs) and metals (notably lead).

The CSM concentrates mainly on PFAS as this is the main CoPC for the site and likely to be the main driver for any additional work at the site, however, other COPCs will be considered in the SAQP.

2.6.1 Sources

Based on anecdotal evidence, historical aerial photographs and the history of the Deniliquin FRNSW site, the following historical contamination sources could have affected the investigation area:

- The site has historically been used as a firefighting training site since sometime between 1991 and 2003.
- Potential source areas include:
  - The hydrocarbon fire training area in the south of the sit and the pit area where most firefighting foams and fuel for ignition are likely to have been used.

- The asphalt surface in the central to southern area of site (most likely ignition based COPCs only).
- The underground pool former fire training area (most likely ignition based COPCs only).
- The stormwater draining channel on site, which showed an elevated PFOS concentration after EPA sampling.
- Designated storage of AFFF and locations where extinguishers were filled.
- Drainage or containment components receiving AFFF contaminated wastewater at designated equipment wash down areas after foam was used for firefighting training, namely:
    - The grassed areas to the south of the AFFF fire training pad
    - The pond and drainage system to the south east of the AFFF fire training area.
- Waste drums located to the south of the AFFF fire training area.
- Minor spills of petroleum hydrocarbons and oils from vehicles traversing the site. The main contaminants associated with fuel spills are expected to include petroleum hydrocarbons and polycyclic aromatic hydrocarbons.

2.6.2 PFAS fate and transport

PFAS forms a component of AFFF, which is sprayed onto fires during training events. The mode of use of AFFF through hoses allows for it to spread through airborne dispersion beyond the training area. Typically, this results in diffuse low levels of PFAS over a wider area. Generally, the highest soil concentrations tend to be at the point source.

PFAS are stable and persistent compounds that do not readily degrade in the environment.

Once in soil, PFAS can leach from soil to water (due to its solubility in water) as water migrates downward through soil to the water table, resulting in contaminated groundwater. Generally, the shorter chain PFAS species are more soluble than the longer chain PFAS. Groundwater will migrate and discharge into the nearest down gradient surface water body – in the case of the site the main discharge area is likely to be either Aljoes Creek approximately 2.5 km to the ast or Edward River approximately 3 km north and east of site. The river is likely to be used for recreational activities and fishing purposes.

Migration through the soil will depend on the attenuation properties of the soil. Some components of the soil (notably organic carbon) can sorb PFAS components. Generally, the longer chain PFAS species will sorb more readily. This, combined with the lower solubility of the longer PFAS species, can result in mainly shorter chain PFAS species being dissolved in water while the large molecules remain in the soil.

The surface water on-site is diverted to an unlined surface drain that discharges into an off-site dam approximately 150 m to the north of the site. It is unlikely this will discharge into any natural water bodies. However, it has the potential to leach vertically into the local groundwater.

Plants (including aquatic plants) have the ability to uptake PFAS through impacted soil water. Grasses and other flora can be consumed by micro- and macro-fauna which may in turn be predated.

The main risks to human health mainly arise through ingestion of impacted media i.e. soil, water or organisms.

In terms of risks to ecological receptors, while contamination can give rise to direct toxic effects on ecosystems, the limiting factor can be the bioaccumulation of contaminants in fish or other species affecting persons or other animals that consume these fish or other species.

2.6.1 Receptors

When evaluating potential adverse health / environmental effects from exposure to a contaminated site, all potentially exposed populations should be considered. For this site, the key populations or receptors of interest are considered to include:

- Current and future onsite workers.
- Current and future construction/intrusive maintenance (utility) workers (on-site and off-site).
- Groundwater which may be relatively shallow (i.e. in the order of 10 to 25 m deep).
- Users of groundwater. GHD understands that groundwater is not extracted at the site for any purpose currently but this could occur in the future and it appears that groundwater is used for domestic purposes at distance > 1.7 km to the east and west.
- Terrestrial ecological receptors – local invertebrates (worms, insects etc), mammals, birds, reptiles that might consume impacted animals, plants and surface water.

2.6.2 Exposure pathways

The primary pathways by which receptors could be exposed to the sources of contamination outlined above are considered to be:

- Dermal contact with contaminated soil and surface water.
- Incidental ingestion of contaminated soils and surface water.
- Ingestion of impacted plant and animal material.
- Terrestrial animal consumption of impacted prey, water, soils and plants.
- Inhalation of contaminated soils or dust (PFAS are not considered to be a vapour hazard dur to their low volatility).
- Extraction and use of groundwater (not currently realised on site).
- Surface runoff and sediment transport into storm water drainage and subsequent transport and discharge to surface dams. This may be enhanced during significant rain events and flooding.

2.6.3 Potential source-pathway-receptor linkages

Based on the current information, a preliminary contamination conceptual site model (CSM) has been developed for potential on site sources of contamination. The CSM is summarised in Table 5 and on Figure 4, Appendix A.

Table 5 – Preliminary CSM

Potential Source	Potential Contaminants	Potential Pathway	Potential Receptor
Former use of AFFF during training Cleaning and wash down of contaminated equipment Disposal of contaminated media Accidental spills	*Primary contaminants of concern:* • PFASs *Other potential contaminants:* • TRH • BTEX • PAHs Heavy Metals (primarily lead)	Human exposure: ● Ingestion of surface water, groundwater, soils and dust. ● Indoor and outdoor inhalation of dust. ● Dermal contact with surface water, groundwater, soil and dust. ● Inhalation of contaminated soils or dust.	Human: ● Site users and visitors; ● Persons undertaking construction, demolition and maintenance works. Nearby ● Residents and commercial/industrial users; ● Users of groundwater; ● Recreational users of the Edwards River
		Environmental exposure: ● Surface Water runoff. ● Vertical migration through the unsaturated zone into the saturated zone and horizontal migration within the groundwater.	Ecological: ● Ecology of Edwards River ● Terrestrial organisms on-site and off-site

3. Sampling and analytical program

3.1 Overview

A process for establishing data quality objectives for an investigation-site has been defined by the NSW DEC *Guidelines for the NSW site Auditor Scheme (2nd edition,* 2006). The Data Quality Objective (DQO) process will be applied to the site investigation, as described below, to ensure that data collection activities are appropriate and achieve the project objectives. The DQO process involves seven steps as follows:

- Step 1: State the problem
- Step 2: Identify the decision
- Step 3: Identify inputs to the decision
- Step 4: Define the study boundaries
- Step 5: Develop a decision rule
- Step 6: Specify limits on decision errors
- Step 7: Optimise the design for obtaining data

The seven DQO steps for this project are defined in Table 6.

Table 6 – Data Quality Objectives

Step		Description
1	**State the problem to be resolved**	What is the likelihood that PFAS sources have contaminated the environment and what risks does it pose?
2	**Identify the decision/s to be made**	To address the problem set out in Step 1, the following decisions are required to achieve the task objective and to identify data gaps and additional information that may be required: • What are the potential sources of PFAS contamination at the site? • Do the concentrations of PFAS in the samples collected exceed adopted guideline criteria? • Do the results of the sampling and analysis indicate there is a potential risk to human health and ecological receptors on-site and off-site?
3	**Identify the inputs to the decision**	To inform the decisions and identify key data gaps and needs, the following information is considered necessary: • The location of potential PFAS contamination sources. • The concentrations of PFAS in soil, groundwater and surface water from laboratory analysis. • Identify potential exposure routes and contamination migration pathways. • The likelihood of PFAS migrating to groundwater and thence off-site.

Step		Description
4	**Define the boundaries of the study**	The study boundary comprises soil, groundwater and surface water within the on-site areas in the vicinity of the identified potential PFAS sources as shown in Figure 2, Appendix A. The study boundaries also extend to surface water impacts between the site and the two dams to the north of the site.
5	**Develop a decision rule**	The key decision rules are: Is PFAS present at concentrations above laboratory level of reporting (LOR) in soil and surface water? • If NO – risks to on-site receptors is low and the potential for PFAS contamination to migrate off-site is low. Further assessment is not supported. • If YES – assess the risks to on-site and off-site receptors; AND: Do the concentrations of PFAS in on-site samples exceed the adopted guideline criteria? • If NO – risks to on-site receptors is low and off-site impact is less likely. Assess the adequacy of the investigations to quantify risk. • If YES – conduct further assessment of risks to on-site receptors. Assess the likelihood of contamination migrating to groundwater and thence off-site.
6	**Specify the tolerable limits on decision errors**	A detailed assessment of potential for sampling and measurement errors will be undertaken based on investigation scope, methodology and results. Data quality will be assessed as detailed in Schedules B2 and B3 of the ASC NEPM. Implications for data quality with respect to the task objective will be identified and discussed. Due to the margin of error associated with analytical methods, any results close to the threshold (within the margin of error either over or under) are more likely to be incorrectly considered either “contaminated” or “uncontaminated”. As targeted samples are to be collected as part of a judgemental approach, greater confidence in results will be achieved through knowledge of the site and the likely location of PFAS sources. As such, the following tolerable limits on decision making are proposed for targeted sampling locations: • For results *within* the margin of error (either above or below the threshold) the initial classification would be considered valid (unless for a chemical not considered to be a contaminant of potential concern). • Any results *above* the threshold would require further investigation and delineation to determine the size of the impact identified.
7	**Optimise the design for**	The sample design will be optimised through:

Step		Description
	obtaining the data	• Identification of potential PFAS sources from existing information and investigations conducted by GHD and others i.e. results of PSI. • A review of the surface water pathways across and leaving the site. • Collection of soil, groundwater and surface water samples. • Appropriate laboratory analysis methodologies. • Evaluation and interpretation of results with respect to relevant guidelines.

3.2 Basis for assessment

3.2.1 Relevant guidelines

The framework for the contamination assessment made herein, was developed in accordance with guidelines "made or approved", by the NSW EPA under Section 105 of the *Contaminated Land Management Act, 1997*. These guidelines include, but are not limited to the following:

- NSW EPA (1995) *Contaminated Sites: Sampling Design Guidelines*
- NSW DEC (2006) *Contaminated Sites: Guidelines for NSW Site Auditor Scheme*
- NSW DECC (2015) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*
- NSW EPA (2011) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*
- NEPM (2013) *National Environment Protection (Assessment of Site Contamination) Amendment Measure (No.1)*, National Environment Protection Council (NEPC)

3.2.2 Potential contaminants of concern

Based on the findings of the PSI and the key aims of this investigations the following contaminants of concern have been identified for the investigation:

- PFAS
- Total recoverable hydrocarbons (TRH)
- Benzene, toluene, ethylbenzene and xylene (BTEX)
- Polycyclic aromatic hydrocarbons (PAHS)
- Metals (primarily lead)

The assessment criteria selected for these chemicals are discussed below.

3.2.3 Contamination assessment criteria

Screening levels – PFAS

There are no approved screening levels for concentrations of PFASs in soil, groundwater or surface water in Australian guidance. Recent documentation released by the Government of the Western Australia Department of Environment Regulations (DER, 2016) provides some interim guidance screening values. The Australian Department of Defence has also developed interim

guidance based on a review of available literature on PFOS and PFOA toxicity to human and aquatic ecosystems, however, while this information has been viewed it is not currently in the public domain.

GHD has also undertaken a review of available PFOS and PFOA information from Australia and overseas and developed interim screening levels (ISLs) which have been adopted for this investigation. The ISLs are presented in Table 7 below.

Table 7 – Adopted PFOS/PFOA ISLs – Soil and Groundwater

Media	Exposure Scenario	PFOS [1]	PFOA	Source	Comments
Soil	Human Health Interim Screening Level (HISL) – Industrial Commercial (mg/kg)	100	240	USEPA Region 4 2009 (in USEPA 2014) - PFOA DER (2016) - PFOS	A scaling factor of 15 applied to residential criteria for PFAS
	Human Health Interim Screening Level (HISL) – Residential (mg/kg)	4	-	DER (2016) - PFOS	
	Ecological Interim Screening Level (EISL) – terrestrial (mg/kg)	0.373	3.73	UK Environment Agency 2009	
Water	Human Health Interim Screening Level (HISL) – Drinking water (µg/L)	0.5	5	Enhealth (2016) – PFOA DER (2016) - PFOS	
	Human Health Interim Screening Level (HISL) – Secondary contact (µg/L)	5	50	DER (2016) – PFOS Enhealth (2016) – PFOA	
	Ecological Interim Screening Level (EISL) – Fresh/Marine water (µg/L)	0.13	220	DER (2016)	For protection of slightly disturbed ecological systems

[1] Enhealth (June 2016) recommends PFOS and PHxS exposures should be summed and the total compared to the TDI for PFOS.

Soil assessment criteria – other CoPCs

Site investigation levels have been adopted from assessment criteria presented in NEPM (2013) Given the site zoning is IN1 - General Industrial, health screening levels (HSL) and health investigation levels (HILs) for commercial / industrial will be used as the investigation screening criteria. Ecological investigation levels (EILs) and ecological screening levels (ESL) for commercial / industrial use are also used.

Assessment criteria – groundwater – other CoPCs

The NEPC (2013) Groundwater Investigation Levels (GILs) are based on the Australian Drinking Water Quality Guidelines 2015 and the Guidelines for Managing Risk in Recreational Waters (NHMRC, 2008). The guidelines provide a framework for risk-based assessment of groundwater contamination.

Groundwater beneath the site is not used for drinking (the surrounding area is serviced by a reticulated potable water supply) but is used for domestic purposes. There is the potential for the underlying aquifer to be in hydraulic continuity with surface water features to the north of the site. Therefore, ecological receptors could come into contact with groundwater discharging from the site. Risks to these receptors will be assessed based on screening groundwater results against the NEPC 2013 GILs for fresh waters.

The HSLs, presented in NEPC 2013 are based on CRC CARE 2011, HSL D (for sand soils), adopted for this investigation are consistent with the soil investigation criterion detailed previously.

3.3 Field Investigation

3.3.1 Objective of the intrusive investigation

The objective of the intrusive investigation is to provide information on the contamination status of the soil/sediment, groundwater and surface water and whether human and ecological receptors on the site and in the surrounding area may be at risk from site impact.

The investigation will also consider mechanisms that might enhance or inhibit contamination migration such as soil type, grain size, sorption capacity, hydraulic conductivity and groundwater salinity. This site-specific information will inform our understanding of contaminant fate and transport which is essential to understanding risks. To achieve this samples of the soil will also be analysed for cation exchange capacity (CEC), total organic carbon and leachability.

3.4 Sampling rationale

To address the investigation objectives outlined above and based on the key risk identified in the preliminary CSM (see Section 2.6) the investigation has been designed to target:

- On site contamination sources, notably those associated with former firefighting activities to help FRNSW understand the residual issues to human health and the environment including site workers.
- Surface water impacts (where possible) in order to assess risks to down gradient farm dams receiving surface water run-off from the site.
- Potential impacts to down gradient groundwater users.

3.5 Scope of intrusive investigations

The scope of the intrusive investigation is summarised as follows:

- Installation and sampling of three groundwater monitoring wells to assess groundwater contamination in beneath fire training area where concentrations are likely to be greatest and to assess groundwater flow directions.
- Opportunistic soil sampling form the groundwater well borehole.
- Soil sampling at eight (8) locations.
- Surface water (assuming water is present) and sediment sampling at 5 coinciding locations.

The sample locations are provided on Figure 5 in Appendix A. Details of the investigation methodology are outlined below.

The rationale for the proposed sampling program is outlined in Table 8.

Table 8 – Sampling Program

Monitoring location	Location	Rationale	Laboratory Analysi
Groundwater			
MW01	Fire training pad	Assess groundwater impact for the purpose of understanding if there is a potential risk to off-site users and future on-site users of groundwater Assessing impact associated with AFFF foam wash-off area.	PFAS, TDS, pH, major ions, Alkalinity
MW02	Western portion of site	Assess groundwater impact for the purpose of understanding if there is a potential risk to off-site users and future on-site users of groundwater. Characterising impact near to western burning area.	PFAS, TDS, pH, major ions, Alkalinity
MW03	North eastern portion of site	Assess groundwater impact for the purpose of understanding if there is a potential risk to off-site users and future on-site users of groundwater. Characterising impact associated with the underground pool fire training area.	PFAS, TDS, pH, major ions, Alkalinity
Soil samples			
SB01 – SB04	Vicinity of Fire training pads and AFFF use	Provide a preliminary indication of possible PFAS soil impacts from reported routine foam discharges in key areas of historical use, in	PFAS, pH, metals, total Fe, CEC, TOC
SB05	Site Coverage		

Monitoring location	Location	Rationale	Laboratory Analysi
SS01 to SS06	Along drainage lines	drainage channels and in the discharge area for surface water (dam). Include former drain to east as well as northern drain.	
SS07 to SS08	Off-site dams		
Surface water			
SW01 – SW04	Off-site dams	Assess surface water at the former fire training area PFAS and in offsite dams. Surface water samples may be reduced or changed depending on the location of exposed surface water within drainage lines.	PFAS, TDS, pH, major ions, Alkalinity

3.6 Sampling Methods

3.6.1 Field work preparations

Health safety and environmental management

Prior to the commencement of field works a health, safety and environmental management plan will be prepared in accordance with GHD's health safety and environmental management policies and procedures.

Underground service location

A qualified service location will be commissioned to clear all proposed intrusive locations prior to the commencement of drilling.

