REVIEW OF ENVIRONMENTAL FACTORS

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PROPOSED PROVISION
OF
EMERGENCY OVERFLOW STORAGE FACILITIES
AT SEWAGE PUMPING STATIONS

VARIOUS LOCATIONS
AT
BERRY, CULBURRA, HUSKISSON,
ST GEORGES BASIN and SUSSEX INLET

Prepared for

Shoalhaven City Council

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Prepared by:

COWMAN STODDART PTY LTD

Town Planning, Agricultural & Environmental Consultants

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Ref. 15/30

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Document Status

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Modifications to the REF following client comment include:

- Minor modification to Sectio0n 3.0 dealing with the project description

1.0 INTRODUCTION

1.1 BACKGROUND

Shoalhaven City Council, through Shoalhaven Water, is the responsible water and sewer authority for the Shoalhaven City Local Government Area. As part of the responsibilities, Shoalhaven Water manages the collection, treatment and distribution of water, along with the collection, treatment and disposal of wastewater back into the environment.

As part of the infrastructure utilised in undertaking these functions, Shoalhaven City Council maintain and operate a series of sewage pumping stations in order to transfer sewerage waste to the treatment plants. At times, failures in the systems occur due to circumstances such as mechanical failure, power outages and the like. Failures at the sewage pump station sites often lead to accidental discharge of untreated sewage waste into the environment.

In order to reduce the risks associated with such accidental discharges, Shoalhaven City Council are planning the provision of emergency storage capacity adjacent to sewage pumping stations in order to provide for the emergency storage of untreated sewage. Shoalhaven Water are currently considering the provision of emergency overflow storage capacity at eleven (11) of its sewer pump stations in various locations within townships of Berry, Culburra, Huskisson, St Georges Basin and Sussex Inlet.

This Review of Environmental Factors (REF) addresses the environmental impacts associated with these activities.

1.2 DECISION MAKING PROCESS

The proposed works are being considered under Part 5 of the Environmental Planning & Assessment Act, being activities which are permissible, do not require development consent, and are to be carried out by a public authority.

The activity is to be carried out by Shoalhaven City Council, where Shoalhaven Local Environmental Plan 2014 is the relevant planning instrument, and the provisions of SEPP Infrastructure 2007 apply. Clause 106 of SEPP Infrastructure enables a public authority to undertake works associated with sewage reticulation without consent on any land, as is the case in this instance.

On this basis a Review of Environmental Factors (REF) for the proposed activity in accordance with Section 111 of the Environmental Planning and Assessment Act and Clause 228 of the Environmental Planning & Assessment Regulations 2000 has been prepared to determine whether the scope of the proposal works are likely to create a

significant impact on the environment. If it is found that the proposed works would create a significant impact an Environmental Impact Statement and/or Species Impact Statement would need to be prepared before the activity could proceed.

2.0 THE SITES AND SURROUNDS

The proposals affect eleven (11) separate sewage pumping stations, located in the townships of Berry, Culburra, Huskisson, St Georges Basin and Sussex Inlet. The following provides relevant details regarding the various sites.

2.1 BERRY

The proposal seeks to provide emergency storage capacity at one sewage pump station in Berry, being SPS 5. **Figure 1** below identifies the location of Berry SPS 5.

Figure 1: Site Locality of Berry SPS 5.

2.1.1 Berry SPS 5

The siting of Berry SPS 5 is to the south of Victoria Street immediately opposite Mark Radium Park which is currently the siting of development associated with the realignment of the Princes Highway, as shown in **Figure 1** above. **Figure 2** is an aerial photo of Berry SPS 5.

Berry SPS 5 is surrounded by the property containing The Arbour Retirement Complex and is sited adjacent the vehicular accessway servicing that development. The subject site features an in-ground pump station, above ground electrical board and a vent pipe, all sited on a hard stand area. **Plate 1** below shows the existing SPS.

The site is in the vicinity of:

- The Arbour Retirement Complex to the south;
- Mark Radium Park to the north;
- The Princes Highway to the west; and
- Residential dwellings within Berry to the north-east.

Figure 2: Aerial photo of Berry SPS 5.

Plate 1: Berry SPS 5.

2.2 CULBURRA

Shoalhaven Council seek to provide emergency storage facilities at 4 sewage pump stations in the township of Culburra. **Figure 3** below identifies the location of the various pump stations.

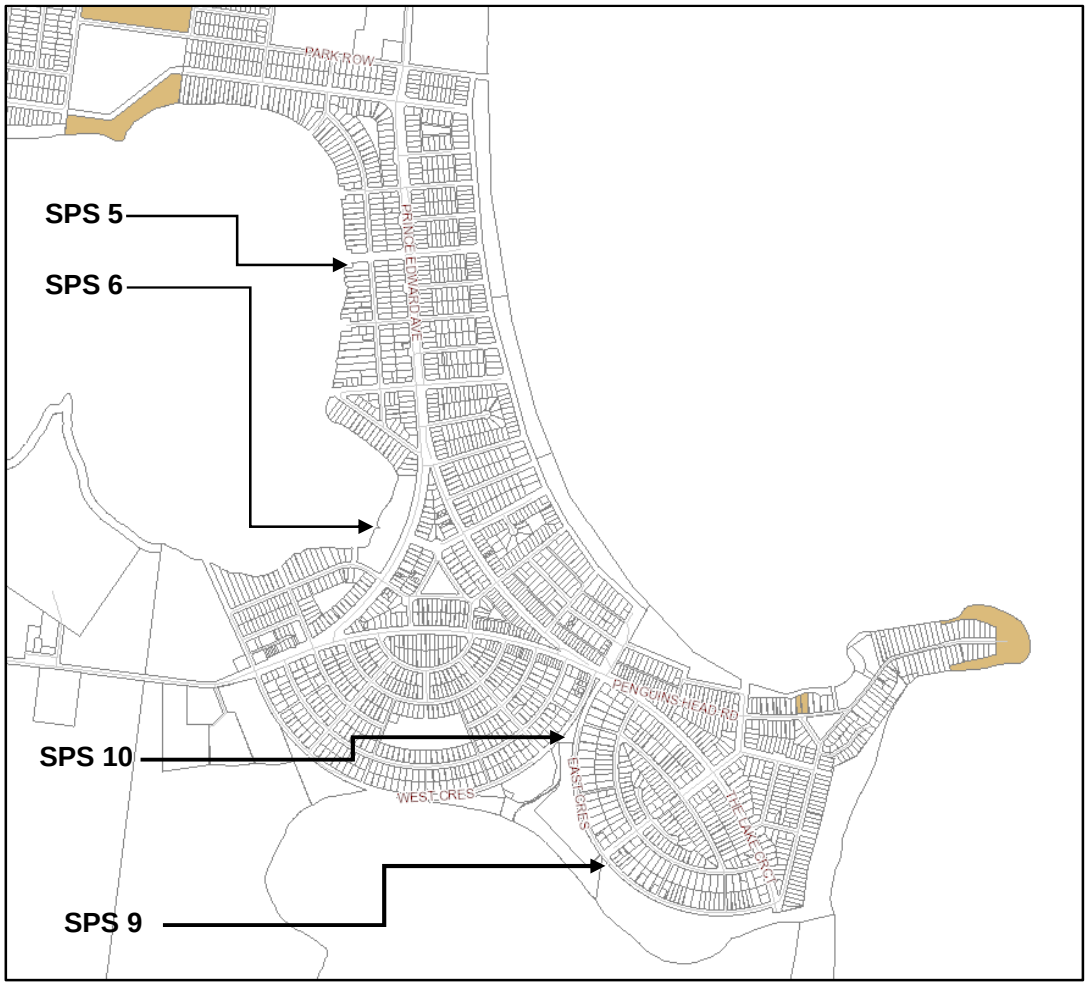


Figure 3: Site locality – Culburra.

2.2.1 Culburra – SPS 5

The siting of Culburra SPS 5 is located within an unconstructed section of The Strand road reserve between properties known as Nos 51 and 51 Addison Road, as shown in **Figure 3** above, and aerial photo being **Figure 4** below.

Culburra SPS 5 features an in-ground pump station, above ground electrical board and a vent shaft, all sited on a hard stand area. **Plate 2** below shows the existing SPS.

The site of Culburra SPS 5 is in the vicinity of:

- Residential development to the south and east;

- The waters of Curley Bay to the west; and
- Vegetated lands to the north, and then residential development fronting Addison Road.

Figure 4: Aerial photo of Culburra SPS 5.

Plate 2: Culburra SPS 5.

2.2.2 Culburra – SPS 6

The siting of Culburra SPS 6 is located to the west of and opposite No. 156 Prince Edward Avenue, as shown in **Figure 3** above, and **Figure 5** below, being an aerial photo of the locality.

Culburra SPS 6 features an in-ground pump station, above ground electrical board and a vent pipe, all sited on a hard stand area. **Plate 3** below shows the existing SPS. Land in the vicinity of the site is:

- Undeveloped to the north and south;
- To the east is single residential dwellings; and
- To the west, land is undeveloped containing vegetated lands, and then the waters of Curleys Bay.

Figure 5: Aerial photo of Culburra SPS 6.

Plate 3: Culburra SPS 6.

2.2.3 Culburra – SPS 9

The siting of Culburra SPS 6 is opposite No 42 East Crescent, Culburra Beach, as shown in **Figure 3** above, and the aerial photo of the locality forming **Figure 6** below. Access to the SPS is via East Crescent which is provided with a sealed surface in this location.

Culburra SPS 9 features an in-ground pump station, above ground electrical board and a vent pipe, all sited on a hard stand area. **Plate 4** below shows the existing SPS.

Land in the vicinity of the site is:

- Undeveloped west of East Crescent; and
- Developed with single residential dwellings to the east.

Lake Wollumboola is sited to the west of Culburra SPS 9, being separated by native vegetation.

Figure 6: Aerial photo of Culburra SPS 9.

Plate 4: Culburra SPS 9.

2.2.4 Culburra – SPS 10

The siting of Culburra SPS 10 is located to the west of the East Crescent Road reserve opposite No. 14 East Crescent, as shown in **Figure 3** above, and the aerial photo of the locality forming **Figure 7** below.

Culburra SPS 10 features an in-ground pump station, above ground electrical board and a vent pipe, all sited on a hard stand area. **Plate 5** below shows the existing SPS. Access to Culburra SPS 10 is via an all-weather gravel access in East Crescent.

In the vicinity of Culburra SPS 10 is generally undeveloped land, with the exception of that to the west, which contains single residential dwellings, separated by naturally vegetated lands.

Figure 7: Aerial photo of Culburra SPS 10.

Plate 5: Culburra SPS 10.

2.3 HUSKISSON AND VINCENTIA

Shoalhaven Council are seeking to provide emergency storage facilities at one location in the Huskisson township, this being SPS 3. **Figure 8** below identifies the location of Huskisson SPS 3.

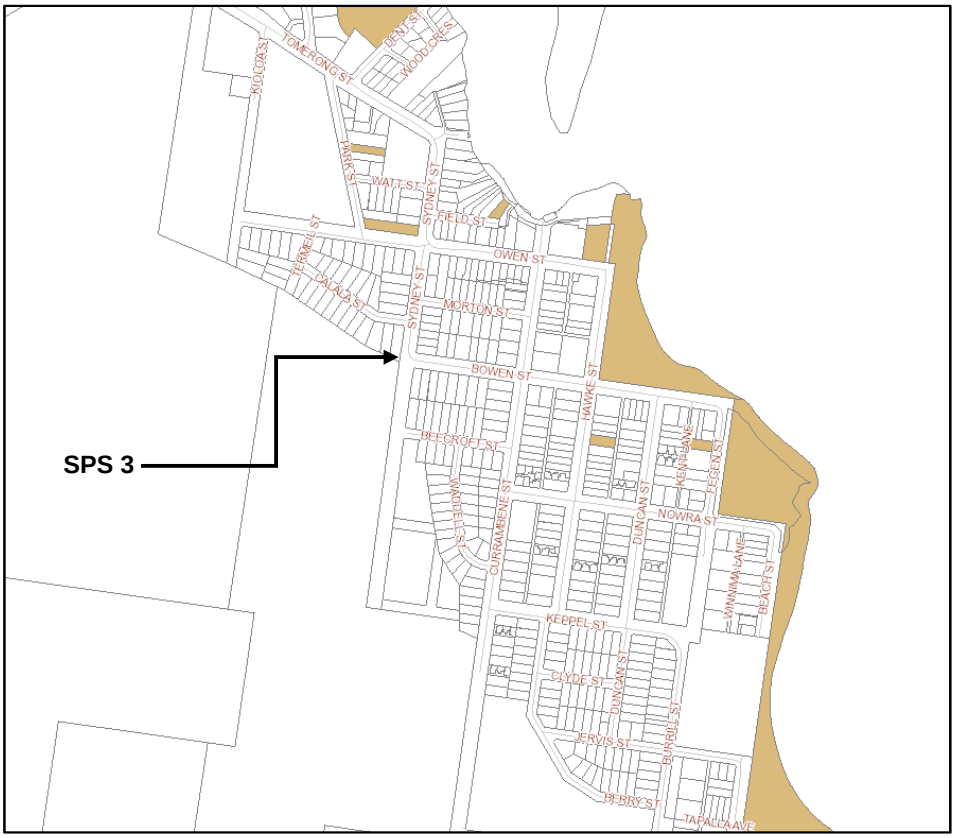


Figure 8: Site Locality Huskisson.

2.3.1 Huskisson and Vincentia – SPS 3

The siting of Huskisson Vincentia SPS 3 is to the west of Sydney Street, sited generally at the intersection of Sydney Street and Bowen Street, as shown in **Figure 8** above, and the aerial photo of the locality forming **Figure 9** below.

Huskisson Vincentia SPS 3 features an in-ground pump station and an above ground electrical board with access via a gravel track from Sydney Street. **Plate 6** below shows the existing SPS.

The area surrounding Huskisson Vincentia SPS 3 contains single residential dwellings to the north and east. Land to the south and west is undeveloped vegetated lands.

Figure 9: Aerial photo of Huskisson Vincentia SPS 3.

Plate 6: Huskisson Vincentia SPS 3.

2.4 ST GEORGES BASIN

Shoalhaven Council seek to provide emergency storage facilities at 3 sewage pump stations in the township of St Georges Basin. **Figure 10** below identifies the location of the various pump stations.

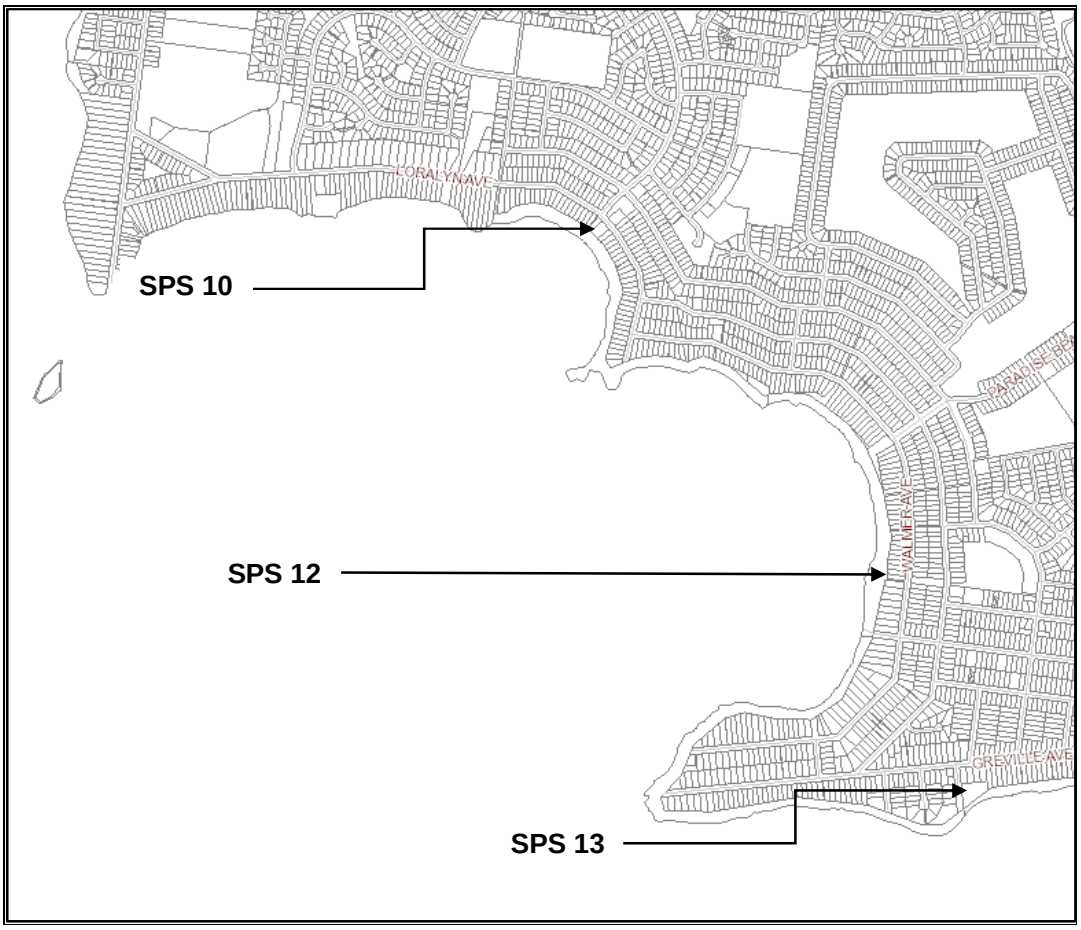


Figure 10: Site locality – St Georges Basin.

2.4.1 St Georges Basin – SPS 10

The siting of St Georges Basin SPS 10 is located to north of No.184 Loralyn Avenue as shown in **Figure 10** above, and the aerial photo being **Figure 11** below.

St Georges Basin SPS 10 features an in-ground pump station, valve pit and overflow structure, all sited on a hard stand area. **Plate7** below shows the existing SPS.

The site of St Georges Basin SPS 10 is in the vicinity of:

- Residential development to the south and north;
- Vegetated land and the waters of St Georges Basin to the west; and

- Vegetated land and residential development to the east of the site fronting Loralyn Avenue.

Figure 11: Aerial photo of St Georges Basin SPS 10.

Plate 7: St Georges Basin SPS 10.

2.4.2 St Georges Basin – SPS 12

The siting of St Georges Basin SPS 12 is located to the north of No.157 Walmer Avenue, as shown in **Figure 10** above, and aerial photo being **Figure 12** below.

St Georges Basin SPS 12 features an in-ground pump station and valve pit sited on a hard stand area. **Plate 8** below shows the existing SPS.

Figure 12: Aerial photo of St Georges Basin SPS 12.

Plate 8: St Georges Basin SPS 12.

The site of St Georges Basin SPS 12 is in the vicinity of:

- Residential development to the north and south;
- Vegetated land and the waters of St Georges Basin to the west; and
- Vegetated land and residential development to the east of the site fronting Walmer Avenue.

2.4.3 St Georges Basin – SPS 13

The siting of St Georges Basin SPS 13 is located to the south of No.104 Greville Avenue and off Irene Street, as shown in **Figure 10** above, and aerial photo being **Figure 14** below.

St Georges Basin SPS 13 features an in-ground pump station, above ground electrical board and a valve pit, all sited on a hard stand area. **Plate 9** below shows the existing SPS.

The site of St Georges Basin SPS 13 is in the vicinity of:

- Residential development to the north;
- Vegetated land and the waters of St Georges Basin to the south; and
- Vegetated land and residential development fronting Irene Street to the west; and
- Vegetated foreshore land to the east.

Figure 13: Aerial photo of St Georges Basin SPS 13.

Plate 9: St Georges Basin SPS 13.

2.5 SUSSEX INLET

Shoalhaven Council seek to provide emergency storage facilities at two sewage pump stations in the township of Culburra. **Figures 14** and **15** below identify the location of the two pump stations.

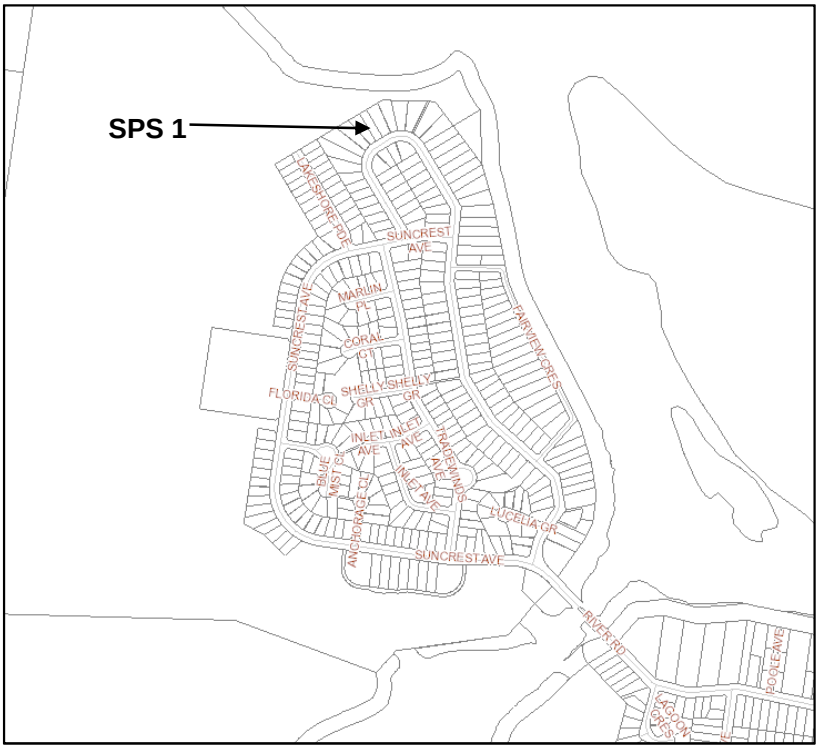


Figure 14: Site locality – Sussex Inlet (SPS 1).

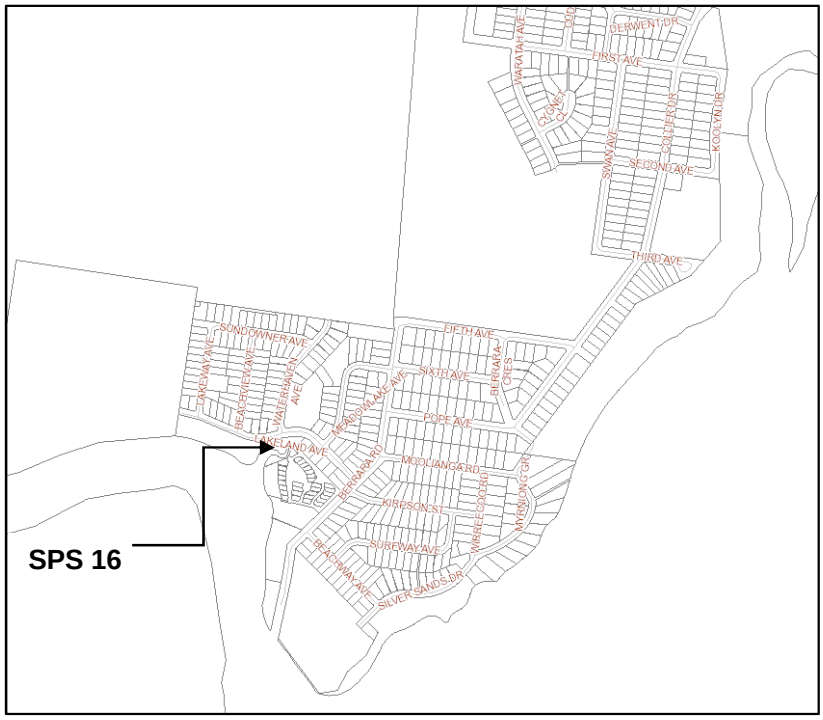


Figure 15: Site locality – Sussex Inlet (SPS 16).

2.5.1 Sussex Inlet – SPS 1

The siting of Sussex Inlet SPS 1 is located between No.34 and No.36 River Road, Sussex Inlet, as shown in **Figure 14** above, and aerial photo being **Figure 16** below.

Sussex Inlet SPS 1 features an in-ground pump station, above ground electrical board, vent shaft and valve pit, all sited on a hard stand area. **Plate 10** below shows the existing SPS.

The site of Sussex Inlet SPS 1 is in the vicinity of:

- Residential development to the east and west;
- Vegetated land and the waters of St Georges Basin to the north; and
- Residential development to the south fronting River Road.

Figure 16: Aerial photo of Sussex Inlet SPS 1.

Plate 10: Sussex Inlet SPS 1.

2.5.2 Sussex Inlet – SPS 16

The siting of Sussex Inlet SPS 16 is located within a foreshore reserve south of Lakeland Avenue, Berrara, as shown in **Figure 15** above, and aerial photo being **Figure 17** below.

Sussex Inlet SPS 16 features an in-ground pump station, above ground electrical board, valve pit, chlorine tank, vent pipe and a vent shaft, all sited on a hard stand area. **Plate 11** below shows the existing SPS.

The site of Sussex Inlet SPS 16 is in the vicinity of:

- Residential development and vegetated reserve land fronting Lakeland Avenue to the north;
- The waters of Berrara Creek to the south west; and
- Vegetated lands and a tourist park to the south and south east.

Figure 17: Aerial photo of Sussex Inlet SPS 16.

Plate 11: Sussex Inlet SPS 16.

3.0 PROPOSED ACTIVITY

3.1 PROPOSAL OUTLINE

Shoalhaven City Council proposes to provide emergency overflow storage facilities connected to a number of sewage pumping stations in either in-ground storage tanks, or underground pipes. The intention is to provide capacity of up to 8 hours of gravity flow in the event of pump station failure to avoid untreated effluent waste being discharged into the environment. The rationale of such works is to provide sufficient emergency storage capacity in order that the failures can be rectified before such discharges occur. The works are intended to have beneficial long term impacts by minimising the occurrence of overflow discharges from the sewerage system.

Plans of the proposed work are included in **Annexure 1**.

The following sections of the REF detail the proposed works affecting each of the sites.

3.1.1 Berry SPS 5

The proposal for Berry SPS 5 is to install an in-ground concrete tank having a diameter of 9.05 m, and a depth of approximately 2.3 m, with the finished level of the tank sitting approximate to the current ground level. The system will be vented via the existing vent pipe provided in conjunction with the established sewage pump station. The works are proposed to be connected to the existing SPS via a 3 m length of sewer pipe.

The tank is proposed to be connected to the existing overflow pipe and head wall.

The works are proposed to the west of the existing pump station in the north-western corner of the allotment, and will require the removal of a small number of trees and shrubs which appear to have been planted in conjunction with the establishment of the sewage pump station.

No additional vent shaft is proposed.

3.1.2 Culburra – SPS 5

The proposal for Culburra SPS 5 is to install an in-ground concrete tank having a diameter of 7.8 m, and a depth of approximately 2.89 m, with the finished level of the tank sitting approximate to the current ground level. The tank will be connected to the existing SPS via a sewer pipe with a 300 mm diameter and having a length of approximately 6 m.

The works are proposed to the east of the existing pump station and will not require the removal of any significant vegetation, with this being restricted to grass lawn.

No additional vent shaft is proposed.

3.1.3 Culburra – SPS 6

The proposal for Culburra SPS 6 is to install an in-ground concrete tank having a diameter of 9.05 m, and a depth of approximately 3.4 m, with the finished level of the tank sitting approximate to the current ground level. The tank will be connected to the existing SPS via a sewer pipe having a length of approximately 4.5 m and a diameter of 225 mm.

The works are proposed to the south-east of the existing pump station adjacent the existing internal access road that services the sewage pumping station in the north-western corner of the allotment, and will require the removal of a small number of trees.

No additional vent shaft is proposed.

3.1.4 Culburra – SPS 9

The proposal for Culburra SPS 9 is to install an in-ground concrete tank having a diameter of 4.8 m, and a depth of approximately 4.0 m, with the finished level of the tank sitting approximate to the current ground level. The tank will connected to the SPS via a sewer pipe having a length of approximately 2.7 m.

The works are proposed to the north of the existing pump station on the raised area provided in conjunction with the sewerage pumping station. The proposal will result in the removal of a very small number of trees to enable its siting.

No additional vent shaft is proposed.

3.1.5 Culburra – SPS 10

The proposal for Culburra SPS 10 is to install an in-ground concrete tank having a diameter of 7.8 m, and a depth of approximately 4.4 m, with the finished level of the tank sitting approximate to the current ground level. Connection to the SPS via a sewer pipe with a length of approximately 6.9 m and a diameter of 300 mm.

The works are proposed to the east of the existing pump station adjacent the constructed access serving the established sewerage pumping station. The proposal will result in the removal of a very small number of trees to enable its siting.

No additional vent pipe is proposed.

3.1.6 Huskisson and Vincentia – SPS 3

The proposal for Huskisson and Vincentia SPS 3 is to install a 1.5 m diameter storage pipe having a length of approximately 14.6 m at a depth of approximately 3.9 m, with a

soil covering of approximately 2.3 m, along with a 1.05 m manhole. A vent shaft is proposed at the northern end of the storage pipe.

The storage pipe is to be located to the east of the sewage pumping station, between it and Sydney Street.

The proposal will not result in the removal of vegetation as the works are sited on lands that have already been disturbed.

3.1.7 St Georges Basin – SPS 10

The proposal for St Georges Basin SPS 10 is to install an in-ground concrete tank having a diameter of 6.0 m, and a depth of approximately 3.44 m, with the finished level of the tank sitting above the surrounding by approximately 400 mm. The tank will be connected to the SPS via: a sewer pipe of approximately 18.5 m, a new manhole, and another new section of sewer pipe of approximately 11.9 m that will connect to an existing manhole adjacent to the SPS.

The works are proposed to the north east of the existing pump station. The proposal will result in the removal of some vegetation to enable the siting of pipes and removal of a very small number of trees to enable siting of the in-ground concrete tank.

No additional vent shaft is proposed.

3.1.8 St Georges Basin – SPS 12

The proposal for St Georges Basin SPS 12 is to install an in-ground concrete tank having a diameter of 10.0 m, and a depth of approximately 2.85 m, with the finished level of the tank sitting approximate to the finished ground level. The tank will be connected to the SPS via a sewer pipe of approximately 10.9 m.

The works are proposed to the east of the existing pump station. The proposal will result in the removal of some vegetation to enable the siting of the pipes and the in-ground concrete tank.

No additional vent shaft is proposed.

3.1.9 St Georges Basin – SPS 13

The proposal for St Georges Basin SPS 13 is to install a 1.8 m diameter storage pipe having a length of approximately 9.8 m and with two access hatches one of which will include an odour filter. The storage pipe will be placed in-ground with a soil covering of approximately 1.1 m. the storage pipe will connect to the SPS via two new sections of sewer pipe (of approximately 2 m and 3 m), along with a new 1.05 m manhole.

The works are proposed to the south east of the existing pump station and will require a small extension of the existing hard stand to the south and south east.

The proposal will result in the removal of some vegetation to enable the siting of the storage pipe.

No additional vent shaft is proposed.

3.1.10 Sussex Inlet – SPS 1

The proposal for Sussex Inlet SPS 1 is to install an in-ground concrete tank having a diameter of 6.0 m, and a depth of approximately 2.38 m, with the finished level of the tank sitting approximate to the current ground level. The tank will be connected to the SPS via a sewer pipe of approximately 16.5 m and a new manhole.

The works are proposed to the south and west of the existing pump station. The proposal will result in the removal of some vegetation to enable the siting of the pipes and the in-ground concrete tank.

No additional vent shaft is proposed.

3.1.11 Sussex Inlet – SPS 16

The proposal for Sussex Inlet SPS 16 is to install an in-ground concrete tank having a diameter of 4.0 m, and a depth of approximately 2.93 m, with the finished level of the tank sitting approximate to the current ground level. The tank will be connected to the SPS via a new vent pipe of 4.0 m. A new sewer pipe of approximately 6.3 m will connect the in-ground tank with an existing manhole and the existing sewer.

The works are proposed to the west of the existing pump station. The proposal will result in the removal of a small area of existing landscaping to enable the siting of the vent pipe. The proposed in-ground tank and new sewer pipe will not result in the removal of any vegetation as the land affected is already disturbed.

No additional vent shaft is proposed.

3.2 STAGING OF PROPOSAL

The proposed activity will be undertaken in phases, including the design phase, construction and commissioning.

The construction will be undertaken as follows:

- Vegetation clearance/grooming where required;
- Installation and maintenance of erosion and sediment controls during construction;

- Excavation of land for tanks or pipes;
- Construction of prefabricated concrete storage tank or prefabricated pipes;
- Installation of interconnecting fittings;
- Installation of discharge pipe;
- Re-establish affected site by way of re-vegetation or re-construction of access.

Once completed, the asset will be maintained by Shoalhaven Water.

Waste Disposal

Waste material from the projects will be restricted to:

- excavated material; and
- excess material used in the works.

3.3 CONSTRUCTION PERIOD AND WORKING HOURS

The expected total duration of the construction period for each site is anticipated to be approximately 4 weeks.

Work hours will be between 7:00 am and 5:00 pm, Mondays to Fridays. Work on Saturday may be undertaken between the hours of 8:00 am and 1:00 pm depending on the schedule progress and Council's desire to complete the project as quickly as possible.

No work is proposed on Sundays or public holidays.

3.4 PLANT AND EQUIPMENT

Plant and equipment utilised in the construction works include:

- various earthmoving equipment including excavators;
- trucks;
- compactors;
- mobile crane to lift tanks and pipes into place; and
- concrete trucks and concrete pumps.

4.0 STATUTORY SITUATION

4.1. STATE LEGISLATION

Environmental Planning & Assessment Act, 1979

Generally the environmental assessment procedures for development fall within the provisions of the Environmental Planning & Assessment Act (EP&A Act), and in particular Parts 3A, 4 and 5 of this Act. Part 3A refers to major projects for which the Minister of Planning is the consent authority. If Part 4 consent is required (ie. a development application is required) then the assessment provisions as outlined under Part 4 apply. Where these procedures do not have to be followed because development consent is not required under the relevant environmental planning instrument, the environmental assessment provisions outlined within Part 5 of the Act are required to be complied with. Part 5 assessment is normally associated with public infrastructure undertakings, such as that which is proposed.

As is detailed in the body of this REF, the proposed activities are to be carried out within the City of Shoalhaven, pursuant to SEPP Infrastructure where Clause 106 enables a public authority to undertake works associated with sewage reticulation without consent on any land, as is the case in this instance.

The assessment of the environmental effects of the proposals are therefore being considered under Part 5 of the Environment Planning & Assessment Act, being a proposal which is permissible, does not require planning consent and an activity which is to be carried out by a public authority. On this basis, this report provides a Review of Environmental Factors for the proposed activity in accordance with Section 111 of the EP&A Act and Clause 228 of the Environmental Planning & Assessment Regulations.

This is further discussed in detail in Section 4.2.3.

Fisheries Management Act 1994

Under the provisions of Section 200 of this Act:

> *"200(1) a local government authority must not carry out dredging or reclamation work in any waters except under the authority of a permit issued by the Minister.*
>
> *Maximum penalty: 500 penalty points*
>
> *(2) This section does not apply to:*
>
> *(a) work authorised under the Crown Lands Act, 1989; or*

> *(b) a work authorised by a relevant public authority (other than a local government authority).*
>
> *(3) This section has effect irrespective of any other Act to the contrary."*

For the purposes of this legislation dredging means (Section 198A):

> *"(a) any work that involves excavation within water, land, or*
>
> *(b) any work that involves the removal of material from water or land that is prescribed by the regulations as being dredging work to which this Division applies."*

The proposed activity does not involve dredging in 'key fish habitat' as defined and mapped by the consent authority (Part 7, Division 3). With regard to the other provisions of the Act, the proposed activity:

- would not affect declared aquatic reserves (Part 7, Division 2 of the Act);
- would not impact mangroves and marine vegetation (Part 7, Division 4);
- would not involve disturbance to gravel beds where salmon or trout spawn (s. 208 of the Act);
- does not involve the release of live fish (Part 7, Division 7);
- does not involve the construction of permanent dams and weirs (s. 218);
- would not impact declared threatened species of endangered ecological communities declared under the Act (Part 7A);
- does not constitute a declared key threatening process (Part 7A);
- would not use explosives in a watercourse (Clauses 70 and 71 of the Fisheries Management (General) Regulation 2010).

As such, a Fisheries Permit is not required under the Fisheries Management Act.

Protection of the Environment Operations Act

The Protection of the Environment Operations Act (POEO Act) commenced on 1 July, 1999. This legislation provides a single licensing arrangement to replace the different licences and approvals under previous pollution control legislation (ie. Clean Air, Water and Noise and Waste Management).

The EPA is the regulatory authority for activities specified in Schedule 1 of the Act (scheduled activities). Local Government is the regulatory authority for non-scheduled activities, except activities undertaken by a public authority which the EPA will regulate. The EPA licenses scheduled activities. Local Government regulate non-scheduled

activities through notice and enforcement powers. However the EPA can issue a licence to regulate water pollution from a non-scheduled activity.

The proposals to undertake works associated with sewage pumping stations connected to treatment works would constitute activities associated with sewage treatment. Schedule 1 of the POEO Act. Includes the following:

> *(1) This clause applies to **sewage treatment**, meaning the operation of sewage treatment systems (including the treatment works, pumping stations, sewage overflow structures and the reticulation system) that involve the discharge or likely discharge of wastes or by-products to land or waters.*
>
> *(2) The activity to which this clause applies is declared to be a scheduled activity if it has a processing capacity that exceeds:*
>
> *(a) 2,500 persons equivalent, as determined in accordance with guidelines established by an EPA Gazettal notice, or*
>
> *(b) 750 kilolitres per day,*
>
> *whichever is the greater.*

The sewage systems affected by the proposed activities, that is Berry, Culburra, Huskisson & Vincentia, St Georges Basin and Sussex Inlet are all currently licenced with the Environment Protection Authority (EPA). In this regard, the Berry scheme is separately licenced being referenced Licence No. 1736, the Culburra, Huskisson & Vincentia and St Georges Basin schemes are licenced as part of the Northern Shoalhaven Reclaimed Water Management Scheme (REMS) which is referenced Licence No. 2419, whilst the Sussex Inlet scheme is a separate one referenced Licence No. 3936.

As a result, no further approval under the POEO Act is required.

Threatened Species Conservation Act

This legislation was introduced with the objective of conserving threatened species, populations and ecological communities of animals and plants. The Act amends the Environment Planning & Assessment Act and the National Parks & Wildlife Act. With respect to this proposal this legislation introduces the need for a proposal to address certain matters in respect of threatened species and their habitats.

The works involved in this project include excavation and tree removal to varying degrees. For the most part however, the works are adjacent to areas that have been disturbed given their proximity to the established sewage pumping stations and the associated infrastructure, such as access.

Flora and fauna impacts are further discussed in Section 5.3 of this REF.

Native Vegetation Act

The objectives of the Native Vegetation Act (NV Act) essentially relate to the conservation and management of native vegetation.

The definition of "native vegetation" under the NV Act is quite broad, it includes; trees, understorey plants, groundcovers and plants occurring in a wetland. To be considered native, indigenous species must cover more than 50% of the area.

Pursuant to Section 25, the NV Act does not apply to certain types of clearing of native vegetation including:

> *(g) any clearing that is, or is part of, an activity carried out by a determining authority within the meaning of Part 5 of the EPA Act if the determining authority has complied with that Part,*
>
> *(h) any clearing that is, or is part of, an activity carried out in accordance with an approval of a determining authority within the meaning of Part 5 of the EPA Act if the determining authority has complied with that Part,*

This REF is an assessment pursuant to Part 5 of the EP&A Act, therefore any clearing associated with the activities described within this REF, and approved on the basis of this REF by the relevant determining authority, are excluded from the provisions of this legislation. Consequently, as Shoalhaven City Council will comply with Part 5 of the EP&A Act, the proposed activity is excluded from the legislative provisions of the NV Act.

Water Management Act 2000

The proposed works are in the vicinity of the Shoalhaven River, a watercourse which is subject to the provisions of the Water Management Act.

The Water Management Act (WM Act) is the main piece of water legislation for NSW ensuring that water is provided for the environment and more secure access to water users. A controlled activity approval under the WMA is required for certain types of developments and activities that are carried out in or near a river, lake or estuary. The WM Act replaces the Rivers and Foreshores Improvements Act.

Section 91 of the WM Act specifies that:

> *"(1) There are two kinds of activity approvals, namely, controlled activity approvals and aquifer interference approvals.*
>
> *(2) A controlled activity approval confers a right on its holder to carry out a specified controlled activity at a specified location in, on or under waterfront land.*"

Under the WM Act, a controlled activity is defined as:

> *"(a) the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or*
>
> *(b) the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or*
>
> *(c) the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or*
>
> *(d) the carrying out of any other activity that affects the quantity or flow of water in a water source."*

For the purposes of the WM Act, *"waterfront land"* means:

> *(a) the bed of any river, together with any land lying between the bed of the river and a line drawn parallel to, and the prescribed distance inland of, the highest bank of the river, or*
>
> *(a1) the bed of any lake, together with any land lying between the bed of the lake and a line drawn parallel to, and the prescribed distance inland of, the shore of the lake, or*
>
> *(a2) the bed of any estuary, together with any land lying between the bed of the estuary and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the estuary, or*
>
> *(b) if the regulations so provide, the bed of the coastal waters of the State, and any land lying between the shoreline of the coastal waters and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the coastal waters,*

The WM Act outlines that a "river" includes:

> *(a) any watercourse, whether perennial or intermittent and whether comprising a natural channel or a natural channel artificially improved, and*
>
> *(b) any tributary, branch or other watercourse into or from which a watercourse referred to in paragraph (a) flows, and*
>
> *(c) anything declared by the regulations to be a river,*
>
> *whether or not it also forms part of a lake or estuary, but does not include anything declared by the regulations not to be a river.*

However, Clause 38 of the WM Regulations outlines that:

> ***38 Controlled activities—public authorities***
>
> *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.*

As the proposed works are to be undertaken by Shoalhaven City Council, given the provisions of Clause 38 of the Regulations, the proposed works would be exempt from the

need to obtain a controlled activity approval under this legislation. Under these circumstances, the proposal does not require a controlled activity under this legislation.

Water quality impacts are considered in Section 5.2 of this REF.

National Parks & Wildlife Act

The National Parks & Wildlife Act, 1974 provides for the protection of national parks, nature reserves, state recreation areas, designated wilderness areas and archaeological sites. The Act also prohibits the disturbance of archaeological sites, threatened and protected fauna, designated wilderness and National Parks.

The NSW National Parks & Wildlife Act 1974 (as amended) provides the primary basis for the legal protection and management of Aboriginal sites within NSW. Implementation of the Aboriginal heritage provisions of this Act is the responsibility of the Aboriginal Heritage Division of the NSW National Parks & Wildlife Service. The rationale behind the Act is to prevent unnecessary or unwarranted destruction of relics and to protect and conserve relics where such action is considered warranted.

If any previously unrecorded Aboriginal sites or relics are detected during the course of the demolition and construction activity, work must cease immediately and the finds must be reported to the NSW National Parks & Wildlife Service Southern Directorate and advice sought as to appropriate course of action.

Council is reminded that under the terms of the National Parks & Wildlife Act, 1974, it is an offence to knowingly destroy, damage or deface an Aboriginal relic without obtaining the prior written permission of the Director-General of the NSW National Parks & Wildlife Service.

Indigenous Heritage matters are further addressed in Section 5.5.1 of this REF.