3.6.2 Soil and sediment sampling

Soil and sediment samples will be collected using the following methodology:

- Shallow soil bores will be advanced to 1 m depth using a hand auger. Samples will be recovered at surface, 0.5 m and 1 m and at 1 m intervals or significant changes in lithology.
- Two (2) deeper soil bores will be advanced using continuous push tube (powered by a drill rig). These bores will be advanced to a depth of 5.0 m.
- Sediment samples will be collected within the top 0.2 m of drainage lines.
- The soil profile will be described in general accordance with the Unified Soil Classification System (USCS) and GHD's standard logging procedures, with features such as seepage, discolouration, staining, odours and other indications of contamination being noted on the borelog, as well as soil sampling information.
- All sampling will be undertaken by an appropriately experienced GHD environmental scientist in general accordance with GHD's Standard Field Operating Procedures to allow

representative samples to be collected, information accurately recorded and quality control is maintained throughout the investigation.

- A PID will be used to assess for the presence of VOCs at each sampling interval.
- Two soil samples will be selected for analysis from the borehole – nominally the surface sample and the 1 m sample.
- Sample jars will be filled to minimise headspace. The containers will be labelled with the job number, sample identification and date collected. All sampling equipment will be Teflon free as this is understood to potentially interact with and impact PFAS concentrations in samples media.
- Following the collection of each sample, the jars will be placed immediately into ice filled coolers for preservation prior to and during transportation to the project laboratory.
- Samples will be accompanied with chain of custody documentation to the project laboratory and will be submitted within holding times appropriate to the analysis required.
- Decontamination procedures will be used during the soil sampling including the use of new disposable gloves for the collection of each sample, decontamination of sampling equipment between each sampling location (using DECON 90/N) and the use of dedicated sampling containers provided by the laboratory.

3.6.3 Groundwater well installation

The monitoring wells will be installed in accordance with industry standards, including guidance provided in the Minimum Construction Requirements for Water Bores in Australia (NUDLC, 2011). Groundwater wells will be designed to ensure that the potential presence of LNAPL can be measured.

The wells will be constructed using 50 mm, Class 18 uPVC flush jointed, threaded well screen and blank casing, a gravel pack surrounding the screened zone extending 0.5 m above the screened interval, a bentonite plug above the screen as a seal and cement grout to the surface. Wells will be completed with flush mounted, traffic rated, cast iron gatic covers. Following installation, the well will be developed using a submersible pump to remove silt introduced during drilling and for alignment of the gravel pack surrounding the well screens.

Following installation, the monitoring wells will be professionally surveyed according to the Australian Height Datum (AHD) and the location will be plotted on a plan.

A borehole log will be prepared for the monitoring well locations showing the geology and well construction details.

It is anticipated that groundwater will be encountered at depths shallower than 12 m bgl. As such it is expected that wells will be installed to depths of no more than 15 m bgl.

3.6.4 Groundwater sampling

Groundwater sampling will be carried out as follows:

- First round – the newly installed wells MW01 - MW03 will be sampled approximately one week following installation.
- The depth of the SWL will be measured using an electronic interface meter, along with the total well depth with all measures recorded from the top of casing.
- A representative groundwater sample will be collected from the monitoring well using the following sampling techniques:

- Purged using low-flow sampling techniques with dedicated tubing, that is Teflon free. The depth of placement of the groundwater sample inlet tube will be recorded during sampling and will be consistent across monitoring locations.
- Field parameters (pH, electrical conductivity (EC), oxygen redox potential, dissolved oxygen (DO) and temperature) will be measured and recorded during purging to ensure that extracted groundwater is representative of the surrounding groundwater conditions. When field parameters reach equilibrium, i.e. consecutive measurements are within 10% of each other for EC, redox and pH, groundwater will be deemed to be representative and groundwater samples will be collected.
- Visual observations will be recorded, in particular, the absence or presence of a hydrocarbon sheen or odour will be recorded during purging.
- Retrieved groundwater sample will immediately be placed into laboratory prepared bottles suitable for the requested analyses.
- Sample bottles will be filled directly from the pump with a minimal amount of air contact and vials for volatile organic analysis will be filled to minimise headspace. Samples that are to be analysed for dissolved metals will be field filtered with a dedicated filter prior to placing the sample into the sample bottle.
- The containers will be labelled with the job number, sample identification and date collected.
- Following the collection of the sample, the bottles will be placed immediately into ice-filled coolers for preservation prior to and during transportation to the project laboratory.
- Samples will be accompanied with chain of custody documentation to the project laboratory and will be submitted within holding times appropriate to the analysis required.
- Dedicated sampling equipment (i.e. tubing, bailers, filters etc.) will be disposed of after each well is sampled with other sampling equipment decontaminated using a mixture of Decon 90 solution and potable water and then rinsed with potable tap water between each well location.

3.6.5 Surface water sampling

Surface water sampling will be undertaken as follows:

- Surface water samples will be collected by grab sampling with a dedicated sample bottle attached to an extendable arm.
- Samples from drainage channels will be collected from the centre of the drain and centre of the water column to the extent practicable.
- Surface water samples will be placed in laboratory supplied bottles appropriate for the particular analyte. The bottles will be immediately stored in chilled insulated containers. All samples will be transferred to the nominated laboratory and accompanied by CoC documents which will specify the tests required and the appropriate levels of reporting (LOR). Further detail on sample preservation, handling and transport is provided in 6.
- Dedicated sample bottles will be used to collect surface water samples, eliminating the need for decontamination of equipment and rinsate samples.
- Collection of Quality Assurance (QA) / Quality Control (QC) samples for groundwater including duplicate and split samples as discussed in Section 7.

3.7 Laboratory Analysis

The analytical schedule proposed for each sampling location is presented in Table 18.

Laboratory analysis will be primarily completed by Australian Laboratory Services (ALS). Secondary laboratory Eurofins-MGT will also be used for analysis of Quality Assurance / Quality Control (QA/QC) samples. Both laboratories are accredited by the National Association of Testing Authorities (NATA).

The analytical plan for the investigation stage is detailed in Table 9.

Up to 10 of the soil and sediment samples will be scheduled for ASLP of PFAS. The selection of samples will be focused on: characterising potential leachate from samples with the highest soil and sediment concentrations reported; and obtaining a reasonable spatial distribution across the investigation area (vertically and horizontally).

Table 9 - Sampling and analytical plan

No. of locations	Sample ID	Samples per location	Total no. of samples	Analyses
Groundwater				
Three proposed wells	MW01 – MW03	1	3	PFAS extended suite
				Major ions, alkalinity
				Total dissolved solids (TDS)
				pH
QA/QC	Duplicate	1	1	PFAS extended suite, TDS, pH
	Triplicate	1	1	
	Rinsate	1	1	PFAS extended suite
Soil				
Three new groundwater wells	MW01 – MW03	2	6	PFAS extended suite
				Total organic carbon (TOC) and total iron
Five targeted soil sample locations	SB01 to SB05	2	10	Metals, K, Al, Si
				Cation exchange capacity (CEC)
Eight targeted sediment sample locations	SS01 to SS08	1	8	Grain size
				PFAS leachate

No. of locations	Sample ID	Samples per location	Total no. of samples	Analyses
QA/QC	Duplicate	1	2	PFAS extended suite, TOC, metals
	Triplicate	1	1	
Surface water				
2 sample locations	SW01 to SW04	1	4	As per groundwater
QA/QC	Duplicate	1	1	PFAS extended suite, TDS, pH
	Triplicate	1	1	

3.7.1 Waste handling

Waste generated onsite will be stored in 40 gallon drums until such time as the waste can be characterised and transported off-site to an appropriately licenced waste facility.

A combination of in situ soil and water data and further soil analysis of generated waste will be used for characterising drilling waste and groundwater sampling generated.

3.7.2 Contingency plan

A contingency plan is outlined below, listing potential unexpected events that may arise during the fieldwork and actions that will be undertaken if unexpected conditions occur:

- Environmental controls will be implemented at all sites to prevent migration of potentially impacted material to the surrounding environment.
- If evidence of contamination other than that expected is encountered, additional samples will be collected for assessment pending discussion with FRNSW.
- If friable asbestos is encountered, works will cease and the area made safe in consultation with GHD's licensed asbestos assessors and FRNSW. This will be undertaken as an addition to the existing scope and cost.

3.7.3 Reporting

The findings of the works documented in this PSI and SAQP will be combined with the site investigation findings and presented as a site investigation report summarising the results of the investigation in general accordance with the *NSW Guidelines for Consultants Reporting on Contaminated Sites* (OEH, 2011). The report will include the following:

- The preliminary site investigation findings.
- Data quality objectives for the works, including a description of the basis for the additional investigations.
- Description of the works undertaken.
- Results of the desktop assessment (information and data review)
- Assessment of potential areas of concern and chemicals of concern including a Tier 1 Risk Assessment for ongoing industrial/commercial use.
- Refined CSM.

- Provision of recommendations on remediation, site management or further investigation, as required.

The report will also contain figures illustrating results of sampling, highlighting exceedances against the adopted guidelines, groundwater flow contours and direction (if possible), and diagrammatic presentation of contaminant results where required.

4. Limitations

This report has been prepared by GHD Pty Ltd (GHD) for Fire & Rescue NSW and may only be used and relied on by Fire & Rescue NSW for the purpose agreed between GHD and Fire & Rescue NSW as set out in **Section 1** of this report.

GHD otherwise disclaims responsibility to any person other than Fire & Rescue NSW arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

GHD was commissioned to undertake a preliminary site investigation and develop a SAQP for the investigation area as outlined in Section 0.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by Fire & Rescue NSW and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

5. References

ANZECC (2000); *National Water Quality Management Strategy, Paper No. 4, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, October 2000,* Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).

AS4482 (1999 and 2005). *Guide to the investigation and sampling of sites with potentially contaminated soil.*

AS/NZS5567.11 (1998). *Water Quality – Sampling – Guidance on the sampling of groundwater.*

AS/NZS 5667.1 (1998). *Water Quality – Sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.*

ASRIS (2013) Australian Soil Resource Information System, (2013).

National Health and Medical Research Council (NHMRC) and National Resource Management Ministerial Council (NRMMC) (2011); *National Water Quality Management Strategy, Australian Drinking Water Guidelines 6, 2011, Version 3.1 (March 2015);* Commonwealth of Australia, Canberra.

Brown C.M. & Stephenson A.E. (1991). *Geology of the Murray Basin [southeastern Australia] (1:1 000 000 scale map)*

CRC Care (2011) Friebel, E and Nadebaum, P 2011, *Health screening levels for petroleum hydrocarbons in soil and Groundwater. Summary*, CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

Geoscience Australia (1993) Deniliquin, NSW, Hydrogeological Map of the Murray Basin series 1:250,000.

Deniliquin Local Environment Plan (2013), developed under the NSW Environmental Planning and Assessment Act 1979.

Department of Water Resources (1987) *Groundwater in New South Wales: Assessment of Pollution Risk*. Department of Water Resources, Sydney, NSW

DER (2016); *Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS), Contaminated Site Guidelines;* WA Department of Environment Regulations Perth, Western Australia.

Enhealth (June 2016); enHealth Statement: Interim national guidance on human health reference values for per- and poly-fuoroalkyl substances for use in site investigations in Australia.

National Health and Medical Research Council (NHMRC), 2008; *Guidelines for Managing Risks in Recreational Water*; Australian Government, Canberra.

National Environmental Protection Measure (NEPM), 2013; *National Environment Protection (Assessment of Site Contamination) Amendment Measure (No.1)*, National Environment Protection Council (NEPC)

NSW Department of Primary Industries, Office of Water, groundwater map, accessed on 17 June 2016, available at: http://allwaterdata.water.nsw.gov.au/water.stm

NSW DEC, 2006; *Contaminated Sites: Guidelines for NSW Site Auditor Scheme*

NSW DECC, 2009; *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.*

NSW DECC (2015) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*

NSW EPA, 1995; *Contaminated Sites: Sampling Design Guidelines*

NSW EPA (2011); *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.*

NSW EPA (2016a) *Search the contaminated land record* (online) accessed: 17 June 2016, available at: http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx

NSW EPA (2016b) *List of NSW contaminated sites notified to EPA* (online) accessed 17 June 2016, available at: http://www.epa.nsw.gov.au/clm/publiclist.htm

NSW EPA (2016c) *Search for Environment Protection licences, applications, notices, audits or pollution studies and reduction programs* (online) accessed on 23 June 2016, available at: http://www.epa.nsw.gov.au/prpoeoapp/

NSW EPA (2016), Fire & Rescue NSW Firefighting Training Site – Deniliquin Airport DOC16/181231 Dated 26th April 2016

NSW OEH (2016d) Search for State Heritage inventory (online) accessed on 28 June 2016, available at: http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx

NUDLC, 2011 National Uniform Drillers Licensing Committee *Minimum Construction Requirements for Water Bores in Australia,* Australian Government National Water Commission.

Office of Environment and Heritage (OEH), 2011; *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*

UK Environmental Agency, 2009; *Review of human health and environmental risks associated with land application of mechanical – biological treatment outputs (Revision 1) Report SC030144/R5 Environment Agency*

US EPA, 2014; *Emerging Contaminants – Perfluorooctane Sulfonate (PFOS) and Perfluoroactanoic Acid (PFOA), Emerging Contaminants Fact Sheet – PFOS and PFOA*

US EPA, 2014a; *Health Effects Document for Perfluorooctanoic Acid (PFOA);* US EPA Washington DC, United States.

US EPA, 2014b; *Health Effects Document for Perfluorooctane Sulfonate (PFOS)*; US EPA Washington DC, United States

Appendices

Appendix A – Figures

LEGEND

- Site Boundary
- Minor Waterways
- Cadastre
- Streets
- Major Waterways

Paper Size A4

0 35 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Fire & Rescue NSW
Londonderry Site Investigation

Site Location and Key Off-site Receptors

Job Number	21-25583
Revision	A
Date	08 Aug 2016

Figure 1

G:\21\25583\GIS\Maps\Deliverables\Deniliquin\21_25583_Z001_Deniliquin_SiteLocation.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: Imagery - ©Land and Property Information (Extracted: 08/08/16); Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber

LEGEND

- Site Boundary
- Cadastre
- Streets
- Major Waterways
- Minor Waterways
- Surface Drainage

Paper Size A4

0 5 10 20 30 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Fire & Rescue NSW
Deniliquin Site Investigation

Job Number 21-25583
Revision A
Date 16 Aug 2016

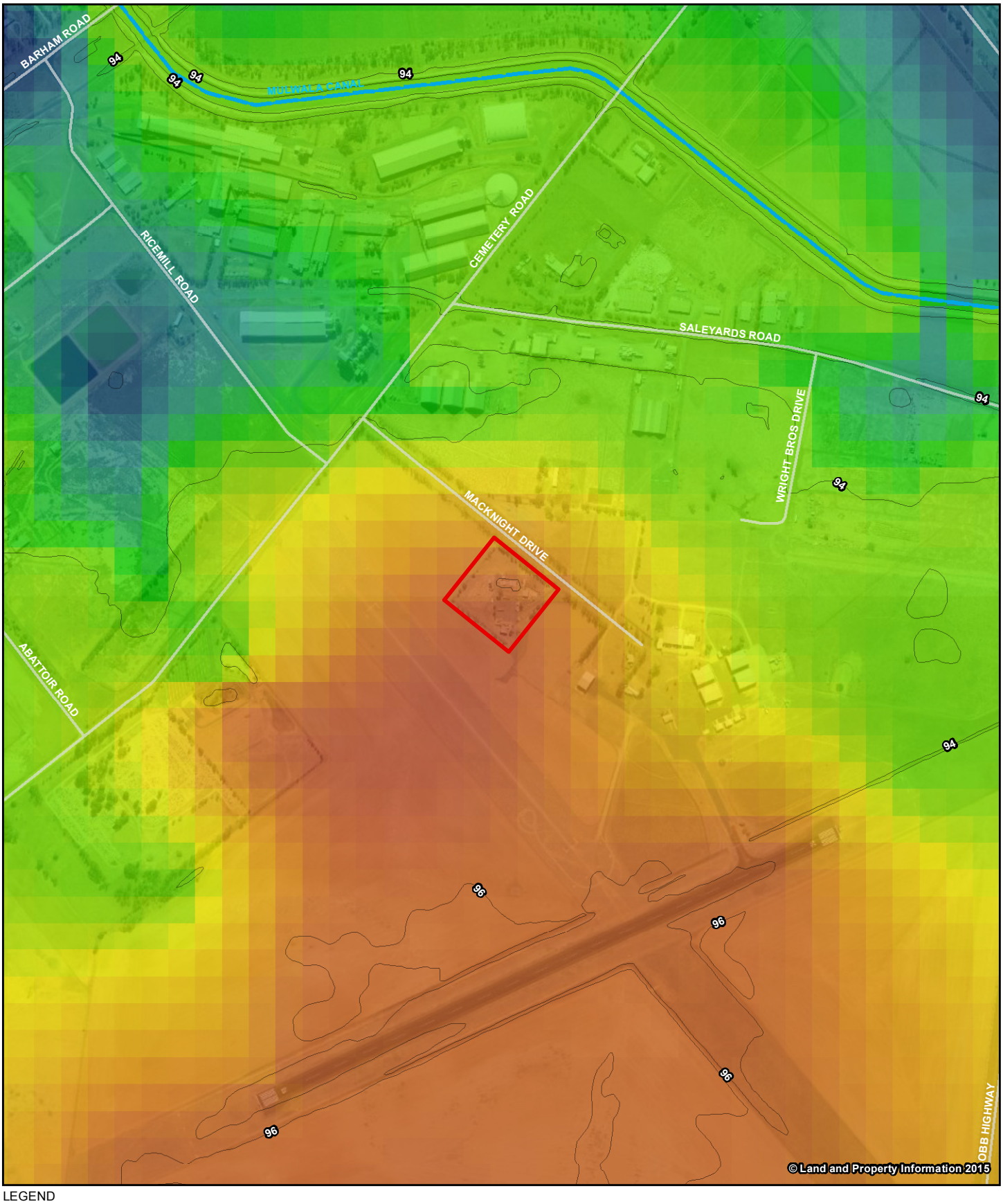
Site Layout

Figure 2

G:\21\25583\GIS\Maps\Deliverables\Deniliquin\21_25583_Z002_Deniliquin_SiteLayout.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: Imagery - ©Land and Property Information (Extracted: 16/08/16); Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber



LEGEND

- Site Boundary
- Streets
- Contours
- Major Waterways
- Minor Waterways

Value

High : 96.3831

Low : 91.7121

Paper Size A4

0 35 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Fire & Rescue NSW
Deniliquin Site Investigation

Job Number 21-25583
Revision A
Date 12 Aug 2016

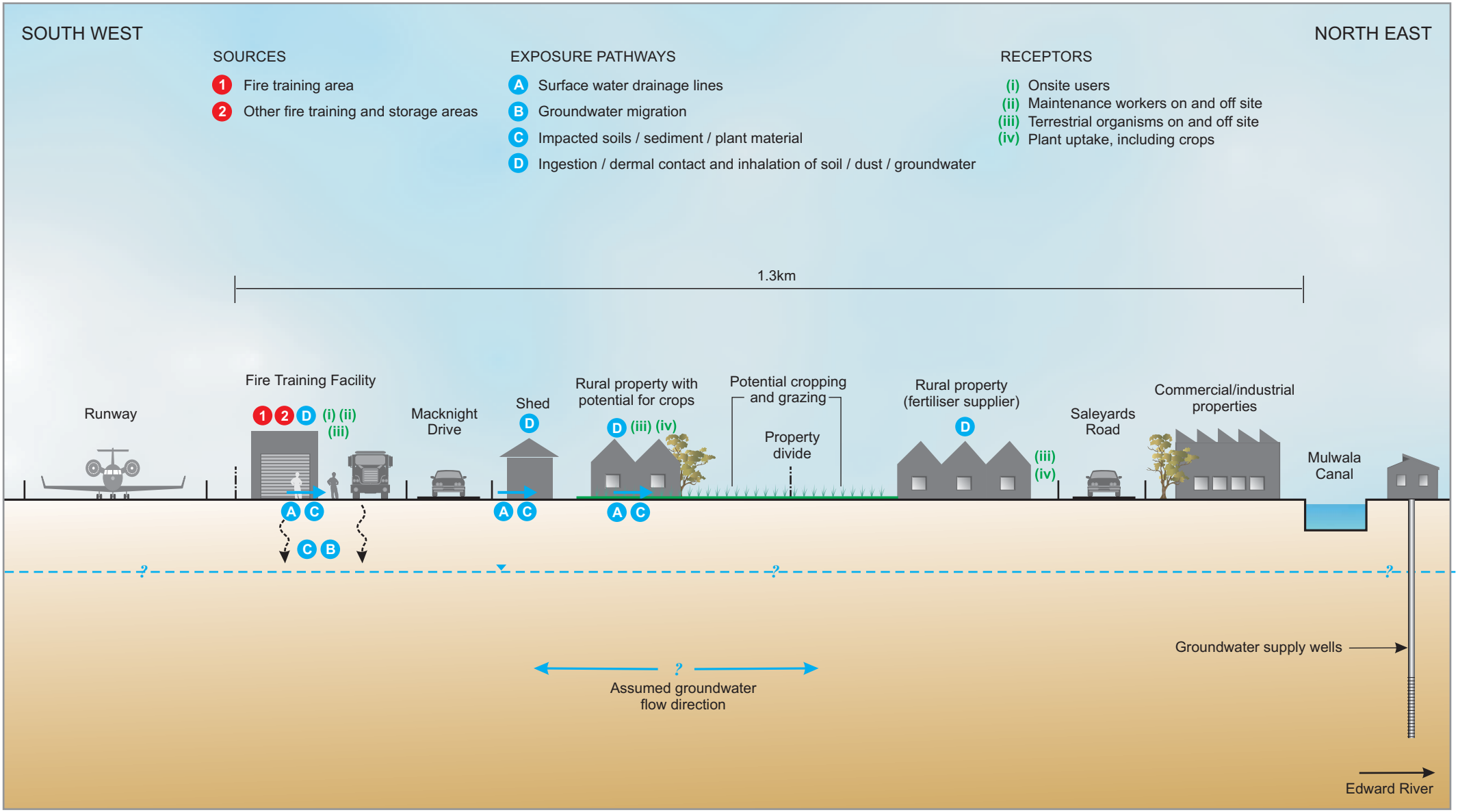
Elevation

Figure 3

G:\21\25583\GIS\Maps\Deliverables\Deniliquin\21_25583_Z003_Deniliquin_Elevation.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: Imagery - ©Land and Property Information (Extracted: 12/08/16); Streets, Waterways, Contours, DEM - NSW LPI 2012 DTDB. Created by:mweber



Conceptual diagram only - not to scale

LEGEND

- Sandy clay
- Groundwater table
- Vapour migration
- Surface water flow

Fire & Rescue NSW
Deliniquin Fire Training Centre

Conceptual Site Model

Job Number	21-25583
Revision	A
Date	10 Aug 2016

Figure 4

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

LEGEND

- Site Boundary
- Streets
- Surface Drainage
- Proposed Monitoring Well (3)
- Proposed Shallow Soil Bore (3)
- Proposed Deep Soil Bore (2)
- Proposed Sediment Sample (8)
- Proposed Surface Water Sample (4)

Paper Size A3

0 10 20 40 60 80

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Fire & Rescue NSW
Deniliquin Site Investigation

Job Number 21-25583
Revision A
Date 16 Aug 2016

Proposed Sample Locations

Figure 5

G:\21\25583\GIS\Maps\Deliverables\Deniliquin\21_25583_Z004_Deniliquin_SampleLocations_A3.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: Imagery - ©Land and Property Information (Extracted: 16/08/16); Streets, Waterways - NSW LPI 2012 DTDB. Created by:mweber

Appendix B – Desk Study Information

Part 1: Site Details

Question	Response	Details
Site Area		
Brief Site Description - Identify key site features, e.g. Depot containing sub-station, pole dump, offices, workshop, truck wash etc...	NSW fire and rescue obtained Site in 1996 from DoD. Used Foams in portion of Site included in photo 1 & photo 7 below only. Foam was rolled out and fires lit in the sump visible in the photo (lit by gas) were put out by the foam. Sump shown in photo 6. The fence in the background wasn't always there so runoff occurred onto grassed area behind (photo 9 - 11). Foam historically drained to the left of the sump (photo & 5), down a drain to "bunded" area (photo 4) which also had saplings to drawn up the water. The bund consisted of tarp like material (photo 8). Foam use ceased approximately 12 years ago when maintenance training was cut due to reduced budget. Time is an estimate only	


Appendix 1


Appendix 2


Appendix 3


Appendix 4


Appendix 5


Appendix 6


Appendix 7


Appendix 8


Appendix 9


Appendix 10


Appendix 11

Access - Is the site fenced /open to the general public?	Fenced but things used to be stolen from Site so easily accessed. Rural area.
ADDITIONAL INFORMATION - Any other anecdotal information from site personnel, locals or site history	

Part 2: Exposure Pathways/Receptors

Question	Response	Details
Occupancy	Occasionally	
Surrounding Land Use		
Bushland/Rural (agricultural)		
Direction from Site	North, East, South, West	
	Adjacent to airport. With rural NSW fire training at airport, but only 4-5 years. Rice mill across road. Drain seeps to dam - council owned and run. Defence land adjacent rented out for grazing.	
Site Conditions		
Surface Condition	Partially Sealed	
	Asphalt/concrete in centre of Site. Grass around.	
Topography/ Slope	Generally flat	
Drainage	Drain runs along north sout direction near the eastern boundary and east Wests through the Site towards council dam	
 Appendix 12  Appendix 13  Appendix 14  Appendix 15  Appendix 16		
Vegetation	Mainly grass cover, with trees	

Score (4/11) 36.36%

Surface Water	
Distance to nearest surface water body	
	Dam - unsure distance
Groundwater	
Depth to Groundwater known?	Off

Score (4/11) 36.36%

Part 3: Potential/Known sources of contamination

Question	Response	Details
Field Service Centre		
Is the site a former FSC?	Yes	
	Still training centre. Only use water	
Storage Tanks		
Is there any evidence of above ground storage tanks including creosote tank, oil storage, fuel?	Yes	
	Former diesel empty now. Since 15 years ago. Lpg gas also stored	
 Appendix 17  Appendix 18		
Are there any current or former under ground storage tanks/bowsers/dip points/fill points/vents/old concrete slabs or cut outs in sealed areas?	Yes	
	Only filling for AST detailed above	
Drains/Sumps		
Are there any drains or sumps on the Site?	Yes	
Is there any obvious staining or oil present within the bund area?	No	
	Drains. Sump in former foam training area detailed below.	
Do any outlets from the drain/sump lead off site?	Yes	

Score (6/17) 35.29%

	Drains to dam	
Chemical Storage		
Are Chemicals stored on the Site?	Yes	
Provide a brief summary of storage conditions,	New foams. Old was stored here too. Some old still there - see red and black drums	


Appendix 19


Appendix 20


Appendix 21


Appendix 22


Appendix 23

Appendix 24

Waste Storage		
Truck Wash		
Is there a truck wash at the site?	No	
Workshop		
Is there a workshop at the site?	No	
Transformer		
Are there any transformers present at the site (operational or stored)?	No	
Substation		
Is there a substation at the Site?	No	
Other Observations		
Are there any stockpiles present on the site?	No	
Is there evidence of asbestos on the ground surface?	No	Clean up a few years. Gov ordered. 16-17 years ago
Is there any evidence of filling on the Site?	No	
Is there any staining on the ground surface?	No	
Are there any obvious or un-identified odours?	No	
Anything else pertinent to the Site inspection?	No	

Score (6/17) 35.29%

Photos

Appendix 1 –Pooling of water draining from where former AFFF use was

Appendix 2 – taken from where former AFFF use was, drain leading to pooling area in first photo

Appendix 3

Appendix 4

Appendix 5 – where AFFF training was. Pit lit by gas and hoses used to extinguish. Fence wasn't always there

Appendix 6

Appendix 7 – "lining" of pulled area

Appendix 8 – view of where training was

Appendix 9 – behind fence

Appendix 10

Appendix 11

Appendix 12

Appendix 13 – Drainage line leading off Site

Appendix 14 – Drainage line

Appendix 15

Appendix 16

Appendix 17 – former fuel storage

Appendix 18

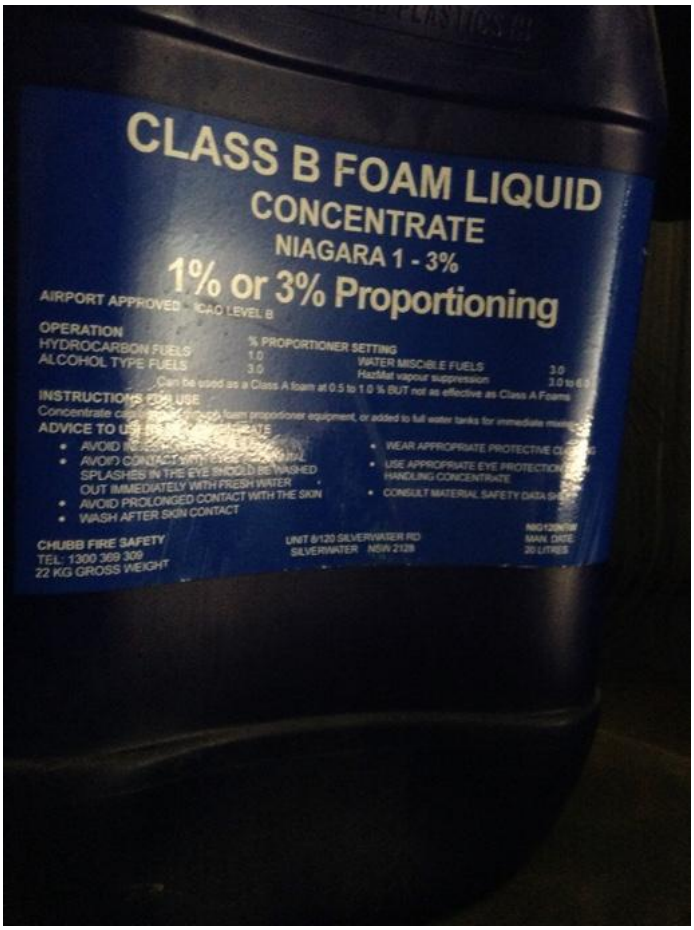
Appendix 19 – current chemical storage

Appendix 20 – new foam – not used for training. Stored for if needed for fire only

Appendix 21

Appendix 22

Appendix 23 – old chemicals. Not used.



Appendix 24


GW504380
GW504175
GW504368
GW503947
GW504264
GW504356
GW500670
GW504333
GW505649
GW500899
GW504029
GW505680
GW503094
GW504262
GW500733
GW500278
GW501823
GW500910
GW503702
GW503704
GW505563
GW504077
GW503895
GW503636
GW066307

NSW Office of Water
Work Summary

GW504201

Licence: 50WA505517 **Licence Status:** CURRENT

Authorised Purpose(s): DOMESTIC,STOCK
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 20/06/2005
Final Depth: 41.50 m
Drilled Depth: 41.50 m

Contractor Name: watson drilling
Driller: David Wilton Watson
Assistant Driller: Jono BRANSON

Property: N/A (WATSON) LOT 14 WILLOW DRIVE DENILIQUIN 2710
GWMA:
GW Zone:
Standing Water Level: 12.400
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	14//811007
Licensed:			

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063235.0
Easting: 316283.0
Latitude: 35°33'27.1"S
Longitude: 144°58'22.8"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	41.50	125			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	38.50	125			Seated on Bottom, Screwed and Glued
1	1	Opening	Screen - Wedge Wire	38.50	40.50	125		1	Stainless Steel 304, Other, A: 1.00mm
1	1	Casing	Pvc Class 12	40.50	41.50	125			Seated on Bottom, Screwed and Glued

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
38.50	40.50	2.00	Unknown	12.40					900.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	7.00	7.00	Clay, brown grey	Clay	
7.00	11.00	4.00	Sand	Sand	
11.00	17.00	6.00	Clay, brown grey	Clay	
17.00	18.00	1.00	Sand, grey	Sand	
18.00	22.00	4.00	Clay, grey brown	Clay	
22.00	28.00	6.00	Sand, grey	Sand	
28.00	38.00	10.00	Clay, brown grey	Clay	
38.00	41.00	3.00	Sand, brown	Sand	
41.00	41.50	0.50	Clay	Clay	

Remarks

20/06/2005: Form A Remarks:
Entered by Clare Hillier

***** End of GW504201 *****

NSW Office of Water
Work Summary

GW504262

Licence: 50WA505594 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Air
Owner Type: Private

Commenced Date:
Completion Date: 11/10/2006
Final Depth: 31.00 m
Drilled Depth: 31.00 m

Contractor Name: watson drilling
Driller: David Wilton Watson
Assistant Driller: Jono BRANSON

Property: N/A (BOSCHEN)
HETHERINGTON STREET
DENILIQUIN 2710
Standing Water Level: 11.500
GWMA:
GW Zone:
Salinity:
Yield: 3.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	1683//1089647
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063938.0
Easting: 316002.0
Latitude: 35°33'04.1"S
Longitude: 144°58'12.2"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	31.00	125			Rotary Air
1	1	Casing	Pvc Class 12	0.00	27.00	125			Seated, Screwed and Glued, S: 30.00-31.00m
1	1	Opening	Screen - Wedge Wire	27.00	30.00	125		1	Stainless Steel 304, Other, A: 1.00mm
1	1	Casing	Pvc Class 12	30.00	31.00	125			Seated, Screwed and Glued

Water Bearing Zones

			WBZ Type						

From (m)	To (m)	Thickness (m)		S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
27.00	30.00	3.00	Unknown	11.50		3.00			300.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.00	2.00	Clay, dark tight	Clay	
2.00	4.00	2.00	Clay, brown tight	Clay	
4.00	9.00	5.00	Clay silty, orange brown	Clay Loam	
9.00	12.00	3.00	Sand coarse, dry	Sand and clay bands	
12.00	19.00	7.00	Clay gritty, brown	Clay Loam	
19.00	21.00	2.00	Sand	Sand	
21.00	25.00	4.00	Clay silty, sand layers	Clay Loam	
25.00	26.00	1.00	Sandy, orange	Sandy Clay	
26.00	28.00	2.00	Sand, brown	Sand	
28.00	30.00	2.00	Sand coarse	Sand and clay bands	
30.00	31.00	1.00	Sand, very silty	Sand	

Remarks

11/10/2006: Form A Remarks:
Entered by Clare Hillier

***** End of GW504262 *****

NSW Office of Water
Work Summary

GW504264

Licence: 50WA505598 **Licence Status:** CANCELLED

Authorised Purpose(s): STOCK,DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 01/07/2006
Final Depth: 35.25 m
Drilled Depth: 36.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller: John WATSON

Property: THE TRIANGLE WAKOOL ROAD DENILIQUIN 2710
GWMA:
GW Zone:
Standing Water Level: 10.000
Salinity:
Yield: 2.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	17//259052
Licensed:			