4.2 STATE POLICIES

4.2.1 NSW Coastal Policy

The NSW Coastal Policy applies:

- *three nautical miles seaward of the mainland and offshore islands;*
- *one kilometre landward of the open coast high water mark;*
- *a distance of one kilometre around:*
  - ⇒ *all bays, estuaries, coastal lakes, lagoons and islands;*
  - ⇒ *tidal waters of coastal rivers to the limit of mangroves, as defined by NSW Fisheries (1985) maps or the tidal limit whichever is closer to the sea.*

Comment

Apart from Berry SPS 5, all sites are identified by mapping supporting the NSW Coastal Policy as being affected by the provisions of the Policy.

4.2.2 State Environmental Planning Policy No. 71 – Coastal Protection

Apart from Berry SPS 5, all sites are located within the coastal zone, and as such, the provisions of SEPP 71 are relevant to those areas. Notwithstanding the above, it is noted that the provisions of SEPP 71 – Coastal Protection only apply to circumstances where a development application is required. As outlined above in Section 4.1, the current works do not require development consent, and as such, are not subject to a development application. Irrespective of this, it is considered that the proposed works are consistent with the thrust of SEPP 71 – Coastal Protection particularly due to the water quality improvements that are expected through the provision of emergency storage capacity of the relevant sewage pump stations.

4.2.3 State Environmental Planning Policy – Infrastructure

The provisions of SEPP Infrastructure assists government agencies, local councils and the communities they support by simplifying the process for providing infrastructure in areas such as education, hospitals, transport and recreational facilities. SEPP Infrastructure has the following aims:

> *to facilitate the effective delivery of infrastructure across the State by:*
>
> *(a) improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and*
>
> *(b) providing greater flexibility in the location of infrastructure and service facilities, and*
>
> *(c) allowing for the efficient development, redevelopment or disposal of surplus government owned land, and*
>
> *(d) identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development), and*
>
> *(e) identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and*
>
> *(f) providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing.*

The provisions of SEPP Infrastructure operate by, amongst other things, identifying certain works which can be undertaken without the need to obtain development consent. As

outlined above, works that can be undertaken without consent are subject to the assessment provisions of Part 5 of the EP&A Act.

Having regard to the subject works, these involve supplementary works associated with sewer pump stations to provide additional emergency storage.

Part 3 – Development Controls of SEPP Infrastructure outlines the development controls associated with this policy. Part 3 – Development Controls includes those activities which can be undertaken under the SEPP without the need to obtain development consent.

Division 18 of Part 3 deals with "Sewerage Systems". Clause 106 in particular states the following:

> ***106 Development permitted without consent***
>
> *(3) Development for the purpose of sewage reticulation systems may be carried out:*
>
> *(a) by or on behalf of a public authority or any person licensed under the Water Industry Competition Act 2006 without consent on any land, and*
>
> *(b) by any other person with consent on any land.*
>
> *However, such development may be carried out on land reserved under the National Parks and Wildlife Act 1974 only if the development is authorised by or under that Act.*

For the purposes of Division 21, "*sewage reticulation system"* means:

> *a facility for the collection and transfer of sewage to a sewage treatment plant or water recycling facility for treatment, or transfer of the treated water for use or disposal, including associated:*
>
> *(a) pipelines and tunnels, and*
>
> *(b)* ***pumping stations****, and*
>
> *(c) dosing facilities, and*
>
> *(d) odour control works, and*
>
> *(e) sewage overflow structures, and*
>
> *(f) vent stacks.*

Furthermore, for the purposes of SEPP Infrastructure, "a public authority" is defined as:

> *(a) has the same meaning as it has in the Act, and*
>
> *(b) in respect of development connected with rail corridors or railway infrastructure facilities, includes the Australian Rail Track Corporation Limited (ACN 081 455 754).*

The EP&A Act 1979 defines a public authority as

> *(a) a public or **local authority constituted by or under an Act**, or*
>
> *(b) a government Department, or*
>
> *(c) a statutory body representing the Crown, or*
>
> *(d) a chief executive officer within the meaning of the Public Sector Employment and Management Act 2002 (including the Secretary), or*
>
> *(e) a statutory State owned corporation (and its subsidiaries) within the meaning of the State Owned Corporations Act 1989, or*
>
> *(f) a chief executive officer of a corporation or subsidiary referred to in paragraph (e), or*
>
> *(g) a person prescribed by the regulations for the purposes of this definition.*

Shoalhaven City Council is a local authority constituted under the Local Government Act 1993, and is therefore a 'public authority' for the purposes of SEPP Infrastructure.

It is noted that the relevant proposals are not sited on land reserved under the National Parks and Wildlife Act 1974.

Given the above statutory provisions, it is clear that the Council (being a public authority) is able to undertake the works (development of a sewage reticulation system) under the provisions of SEPP Infrastructure.

Under the circumstances, it is considered that the provisions of SEPP Infrastructure, and in particular Clause 106, apply with respect to the current project and as a result, the development is permissible without consent, and Part 5 of the EP&A Act applies.

4.3 SHOALHAVEN LOCAL ENVIRONMENTAL PLAN 2014 (SLEP)

Shoalhaven Local Environmental Plan 2014 (SLEP) applies to the subject land. Accompanying this REF as **Annexure 2** are a series of maps that consider the provisions of Shoalhaven LEP 2014. **Table 1** below outlines the zones that apply to the various sites the subject of this REF.

Table 1

Zoning under SLEP 2014

Site	*Zone*
Berry SPS 5	SP2 Infrastructure
Culburra SPS 5	E2 Environmental Conservation R2 Low Density Residential
Culburra SPS 6	E2 Environmental Conservation RE1 Public Recreation

Table 1 (continued)

Site	*Zone*
Culburra SPS 9	RE1 Public Recreation
Culburra SPS 10	RE1 Public Recreation R3 Medium Density Residential
Huskisson & Vincentia SPS 3	R2 Low Density Residential E1 National Parks and Nature Reserves[1]
St Georges Basin SPS 10	RE1 Public Recreation
St Georges Basin SPS 12	RE1 Public Recreation
St Georges Basin SPS 13	RE1 Public Recreation
Sussex Inlet SPS 1	RE1 Public Recreation
Sussex Inlet SPS 16	RE1 Public Recreation

[1] Established SPS sited on E1 zoned land however by reference to the plans provided by Shoalhaven Council (**Annexure 1**), the proposed works, are on land zoned R2 Low Density Residential.

As outlined above in Section 4.2.3, the proposal is permissible without consent under the provisions of SEPP Infrastructure, and consequently, it is unnecessary to consider permissibility under SLEP. Clause 5.12 of SLEP deals with Infrastructure Development and states that:

> *(1) This Plan does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out with or without development consent, or that is exempt development, under State Environmental Planning Policy (Infrastructure 2007).*
>
> *(2) This Plan does not restrict or prohibit, or enable the restriction or prohibition of the use of existing buildings of the Crown by the Crown.*

As outlined above in Section 4.2.3 of this REF, the proposed works are to be undertaken pursuant to the provisions of SEPP Infrastructure. It is noted that pursuant to subclause (2), the provisions of SLEP must not restrict development permitted under SEPP Infrastructure.

Other Parts of the SLEP affect development having regard to:

- Part 4 – Principal Development Standards.
- Part 5 – Miscellaneous Provisions.
- Part 6 – Urban Release Areas; and
- Part 7 – Additional Local Provisions.

The effect of these Parts depend on a number of matters, including mapping which supports the SLEP, along with the nature of the site and application.

Mapping accompanying SLEP has been reviewed, and **Table 2** assesses the proposed works against those provisions having application to the site and activity.

Table 2

Shoalhaven LEP 2014 Provisions

SLEP 2014 Clause	***Provisions***	***Comments***
Clause 5.5 *Development within the coastal zone*	*(1) The objectives of this clause are as follows:* *(a) to provide for the protection of the coastal environment of the State for the benefit of both present and future generations through promoting the principles of ecologically sustainable development,* *(b) to implement the principles in the NSW Coastal Policy, and in particular to:* *(i) protect, enhance, maintain and restore the coastal environment, its associated ecosystems, ecological processes and biological diversity and its water quality, and* *(ii) protect and preserve the natural, cultural, recreational and economic attributes of the NSW coast, and* *(iii) provide opportunities for pedestrian public access to and along the coastal foreshore, and* *(iv) recognise and accommodate coastal processes and climate change, and* *(v) protect amenity and scenic quality, and* *(vi) protect and preserve rock platforms, beach environments and beach amenity, and* *(vii) protect and preserve native coastal vegetation, and* *viii) protect and preserve the marine environment, and* *(ix) ensure that the type, bulk, scale and size of development is appropriate for the location and protects and improves the natural scenic quality of the surrounding area, and* *(x) ensure that decisions in relation to new development consider the broader and cumulative impacts on the catchment, and* *(xi) protect Aboriginal cultural places, values and customs, and* *(xii) protect and preserve items of heritage, archaeological or historical significance.* *(2) Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority has considered:*	All sites are located within the coastal zone, excepting Berry SPS 5. The proposed works are considered to be consistent with the thrust of the provisions of Clause 5.5 given that the works will provide emergency storage of sewage waste in the event of failures in the sewerage system, thus minimising potential for uncontrolled discharges into the environment.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
5.5 continued	*(a) existing public access to and along the coastal foreshore for pedestrians (including persons with a disability) with a view to:* *(i) maintaining existing public access and, where possible, improving that access, and* *(ii) identifying opportunities for new public access, and*	• The proposed activity will not impede or diminish public access to coastal foreshore areas.
	(b) the suitability of the proposed development, its relationship with the surrounding area and its impact on the natural scenic quality, taking into account: *(i) the type of the proposed development and any associated land uses or activities (including compatibility of any land-based and water-based coastal activities), and* *(ii) the location, and* *(iii) the bulk, scale, size and overall built form design of any building or work involved, and*	• The activity will not affect the scenic quality of the surrounding area, with works being generally subsurface.
	(c) the impact of the proposed development on the amenity of the coastal foreshore including: *(i) any significant overshadowing of the coastal foreshore, and* *(ii) any loss of views from a public place to the coastal foreshore, and*	• No amenity impacts arise with the works being generally subsurface.
	(d) how the visual amenity and scenic qualities of the coast, including coastal headlands, can be protected, and	• No impacts are expected on visual amenity or scenic quality.
	(e) how biodiversity and ecosystems, including: *(i) native coastal vegetation and existing wildlife corridors, and* *(ii) rock platforms, and* *(iii) water quality of coastal waterbodies, and* *(iv) native fauna and native flora, and their habitats, can be conserved, and*	• The proposal is not expected to adversely impact on biodiversity or ecosystems. This is further addressed in Section 5.3 of REF.
	(f) the cumulative impacts of the proposed development and other development on the coastal catchment	• The activity is unlikely to result in adverse cumulative impacts due to the positive environmental outcomes associated with the works.

Table 2 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
5.5 continued	*(3) Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority is satisfied that:* *(a) the proposed development will not impede or diminish, where practicable, the physical, land-based right of access of the public to or along the coastal foreshore, and* *(b) if effluent from the development is disposed of by a non-reticulated system, it will not have a negative effect on the water quality of the sea, or any beach, estuary, coastal lake, coastal creek or other similar body of water, or a rock platform, and* *(c) the proposed development will not discharge untreated stormwater into the sea, or any beach, estuary, coastal lake, coastal creek or other similar body of water, or a rock platform, and* *(d) the proposed development will not:* *(i) be significantly affected by coastal hazards, or* *(ii) have a significant impact on coastal hazards, or* *(iii) increase the risk of coastal hazards in relation to any other land*	• Not applicable to the activity. • Not applicable to the activity. • Not applicable to the activity. • Not applicable to the activity.
Clause 5.10 Heritage Conservation	*(1) The objectives of this clause are:* *(a) to conserve the environmental heritage of Shoalhaven; and* *(b) to conserve the heritage significance of heritage items and heritage conservation areas including associated fabric, settings and views; and* *(c) to conserve archaeological sites; and* *(d) to conserve Aboriginal objects and Aboriginal places of heritage significance.* *(2) Development consent is required for any of the following:* *(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):* *(i) a heritage item,* *(ii) an Aboriginal object* *(iii) a building, work, relic or tree within a heritage conservation area,*	There are no sites that directly contain identified heritage items under SLEP. However, Berry SPS 5 is located within the vicinity of an identified heritage item, being located opposite a public reserve that is identified. The proposed works in this location are restricted to the installation of an in ground concrete tank which is not prominent in the landscape. The construction activities are sited well clear of the identified item such that no direct impacts will arise. Consequently, impacts on the heritage item are not anticipated.

Table 2 (continued)

<table>
<tr><th>SLEP 2014 Clause</th><th>Provisions</th><th>Comments</th></tr>
<tr>
<td>Clause 7.1
Acid sulfate soils</td>
<td>
(1) The objective of this clause is to ensure that development does not disturb, expose or drain acid sulfate soils and cause environmental damage.
(2) Development consent is required for the carrying out of works described in the Table to this subclause on land shown on the Acid Sulfate Soils Map as being of the class specified for those works, except as provided by this clause.
<table>
<tr><th>Class</th><th>Works</th></tr>
<tr><td>1</td><td>Any works.</td></tr>
<tr><td>2</td><td>Works below the natural ground surface.
Works by which the watertable is likely to be lowered.</td></tr>
<tr><td>3</td><td>Works more than 1 metre below the natural ground surface.
Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.</td></tr>
<tr><td>4</td><td>Works more than 2 metres below the natural ground surface.
Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.</td></tr>
<tr><td>5</td><td>Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.</td></tr>
</table>
(3) Development consent must not be granted under this clause for the carrying out of works unless an acid sulfate soils management plan has been prepared for the proposed works in accordance with the Acid Sulfate Soils Manual and has been provided to the consent authority.
(4) Despite subclause (2), development consent is not required under this clause for the carrying out of works if:
</td>
<td>
All sites are affected by potential acid sulfate soils to varying degrees as follows:
<table>
<tr><td>Berry SPS 5</td><td>Class 5</td></tr>
<tr><td>Culburra SPS 5</td><td>Classes 4 and 5</td></tr>
<tr><td>Culburra SPS 6</td><td>Classes 4 and 5</td></tr>
<tr><td>Culburra SPS 9</td><td>Classes 4 and 5</td></tr>
<tr><td>Culburra SPS 10</td><td>Classes 4 and 5</td></tr>
<tr><td>Huskisson & Vincentia SPS 3</td><td>Class 5</td></tr>
<tr><td>St Georges Basin SPS 10</td><td>Class 5</td></tr>
<tr><td>St Georges Basin SPS 12</td><td>Class 2 and 5</td></tr>
<tr><td>St Georges Basin SPS 13</td><td>Class 5</td></tr>
<tr><td>Sussex Inlet SPS 1</td><td>Class 5</td></tr>
<tr><td>Sussex Inlet SPS 16</td><td>Class 2 and 5</td></tr>
</table>
With regard to those proposals on the Class 5 land, whilst in part these are sited within 500 metres of Class 1, 2 3, or 4 affected land, the proposed works are either not below 5 m AHD, or alternatively, are not expected to lower the water table. As such, further assessment of these sites (ie. Berry SPS 5, Huskisson & Vincentia SPS 3, St Georges Basin SPS 10, St Georges Basin SPS 13 and Sussex Inlet SPS 1) is not warranted.
However, it is recommended that further acid sulfate soils assessment be undertaken having regard to Culburra SPS 5, Culburra SPS 6,
</td>
</tr>
</table>

Table 2 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
7.1 continued	*(a) a preliminary assessment of the proposed works prepared in accordance with the Acid Sulfate Soils Manual indicates that an acid sulfate soils management plan is not required for the works, and* *(b) the preliminary assessment has been provided to the consent authority and the consent authority has confirmed the assessment by notice in writing to the person proposing to carry out the works.* *(5) Despite subclause (2), development consent is not required under this clause for the carrying out of any of the following works by a public authority (including ancillary work such as excavation, construction of access ways or the supply of power):* *(a) emergency work, being the repair of the works of the public authority required to be carried out urgently because the works have been damaged, have ceased to function or pose a risk to the environment or to public health and safety,* *(b) routine management work, being the periodic inspection, cleaning, repair or replacement of the works of the public authority (other than work that involves the disturbance of more than 1 tonne of soil).* *(c) minor work, being work that costs less than $20,000 (other than drainage work)* *(6) Despite subclause (2), development consent is not required under this clause to carry out any works if:* *(a) the works involve the disturbance of less than 1 tonne of soil, and* *(b) the works are not likely to lower the watertable.*	Culburra SPS 9, Culburra SPS 10, St Georges Basin SPS 12 and Sussex Inlet SPS 16, to review the actual extent of acid sulfate soils, and where present, an acid sulfate soils management plan be prepared and implemented should the works proceed.
Clause 7.3 *Flood Planning*	*(1) The objectives of this clause are as follows:* *(a) to minimise the flood risk to life and property associated with the use of land,* *(b) to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change,*	The *Flood Planning Area Map* that accompanies the SLEP 2014 identifies the proposed sites as being affected by flooding to varying degrees. Notwithstanding this, the proposal: • Will not impact flood waters due to all works being subsurface,

Table 2 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
7.3 continued	*(c) to avoid significant adverse impacts on flood behaviour and the environment.* *(2) This clause applies to:* *(a) land identified as "Flood Planning Area" on the Flood Planning Area Map, and* *(b) other land at or below the flood planning level.* *(3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:* *(a) is compatible with the flood hazard of the land, and* *(b) will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and* *(c) incorporates appropriate measures to manage risk to life from flood, and* *(d) will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and* *(e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding, and* *(f) will not affect the safe occupation or evacuation of the land* *(4) A word or expression used in this clause has the same meaning as it has in the Floodplain Development Manual (ISBN 0 7347 5476 0) published by the NSW Government in April 2005, unless it is otherwise defined in this clause.* *(5) In this clause:* ***flood planning level** means the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metre freeboard.*	• Will not be impacted by floodwaters due to all components being subsurface, and relying upon gravity drainage. Flooding is further addressed in Section 5.10.
Clause 7.4 *Coastal Risk Planning*	*(1) The objectives of this clause are as follows:* *(a) to avoid significant adverse impacts from coastal hazards,* *(b) to ensure uses of land identified as coastal risk are compatible with the risks presented by coastal hazards,* *(c) to enable the evacuation of land identified as coastal risk in an emergency,* *(d) to avoid development that increases the severity of coastal hazards.*	Although not reproduced in Annexure 2, the *Coastal Risk Planning* map has been examined and none of the sites are located on land identified as a "*Coastal Risk Planning Area"*. In this regard, none of the site are located on the actual open coastline and as such, no issues arise.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.4 continued	*(2) This clause applies to the land identified as "Coastal Risk Planning Area" on the Coastal Risk Planning Map.* *(3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:* *(a) will avoid, minimise or mitigate exposure to coastal processes, and* *(b) is not likely to cause detrimental increases in coastal risks to other development or properties, and* *(c) is not likely to alter coastal processes and the impacts of coastal hazards to the detriment of the environment, and* *(d) incorporates appropriate measures to manage risk to life from coastal risks, and* *(e) is likely to avoid or minimise adverse effects from the impact of coastal processes and the exposure to coastal hazards, and* *(f) provides for the relocation, modification or removal of the development to adapt to the impact of coastal processes and coastal hazards, and* *(g) has regard to the impacts of sea level rise.* *(4) A word or expression used in this clause has the same meaning as it has in the NSW Coastal Planning Guideline: Adapting to Sea Level Rise (ISBN 978-1-74263-035-9) published by the NSW Government in August 2010, unless it is otherwise defined in this clause.* *(5) In this clause: coastal hazard has the same meaning as in the Coastal Protection Act 1979.*	
Clause 7.5 Terrestrial Biodiversity	*(1) The objective of this clause is to maintain terrestrial biodiversity, by:* *(a) protecting native flora and fauna,* *(b) protecting the ecological processes necessary for their continued existence, and* *(c) encouraging the recovery of native flora and fauna, and their habitats* *(2) This clause applies to land:* *(a) identified as "Biodiversity—habitat corridor" or "Biodiversity—significant vegetation" on the Terrestrial Biodiversity Map, and*	Mapping supporting the SLEP 2014 identifies the following sites as containing lands of biodiversity significance: • Culburra SPS 6; and • Culburra SPS 9; These sites are already highly disturbed, and only minor tree removal is necessary to support the in ground concrete tanks which are to be installed at these locations.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.5 continued	*(b) situated within 40m of the bank (measured horizontally from the top of the bank) of a natural waterbody.* *(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider:* *(a) whether the development is likely to have:* *(i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and* *(ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and* *(iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and* *(iv) any adverse impact on the habitat elements providing connectivity on the land, and* *(b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.* *(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:* *(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or* *(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or* *(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.* *(5) For the purpose of this clause:* ***bank** means the limit of the bed of a natural waterbody.* ***bed,** of a natural waterbody, means the whole of the soil of the channel in which the waterbody flows, including the portion that is alternatively covered and left bare with an increase or diminution in the supply of water and that is adequate to contain the waterbody at its average or mean stage without reference to extraordinary freshets in the time of flood or to extreme droughts.*	The works have been designed to minimise the extent of additional disturbances, and on this basis, it is considered that adverse impacts are unlikely to arise. Flora and fauna impacts are considered in Section 5.3 of this REF.

Table 2 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
Clause 7.6 *Riparian land and watercourses*	*(1) The objective of this clause is to protect and maintain the following:* *(a) water quality within watercourses,* *(b) the stability of the bed and banks of watercourses,* *(c) aquatic and riparian habitats,* *(d) ecological processes within watercourses and riparian areas* *(2) This clause applies to all of the following:* *(a) land identified as "Riparian Land" on the Riparian Lands and Watercourses Map,* *(b) land identified as "Watercourse Category 1", "Watercourse Category 2" or "Watercourse Category 3" on that map,* *(c) all land that is within 50 metres of the top of the bank of each watercourse on land identified as "Watercourse Category 1", "Watercourse Category 2" or "Watercourse Category 3" on that map.* *(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider:* *(a) whether or not the development is likely to have any adverse impact on the following:* *(i) the water quality and flows within the watercourse,* *(ii) aquatic and riparian species, habitats and ecosystems of the watercourse,* *(iii) the stability of the bed and banks of the watercourse,* *(iv) the free passage of fish and other aquatic organisms within or along the watercourse,* *(v) any future rehabilitation of the watercourse and its riparian areas, and* *(b) whether or not the development is likely to increase water extraction from the watercourse, and* *(c) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.* *(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:*	The *Riparian Lands and Watercourses Map* identifies the following sites as containing riparian lands and/or Category 1, 2 or 3 watercourses: • Culburra SPS 6 in part contains riparian land, with this site being adjacent the waters of Curleys Bay; and • Sussex Inlet SPS 16 includes a category 2 watercourse to the east/south east and a category 1 watercourse to the south west (Berrara Creek); Works associated with Culburra SPS 6 involves minor tree removal to enable the installation of a 7.8 m diameter concrete tank. The proposed works are sited between the established SPS and Prince Edward Ave, away from the identified riparian area. The proposal is unlikely to adversely affect water quality, the stability of the bed and banks of watercourses, aquatic and riparian habitats, and ecological processes. On the contrary, the works are relatively minor, whilst the provision of emergency storage to minimise potential for spillages from the existing SPS will improve environmental outcomes. Works associated with Sussex Inlet SPS 16 involve the removal of a small amount of existing landscaping vegetation to enable installation of a new vent pipe. The proposed works are located approximately 80 m from the category 1 watercourse and 17 m from the category 2 watercourse.

Table 2 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
7.6 continued	*(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or* *(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or* *(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.* *(5) For the purpose of this clause:* ***bank** means the limit of the bed of a watercourse.* ***bed**, of a watercourse, means the whole of the soil of the channel in which the watercourse flows, including the portion that is alternatively covered and left bare with an increase or diminution in the supply of water and that is adequate to contain the watercourse at its average or mean stage without reference to extraordinary freshets in the time of flood or to extreme droughts.*	The proposal is unlikely to adversely affect water quality, the stability of the bed and banks of watercourses, aquatic and riparian habitats, and ecological processes. On the contrary, the works are relatively minor, whilst the provision of emergency storage to minimise potential for spillages from the existing SPS will improve environmental outcomes.
Clause 7.7 *Landslide risk and other land degradation*	*(1) The objective of this clause is to maintain soil resources and the diversity and stability of landscapes, including protecting land:* *(a) comprising steep slopes, and* *(b) susceptible to other forms of land degradation.* *(2) This clause applies to the following land:* *(a) land with a slope in excess of 20% (1:5), as measured from the contours of a 1:25,000 topographical map, and* *(b) land identified as "Sensitive Area" on the Natural Resource Sensitivity—Land Map* *(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider any potential adverse impact, either from, or as a result of, the development in relation to:* *(a) the geotechnical stability of the site, and* *(b) the probability of increased erosion or other land degradation processes.* *(4) Before granting consent to development on land to which this clause applies, the consent authority must be satisfied that:* *(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or*	No sites are located within that area affected by Clause 7.7.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
7.7 continued	*(b) if that impact cannot be reasonably avoided – the development is designed, sited and will be managed to minimise that impact, or* *(c) if that impact cannot be minimised – the development will be managed to mitigate that impact.* *(5) In this clause, topographical map means the most current edition of a topographical map, produced by Land and Property Information, a division of the Department of Finance and Services, that identifies the Council's local government area and boundary.*	
Clause7.8 *Scenic protection*	*(1) The objective of this clause is to protect the natural environmental and scenic amenity of land that is of high scenic value.* *(2) This clause applies to land identified as "Scenic Protection" on the Scenic Protection Area Map.* *(3) In deciding whether to grant development consent for development on land to which this clause applies, the consent authority must:* *(a) consider the visual impact of the development when viewed from a public place and be satisfied that the development will involve the taking of measures that will minimise any detrimental visual impact, and* *(b) consider the number, type and location of existing trees and shrubs that are to be retained and the extent of landscaping to be carried out on the site, and* *(c) consider the siting of the proposed buildings.*	None of the sites are identified as requiring scenic protection. The provisions of this clause therefore do not apply to the subject site. Notwithstanding this, with works being primarily subsurface, no scenic impacts of significance arise.
Clause 7.20 *Development in the Jervis Bay region*	*(1) The objectives of this clause are as follows:* *(a) to protect the natural and cultural values of the Jervis Bay region,* *(b) to ensure that development in the region contributes to the natural and cultural values of the region.*	Those sites located within the Jervis Bay region are Culburra SPS 9, Culburra SPS 10, Huskisson & Vincentia SPS 3, St Georges Basin SPS 10, St Georges Basin SPS 12 and St Georges Basin SPS 13.

Table 2 (continued)

SLEP 2014 Clause	***Provisions***	***Comments***
7.20 continued	*(2) This clause applies to land in the Jervis Bay region identified as "Cl 7.20" on the Clauses Map.* *(3) Development consent must not be granted to development in a coastal sand dune area, on a rocky headland or on a flat, well-drained area along a major creekline unless the consent authority is satisfied that there will be no significant adverse impact on the natural or cultural values of the area.* *(4) Development in the vicinity of the Point Perpendicular lighthouse group (including the lighthouse, generator, annexe, three residences and ancillary structure), being land to which this clause applies, must be compatible with that group and be complementary to that group in terms of design and external colour.* *(5) Development in the vicinity of the Huskisson Tapalla Point rock platform, being land to which this clause applies, must be compatible with that geological site.* *(6) Development on land to which this clause applies and identified as "Biodiversity—habitat corridor" on the Terrestrial Biodiversity Map must be designed to:* *(a) minimise disturbance to the existing structure and species composition of native vegetation communities, and* *(b) allow native fauna and flora to feed, breed, disperse, colonise or migrate (whether seasonally or nomadically), and* *(c) regenerate and revegetate degraded lands with local native species.* *Evidence of how these criteria are achieved is to be submitted with any application to develop land that is subject to this subclause.* *(7) If a development application for development on land to which this clause applies involves a public utility undertaking, or a public or private access road through land identified as "Biodiversity—habitat corridor" on the Terrestrial Biodiversity Map, development consent must not be granted for the development unless the consent authority is satisfied that there will be no significant adverse impacts on the ecology of that habitat corridor.* *(8) Development consent must not be granted for development on land to which this clause applies and specifically identified as "Disturbed habitat and vegetation Cl 7.20" on the Terrestrial Biodiversity Map unless the consent authority is satisfied that the development is designed to maximise the retention of native vegetation and the rehabilitation of degraded areas.*	The proposed works are considered to be consistent with the objectives and requirements of this Clause given that: • The proposal is to provide emergency storage capacity at the relevant SPS in order to avoid accidental spillages of untreated effluent. • The works have been designed to minimise vegetation removal through the careful siting and design of the storage facilities, • The works are not located near any of the sensitive features identified by Clause 7.20 such as Point Perpendicular or Tapalla Point.

Table 2 (continued)

SLEP 2014 Clause	*Provisions*	*Comments*
	(9) Development consent must not be granted for development for tourist and visitor accommodation and ancillary facilities on land to which this clause applies unless the consent authority is satisfied that the development will contribute to: *(a) the variety of activities and accommodation for visitors, and* *(b) visitor appreciation of the natural and cultural values of the region.*	

The proposed activity is considered to be generally consistent with the requirements of the SLEP 2014.

4.4 DRAFT PLANNING INSTRUMENTS

There are no Draft planning instruments that would affect the proposed works.

4.5 DEVELOPMENT CONTROL PLANS

The subject sites are within that area affected by the provisions of the Shoalhaven DCP 2014. The Shoalhaven DCP 2014 contains a series of generic chapters that apply to the whole Shoalhaven and affect certain development, constraints and land uses, in addition to area specific chapters where Council has adopted specific controls.

Those generic chapters which may have relevance would include:

- G 1 – Site Analysis, Sustainable Design and Building Materials in Rural and Coastal Areas;
- G2 –Sustainable Stormwater Management and Erosion/Sediment Control;
- G3 – Landscaping Design Guidelines;
- G4 – Removal and Amenity of Trees;
- G5 – Threatened Species Impact Assessment;
- G6 – Various coastal policies and plans Coastal Management Areas;
- G7 – Waste Minimisation and Management Controls;
- G9 – Development on Flood Prone Land; and
- G26 – Acid Sulphate Soils and Geotechnical (Site Stability) Guidelines.

There are no Area Specific Chapters of the Shoalhaven DCP 2014 applying to the proposed works.

The provisions of the Shoalhaven DCP 2014 only apply where consent is required, and therefore have no implications.

5.0 ENVIRONMENTAL CONSIDERATIONS

5.1 TOPOGRAPHY AND SOILS

Berry SPS 5

This site and nearby areas feature relatively level land being sited at approximately RL 10 m AHD according to the 1: 25 000 topographic map for "Berry", to the south of the established Berry urban area.

In the locality, according to the 1:250 000 Geological Series Sheet for "Wollongong", soils are Permian from the Shoalhaven Group being Berry Formation featuring siltstone, shale and sandstone.

The subject site and adjoining lands do not feature any watercourses or drainage networks.

The site and adjoining lands are mapped by SLEP 2014 as containing Class 5 acid sulfate soils.

Culburra SPS 5

This site and nearby areas feature relatively level land being sited approximately RL 3 m AHD according to contours supplied on the plans of the proposal. The site is located on the western edge of the Culburra urban area and to the east of Curleys Bay which is part of the Crookhaven River system.

In the locality, according to the 1:250 000 Geological Series Sheet for "Wollongong", soils are a combination of Quaternary comprising alluvium, gravel, swamps deposits and sand dunes, and Permian from the Shoalhaven Group, Megalong Conglomerate featuring Wandrawandian Siltstone comprising siltstone, silty sandstone and being pebbly in part.

The site and adjoining lands are mapped by SLEP as containing Class 4 and 5 acid sulfate soils.

Culburra SPS 6

This site and nearby areas feature relatively level land being sited at approximately RL 3 m AHD according to contours supplied on the plans of the proposal. The site is located on the western edge of the Culburra urban area and to the east of Curleys Bay which is part of the Crookhaven River system.

In the locality, according to the 1:250 000 Geological Series Sheet for "Wollongong", soils are a combination of Quaternary comprising alluvium, gravel, swamps deposits and sand

dunes, and Permian from the Shoalhaven Group, Megalong Conglomerate featuring Wandrawandian Siltstone comprising siltstone, silty sandstone and being pebbly in part.

The site and adjoining lands are mapped by SLEP as containing Class 4 and 5 acid sulfate soils.

Culburra SPS 9

This site and nearby areas are relatively level being sited at approximately RL 4 m AHD according to plans supplied with the proposal.

In the locality, according to the 1:250 000 Geological Series Sheet for "Wollongong", soils are a combination of Quaternary comprising alluvium, gravel, swamps deposits and sand dunes, and Permian from the Shoalhaven Group, Megalong Conglomerate featuring Wandrawandian Siltstone comprising siltstone, silty sandstone and being pebbly in part.

This site is located to the south of the Culburra urban area and is within the catchment of Lake Wollumboola.

The site and adjoining lands are mapped by SLEP as containing Class 4 and 5 acid sulfate soils.

Culburra SPS 10

This site and nearby areas are relatively level being sited at approximately RL 5 m AHD according to plans supplied with the proposal.

In the locality, according to the 1:250 000 Geological Series Sheet for "Wollongong", soils are a combination of Quaternary comprising alluvium, gravel, swamps deposits and sand dunes, and Permian from the Shoalhaven Group, Megalong Conglomerate featuring Wandrawandian Siltstone comprising siltstone, silty sandstone and being pebbly in part.

This site is located to the south of the Culburra urban area and is within the catchment of Lake Wollumboola.

The site and adjoining lands are mapped by SLEP as containing Class 4 and 5 acid sulfate soils.

Huskisson and Vincentia SPS 3

This site and nearby areas features relatively level land being sited at approximately RL 3.0 m AHD according to plans with the proposal.

In the locality, according to the 1:250 000 Geological Series Sheet for Ulladulla, soils are from the Permian period arising from the Shoalhaven Group, Megalong Conglomerate

featuring Wandrawandian Siltstone comprising siltstone, silty sandstone and being pebbly in part.

The subject site and adjoining lands do not feature watercourses or drainage networks.

The site and adjoining lands are mapped by SLEP as containing Class 5 acid sulfate soils.

St Georges Basin SPS 10

This site and nearby areas feature relatively level land being sited at approximately RL 2 m AHD according to plans supplied by Council with the proposal.

In the locality, according to the 1:250 000 Geological Series Sheet for Ulladulla, soils are from the Permian period arising from the Shoalhaven Group, Megalong Conglomerate featuring Wandrawandian Siltstone comprising siltstone, silty sandstone and being pebbly in part.

The site is located on the southern edge of the St Georges Basin urban area and is within the catchment of St Georges Basin.

The site and adjoining lands are mapped by SLEP as containing Class 5 acid sulfate soils.

St Georges Basin SPS 12

This site and nearby areas features relatively level land being sited at approximately RL 2.0 m AHD according to plans with the proposal.

In the locality, according to the 1:250 000 Geological Series Sheet for Ulladulla, soils are from the Permian period arising from the Shoalhaven Group, Megalong Conglomerate featuring Wandrawandian Siltstone comprising siltstone, silty sandstone and being pebbly in part.

The site is located on the western edge of the Sanctuary Point urban area and is within the catchment of St Georges Basin.

The site and adjoining lands are mapped by SLEP as containing Class 2 and 5 acid sulfate soils.

St Georges Basin SPS 13

This site and nearby areas feature relatively level land being sited at approximately RL 3 m AHD according to plans supplied by Council with the proposal. The site slopes down to the south and will require a small extension of the existing hardstand as part of the proposed works.

In the locality, according to the 1:250 000 Geological Series Sheet for Ulladulla, soils are from the Permian period arising from the Shoalhaven Group, Megalong Conglomerate

featuring Wandrawandian Siltstone comprising siltstone, silty sandstone and being pebbly in part.

The site is located on the southern edge of the Sanctuary Point urban area and is within the catchment of St Georges Basin.

The site and adjoining lands are mapped by SLEP as containing Class 5 acid sulfate soils.

Sussex Inlet SPS 1

This site and nearby areas features relatively level land being sited at approximately RL 1.5 m AHD according to plans with the proposal.

In the locality, according to the 1:250 000 Geological Series Sheet for "Ulladulla", soils are from the Quaternary period comprising alluvium, gravel, swamps deposits and sand dunes.

The site is located on the northern edge of the Sussex Inlet urban area and is within the catchment of St Georges Basin.

The site and adjoining lands are mapped by SLEP as containing Class 2 and 5 acid sulfate soils.

Sussex Inlet SPS 16

This site and nearby areas feature relatively level land being sited at approximately RL 3 m AHD according to plans supplied by Council with the proposal.

In the locality, according to the 1:250 000 Geological Series Sheet for Ulladulla, soils are from the Permian period arising from the Shoalhaven Group, Megalong Conglomerate featuring Wandrawandian Siltstone comprising siltstone, silty sandstone and being pebbly in part.

The site is located to the south west of the Berrara urban area and is within the catchment of Berrara Creek.

The site and adjoining lands are mapped by SLEP as containing Class 2 and 5 acid sulfate soils.

5.2 WATER AND SOIL QUALITY ISSUES

5.2.1 Acid Sulfate Soils

Mapping accompanying the Shoalhaven LEP 2014 identifies lands which are potentially affected by acid sulfate soils. All sites are affected by potential acid sulfate soils to varying degrees as follows:

- Class 5:
  - Berry SPS 5;
  - Huskisson & Vincentia SPS 3;
  - St Georges Basin SPS 10;
  - St Georges Basin SPS 13; and
  - Sussex Inlet SPS 1.

  The activities on the Class 5 land, whilst in part are sited within 500 metres of Class 1, 2, 3 or 4 affected land, these are either not below 5 m AHD, or alternatively are not expected to lower the water table. As such, further assessment of these sites is not warranted.

- Both Classes 4 and 5:
  - Culburra SPS 5;
  - Culburra SPS 6;
  - Culburra SPS 9; and
  - Culburra SPS 10.

  Works at these sites involve excavation of soil to enable the installation of the proposed storage tanks, with approximate depths varying between 2.8 m and 4.4 m.

  It is recommended that further acid sulfate soils assessment be undertaken having regard to these sites to review the actual presence of acid sulfate soils, and if present, an acid sulfate soils management plan must be prepared, with recommendations being made for the treatment and disposal of such soils, and these being implemented in undertaking the proposed works.

- Both Classes 2 and 5:
  - St Georges Basin SPS 12; and
  - Sussex Inlet SPS 16.

  Works at these sites involve excavation of soil to enable the installation of the proposed storage tanks, with approximate depths varying between approximately 2.8 m and 2.9 m.

  It is recommended that further acid sulfate soils assessment be undertaken having regard to these sites to review the actual presence of acid sulfate soils, and if present, an acid sulfate soils management plan must be prepared, with recommendations being made for the treatment and disposal of such soils, and these being implemented in undertaking the proposed works.

5.2.2 Soil Erosion and Sedimentation Control

All proposals have the potential to result in soil erosion due to the varying degrees of excavation, stockpiling and removal of soil in order to enable the proposed storage tanks and pipes to be installed.

Irrespective of the location, in order to ensure that no sediment is exported off-site it is considered essential that soil erosion and sedimentation controls be implemented during the construction of the works. Consequently, it is recommended that Soil Erosion and Sedimentation Control Plans be prepared for each site, and which should include the following:

- Soil stockpiles being sited clear of any drainage lines;
- The installation of geotextile fabric downslope of disturbed areas;
- Provision of staked hay bales being provided where concentrated flows are likely to occur, and are to remain until such time as disturbed areas are stabilised; and
- All disturbed areas are to be stabilised as soon as possible following completion of the works.

5.3 FLORA AND FAUNA

The following section addresses flora and fauna impacts associated with the proposed activities.

Berry SPS 5

The siting of the Berry SPS 5 is on disturbed land sited between the Berry township and the Arbour Retirement Complex. The works associated with Berry SPS 5 involve the installation of a 9.05 m diameter tank within the established area of the existing SPS and no removal of mature vegetation is required to support the activity. On this basis, it is considered that adverse impacts are unlikely to arise in regards to this site.

Culburra SPS 5

The area of Culburra SPS 5 is sited within an unconstructed area of The Strand road reserve on land that is cleared and elevated to accommodate the established facilities. The proposed works involve the installation of a concrete tank having a diameter of some 6.73 m and no removal of mature vegetation is required to enable the construction to take place. According to Shoalhaven Council, mapping reveals no threatened species, ROTAP, or NSW threatened flora or fauna on the site or surrounds.

Given the above, it is considered that adverse impacts are unlikely to arise at the site of Culburra SPS 5.

Culburra SPS 6

The siting of Culburra SPS 6 is to the west of Prince Edward Avenue along an all-weather access road on land that is surrounded by native vegetation.

According to research undertaken by Shoalhaven Council, the proposed activity is sited on land that is identified as Swamp Oak Floodplain Forest, however no ROTAP, or NSW threatened flora or fauna were identified.

The proposal involves the removal of 4 small trees to enable the installation of a 7.8 m diameter concrete tank. The trees to be removed are adjacent the existing raised accessway, on the fringe of the more densely vegetated forested area, and are surrounded by more mature examples of the same species.

Given the above, it is considered that adverse impacts are unlikely to arise at this site.

Culburra SPS 9

Having regard to Culburra SPS 9, the area encompassing the proposed activity is cleared, operational land surrounded by vegetated land. Works proposed to Culburra SPS 9 involve the installation of an in-ground tank with a diameter of some 4.8 m. The works are sited entirely on an elevated pad formed in conjunction with the establishment of the SPS.

According to research undertaken by Shoalhaven Council, GIS analysis revealed no threatened flora or RPTAP species, however threatened species records identified three species and communities on or in the vicinity of the site as follows:

- Bristlebird Habitat;
- Coastal Salt Marsh; and
- Bangalay Sand Forest of the Sydney Basin and South East Corner.

Given that the proposal does not involve any vegetation clearing with all works confined to the disturbed elevated pad, it is considered that adverse impacts are unlikely to arise at this site.

Culburra SPS 10

The siting of Culburra SPS 10 is to the west of East Crescent on area that has been cleared to accommodate the SPS and its access road. The works proposed at this site involve the installation of a 7.8 m diameter concrete tank, and includes the removal of a small extent of immature vegetation immediately adjacent the SPS.

According to research undertaken by Shoalhaven Council, no threatened flora, fauna or ROTAP species are apparent at this site. However notwithstanding this, Council has advised that Bangalay Sand Forest of the Sydney Basin and South East Corner, which is an endangered ecological community (EEC), has been identified approximately 60 m from the site. In regard to this, it is noted that the EC is not directly affected by the proposal, whilst the vegetation removal associated with the upgrading in this area is restricted to a modest number of trees on the fringe of the established disturbed area associated with the established SPS.

Given the above, it is considered that adverse impacts are unlikely to arise for Culburra SPS 10.

Huskisson and Vincentia SPS 3

Huskisson and Vincentia SPS 3 is located off Sydney Street, accessed via a gravel formed road, and features a SPS with cleared surrounds. The works proposed for Huskisson and Vincentia SPS 3 involve an in-ground pipe with a length of 14.6 m. No vegetation removal is required to enable the installation of works at this site.

According to research undertaken by Shoalhaven Council, no ROTAP or threatened fauna or flora are identified as existing at the site, however Swamp Sclerophyll Forest on Coastal Floodplains and Bristlebird Habitat were identified within 200 m of the proposed site. Having regard to these matters, it is considered that the proposal will unlikely result in any adverse impact given that works are subsurface and no vegetation removal is required to support the activity.

St Georges Basin SPS 10

St Georges Basin SPS 10 is located off Loralyn Avenue and accessed via a gravel formed road. The works proposed for St Georges Basin SPS 10 involve an in-ground concrete tank with a diameter of some 6.0 m.

The proposal will require the removal of some vegetation to enable the siting of pipes and removal of a very small number of trees to enable siting of the in-ground concrete tank.

According to research undertaken by Shoalhaven Council, no ROTAP or threatened fauna or flora are identified as existing at the site, however the following species were identified within 500 m of the proposed site:

- *Syzgium Paniculatum* (ROTAP, Glossy Black Cockatoo feed tree);
- *Melaleuca Biconvexa* (significant hollow bearing tree);
- Square-tailed Kite;

- Little Lorikeet;
- Glossy Black Cockatoo; and
- Yellow-bellied Glider.

Council research has also identified the following:

- An area of Bangalay Sand Forest of the Sydney Basin and South East Corner, which is an Endangered Ecological community (EEC), is located to the west of the site along the foreshore.
- An area identified as Yellow-Bellied Glider Home Range is located approximately 160 m east of the proposed site.

It is considered that the proposal will unlikely result in any adverse impact on the EEC or Yellow-Bellied Glider Home Range given that works will not directly affect these areas.

The vegetation removal associated with the works is restricted to a modest number of trees on the fringe of an existing disturbed area associated with the established SPS. Two of the trees identified for removal are Spotted Gums *Corymbia maculata* and are considered to be potentially significant given their maturity and location. On this basis a Threatened Species Assessment has been undertaken by Gaia Research Pty Ltd to assess the impacts of the proposed removal of these trees on threatened species of fauna (see **Annexure 4**). The assessment below is based upon the findings of the Threatened Species Assessment, which includes application of the seven part test in Section 5A of the EP&A Act as amended by the *Threatened Species Conservation (TSC) Act (1995)* and application of the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act (1999)*.

According to Gaia Research, the site has been subject to previous disturbance and is now a remnant within an urban landscape. The two trees identified for removal do not contain hollows and based on diameter at breast height would be approximately 100 years old. Two threatened fauna species, the Grey-headed Flying Fox and Little Lorikeet, have been detected in the area and may forage on the trees when they are in flower.

The Grey-headed Flying Fox and Little Lorikeet are both currently listed as threatened under the *TSC Act.* The Grey-headed Flying Fox is also a listed threatened species under the *EPBC Act*.

The loss of foraging habitat (removal of two Spotted Gums) is small in comparison to that available in the area and is not considered to have a significant impact on the local (NSW) populations of Grey-headed Flying Fox and Little Lorikeet.

With respect to the seven part test, Gaia Research concluded that the proposal will not have a significant impact on the Grey-headed Flying Fox or Little Lorikeet.

With respect to the *EPBC Act*, Gaia Research concludes that the proposed development does not need to be referred to the Commonwealth Minister for the Environment.

Notwithstanding the above conclusions, Gaia Research recommend that at least four (4) parrot nest boxes be installed as an offset within the site.

St Georges Basin SPS 12

St Georges Basin SPS 12 is located off Walmer Avenue, accessed via a gravel formed road, and features a SPS with cleared surrounds. The works proposed for St Georges Basin SPS 12 involve an in-ground concrete tank with a diameter of some 10.0 m. The proposal will result in the removal of some vegetation to enable the siting of the pipes and the in-ground concrete tank, although the area affected largely comprises cleared land.

According to research undertaken by Shoalhaven Council, no ROTAP or threatened fauna or flora are identified as existing at the site, however an area of Bangalay Sand Forest of the Sydney Basin and South East Corner, which is an Endangered Ecological Community (EEC), is located to the west of the site along the foreshore.

It is considered that the proposal will unlikely result in any adverse impact on the EEC given that works will not directly affect this area.

Given that the vegetation proposed to be removed is restricted to a very modest number of trees/shrubs that are not considered significant, and are sited on the fringe of an otherwise existing disturbed area associated with the established SPS, it is considered that adverse impacts are unlikely to arise at this site.

St Georges Basin SPS 13

St Georges Basin SPS 13 is located off Irene Street, accessed via a gravel formed road, and features a SPS with cleared surrounds. The works proposed for St Georges Basin SPS 13 involve an in-ground pipe with a length of approximately 9.8 m. The proposal will result in the removal of some vegetation to enable the siting of the storage pipe and a small extension of the existing hard stand to the south and south east.

According to research undertaken by Shoalhaven Council, no ROTAP or threatened flora are identified as existing at the site, however the following were identified:

- the site is part of an area of Bangalay Sand Forest of the Sydney Basin and South East Corner, which is an Endangered Ecological Community (EEC); and

- Square-tailed Kite and Grey-headed Flying Fox have been detected within the vicinity of the site.

Having regard to these matters, it is considered that the proposal will unlikely result in any adverse impact given that vegetation proposed to be removed is not considered significant and is restricted to a very modest area on the fringe of an existing disturbed area associated with the established SPS.

Sussex Inlet SPS 1

Sussex Inlet SPS 1 is located off River Road, accessed via a gravel formed road, and features a SPS with cleared surrounds including the curtilage of an adjoining dwelling. The works proposed for Sussex Inlet SPS 1 involve an in-ground concrete tank with a diameter of approximately 6.0 m. The proposal will result in the removal of some vegetation to enable the siting of the pipes and the in-ground concrete tank.

According to research undertaken by Shoalhaven Council, no ROTAP or threatened fauna or flora are identified as existing at the site, however the following have been identified:

- SEPP 14 Coastal Wetland - immediately north of the site;
- Swamp Sclerophyll Forest on Coastal Floodplains - immediately north of the site;
- Swamp Oak Floodplain Forest - 170 m north east of the site;
- Coastal Saltmarsh - 35m north of the site; and
- *Pterostylis ventricosa* (an orchid species) - 650 m west of the site.

Having regard to these matters, it is considered that the proposal will unlikely result in any adverse impact given that:

- The proposed vegetation is not significant;
- works will not directly affect the above listed habitats/species; and
- vegetation proposed to be removed is restricted to a very modest area on the fringe of an existing disturbed area associated with the established SPS and surrounding residences.

Sussex Inlet SPS 16

Sussex Inlet SPS 16 is located south of Lakeland Avenue and features a SPS with cleared surrounds that include a small area of ornamental landscape planting. The works proposed for Sussex Inlet SPS 16 involve an in-ground concrete tank with a diameter of approximately 4.0 m. Removal of a small area of existing landscape planting is required to enable the installation of works at this site.

According to research undertaken by Shoalhaven Council, no ROTAP or threatened fauna or flora are identified as existing at the site, however the following have been identified:

- Swamp Oak Floodplain Forest - 40 m north of the site;
- Bangalay Sand Forest of the Sydney Basin and South east Corner - 220 m south west of the site; and
- Recordings of Powerful Owl - 200 m north east of the site.

Having regard to these matters, it is considered that the proposal will unlikely result in any adverse impact given that the proposal is located within an existing disturbed area associated with the established SPS and only requires removal of a small area of existing landscape planting.

Conclusion

The above assessment has considered the impacts of the proposed activity on threatened species and their habitats. For all sites the proposed works are considered to be relatively minor and will either affect land which is already disturbed, and/or will not result in the removal of any vegetation or involves the removal of a very small extent of vegetation. In addition, the significant environmental benefits that arise from the ability to store untreated sewage waste to prevent unplanned discharges in to the environment, including sensitive waterways will better protect the environment.

Despite the above, although no significant impacts on threatened species or their habitats are expected from the proposed activity, it is recommended that following mitigation measures be implemented to ensure that impacts are minimised:

- at least four (4) parrot nest boxes be installed as an offset within the site of St Georges Basin SPS 10;
- sediment and erosion control to ensure that sediment is not exported off site; and
- preparation of a Construction Management Plan which is to include the siting of the construction compound, vehicular access to the site; vehicle and crane parking, material storage areas, all of which are to be undertaken on disturbed areas.

5.4 VISUAL IMPACT

The various sewage pumping stations contain lands which are already developed to varying degrees with features including in-ground pump stations, above ground electrical boards, vent shafts, and hard stand areas.

The proposed works have the potential to impact on the visual amenity of the locality through:

- tree removal and vegetation clearance;
- excavation and disturbances to enable the storage facilities to be installed; and
- the provision of storage facilities involving either tanks or pipes.

For the most part, the proposed activities are either:

- temporary in nature, having regard to the construction impacts; or
- sited either subsurface or at ground level, such that no significant long term visual impacts arise; or
- are very minor having regard to the vent shafts; or
- are in remote locations where impacts are not perceived.

As a result of the above, no significant mitigation is required.

5.5 HERITAGE

5.5.1 Indigenous Heritage

Attached as **Annexure 3** is an Aboriginal Due Diligence Assessment report which has considered the potential impacts of the proposed activities on indigenous cultural heritage. The assessment has addressed the requirements of the DECCW *"Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales"*.

The Aboriginal Due Diligence Assessment has concluded that the affected sites are not constrained by potential Aboriginal sites due to the nature of the lands the subject of the works, which are already disturbed by the established sewer pumping stations, and as such, it is considered that these areas are not constrained.

Notwithstanding the above, the Aboriginal Due Diligence Assessments have made recommendations in regard to all sites that if any aboriginal material is unearthed, work will be required to cease immediately and advice from National Parks & Wildlife Service will be sought before work continues.

5.5.2 Non-Indigenous Heritage

A search of SLEP and the State Heritage Register has been carried out to determine if the sites have been listed as an item of environmental heritage or included in any Local Environmental Plan as an item or included within any Heritage Studies. No record of the site has been found after searches of these documents.

There is an identified heritage items in the vicinity Berry SPS 5. In this regard, Berry SPS 5 is located opposite a public reserve that is identified under the Shoalhaven SLEP 2014. The proposed works in this location are restricted to the installation of an in ground

concrete tank which will not be prominent in the landscape. No significant impacts are expected to arise during the construction of the activities.

Consequently, impacts on the identified heritage item are not anticipated and no mitigation is required.

Under these circumstances, it is considered the proposed works do not affect an item with any heritage significance.

5.6 TRAFFIC AND TRANSPORTATION IMPACTS

Traffic impacts associated with the proposed works are expected to occur from traffic and parking associated with work crews undertaking the relevant construction activities. In this regard, once constructed, traffic generation at the sites is not anticipated to increase beyond that already experienced in the maintenance of the various SPS.

All of the established SPS are currently accessible by vehicles and equipment and therefore access should not present any difficulty. No upgrading of the existing access arrangements is considered necessary although it is noted that the siting of some of the works will affect the existing access and in those instances, modification in order to continue the provision of access will be necessary.

Having regard to the impacts associated with construction traffic, these will only occur for a short period expected to be approximately 4 weeks, and as such, are unlikely to lead to significant adverse traffic conflicts. Notwithstanding this, it is considered that Traffic Management Plans should be prepared for the construction phase of the works in order to ensure that construction traffic and contractor parking is properly managed to avoid impacts.

5.7 AMENITY IMPACTS

The proposal has the potential to impact on the amenity of the locality during construction works.

Construction impacts associated with the works would mainly relate to noise. These impacts are somewhat mitigated by virtue of:

- The siting of actual works being relatively remote from sensitive receiving environments such as residential dwellings;
- the limited construction phase being approximately 4 weeks;
- works being undertaken during normal daylight hours; and

- all plant and equipment operating at the site being used between 7:00 am and 5:00 pm during weekdays and 8:00 am to 1:00 pm on weekends as background noise levels are normally higher than other times during the day. No work is to be undertaken on Sundays.

Dust impacts are not anticipated due to the limited traffic generated during the construction phase and the provision of vehicular access to the sites.

5.8 SERVICING

The subject sites are serviced with all essential infrastructure necessary for the establishment and maintenance of this activity. In this regard, it is noted that the various sites already contain an existing sewage pumping station, which are already operational and serviced with essential infrastructure necessary to support the activities being undertaken.

5.9 WASTE MANAGEMENT

The proposal will result in the generation of waste in the removal of excavated material to enable the in-ground tanks and pipes to be installed. Furthermore, the installation process may result in some surplus materials requiring disposal.

The generation of waste from excavation introduces Acid Sulphate Soils issues which have been addressed above in Section 5.2.1. This will require the preparation of further acid sulfate soils assessment for the following sites:

- Culburra SPS 5;
- Culburra SPS 6;
- Culburra SPS 9;
- Culburra SPS 10;
- St Georges Basin SPS 12; and
- Sussex Inlet SPS 16.

In addition to the above, mitigation measures are also recommended in the form of the preparation of a Waste Minimisation and Management Plan for all sites, and compliance with its recommendations.

5.10 NATURAL HAZARDS

5.10.1 Bushfire

All sites are identified by mapping prepared by Shoalhaven Council and endorsed by the NSW Rural Fire Service as being bushfire prone to varying degrees, with the exception of Berry SPS 5. Berry SPS 5 is located on cleared land, with adjoining and nearby land being well managed such that minimal bushfire threat is apparent. Having regard to all other sites, these are located with more significant vegetation in close proximity, thus warranting the bushfire prone status.

Development in bushfire prone areas is typically affected by the provisions of Planning for Bush Fire Protection 2006 (PBP) which aims to control development to provide for the protection of human life (including firefighters) and to minimise impacts on property from the threat of bush fire, while having due regard to development potential, on-site amenity and protection of the environment. The provisions of PBP have been examined and these do not affect the proposed activity due to its nature.

Having regard to bushfire risks, the proposed works are not expected to be impacted by bushfire given that:

- the works affect existing assets and the proposed works do not seek to introduce a new use to the bushfire prone lands;
- the works are predominantly subsurface, are of non-flammable materials and supplement the existing infrastructure; and
- the proposed works do not increase the risk of bushfire on the established infrastructure.

Given the above, no mitigation measures are recommended having regard to bushfire.

5.10.2 Flooding

All sites, except for Sussex Inlet SPS 16, are identified by mapping prepared by Shoalhaven City Council as being potentially flood affected. Indeed, it is the low-lying nature of the relevant SPS that has deemed them appropriate for the proposed upgrading works in order that discharges are contained, rather than escaping into nearby waterways and low-lying areas.

Having regard to flooding risks, the proposed works are not expected to be impacted given that:

- the assets are all existing and the proposed works do not seek to introduce a new use to the flood prone lands;

- the works are of a nature that will not be impacted by inundation by floodwaters; and
- the works do not significantly alter the current level of the land and therefore will not lead to the displacement of floodwaters to impact on nearby properties.

Given the above, no mitigation measures are recommended having regard to flooding.

6.0 CONSIDERATION OF ENVIRONMENTAL IMPACTS

A Determining Authority's duty to consider environmental impact is set out in Section 111 of the EP&A Act. Pursuant to Section 111 Council has:

> *"examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity."*

Table 3 below addresses the specific matters to consider outlined in Section 111.

Table 3

Section 111 of EP&A Act

Matter to be Considered	Comment
any conservation agreement entered into under the *National Parks and Wildlife Act 1974* and applying to the whole or part of the land to which the activity relates, and any plan of management adopted under that Act for the conservation area to which the agreement relates	No conservation agreements apply to the land affected by the proposed activity.
any joint management agreement entered into under the *Threatened Species Conservation Act 1995*	No joint management agreement under the Threatened Species Conservation Act applies to the land affected by the proposed activity.
any biobanking agreement entered into under Part 7A of the *Threatened Species Conservation Act 1995* that applies to the whole or part of the land to which the activity relates	No bio-banking agreement under the Threatened Species Conservation Act applies to the land affected by the proposed activity.
the effect of an activity on any wilderness area (within the meaning of the *Wilderness Act 1987*) in the locality in which the activity is intended to be carried on	There are no declared wilderness areas in the vicinity of the site affected by the proposed activity.
critical habitat	Declared critical habitat is restricted to: • Gould's Petrel, • Little penguin population in Sydney's North Harbour, • Mitchell's Rainforest Snail in Stotts Island Nature Reserve, and • Wollemi Pine. The proposed activity does not affect these areas.
in the case of threatened species, populations and ecological communities, and their habitats, whether there is likely to be a significant effect on those species, populations or ecological communities, or those habitats	The land the subject of the proposed activity comprises disturbed lands which contain no native vegetation and as such the proposal is not expected to impact threatened species, population and ecological communities and their habitats.
any other protected fauna or protected native plants within the meaning of the *National Parks and Wildlife Act 1974*	As the proposal does not affect native vegetation, no impacts are expected.

Having regard to the above, Section 5A of the EP&A Act identifies a number of factors that must be taken into account to determine whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats. These factors, commonly called "7-part test", must be taken into account when addressing Section 111 factors listed above.

Assessments for most sites indicate that it is unlikely that there would be threatened species, threatened populations, endangered ecological communities, or their habitats in the area that would be significantly affected by the proposed activities. An assessment of the significantly disturbed nature of the sites with no native vegetation of significance being impacted and the minor additional disturbances proposed, also indicated that the likelihood of threatened species is very low.

A Threatened Species Assessment has been undertaken by Gaia Research Pty Ltd to assess the impacts associated with the proposed removal of two more significant trees at the site of St Georges Basin SPS 10 (see **Annexure 4**). With respect to the seven part test, Gaia Research concluded that the proposal will not have a significant impact on any listed threatened species.

As such, it has been determined that overall the proposal is unlikely to have a significant impact on threatened species and a species impact statement is not required.

The likely environmental effect of the proposed activity, provision of emergency storage capacity adjacent to sewage pumping stations in order to provide emergency storage of untreated sewage have also been assessed by considering each of the matters set out in Clause 228 of the Regulations.

(a) any environmental impact on a community

The proposed works minimise impacts on the environment given that these are largely confined to areas that have already been disturbed, or alternatively are curtailed through minimising the extent of disturbance to only that necessary to enable the works to be done.

A Threatened Species Assessment undertaken by Gaia Research Pty Ltd to assess the impacts associated with the proposed removal of two more significant trees at the site of St Georges Basin SPS 10 (see **Annexure 4**), concluded that the proposal will not have a significant impact on any listed threatened species or communities.

Balancing any potential adverse impacts associated with the activities is the significant positive outcome resulting in the provision of emergency storage for untreated effluent, which otherwise may enter the environment.

(b) any transformation of a locality

None of the localities will be transformed as a result of Council's proposal. In this regard, all sites already contain sewer pumping stations which involve cleared land, raised pads, all-weather access, pump stations and essential infrastructure. The proposed activities are all predominantly subsurface, and will not result in any significant adverse visual impacts. The current use of the sites will continue the current practices.

(c) any environmental impact on the ecosystem of the locality

Having regard to all of the sites the subject of this REF, the proposed works are not expected to have any significant impact on ecosystems.

(d) any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality

The proposals will not significantly reduce the aesthetic, scientific or environmental quality of any of the localities.

(e) any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations

The properties the subject of the REF has not been identified by either Council or Government Agencies through either Shoalhaven LEP or the State Heritage Register as having such values.

Having regard to indigenous cultural heritage matters, the works are proposed on land which has been disturbed by past development practices, primarily due to the construction of the sewer pumping stations.

(f) any impact on the habitat of protected fauna (within the meaning of the National Parks & Wildlife Act 1974)

The proposed works do not impact on the habitat of protected fauna as the proposal is on land that is already disturbed by past activities.

(g) any endangering of any species of animal, plant or other form of life, whether living on land, or water or in the air

The relatively disturbed nature of the sites, and the minor disturbances necessary to enable the works to proceed, will not endanger any plant or animal species.

(h) any long-term effects on the environment

The proposed works will not alter the existing environment to any significant extent and no long-term effects are anticipated.

(i) any degradation of the quality of the environment

This assessment has not identified that there will be any significant effect on the quality of the environment.

(j) any risk to safety of the environment

The REF outlines measures to minimise the risk to the environment. For the most part, the proposed works improves environmental outcomes through the provision of storage capacity to minimise risk of untreated effluent discharging to the environment.

(k) any reduction in the range of beneficial uses of the environment

The proposed works will not reduce the range of beneficial uses of the environment. In this regard, the works are modest in nature, and are to be undertaken adjacent existing sewage pumping stations.

It is not expected that the proposed works will reduce any beneficial uses of the local environment.

(l) any pollution of the environment

The recommendations of this REF include soil and water management during the construction phase, which when implemented will ensure that the proposal adequately controls disturbed soil to avoid the pollution of the local environment.

On this basis, the proposal is unlikely to result in the pollution of the environment. On the contrary, the works are proposed in order to provide emergency storage capacity for various SPS in order that unanticipated failures in the sewerage system do not lead to the pollution of the environment through untreated sewerage entering the environment.

(m) any environmental problems associated with the disposal of waste

Provided the measures recommended in this REF are implemented, particularly having regard to the assessment of acid sulfate soils, no environmental problems associated with the disposal of waste are expected.

(n) any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply

The activity will result in the use of concrete tanks and pipes to provide the storage capacity, whilst the plan and equipment used to undertake the construction activities will

utilise diesel fuel. These materials are not currently in short supply or likely to become in short supply.

(o) any cumulative environmental effect with other existing or likely future activities.

The proposal is specific to the relevant sewage pump stations the subject of the REF which have environmental characteristics only relevant to that land.

Notwithstanding this, the proposed activity has beneficial environmental impacts through the provision of emergency storage of untreated sewerage, that if other SPS are similarly upgraded, any impacts would be of similar benefit in avoiding unintended discharges.

(p) any impact on coastal processes and coastal hazards, including those under projected climate change conditions.

For those locations near the coast (being Culburra SPS 5, Culburra SPS 6, Culburra SPS 9, Culburra SPS 10, Huskisson and Vincentia SPS 3, St Georges Basin SPS 10, St Georges Basin SPS 12, St Georges Basin SPS 13, Sussex Inlet SPS 1 and Sussex Inlet SPS 16), the actual construction of the proposed works will not have any significant adverse impacts on coastal processes or hazards, provided that the mitigation measures recommended in this REF (acid sulfate soils assessment, and erosion and sedimentation controls) are implemented.

7.0 RECOMMENDATIONS FOR ENVIRONMENTAL MANAGEMENT

7.1 LICENCES AND APPROVAL REQUIREMENTS

All activities carried out in the project area as part of the demolition and construction must comply with relevant environmental legislation and regulations. Section 4.0 of this REF details the overall legislation framework which relates to a project of this nature. Other approvals that may be required under State legislation are provided in **Table 4** below. As indicated some of the approvals listed are not, at this stage, required but depending on the nature of the demolition and construction activities may be required as work proceeds.

Table 4

Approvals under NSW Legislation

Act	***Authority***	***Requirements***
Environmentally Hazardous Chemicals Act, 1985	Environment Protection Authority	Requires the keeping or distribution of certain chemicals that are notified from time to time by the EPA are licensed under the Act.
Protection of the Environment Operations Act, 1997	Environment Protection Authority	Council would need to ensure that waste is disposed to an EPA approved waste depot. Licences are also required for the generating or storing certain hazardous wastes.
Heritage Act 1977	NSW Heritage Office	If any heritage sites are disturbed an excavation permit for disturbing sites known or suspected to contain relics would be required.
National Parks and Wildlife Act 1974 Section 90	NPWS	If there is destruction or disturbance of an Aboriginal relic or place, approval would be required under s.90.

7.2 RECOMMENDATIONS FOR ENVIRONMENTAL MANAGEMENT

The recommendations of this REF seek to ensure that Council will undertake the construction activities so that potential environmental impacts are avoided or minimised.

Council (and any contractors) should manage environmental impacts by careful planning and implementation of best management environmental mitigation practices during construction activities.

To fulfil these obligations, Council (and any contractors) should comply with the following recommendations for each of the sites:

Site Management

- A Construction Management Plan should be prepared by the contractor and include:
  - site compound;
  - vehicular access to the site;
  - vehicle, plant and crane parking, which is to be undertaken on disturbed areas;
  - material storage area;
  - disposal of waste. In this regard, a Waste Minimisation and Management Plan is to be incorporated into the CMP and which is to detail the waste generation, storage and disposal with a view to minimising the disposal of waste to landfill;
  - Soil Erosion and Sedimentation Control Plans which must consider:
    - Soil stockpiles being sited clear of any drainage lines;
    - The installation of geotextile fabric downslope of disturbed areas;
    - Provision of staked hay bales being provided where concentrated flows are likely to occur, and are to remain until such time as disturbed areas are stabilised; and
    - All disturbed areas are to be stabilised as soon as possible following completion of the works.

Vegetation Protection

- Works are to be undertaken in a manner to avoid the unnecessary removal of vegetation.
- Trees and other vegetation to be retained should be suitably identified, accurately marked and protected prior to any vegetation removal.

Threatened Species

- In order to offset the removal of more significant vegetation of the site of St Georges Basin SPS 10, at least 4 parrot nest boxes are to be installed within the site, supervised by a suitably qualified and experienced ecologist.

Acid Sulfate Soils

- For the following sites:
  - Culburra SPS 5;
  - Culburra SPS 6;
  - Culburra SPS 9;

- Culburra SPS 10;
- St Georges Basin SPS 12; and
- Sussex Inlet SPS 16.

An Acid Sulfate Soils Assessment is to be undertaken to determine the actual extent of acid sulfate soils, and if present, an Acid Sulfate Soils Management Plan must be prepared, with recommendations being made for the treatment and disposal of such soils, and these being implemented in undertaking the proposed works.

Water Quality

- Council must require that all measures recommended by the Soil Erosion and Sedimentation Control Plan are installed prior to works being undertaken and must be maintained for the duration of works until disturbed areas are stabilised.

Air Quality General Requirements

- All site vehicles and machinery should be fitted with appropriate emission control equipment, maintained frequently and serviced to manufacturer's specifications.

Noise Quality

- All construction work is to be programmed to ensure minimal disturbance to the local community.
- Noisy plant and equipment is to be used between 7:00 am and 5:00 pm during weekdays and 8:00 am to 1:00 pm on Saturdays as background noise levels are normally higher than other times during the day. No work is to be undertaken on Sundays.
- Loud equipment should where possible have a noise directional characteristic so that noise is minimised in sensitive areas.
- Keep engine covers closed.
- Ensure that noisy machinery is not left running when not required.
- All construction equipment is to be well maintained.

Heritage

- All personnel are to be informed of their legal obligations if any Indigenous heritage material is uncovered during demolition and construction works.
- Council will seek an Aboriginal Heritage Impact Permit if required to remove or harm any objects uncovered by the works.

- Council will seek approval from the NPWS for consent to destroy any artefact so found if necessary.

Traffic

- Traffic Management Plans should be prepared for the construction phase of the works in order to ensure that construction traffic and contractor parking is properly managed to avoid impacts on the public road network.
- All temporary vehicle parking during the construction phase is to be undertaken on existing disturbed areas and no vegetation clearance or disturbance is permitted.

Maintenance of Machinery and Equipment (Storage, Maintenance and Refuelling)

- Where practicable maintenance and repairs of machinery and equipment is to be undertaken off-site. Storage of plant and equipment shall be limited to the area identified in the Construction Management Plan.

Consultation

- Council shall consult with the community and provide an opportunity to comment on the proposed works:

8.0 CONCLUSION AND RECOMMENDATIONS

The purpose of this report is to address the environmental impacts specifically associated with:

- the provision of emergency overflow storage facilities connected to a number of sewage pumping stations in either in-ground storage tanks, or underground pipes. This REF has been prepared in accordance with the requirements of Part 5 and Clause 228 of the Environment Planning & Assessment Act and Regulations respectively.

The report has found that:

- For all sites:
    - The proposal is not inconsistent with any state legislation or policies, regional or local planning provisions.
    - The proposal will not adversely impact any threatened flora and fauna or their habitats.
    - The proposal will not unreasonably impact on the visual amenity of the locality.
    - The proposal is a positive one that will result in the provision of emergency storage to avoid untreated effluent waste being discharged into the environment form the sewerage system.
    - Measures will need to be incorporated during the construction phase of the development. In this regard:
        - A Construction Management Plan should be prepared by the contractor and include:
            - site compound;
            - vehicular access to the site;
            - vehicle, plant and crane parking, which is to be undertaken on disturbed areas;
            - material storage area;
            - disposal of waste. In this regard, a Waste Minimisation and Management Plan is to be incorporated into the CMP and which is to detail the waste generation, storage and disposal with a view to minimising the disposal of waste to landfill;
            - Soil Erosion and Sedimentation Control Plans which must consider:
                - Soil stockpiles being sited clear of any drainage lines;
                - The installation of geotextile fabric downslope of disturbed areas;
                - Provision of staked hay bales being provided where concentrated flows are likely to occur, and are to remain until such time as disturbed areas are stabilised; and

- All disturbed areas are to be stabilised as soon as possible following completion of the works.

- If during demolition or construction works any aboriginal relics are uncovered, all works are to cease and advice will be sought from National Parks & Wildlife Service before work continues.
- Council must undertake consultation with the community.

- For St Georges Basin SPS 10, it is recommended that at least four (4) parrot nest boxes be installed within the site as an offset for the removal of more significant vegetation.

9.0 DETERMINATION

This Review of Environmental Factors assesses the likely impact of a proposal by Shoalhaven City Council (Assets and Works) for:

- the provision of emergency overflow storage facilities connected to a number of sewage pumping stations in either in-ground storage tanks, or underground pipes. This REF has been prepared in accordance with the requirements of Part 5 and Clause 228 of the Environment Planning & Assessment Act and Regulations respectively.

Shoalhaven City Council has:

(i) engaged Cowman Stoddart Pty Ltd, Town Planning, Agricultural and Environmental Consultants, to prepare a Review of Environmental Factors which describes the proposed works and assesses likely environmental impacts in accordance with Part 5 of the Environmental Planning and Assessment ACT 1979;

(ii) considered the potential environmental effects of the proposal and the effectiveness and feasibility of means of reducing or preventing detrimental effects.

I, …….. as Director, Assets and Works, of Shoalhaven City Council hereby determine that the proposed works will proceed.

(i) I have determined that it is unlikely that there will be any significant environmental impact as a result of the proposed works;

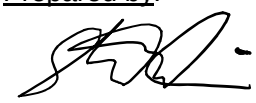
(ii) the proposed safeguards identified in the REF are to be adopted;

(iii) no environmental impact statement is required for the proposed works; and

(iv) the proposed activity is not likely to significantly affect threatened species, populations or ecological communities or their habitats and a Species Impact Statement is not required.

.....	.....
Director **Shoalhaven Water** **Shoalhaven City Council**	Date

Prepared by:



Stuart Dixon **Cowman Stoddart Pty Ltd**	22 December 2015 Date

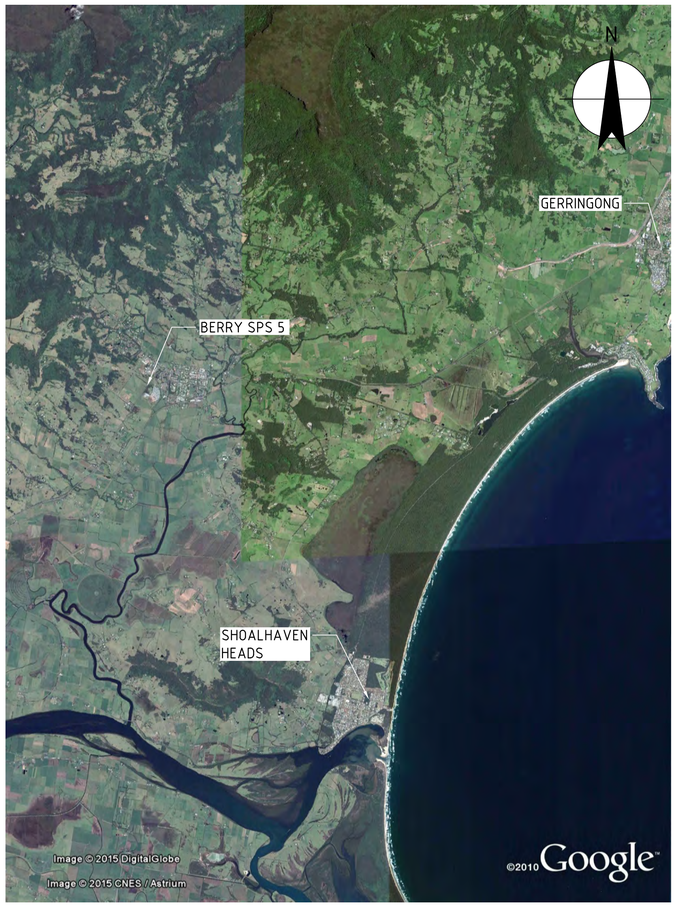
ANNEXURE 1

ANNEXURE 1

Plans of Development

SHOALHAVEN WATER

SPS EMERGENCY STORAGE UPGRADE



LOCALITY PLAN
NTS

DRAWING SCHEDULE

DRG No.	DRAWING TITLE
24051-100	LOCALITY PLAN AND DRAWING SCHEDULE
24051-101	GENERAL AND CONSTRUCTION NOTES
24051-102	SPECIFICATION FOR EMERGENCY STORAGE TANK
24051-103	CONCRETE AND REINFORCEMENT NOTES SHEET 1 OF 2
24051-104	CONCRETE AND REINFORCEMENT NOTES SHEET 2 OF 2
24051-120	HUSKISSON AND VINCENTIA SPS 3 - PLAN AND LONGITUNIDAL SECTION
24051-121	HUSKISSON AND VINCENTIA SPS 3 - STORAGE PIPE DETAILS
23835-110	CULBURRA SPS 5 - PLAN AND LONGITUNIDAL SECTION
23835-111	CULBURRA SPS 5 - EMERGENCY STORAGE TANK DETAILS
23835-112	ACCESS HATCH DETAILS
23835-120	CULBURRA SPS 6 - PLAN AND LONGITUNIDAL SECTION
23835-121	CULBURRA SPS 6 - EMERGENCY STORAGE TANK DETAILS
23835-130	CULBURRA SPS 9 - PLAN AND LONGITUNIDAL SECTION
23835-131	CULBURRA SPS 9 - EMERGENCY STORAGE TANK DETAILS
23835-140	CULBURRA SPS 10 - PLAN AND LONGITUNIDAL SECTION
23835-141	CULBURRA SPS 10 - EMERGENCY STORAGE TANK DETAILS
24171-110	SUSSEX INLET SPS 1 - PLAN AND LONGITUDINAL SECTION
24171-111	SUSSEX INLET SPS 1 - EMERGENCY STORAGE TANK DETAILS
24171-120	SUSSEX INLET SPS 16 - PLAN AND LONGITUDINAL SECTION
24171-121	SUSSEX INLET SPS 16 - EMERGENCY STORAGE TANK DETAILS
23808-100	ST. GEORGE'S BASIN SPS 10 - PLAN AND LONGITUDINAL SECTION
23808-101	ST. GEORGE'S BASIN SPS 10 - EMERGENCY STORAGE TANK DETAILS
23808-102	MISCELLANEOUS DETAILS
23808-110	ST. GEORGE'S BASIN SPS 12 - PLAN AND LONGITUDINAL SECTION
23808-111	ST. GEORGE'S BASIN SPS 12 - EMERGENCY STORAGE TANK DETAILS
23808-120	ST. GEORGE'S BASIN SPS 13 - PLAN AND LONGITUDINAL SECTION
23808-121	ST. GEORGE'S BASIN SPS 13 - STORAGE PIPE DETAILS
23702-100	BERRY SPS 5 - PLAN AND LONGITUDINAL SECTION
23702-101	BERRY SPS 5 - EMERGENCY STORAGE TANK DETAILS
23702-102	BERRY SPS 5 - EMERGENCY STORAGE TANK DETAILED SECTIONS

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

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CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

DESIGNED:	MH	DATE: 18.03.15	COMPANY: GHD
DRAWN:	KM	DATE: 18.03.15	COMPANY: GHD
CHECKED:	SR	DATE: 12.06.15	COMPANY: GHD
APPROVED:	CS	DATE: 15.01.16	COMPANY: GHD

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

LOCALITY PLAN AND DRAWING SCHEDULE

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
	NTS		24051	100	0

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GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE DRAWINGS, WITH WATER SERVICES ASSOCIATION OF AUSTRALIA - SEWERAGE SUPPLY CODE OF AUSTRALIA - WSA 02-2002 V2.3 AND SHOALHAVEN WATER'S SUPPLEMENT TO THE WATER SERVICES ASSOCIATION OF AUSTRALIA - SEWERAGE SUPPLY CODE OF AUSTRALIA (WSA 02-2002) VERSION 2.3 THESE NOTES AND THE SPECIFICATION. THE CONTRACTOR SHALL ENSURE THAT THEY ARE CONVERSANT WITH ALL CURRENT REVISIONS, AMENDMENTS AND UPDATES THAT SHOALHAVEN WATER HAS MADE TO THEIR STANDARDS.
2. THE CONTRACTOR SHALL OBTAIN A SECTION 138 CONSENT FROM SHOALHAVEN CITY COUNCIL TO OPERATE A CONSTRUCTION SITE WITHIN THE ROAD RESERVE. THE CONTRACTOR SHALL COMPLY WITH ALL CONDITIONS CONTAINED WITHIN THE SECTION 138 CONSENT.
3. THE CONTRACTOR SHALL OBTAIN AN APPROVED ROAD OCCUPANCY LICENCE FROM ROADS AND MARITIME SERVICES (RMS) WHEN WORKS IMPACT THE RMS ROADS.

SURVEY, SET OUT AND ASSET RECORDING:

4. ALL LEVELS ARE IN METRES TO AHD.
5. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56- 94).
6. THE CONTRACTOR IS DIRECTLY RESPONSIBLE FOR ENSURING THE PROJECT SET OUT IS CONSISTENT WITH THE DESIGN. THE CONTRACTOR SHALL PROVIDE ALL LABOUR, MATERIALS AND EQUIPMENT NECESSARY FOR THE ACCURATE SETTING OUT OF THE ENTIRE WORKS. THE CONTRACTOR SHALL ENSURE THE PIPES ARE LAID TO CORRECT INVERT LEVELS. SHOULD ACTUAL SITE CONDITIONS CONFLICT IN ANY WAY WITH THAT DOCUMENTED, THE CONTRACTOR SHALL CONTACT THE SUPERINTENDENT FOR CLARIFICATION BEFORE PROCEEDING.
7. THE CONTRACTOR IS TO ENGAGE A SUITABLY QUALIFIED AND EXPERIENCED SURVEYOR TO UNDERTAKE ASSET RECORDING OF THE WORK. ALL SURVEYOR WORKS AND DATA RECORDING SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE SHOALHAVEN WATER TECHNICAL SPECIFICATION FOR WORK AS EXECUTED INFORMATION.
8. ALL CHAINAGES ARE IN METRES.
9. OFFSET FROM PARALLEL SERVICES ARE FOR INFORMATION ONLY AND ARE APPROXIMATE CENTRELINE TO CENTRELINE DISTANCES.

PRODUCTS AND MATERIALS:

10. ALL PRODUCTS AND MATERIALS SHALL COMPLY WITH THE DRAWINGS AND THE SPECIFICATION.
11. BOLLARDS TO BE HEAVY DUTY GALVANIZED STEEL'SECURAPOST' 1200mm HIGH 125 NB WITH PADLOCK AND SLEEVE BY LEDA SECURITY PRODUCTS OR APPROVED EQUIVALENT. FINISH SHALL BE FACTORY POWDER COAT TO AS3715 IN 'INDUSTRIAL YELLOW', WALL THICKNESS TO BE NOM. 5.4mm. BOLLARDS TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS AND DETAILS.

APPURTENANCES (FITTINGS):

12. ALL DUCTILE IRON VALVES, FITTINGS AND BENDS SHALL BE NYLON OR FUSION BONDED EPOXY (FBE) COATED TO AS/NZS 4158.
13. MINIMUM PRESSURE RATING FOR ALL VALVES SHALL BE PN16.
14. VALVES AND FITTINGS TO BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATION.

EMBEDMENT:

15. ACCEPTABLE EMBEDMENT MATERIALS INCLUDE COMPACTION SAND (IN ACCORDANCE WITH WSA-PS-360), 5mm MINUS CRUSHED ROCK (IN ACCORDANCE WITH WSA-PS-361).
16. EMBEDMENT SHALL BE COMPACTED TO A DENSITY INDEX OF AT LEAST 60% IN NON-TRAFFICABLE AREAS AND 70% IN TRAFFICABLE AREAS.
17. AFTER PLACEMENT, THE MATERIAL SHALL BE WORKED TO ENSURE ALL VOIDS, ESPECIALLY AT HAUNCHES, ARE FILLED. WHERE COMPACTION IS REQUIRED USE HAND TAMPERS, SURFACE PLATE VIBRATORS OR VIBRATORY ROLLERS. COMPACTED LIFT THICKNESS SHALL NOT EXCEED 300mm. WHERE HAND TAMPERS ARE USED, THE LIFT THICKNESS SHALL NOT EXCEED 150mm, THE LENGTH OF THE VIBRATOR OR HALF THE PIPE DIAMETER (WHICHEVER IS GREATER).

BACKFILL:

18. IN NON-TRAFFICABLE AREAS, TRENCH BACKFILL SHALL CONSIST OF TRENCH SPOIL FREE OF STONES LARGER THAN 100mm, COMPACTED TO AT LEAST 95% DRY DENSITY RATIO IN ROAD VERGES AND 90% ELSEWHERE. COMPACTED LIFT THICKNESS SHALL NOT EXCEED 300mm.
19. IN TRAFFICABLE AREAS, TRENCH BACKFILL SHALL CONSIST OF CRUSHED ROCK CLASS 2 SUB-BASE MATERIAL WITH PLASTICITY INDEX LESS THAN 12, 100% PASSING 19 SIEVE AND 6-20% 0.075 SIEVE. COMPACT TO AT LEAST 95% DRY DENSITY RATIO IN LAYERS NOT EXCEEDING 300mm.
20. COMPACTION TRIALS AND COMPACTION TESTING SHALL BE UNDERTAKEN IN ACCORDANCE WITH SPECIFICATION.

OTHER SERVICES:

21. TO RECEIVE THE MOST UP TO DATE INFORMATION PRIOR TO CONSTRUCTION, "DIAL BEFORE YOU DIG" SHALL BE UNDERTAKEN BY THE CONTRACTOR TO AID IN THE LOCATION OF OTHER SERVICES. OTHER SERVICES SHALL BE CAREFULLY LOCATED PRIOR TO FULL EXCAVATION AT THE CONTRACTOR'S COST. IF A SERVICE CLASH ARISES THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE SUPERINTENDENT. RECORDS OF SERVICE LOCATION SHALL BE SUBMITTED TO THE SUPERINTENDENT AT THE COMPLETION OF THE WORKS. CLEARANCES BETWEEN PROPOSED SERVICES/WORKS AND OTHER UNDERGROUND SERVICES SHALL BE IN ACCORDANCE WITH TABLE 4.2 IN SHOALHAVEN WATER SUPPLEMENT TO WSA02- 2002-V2.3.
22. THE CONTRACTOR SHALL NOTIFY THE RELEVANT SERVICE AUTHORITIES PRIOR TO THE COMMENCEMENT OF SERVICE LOCATIONS AND CONSTRUCTION IN THE VICINITY OF SERVICES.

ACCEPTANCE TESTING:

23. TESTING SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE SPECIFICATION.
24. ALL TEST RESULTS SHALL BE DOCUMENTED AND REPORTED TO THE SUPERINTENDENT.
25. THE CONTRACTOR &/OR CONSULTANT SHALL PROVIDE 5 DAYS NOTICE TO THE SUPERINTENDENT PRIOR TO TESTING BEING UNDERTAKEN.
26. THE CONTRACTOR SHALL PROVIDE AT LEAST 7 DAYS NOTICE TO THE SUPERINTENDENT PRIOR TO CONNECTING NEW WORKS TO THE EXISTING NETWORK.
27. READ THESE NOTES IN CONJUNCTION WITH OTHER ENGINEERING DRAWINGS AND SPECIFICATIONS, AND WITH SUCH OTHER WRITTEN INSTRUCTIONS ISSUED. IN CASE OF DISCREPANCY, PRECEDENCE IS GIVEN TO DRAWINGS, THEN NOTES, THEN SPECIFICATION.