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064715.0
Easting: 315897.0
Latitude: 35°32'38.9"S
Longitude: 144°58'08.7"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	35.25	125			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	32.25	125			Seated on Bottom, Screwed and Glued, S: 33.75-35.25m
1	1	Opening	Screen - Wedge Wire	32.25	33.75	125		1	Stainless Steel 304, Other, A: 1.00mm
1	1	Casing	Pvc Class 12	33.75	35.25	125			Seated on Bottom, Screwed and Glued

Water Bearing Zones

			WBZ Type						

From (m)	To (m)	Thickness (m)		S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
32.25	33.75	1.50	Unknown	10.00		2.00			360.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.50	0.50	Garden Soil	Gabbro	
0.50	1.50	1.00	Clay soft, yellow grey	Clay Loam	
1.50	3.00	1.50	Clay stiff, grey	Clay Loam	
3.00	4.50	1.50	Clay, orange brown grey	Clay	
4.50	7.00	2.50	Gritty clay, brown grey brittle dry	Granite	
7.00	8.50	1.50	Clay, mainly brown brittle dry	Clay	
8.50	13.00	4.50	Clay, mainley smooth brown grey tough	Clay	
13.00	13.50	0.50	Sand medium, mainly grey	Sand and clay bands	
13.50	14.00	0.50	Sand coarse, mainly grey	Sand and clay bands	
14.00	15.00	1.00	finer ml ok	Fine Sand	
15.00	17.00	2.00	Clay firm brown grey	Clay Loam	
17.00	18.00	1.00	Clay, softer medium soft	Clay	
18.00	22.00	4.00	Clay, tough medium soft	Clay	
22.00	24.20	2.20	Clay, softer good roof	Clay	
24.20	24.50	0.30	Sand coarse, brown	Sand and clay bands	
24.50	28.50	4.00	Clay, stiff yellow brown grey	Clay	
28.50	30.00	1.50	Clay, softer yellow brown grey	Clay	
30.00	32.00	2.00	Clay, softer again	Clay	
32.00	33.50	1.50	Sand coarse, grey brown gml	Sand and clay bands	
33.50	34.00	0.50	Clay, grey brwon	Clay	
34.00	35.00	1.00	Clay, soft	Clay	
35.00	36.00	1.00	Clay, very soft silty brown	Clay	

Remarks

01/07/2006: Form A Remarks:
Entered by Clare Hillier

***** End of GW504264 *****

NSW Office of Water
Work Summary

GW504331

Licence: 50WA505523 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 01/03/2005
Final Depth: 25.50 m
Drilled Depth: 29.00 m

Contractor Name: watson drilling
Driller: David Wilton Watson
Assistant Driller: Geoff Kelly

Property: N/A (BRUNKER) 251-253 HARFLEUR STREET DENILIQUIN 2710
Standing Water Level: 10.300
GWMA:
GW Zone:
Salinity:
Yield: 5.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	17/44/979186
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6065114.0
Easting: 315727.0
Latitude: 35°32'25.8"S
Longitude: 144°58'02.2"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	25.50	125			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	22.50	125			Screwed and Glued
1	1	Opening	Screen - Wedge Wire	22.50	24.00	125		1	Stainless Steel 304, Other, A: 1.00mm
1	1	Casing	Pvc Class 12	24.00	25.50	125			Screwed and Glued

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)		Duration (hr)	Salinity (mg/L)

							Hole Depth (m)		

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Clay, dark grey	Clay	
1.00	8.00	7.00	Clay, grey brown	Clay	
8.00	9.50	1.50	Silty clay	Silty Clay	
9.50	11.20	1.70	Sand, dirty brown	Sand	
11.20	21.30	10.10	Clay, grey brown	Clay	
21.30	24.00	2.70	Sand, medium coarse grey brown	Sand	
24.00	29.00	5.00	Clay, grey brown	Clay	

Remarks

01/03/2005: Form A Remarks:
Entered by Clare Hillier
Water bearing zones not entered as no from and to depths given

***** End of GW504331 *****

NSW Office of Water
Work Summary

GW504333

Licence: 50WA504708 **Licence Status:** CURRENT

Authorised Purpose(s): RECREATION (GROUNDWATER)
Intended Purpose(s): RECREATION - LOW SECURITY

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 04/02/2005
Final Depth: 42.00 m
Drilled Depth: 44.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller: Geoff KELLY

Property: N/A (N V R) CNR HETHERINGTON & PACKENHAM STREETS DENILIQUIN 2710
Standing Water Level: 9.100
GWMA:
GW Zone:
Salinity:
Yield: 21.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	9//790826
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064398.0
Easting: 315618.0
Latitude: 35°32'49.0"S
Longitude: 144°57'57.3"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	42.00	125			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	39.00	125			Screwed and Glued
1	1	Opening	Screen - Wedge Wire	39.00	41.00	125		1	Stainless Steel 304, Other
1	1	Casing	Pvc Class 12	41.00	42.00	125			Screwed and Glued

Water Bearing Zones

			WBZ Type						

From (m)	To (m)	Thickness (m)		S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	10.00	10.00	Clay, grey brown	Clay	
10.00	11.00	1.00	Sand, clayed coarse grey	Sand	
11.00	29.00	18.00	Clay, grey brown	Clay	
29.00	30.00	1.00	Silty clay	Silty Clay	
30.00	33.00	3.00	Sand, dirty brown	Sand	
33.00	35.00	2.00	Clayed sand	Clayey Gravel	
35.00	36.00	1.00	Sand, dirty	Sand	
36.00	39.00	3.00	Sand, cleaner medium brown	Sand	
39.00	41.00	2.00	Sand, cleaner medium coarse brown	Sand	
41.00	43.00	2.00	Clayed sand	Clayey Gravel	
43.00	44.00	1.00	Clay	Clay	

Remarks

04/02/2005: Form A Remarks:
Entered by Clare Hillier
Water bearing zones not entered as no from and to depths given

***** End of GW504333 *****

NSW Office of Water
Work Summary

GW504356

Licence: 50WA506489 **Licence Status:** CURRENT

Authorised Purpose (s): STOCK,DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: P.W.D.

Commenced Date:
Completion Date: 23/01/2008
Final Depth: 24.20 m
Drilled Depth: 24.20 m

Contractor Name: watson drilling
Driller: Mathew James Rhook
Assistant Driller: Adrian EIFFERT

Property: SOUTHDOWN 244 BARHAM ROAD DENILIQUIN 2710 NSW
GWMA:
GW Zone:
Standing Water Level: 10.200
Salinity:
Yield: 2.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	32//802306
Licensed:			

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064296.0
Easting: 311466.0
Latitude: 35°32'49.5"S
Longitude: 144°55'12.4"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	24.20	125			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	22.20	125	110		Seated, Screwed and Glued, S: 23.20-24.00m
1	1	Opening	Screen - Wedge Wire	22.20	23.20	125		1	Stainless Steel 304, Other, A: 1.00mm
1	1	Casing	Pvc Class 12	23.20	24.20	125	110		Seated, Screwed and Glued

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)		Duration (hr)	Salinity (mg/L)

							Hole Depth (m)		
22.20	23.20	1.00	Unknown	10.20		2.00			400.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	4.00	4.00	Topsoil, brown	Topsoil	
4.00	5.00	1.00	Clay, grey	Clay	
5.00	10.00	5.00	Clay, grey brown	Clay	
10.00	17.00	7.00	Clay, grey browon orange	Clay	
17.00	19.00	2.00	Clay, grey	Clay	
19.00	22.00	3.00	Clay, grey silty	Clay	
22.00	23.50	1.50	Sand, fine GML	Sand	
23.50	24.20	0.70	Clay, grey	Clay	

Remarks

23/01/2008: Form A Remarks:
Entered by Clare Hillier

***** End of GW504356 *****

NSW Office of Water
Work Summary

GW504368

Licence: 50WA505677 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 15/01/2009
Final Depth: 25.50 m
Drilled Depth: 25.50 m

Contractor Name: watson drilling
Driller: Mathew James Rhook
Assistant Driller: Matthew TAIG

Property: N/A (RHOOK) 259 HETHERINGTON STREET DENILIQUIN 2710
Standing Water Level: 11.500
GWMA:
GW Zone:
Salinity:
Yield: 2.500

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	57//235441
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064810.0
Easting: 315241.0
Latitude: 35°32'35.3"S
Longitude: 144°57'42.7"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	25.50	150			Rotary Mud
1	1	Casing	Pvc Class 9	0.00	23.00	100	90		Suspended in Clamps, Screwed and Glued, S: 23.50-24.00m
1	1	Opening	Screen - Wedge Wire	23.50	25.00	100		1	Stainless Steel, Screwed, A: 1.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

23.50	25.00	1.50	Unknown	11.50		2.50		01:00:00	250.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.50	0.50	Topsoil, brown	Topsoil	
0.50	6.00	5.50	Clay, light grey to brown	Clay	
6.00	14.00	8.00	Clay, light grey	Clay	
14.00	18.00	4.00	Sand, orange brown	Sand	
18.00	23.00	5.00	Clay, light grey	Clay	
23.00	25.00	2.00	Sand, light brown	Sand	
25.00	25.50	0.50	Clay, light brown	Clay	

Remarks

15/01/2009: Form A Remarks:
Entered by Clare Hillier

***** End of GW504368 *****

NSW Office of Water
Work Summary

GW504380

Licence: 50WA506152 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 22/05/2008
Final Depth: 24.50 m
Drilled Depth: 26.00 m

Contractor Name: watson drilling
Driller: Christopher David Marshall
Assistant Driller: Tom CHEESEMAN

Property: N/A (GLOWREY) 248 HARFLEUR STREET DENILIQUIN 2710 NSW
Standing Water Level:
GWMA:
GW Zone:
Salinity:
Yield: 3.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	1//195544
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064997.0
Easting: 315691.0
Latitude: 35°32'29.6"S
Longitude: 144°58'00.7"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	24.50	100			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	22.00	100			Seated, Screwed and Glued, S: 23.50-24.50m
1	1	Opening	Screen - Wedge Wire	22.00	23.50	100		1	Stainless Steel 304, Other, A: 0.75mm
1	1	Casing	Pvc Class 12	23.50	24.50	100			Screwed and Glued

Water Bearing Zones

			WBZ Type						

From (m)	To (m)	Thickness (m)		S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
22.00	23.50	1.50	Unknown			3.00			300.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Topsoil, brown	Topsoil	
1.00	21.50	20.50	Clay, grey brown	Clay	
21.50	23.50	2.00	Sand, white brown GML	Sand	
23.50	26.00	2.50	Clay, grey brown	Clay	

Remarks

22/05/2008: Form A Remarks:
Entered by Clare Hillier

***** End of GW504380 *****

NSW Office of Water
Work Summary

GW505465

Licence: 50BL151748 **Licence Status:** CONVERTED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 03/08/1994
Final Depth: 28.00 m
Drilled Depth: 28.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller:

Property: N/A (LIEFTING) 148 HETHERINGTON STREET DENILIQUIN 2710 NSW
GWMA:
GW Zone:
Standing Water Level: 7.900
Salinity:
Yield: 1.500

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	163A//368074
Licensed:			

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063910.0
Easting: 315769.0
Latitude: 35°33'04.9"S
Longitude: 144°58'02.9"E

GS Map: -
MGA Zone: 0
Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	28.00	155			Rotary Mud
1	1	Casing	Pvc Class 9	0.30	24.00	110			
1	1	Opening	Screen - Wire Wound	24.00	26.00	100		1	Stainless Steel, A: 0.07mm
1	1	Casing	Pvc Class 9	26.00	28.00	92			Seated on Bottom

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)		Duration (hr)	Salinity (mg/L)

							Hole Depth (m)		
24.00	26.00	2.00	Unknown	7.90	15.00	1.50			300.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Clay, brown	Clay	
1.00	6.90	5.90	Clay, grey brown	Clay	
6.90	10.00	3.10	Sand, brown	Sand	
10.00	13.00	3.00	Clayed sand, brown	Clayey Sand	
13.00	19.50	6.50	Clay, brown grey	Clay	
19.50	21.00	1.50	Sandy Clay	Sandy Clay	
21.00	24.00	3.00	Clay, grey brown	Clay	
24.00	26.00	2.00	Sand, brown	Sand	
26.00	28.00	2.00	Clay, brown grey	Clay	

Remarks

03/08/1994: Form A Remarks:
Entered by Clare Hillier
No completion date given used applicants signature date of declaration for proposed development

***** End of GW505465 *****

NSW Office of Water
Work Summary

GW505483

Licence: 50BL138430 **Licence Status:** CANCELLED

Authorised Purpose(s): STOCK,DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method:
Owner Type: Private

Commenced Date:
Completion Date: 01/01/1988
Final Depth:
Drilled Depth:

Contractor Name:
Driller: Unkown Unknown
Assistant Driller:

Property: N/A (WALLACE) HENRY STREET DENILIQUIN 2710 NSW
GWMA:
GW Zone:
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:			
Licensed:	TOWNS	TOWNS.81	1681//1089647

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064109.0
Easting: 316140.0
Latitude: 35°32'58.7"S
Longitude: 144°58'17.8"E

GS Map: -
MGA Zone: 0
Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

01/01/1988: Form A Remarks:
Entered by Clare Hillier
Very little information supplied

***** End of GW505483 *****

NSW Office of Water
Work Summary

GW505563

Licence: 50WA507267 **Licence Status:** CURRENT

Authorised Purpose(s): STOCK,DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 09/12/2011
Final Depth: 45.00 m
Drilled Depth: 45.00 m

Contractor Name: watson drilling
Driller: David Wilton Watson
Assistant Driller: Jesse Harris and Mitch Slee

Property: N/A MCCULLOCH & RANDALL 177 LAWSON SYPHON ROAD DENILIQUIN 2710 NSW
GWMA:
GW Zone:
Standing Water Level: 12.000
Salinity:
Yield: 5.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	11//774926
Licensed:			

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063192.0
Easting: 316096.0
Latitude: 35°33'28.4"S
Longitude: 144°58'15.3"E

GS Map: -
MGA Zone: 0
Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	45.00	200			Rotary Mud
1	1	Casing	Pvc Class 12	-0.50	41.00	140	124		Suspended in Clamps, Glued, S: 43.00-44.50m
1	1	Opening	Screen - Wire Wound	41.00	43.00	140		1	Stainless Steel, Other, A: 1.25mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

41.00	43.00	2.00	Unknown	12.00		5.00		01:00:00	800.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	clay, brown	Clay	
1.00	10.00	9.00	clay, grey brown	Clay	
10.00	14.00	4.00	coarse sand, grey brown	Coarse Sand	
14.00	15.00	1.00	sand, brown	Sand	
15.00	17.00	2.00	coarse sand, grey brown	Coarse Sand	
17.00	23.00	6.00	sand, dirty, brown	Sand	
23.00	26.50	3.50	fine sand, brown	Fine Sand	
26.50	30.00	3.50	sand, brown yellow	Sand	
30.00	35.00	5.00	clay, grey brown	Clay	
35.00	43.00	8.00	coarse sand, grey brown	Coarse Sand	
43.00	45.00	2.00	clay, brown	Clay	

Remarks

09/12/2011: Form A Remarks:
Helen Lester: Coordinates based on location map provided with the Form A.

***** End of GW505563 *****

NSW Office of Water
Work Summary

GW505586

Licence: 50WA512280 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 16/10/2012
Final Depth: 27.00 m
Drilled Depth: 27.00 m

Contractor Name: watson drilling
Driller: David Wilton Watson
Assistant Driller: Nick Semple

Property: N/A (LIEFTING) 148 HETHERINGTON STREET DENILIQUIN 2710 NSW
Standing Water Level: 10.200
GWMA:
GW Zone:
Salinity:
Yield: 2.500

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	163A//368074
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063900.0
Easting: 315731.0
Latitude: 35°33'05.2"S
Longitude: 144°58'01.4"E

GS Map: -
MGA Zone: 0
Coordinate Source: GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	27.00	200			Rotary Mud
1		Annulus	Bentonite/Grout	0.00	5.00				PL:Poured/Shovelled
1	1	Casing	Pvc Class 12	0.00	24.00	140	110		Seated on Bottom, Glued, S: 26.00-27.00m
1	1	Opening	Screen - Wedge Wire	24.00	26.00	140		1	Stainless Steel, Other, A: 1.00mm

Water Bearing Zones

			WBZ Type						

From (m)	To (m)	Thickness (m)		S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
24.00	26.00	2.00	Unknown	10.20	20.00	2.50		00:20:00	700.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	clay, red	Clay	
1.00	2.00	1.00	clay, grey	Clay	
2.00	3.00	1.00	clay, yellow	Clay	
3.00	4.00	1.00	clay, grey	Clay	
4.00	6.00	2.00	sandy clay, grey	Sandy Clay	
6.00	11.00	5.00	coarse sand, orange brown	Coarse Sand	
11.00	12.00	1.00	sandy clay	Sandy Clay	
12.00	17.00	5.00	clay, grey brown	Clay	
17.00	20.00	3.00	sandy clay	Sandy Clay	
20.00	23.00	3.00	clay, grey	Clay	
23.00	24.00	1.00	medium sand, brown	Medium Sand	
24.00	26.00	2.00	medium sand, white orange	Medium Sand	
26.00	27.00	1.00	clay, grey	Clay	

Remarks

16/10/2012: Form A Remarks:
Helen Lester: GPS provided by the consultant/driller.