CONSTRUCTION NOTES:

28. CARRY OUT WORK IN A SAFE MANNER IN ACCORDANCE WITH APPLICABLE LEGISLATION, STATUTORY REGULATIONS, BY-LAWS OR RULES. CONTRACTOR IS RESPONSIBLE FOR HEALTH AND SAFETY OF SITE PERSONNEL AND GENERAL PUBLIC IN ACCORDANCE WITH WORK HEALTH AND SAFETY ACT 2011, LEGISLATIVE REQUIREMENTS, ASSOCIATED REGULATIONS AND CODES OF PRACTICE, INDUSTRIAL AGREEMENTS AND ACCEPTED INDUSTRY PRACTICE.
29. REFER DISCREPANCIES TO SUPERINTENDENT BEFORE PROCEEDING WITH WORK.
30. NOMINATION OF PROPRIETARY ITEMS DOES NOT INDICATE EXCLUSIVE PREFERENCE, BUT INDICATES REQUIRED PROPERTIES OF ITEM. SIMILAR ALTERNATIVES HAVING REQUIRED PROPERTIES MAY BE OFFERED FOR APPROVAL. APPROVAL DOES NOT AUTHORISE A VARIATION TO THE CONTRACT. INSTALL PROPRIETARY ITEMS IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS AND RECOMMENDATIONS.
31. OBTAIN NECESSARY PERMITS AND APPROVALS FROM RELEVANT AUTHORITIES BEFORE COMMENCING WORK ON SITE. NOTIFY RELEVANT SERVICE AUTHORITIES BEFORE COMMENCING WORK ON SITE.
32. GIVE TWO WORKING DAYS (48 HOURS) NOTICE SO THAT INSPECTION MAY BE MADE OF CRITICAL STAGES OF WORK.
33. INSPECTIONS UNDERTAKEN BY SUPERINTENDENT OR OTHERS DO NOT RELIEVE CONTRACTOR OF RESPONSIBILITY FOR COMPLIANCE WITH DRAWINGS AND SPECIFICATIONS.
34. DO NOT OBTAIN DIMENSIONS BY SCALING FROM DRAWINGS.
35. DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
36. DATUM FOR LEVELS IS AHD (AUSTRALIAN HEIGHT DATUM).
37. HAVE SURVEY AND SETTING OUT UNDERTAKEN BY A REGISTERED SURVEYOR.
38. VERIFY ON SITE SETTING OUT DIMENSIONS AND EXISTING MEMBER SIZES SHOWN ON DRAWINGS BEFORE SHOP DRAWINGS, CONSTRUCTION AND FABRICATION IS COMMENCED. EXISTING STRUCTURES SHOWN ON DRAWINGS ARE IN APPROXIMATE LOCATIONS ONLY.
39. TAKE CARE OF HAZARDS ASSOCIATED WITH BURIED, CONCEALED OR OVERHEAD SERVICES. UNDERTAKE EXPLORATION TO ESTABLISH LOCATION OF AND PROTECT EXISTING SERVICES AT SITE. SERVICES SHOWN ON DRAWINGS ARE IN APPROXIMATE LOCATIONS ONLY. SERVICES OTHER THAN THOSE SHOWN MAY EXIST ON SITE. MARK LOCATIONS OF SERVICES CLEARLY ON SITE, AND ON AS-BUILT DRAWINGS. HAND EXCAVATE WITHIN ONE METRE OF IN-GROUND SERVICES.
40. DISPOSE OF SURPLUS MATERIAL OFF SITE IN ACCORDANCE WITH LOCAL AUTHORITY WASTE REGULATIONS.
41. IMPLEMENT SOIL AND WATER MANAGEMENT PROCEDURES TO AVOID EROSION, CONTAMINATION AND SEDIMENTATION OF SITE, SURROUNDING AREAS AND DRAINAGE SYSTEMS.
42. WORKMANSHIP AND MATERIALS TO COMPLY WITH AUSTRALIAN STANDARDS, BUILDING CODE OF AUSTRALIA (BCA) AND BY-LAWS AND ORDINANCES OF RELEVANT BUILDING AUTHORITIES. ALL STANDARDS REFERRED TO ARE THOSE CURRENT (AS AMENDED) AT COMMENCEMENT OF CONTRACT.
43. PROVIDE FOR TEMPORARY SUPPORT OF ADJOINING ELEMENTS DURING CONSTRUCTION.
44. MAKE GOOD ANY DAMAGE TO EXISTING ELEMENTS AT COMPLETION OF WORKS.
45. WHERE NEW WORK ABUTS EXISTING, PROVIDE SMOOTH TRANSITION FREE OF ABRUPT CHANGES.
46. HAVE TESTING PERFORMED BY AN INDEPENDENT NATA (NATIONAL ASSOCIATION OF TESTING AUTHORITIES) ACCREDITED AUTHORITY, AND PROVIDE TEST REPORTS TO SUPERINTENDENT.
47. SEPARATE METALS FROM INCOMPATIBLE MATERIALS (eg STAINLESS STEEL, GALVANIZED STEEL, UNGALVANIZED STEEL AND TREATED TIMBER etc) BY CONCEALED LAYERS OF SUITABLE INERT MATERIALS OF SUITABLE THICKNESSES. USE PLASTIC SLEEVES AND WASHERS FOR BOLTS, etc.
48. KEEP ON SITE A COMPLETE SET OF CONTRACT DOCUMENTS (INCLUDING DRAWINGS AND SPECIFICATIONS) AND SITE INSTRUCTIONS.

TEMPORARY WORKS:

49. THESE DRAWINGS DO NOT DETAIL TEMPORARY WORKS. CONSTRUCTION METHODS AND TEMPORARY WORKS ARE RESPONSIBILITY OF THE CONTRACTOR.
50. PROVIDE SCAFFOLDING, BARRIERS, FALL RESTRAINT, HAND-MID RAILS AND TOE BOARDS FOR WORK AT HEIGHT. ERECT ACCESS STAIRS AT EARLIEST OPPORTUNITY TO REDUCE OPEN SHAFT HAZARDS AND FACILITATE ACCESS. MAINTAIN SAFETY MESH AND BARRIERS TO ALL OPENINGS AND ELEVATED EDGES.
51. MAINTAIN STRUCTURE IN A STABLE CONDITION DURING CONSTRUCTION AND PROVIDE TEMPORARY BRACING AND/OR SUPPORT AS REQUIRED.

CONCRETE PIPE BEDDING NOTES FOR TYPE HS2 SUPPORT:

52. MATERIAL GRADING REQUIREMENTS

SIEVE SIZE (mm)	75.0	19.0	9.5	2.36	0.60	0.30	0.15	0.075
BED & HAUNCH ZONES (% MASS PASSING)	-	100	-	100-50	90-20	60-10	25-0	10-0
SIDE ZONE (% MASS PASSING)	100	-	100-50	100-30	50-15	-	-	20-0

53. BEDDING

BED ZONE MATERIALS SHALL BE SELECT FILL. SELECT FILL AS DEFINED IN AS/NZS 3725:2007 IS MATERIAL OBTAINED FROM EXCAVATION OF THE PIPE TRENCH OR ELSEWHERE WITH A PARTICLE SIZE NOT GREATER THAN 19mm, AND WHICH CONFORMS WITH THE FOLLOWING SOIL CLASSES AS DEFINED IN APPENDIX D OF AS 1726.

SELECT FILL GRADING REQUIREMENTS ARE DEFINED AS BELOW.

SIEVE SIZE (mm)	19.0	2.36	0.60	0.30	0.15	0.075
% MASS PASSING	100	100-50	90-20	60-10	25-0	10-0

THE MATERIAL PASSING THE 0.075mm SIEVE MUST HAVE LOW PLASTICITY AS DESCRIBED IN APPENDIX D OF AS 1726.

54. REFILLING

54.A THE HAUNCH ZONE SHALL EXTEND FROM THE TOP OF THE BED ZONE TO 0.30 TIMES THE PIPE OUTSIDE DIAMETER AND SHALL BE FILL MATERIAL COMPLYING WITH THE REQUIREMENTS SHOWN ABOVE FOR THE BED ZONE.

THE MATERIAL SHALL BE PLACED OVER THE FULL WIDTH OF THE TRENCH EITHER IN LAYERS NOT EXCEEDING 150mm COMPACTED THICKNESS AND COMPACTED BY CONVENTIONAL METHODS OR COMPACTED IN ONE OPERATIONS BY SATURATION AND VIBRATION TO ACHIEVE A MINIMUM DENSITY INDEX (DI) OF 60.

COMPACTION ACHIEVED SHALL BE MONITORED BY FIELD TESTING IN ACCORDANCE WITH AS 1289.

54.B THE SIDE ZONE SHALL EXTEND FROM THE TOP OF THE HAUNCH ZONE TO 0.50 TIMES PIPE OUTSIDE DIAMETER AND SHALL CONSISTS OF SELECT FILL MATERIAL COMPLYING WITH THE FOLLOWING GRADING.

SIEVE SIZE (mm)	75	9.5	2.36	0.60	0.075
% MASS PASSING	100	100-50	100-30	50-15	25-0

THE MATERIAL SHALL BE PLACED OVER THE FULL WIDTH OF THE TRENCH IN LAYERS NOT EXCEEDING 150mm COMPACTED THICKNESS AND COMPACTED BY TAMPING, ROLLING OR VIBRATING TO A MINIMUM RELATIVE DENSITY (RD) OF 90% OR A MINIMUM DENSITY INDEX (DI) OF 60.

COMPACTION ACHIEVED SHALL BE MONITORED BY FIELD TESTING IN ACCORDANCE WITH AS 1289.

54.C THE OVERLAY ZONE SHALL EXTEND FROM THE TOP OF THE SIDE ZONE TO 150mm ABOVE THE TOP OF THE PIPE AND AROUND THE PIPE MEASURED RADIALLY FROM ANY POINT. THE FILL MATERIAL IN THE OVERLAY ZONE SHALL BE ORDINARY FILL CONSISTING OF MATERIAL FROM THE EXCAVATION OR ELSEWHERE. IT SHALL NOT CONTAIN ANY STONES LARGER THAN 150mm, NOR MORE THAN 20% WITH A SIZE BETWEEN 75mm AND 150mm.MATERIAL SHOULD BE COMPACTED AS NECESSARY TO PREVENT EXCESSIVE SETTLEMENT IN THE GROUND SURFACE LEVEL OVER THE INSTALLED PIPELINE. MINIMUM RELATIVE DENSITY (RD) OF 90%.

THE FILL IN THE OVERLAY ZONE SHOULD BE PLACED AND COMPACTED IN RELATIVELY THIN LAYERS. FOR SELECT FILL THE LAYER THICKNESS SHOULD NOT EXCEED 200mm.

54.D BACKFILL OR EMBANKMENT FILL IS TO BE REMAINDER OF THE REFILLING AND SHOULD CONSISTS OF ANY AVAILABLE MATERIAL UP TO FINISHED LEVELS AS SHOWN ON THE DRAWINGS.

THE MATERIAL SHOULD BE COMPACTED AS NECESSARY TO PREVENT EXCESSIVE SETTLEMENT IN THE GROUND SURFACE LEVEL OVER THE INSTALLED PIPELINE. MINIMUM RELATIVE DENSITY (RD) OF 90%.

55. IMPORTANT NOTES:
    - ENSURE THE BED ZONE IS EVEN AND WELL GRADED TO PROVIDE UNIFORM SUPPORT FOR THE PIPE.
    - DO NOT COMPACT DIRECTLY OVER THE PIPE.
    - ENSURE THE PIPE IS APPROPRIATELY EMBEDDED AND COVERED BEFORE ALLOWING ANY CONSTRUCTION EQUIPMENT OR PLANT OVER THE TOP.
    - COMPACT AS YOU GO AND ENSURE THAT THE APPROPRIATE LEVELS OF COMPACTION ARE REACHED.

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
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CONSULTANT REFERENCE No.: 23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

DESIGNED: MH	DATE: 18.03.15	COMPANY: GHD	
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TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

GENERAL AND CONSTRUCTION NOTES

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
	NTS		24051	101	0

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GENERAL NOTES

G1. THE WORK COVERED BY THIS SPECIFICATION INCLUDES THE FURNISHING OF ALL PLANT, LABOUR, EQUIPMENT AND MATERAILS AS REQUIRED OR NECESSARY FOR THE DESIGN AND CONSTRUCTION OF REINFORCED CONCRETE EMERGENCY TANKS AS SHOWN ON THE DRAWINGS AND/OR AS SPECIFIED HEREIN.

G2. DESIGN OF EMERGENCY STORAGE TANKS SHALL BE UNDERTAKEN AND CERTIFIED BY QUALIFIED EXPERIENCED ENGINEERS REGISTERED WITH THE INSTITUTION OF ENGINEERS OF AUSTRALIA AND THE NATIONAL PROFESSIONAL ENGINEERING REGISTER SCHEME.

DESIGN REQUIREMENTS

G3. DESIGN LIFE = 50 YRS.

G4. DIMENSION AND LEVEL: EMERGENCY STORAGE TANK DIMENSIONS AND LEVELS SUCH AS INTERNAL DIAMETER, HEIGHT, FLOOR LEVEL, TOP OF ROOF LEVEL, OVERFLOW LEVEL, CONNECTION DETAILS ETC.TO BE AS SHOWN ON THE EMERGENCY STORAGE TANK DETAILS DRAWING.

G5. DESIGN DRAWING OF ROOF ACCESS HATCH IS SHOWN AS DRAWING 23835-112. THE CONTRACTOR WILL REQUIRE THIS DRAWING FOR THE CONSTRUCTION OF ACCESS HATCH AND DETERMINATION OF RECESS REQUIRED AT ROOF ACCESS OPENINGS.

DESIGN STANDARDS

G6. DESIGN TO COMPLY WITH THE FOLLOWING AUSTRALIAN STANDARDS:

- AS/NZS 1170.0:2002 STRUCTURAL DESIGN ACTIONS PART 0 : GENERAL PRINCIPLES
- AS/NZS 1170.1:2002 STRUCTURAL DESIGN ACTIONS PART 1: PERMANENT, IMPOSED AND OTHER ACTIONS.
- AS/NZS 1170.2:2002 STRUCTURAL DESIGN ACTIONS PART 2: WIND ACTIONS
- AS/NZS 1170.4: 2007 STRUCTURAL DESIGN ACTIONS PART 4 EARTHQUAKE ACTIONS
- AS 3600: 2009 CONCRETE STRUCTURES
- AS 3735:2001 CONCRETE STRUCTURES FOR RETAINING LIQUIDS
- BCA: BUILDING CODE OF AUSTRALIA
- AS 1657: 2013 FIXED PLATFORMS, WALKWAYS, STAIRWAYS AND LADDERS

DESIGN LOADING

G7. ALL STRUCTURES SHALL BE DESIGNED IN ACCORDANCE WITH THE PRINCIPLES OF STRUCTURAL MECHANICS AND CONSTRUCTED TO BE CAPABLE OF SUSTAINING THE MOST ADVERSE COMBINATIONS OF LOAD TO WHICH THEY MAY BE SUBJECTED. DESIGN LOADING CASES SHALL INCLUDE FULL TANK WITH NO EXTERNAL EARTH/WATER PRESSURE AND EMPTY TANK WITH EXTERNAL EARTH/WATER PRESSURE. DESIGN SHALL BE IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF THE BUILDING CODE OF AUSTRALIA AND AUSTRALIAN STANDARDS, INCLUDING:

- DEAD AND LIVE LOADS INCLUDING EARTH PRESSURES, GROUNDWATER PRESSURES AND LIQUID PRESSURES SHALL BE IN ACCORDANCE WITH AS/NZS 1170.1
- ROOF LIVE LOAD: MEDIUM VEHICULAR LOADING (10 TON) ACCORDING TO TABLE 3.1 OF AS/NZS 1170.1
- WIND LOADS TO AS/NZS1170.0:2002: AS/NZS 1170.2:2002 AND BCA
  AVERAGE RECURRENCE INTERVAL : 1000 years
- EARTHQUAKE LOADS TO AS/NZS1170.0:2002: AS/NZS 1170.4:2007 AND BCA
  AVERAGE RECURRENCE INTERVAL : 1000 years
- BUOYANCY FORCE SHALL BE RESISTED BY THE PROVISION OF BALLAST TO RESIST THE FLOATATION FORCES IN ACCORDANCE WITH AS/NZS 1170.0 SECTION 4

DESIGN DRAWING AND CERTIFICATION

G8. CONTRACTOR SHALL SUBMIT DESIGN DRAWINGS OF THE EMERGENCY STORAGE TANK. FOR APPROVAL PRIOR TO CONSTRUCTION. PROVIDE INDEPENDENT STRUCTURAL CERTIFICATION OF THE DESIGN.

DESIGN FLOOD LEVELS

G9. EMERGENCY STORAGE TANKS TO BE DESIGNED TO RESIST PRESSURES (INCLUDING BOUYANCY) FOR THE FOLLOWING 1% AEP FLOOD LEVELS:

- CULBURRA SPS 5: 3.6m AHD
- CULBURRA SPS 6: 3.6m AHD
- CULBURRA SPS 9: 2.8m AHD
- CULBURRA SPS 10: 2.8m AHD
- SUSSEX INLET SPS 1: 3.2m AHD
- SUSSEX INLET SPS 16: 3.2m AHD
- ST. GEORGE'S BASIN SPS 10: 3.2m AHD
- ST. GEORGE'S BASIN SPS 12: 3.2m AHD
- BERRY SPS 5: 8.9m AHD

FOUNDATIONS AND FOOTINGS

F1. GROUND SLABS AND FOOTINGS SHALL BE DESIGNED APPROPRIATE TO GROUND CONDITIONS TO ENSURE STRUCTURES PROVIDE THE INTENDED FUNCTION OVER THE INTENDED DESIGN LIFE AND TO CONTROL MOVEMENTS WITHIN ACCEPTABLE LIMITS NOMINATED BY THE RELEVANT STANDARDS.

F2. GEOTECHNICAL REPORT PROVIDED IS FOR INFORMATION ONLY. THE PRINCIPAL DOES NOT REPRESENT THAT THE AVAILABLE GEOTECHNICAL INFORMATION SHOWS COMPLETELY THE EXISTING CONDITIONS AND DOES NOT WARRANT THE CORRECTNESS OF THE DESIGNATION OF ROCK AND OTHER NATURALLY OCCURRING MATERIALS SHOWN IN REPORTS, MAPS, DRAWINGS OR OTHER INFORMATION MADE AVAILABLE TO THE CONTRACTOR BY THE PRINCIPAL. THE CONTRACTOR SHALL INFORM ITSELF THOROUGHLY AND MAKE ITS OWN DEDUCTIONS AND CONCLUSIONS AS TO THE NATURE OF THE MATERIAL TO BE EXCAVATED, THE DIFFICULTY OF MAKING AND MAINTAINING THE REQUIRED EXCAVATIONS AND OF DOING OTHER WORK AFFECTED BY THE GEOLOGY OF THE SITE AND SHALL ACCEPT FULL RESPONSIBILITY THEREFORE.

F3. ENSURE EXCAVATIONS ARE STABLE AND PROTECT SURROUNDING PROPERTY AND SERVICES FROM ADVERSE EFFECTS OF GROUND WORKS. PROVIDE TEMPORARY WORKS AS REQUIRED. PROVIDE SHORING CERTIFIED BY SUITABLY QUALIFIED STRUCTURAL ENGINEER TO ALL DEEP EXCAVATIONS WHERE REQUIRED.

F4. USE SUITABLE CONSTRUCTION TECHNIQUES AND EQUIPMENT FOR BACKFILLING ADJACENT TO STRUCTURES TO PREVENT OVERSTRESS AND DAMAGE. BACKFILL EVENLY TO AVOID DIFFERENTIAL SOIL PRESSURES ON STRUCTURES. BACKFILL AGAINST STRUCTURES ONLY AFTER SPECIFIED CONCRETE STRENGTH IS ACHIEVED, AND PERMANENT SUPPORT INSTALLED WHERE APPLICABLE.

GEOTECHNICAL INSPECTION AND CERTIFICATION

F5. THE CONTRACTOR IS TO ENGAGE A GEOTECHNICAL ENGINEER TO INSPECT EXCAVATIONS FOR TANK FOUNDATIONS TO CONFIRM THAT THE REQUIRED BEARING CAPACITY IS ACHIEVED AND THE FOUNDATION IS BEARING ON SUITABLE MATERIAL.

CONCRETE

C1. THE DESIGN AND CONSTRUCTION OF CONCRETE WORKS FOR EMERGENCY STORAGE TANK INCLUDE THE FOLLOWING:

- ROOF
- WALL
- FLOOR
- ROOF SUPPORT COLUMN (WHERE REQUIRED)

C2. CONCRETE WORK INCLUDES ASSOCIATED FORMWORK, REINFORCEMENT, JOINTS, UNDERLAYS, MEMBRANES, WATERSTOPS AND SURFACE FINISHES AS SPECIFIED IN THE GENERAL NOTES DRAWING.

C3. REFER TO DRAWING 24051-103 AND 24051-104 FOR THE MINIMUM REQUIREMENTS OF CONCRETE WORKS FOR EMERGENCY STORAGE TANK.

- CONCRETE GRADE AND MIX DESIGN: C5, C6.
- CONCRETE FINISH: C44
- HYDROSTATIC TESTING: C45
- CLEAR COVER OF REINFORCEMENT: C51

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

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Shoalhaven Water
A Group of Shoalhaven City Council

DESIGNED: MH	DATE: 18.03.15	COMPANY: GHD	
DRAWN: KM	DATE: 18.03.15	COMPANY: GHD	
CHECKED: SR	DATE: 12.06.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

SPECIFICATION FOR EMERGENCY STORAGE TANK

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
M	NTS		24051	102	0

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CONCRETE

CONCRETE MIX

C1. WORKMANSHIP AND MATERIALS TO COMPLY WITH AS3600, AS3610, AS1379, AS1478, AS3582, AND AS3972. FOR LIQUID RETAINING STRUCTURES ALSO COMPLY WITH AS3735.

C2. WET CONCRETE TO BE UNIFORM, HOMOGENEOUS, COHESIVE AND ABLE TO WORK READILY INTO CORNERS AND AROUND REINFORCEMENT COMPLETELY FILLING FORMWORK WITHOUT SEGREGATION, EXCESS FREE WATER ON SURFACE, LOSS OF MATERIAL OR CONTAMINATION. CONCRETE TO HAVE GOOD DIMENSIONAL STABILITY AND ABLE TO RESIST PLASTIC SETTLEMENT CRACKING, THERMAL CRACKING AND SHRINKAGE CRACKING.

C3. FINISHED CONCRETE TO BE A DURABLE, DENSE, HOMOGENEOUS MASS COMPLETELY FILLING FORMWORK, EMBEDDING REINFORCEMENT AND TENDONS, AND FREE OF STONE POCKETS, OF UNIFORM COLOUR AND TEXTURE, WITH LOW PERMEABILITY AND ADEQUATE BUT NOT EXCESSIVE STRENGTH FOR GRADE.

C4. WHERE CONCRETE IS USED FOR EMERGENCY STORAGE TANK THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE CONCRETE MIX DESIGN, VERIFICATION, LIMITING CONCRETE CRACKING TO WITHIN RECOMMENDATIONS MADE IN AS3735, PLACEMENT AND ALL OTHER ASSOCIATED ELEMENTS. THE CONCRETE MIX DESIGN IS TO BE BASED ON DESIGN LIFE OF 50 YRS AND EXPOSURE CLASSIFICATION D AT THE LIQUID FACE OF THE EMERGENCY STORAGE TANK

C5. WHERE CONCRETE IS USED FOR EMERGENCY STORAGE TANK THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE CONCRETE MIX DESIGN, VERIFICATION, LIMITING CONCRETE CRACKING TO WITHIN RECOMMENDATIONS MADE IN AS3735, PLACEMENT AND ALL OTHER ASSOCIATED ITEMS.

C6. UNLESS NOTED OTHERWISE MINIMUM QUALITY OF CONCRETE ELEMENTS TO BE AS FOLLOWS:

STRUCTURAL ELEMENT	EMERGENCY STORAGE TANK	PIT WALL AND FLOOR	BLINDING & MASS CONCRETE
STRENGTH GRADE (MPa)	S40	N32	N15
MINIMUM CHARACTERISTIC STRENGTH AT 28 DAYS (MPa)	40	32	15
MAX. 56 DAYS DRYING SHINKAGE (m/m)	600×10^{-6}	-	-

A MINIMUM OF THREE WEEKS PRIOR TO COMMENCEMENT OF STRUCTURAL CONCRETE WORK, THE CONTRACTOR SHALL SUBMIT DETAILS OF CONCRETE MIX, TEST RESULTS CONDUCTED BY A CERTIFICATION BODY TO THE SUPERINTENDENT FOR APPROVAL.

C7. SUPPLEMENTARY CEMENTITIOUS MATERIALS INCLUDE SILICA FUME, FLY ASH, AND GROUND GRANULATED BLAST FURNACE SLAG (GGBFS OR SLAG).

C8. ADMIXTURES TO COMPLY WITH AS1478. ADMIXTURES MUST NOT REDUCE STRENGTH OF CONCRETE BELOW SPECIFIED VALUE. USE ADMIXTURES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. CONCRETE ADDITIVES SHALL NOT ENHANCE CORROSION OF REINFORCEMENT, NOR BE DETRIMENTAL TO CONCRETE OR STEEL DURING EXPECTED LIFE OF STRUCTURE. DO NOT USE CHEMICAL ADMIXTURES OR OTHER MATERIALS WITHOUT SUPERINTENDENT'S WRITTEN APPROVAL.

C9. S40 GRADE CONCRETE IS REQUIRED TO HAVE HIGH DURABILITY.
PROVIDE CONCRETE WITH:
- AN AVERAGE COMPRESSIVE STRENGTH AT COMPLETION OF CURING NOT LESS THAN 75% OF SPECIFIED f'c.
- A TOTAL REACTIVE ALKALI CONTENT NOT GREATER THAN 3.0 kg/m3 Na2O (EQUIVALENT).
- PLACE CONCRETE IN LAYERS LESS THAN 300 mm THICK AND VIBRATE EACH LAYER BEFORE PLACING NEXT.

C10. S40 GRADE CONCRETE REQUIREMENTS:
- DO NOT USE METAL INSERTS WITHIN COVER CONCRETE INCLUDING METAL BAR CHAIRS.
- DO NOT ALLOW CONCRETE TO FALL VERTICALLY WHEN PLACING, OR TO ENTRAP AIR IN ANY OTHER WAY.
- PREVENT EVAPORATION OF WATER FROM CONCRETE SURFACES IMMEDIATELY AFTER LAYING.
- MOIST CURE CONCRETE FOR A MINIMUM OF SEVEN DAYS.

C11. DO NOT ADD WATER TO CONCRETE AFTER TRUCK HAS LEFT BATCHING PLANT.

C12. MIX CONCRETE TO ENSURE UNIFORM DISTRIBUTION OF CONSTITUENTS.

CONCRETE TESTING

C13. TEST SLUMP OF EACH BATCH OF CONCRETE DELIVERED BEFORE PLACING CONCRETE FROM THAT DELIVERY. SLUMP MEASURED TO BE NO GREATER THAN TARGET SLUMP WITHIN TOLERANCES GIVEN IN AS1379 CLAUSE 5.2.3.

C14. CARRY OUT PROJECT ASSESSMENT OF CONCRETE TO AS1379 CLAUSE 6.4 AND 6.5. TAKE SAMPLES AT PROJECT SITE AT POINT OF DISCHARGE FROM AGITATOR. SPREAD SAMPLING EVENLY THROUGH POUR. SAMPLE CONCRETE FOR PROJECT ASSESSMENT CONCURRENTLY WITH EACH SAMPLE TAKEN FOR PRODUCTION ASSESSMENT AT PROJECT SITE. FOR EACH CONCRETE DESIGN MIX TAKE ONE SAMPLE FROM EACH 25 CUBIC METRES OF CONCRETE DELIVERED PER DAY, NOT LESS THAN FIVE SAMPLES TOTAL FOR EACH MIX DESIGN. EACH SAMPLE TO COMPRISE FOUR CYLINDERS: TEST TWO AT 7 DAYS AND TWO AT 28 DAYS.

C15. CARRY OUT DRYING SHRINKAGE TESTING TO AS1012.13. FOR EACH CONCRETE DESIGN MIX TAKE ONE SAMPLE EVERY THREE MONTHS, OR FOR EVERY 200 m3 OF CONCRETE PLACED WITH A MINIMUM OF ONE SAMPLE. EACH SAMPLE TO COMPRISE THREE SPECIMENS. SAMPLE CONCRETE AT PROJECT SITE, DIRECTLY FROM DELIVERY VEHICLE. BASE ASSESSMENT ON AVERAGE OF THREE TEST RESULTS.

C16. CONCRETE TESTING TO BE BY AN APPROVED NATA REGISTERED LABORATORY.

FORMWORK

C17. RESPONSIBILITY FOR DESIGN, CERTIFICATION, CONSTRUCTION AND PERFORMANCE OF FORMWORK AND FALSEWORK LIES WITH CONTRACTOR. CERTIFICATION IS TO BE DONE BY A CHARTERED PROFESSIONAL ENGINEER OF THE INSTITUTION OF ENGINEERS AUSTRALIA WITH RELEVANT EXPERIENCE IN THE DESIGN OF FORMWORK.

C18. DO NOT SUPPORT OR RESTRAIN FORMWORK ON PERMANENT WORKS WITHOUT SUPERINTENDENT'S WRITTEN APPROVAL.

C19. CONSTRUCT FORMWORK TO COMPLY WITH AS3610 AND CLAUSE 17.6 OF AS3600 WHERE THIS IS MORE STRINGENT SO CONCRETE WILL HAVE DIMENSIONS, SHAPE, LOCATION AND FINISH SPECIFIED. PROVIDE OPENINGS OR REMOVABLE PANELS FOR INSPECTION AND CLEANING. APPLY RELEASE AGENT COMPATIBLE WITH CONTACT SURFACES TO INTERIOR OF FORMWORK. SEAL JOINTS BETWEEN FORMWORK PANELS, AND TO HARDENED CONCRETE WITH A FLEXIBLE RUBBER STRIP. SET OUT FORMWORK TO GIVE A REGULAR ARRANGEMENT OF PANELS, JOINTS, BOLT HOLES AND SIMILAR VISIBLE ELEMENTS IN FORMED SURFACE.

C20. DO NOT USE FORMWORK HARDWARE THAT FORMS A COMPLETE HOLE THROUGH CONCRETE ELEMENTS. DO NOT USE REINFORCEMENT TO SUPPORT FORMWORK.

C21. PROVIDE HOLES IN REBATE FORMERS, etc, AS REQUIRED TO PREVENT AIR ENTRAPMENT.

C22. DO NOT STRIP FORMWORK UNTIL CONCRETE IS HARDENED SUFFICIENTLY TO WITHSTAND MOVEMENT AND FORM REMOVAL WITHOUT DAMAGE.

C23. STRIP FORMWORK TO AS3600 CLAUSE 17.6. REMOVE FORM TIE BOLTS WITHOUT DAMAGING CONCRETE. PARTS OF BOLTS LEFT IN CONCRETE MUST NOT INTRUDE INTO COVER CONCRETE. FLUSH FILL HOLES USING PRE-MIXED NON-SHRINK CEMENTITIOUS REPAIR MORTAR MATCHING CONCRETE SURFACE COLOUR, STRENGTH AND DURABILITY AND ADEQUATE BOND.

PLACING OF CONCRETE

C24. CONSTRUCTION TOLERANCES TO BE TO AS3610.

C25. REMOVE FREE WATER, DUST AND DEBRIS, STAINS etc FROM FORMS, EXCAVATIONS etc BEFORE PLACING CONCRETE. IN HOT CONDITIONS DAMPEN FORMWORK AND/OR SUB-GRADE BEFORE PLACING CONCRETE.

C26. ELAPSED TIME BETWEEN WETTING OF MIX AND DISCHARGE OF CONCRETE AT SITE MUST BE AS SHORT AS POSSIBLE, AND COMPLY WITH THE FOLLOWING.

CONCRETE TEMPERATURE AT TIME OF DISCHARGE	MAXIMUM ELAPSED TIME (HOURS)
10 - 24	2.00
24 - 27	1.50
27 - 30	1.00
30 - 32	0.75

C27. USE PLACEMENT METHODS THAT WILL MINIMISE PLASTIC SETTLEMENT AND SHRINKAGE CRACKING. LIMIT VERTICAL FREE FALL BY USE OF CHUTES, etc. KEEP CHUTES VERTICAL, FULL AND IMMERSED IN CONCRETE. PLACE CONCRETE IN LAYERS AND BLEND SUCCEEDING LAYERS BY COMPACTION. MAINTAIN CONCRETE EDGE IN A PLASTIC STATE. PROPERLY COMPACT CONCRETE USING MECHANICAL VIBRATORS (AND HAND METHODS IF REQUIRED) TO REMOVE AIR BUBBLES AND GIVE MAXIMUM COMPACTION WITHOUT SEGREGATION OF CONCRETE. TAKE CARE TO AVOID CONTACT BETWEEN VIBRATORS AND PARTIALLY HARDENED CONCRETE, FORMWORK OR REINFORCEMENT. DO NOT USE VIBRATORS TO MOVE CONCRETE ALONG FORMS.

C28. OBTAIN SUPERINTENDENT'S WRITTEN APPROVAL OF PLACEMENT METHODS FOR CONCRETE ELEMENTS GREATER THAN 1500 mm HEIGHT.

C29. KEEP ON SITE A LOG BOOK RECORDING EACH PLACEMENT OF CONCRETE INCLUDING DATE, CLIMATIC CONDITIONS, PORTION OF WORK, SPECIFIED GRADE AND SOURCE OF CONCRETE, DELIVERY DOCKET DATA, METHODS OF PLACEMENT AND COMPACTION, PROJECT ASSESSMENT CARRIED OUT, SLUMP MEASUREMENTS, VOLUME AND OTHER NOTABLE MATTERS.

C30. IN COLD WEATHER MAINTAIN TEMPERATURE OF FRESHLY MIXED CONCRETE WITHIN LIMITS SHOWN BELOW. "OUTDOOR" AIR TEMPERATURE IS AIR TEMPERATURE AT TIME OF MIXING, OR PREDICTED OR LIKELY AIR TEMPERATURE DURING NEXT 48 HOURS. BEFORE AND WHILE PLACING CONCRETE MAINTAIN TEMPERATURE OF FORMWORK AND REINFORCEMENT AT > 5°C. DO NOT USE CALCIUM CHLORIDE, SALTS, CHEMICALS OR OTHER MATERIAL IN MIX TO LOWER THE FREEZING POINT OF CONCRETE. DO NOT ALLOW FROZEN MATERIALS TO ENTER MIXER. DO NOT USE HIGH ALUMINA CEMENT.

C31. KEEP FORMS, MATERIALS, EQUIPMENT IN CONTACT WITH CONCRETE FREE OF FROST AND ICE. HEAT CONCRETE MATERIALS (OTHER THAN CEMENT) TO MINIMUM TEMPERATURE NECESSARY TO ENSURE TEMPERATURE OF PLACED CONCRETE IS WITHIN LIMITS SPECIFIED. MAXIMUM WATER TEMPERATURE: 60°C WHEN PLACED IN MIXER.

OUTDOOR TEMPERATURE	TEMPERATURE OF CONCRETE	
	MINIMUM	MAXIMUM
>5°C	10°C	32°C
<5°C	18°C	32°C

C32. IN HOT WEATHER PREVENT PREMATURE STIFFENING OF FRESH CONCRETE; REDUCE WATER ABSORPTION AND EVAPORATION LOSSES. MIX, TRANSPORT, PLACE AND COMPACT CONCRETE AS QUICKLY AS POSSIBLE. DURING PLACEMENT TEMPERATURE OF CONCRETE MUST NOT EXCEED TEMPERATURES BELOW:

CONCRETE ELEMENT	TEMPERATURE LIMIT
UNREINFORCED CONCRETE IN SECTIONS ≥ 1 METRE EACH DIMENSIONS	27°C
CONCRETE fc ≥ 40 MPa IN SECTIONS ≥ 500mm THICKNESS	27°C
CONCRETE IN FOOTINGS, BEAMS, COLUMNS, WALLS AND SLABS fc ≤ 32MPa	32°C
ELSEWHERE	27°C

DO NOT MIX CONCRETE WHEN SURROUNDING OUTDOOR SHADE TEMPERATURE ≥ 38°C. MAINTAIN TEMPERATURE OF FORMWORK AND REINFORCEMENT AT ≤ 32°C BEFORE AND DURING PLACING. MAINTAIN SPECIFIED TEMPERATURE OF PLACED CONCRETE BY:
- COOLING CONCRETE USING LIQUID NITROGEN INJECTION BEFORE PLACING, OR
- COVERING CONTAINER IN WHICH CONCRETE IS TRANSPORTED TO FORMS, OR
- SPRAYING COARSE AGGREGATE USING COLD WATER, OR
- USING CHILLED MIXING WATER.

C33. PROTECT FRESH CONCRETE FROM PREMATURE DRYING - PARTICULARLY IN HOT, WINDY OR DRY (LOW HUMIDITY) CONDITIONS, EXCESSIVELY HOT OR COLD TEMPERATURES, RAIN, etc. PROVIDE WIND BREAKS. MAINTAIN CONCRETE AT A REASONABLY CONSTANT TEMPERATURE WITH MINIMUM MOISTURE LOSS FOR CURING PERIOD.

C34. FOR CONCRETE WITH WATER:CEMENT RATIO LESS THAN 0.5, IN HOT, WINDY OR DRY (LOW HUMIDITY) CONDITIONS SPRAY EXPOSED SURFACES OF FRESH CONCRETE WITH FOG SPRAY APPLICATION OF ALIPHATIC ALCOHOL RETARDANT IMMEDIATELY AFTER PLACEMENT TO REDUCE RISK OF PLASTIC SHRINKAGE CRACKING. IN SEVERE CLIMATIC CONDITIONS CONSIDER REVIBRATING CONCRETE BEFORE IT REACHES INITIAL SET.

C35. COMMENCE CURING OF CONCRETE TO AS3600 AS SOON AS POSSIBLE AFTER PLACING AND FINISHING OR STRIPPING, AND WITHIN ONE HOUR. ENSURE EXPOSED SURFACES ARE NOT STAINED. ACCEPTABLE METHODS OF CURING INCLUDE:
- RETENTION OF FORMWORK
- PONDING OR CONTINUOUS SPRINKLING WITH WATER (MOIST CURING)
- AN IMPERMEABLE MEMBRANE (USE WHITE OR LIGHT COLOURED PLASTIC IN HOT CONDITIONS). SEAL AROUND EDGES
- AN ABSORPTIVE COVER KEPT CONTINUOUSLY WET AND COVERED BY IMPERMEABLE MEMBRANE
- STEAM CURING
- AN APPROVED CURING COMPOUND (FOR NORMAL CLASS CONCRETE ONLY) PROVIDE:
  - EFFICIENCY INDEX
  - CERTIFIED TEST RESULTS FOR WATER RETENTION TO AS3799 APPENDIX B
  - EVIDENCE THAT AN ACCEPTABLE FINAL SURFACE COLOUR WILL BE OBTAINED
  - EVIDENCE OF COMPATIBILITY WITH CONCRETE AND APPLIED FINISHES (IF ANY)
  - METHODS OF OBTAINING REQUIRED ADHESION FOR TOPPINGS, RENDER etc.
  - UNIFORM CONTINUOUS FLEXIBLE COATING WITHOUT VISIBLE BREAKS OR PINHOLES, WHICH REMAINS UNBROKEN FOR AT LEAST THE CURING PERIOD AFTER APPLICATION.

C36. DO NOT USE WAX-BASED OR CHLORINATED RUBBER-BASED CURING COMPOUNDS ON SURFACES FORMING SUBSTRATES TO APPLIED FINISHES, CONCRETE TOPPINGS AND CEMENT BASED RENDER.

C37. CURE CONTINUOUSLY UNTIL NUMBER OF DAYS DURING WHICH AIR TEMPERATURE IS ABOVE 10°C TOTALS:
- 3 DAYS FOR EXPOSURES CLASSIFICATION A1 AND A2
- 7 DAYS FOR EXPOSURE CLASSIFICATION B1, B2 AND C.

C38. PREVENT RAPID DRYING OUT AT END OF CURING PERIOD.

C39. PROVIDE EXPOSED EDGES AND RE-ENTRANT CORNERS WITH 45 DEGREES x 25 mm CHAMFERS OR FILLETS UNLESS NOTED OTHERWISE.

C40. DO NOT MAKE HOLES, PENETRATIONS, RECESSES, CHASES, NOR EMBED PIPES (OTHER THAN THOSE SHOWN ON STRUCTURAL DRAWINGS) WITHOUT APPROVAL OF SUPERINTENDENT. DO NOT PLACE CONDUITS, PIPES etc WITHIN COVER CONCRETE. LOCATE CONDUITS, PIPES etc ONLY IN MIDDLE THIRD OF SLAB OR BEAM DEPTH AND BETWEEN REINFORCEMENT LAYERS, AND SPACED AT 3 x DIAMETER CENTRES MINIMUM. DO NOT CUT REINFORCEMENT AT PENETRATIONS WITHOUT APPROVAL

C41. PROVIDE DRIP GROOVES IN SOFFIT OF BEAMS AND SLABS AT EXTERNAL PERIMETER OF STRUCTURES. ENSURE COVER TO REINFORCEMENT IS ACHIEVED.

C42. REMOVE PROPS AND FORMWORK FOR BEAMS AND SLABS AND ENSURE CONCRETE HAS GAINED ADEQUATE STRENGTH BEFORE CONSTRUCTING WALLS OR PLACING OTHER PERMANENT LOADING ON WORK.

C43. WHERE CONCRETE BEARS ON LOAD BEARING MASONRY AND BRICKWORK, TROWEL SMOOTH AND FLAT A 5 mm THICK LAYER OF MORTAR AND SEPARATE CONCRETE WITH TWO LAYERS OF "SUPER ALCOR".

C44. FINISH CONCRETE SURFACES TO AS3610 AND AS SHOWN BELOW:
FORMED SURFACE FINISH:
(a) EXPOSED SURFACES (EXPOSED TO LIQUID AND AIR) - CLASS 2 TO AS3610.
(b) BURIED SURFACES – CLASS 3 TO AS3610.
UNFORMED SURFACE FINISH:
(a) WATER RETAINING STRUCTURES : STEEL TROWEL FINISH
(b) OTHER STRUCTURES: WOOD FLOAT FINISH.

C45. ALL LIQUID RETAINING STRUCTURES SHALL BE TESTED FOR WATER TIGHTNESS IN ACCORDANCE WITH CLAUSE 7.3 OF AS3735. TESTING SHALL TAKE PLACE AND SUCCESSFULLY COMPLETED PRIOR TO BACKFILLING AROUND STRUCTURES AND PRIOR TO PLACING CONCRETE BENCHING OR MORTAR TOPPING.

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

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CONSULTANT REFERENCE No. 23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

		DATE	COMPANY
DESIGNED:	MH	18.03.15	GHD
DRAWN:	KM	18.03.15	GHD
CHECKED:	SR	12.06.15	GHD
APPROVED:	CS	15.01.16	GHD

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

CONCRETE AND REINFORCEMENT NOTES
SHEET 1 OF 2

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
M	NTS		24051	103	0

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C46. FORM CONSTRUCTION JOINTS AND USE ONLY WHERE SHOWN OR WHERE APPROVED BY CONTRACTOR'S DESIGNER. CONSTRUCTION JOINTS IN SLABS ARE TO BE VERTICAL, STRAIGHT AND TRUE. TO ACHIEVE ADEQUATE BOND ENSURE ENTIRE SURFACE IS CLEAN, FREE OF LAITANCE AND BLEMISHES, AND INTENTIONALLY ROUGHENED TO A FULL AMPLITUDE OF NOT LESS THAN 5 mm WITH COARSE AGGREGATE EXPOSED. UNLESS NOTED OTHERWISE, COAT EXISTING CONCRETE WITH NEAT CEMENT SLURRY JUST BEFORE PLACING ADJACENT FRESH CONCRETE SO THAT CEMENT SLURRY REMAINS PLASTIC.

C47. PROVIDE JOINTING MATERIALS COMPATIBLE WHEN USED TOGETHER AND NON-STAINING TO CONCRETE IN VISIBLE LOCATIONS.

C48. INSTALL HYDROPHILIC WATERSTOPS ONTO SMOOTH CONCRETE SURFACES STRICTLY IN ACCORDANCE WITH MANUFACTURER'S WRITTEN REQUIREMENTS. DO NOT SCABBLE CONCRETE BENEATH THESE WATERSTOPS.

C49. DO NOT INSTALL SEALANTS IF EXPECTED MAXIMUM DAILY TEMPERATURE EXCEEDS 30 DEGREES C. ENSURE RECESSES ARE CLEAN AND DRY PRIOR TO INSTALLING FILLERS OR SEALANTS, AND PREPARE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. TOLERANCE ON SEALANT WIDTHS +5, -0 mm.

REINFORCEMENT COVER

C50. COVER IS CLEAR DISTANCE BETWEEN ANY REINFORCEMENT (INCLUDING LIGATURES, TIE WIRE etc) AND OUTSIDE SURFACE OF STRUCTURAL CONCRETE.

C51. MINIMUM CLEAR COVER OF REINFORCEMENT WILL BE AS FOLLOWS
LIQUID FACE OF EMERGENCY STORAGE TANK = 75 mm.
UNLESS NOTED OTHERWISE IN DRAWINGS ALL OTHER COVER = 50mm

REINFORCEMENT

R1. SYMBOLS ON DRAWINGS FOR GRADE AND TYPE OF REINFORCEMENT ARE AS FOLLOWS:
R: STRUCTURAL GRADE 250 PLAIN ROUND BAR TO AS/NZS4671
N: HOT ROLLED GRADE 500 DEFORMED (RIBBED) BAR DUCTILITY CLASS N TO AS/NZS4671
L: HOT ROLLED GRADE 500 DEFORMED BAR DUCTILITY CLASS L TO AS/NZS4671
SL: HARD DRAWN WIRE GRADE 500 SQUARE MESH DUCTILITY CLASS L TO AS/NZS4671
RL: HARD DRAWN WIRE GRADE 500 RECTANGULAR MESH DUCTILITY CLASS L TO AS/NZS4671
TM: HARD DRAWN STEEL GRADE 500 TRENCH MESH DUCTILITY CLASS L TO AS/NZS4671
W: GRADE 500 STEEL REINFORCING WIRE TO AS/NZS4671

R2. PROVIDE ACRS (AUSTRALIAN CERTIFICATION AUTHORITY FOR REINFORCING STEEL LTD) CERTIFICATION OF COMPLIANCE WITH AS/NZS4671 FOR ALL REINFORCEMENT. PROVIDE CERTIFICATION OF COMPLIANCE WITH AS1311 FOR ALL PRESTRESSING TENDONS.

R3. PROVIDE DOCUMENTATION TO SHOW THAT REINFORCEMENT SUPPLIER AND MILL COMPLIES WITH AS/NZS4671.

R4. REINFORCEMENT MUST HAVE UNIQUE MARKS TO IDENTIFY SUPPLIER.

R5. DO NOT USE LOW DUCTILITY REINFORCEMENT (GRADE L) UNLESS OTHER NOTED OTHERWISE.

R6. USE MESH SUPPLIED IN FLAT SHEETS UNLESS APPROVED OTHERWISE.

R7. REINFORCEMENT TO BE CLEAN, FREE OF LOOSE MILL SCALE, RUST, OIL, GREASE, MUD OR OTHER MATERIAL THAT MIGHT REDUCE BOND BETWEEN REINFORCEMENT AND CONCRETE.

R8. SUBMIT PROPOSAL FOR CUTTING OR DISPLACING REINFORCEMENT

R9. DESIGNATION OF REINFORCEMENT BARS IS AS SHOWN:
eg. 17 N20 - 350 EF
17: DENOTES No OF BARS AND TYPE IN GROUP
N: DENOTES BAR GRADE AND DUCTILITY CLASS
20: DENOTES NOMINAL BAR DIAMETER IN mm
350: DENOTES SPACING IN mm
EF: DENOTES LOCATION

R10. TO MINIMIZE TRIP HAZARDS CONSIDER MAXIMUM REINFORCEMENT BAR SPACING FOR TRAFFICABLE AREAS PRIOR TO CASTING CONCRETE OF 200 mm. ALTERNATIVELY PROVIDE SL82 ADDITIONAL IF MAIN REINFORCEMENT SPACING IS GREATER THAN 200 mm.

R11. FOLLOWING ABBREVIATIONS APPLY TO LOCATION OF REINFORCEMENT:

EW: EACH WAY	FF: FAR FACE	BB: BOTTOM BOTTOM (LAID FIRST)
EF: EACH FACE	B: BOTTOM	TT: TOP TOP (LAID LAST)
NF: NEAR FACE	T: TOP	C OR CP: CENTRALLY PLACED

R12. PROVIDE STANDARD COGS AND HOOKS TO AS3600. TERMINATE ENDS OF COLUMN AND BEAM LIGATURES IN A HOOK OF AT LEAST 135 DEGREES. PROVIDE FIRST LIGATURE WITHIN 50 mm OF FACE OF SUPPORT.

R13. PROVIDE ONE CONTINUOUS BAR PARALLEL TO (WITHIN 75 mm OF) CONCRETE EDGES, INCLUDING CONSTRUCTION JOINTS UNLESS NOTED OTHERWISE.

R14. PROVIDE N12 DIAGONAL TRIMMER BARS BY 1000 mm LONG AT EACH LAYER OF REINFORCEMENT AT RE-ENTRANT CORNERS, OPENINGS, SERVICE PENETRATIONS etc UNLESS NOTED OTHERWISE.

R15. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND IS NOT NECESSARILY IN TRUE PROJECTION. SET REINFORCEMENT OUT AT EQUAL CENTRES IF SPACING IS NOT NOMINATED.

R16. CAP STARTER BARS AND OTHER REINFORCEMENT TO REDUCE RISK OF IMPALEMENT AND LACERATIONS.

R17. ENSURE ALL LAID REINFORCING BARS ARE RESTRAINED BEFORE STOPPING WORK TO PREVENT BARS ROLLING UNDERFOOT.

R18. SECURE REINFORCEMENT IN POSITION AGAINST DISPLACEMENT AND MAINTAIN SPECIFIED CLEAR CONCRETE COVER TO REINFORCEMENT (INCLUDING FITMENTS) BY APPROVED CHAIRS, SPACERS, LIGATURES OR TIES AT 800 mm MAXIMUM CENTRES EACH WAY UNLESS NOTED OTHERWISE. PROVIDE ADEQUATE SUPPORT TO PREVENT DISPLACEMENT OF REINFORCEMENT BY WORKMEN OR EQUIPMENT DURING CONCRETE PLACEMENT.

R19. SECURELY TIE REINFORCEMENT WITH WIRE TIES. TURN ENDS OF TIE WIRES INTO CONCRETE, CLEAR OF COVER ZONE.

R20. TIE BUNDLED BARS TOGETHER SO THEY ARE IN CLOSEST POSSIBLE CONTACT WITH 2.5 mm DIAMETER WIRE AT CENTRES LESS THAN 24 TIMES DIAMETER OF SMALLEST BAR IN BUNDLE.

R21. FOR BEAMS, TIE STIRRUPS TO BARS IN EACH CORNER OF EACH STIRRUP. FIX OTHER LONGITUDINAL BARS TO STIRRUPS AT 1000 MAXIMUM CENTRES.

R22. FOR EXTERNAL OR CORROSIVE APPLICATIONS USE HOT DIP GALVANIZED TIE WIRES.

R23. SUPPORT REINFORCEMENT ON PROPRIETARY CONCRETE, METAL OR PLASTIC SUPPORTS ADEQUATE TO WITHSTAND CONSTRUCTION AND TRAFFIC LOADS AND MAINTAIN DURABILITY OF FINISHED CONCRETE STRUCTURE. FOR CONCRETE SURFACES WITH B2 EXPOSURE CLASSIFICATION OR GREATER, ONLY USE PROPRIETARY HIGH STRENGTH FIBRE REINFORCED CEMENT SPACER BLOCKS OR SUPPORTS.

R24. DO NOT PLACE OR MOVE REINFORCEMENT DURING OR AFTER CONCRETE PLACEMENT.

R25. ENSURE EMBEDDED ITEMS (INSERTS, THREADED SOCKETS, FERRULES, BOLTS, DISSIMILAR METAL ITEMS, etc) IN COVER CONCRETE OR EXPOSED TO AIR ARE NOT IN CONTACT WITH REINFORCEMENT. PROVIDE ISOLATION BETWEEN DISSIMILAR METALS, AND BETWEEN REINFORCEMENT AND EXPOSED ITEMS.

R26. SPLICE REINFORCEMENT ONLY AT LOCATIONS SHOWN ON DRAWINGS OR AS APPROVED BY SUPERINTENDENT. STAGGER LAPS WHERE POSSIBLE. LAPPED SPLICE LENGTHS TO COMPLY WITH AS3600. CLEAR SPACING BETWEEN LAPPED BARS TO BE LESS THAN THREE TIMES BAR DIAMETER.

R27. LAPPED SPLICE LENGTHS FOR HORIZONTAL BARS WITH MORE THAN 300 mm CONCRETE CAST BELOW THE BAR AND SPACED AT ≥ 150 mm CENTRES TO COMPLY WITH THE FOLLOWING UNLESS NOTED OTHERWISE:

COVER	f'c	N12	N16	N20	N24	N28	N32
≥ 25	≥ 20	770	1150	1570	-	-	-
≥ 30	≥ 25	630	980	1350	1740	-	-
≥ 40	≥ 32	510	770	1100	1440	1810	2220
≥ 50	≥ 40	460	630	890	1200	1530	1890

DO NOT INTERPOLATE INTERMEDIATE VALUES OF SPLICE LENGTHS.
LAPPED SPLICE LENGTHS FOR BARS IN COLUMNS REFER TO AS3600 OR SUPERINTENDENT.
EPOXY COATED BARS, BARS IN LIGHTWEIGHT CONCRETE AND SLIP FORMED CONCRETE WILL REQUIRE LONGER SPLICE LENGTHS. REFER TO AS3600 OR SUPERINTENDENT.

R28. LAPPED SPLICE LENGTHS FOR VERTICAL BARS (AND HORIZONTAL BARS WITH LESS THAN 300 mm CONCRETE CAST BELOW THE BAR) SPACED AT ≥ 150 mm CENTRES TO COMPLY WITH THE FOLLOWING UNLESS NOTED OTHERWISE:

COVER	f'c	N12	N16	N20	N24	N28	N32
≥ 25	≥ 20	590	890	1210	-	-	-
≥ 30	≥ 25	490	750	1040	1340	-	-
≥ 40	≥ 32	390	600	840	1110	1400	1710
≥ 50	≥ 40	350	480	690	920	1180	1450

NOT APPLICABLE FOR BARS IN COLUMNS.
DO NOT INTERPOLATE INTERMEDIATE VALUES OF SPLICE LENGTHS.
LAPPED SPLICE LENGTHS FOR BARS IN COLUMNS REFER TO AS3600 OR SUPERINTENDENT.
EPOXY COATED BARS, BARS IN LIGHTWEIGHT CONCRETE AND SLIP FORMED CONCRETE WILL REQUIRE LONGER SPLICE LENGTHS. REFER TO AS3600 OR SUPERINTENDENT.

R29. REINFORCEMENT SPLICES IN TENSION MEMBERS MUST BE WELDED OR MECHANICAL SPLICES.

R30. ENSURE REINFORCEMENT COUPLERS PROVIDE FULL TENSION CAPACITY OF REINFORCEMENT.

R31. LAY MESH REINFORCEMENT SO THAT MINIMUM COVER IS TO MAIN WIRES UNLESS NOTED OTHERWISE.

R32. PROVIDE MINIMUM MESH LAPS TO CROSS WIRES OF REINFORCING MESH, SO THAT TWO OUTERMOST WIRES OF ONE SHEET OVERLAP TWO OUTERMOST WIRES OF ADJACENT SHEET BY AT LEAST 25 mm, THUS:

MESH TYPE	END LAP	SIDE LAP
RECTANGULAR MESHES	225	125
SQUARE MESHES SL102 TO SL42	225	225
SL81	125	125
TRENCH MESH	500	N/A

USE LAP LENGTHS BASED ON LARGEST WIRE SPACING. DO NOT LAP MORE THAN THREE SHEETS AT ANY ONE POINT. ALTERNATIVELY USE N12 SPLICE BARS TO LAP ADJACENT SHEETS OF MESH, SPACING OF SPLICE BARS TO MATCH SPACING OF BARS IN MESH, SPLICE BARS TO OVERLAP MESH BY 750 mm MINIMUM UNLESS NOTED OTHERWISE.

R33. SPLICE TRENCH MESH BY A LAP OF 750 mm MINIMUM UNLESS NOTED OTHERWISE. AT T- AND L-INTERSECTIONS, CONTINUE TRENCH MESH FULL WIDTH OF INTERSECTION. AT L-INTERSECTIONS PROVIDE AN N12 L BAR TO LAP 750 mm WITH OUTSIDE BARS UNLESS NOTED OTHERWISE.

R34. DO NOT WELD REINFORCEMENT UNLESS SHOWN ON DRAWINGS OR OTHERWISE APPROVED BY SUPERINTENDENT. WHERE ALLOWED, WELDING OF REINFORCEMENT (INCLUDING TACK-WELDING FOR FIXING PURPOSES) TO COMPLY WITH AS3600 AND AS/NZS1554.3. DO NOT WELD REINFORCEMENT WITHIN 75 mm OF A SECTION THAT HAS BEEN BENT (100 mm FOR N28 AND N32 BARS, 125 mm FOR N36 BARS).
EXTENT OF WELD INSPECTION/TESTING TO BE:

- VISUAL SCANNING 100% OF WELDS
- VISUAL EXAMINATION 50% OF WELDS
- RADIOGRAPHIC OR ULTRASONIC 5% OF FILLET WELDS AND 100% OF BUTT WELDS.

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com
CONSULTANT REFERENCE No. 23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

DESIGNED: MH	DATE: 18.03.15	COMPANY: GHD	
DRAWN: KM	DATE: 18.03.15	COMPANY: GHD	
CHECKED: SR	DATE: 12.06.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

CONCRETE AND REINFORCEMENT NOTES
SHEET 2 OF 2

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
M	NTS		24051	104	0

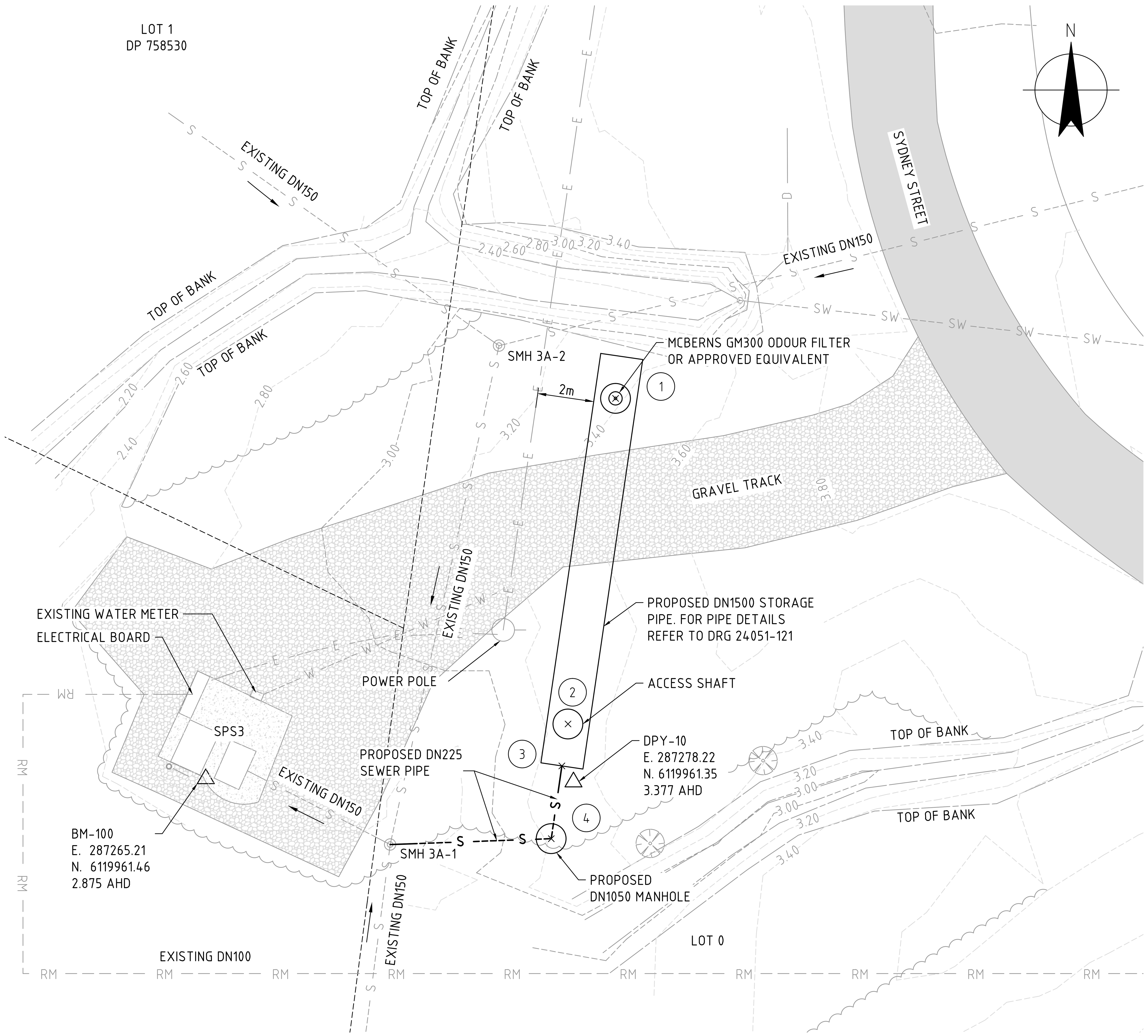
Plot Date: 15/01/16 - 10:41 Cad File: G:\23\1426652\CADD\Drawings\Package 1\24051-104.dwg

SETOUT POINTS			
POINT	EASTING	NORTHING	REMARKS
1	287279.71	6119974.91	CENTRE OF ACCESS SHAFT AND ODOUR FILTER
2	287278.03	6119963.40	CENTRE OF ACCESS SHAFT
3	287277.81	6119961.91	END OF DN225 PIPE
4	287277.43	6119959.34	CENTRE OF DN1050 MANHOLE

SURVEY CONTROL POINTS				
POINT	EASTING	NORTHING	LEVEL	REMARKS
1	287303.92	6119979.32	3.797m	PM23730
2	287284.62	6120041.51	5.210m	PM23724
10	287278.22	6119961.35	3.387m	DPY
100	287265.21	6119961.53	2.875m	BM

LEGEND

- EXISTING RISING MAIN (RM)
- EXISTING SEWER MAIN (S)
- EXISTING STORM WATER (SW)
- EXISTING DRAIN (D)
- EXISTING WATER MAIN (W)
- EXISTING ELECTRICITY BELOW GROUND (E)
- EXISTING ELECTRICITY ABOVE GROUND (E)
- EXISTING CONTOUR MAJOR (2.0)
- EXISTING CONTOUR MINOR (2.1)
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER (S)
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL

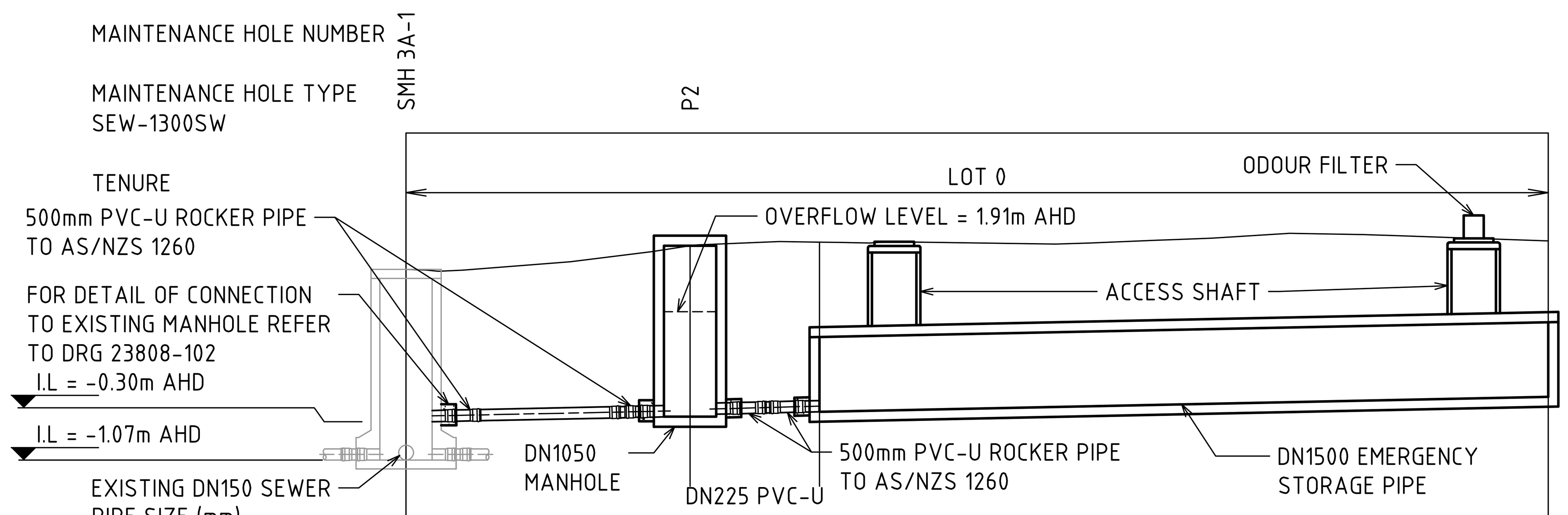


PLAN
SCALE 1:100

NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRILLIA (MGA 56-94).
4. ALL CHAINAGES ARE IN METRES.
5. FOR CONSTRUCTION NOTES REFER TO DRAWINGS 24051-101,102,103 AND 104.
6. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
7. DESIGN BASED ON 1% AEP FLOOD LEVEL OF 2.87m AHD.

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE



PIPE SIZE (mm) / PIPE CLASS	DN225 PVC-U SN8 RRJ	DN225 PVC-U SN8 RRJ	DN1500 SN8 RRJ
GRADE	-1.75%	-1.92%	-2.05%

DATUM R.L. -5.00

DEPTH TO INVERT	3.828 3.058	3.436 3.386	3.406 3.406	3.132
INVERT LEVEL	-1.070 -0.300	-0.200 -0.150	-0.100 -0.100	0.200
FINISHED SURFACE LEVEL	2.758	3.236	3.306	3.332
NATURAL SURFACE LEVEL	2.758	3.236	3.306	3.332
CHAINAGE	0.000	5.703	8.303	22.943

SECTION
SCALE 1:100 H; 1:100V

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS: GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com
CONSULTANT REFERENCE No. 23-1426652-01

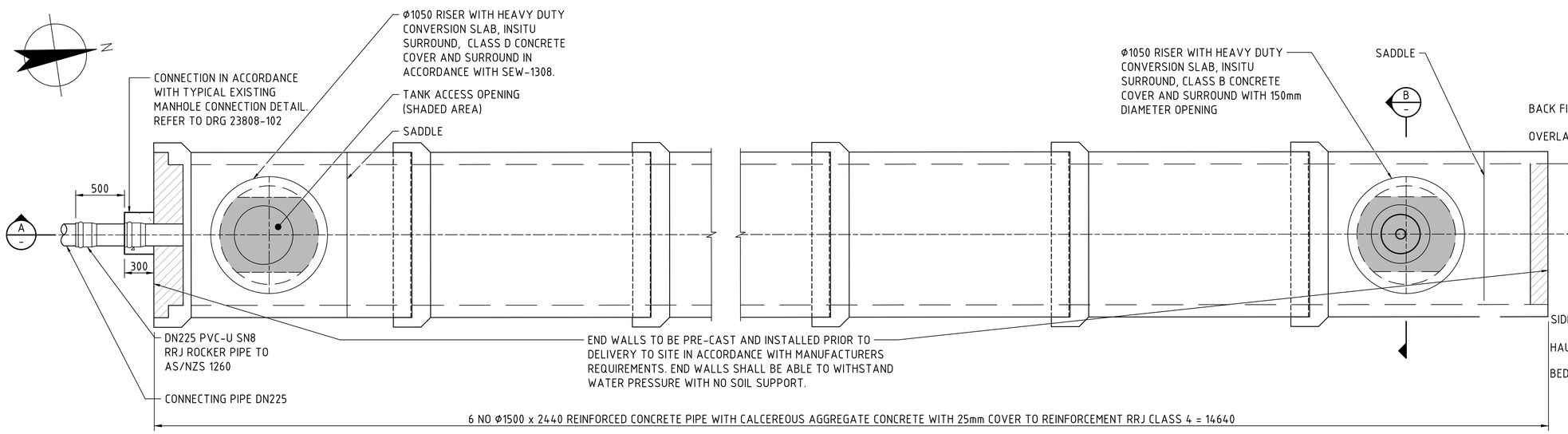
Shoalhaven Water — A Group of Shoalhaven City Council

		DATE	COMPANY
DESIGNED:	MH	14.11.14	GHD
DRAWN:	KM	14.11.14	GHD
CHECKED:	SR	12.06.15	GHD
APPROVED:	CS	15.01.16	GHD

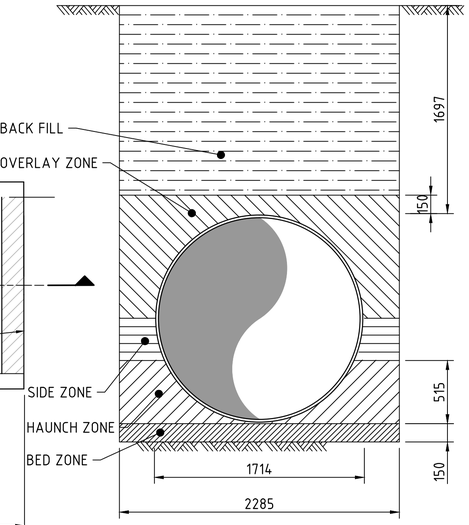
TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE
HUSKISSON AND VINCENTIA SPS3
PLAN AND LONGITUDINAL SECTION

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
	1:100		24051	120	0

Plot Date: 15/01/16 - 10:41 Cad File: G:\23\1426652\CADD\Drawings\Package 1\24051-120.dwg



PLAN
SCALE 1: 25

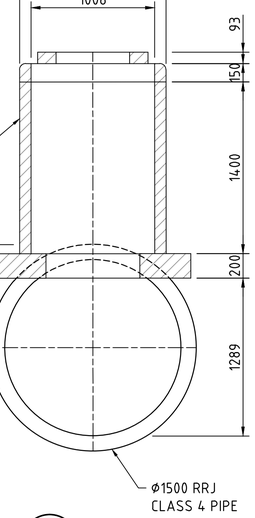


PIPE CLASS 4 BEDDING DESIGN (TYPE HS2 SUPPORT)
SCALE 1:25

NOTE:

FOR BEDDING MATERIAL AND COMPACTION DETAILS REFER TO DRAWING 24051-101.

A SECTION
SCALE 1 : 25



B SECTION
SCALE 1 : 25

WARNING

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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
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E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

		DATE:	COMPANY:
DESIGNED:	MH	14.11.14	GHD
DRAWN:	KM	02.03.15	GHD
CHECKED:	SR	12.06.15	GHD
APPROVED:	CS	15.01.16	GHD

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

HUSKISSON AND VINCENTIA SPS3
STORAGE PIPE DETAILS

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
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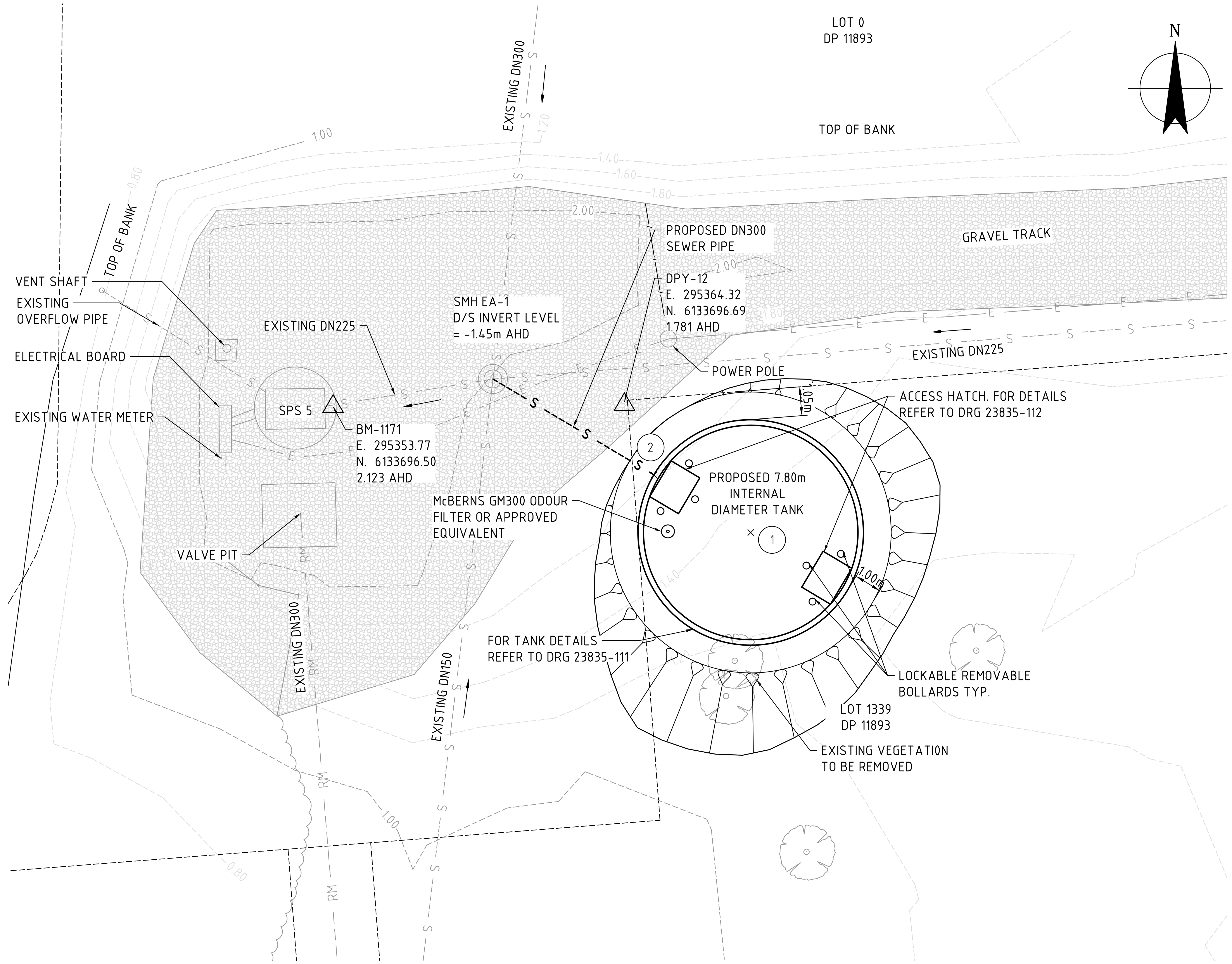
Plot Date: 15/01/16 - 10:41 Cad File: G:\23\1426652\CADD\Drawings\Package 1\24051-121.dwg



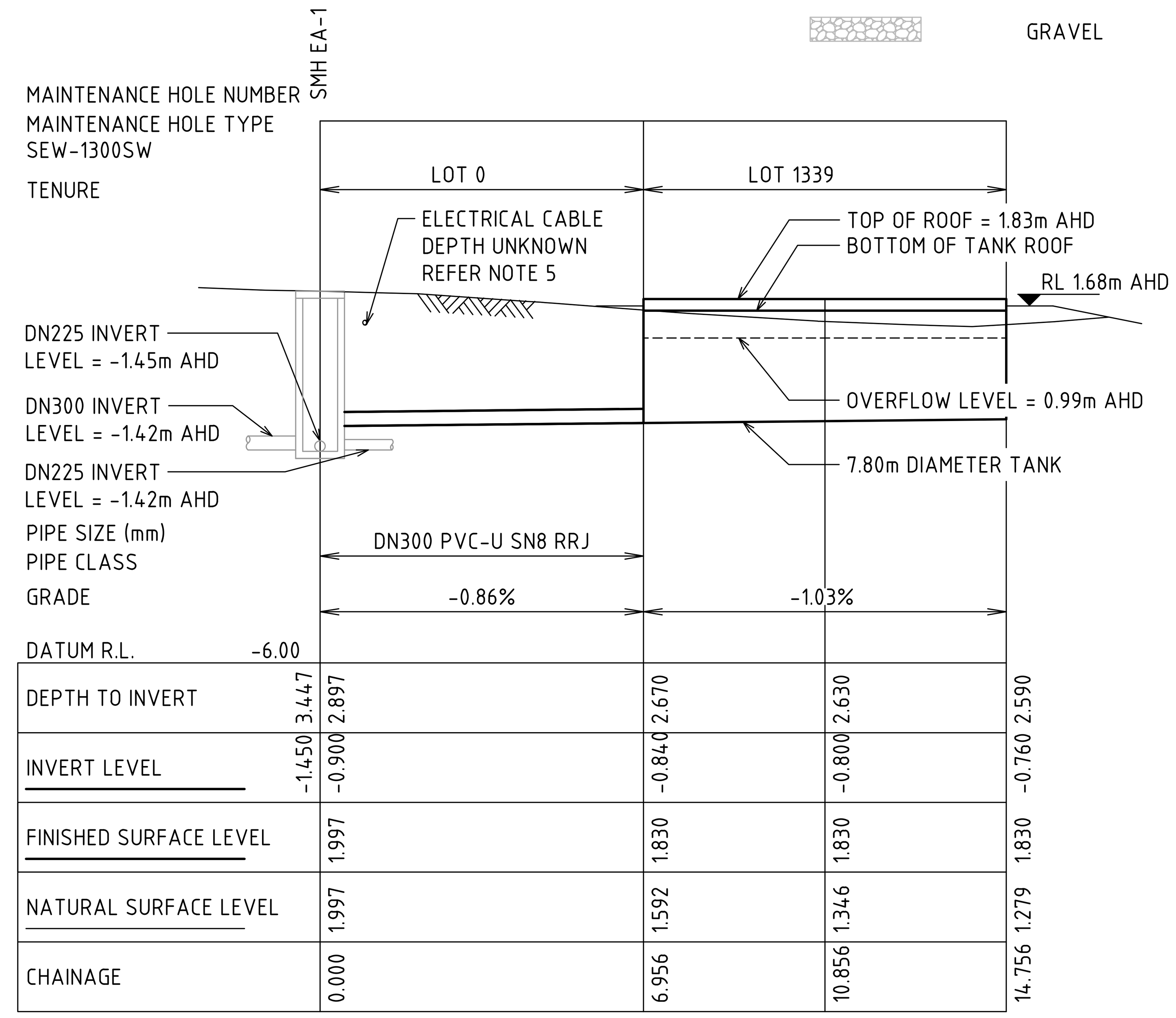
PLAN
SCALE 1:100

SETOUT POINTS			
POINT	EASTING	NORTHING	REMARKS
1	295368.89	6133691.95	CENTRE OF TANK
2	295365.38	6133694.04	CENTRE OF DN300 SEWER PIPE

SURVEY CONTROL POINTS				
POINT	EASTING	NORTHING	LEVEL	REMARKS
2	295454.57	6133471.96	5.070m	PM151232
11	295581.77	6133507.41	5.118m	PM706015
10	295441.04	6133479.73	4.817m	DPY
11	295435.46	6133679.48	1.387m	DPY
12	295364.32	6133696.68	1.781m	DPY
1171	295353.77	6133696.51	2.123m	BM

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL



SECTION
SCALE 1:100 H; 1:100V

NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56-94)
4. ALL CHAINAGES ARE IN METRES.
5. EXISTING UNDERGROUND ELECTRICAL CABLE TO BE LOCATED BY CONTRACTOR AND SUPPORTED DURING CONSTRUCTION.
6. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION.

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

WARNING
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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
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E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No. 23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

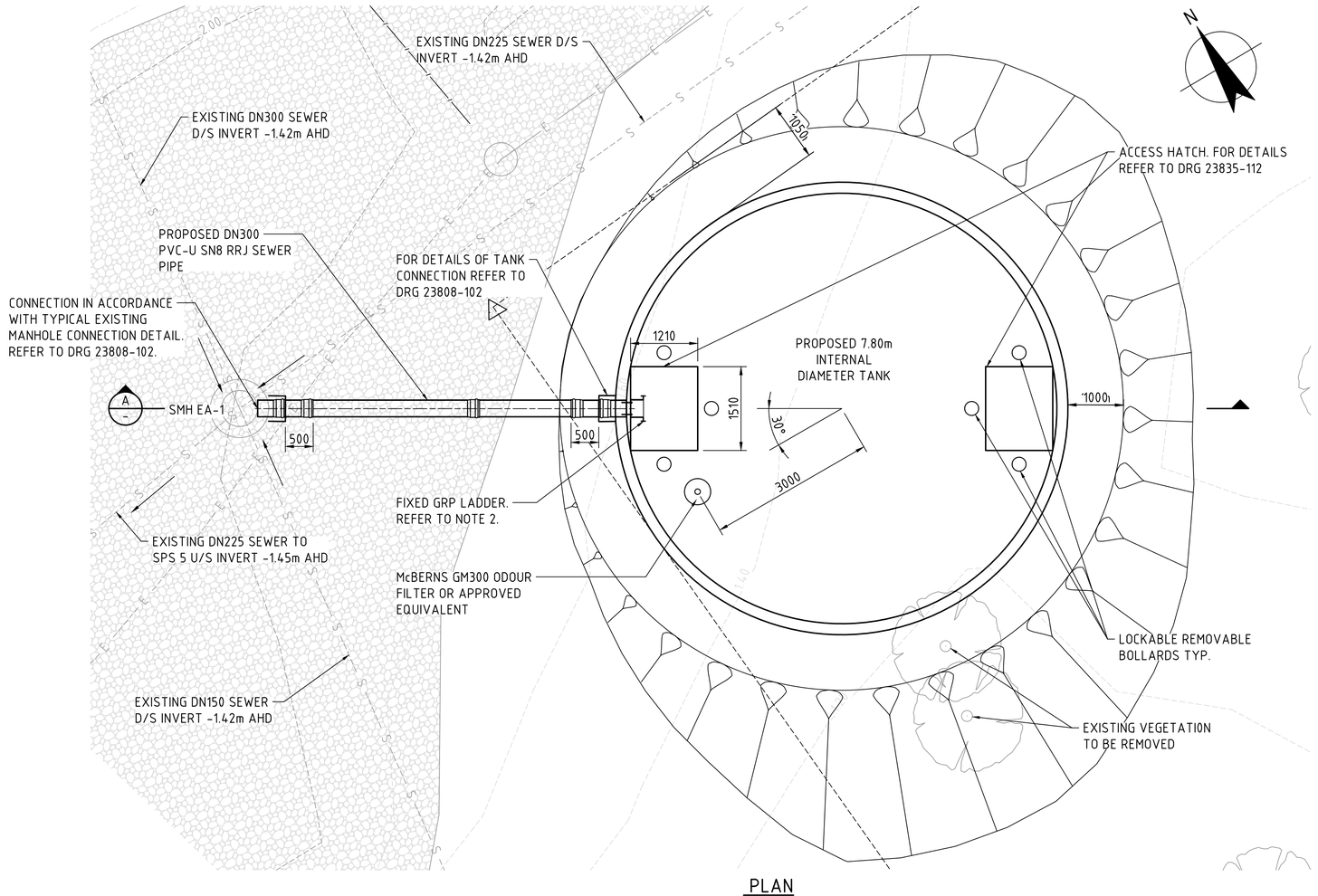
		DATE		COMPANY
DESIGNED:	MH	14.11.14		GHD
DRAWN:	JP	02.03.15		GHD
CHECKED:	SR	12.06.15		GHD
APPROVED:	CS	15.01.16		GHD

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

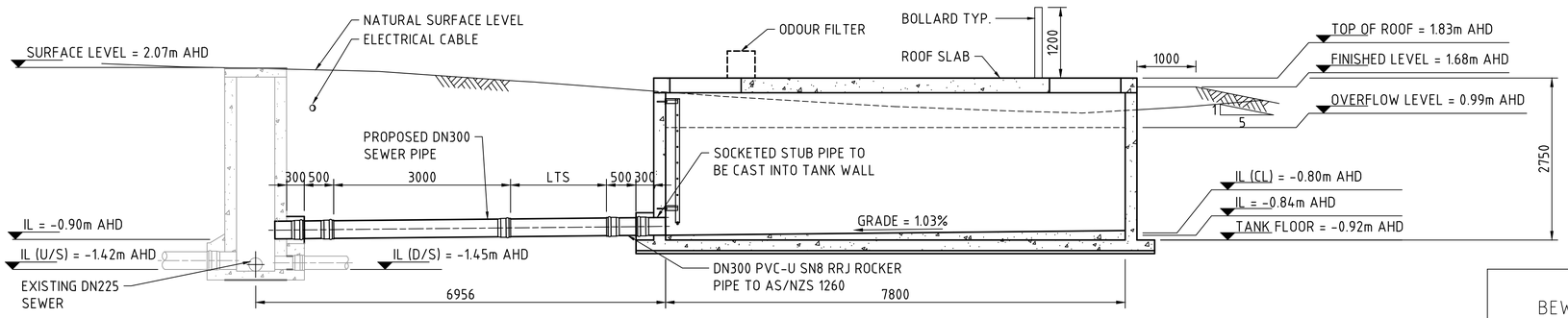
CULBURRA SPS 5
PLAN AND LONGITUDINAL SECTION

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
	1:100		23835	110	0

Plot Date: 15/01/16 - 10:41 Cad File: G:\23\1426652\CADD\Drawings\Package 1\23835-110.dwg



PLAN
SCALE 1:50



A SECTION
\- SCALE 1:50

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL

NOTES:

1. FOR DESIGN AND CONSTRUCTION SPECIFICATION FOR EMERGENCY STORAGE TANK REFER TO DRAWING 24051-102.
2. FIXED GLASS REINFORCED PLASTICS (GRP) LADDER TO BE "TYPE A" TO WSA PS-315. LADDER MOUNTING, FASTENING COMPONENTS AND MOVABLE TOP EXTENSIONS TO BE STAINLESS STEEL GRADE 316.