***** End of GW505586 *****

NSW Office of Water
Work Summary

GW505649

Licence: 50WA505683 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 19/02/2014
Final Depth: 35.00 m
Drilled Depth: 35.00 m

Contractor Name: watson drilling
Driller: Jason Walter Campbell
Assistant Driller: Mick Pack

Property: N/A (CAVANAGH) 182 HENRY STREET DENILIQUIN 2710
GWMA:
GW Zone:
Standing Water Level:
Salinity:
Yield: 2.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	121//879386
Licensed:			

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064306.0
Easting: 315902.0
Latitude: 35°32'52.1"S
Longitude: 144°58'08.5"E

GS Map: -
MGA Zone: 0
Coordinate Source: GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	35.00	195			Rotary Mud
1		Annulus	Bentonite/Grout	0.00	10.00				
1	1	Casing	Pvc Class 12	0.00	31.00	140	124		Seated on Bottom, Glued, S: 34.00-35.00m
1	1	Opening	Screen - Wedge Wire	31.00	34.00	140		1	Stainless Steel 304, Screwed, A: 0.75mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)		Duration (hr)	Salinity (mg/L)

							Hole Depth (m)		
28.00	34.00	6.00	Unknown			2.00			

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	4.00	4.00	clay, dark brown	Clay	
4.00	10.00	6.00	sand, brown	Sand	
10.00	28.00	18.00	clay, grey brown	Clay	
28.00	34.00	6.00	sand, brown and orange	Sand	
34.00	35.00	1.00	clay, grey and brown	Clay	

Remarks

19/02/2014: Form A Remarks:
Helen Lester: Coordinates are taken from charted licence location.

***** End of GW505649 *****

NSW Office of Water
Work Summary

GW042855

Licence: 50BL105470
Licence Status: LAPSED

Authorised Purpose(s): IRRIGATION,STOCK,DOMESTIC
Intended Purpose(s): IRRIGATION

Work Type: Bore
Work Status:
Construct.Method: Cable Tool
Owner Type: Private

Commenced Date:
Completion Date: 01/08/1976
Final Depth: 22.90 m
Drilled Depth: 22.90 m

Contractor Name:
Driller:
Assistant Driller:

Property: N/A
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level (m):
Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.081	181
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot //

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)
Northing: 6063198.0
Easting: 316557.0
Latitude: 35°33'28.5"S
Longitude: 144°58'33.6"E

GS Map: -
MGA Zone: 0
Coordinate Source: GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1	1	Casing	Threaded Steel	0.00	22.90	152			Suspended in Clamps

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
22.90	22.90	0.00	Unconsolidated	10.70		0.63			

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	Clay Grey	Clay	
0.30	1.52	1.22	Clay Hard	Clay	
1.52	2.74	1.22	Clay Grey	Clay	
2.74	5.49	2.75	Clay Grey Sandy	Clay	
5.49	6.10	0.61	Clay Grey Sandy	Clay	
6.10	8.23	2.13	Clay Grey Sandy	Clay	
8.23	10.06	1.83	Sand Some Clay Medium	Sand	
10.06	10.36	0.30	Clay Grey Sandy Stones	Clay	
10.36	11.58	1.22	Clay Grey Sandy	Clay	
11.58	12.80	1.22	Sand Wet Fine	Sand	
12.80	13.72	0.92	Sand Grey Wet Fine	Sand	
13.72	16.15	2.43	Sand Grey Wet Clay Medium	Sand	
16.15	17.07	0.92	Clay Sandy	Clay	
17.07	18.29	1.22	Clay Grey Sandy	Clay	
18.29	19.51	1.22	Clay Grey	Clay	
19.51	21.95	2.44	Clay Grey Sandy	Clay	
21.95	22.86	0.91	Clay Grey Sandy	Clay	
22.86	22.88	0.02	Sand Fine Water Supply	Sand	

Remarks

***** End of GW042855 *****

NSW Office of Water
Work Summary

GW066126

Licence: 50WA509986
Licence Status: CANCELLED
Authorised Purpose(s): DOMESTIC
Intended Purpose(s):

Work Type: Bore
Work Status:
Construct.Method: Cable Tool
Owner Type: Private

Commenced Date:
Completion Date: 31/12/1991
Final Depth: 27.00 m
Drilled Depth: 27.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller:

Property: N/A (TAYLOR) 201 HENRY STREET DENILIQUIN 2710 NSW
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level (m): 7.900
Salinity Description:
Yield (L/s): 1.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.081	UNKNOWN FROM HYDSYS
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot 156//756325

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 94.00 m (A.H.D.)
Elevation Source: Est. Contour >15M.
Northing: 6064908.0
Easting: 315766.0
Latitude: 35°32'32.5"S
Longitude: 144°58'03.6"E

GS Map: -
MGA Zone: 0
Coordinate Source: GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	27.00	155			Cable Tool
1	1	Casing	Pvc Class 9	0.00	25.00	115			Seated on Bottom
1	1	Opening	Screen - Wire Wound	25.00	27.00	100		1	Stainless Steel

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
24.00	26.50	2.50	Unknown	7.90	9.00	1.00	27.00		

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	10.00	10.00	GREY BROWN CLAY	Unknown	
10.00	11.00	1.00	MED COARSE BROWN SAND	Unknown	
11.00	24.00	13.00	GREY BROWN CLAY	Unknown	
24.00	27.00	3.00	MED GREY BROWN SAND	Unknown	

Remarks

***** End of GW066126 *****

NSW Office of Water
Work Summary

GW066307

Licence:
Licence Status:
Authorised Purpose(s):
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method:
Owner Type:

Commenced Date:
Completion Date: 28/07/1988
Final Depth: 30.00 m
Drilled Depth: 30.00 m

Contractor Name:
Driller:
Assistant Driller:

Property:
GWMA:
GW Zone:
Standing Water Level (m): 12.000
Salinity Description:
Yield (L/s): 2.700

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	2//258108
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 93.00 m (A.H.D.)
Elevation Source: Est. Contour >15M.
Northing: 6062584.0
Easting: 316670.0
Latitude: 35°33'48.5"S
Longitude: 144°58'37.6"E

GS Map: -
MGA Zone: 0
Coordinate Source: GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1	1	Casing	P.V.C.	0.00	27.00	105			Seated on Bottom
1	1	Opening		27.00	30.00	105		1	A: 1.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
23.50	30.00	6.50	Unconsolidated	12.00		2.70			

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

19/11/2009: Updated details as per existing data.

***** End of GW066307 *****

NSW Office of Water
Work Summary

GW500085

Licence: 50WA510031 **Licence Status:** CANCELLED

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Cable Tool
Owner Type:

Commenced Date:
Completion Date: 15/11/1996
Final Depth: 41.00 m
Drilled Depth: 42.50 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller:

Property: N/A (WATSON) 244 HARFLEUR STREET DENILIQUIN 2710 NSW
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.081	LOT 4 DP244654
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot 4//244654

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064965.0
Easting: 315761.0
Latitude: 35°32'30.7"S
Longitude: 144°58'03.5"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	41.00	100			Rotary Mud
1	1	Casing	P.V.C.	0.00	37.00	100			
1	1	Opening	Screen	37.00	40.00	100		1	()
1	1	Casing	P.V.C.	40.00	41.00	100			

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
35.50	40.50	5.00	Unknown	7.10		152.00			1000.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	clay, dark grey	Unknown	
1.00	21.50	20.50	clay, grey brown, firm	Unknown	
21.50	32.50	11.00	clay, soft grey brown	Unknown	
32.50	35.30	2.80	clay, gritty	Unknown	
35.30	35.50	0.20	sand, dirty	Unknown	
35.50	36.00	0.50	sand, course grey	Unknown	
36.00	37.00	1.00	sand, course grey	Unknown	
37.00	38.00	1.00	sand, course brown	Unknown	
38.00	39.00	1.00	sand, course brown	Unknown	
39.00	40.00	1.00	sand, course brown	Unknown	
40.00	40.50	0.50	sand, course brown	Unknown	
40.50	42.50	2.00	clay, grey	Unknown	

Remarks

15/11/1996: Form A Remarks:
casing and screen fixing was listed as Heat Shrunk. Screen aperture was given as 060th - not entered.

***** End of GW500085 *****

NSW Office of Water
Work Summary

GW500278

Licence: 50BL145480 **Licence Status:** CANCELLED

Authorised Purpose(s): TEST BORE
Intended Purpose(s): TEST BORE

Work Type: Bore
Work Status:
Construct.Method:
Owner Type: Private

Commenced Date:
Completion Date: 02/04/1998
Final Depth:
Drilled Depth:

Contractor Name:
Driller: Rex Langford Watson
Assistant Driller:

Property: PEPPERGROVE BARHAM ROAD DENILIQUIN 2710 NSW
GWMA: -
GW Zone: -
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	22//1006180
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot 22//1006180

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063683.0
Easting: 311434.0
Latitude: 35°33'09.3"S
Longitude: 144°55'10.7"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

07/12/2009: Reviewed data - nothing to update.

***** End of GW500278 *****

NSW Office of Water
Work Summary

GW500331

Licence: 50WA510052
Licence Status: CANCELLED

Authorised Purpose(s): DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Cable Tool
Owner Type:

Commenced Date:
Completion Date: 17/03/1998
Final Depth: 34.00 m
Drilled Depth: 34.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller:

Property: N/A (NOLAN) 126 CAREW STREET DENILIQUIN 2710
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level:
Salinity:
Yield: 1.270

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.081	LOT 222 DP845841
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot 222//845841

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063811.0
Easting: 316176.0
Latitude: 35°33'08.4"S
Longitude: 144°58'19.0"E

GS Map: -
MGA Zone: 0
Coordinate Source: Property Details Only

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	34.00	100			Cable Tool
1	1	Casing	Pvc Class 9	0.00	24.50	100			Heat Shrunk
1	1	Opening	Screen - Wire Wound	24.50	26.50	100		1	Stainless Steel, Heat Shrunk, A: 2.00mm
1	1	Casing	Pvc Class 9	26.50	32.50	100			Heat Shrunk
1	1	Opening	Screen - Wire Wound	32.50	33.00	100		1	Stainless Steel, Heat Shrunk, A: 2.00mm
1	1	Casing	Pvc Class 9	33.00	34.00	100			Heat Shrunk

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
24.50	26.50	2.00	Unknown						
32.50	33.00	0.50	Unknown						

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	3.00	3.00	clay firm to topsoil	Clay	
3.00	7.00	4.00	clay mustardy soft	Clay	
7.00	14.00	7.00	sand brown	Sand	
14.00	20.00	6.00	clay gritty brown grey and layered	Clay	
20.00	24.00	4.00	clay mustard	Clay	
24.00	25.00	1.00	sand fine brown (g.m.d.)	Sand	
25.00	26.00	1.00	sand med (g.m.l.) lm	Sand	
26.00	26.50	0.50	sand, med (g.m.l.) lm	Sand	
26.50	27.00	0.50	clay silty brown and grey	Clay	
27.00	30.00	3.00	clay silty sand layers (p.m.l.)	Clay	
30.00	32.00	2.00	sand silty clay bound (p.m.l.)	Sand	
32.00	33.00	1.00	sand coarse	Sand	
33.00	34.00	1.00	clay firm dark brown	Clay	

Remarks

***** End of GW500331 *****

NSW Office of Water
Work Summary

GW500670

Licence: 50WA510044 **Licence Status:** CANCELLED

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Cable Tool
Owner Type:

Commenced Date:
Completion Date: 15/04/1998
Final Depth: 34.00 m
Drilled Depth: 34.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller:

Property: N/A (MITSCH) 201 WARING STREET DENILIQUIN 2710 NSW
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level: 9.500
Salinity:
Yield: 1.524

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.081	LOT 8 SECTION 82
Licensed:	TOWNSEND	SOUTH	Whole Lot
		DENILIQUIN	8/82/758913

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064445.0
Easting: 315768.0
Latitude: 35°32'47.5"S
Longitude: 144°58'03.3"E

GS Map: -
MGA Zone: 0
Coordinate Source: Property Details Only

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	34.00	100			Cable Tool
1	1	Casing	Pvc Class 9	0.00	31.50	100			
1	1	Opening	Screen - Wire Wound	31.50	33.50	100		1	Stainless Steel, Heat Shrunk, A: 0.75mm
1	1	Casing	Pvc Class 9	33.50	34.00	100			

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
31.50	33.50	2.00	Unknown						

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	4.00	4.00	grey clay	Clay	
4.00	9.00	5.00	grey brown clay	Invalid Code	
9.00	11.00	2.00	sand dirty silty clay	Sand	
11.00	12.00	1.00	sand medium coarse grey brown	Sand	
12.00	27.00	15.00	clay medium firm grey brown	Clay	
27.00	28.00	1.00	clay sandy	Clay	
28.00	31.00	3.00	clay grey brown	Clay	
31.00	33.50	2.50	sand medium coarse brown	Sand	
33.50	34.00	0.50	sand dirty silty	Sand	

Remarks

***** End of GW500670 *****

NSW Office of Water
Work Summary

GW500733

Licence: 50BL197071
Licence Status: CONVERTED

Authorised Purpose(s): STOCK,DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Cable Tool
Owner Type:

Commenced Date:
Completion Date: 01/05/1992
Final Depth: 27.00 m
Drilled Depth: 27.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller:

Property: PEPPER GROVE BARHAM ROAD DENILIQUIN 2710
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level: 11.700
Salinity:
Yield: 1.270

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	22//1006180
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot //

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063701.0
Easting: 311450.0
Latitude: 35°33'08.8"S
Longitude: 144°55'11.3"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	27.00	100			Cable Tool
1	1	Casing	Pvc Class 9	0.00	20.50	100			Heat Shrunk
1	1	Opening	Screen - Wire Wound	20.50	22.00	100		1	Stainless Steel, Heat Shrunk, A: 1.25mm
1	1	Casing	Pvc Class 9	22.00	24.10	100			Heat Shrunk
1	1	Opening	Screen - Wire Wound	24.10	25.10	100		1	Stainless Steel, Welded, A: 1.00mm
1	1	Casing	Pvc Class 9	25.10	27.00	100			Heat Shrunk

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
20.50	22.00	1.50	Unknown						
24.10	25.10	1.00	Unknown						

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	clay dark brown	Clay	
1.00	3.00	2.00	clay light brown	Invalid Code	
3.00	9.00	6.00	sand dry	Sand	
9.00	10.00	1.00	clay soft	Clay	
10.00	10.50	0.50	sand dirty coarse	Sand	
10.50	20.50	10.00	clay grey brown	Clay	
20.50	22.00	1.50	sand medium coarse brown	Sand	
22.00	23.00	1.00	clay firm grey	Clay	
23.00	24.30	1.30	clay softer grey	Clay	
24.30	25.30	1.00	sand medium fine grey brown	Sand	
25.30	27.00	1.70	clay brown	Clay	

Remarks

***** End of GW500733 *****

NSW Office of Water
Work Summary

GW500899

Licence: 50BL196451 **Licence Status:** CONVERTED

Authorised Purpose (s): STOCK,DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Cable Tool
Owner Type:

Commenced Date:
Completion Date: 14/12/1998
Final Depth: 42.00 m
Drilled Depth: 45.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller:

Property: N/A (CORSCADDEN) LOT 159 HETHERINGTON STREET DENILIQUIN 2710
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level: 8.900
Salinity:
Yield: 3.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.081	LT 159 DP 756325
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot 159//756325

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064165.0
Easting: 315808.0
Latitude: 35°32'56.7"S
Longitude: 144°58'04.7"E

GS Map: -
MGA Zone: 0
Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	42.00	125			Cable Tool
1	1	Casing	Pvc Class 9	0.00	39.50	100			Heat Shrunk
1	1	Opening	Screen - Wire Wound	39.50	41.00	100		1	Stainless Steel, Heat Shrunk, A: 2.00mm
1	1	Casing	Pvc Class 9	41.00	42.00	100			Heat Shrunk

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
39.50	41.00	1.50	Unknown						

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	4.00	4.00	clay firm grey	Clay	
4.00	7.50	3.50	clay medium grey brown	Clay	
7.50	8.60	1.10	clay gritty	Clay	
8.60	9.20	0.60	clay medium grey brown	Clay	
9.20	9.80	0.60	sand coarse brown	Sand	
9.80	10.00	0.20	clay grey	Clay	
10.00	11.30	1.30	sand coarse brown	Sand	
11.30	17.00	5.70	clay grey	Clay	
17.00	18.00	1.00	clay hard	Clay	
18.00	20.20	2.20	clay gritty	Clay	
20.20	21.00	0.80	clay soft	Clay	
21.00	25.00	4.00	clay gritty	Clay	
25.00	32.00	7.00	clay grey brown	Clay	
32.00	33.00	1.00	clay gritty	Clay	
33.00	33.50	0.50	sand coarse brown	Sand	
33.50	36.50	3.00	clay grey	Clay	
36.50	39.00	2.50	sand dirty	Sand	
39.00	41.00	2.00	sand coarse brown and gravel	Sand	
41.00	42.00	1.00	sand heavily clayed	Sand	
42.00	43.00	1.00	sand coarse brown and gravel	Sand	
43.00	45.00	2.00	clay grey	Clay	

Remarks

***** End of GW500899 *****

NSW Office of Water
Work Summary

GW500910

Licence: 50BL197686
Licence Status: CONVERTED

Authorised Purpose(s): STOCK,DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status:
Construct.Method: Cable Tool
Owner Type:

Commenced Date:
Completion Date: 17/03/2000
Final Depth: 42.00 m
Drilled Depth: 45.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller:

Property: N/A (PEARN) LOT 19 WILLOW DRIVE DENILIQUIN 2710
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level: 9.250
Salinity:
Yield: 0.300

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.081	LT 19 DP 811007
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot 19//811007

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063549.0
Easting: 316158.0
Latitude: 35°33'16.9"S
Longitude: 144°58'18.1"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	42.00	125			Cable Tool
1	1	Casing	Pvc Class 9	0.00	39.50	100			Heat Shrunk
1	1	Opening	Screen - Wire Wound	39.05	41.05	100		1	Stainless Steel, Welded, A: 2.00mm
1	1	Casing	Pvc Class 9	41.05	42.00	100			Heat Shrunk