WARNING
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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
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CONSULTANT REFERENCE No. 23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

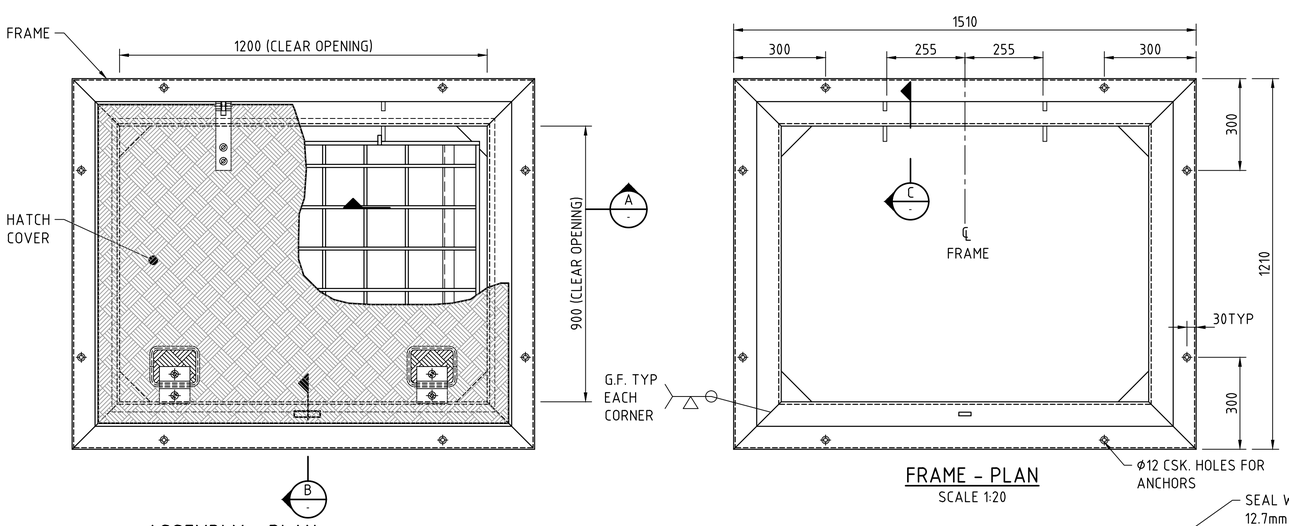
DESIGNED: MH	DATE: 14.11.14	COMPANY: GHD	
DRAWN: JP	DATE: 16.02.15	COMPANY: GHD	
CHECKED: SR	DATE: 12.06.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

CULBURRA SPS 5
EMERGENCY STORAGE TANK DETAILS

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
	1:50		23835	111	0

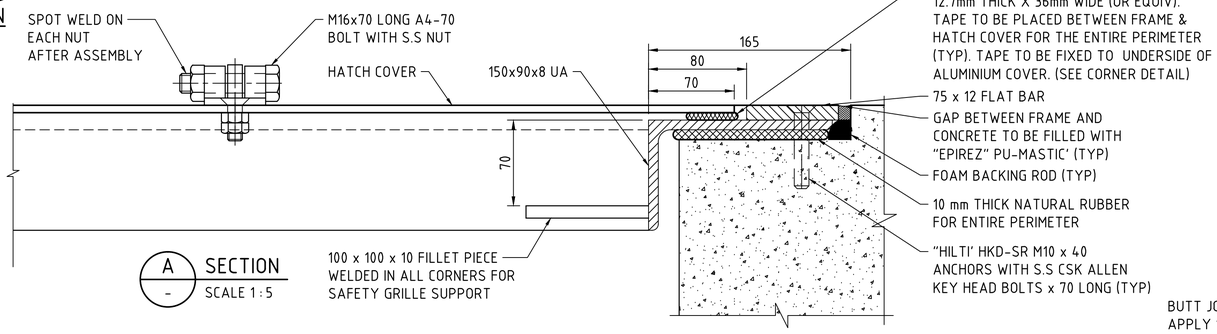
Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 1\23835-111.dwg



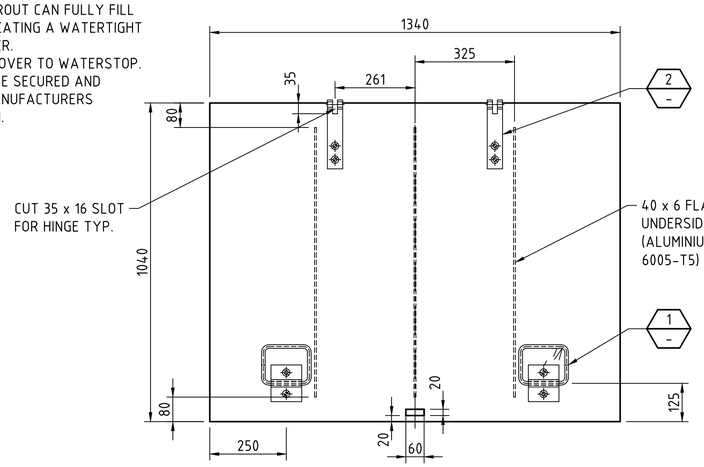
ASSEMBLY - PLAN
SCALE 1:20

FRAME - PLAN
SCALE 1:20

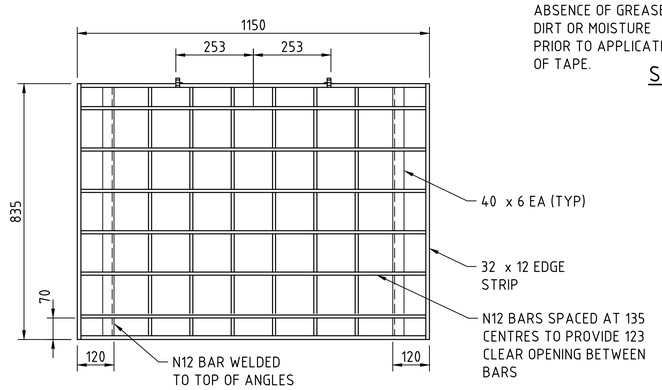
NOTES
1. COVER IS CLASSIFIED LIGHT DUTY.
2. ALL COMPONENTS ASSOCIATED WITH THE FRAME & SAFETY GRILLE TO BE STAINLESS STEEL 316 & COVERS TO BE ALUMINIUM, UNLESS NOTED OTHERWISE.
3. N12 SAFETY GRILLE BARS TO BE STAINLESS STEEL GRADE 316 RIBBED REINFORCEMENT BARS WITH A MINIMUM 0.2% PROOF STRESS OF 500MPa.
4. ALL WELDS TO BE 6mm CONTINUOUS FILLET WELDS UNLESS NOTED OTHERWISE
5. COVERS HAVE BEEN DESIGNED FOR A LIVE LOAD OF 2.5 kPa AS PER AS 1657
6. GROUT TO BE MASTERFLOW 830 OR APPROVED EQUIVALENT. GROUT SUPPLIER SHALL ENSURE GROUT CAN FULLY FILL PENETRATION CREATING A WATERTIGHT CONCRETE BARRIER.
7. MAINTAIN 75mm COVER TO WATERSTOP. WATERSTOP TO BE SECURED AND INSTALLED TO MANUFACTURERS RECOMMENDATION.



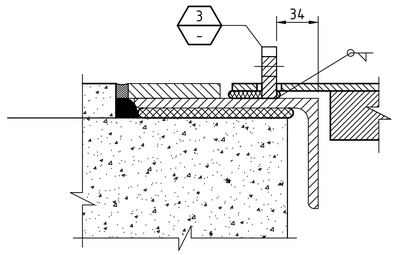
A SECTION
SCALE 1:5



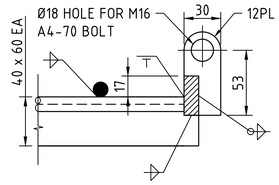
HATCH COVER - PLAN
SCALE 1:20



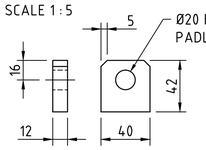
GRILLE - PLAN
SCALE 1:20



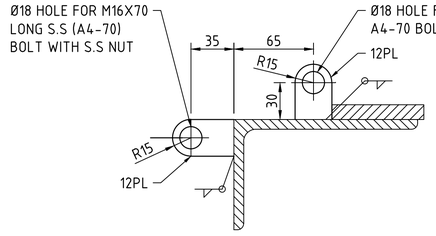
B SECTION
SCALE 1:5



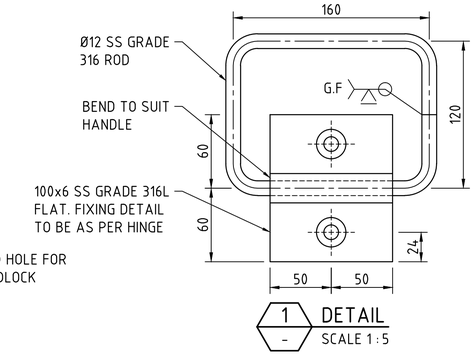
D SECTION
SCALE 1:5



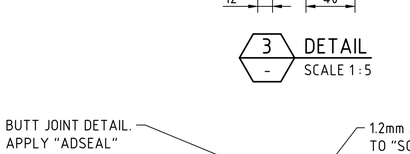
3 DETAIL
SCALE 1:5



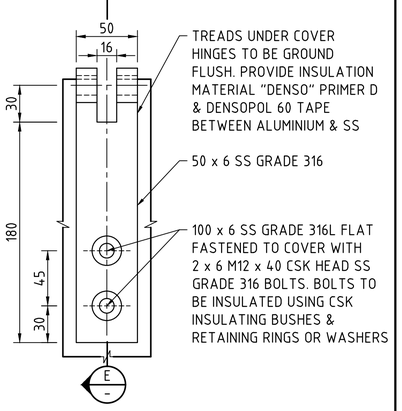
C SECTION
SCALE 1:5

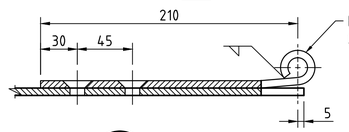


1 DETAIL
SCALE 1:5



SEALING TAPE CORNER DETAIL
SCALE 1:20





E SECTION
SCALE 1:5

0 0.05 0.1 0.15 0.2 0.25m
SCALE 1:5 AT ORIGINAL SIZE

0 0.2 0.4 0.6 0.8 1.0m
SCALE 1:20 AT ORIGINAL SIZE

6 BASE THICKNESS TREAD PLATE
MATERIAL: ALUMINIUM ALLOY 5251
WEIGHT: 24.6 kg
(INCLUDING REINFORCING STRIPS BUT EXCLUDING HINGES & LIFTING HANDLES)

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

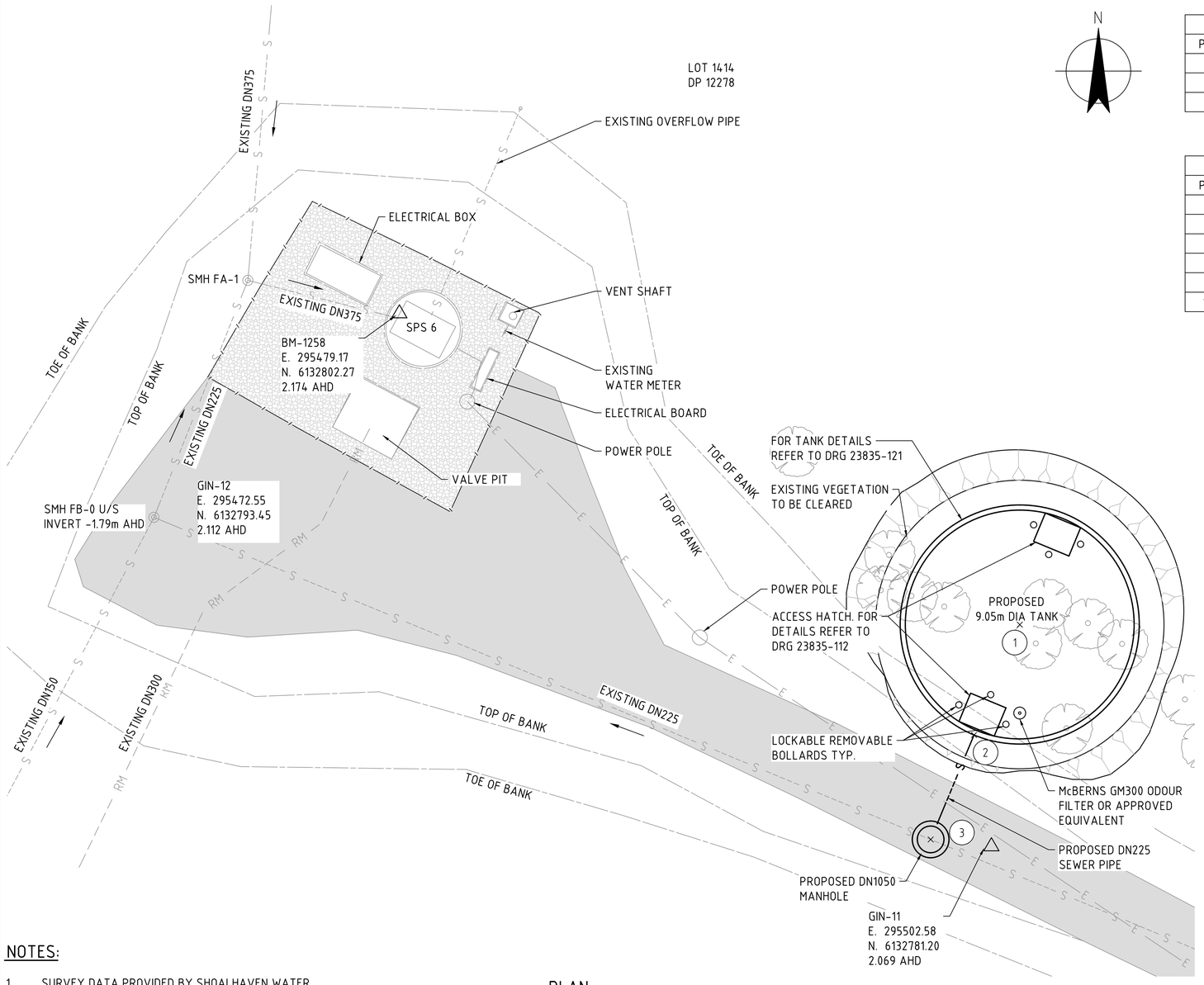
Shoalhaven Water
A Group of Shoalhaven City Council

DESIGNED: MH	DATE: 14.11.14	COMPANY: GHD	
DRAWN: KM	DATE: 16.03.15	COMPANY: GHD	
CHECKED: SR	DATE: 12.06.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

ACCESS HATCH DETAILS

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
	AS SHOWN		23835	112	0



PLAN
SCALE 1:100

N

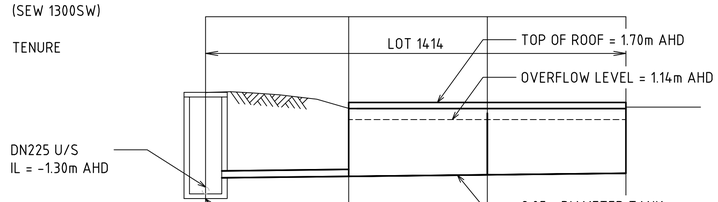
SETOUT POINTS			
POINT	EASTING	NORTHING	REMARKS
1	295503.70	6132789.88	CENTRE OF TANK
2	295501.89	6132785.52	END OF DN225 SEWER PIPE
3	295500.18	6132781.39	CENTRE OF MANHOLE

SURVEY CONTROL POINTS				
POINT	EASTING	NORTHING	LEVEL	REMARKS
1	295600.14	6132807.78	2.317m	PM73555
2	295468.90	6132577.25	4.736m	SSM96696
10	295546.45	6132756.90	1.920m	DPY
11	295502.58	6132781.20	2.069m	GIN
12	295472.55	6132793.45	2.112m	GIN
1258	295479.17	6132802.27	2.174m	BM

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL

MAINTENANCE HOLE TYPE P2
(SEW 1300SW)



PIPE SIZE (mm)		DN225 PVC-U SN8 RRJ	
PIPE CLASS			
GRADE		-1.06%	-1.12%
DATUM R.L.	-6.00		
DEPTH TO INVERT	2.784	2.411	2.360
INVERT LEVEL	-0.760	-0.711	-0.660
FINISHED SURFACE LEVEL	2.024	1.700	1.700
NATURAL SURFACE LEVEL	2.024	1.512	1.350
CHAINAGE	0.000	4.671	9.196

DATUM R.L.	-0.610	2.310	
INVERT LEVEL	-0.610		
FINISHED SURFACE LEVEL	1.700		
NATURAL SURFACE LEVEL	1.350		
CHAINAGE	13.721		

SECTION
SCALE 1:100 H; 1:100V

NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56-94)
4. ALL CHAINAGES ARE IN METRES.
5. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION.

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

DIAL BEFORE YOU DIG www.1100.com.au

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

DESIGNED: MH	DATE: 26.11.14	COMPANY: GHD	
DRAWN: JP	DATE: 02.03.15	COMPANY: GHD	
CHECKED: SR	DATE: 12.06.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

CULBURRA SPS6
PLAN AND LONGITUDINAL SECTION

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
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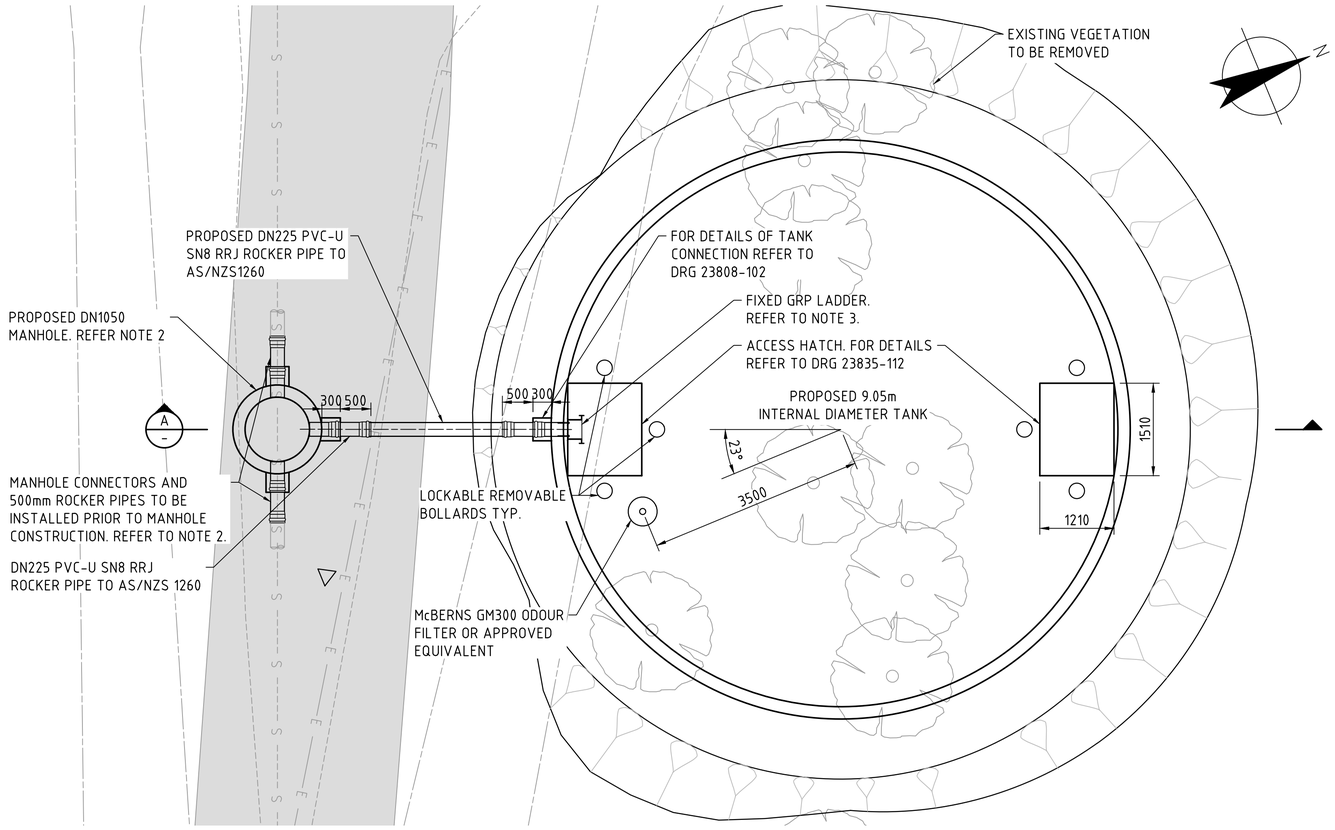
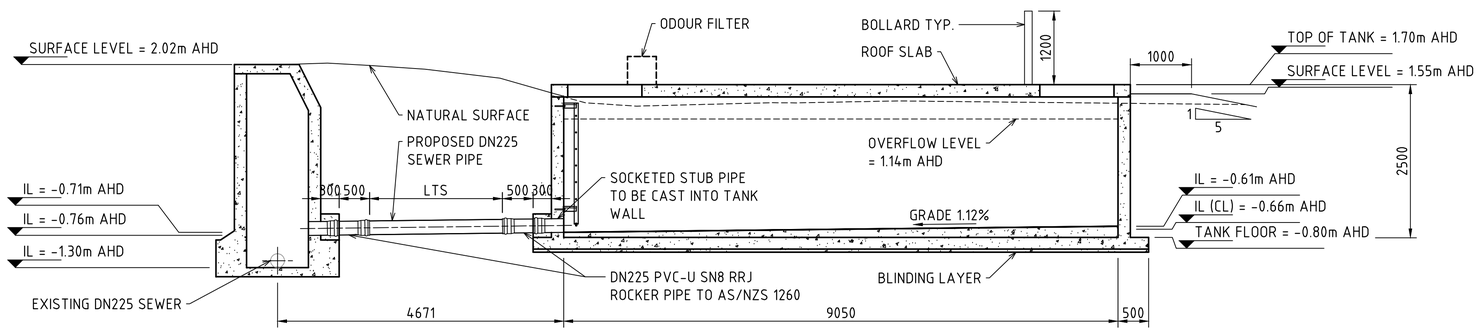
Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 1\23835-120.dwg



PLAN
SCALE 1:50



A SECTION
- SCALE 1:50

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL

NOTES:

1. FOR DESIGN AND CONSTRUCTION SPECIFICATION FOR EMERGENCY STORAGE TANK REFER TO DRAWING 24051-102.
2. NEW MANHOLE TO BE TYPE P2 IN ACCORDANCE WITH SEW-1300SW. MANHOLE TO BE CONSTRUCTED OVER THE EXISTING SEWER IN ACCORDANCE WITH SEW-1502 WITH REACTIVE BASE.
3. FIXED GLASS REINFORCED PLASTICS (GRP) LADDER TO BE "TYPE A" WSA PS-315. LADDER MOUNTING, FASTENING COMPONENTS AND MOVABLE TOP EXTENSIONS TO BE STAINLESS STEEL GRADE 316.

WARNING
BEWARE OF UNDERGROUND SERVICES
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DIAL BEFORE YOU DIG www.1100.com.au

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

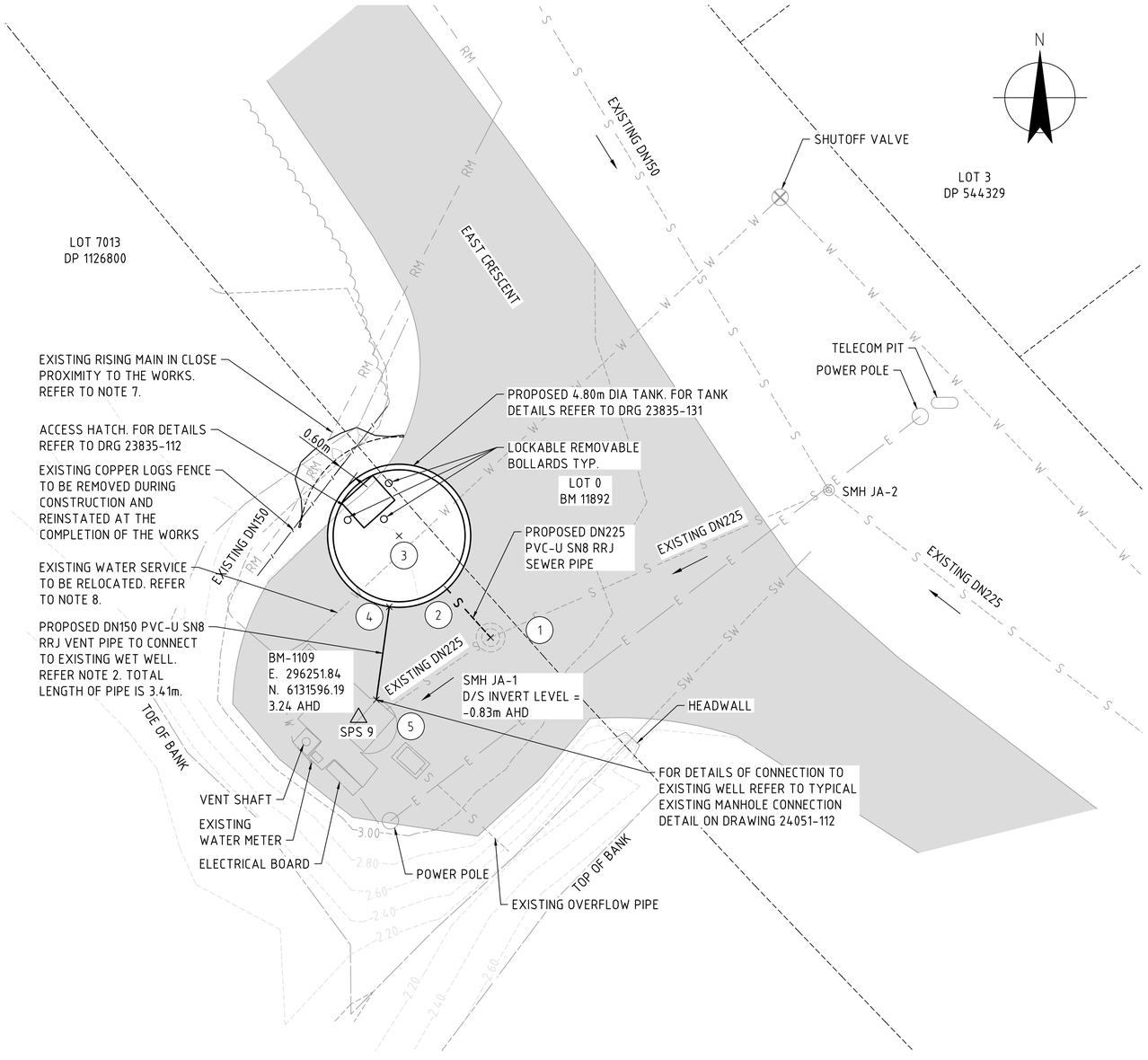
		DATE:	COMPANY:
DESIGNED:	MH	26.11.14	GHD
DRAWN:	JP	02.03.15	GHD
CHECKED:	SR	12.06.15	GHD
APPROVED:	CS	15.01.16	GHD

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

CULBURRA SPS6
EMERGENCY STORAGE TANK DETAILS

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
	1:50		23835	121	0

Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 1\23835-121.dwg



PLAN
SCALE 1:100

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

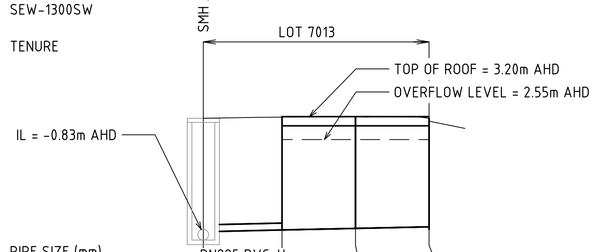
SETOUT POINTS			
POINT	EASTING	NORTHING	REMARKS
1	296256.64	6131599.01	CENTRE OF MANHOLE
2	296255.05	6131600.77	END OF DN225 SEWER PIPE
3	296253.31	6131602.70	CENTRE OF TANK
4	296252.96	6131600.13	END OF DN150 VENT PIPE
5	296252.48	6131596.75	CONNECTION TO EXISTING WELL

SURVEY CONTROL POINTS				
POINT	EASTING	NORTHING	LEVEL	REMARKS
1	296305.99	6131552.28	2.729m	PM73547
10	296285.80	6131597.19	3.340m	DPY
11	296258.55	6131601.81	3.103m	GIN
100	296495.04	6131541.34	2.991m	PM73548
1109	296251.84	6131596.19	3.244m	BM

MAINTENANCE HOLE NUMBER

MAINTENANCE HOLE TYPE
SEW-1300SW

TENURE



PIPE SIZE (mm)		DN225 PVC-U		
PIPE CLASS		SN8 RRJ		
GRADE		-1.75%	-2.08%	
DATUM R.L.	-4.00			
DEPTH TO INVERT	3.692	3.700	3.650	3.680
INVERT LEVEL	-0.545	-0.500	-0.450	-0.480
FINISHED SURFACE LEVEL	3.147	3.200	3.200	3.200
NATURAL SURFACE LEVEL	3.147	3.184	3.199	3.147
CHAINAGE	0.000	2.569	4.969	7.369

SECTION
SCALE 1:100 H; 1:100V

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL

NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. VENT LINE SHALL BE LAID AT A CONTINUOUSLY FALLING GRADE OF 1% FROM EXISTING WELL TO STORAGE TANK.
3. ALL LEVELS ARE IN METRES TO AHD.
4. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56-94).
5. ALL CHAINAGES ARE IN METRES.
6. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
7. CONTRACTOR TO LOCATE EXISTING RISING MAIN AND ENSURE THE INTEGRITY OF THE PIPE IS MAINTAINED DURING CONSTRUCTION.
8. CONTRACTOR TO LOCATE THE EXISTING WATER SERVICE AND RELOCATE IN CONSULTATION WITH SHOALHAVEN WATER.

WARNING
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DIAL BEFORE YOU DIG www.1100.com.au

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

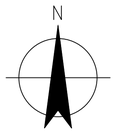
DESIGNED: MH	DATE: 26.11.14	COMPANY: GHD	
DRAWN: JP	DATE: 06.03.15	COMPANY: GHD	
CHECKED: SR	DATE: 12.06.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

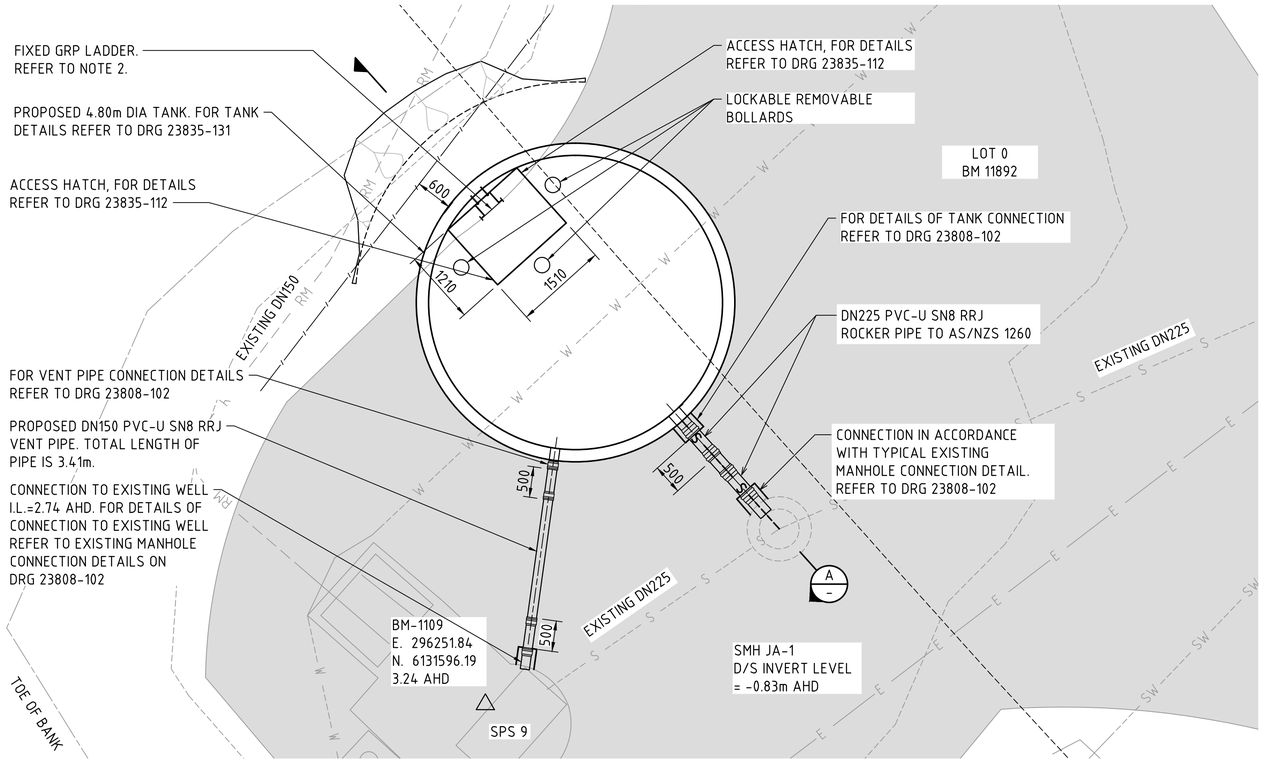
TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

CULBURRA SPS9
PLAN AND LONGITUDINAL SECTION

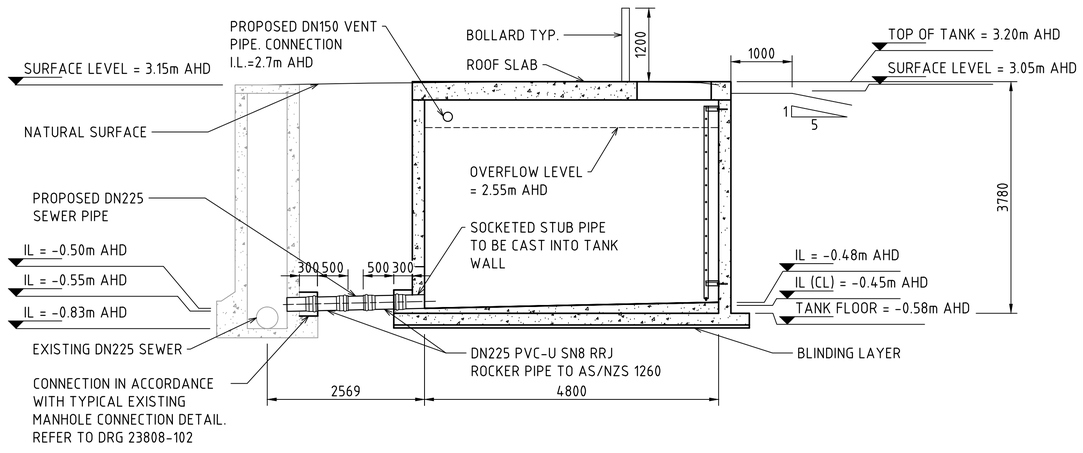
SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
	1:100		23835	130	0

Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 1\23835-130.dwg





PLAN
SCALE 1:50



A SECTION
SCALE 1 :50

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL

NOTES:

1. FOR DESIGN AND CONSTRUCTION SPECIFICATION FOR EMERGENCY STORAGE TANK REFER TO DRAWING 24051-102.
2. FIXED GLASS REINFORCED PLASTICS (GRP) LADDER TO BE "TYPE A" TO WSA PS-315. LADDER MOUNTING, FASTENING COMPONENTS AND MOVABLE TOP EXTENSIONS TO BE STAINLESS STEEL GRADE 316.

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

WARNING
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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
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CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

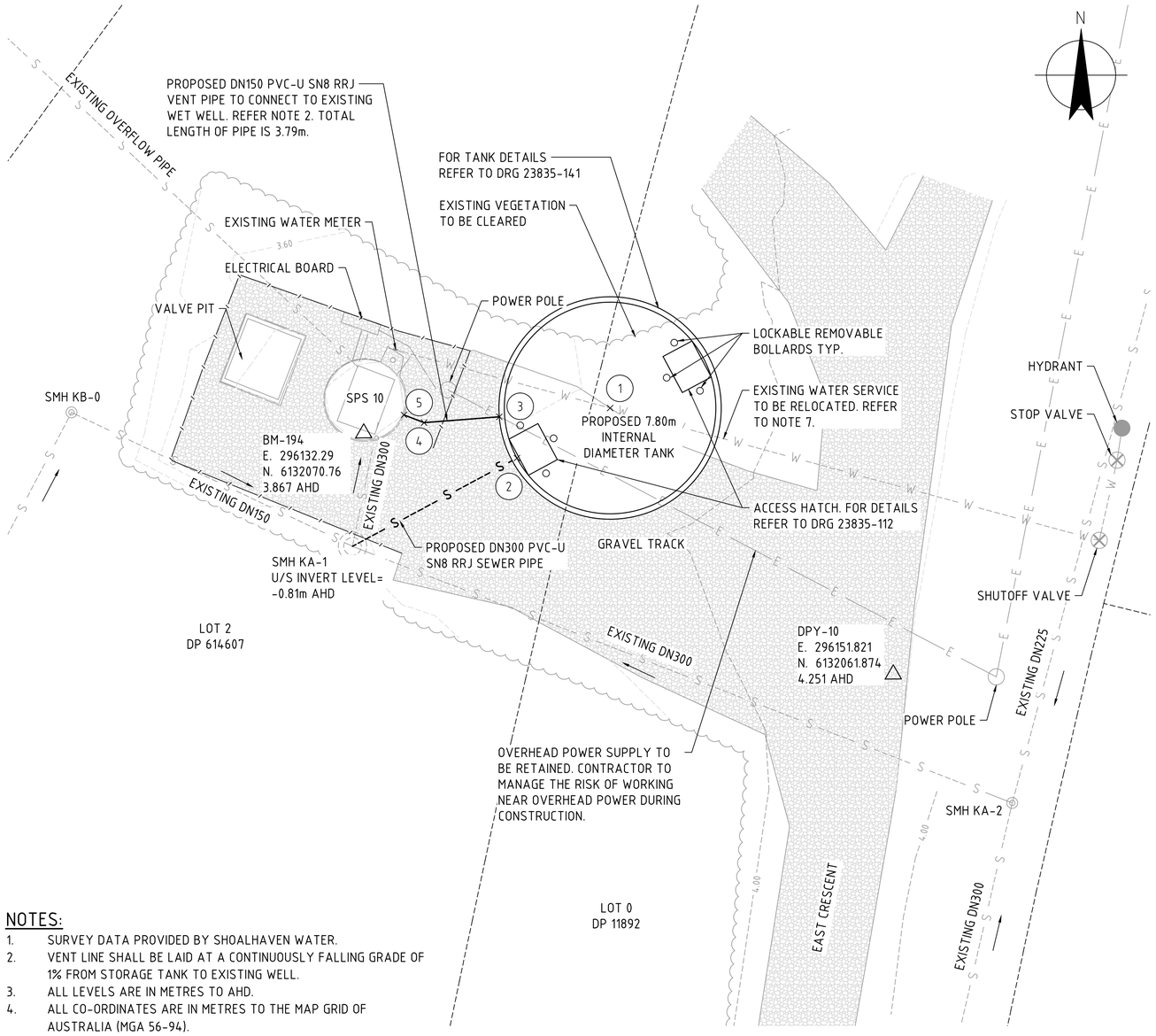
DESIGNED: MH	DATE: 26.11.14	COMPANY: GHD	
DRAWN: JP	DATE: 06.03.15	COMPANY: GHD	
CHECKED: SR	DATE: 12.06.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

CULBURRA SPS9
EMERGENCY STORAGE TANK DETAILS

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
	1:50		23835	131	0

Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 1\23835-131.dwg



SETOUT POINTS			
POINT	EASTING	NORTHING	REMARKS
1	296141.38	296141.38	CENTRE OF TANK
2	296137.94	296137.94	END OF DN300 SEWER PIPE
3	296137.29	296137.29	END OF VENT PIPE
4	296134.52	296134.52	30° BEND VENT PIPE
5	296133.77	296133.77	CONNECTION TO WET WELL

SURVEY CONTROL POINTS				
POINT	EASTING	NORTHING	LEVEL	REMARKS
1	296126.19	6131905.08	4.596m	PM73551
2	296162.04	6132100.33	4.728m	PM70599
10	296151.82	6132061.87	4.251m	DPY
194	296132.29	6132070.76	3.867m	BM

LEGEND

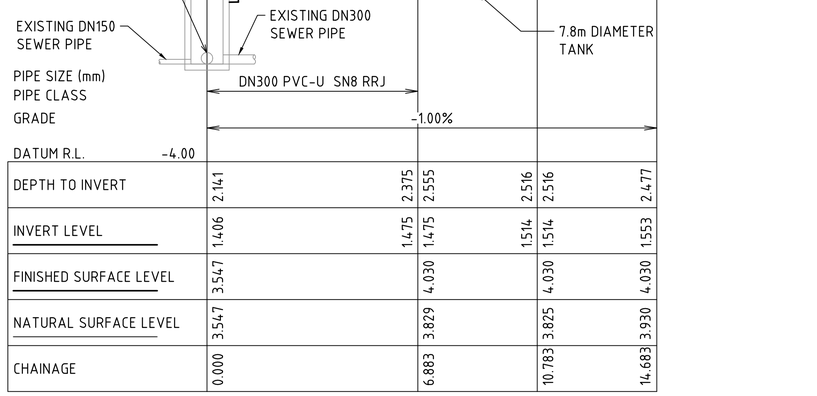
- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL

NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. VENT LINE SHALL BE LAID AT A CONTINUOUSLY FALLING GRADE OF 1% FROM STORAGE TANK TO EXISTING WELL.
3. ALL LEVELS ARE IN METRES TO AHD.
4. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56-94).
5. ALL CHAINAGES ARE IN METRES.
6. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
7. CONTRACTOR TO LOCATE THE EXISTING WATER SERVICE AND RELOCATE IN CONSULTATION WITH SHOALHAVEN WATER.