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
39.00	41.50	2.50	Unknown						

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	clay brown	Clay	
1.00	2.00	1.00	clay grey	Clay	
2.00	17.50	15.50	clay grey brown	Clay	
17.50	18.00	0.50	sand coarse brown	Sand	
18.00	20.00	2.00	sand coarse grey	Sand	
20.00	26.00	6.00	clay grey brown	Clay	
26.00	32.00	6.00	clay dirty silty sandy	Clay	
32.00	33.00	1.00	clay coarse grey sandy	Clay	
33.00	34.00	1.00	clay firm grey	Clay	
34.00	38.00	4.00	clay grey brown	Clay	
38.00	39.00	1.00	sand dirty clayed brown	Sand	
39.00	40.00	1.00	sand cleaner	Sand	
40.00	41.50	1.50	sand and gravel coarse clean grey brown	Sand	
41.50	45.00	3.50	clay mainly	Clay	

Remarks

***** End of GW500910 *****

NSW Office of Water
Work Summary

GW501823

Licence: 50BL196395 **Licence Status:** CONVERTED

Authorised Purpose(s): STOCK,DOMESTIC,IRRIGATION
Intended Purpose(s): IRRIGATION

Work Type: Bore
Work Status:
Construct.Method:
Owner Type:

Commenced Date:
Completion Date: 01/03/2003
Final Depth: 226.00 m
Drilled Depth: 234.00 m

Contractor Name: watson drilling
Driller: Jason Walter Campbell
Assistant Driller:

Property: N/A (CARROLL) CEMETERY ROAD DENILIQUIN 2710
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level:
Salinity:
Yield: 120.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	34 1009711
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot 34//1009711

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063521.0
Easting: 311906.0
Latitude: 35°33'14.9"S
Longitude: 144°55'29.3"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	71.00	300			Rotary Mud
1		Hole	Hole	71.00	226.00	225			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	71.00	300			Screwed and Glued
1	1	Casing	Pvc Class 12	71.00	188.00	225			Screwed and Glued
1	1	Opening	Screen	188.00	191.00	225		1	Stainless Steel 304, Other, A: 1.50mm
1	1	Opening	Screen	191.00	194.00	225		1	Stainless Steel 304, Other, A: 1.00mm

1	1	Casing	Pvc Class 12	194.00	210.00	225			Screwed and Glued
1	1	Opening	Screen	210.00	212.00	225		1	Stainless Steel 304, Other, A: 0.75mm
1	1	Opening	Screen	212.00	221.00	225		1	Stainless Steel 304, Other, A: 1.00mm
1	1	Opening	Screen	221.00	226.00	225		1	Stainless Steel 304, Other, A: 1.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	3.00	3.00	clay red to light brown	Clay	
3.00	5.00	2.00	clay sandy	Clay	
5.00	8.00	3.00	clay brown	Clay	
8.00	11.00	3.00	sand with some clay grey to light brown	Sand	
11.00	18.00	7.00	clay light grey and orange	Invalid Code	
18.00	21.00	3.00	sand orange	Sand	
21.00	24.00	3.00	clay light brown and grey	Invalid Code	
24.00	26.00	2.00	sand yellow	Sand	
26.00	34.00	8.00	clay grey and orange	Clay	
34.00	38.00	4.00	sand yellow and white	Sand	
38.00	41.00	3.00	clay brown	Clay	
41.00	44.00	3.00	sand multi-coloured (white, orange and grey)	Sand	
44.00	48.00	4.00	clay multi-coloured	Clay	
48.00	61.00	13.00	clay sandy multi-coloured	Clay	
61.00	78.00	17.00	clay grey	Clay	
78.00	80.00	2.00	sand fine grey	Sand	
80.00	84.00	4.00	clay with some sand, grey and orange	Clay	
84.00	87.00	3.00	sand light grey and white	Sand	
87.00	91.00	4.00	clay sandy multi-coloured	Clay	
91.00	95.00	4.00	clay with some grey sand	Clay	
95.00	96.00	1.00	sand grey	Sand Grains (Lithic)	
96.00	99.00	3.00	clay sandy grey	Clay	
99.00	101.00	2.00	clay grey	Clay	
101.00	105.00	4.00	sand and clay multi-coloured	Sand	
105.00	108.00	3.00	sand multi and rusty coloured	Sand	
108.00	112.00	4.00	clay sandy white and grey	Clay	
112.00	115.00	3.00	sand grey and white	Sand Grains (Lithic)	
115.00	120.00	5.00	clay with some sand grey and white	Clay	
120.00	121.00	1.00	clay yellow white	Clay	
121.00	146.00	25.00	sand white and grey coarse	Sand	
146.00	157.00	11.00	coal silty black and grey	Coal	
157.00	163.00	6.00	coal black	Coal	
163.00	171.00	8.00	coal and clay black and white	Coal	
171.00	175.00	4.00	sand grey	Invalid Code	
175.00	186.00	11.00	silt and coal grey	Silt	
186.00	195.00	9.00	sand grey medium	Sand Grains (Lithic)	
195.00	208.00	13.00	coal black	Coal	
208.00	226.00	18.00	sand grey medium to coarse	Sand Grains (Lithic)	
226.00	234.00	8.00	coal black	Coal	

Remarks

***** End of GW501823 *****

NSW Office of Water
Work Summary

GW503094

Licence: 50BL198818
Licence Status: CONVERTED

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: New Bore
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 09/03/2006
Final Depth: 42.50 m
Drilled Depth: 46.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller: Robert Green

Property: N/A (BECKER) LOT 2 LAWSON SYPHON ROAD DENILIQUIN 2710
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level: 7.000
Salinity:
Yield: 3.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	2//564836
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot 2//564836

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063898.0
Easting: 315596.0
Latitude: 35°33'05.2"S
Longitude: 144°57'56.0"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	46.00	125			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	32.00	125			Screwed and Glued
1	1	Opening	Screen - Wedge Wire	32.00	34.00	125		1	Stainless Steel 304, Other, A: 1.50mm
1	1	Casing	Pvc Class 12	34.00	41.00	125			Screwed and Glued
1	1	Opening	Screen - Wedge Wire	41.00	42.00	125		1	Stainless Steel 304, Other, A: 1.75mm

1	1	Casing	Pvc Class 12	42.00	42.50	125			Screwed and Glued

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	topsoil	Topsoil	
1.00	7.00	6.00	clay brown grey	Clay	
7.00	13.00	6.00	clay brown silty	Clay	
13.00	22.00	9.00	clay grey	Clay	
22.00	24.00	2.00	sand brown	Sand	
24.00	31.50	7.50	clay brown	Clay	
31.50	34.00	2.50	sand brown	Sand	
34.00	40.50	6.50	clay grey	Clay	
40.50	42.20	1.70	sand grey	Sand Grains (Lithic)	
42.20	46.00	3.80	clay grey	Clay	

Remarks

***** End of GW503094 *****

NSW Office of Water
Work Summary

GW503437

Licence: 50BL197249
Licence Status: CONVERTED
Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: New Bore
Construct.Method:
Owner Type: Private

Commenced Date:
Completion Date: 31/03/1999
Final Depth: 32.00 m
Drilled Depth: 32.00 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller:

Property: N/A (SUTTON) CAREW STREET DENILIQUIN 2710
GWMA: 016 - LOWER MURRAY (D/S COROWA)
GW Zone: 001 - MURRAY - CALIVIL RENMARK
Standing Water Level: 8.200
Salinity:
Yield: 4.572

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	221//845841
Licensed:	TOWNSEND	SOUTH DENILIQUIN	Whole Lot 221//845841

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064030.0
Easting: 316379.0
Latitude: 35°33'01.4"S
Longitude: 144°58'27.2"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	25.50	100			(Unknown)
1	1	Casing	Pvc Class 9	0.00	23.00	100			Heat Shrunk
1	1	Opening	Screen	23.00	24.50	100		1	Stainless Steel, Heat Shrunk, A: 1.50mm
1	1	Casing	Pvc Class 9	24.50	25.50	100			Heat Shrunk

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
23.00	24.50	1.50	Unknown						

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	8.50	8.50	firm grey clay	Clay	
8.50	11.00	2.50	medium coarse grey brown sand and gravel	Sand	
11.00	22.00	11.00	grey brown clay	Clay	
22.00	23.00	1.00	medium fine grey brown sand	Sand	
23.00	24.50	1.50	coarse brown sand	Sand	
24.50	29.00	4.50	clay grey brown	Clay	
29.00	30.00	1.00	silt	Silt	
30.00	31.00	1.00	clay sandy	Invalid Code	
31.00	32.00	1.00	clay firm grey brown	Clay	

Remarks

***** End of GW503437 *****

NSW Office of Water
Work Summary

GW503636

Licence: 50BL199323 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Local Govt

Commenced Date:
Completion Date: 11/03/2005
Final Depth: 12.50 m
Drilled Depth: 12.50 m

Contractor Name: watson drilling
Driller: Rex Langford Watson
Assistant Driller: Geoff Kelly

Property: RRLPB RESERVE CEMETERY ROAD DENILIQUIN 2710
Standing Water Level:
GWMA:
GW Zone:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	3//601862
Licensed:			

Region: 50 - Murray
CMA Map:
River Basin: - Unknown
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6062647.0
Easting: 312538.0
Latitude: 35°33'43.7"S
Longitude: 144°55'53.6"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	12.50	150			Rotary Mud
1		Annulus	Waterworn/Rounded	6.00	12.50				Graded
1	1	Casing	Pvc Class 12	0.00	6.50	50			Screwed and Glued
1	1	Opening	Screen - Wedge Wire	6.00	12.50	50		1	Stainless Steel 304, Other

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	clay dark grey	Clay Loam	
1.00	2.00	1.00	clay light grey	Clay Loam	
2.00	3.00	1.00	clay brown	Clay Loam	
3.00	11.00	8.00	sand fine medium coarse grey and brown	Sand Grains (Lithic)	
11.00	12.50	1.50	clay silty	Clay Loam	

Remarks

11/03/2005: Form A Remarks:
Dead animal pit.
Bentonite/grout seal installed.
Entered by H. Lester

***** End of GW503636 *****

NSW Office of Water
Work Summary

GW503702

Licence: 50BL200173 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Local Govt

Commenced Date:
Completion Date: 05/05/2008
Final Depth: 14.50 m
Drilled Depth: 14.50 m

Contractor Name: watson drilling
Driller: Christopher David Marshall
Assistant Driller: Lee Nicka

Property: DENILIQUIN AERODROME DENILIQUIN 2710
GWMA:
GW Zone:
Standing Water Level:
Salinity:
Yield: 0.250

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	29//1118139
Licensed:			

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063282.0
Easting: 313903.0
Latitude: 35°33'24.0"S
Longitude: 144°56'48.3"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	14.50	100			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	12.50	100			Seated, Screwed and Glued
1	1	Opening	Screen - Wedge Wire	12.50	13.50	100		1	Stainless Steel 304, Other
1	1	Casing	Pvc Class 12	13.50	14.50	100			Screwed and Glued, S: 13.50-15.00m

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

12.50	13.50	1.00	Unknown			0.25			4200.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	topsoil brown	Topsoil	
1.00	9.50	8.50	clay brown	Clay Loam	
9.50	13.50	4.00	sand brown	Sand Grains (Lithic)	
13.50	14.50	1.00	clay brown	Clay Loam	

Remarks

05/05/2008: Form A Remarks:
Entered by H. Lester

***** End of GW503702 *****

NSW Office of Water
Work Summary

GW503704

Licence: 50BL200173 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method: Rotary Mud
Owner Type: Local Govt

Commenced Date:
Completion Date: 08/05/2009
Final Depth: 11.00 m
Drilled Depth: 11.00 m

Contractor Name: watson drilling
Driller: Christopher David Marshall
Assistant Driller: Lee Nicka

Property: DENILIQUIN AERODROME DENILIQUIN 2710
GWMA:
GW Zone:
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	29//1118139
Licensed:			

Region: 50 - Murray
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063240.0
Easting: 313978.0
Latitude: 35°33'25.4"S
Longitude: 144°56'51.3"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	11.00	100			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	9.00	100			Seated, Screwed and Glued
1	1	Opening	Screen - Wedge Wire	9.00	10.00	100		1	Stainless Steel 304, Other
1	1	Casing	Pvc Class 12	10.00	11.00	100			Screwed and Glued, S: 10.00-11.00m

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

9.00	10.00	1.00	Unknown							

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	topsoil brown	Topsoil	
1.00	8.00	7.00	clay brown	Clay Loam	
8.00	11.00	3.00	sand brown	Sand Grains (Lithic)	

Remarks

08/05/2009: Form A Remarks:
Entered by H. Lester

***** End of GW503704 *****

NSW Office of Water
Work Summary

GW503895

Licence: 50WA506302 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Air
Owner Type: Private

Commenced Date:
Completion Date: 02/02/2007
Final Depth: 47.00 m
Drilled Depth: 47.00 m

Contractor Name: watson drilling
Driller: Jason Walter Campbell
Assistant Driller: Tom Cheeseman

Property: N/A (JANSEN) 21 COOINDA LANE DENILIQUIN 2710 NSW
GWMA:
GW Zone:
Standing Water Level: 12.000
Salinity:
Yield: 3.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	21//258108
Licensed:			

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6062822.0
Easting: 316542.0
Latitude: 35°33'40.7"S
Longitude: 144°58'32.7"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	44.00	125			Rotary Air
1		Annulus	Bentonite/Grout	19.00	22.00				
1		Annulus	Waterworn/Rounded	22.00	44.00				Graded
1	1	Casing	Pvc Class 12	0.00	28.50	125			Seated, Screwed and Glued, S: 43.00-44.00m
1	1	Opening	Screen - Wedge Wire	28.50	29.50	125		1	Stainless Steel 304, Other, A: 1.00mm
1	1	Casing	Pvc Class 12	29.50	41.00	125			Screwed and Glued
1	1	Opening	Screen - Wedge Wire	41.00	43.00	125		1	Stainless Steel 304, Other, A: 1.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
28.50	29.50	1.00	Unknown	12.00	20.00	3.00			800.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	8.50	8.50	Clay, Grey Brown	Clay	
8.50	20.00	11.50	Sand, Brown, Slightly clayed	Sand	
20.00	26.00	6.00	Clay, firm, grey brown	Clay	
26.00	28.50	2.50	Clay, grey, sandy	Clay	
28.50	29.80	1.30	Sand, Grey brown	Sand	
29.80	33.00	3.20	Clay, silty, grey brown	Clay	
33.00	38.00	5.00	Clay, grey brown	Clay	
38.00	41.00	3.00	Clay, grey brown with sand layers	Clay	
41.00	43.00	2.00	Sand, grey medium to coarse, clay layers	Sand	
43.00	47.00	4.00	Clay, grey brown	Clay	

Remarks

02/02/2007: Form A Remarks:
Entered by Clare Hillier

***** End of GW503895 *****

NSW Office of Water
Work Summary

GW503905

Licence: 50WA505696 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Air
Owner Type: Private

Commenced Date:
Completion Date: 26/04/2007
Final Depth: 28.00 m
Drilled Depth: 28.00 m

Contractor Name: watson drilling
Driller: Jason Walter Campbell
Assistant Driller: Tom Cheeseman

Property: N/A (SCOTT) 3 LUCAS COURT DENILIQUIN 2710 NSW
GWMA:
GW Zone:
Standing Water Level: 9.000
Salinity:
Yield: 2.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	11//258991
Licensed:			

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064766.0
Easting: 315871.0
Latitude: 35°32'37.2"S
Longitude: 144°58'07.7"E

GS Map: -
MGA Zone: 0
Coordinate Source: Map Interpretation

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	28.00	100			Rotary Air
1	1	Casing	Pvc Class 12	0.00	23.50	100			Seated on Bottom, Screwed and Glued, S: 27.00-28.00m
1	1	Opening	Screen - Wedge Wire	23.50	25.50	100		1	Stainless Steel 304, Other, A: 1.00mm
1	1	Opening	Screen - Wedge Wire	25.50	27.00	100		1	Stainless Steel 304, Other, A: 0.75mm

Water Bearing Zones

			WBZ Type						

From (m)	To (m)	Thickness (m)		S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
23.50	25.50	2.00	Unknown	9.00		2.00			200.00
25.50	27.00	1.50	Unknown						200.00

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.50	0.50	Topsoil	Topsoil	
0.50	8.00	7.50	Clay, grey brown	Clay	
8.00	11.00	3.00	Sand, dirty, brown	Sand	
11.00	19.00	8.00	Clay, firm, grey brown	Clay	
19.00	22.50	3.50	Clay, softer, grey brown	Clay	
22.50	25.00	2.50	Sand, medium, brown	Sand	
25.00	25.30	0.30	Clay, soft, grey	Clay	
25.30	27.00	1.70	Sand, fine, brown	Sand	
27.00	28.00	1.00	Clay, brown grey	Clay	

Remarks

26/04/2007: Form A Remarks:
Entered by Clare Hillier

***** End of GW503905 *****

NSW Office of Water
Work Summary

GW503947

Licence: 50WA506276 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Air
Owner Type: Private

Commenced Date:
Completion Date: 23/08/2010
Final Depth: 41.00 m
Drilled Depth: 41.00 m

Contractor Name: watson drilling
Driller: Steven Griffiths
Assistant Driller: Adrian Eiffert

Property: N/A (KERRY) 207 HENRY STREET DENILIQUIN 2710 NSW
Standing Water Level: 11.600
GWMA:
GW Zone:
Salinity:
Yield: 2.500

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	F//402718
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064595.0
Easting: 315845.0
Latitude: 35°32'42.7"S
Longitude: 144°58'06.5"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	35.50	100			Rotary Air
1	1	Casing	Pvc Class 12	0.00	32.00	100	84		Seated, Screwed and Glued, S: 34.50-36.00m
1	1	Opening	Screen - Wedge Wire	32.00	34.50	100		1	Stainless Steel 304, Other, A: 1.00mm
1	1	Casing	Pvc Class 12	34.50	35.50	100	84		Seated, Screwed and Glued

Water Bearing Zones

			WBZ Type						

From (m)	To (m)	Thickness (m)		S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
32.00	34.50	2.50	Unknown	11.60		2.50			300.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Topsoil, brown	Topsoil	
1.00	7.00	6.00	Clay, grey	Clay	
7.00	10.00	3.00	Clay, brown	Clay	
10.00	11.00	1.00	Sand, red & brown	Sand	
11.00	20.00	9.00	Clay, brown	Clay	
20.00	21.00	1.00	Sand, coarse, white	Sand	
21.00	30.50	9.50	Clay, brown	Clay	
30.50	34.50	4.00	Sand, coarse, red & brown gml	Sand	
34.50	35.50	1.00	Clay, grey	Clay	
35.50	38.00	2.50	Sand, white	Sand	
38.00	41.00	3.00	Clay, brown	Clay	

Remarks

23/08/2010: Form A Remarks:
Entered by Clare Hillier

***** End of GW503947 *****

NSW Office of Water
Work Summary

GW504029

Licence: 50WA506983 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 09/10/2009
Final Depth: 48.50 m
Drilled Depth: 109.00 m

Contractor Name: watson drilling
Driller: Christopher David Marshall
Assistant Driller: Tom Cheeseman

Property: N/A (CALAGAZ) 176-178 HETHERINGTON STREET DENILIQUIN 2710 NSW
Standing Water Level:
GWMA:
GW Zone:
Salinity:
Yield: 3.500

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	1603//1118618
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064088.0
Easting: 315641.0
Latitude: 35°32'59.0"S
Longitude: 144°57'58.0"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	48.50	125			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	45.00	125			Seated, Screwed and Glued, S: 48.00-48.50m
1	1	Opening	Screen - Wedge Wire	45.00	48.00	125		1	Stainless Steel 304, Other, A: 1.75mm
1	1	Casing	Pvc Class 12	48.00	48.50	125			Screwed and Glued

Water Bearing Zones

			WBZ Type						

From (m)	To (m)	Thickness (m)		S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
45.00	48.00	3.00	Unknown			3.50			1000.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Topsoil, grey	Topsoil	
1.00	4.00	3.00	Clay, brown grey	Clay	
4.00	16.00	12.00	Sand, grey medium	Sand	
16.00	17.00	1.00	Sandy clay, orange	Sandy Clay	
17.00	20.00	3.00	Clay, grey orange	Clay	
20.00	23.00	3.00	Sand, medium coarse grey	Sand	
23.00	26.00	3.00	Clay, dark grey orange	Clay	
26.00	30.00	4.00	Sand, coarse, grey orange	Sand	
30.00	35.00	5.00	Sand clay, coarse orange grey	Sand Grains (Lithic)	
35.00	39.00	4.00	Clay, grey orange	Clay	
39.00	43.00	4.00	Clay, orange	Clay	
43.00	55.00	12.00	Sand, laminated clays, orange	Sand	
55.00	60.00	5.00	Clay, sand orange	Clay	
60.00	61.00	1.00	Clay, orange	Clay	
61.00	64.00	3.00	Sand, grey , clay,orange	Sand	
64.00	70.00	6.00	Sand, medium grey	Sand	
70.00	73.00	3.00	Sand Clay	Sand Grains (Lithic)	
73.00	77.00	4.00	Clay, grey	Clay	
77.00	89.00	12.00	Sand Clay	Sand Grains (Lithic)	
89.00	91.00	2.00	Sand, grey fine ml	Sand	
91.00	97.00	6.00	Sand, grey fine to medium ml medium	Sand	
97.00	103.00	6.00	Sand, grey fine to medium ml medium	Sand	
103.00	107.00	4.00	Sand, grey medium to coarse ml medium	Sand	
107.00	109.00	2.00	Sand clay grey	Sand Grains (Lithic)	

Remarks

09/10/2009: Form A Remarks:
Entered by Clare Hillier

***** End of GW504029 *****

NSW Office of Water
Work Summary

GW504077

Licence: 50WA505517
Licence Status: CURRENT

Authorised Purpose(s): DOMESTIC,STOCK
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 25/01/2009
Final Depth: 20.50 m
Drilled Depth: 21.00 m

Contractor Name: watson drilling
Driller: David Wilton Watson
Assistant Driller: Jason Campbell

Property: N/A (WATSON) LOT 14 WILLOW DRIVE DENILIQUIN 2710
GWMA:
GW Zone:
Standing Water Level: 11.500
Salinity:
Yield: 2.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:			
Licensed:	TOWNS	TOWNS.81	14//811007

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063215.0
Easting: 316239.0
Latitude: 35°33'27.8"S
Longitude: 144°58'21.0"E

GS Map: -
MGA Zone: 0
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	20.50	125			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	20.50	125			S: 20.00-20.50m
1	1	Opening	Slots - Horizontal	18.50	20.00	125		1	Stainless Steel 304, Other

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

18.50	20.00	1.50	Unknown	11.50		2.00			

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	7.00	7.00	Clay, Brown and Grey	Clay	
7.00	11.00	4.00	Sand, Yellow Brown	Sand	
11.00	18.50	7.50	Clay, Brown and Grey	Clay	
18.50	20.00	1.50	Sand, dirty Grey, then Brown	Sand	
20.00	21.00	1.00	Clay, Grey	Clay	

Remarks

04/01/2011: Bore No. 2.

***** End of GW504077 *****

NSW Office of Water
Work Summary

GW504159

Licence: 50WA505709 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 27/11/2007
Final Depth: 29.00 m
Drilled Depth: 30.00 m

Contractor Name: watson drilling
Driller: Percy Andrew Garden
Assistant Driller: Adrian EIFFERT

Property: N/A (BROWN) 125-127 HETHERINGTON STREET DENILIQUIN 2710 NSW
Standing Water Level: 11.300
GWMA:
GW Zone:
Salinity:
Yield: 3.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	1692//1092510
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063886.0
Easting: 316069.0
Latitude: 35°33'05.9"S
Longitude: 144°58'14.8"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	29.00	125			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	25.50	125	112		Seated, Screwed and Glued, S: 28.00-29.00m
1	1	Opening	Screen - Round Wire	25.50	28.00	125		1	Stainless Steel 304, A: 1.00mm
1	1	Casing	Pvc Class 12	28.00	29.00	125	112		Seated, Screwed and Glued

Water Bearing Zones

			WBZ Type						

From (m)	To (m)	Thickness (m)		S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
25.50	28.00	2.50	Unknown	11.30		3.00			200.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Topsoil clay, dark	Topsoil	
1.00	2.00	1.00	Clay, dark brown	Clay	
2.00	3.00	1.00	Clay, brown grey	Clay	
3.00	6.00	3.00	Clay, grey	Clay	
6.00	7.00	1.00	Sand, brown clayed	Sand	
7.00	13.00	6.00	Sand, grey brown clayed NML	Sand	
13.00	18.00	5.00	Clay, grey brown	Clay	
18.00	20.00	2.00	Clay, grey brown soft	Clay	
20.00	24.00	4.00	Clay, grey firm	Clay	
24.00	25.00	1.00	Sand, brown clayed	Sand	
25.00	26.00	1.00	Sand, brown m/c MML	Sand	
26.00	28.00	2.00	Sand, grey brown m/c MML	Sand	
28.00	29.00	1.00	Sand, fine V clayed	Sand	
29.00	30.00	1.00	Clay, grey browns	Clay	

Remarks

27/11/2007: Form A Remarks:
Entered by Clare Hillier

***** End of GW504159 *****

NSW Office of Water
Work Summary

GW504171

Licence: 50WA505645 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method:
Owner Type: Private

Commenced Date:
Completion Date: 14/10/2006
Final Depth: 33.00 m
Drilled Depth: 35.00 m

Contractor Name: watson drilling
Driller: David Wilton Watson
Assistant Driller: Tom CHEESEMAN

Property: N/A (FORD) HETHERINGTON STREET DENILIQUIN 2710
GWMA:
GW Zone:
Standing Water Level: 11.600
Salinity:
Yield: 2.500

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	1691//1092510
Licensed:			

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6064044.0
Easting: 316187.0
Latitude: 35°33'00.8"S
Longitude: 144°58'19.6"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	33.00	125			Unknown
1	1	Casing	Pvc Class 12	0.00	29.50	125	109		Seated, Screwed and Glued, S: 32.00-33.00m
1	1	Opening	Screen - Wedge Wire	29.50	32.00	125		1	Stainless Steel 304, Other, A: 1.25mm
1	1	Casing	Pvc Class 12	32.00	33.00	125	109		Seated, Screwed and Glued

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)		Duration (hr)	Salinity (mg/L)

							Hole Depth (m)		
29.50	32.00	2.50	Unknown	11.60		2.50			300.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	4.00	4.00	Clay, brown	Clay	
4.00	7.00	3.00	Clay, brown grey	Clay	
7.00	8.00	1.00	Clay, sandy	Clay	
8.00	12.00	4.00	Sand, brown yellow	Sand	
12.00	19.00	7.00	Clay, brown grey	Clay	
19.00	20.50	1.50	Sand fine, grey brown	Sand Grains (Lithic)	
20.50	28.00	7.50	Clay, brown grey	Clay	
28.00	31.00	3.00	Sand, brown med	Sand	
31.00	33.00	2.00	Sand, dirty clayed brown	Sand	
33.00	35.00	2.00	Clay, brown grey	Clay	

Remarks

14/10/2006: Form A Remarks:
Entered by Clare Hillier

***** End of GW504171 *****

NSW Office of Water
Work Summary

GW504173

Licence: 50WA505780 **Licence Status:** CURRENT

Authorised Purpose (s): STOCK,DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Mud
Owner Type: Private

Commenced Date:
Completion Date: 16/10/2007
Final Depth: 32.00 m
Drilled Depth: 35.00 m

Contractor Name: watson drilling
Driller: Steven Griffiths
Assistant Driller: Tom CHEESEMAN

Property: N/A (HOCKING) WILLOW DRIVE DENILIQUIN 2710 NSW
GWMA:
GW Zone:
Standing Water Level: 9.000
Salinity:
Yield: 3.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	161//856530
Licensed:			

Region: 50 - Murray
River Basin: 409 - MURRAY RIVERINA
Area/District:
CMA Map: 7826-N
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6063535.0
Easting: 316413.0
Latitude: 35°33'17.5"S
Longitude: 144°58'28.2"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	32.00	125			Rotary Mud
1	1	Casing	Pvc Class 12	0.00	29.00	125	110		Seated on Bottom, Screwed and Glued, S: 31.00-32.00m
1	1	Opening	Screen - Round Wire	29.00	31.00	125		1	Stainless Steel 304, Screwed, A: 1.00mm
1	1	Casing	Pvc Class 12	31.00	32.00	125	110		Seated on Bottom, Screwed

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)		Duration (hr)	Salinity (mg/L)

							Hole Depth (m)		
29.00	31.00	2.00	Unknown	9.00		3.00			200.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Topsoil, brown	Topsoil	
1.00	4.00	3.00	Clay, brown grey	Clay	
4.00	10.00	6.00	Sand, fine to medium	Sand	
10.00	16.00	6.00	Clay, brown grey	Clay	
16.00	18.00	2.00	Sand, fine to medium ML medium	Sand	
18.00	27.50	9.50	Clay, brown grey	Clay	
27.50	30.00	2.50	Sand, some clay ML medium	Sand	
30.00	31.00	1.00	Sand, fine to medium ML medium	Sand	
31.00	35.00	4.00	Clay, brown grey	Clay	

Remarks

16/10/2007: Form A Remarks:
Entered by Clare Hillier

***** End of GW504173 *****

NSW Office of Water
Work Summary

GW504175

Licence: 50WA506069 **Licence Status:** CURRENT

Authorised Purpose (s): DOMESTIC
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Air
Owner Type: Private

Commenced Date:
Completion Date: 10/09/2007
Final Depth: 25.00 m
Drilled Depth: 26.00 m

Contractor Name: watson drilling
Driller: Steven Griffiths
Assistant Driller: Adrian EIFFERT

Property: N/A (HETHERINGTON) 252 HARFLEUR STREET DENILIQUIN 2710 NSW
Standing Water Level: 9.000
GWMA:
GW Zone:
Salinity:
Yield: 2.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	TOWNS	TOWNS.81	1//625711
Licensed:			

Region: 50 - Murray
CMA Map: 7826-N
River Basin: 409 - MURRAY RIVERINA
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6065029.0
Easting: 315697.0
Latitude: 35°32'28.5"S
Longitude: 144°58'01.0"E

GS Map: -
MGA Zone: 0
Coordinate Source: GIS - Geographic Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	25.00	125			Rotary Air
1	1	Casing	Pvc Class 12	0.00	22.00	125			Seated on Bottom, Screwed and Glued, S: 24.00-25.00m
1	1	Opening	Screen - Wedge Wire	22.00	24.00	125		1	Stainless Steel 304, Other, A: 1.00mm
1	1	Casing	Pvc Class 12	24.00	25.00	125			Seated on Bottom, Screwed and Glued

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
22.00	24.00	2.00	Unknown	9.00		2.00			200.00

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Topsoil, brown	Topsoil	
1.00	4.00	3.00	Clay, grey	Clay	
4.00	6.00	2.00	Clay, brown grey	Clay	
6.00	7.00	1.00	Clay, grey	Clay	
7.00	11.00	4.00	Clay, grey brown	Clay	
11.00	16.00	5.00	Clay, gritty brown	Clay	
16.00	22.00	6.00	Clay, grey	Clay	
22.00	24.00	2.00	Sand, brown	Sand	
24.00	26.00	2.00	gritty	Granite	

Remarks

10/09/2007: Form A Remarks:
Entered by Clare Hillier

***** End of GW504175 *****

Healthy Environment, Healthy Community, Healthy Business

Home Contaminated land Record of notices

Search results

Your search for:Suburb: DENILIQUIN

Matched 4 notices relating to 1 site.

Search Again
Refine Search

Suburb	Address	Site Name	Notices related to this site
DENILIQUIN	336 Victoria STREET	Shell Coles Express Service Station	4 former

Page 1 of 1

17 June 2016

Results of search of List of NSW contaminated sites notified to EPA

Search completed 17 June 2016

Suburb	Site Name	Address	Contamination Activity Type	Management Class
DENILIQUIN	Caltex Service Station	116-118 Hardinge STREET	Service Station	Under assessment
DENILIQUIN	Former Shell Depot	143-147 Napier STREET	Other Petroleum	Regulation under CLM Act not required
DENILIQUIN	Shell Coles Express Service Station	336 Victoria STREET	Service Station	Contamination formerly regulated under the CLM Act
DENILIQUIN	Deniliquin Gasworks	365 and 369 George and 380 Charlotte STREET	Gasworks	Under assessment
DENILIQUIN	Landmark Chemicals Storagey	99-101 Davidson STREET	Chemical Industry	Under assessment
DENILIQUIN	BP Depot (Reliance Petroleum)	Cormer Hardinge Street and Sloane STREET	Service Station	Under assessment

Healthy Environment, Healthy Community, Healthy Business

Search results

Your search for: **POEO Licences** with the following criteria

Suburb - DENILIQUIN

returned 11 results

Export to excel 1 of 1 Pages Search Again

Number	Name	Location	Type	Status	Issued date
20735	AUSTRALIAN FOOD & AGRICULTURE COMPANY LIMITED	Conargo Road, DENILIQUIN, NSW 2710	POEO licence	Issued	19 Jan 2016
11614	AUSTRALIAN MEAT GROUP PTY LTD	ABATTOIR ROAD, DENILIQUIN, NSW 2710	POEO licence	Issued	17 Apr 2002
12669	BUCKAROO PASTORAL PTY LTD	MONIMAIL ROAD, DENILIQUIN, NSW 2710	POEO licence	Surrendered	08 May 2007
12173	CHARLIE CARP LTD	LOT 2 SALEYARDS ROAD, DENILIQUIN, NSW 2710	POEO licence	Surrendered	15 Jul 2004
6188	DENILIQUIN COUNCIL	HAY ROAD, DENILIQUIN, NSW 2710	POEO licence	Issued	26 Sep 2000
1694	DENILIQUIN COUNCIL	CALIMO STREET, DENILIQUIN, NSW 2710	POEO licence	Issued	10 Nov 2000
11506	DENILIQUIN COUNCIL	Saleyards Road, DENILIQUIN, NSW 2710	POEO licence	Issued	12 Oct 2001
6532	GREATER SOUTHERN AREA HEALTH SERVICE	40 CHARLOTTE STREET, DENILIQUIN, NSW 2710	POEO licence	No longer in force	26 Jun 2000
5014	MURRAY IRRIGATION LIMITED	WAKOOL, COROWA, BERRIGAN, JERILDERIE, CONARGO, MURRAY & DENILIQUIN, DENILIQUIN, NSW 2710	POEO licence	Issued	28 Mar 2001
1833	RICEGROWERS LIMITED	SALE YARDS ROAD, DENILIQUIN, NSW 2710	POEO licence	Issued	10 Oct 2000
20067	V/Line Pty Ltd	Rail Reserve: Murray River to Tocumwal, TOCUMWAL, NSW 2714	POEO licence	Issued	24 Jan 2012

Connect Fee

We
Pub

21 June 2016

Appendix C – NSW EPA Letter Report

Our reference: DOC16/181231

Mr Greg Mullins AFSM
Commissioner
Fire and Rescue NSW
PO Box A249
Sydney South NSW 1232

Dear Commissioner

RE: Fire & Rescue NSW Firefighting Training Site – Deniliquin Airport

The Environment Protection Authority (EPA) is undertaking an investigation program to assess the historical legacy of perfluorinated compound (PFC) use across NSW. We are focussing on sites where these chemicals may have been used in large quantities in the past. This includes firefighting training facilities.