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

PLAN
SCALE 1:100



SECTION
SCALE 1:100 H; 1:100V

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

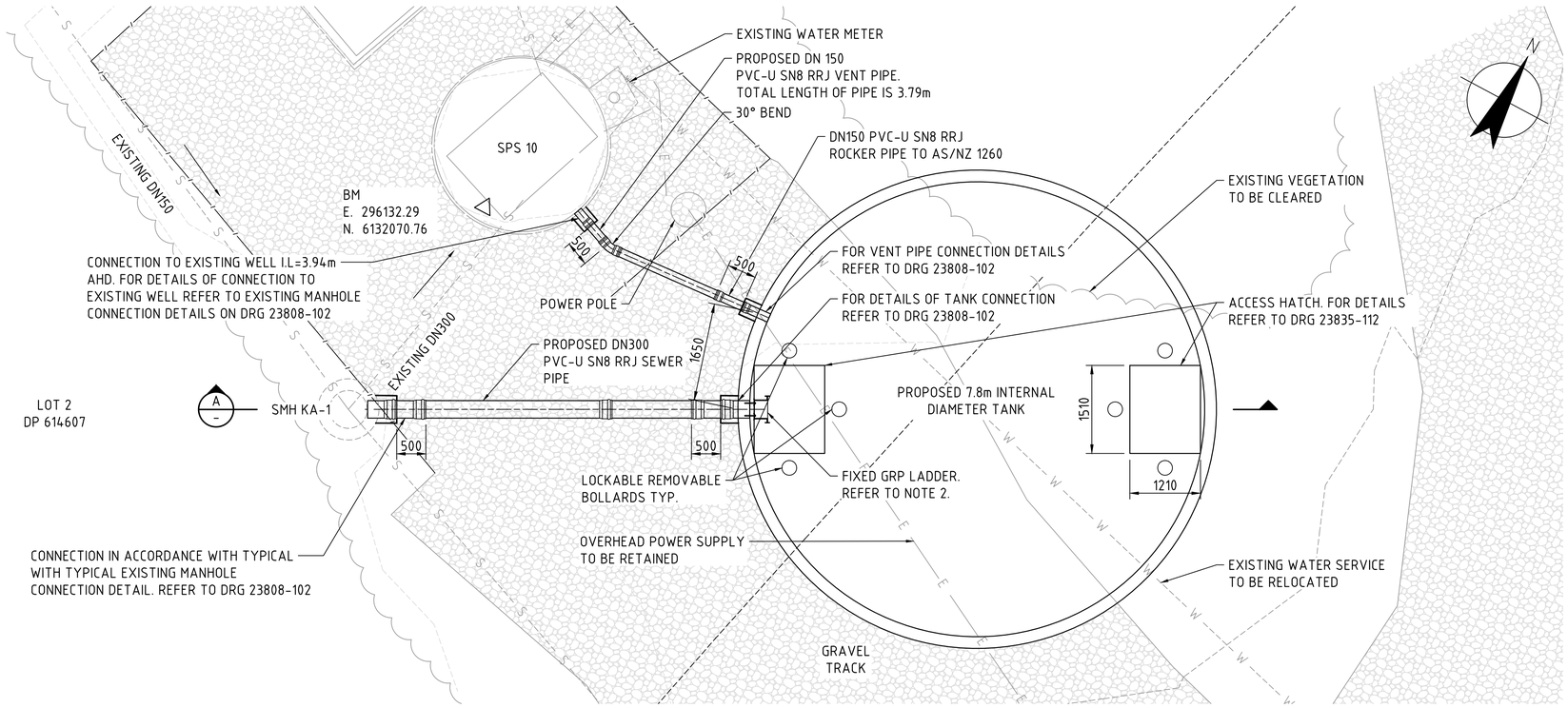
DESIGNED: MH	DATE: 26.11.14	COMPANY: GHD	
DRAWN: KM	DATE: 26.11.14	COMPANY: GHD	
CHECKED: SR	DATE: 12.06.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

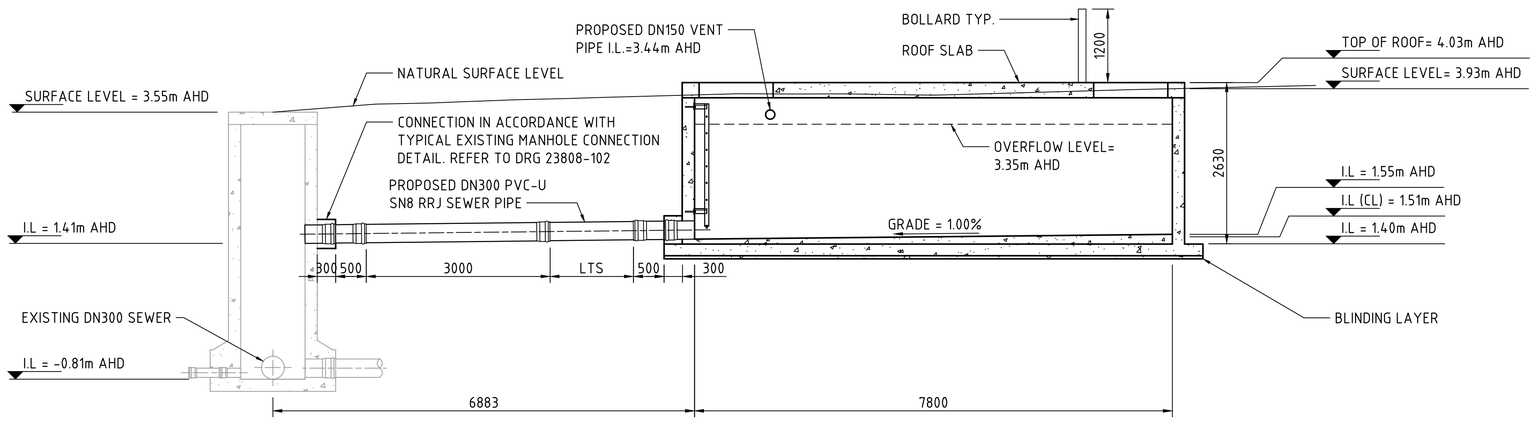
CULBURRA SPS10
PLAN AND LONGITUDINAL SECTION

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
	1:100		23835	140	0

Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 1\23835-140.dwg



PLAN
SCALE 1:50



SECTION
SCALE 1:50

LEGEND

- EXISTING RISING MAIN (RM)
- EXISTING SEWER MAIN (S)
- EXISTING STORM WATER (SW)
- EXISTING DRAIN (D)
- EXISTING WATER MAIN (W)
- EXISTING ELECTRICITY BELOW GROUND (E)
- EXISTING ELECTRICITY ABOVE GROUND (E)
- EXISTING CONTOUR MAJOR (2.0)
- EXISTING CONTOUR MINOR (2.1)
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL

NOTES:

1. FOR DESIGN AND CONSTRUCTION SPECIFICATION FOR EMERGENCY STORAGE TANK REFER TO DRAWING 24051-102.
2. FIXED GLASS REINFORCED PLASTICS (GRP) LADDER TO BE "TYPE A" TO WSA PS-315. LADDER MOUNTING, FASTENING COMPONENTS AND MOVABLE TOP EXTENSIONS TO BE STAINLESS STEEL GRADE 316.

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

WARNING
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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

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CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

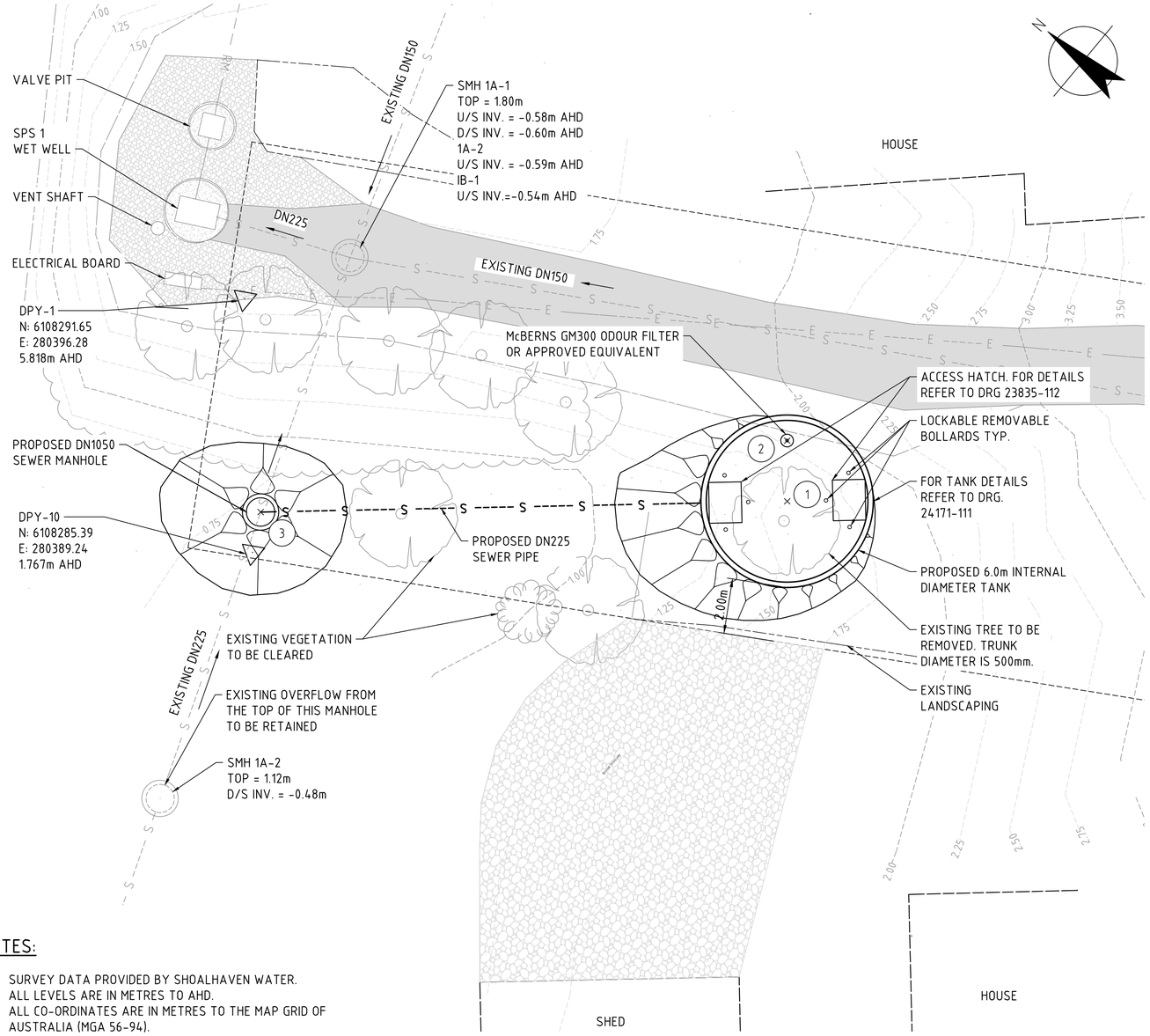
DESIGNED: MH	DATE: 26.11.14	COMPANY: GHD	
DRAWN: KM	DATE: 03.09.15	COMPANY: GHD	
CHECKED: SR	DATE: 12.06.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

CULBURRA SPS10
EMERGENCY STORAGE TANK DETAILS

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
	1:50		23835	141	0

Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 1\23835-141.dwg



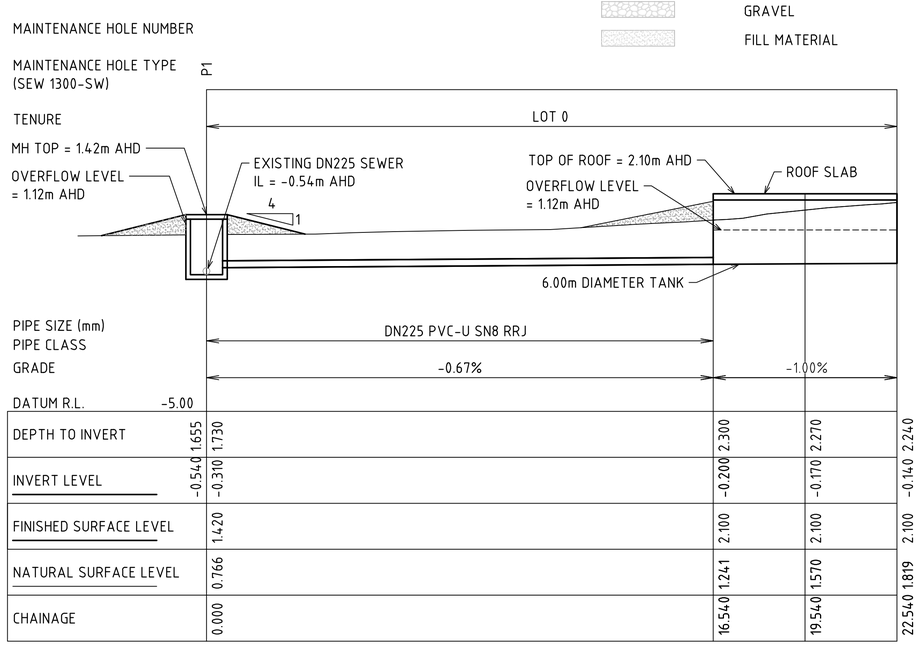
PLAN
SCALE 1:100

SETOUT POINTS			
POINT	EASTING	NORTHING	REMARKS
1	280403.39	6108271.36	CENTRE OF TANK
2	280405.12	6108272.80	CENTRE OF ODOUR CONTROL
3	280390.59	6108286.12	CENTRE OF PROPOSED DN1050 MH

SURVEY CONTROL POINTS				
POINT	EASTING	NORTHING	LEVEL	REMARKS
1	280396.28	6108291.65	5.818m	DPY
10	280389.24	6108285.39	1.767m	DPY
100	280396.78	6108190.58	5.841m	DH

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL
- FILL MATERIAL



SECTION
SCALE 1:100

NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56-94).
4. ALL CHAINAGES ARE IN METRES.
5. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION.

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

WARNING
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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

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GHD
57 Graham Street Nowra NSW 2541
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E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No. 23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

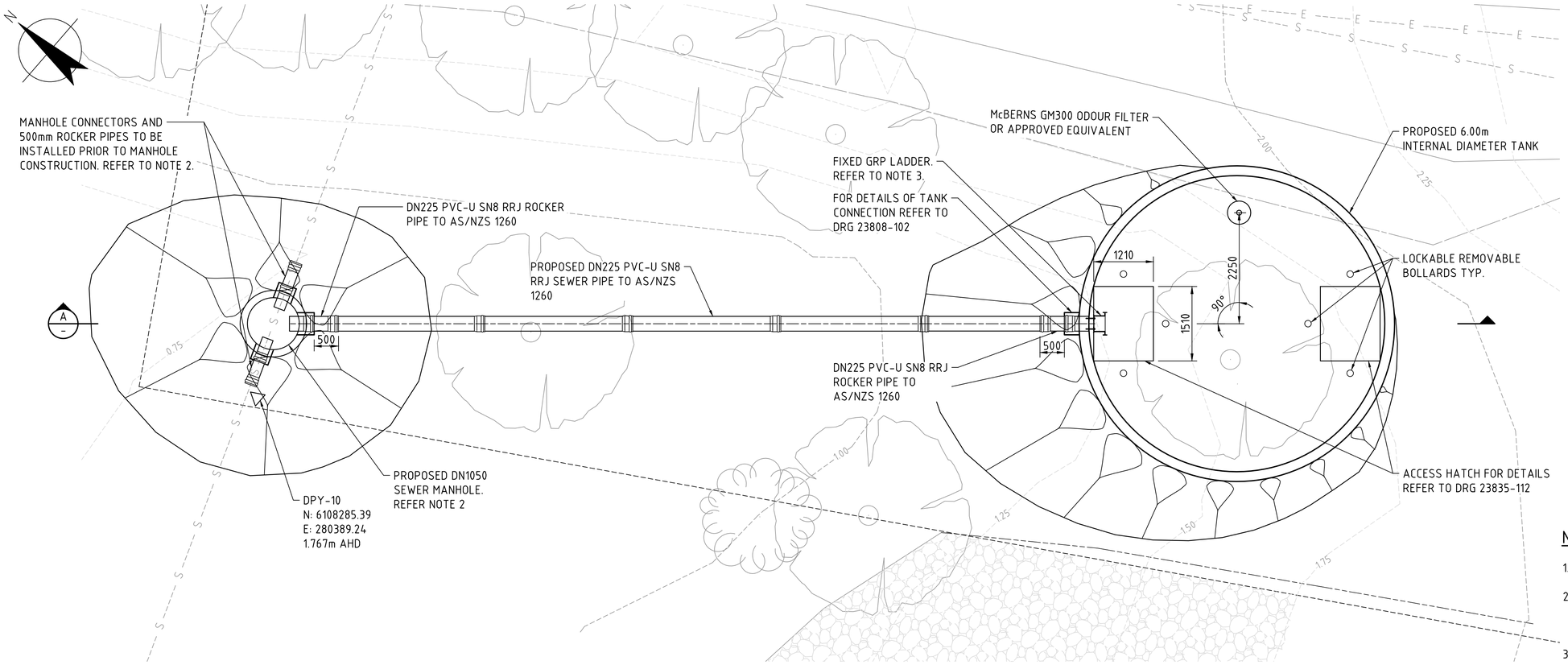
DESIGNED: MH	DATE: 09.03.15	COMPANY: GHD	
DRAWN: KM	DATE: 09.03.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

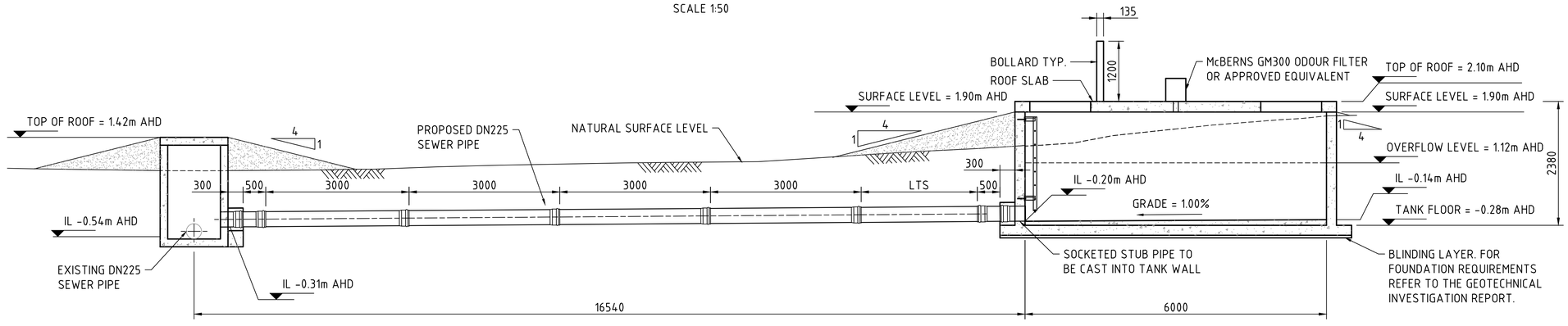
SUSSEX INLET SPS 1
PLAN AND LONGITUDINAL SECTION

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A1	1:100		24171	110	0

Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 2\24171-110.dwg



PLAN
SCALE 1:50



A SECTION
SCALE 1:50

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL
- FILL MATERIAL

NOTES:

1. FOR DESIGN AND CONSTRUCTION SPECIFICATION FOR EMERGENCY STORAGE TANK REFER TO DRAWING 24051-102.
2. NEW MANHOLE TO BE TYPE P2 IN ACCORDANCE WITH SEW-1300SW AND SEW-1302SW. MANHOLE TO BE CONSTRUCTED OVER THE EXISTING SEWER IN ACCORDANCE WITH SEW-1502 WITH REACTIVE BASE.
3. FIXED GLASS REINFORCED PLASTICS (GRP) LADDER TO BE "TYPE A" TO WSA PS-315. LADDER MOUNTING, FASTENING COMPONENTS AND MOVABLE TOP EXTENSIONS TO BE STAINLESS STEEL GRADE 316.

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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

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E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

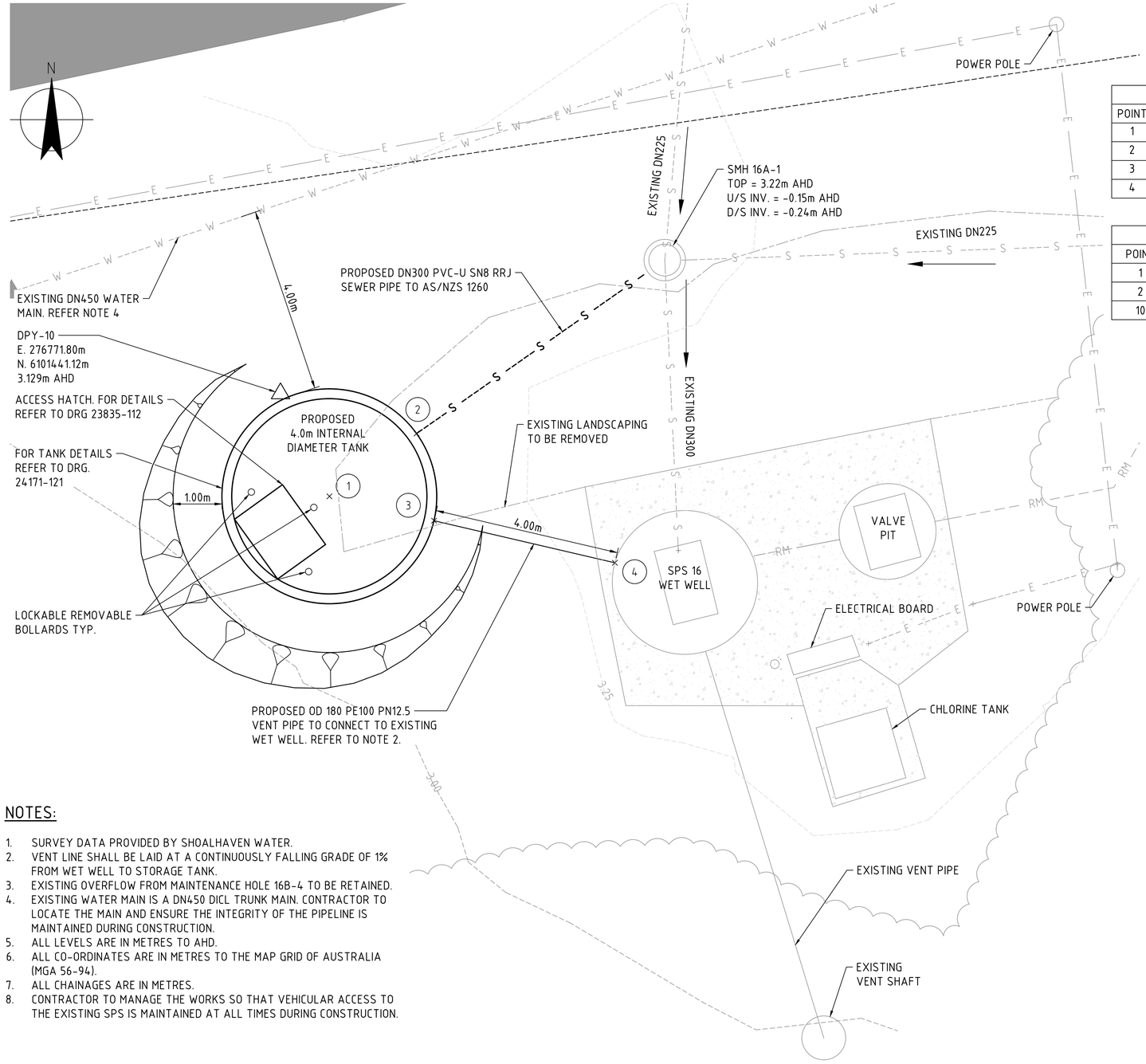
DESIGNED: MH	DATE: 27.05.15	COMPANY: GHD	
DRAWN: KM	DATE: 29.05.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

SUSSEX INLET SPS 1
EMERGENCY STORAGE TANK DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A1	1:50		24171	111	0

Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 2\24171-111.dwg



SETOUT POINTS			
POINT	EASTING	NORTHING	REMARKS
1	276772.80	6101439.01	CENTRE OF TANK
2	276774.59	6101440.30	END OF PROPOSED DN225 SEWER PIPE
3	276774.94	6101438.52	END OF PROPOSED OD180 VENT PIPE
4	276778.65	6101437.65	CONNECTION TO EXISTING WET WELL

SURVEY CONTROL POINTS				
POINT	EASTING	NORTHING	LEVEL	REMARKS
1	276604.63	6101490.24	2.351m	PM 124820
2	276694.08	6101450.79	2.267m	PM 124812
10	276771.80	6101441.12	3.129m	DPY

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
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- BUILDING BOUNDARY
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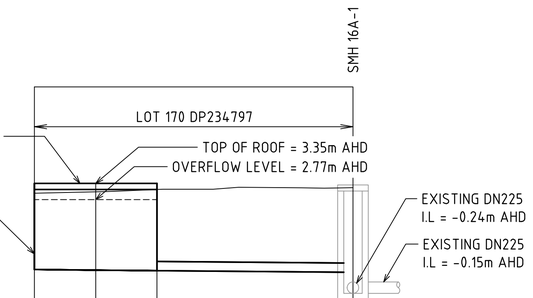
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL

MAINTENANCE HOLE NUMBER

MAINTENANCE HOLE TYPE
SEW 1300SW

TENURE



PIPE SIZE (mm)					
PIPE CLASS					
GRADE		-1.00%		-0.78%	
DATUM R.L. -4.00					
DEPTH TO INVERT	2.810	2.830	2.850	2.850	2.850 3.540
INVERT LEVEL	0.540	0.520	0.500	0.500	0.450 -0.240
FINISHED SURFACE LEVEL	3.350	3.350		3.350	3.300
NATURAL SURFACE LEVEL	3.029	3.073		3.153	3.208
CHAINAGE	0.000	2.000		4.000	10.399

SECTION
SCALE 1:100 H; 1:100V

NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. VENT LINE SHALL BE LAID AT A CONTINUOUSLY FALLING GRADE OF 1% FROM WET WELL TO STORAGE TANK.
3. EXISTING OVERFLOW FROM MAINTENANCE HOLE 16B-4 TO BE RETAINED.
4. EXISTING WATER MAIN IS A DN450 DICL TRUNK MAIN. CONTRACTOR TO LOCATE THE MAIN AND ENSURE THE INTEGRITY OF THE PIPELINE IS MAINTAINED DURING CONSTRUCTION.
5. ALL LEVELS ARE IN METRES TO AHD.
6. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56-94).
7. ALL CHAINAGES ARE IN METRES.
8. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION.

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

PLAN
SCALE 1:50

WARNING
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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

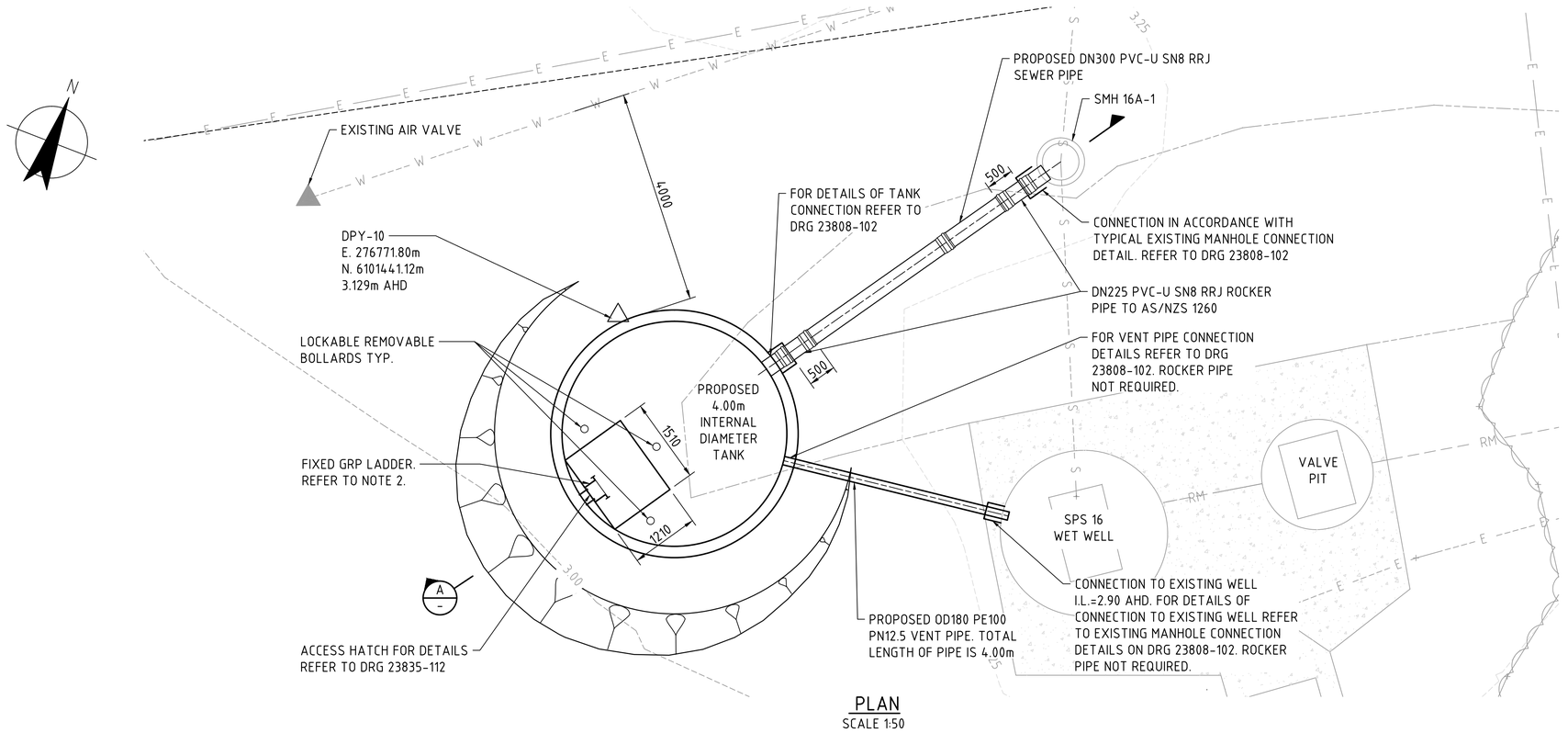
DESIGNED: MH	DATE: 02.03.15	COMPANY: GHD	
DRAWN: KM	DATE: 02.03.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

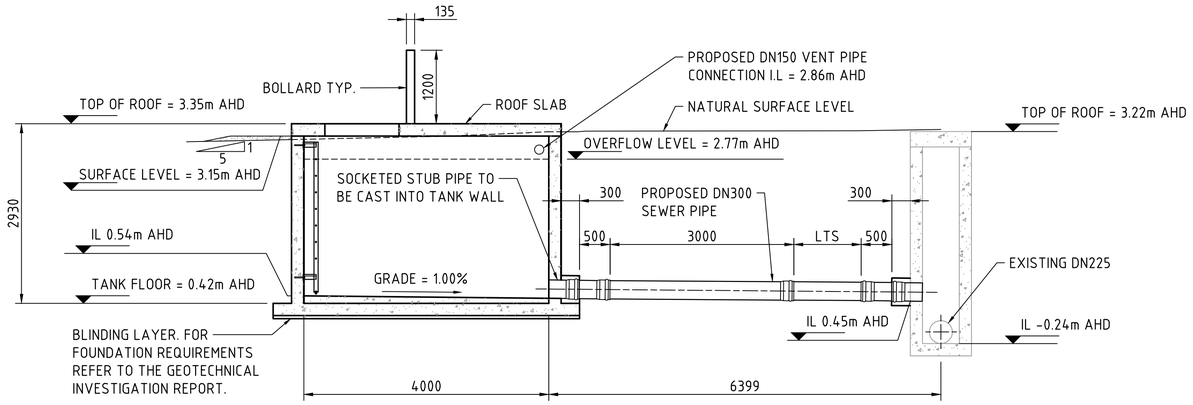
SUSSEX INLET SPS 16
PLAN AND LONGITUDINAL SECTION

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A1	AS SHOWN		24171	120	0

Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 2\24171-120.dwg



PLAN
SCALE 1:50



A
-
SECTION
SCALE 1:50

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL
- FILL MATERIAL

NOTES:

1. FOR DESIGN AND CONSTRUCTION SPECIFICATION FOR EMERGENCY STORAGE TANK REFER TO DRAWING 24051-102.
2. FIXED GLASS REINFORCED PLASTICS (GRP) LADDER TO BE "TYPE A" TO WSA PS-315. LADDER MOUNTING, FASTENING COMPONENTS AND MOVABLE TOP EXTENSIONS TO BE STAINLESS STEEL GRADE 316.

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
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E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

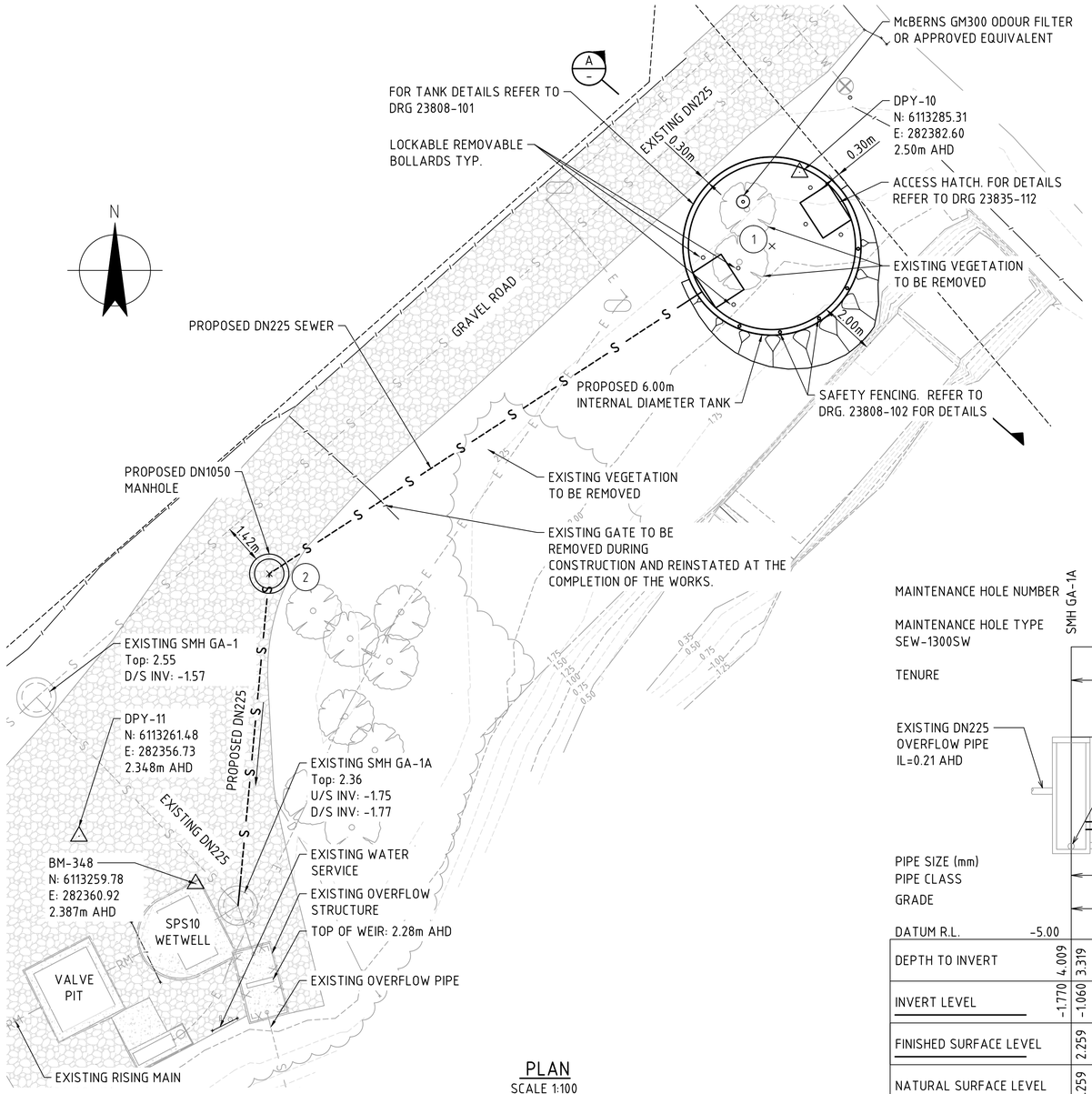
DESIGNED: MH	DATE: 27.05.15	COMPANY: GHD	
DRAWN: KM	DATE: 29.05.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

SUSSEX INLET SPS 16
EMERGENCY STORAGE TANK DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A1	1:50		24171	121	0

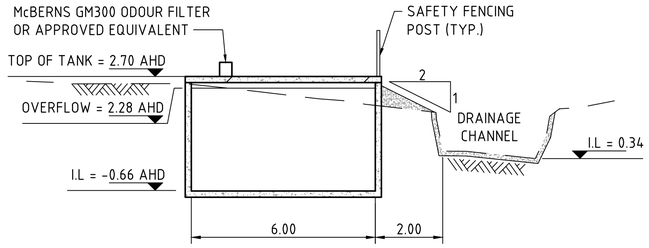
Plot Date: 15/01/16 - 10:42 Cad File: G:\23\1426652\CADD\Drawings\Package 2\24171-121.dwg



PLAN
SCALE 1:100

SETOUT POINTS			
POINT	EASTING	NORTHING	REMARKS
1	282381.61	6113282.67	CENTRE OF TANK
2	282363.57	6113270.91	CENTRE OF PROPOSED DN1050 MH

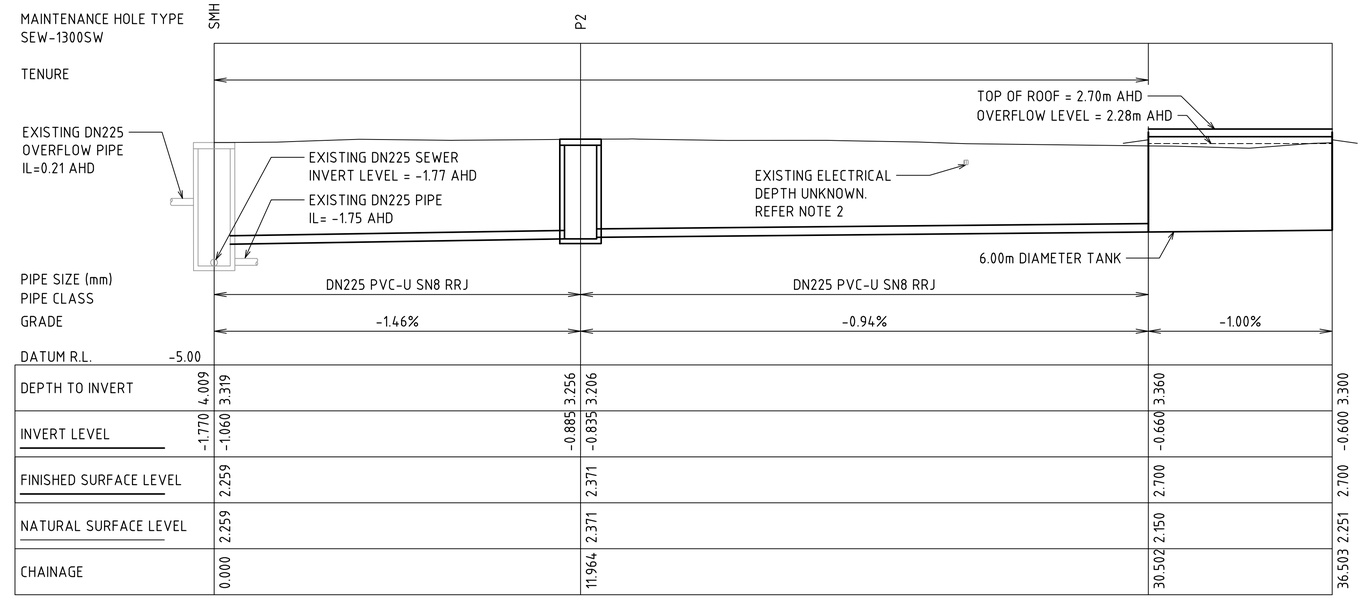
SURVEY CONTROL POINTS				
POINT	EASTING	NORTHING	LEVEL	REMARKS
1	282376.65	6113322.57	2.960m	PM 127613
2	282462.66	6113386.21	4.470m	SSM 135060
10	282382.60	6113285.31	2.500m	DPY
11	282356.73	6113261.48	2.348m	DPY
348	282360.92	6113259.78	2.387m	BM



A – SECTION
SCALE 1 : 100

LEGEND

- EXISTING RISING MAIN (RM)
- EXISTING SEWER MAIN (S)
- EXISTING STORM WATER (SW)
- EXISTING DRAIN (D)
- EXISTING WATER MAIN (W)
- EXISTING ELECTRICITY BELOW GROUND (E)
- EXISTING ELECTRICITY ABOVE GROUND (E)
- EXISTING CONTOUR MAJOR (2.0)
- EXISTING CONTOUR MINOR (2.1)
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER (S)
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL
- FILL MATERIAL



SECTION
SCALE 1:100 H; 1:100V

NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. EXISTING UNDERGROUND ELECTRICAL CABLE TO BE LOCATED BY CONTRACTOR AND SUPPORTED DURING CONSTRUCTION.
3. ALL LEVELS ARE IN METRES TO AHD.
4. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56-94).
5. ALL CHAINAGES ARE IN METRES.
6. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

WARNING
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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
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E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No. 23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

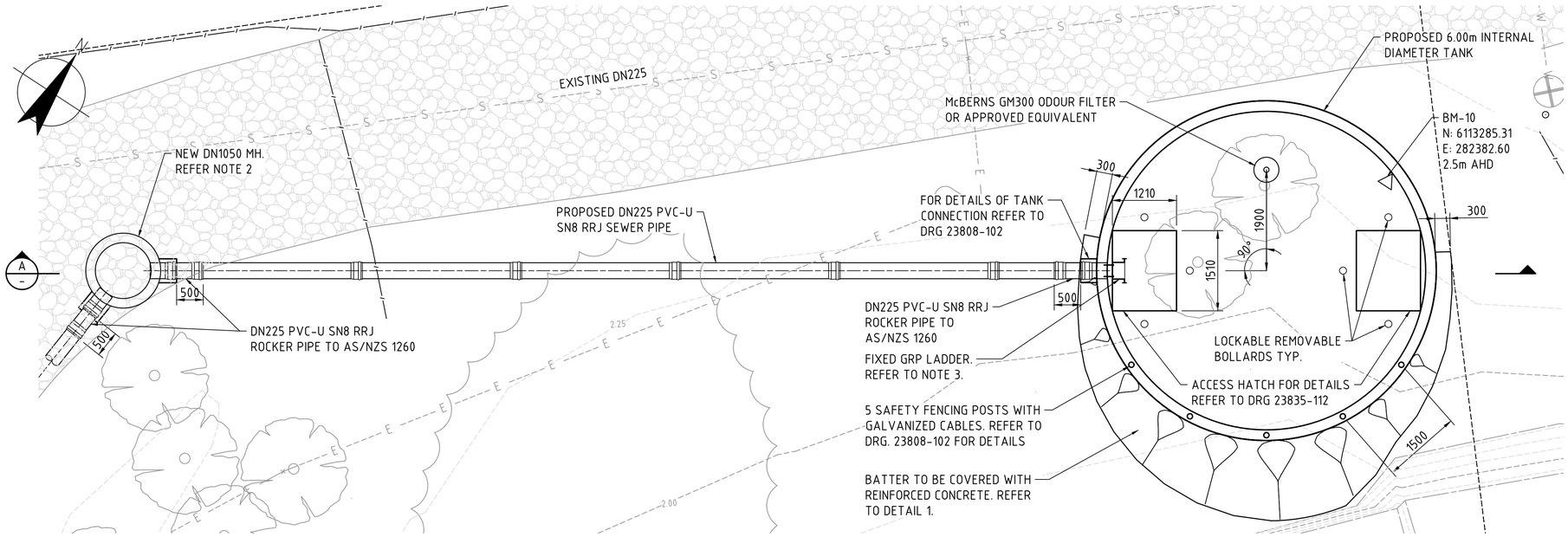
DESIGNED: MH	DATE: 13.01.15	COMPANY: GHD	
DRAWN: KM	DATE: 30.03.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

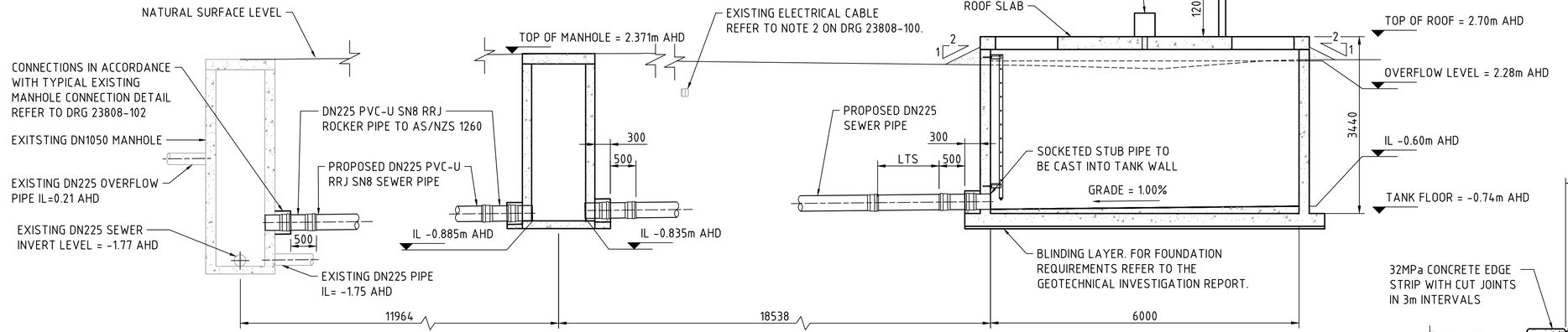
ST. GEORGE'S BASIN SPS 10
PLAN AND LONGITUDINAL SECTION

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
A1	AS SHOWN		23808	100	0

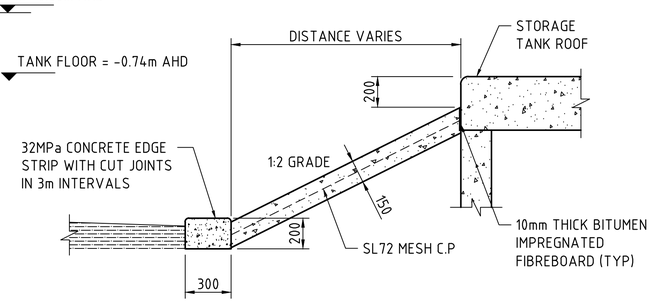
Plot Date: 15/01/16 - 10:43 Cad File: G:\23\1426652\CADD\Drawings\Package 2\23808-100.dwg



PLAN
SCALE 1:50



A SECTION
SCALE 1 : 50



CONCRETE APRON SECTION

1 DETAIL
SCALE 1 : 20

LEGEND

- RM — EXISTING RISING MAIN
- S — S — EXISTING SEWER MAIN
- SW — SW — EXISTING STORM WATER
- D — D — EXISTING DRAIN
- W — W — EXISTING WATER MAIN
- E — E — EXISTING ELECTRICITY BELOW GROUND
- E — E — EXISTING ELECTRICITY ABOVE GROUND
- 2.0 EXISTING CONTOUR MAJOR
- 2.1 EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- S — S — PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL
- FILL MATERIAL

NOTES:

1. FOR DESIGN AND CONSTRUCTION SPECIFICATION FOR EMERGENCY STORAGE TANK REFER TO DRAWING 24051-102.
2. NEW MANHOLE TO BE TYPE P2 IN ACCORDANCE WITH SEW-1300SW AND SEW-1302SW.
3. FIXED GLASS REINFORCED PLASTICS (GRP) LADDER TO BE "TYPE A" TO WSA PS-315. LADDER MOUNTING, FASTENING COMPONENTS AND MOVABLE TOP EXTENSIONS TO BE STAINLESS STEEL GRADE 316.