As a part of this program EPA officers Luke Formosa (Chemicals Regulation) and Christopher Burton (Albury Unit) undertook a site inspection at the Fire and Rescue NSW (FRNSW) firefighting training site at Deniliquin Airport on 11 February 2016 with FRNSW officers Inspector Stewart Alexander and Captain Martin Smith, and retired fire fighter Mr Bill Muirhead. I write to inform you of the EPA's findings of the inspection.

Inspection
The fire training site is about 1 hectare in area and is owned by Deniliquin Council. We understand that aqueous film-forming foam (AFFF) and other firefighting foams potentially containing PFCs were used for training firefighters on the hydrocarbon fire training pad and also at a pit area used for evaluating different firefighting foams. Due to the nature of the training conducted at the site there is the potential for significant amounts of PFCs to have been released to the environment.

One surface water sample was obtained from a stormwater drainage channel on site and five samples of soil were obtained from foam usage locations on the premises during the inspection. The samples were submitted for laboratory analysis for certain PFCs (see results in table below). The perfluorooctane sulfonate (PFOS) concentration detected in the drainage channel surface water sample was **3.7 µg/L**. The highest concentration of PFOS in soil was **1.2 mg/kg** with a concentration of PFOS in leachate of **30.3 µg/L**.

Guidelines
There are presently no guidelines established in Australia for assessing PFC contamination in the environment. Several national working groups are currently working towards finalisation of guidelines in mid 2016. In the interim the NSW EPA has commissioned Environmental Risk Sciences Pty Ltd to prepare a decision tree and screening criteria based on draft drinking water guidelines and draft guidelines for the protection of freshwater ecosystems. The screening criteria document has been provided to you under separate cover.

PO Box A290 Sydney South NSW 1232
59-61 Goulburn St Sydney NSW 2000
Tel: (02) 9995 5000 Fax: (02) 9995 5999
TTY (02) 9211 4723
ABN 43 692 285 758
www.epa.nsw.gov.au

Based on current scientific advice and in accordance with the decision tree we have adopted the screening guideline of **0.1 µg/L** for PFOS in surface waters or groundwater leaving a site as the threshold above which priority investigation is warranted. Concentrations of PFOS above **10 µg/L** in surface waters or groundwater at a site indicate elevated contamination that requires priority investigation.

Additionally, we have not adopted a screening guideline for soil samples, due to the way that PFCs behave in soils. Instead, we recommend subjecting soil samples to the Australian Standard Leaching Procedure (ALSP) to assess the degree to which PFCs will leach from the soils into nearby surface water or groundwater. ASLP analysis of soil samples that show concentrations of PFOS above **100 µg/L** from soils at a site indicate elevated contamination that requires priority investigation.

Results

Fire & Rescue NSW Training Site - Deniliquin Airport – 11.02.16								
Sample ID	PFOA		PFOS		6:2 FTS (C2H4-perfluorooctane sulfonate)		8:2 FTS (C2H4-perfluorodecane sulfonate)	
	Soil mg/kg	Leachate µg/L	Soil mg/kg	Leachate µg/L	Soil mg/kg	Leachate µg/L	Soil mg/kg	Leachate µg/L
Composite soil sample southern side behind hydrocarbon fire training are	0.012	0.32	0.94	**12.5**	0.0025	0.3	0.0066	<0.1
Composite soil sample collection western side adjacent hydrocarbon fire training site	<0.002	0.16	1.2	**30.3**	0.0088	0.4	0.035	0.3
Composite soil sample near recent firefighting foam demonstration area	<0.002	<0.01	0.0075	0.18	<0.002	<0.1	0.0031	<0.1
Composite soil sample near fence which borders with Deniliquin airport	<0.002	<0.01	0.04	0.56	<0.002	<0.1	<0.002	<0.1
Composite soil sample east of military training area	0.0030	0.08	0.26	**8.12**	0.0065	0.5	0.062	0.7
Run off water sample obtained from onsite drainage channel	0.18 µg/L		**3.7 µg/L**		0.011 µg/L		<0.05 µg/L	

Recommendations

On the basis of the detection of PFOS in the water sample obtained from the onsite drainage channel at the training site at a concentration of 3.7 µg/L, and a concentration of PFOS in leachate of 30.3 µg/L, we recommend that, although not a priority site, further investigation should be undertaken into the nature, extent, fate and transport of PFCs on the site and off-site. This investigation should include consideration of the following matters:

a. Lateral and vertical soil sampling with ASLP analysis for PFCs and hydrocarbons with the objective of delineating the extent of soil contamination and assessing whether soil contamination may present an ongoing source of contamination to waters.

b. Installation and sampling of groundwater wells or identification and sampling of existing bores with the objective of delineating the extent of PFC contamination in the unconfined aquifer.
c. Identification of any sensitive receptors and preferential pathways for exposure to the contamination.
d. Construction of a written and visual conceptual site model.
e. Recommendations for any further investigation if warranted.

The above works will require notification of Deniliquin Council. We ask that you work with Council in planning an appropriate scope for the next phase of the investigation and would be pleased to assist with initiation of these discussions.

Thank you for your proactive and open approach to addressing this legacy contamination matter. The EPA will continue to work closely with FRNSW and other stakeholders to ensure an appropriate, scientific and risk-based resolution.

If you have any queries relating to this matter please contact me on 02 9995 5995 or Chris Burton, Regional Operations Officer, Albury Unit 02 6022 0609.

Yours sincerely

13 April 2016

ANDREW MITCHELL
Manager Hazardous Incidents
Environment Protection Authority

Copy: Ms Julie Rogers, Manager of Environmental Services, Deniliquin Shire Council

Appendix D – Historical Aerials Photograph Log

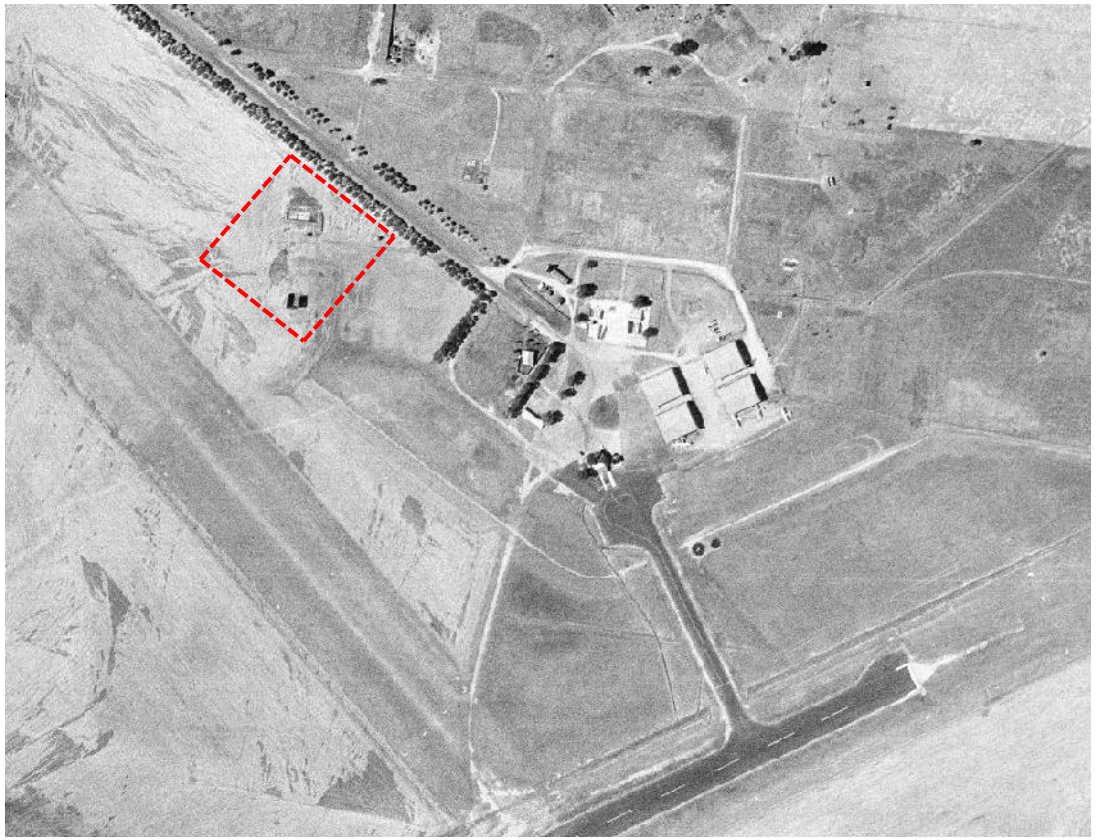
1961

Approximate location of investigation area

North

1976

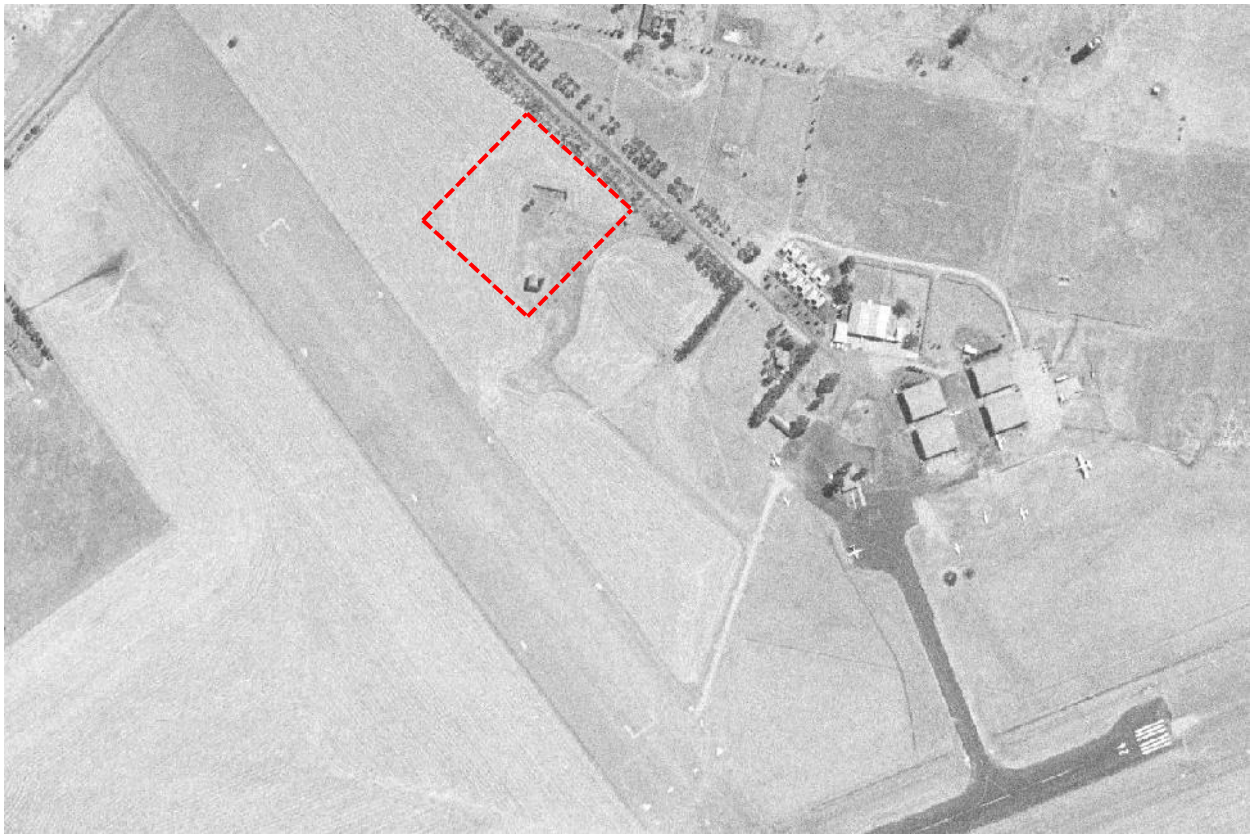
Approximate location of investigation area



North

1991

Approximate location of investigation area



North

2003

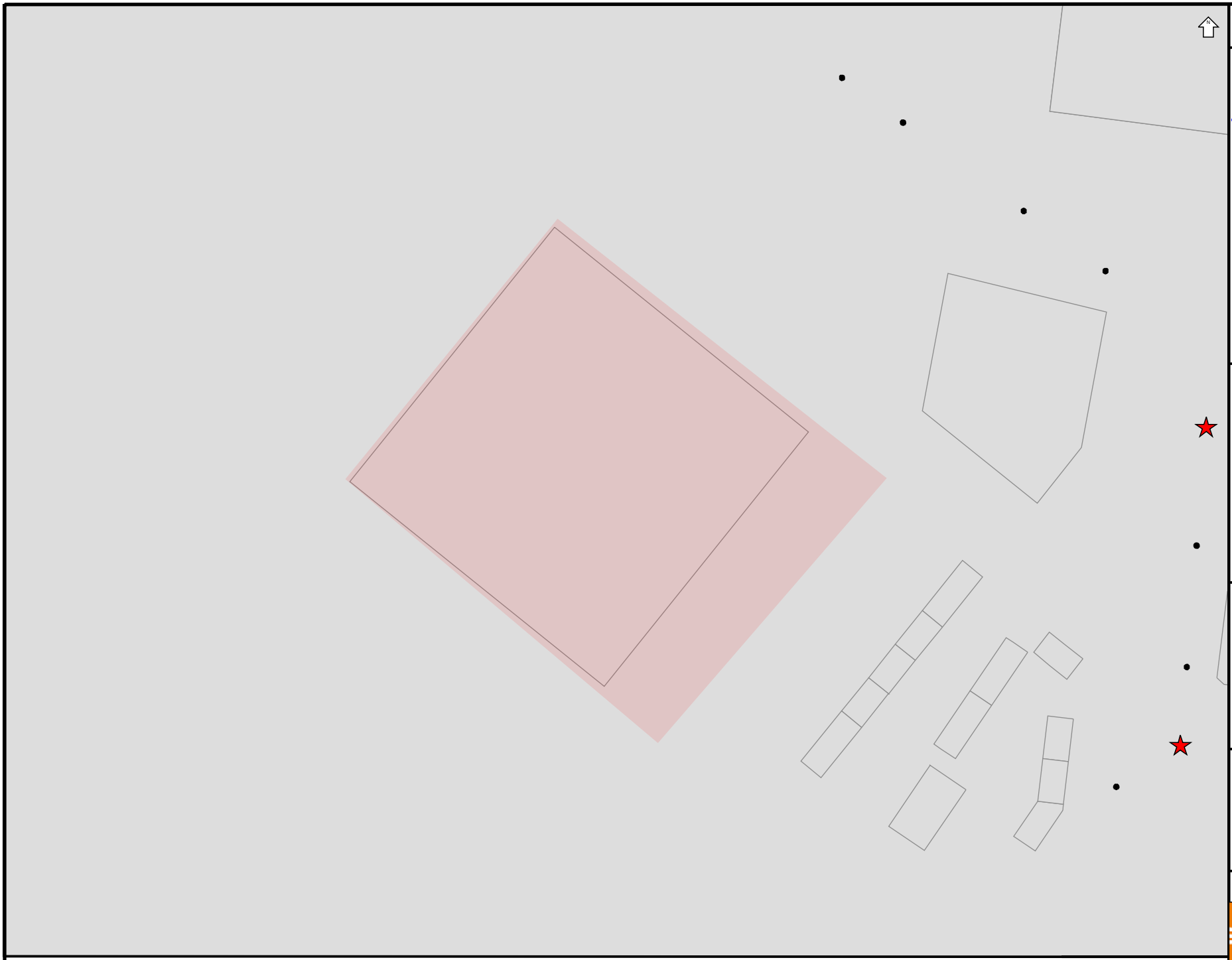
Approximate location of investigation area

North

2016 Approximate location of investigation area

North

Appendix E – Dial Before You Dig Services Information



Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- LV Underground Cable
- HV Underground Cable
- Underground Pipe
- Underground Earth or Wires
- Ground Substation
- Pole
- Cubicle
- Pit
- Area of Interest

Critical Assets
Contact Essential Energy on 13 23 91

- Zone Substation
- Underground Cable
- Underground Fibre

Proposed Works

- Area of proposed works

Proposed assets are shown as orange symbols

THE INFORMATION ON THIS MAP MAY NOT BE ACCURATE.
If details are incorrect, please notify Essential Energy on 13 23 91 (or fax 1800 354 636)

ISSUE DATE: 20/06/2016

You must resubmit your request if you have not started work within 4 weeks of the 'Issue Date' above

A4 | SCALE: 1:2340

Job Number: 10848620 Sequence number: 53666423 Job location: Ricemill Road, Deniliquin Map Centre: 144° 56' 44.9", -35° 33' 9.0"

essential energy

GHD

133 Castlereagh St Sydney NSW 2000

-

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Final	C. El-Khouri J. Ewing	Stefan Charteris	On file	Stefan Charteris	On file	16/08/2016

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