SCALE 1:20 AT ORIGINAL SIZE (0 0.2 0.4 0.6 0.8 1.0m)
SCALE 1:50 AT ORIGINAL SIZE (0 0.5 1.0 1.5 2.0 2.5m)

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES IS APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

DIAL BEFORE YOU DIG www.1100.com.au

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.: 23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

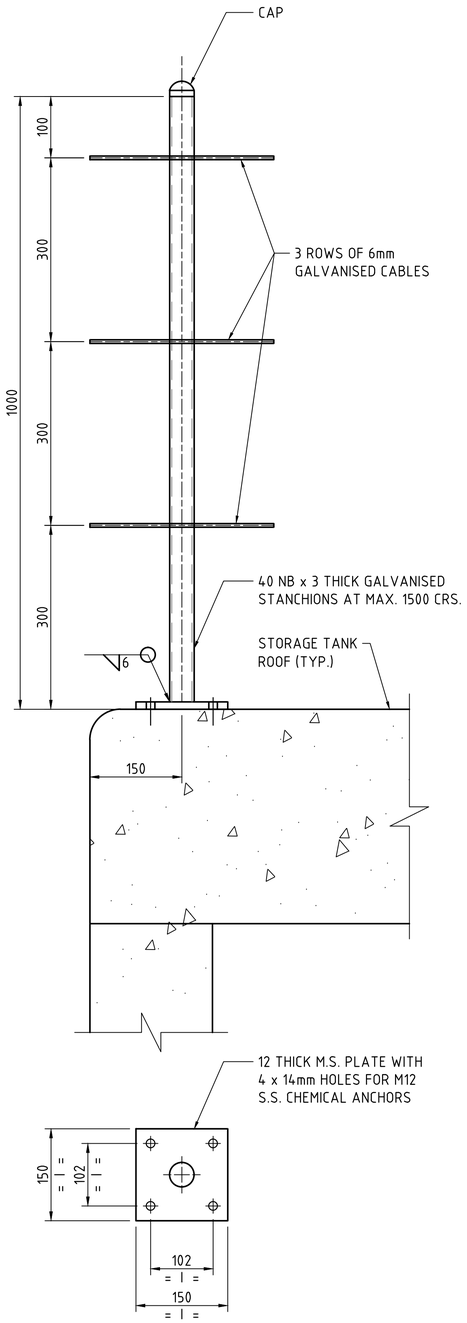
DESIGNED: MH	DATE: 27.05.15	COMPANY: GHD	
DRAWN: KM	DATE: 29.05.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

ST. GEORGE'S BASIN SPS 10
EMERGENCY STORAGE TANK DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A1	AS SHOWN		23808	101	0

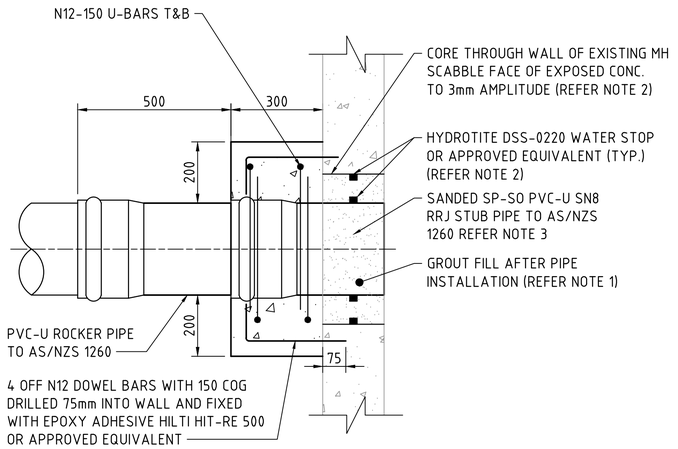
Plot Date: 15/01/16 - 10:43 Cad File: G:\23\1426652\CADD\Drawings\Package 2\23808-101.dwg



SAFETY FENCE DETAILS
SCALE 1:5

0 0.05 0.1 0.15 0.2 0.25m
SCALE 1:5 AT ORIGINAL SIZE

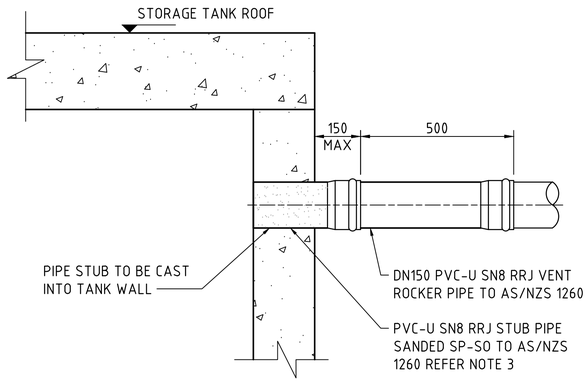
0 0.1 0.2 0.3 0.4 0.5m
SCALE 1:10 AT ORIGINAL SIZE



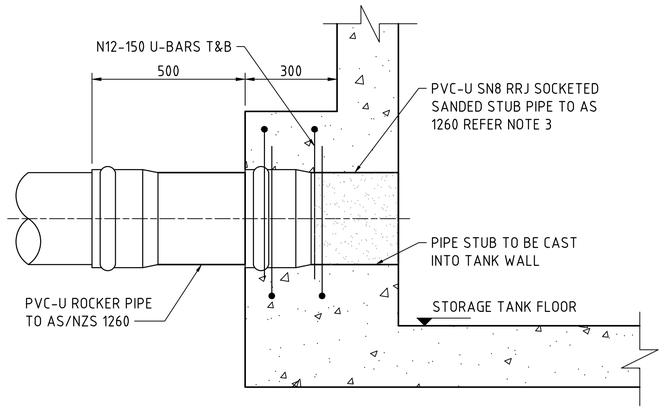
TYPICAL DETAIL - HIGH LEVEL PIPE CONNECTION TO EXISTING MAINTENANCE HOLE
SCALE 1:10

NOTES:

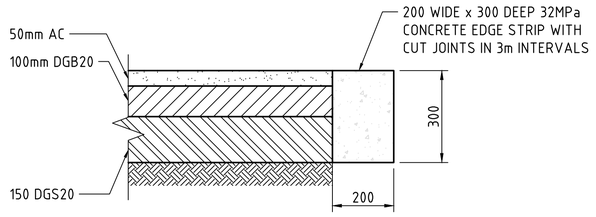
1. GROUT TO BE MASTERFLOW 830 OR APPROVED EQUIVALENT. GROUT SUPPLIER SHALL ENSURE GROUT CAN FULLY FILL PENETRATION CREATING A WATERTIGHT CONCRETE BARRIER.
2. MAINTAIN 75mm COVER TO WATERSTOP. WATERSTOP TO BE SECURED AND INSTALLED TO MANUFACTURERS RECOMMENDATION.
3. PIPE TO BE SANDED BY PIPE MANUFACTURER.



VENT PIPE CONNECTION TO STORAGE TANK DETAIL
SCALE 1:10



TYPICAL STORAGE TANK CONNECTION DETAIL
SCALE 1:10



TYPICAL SECTION THROUGH ASPHALTIC CONCRETE
SCALE 1:10

WARNING
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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.: 23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

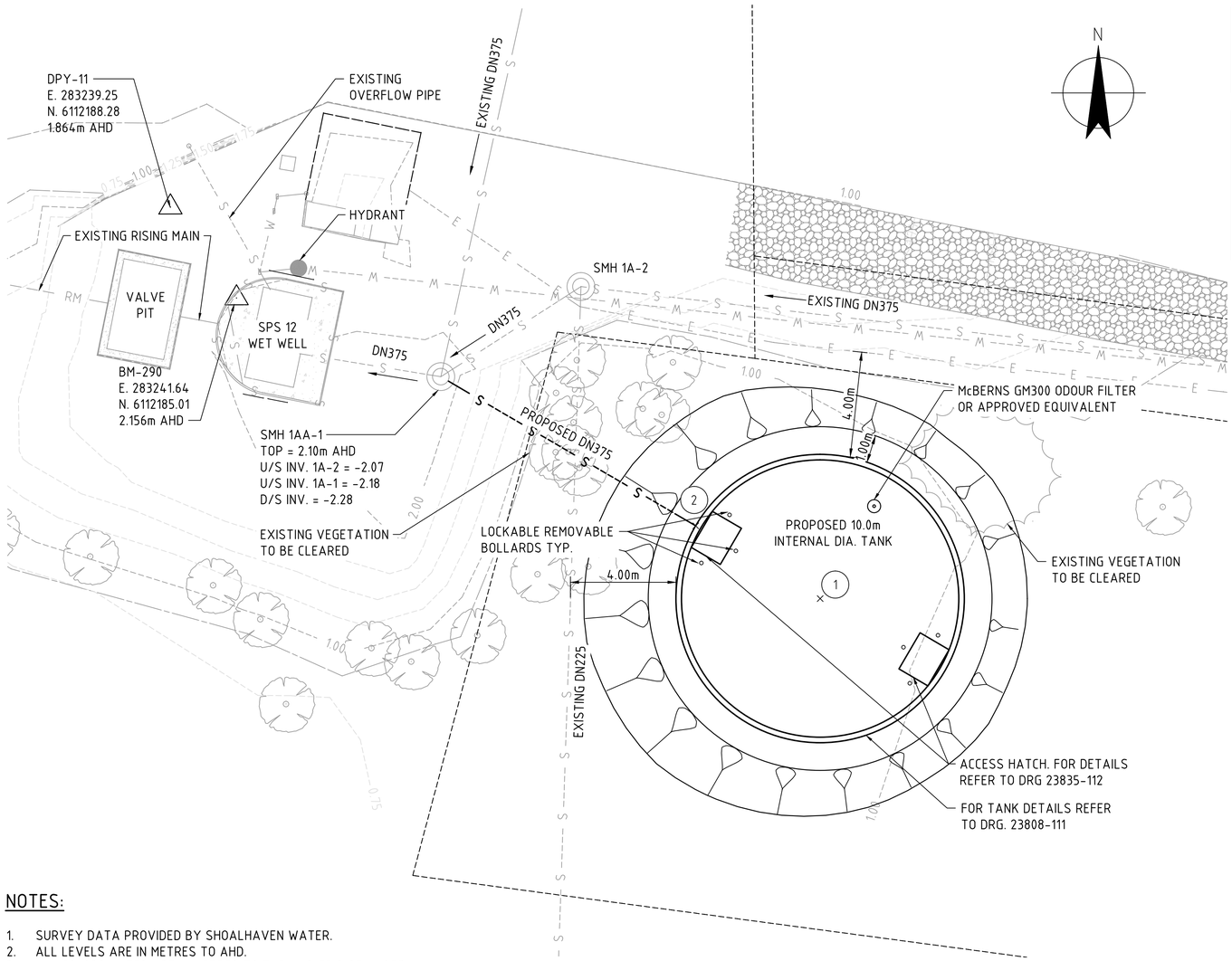
DESIGNED: MH	DATE: 27.05.15	COMPANY: GHD	
DRAWN: KM	DATE: 29.05.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

MISCELLANEOUS DETAILS

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
A1	AS SHOWN		23808	102	0

Plot Date: 15/01/16 - 10:43 Cad File: G:\23\1426652\CADD\Drawings\Package 2\23808-102.dwg



SETOUT POINTS			
POINT	EASTING	NORTHING	REMARKS
1	283262.69	6112174.17	CENTRE OF TANK
2	283258.20	6112176.79	END OF PROPOSED DN375 SEWER PIPE

SURVEY CONTROL POINTS				
POINT	EASTING	NORTHING	LEVEL	REMARKS
2	283321.68	6112112.50	2.170m	PM 127616
10	283312.10	6112174.35	1.944m	DPY
11	283239.26	6112188.28	1.864m	DPY
290	283241.64	6112185.01	2.156m	BM
510	283341.46	6112347.89	2.990m	PM 127615

LEGEND

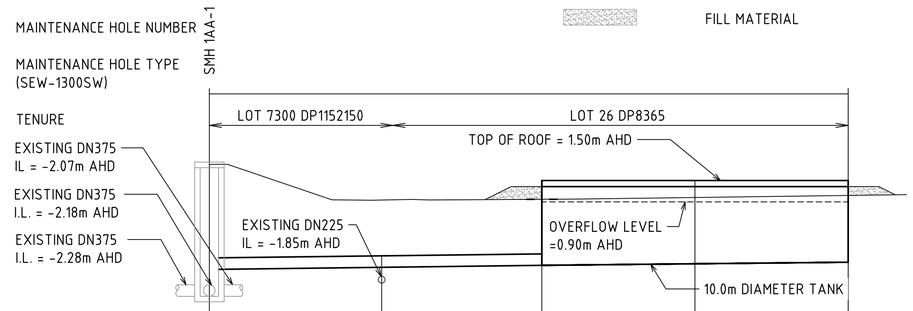
- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- CONCRETE
- GRAVEL
- FILL MATERIAL

NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56-94).
4. ALL CHAINAGES ARE IN METRES.
5. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION

PLAN

SCALE 1:100



DEPTH TO INVERT	4.380	3.500			2.197		2.770		2.720	2.670
INVERT LEVEL	-2.280	-1.400			-1.333		-1.270		-1.220	-1.170
FINISHED SURFACE LEVEL	2.100				0.864		1.500		1.500	1.500
NATURAL SURFACE LEVEL	2.023				0.864		0.887		0.946	1.013
CHAINAGE	0.000				5.625		10.851		15.851	20.851

SECTION

SCALE 1:100 H, 1:100 V

WARNING
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CONSTRUCTION ISSUE

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No. 23-1426652-01

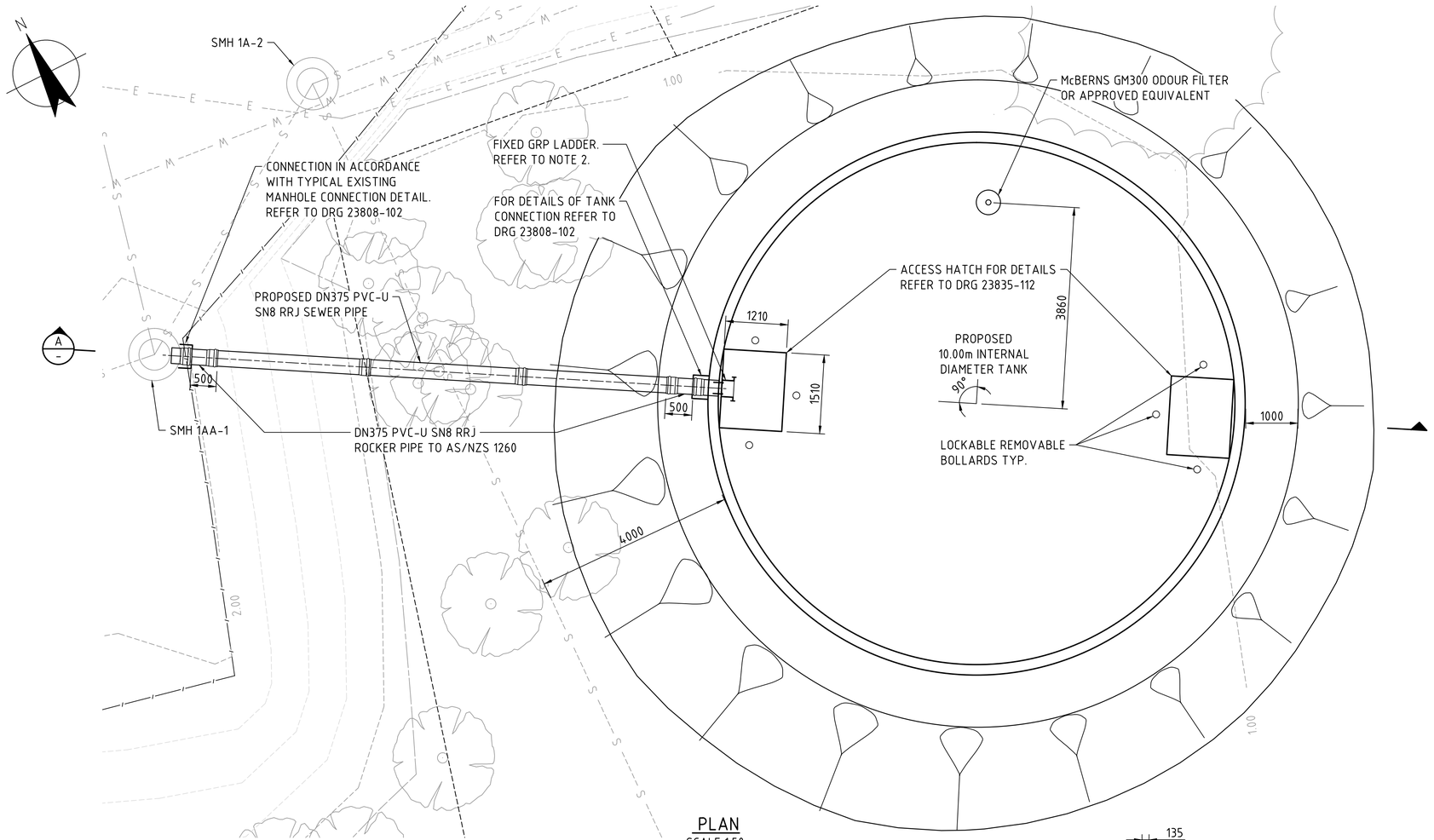
Shoalhaven Water
A Group of Shoalhaven City Council

DESIGNED: MH	DATE: 09.03.15	COMPANY: GHD	
DRAWN: JP	DATE: 09.03.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

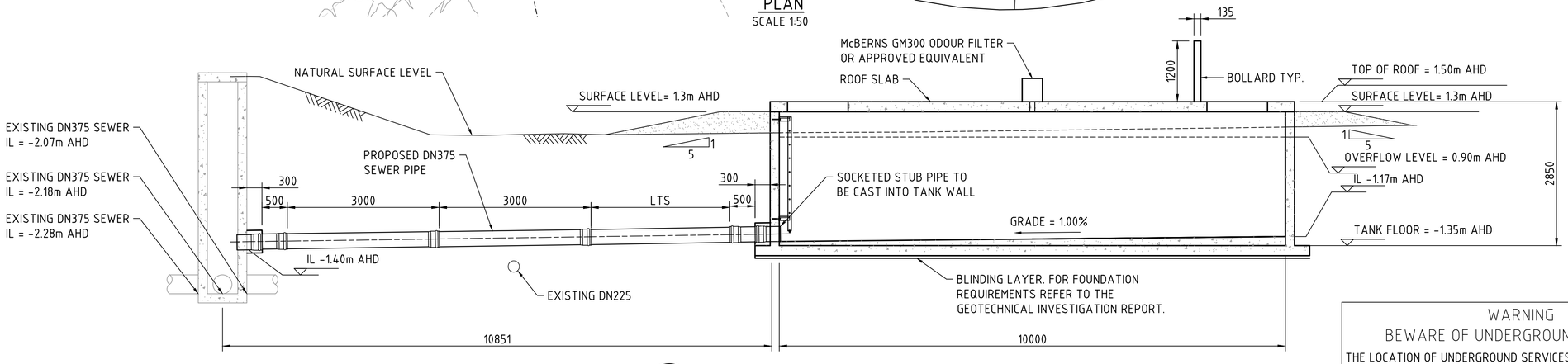
TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

ST. GEORGE'S BASIN SPS 12
PLAN AND LONGITUDINAL SECTION

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A1	1:100		23808	110	0



PLAN
SCALE 1:50



A
-
SECTION
SCALE 1 : 50

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- CONCRETE
- GRAVEL
- FILL MATERIAL

NOTES:

1. FOR DESIGN AND CONSTRUCTION SPECIFICATION FOR EMERGENCY STORAGE TANK REFER TO DRAWING 24051-102.
2. FIXED GLASS REINFORCED PLASTICS (GRP) LADDER TO BE "TYPE A" TO WSA PS-315. LADDER MOUNTING, FASTENING COMPONENTS AND MOVABLE TOP EXTENSIONS TO BE STAINLESS STEEL GRADE 316.

WARNING
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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

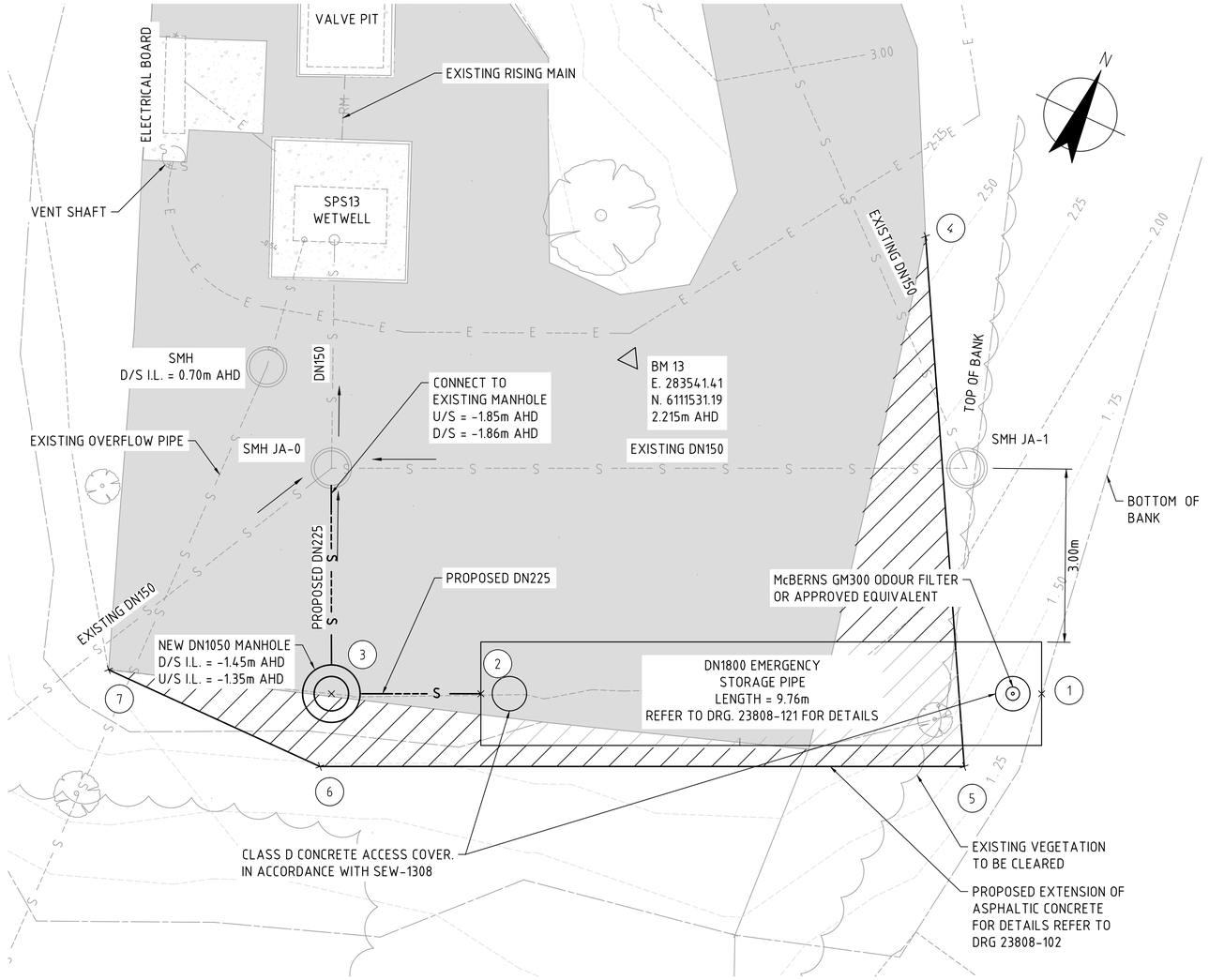
DESIGNED: MH	DATE: 27.05.15	COMPANY: GHD	
DRAWN: KM	DATE: 29.05.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

ST. GEORGE'S BASIN SPS 12
EMERGENCY STORAGE TANK DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A1	1:50		23808	111	0

Plot Date: 15/01/16 - 10:43 Cad File: G:\23\1426652\CADD\Drawings\Package 2\23808-111.dwg



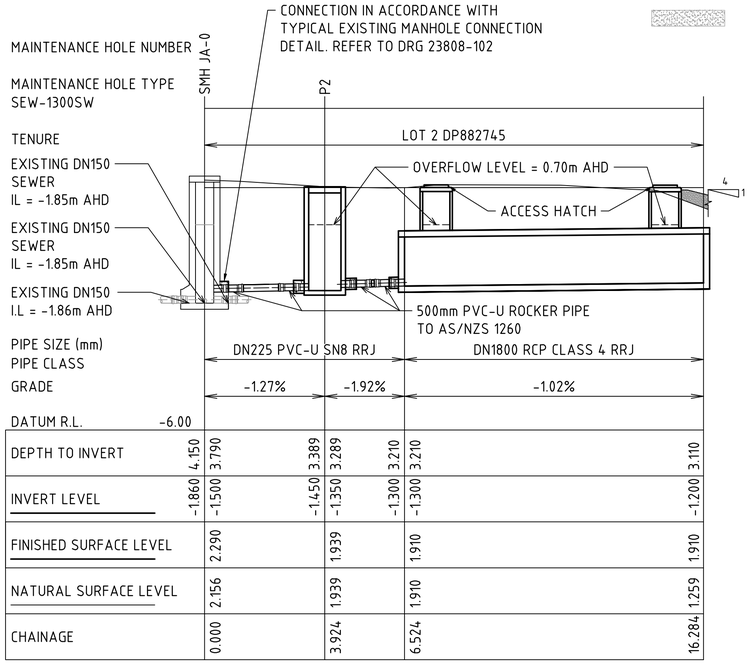
PLAN
SCALE 1:50

SETOUT POINTS			
POINT	EASTING	NORTHING	REMARKS
1	283550.37	6111528.94	C.L. DN1800 STORAGE TANK - EAST END
2	283541.52	6111524.82	C.L. DN1800 STORAGE TANK WEST END
3	283539.16	6111523.72	CENTRE OF PROPOSED DN1050 MH
4	283545.17	6111535.30	CONNECTION TO EXISTING AC
5	283549.68	6111527.22	CORNER OF AC EXTENSION
6	283539.51	6111522.49	CORNER OF AC EXTENSION
7	283535.47	6111522.47	CONNECTION TO EXISTING AC

SURVEY CONTROL POINTS				
POINT	EASTING	NORTHING	LEVEL	REMARKS
1	283259.08	6111587.14	13.150m	PM127608
2	283560.67	6111628.06	15.200m	PM106295
10	283462.87	6111618.29	14.957m	DPY
11	283481.63	6111552.61	14.702m	DH
12	283515.89	6111549.50	10.067m	GIN
13	283541.41	6111531.19	2.215m	GIN

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- EXISTING ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL
- PROPOSED ASPHALTIC CONCRETE
- FILL MATERIAL



DEPTH TO INVERT	4.150	3.790	3.389	3.289	3.210	3.210	3.110
INVERT LEVEL	-1.860	-1.500	-1.450	-1.350	-1.300	-1.300	-1.200
FINISHED SURFACE LEVEL	2.290		1.939		1.910	1.910	
NATURAL SURFACE LEVEL	2.156		1.939		1.910	1.259	
CHAINAGE	0.000		3.924		6.524	16.284	

SECTION
SCALE 1:100 H; 1:100V

NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56-94).
4. ALL CHAINAGES ARE IN METRES.
5. FOR CONSTRUCTION NOTES, REFER TO DRAWINGS 24051-101, 102, 103 AND 104.
6. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
7. DESIGN BASED ON 1% AEP FLOOD LEVEL OF 3.2m AHD.

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

WARNING
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DIAL BEFORE YOU DIG www.1100.com.au

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No. 23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

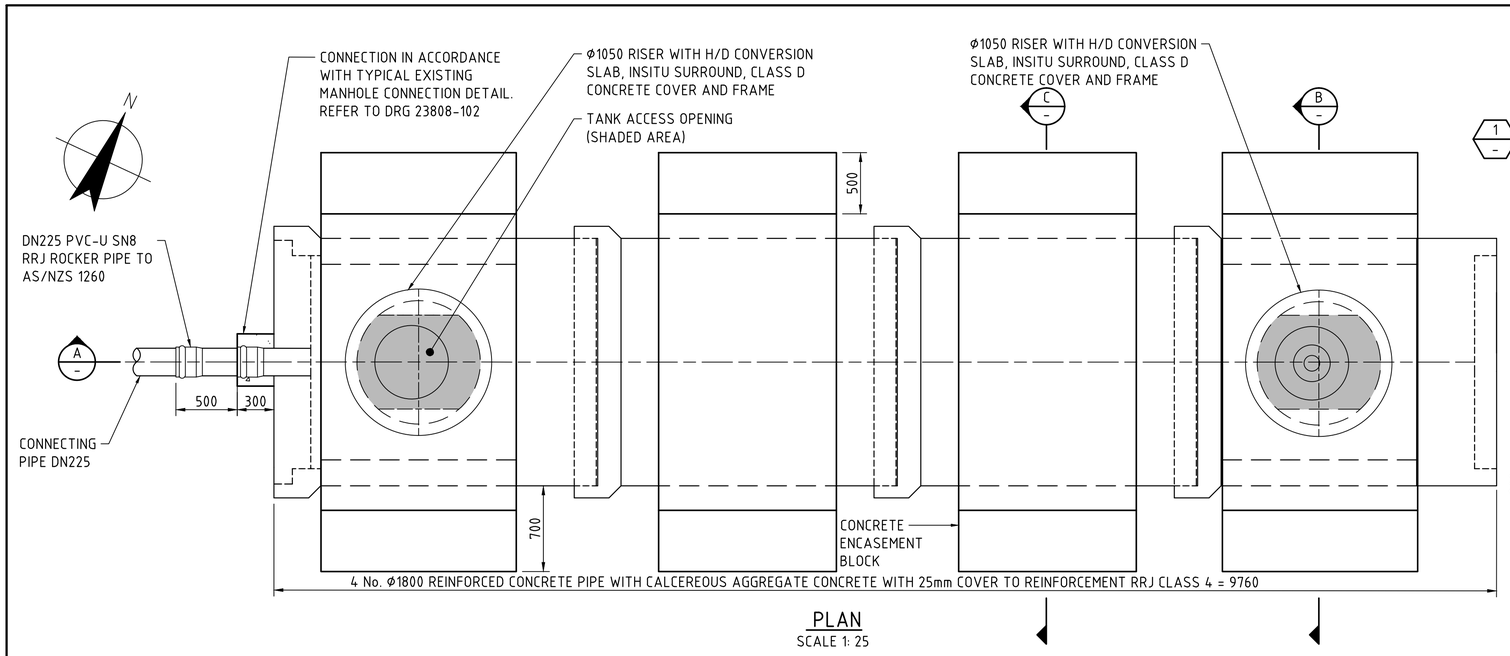
DESIGNED: MH	DATE: 13.01.15	COMPANY: GHD	
DRAWN: KM	DATE: 26.02.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

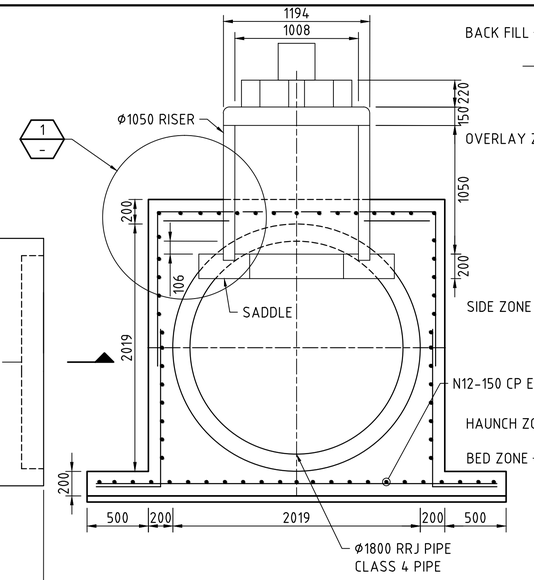
ST. GEORGE'S BASIN SPS 13
PLAN AND LONGITUDINAL SECTION

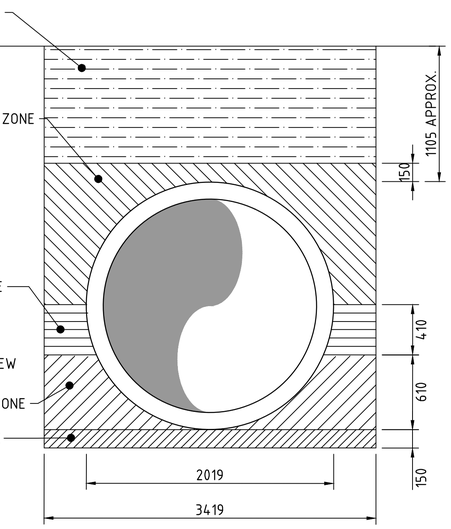
SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A1	AS SHOWN		23808	120	0

Plot Date: 15/01/16 - 10:43 Cad File: G:\23\1426652\CADD\Drawings\Package 2\23808-120.dwg

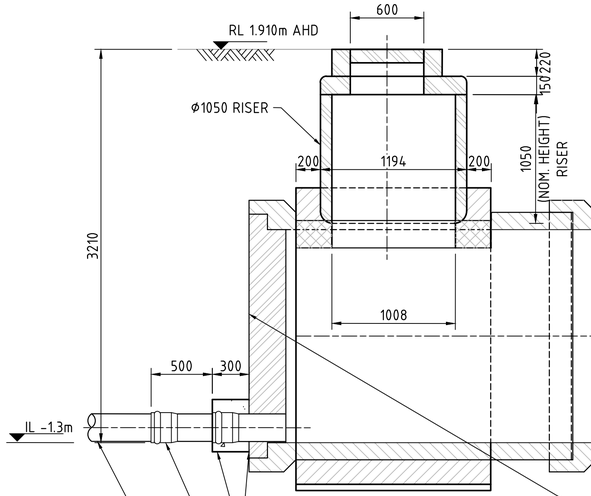


PLAN
SCALE 1: 25

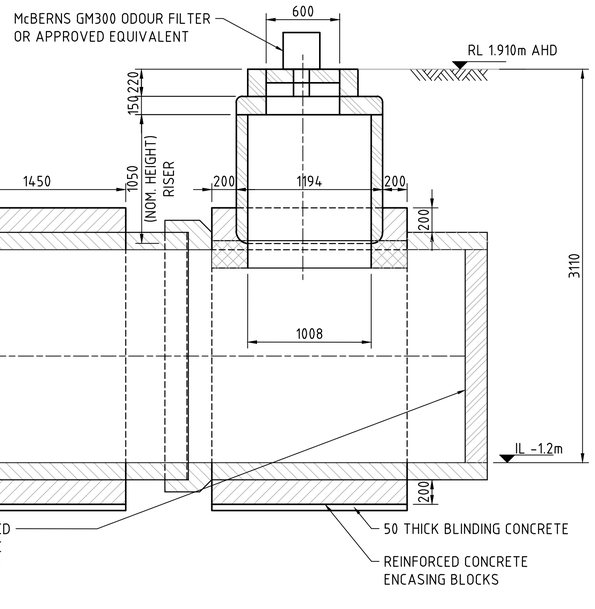




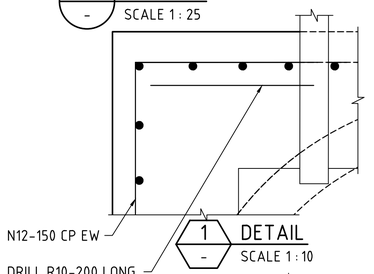
PIPE CLASS 4 BEDDING DESIGN (TYPE HS2 SUPPORT)
NTS



A SECTION
SCALE 1 : 25



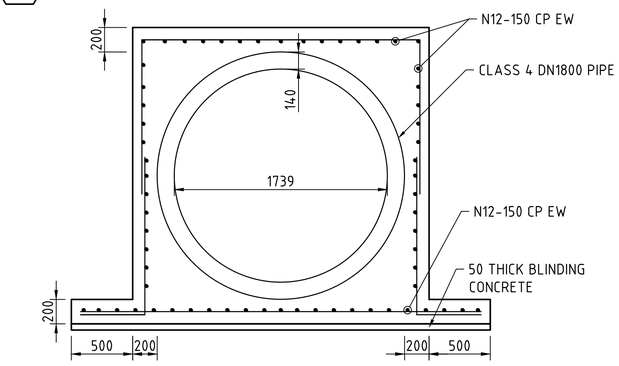
B SECTION
SCALE 1 : 25



1 DETAIL
SCALE 1 : 10

NOTES:

1. FOR BEDDING MATERIAL AND COMPACTION DETAILS REFER TO DRG 24051-101.
2. N32 GRADE CONCRETE.
3. N15 GRADE CONCRETE FOR BLINDING.
4. FOUNDATION HAS BEEN DESIGNED FOR AN ALLOWABLE BEARING CAPACITY OF 50 kPa.
5. FOUNDATION TO BE INSPECTED AND APPROVED BY A GEOTECHNICAL ENGINEER BEFORE PLACING BLINDING.



C SECTION
SCALE 1 : 25

WARNING
BEWARE OF UNDERGROUND SERVICES
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DIAL BEFORE YOU DIG www.1100.com.au

CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

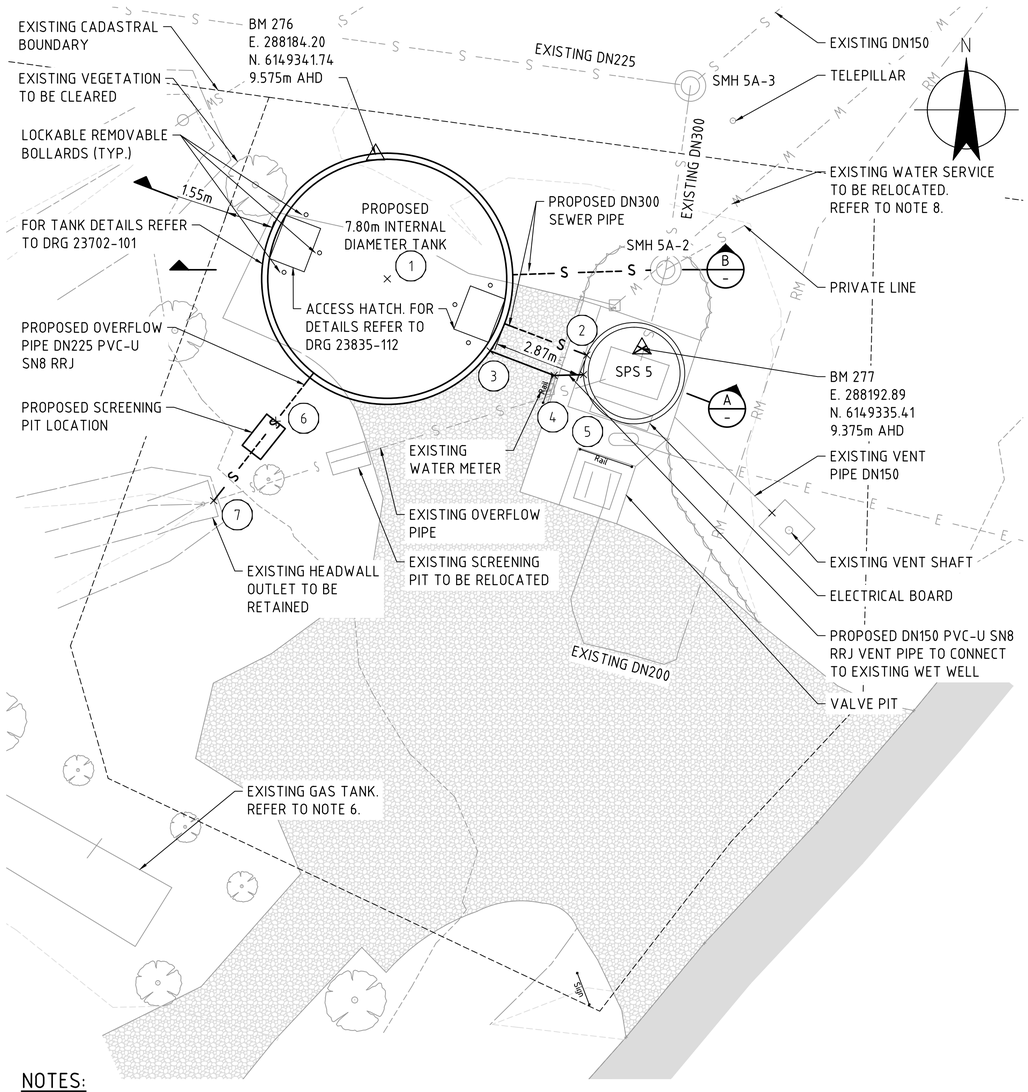
Shoalhaven Water
A Group of Shoalhaven City Council

DESIGNED: MH	DATE: 27.05.15	COMPANY: GHD	
DRAWN: KM	DATE: 28.04.15	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

ST GEORGE'S BASIN SPS13
STORAGE PIPE DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A1	AS SHOWN		23808	121	0



SETOUT POINTS

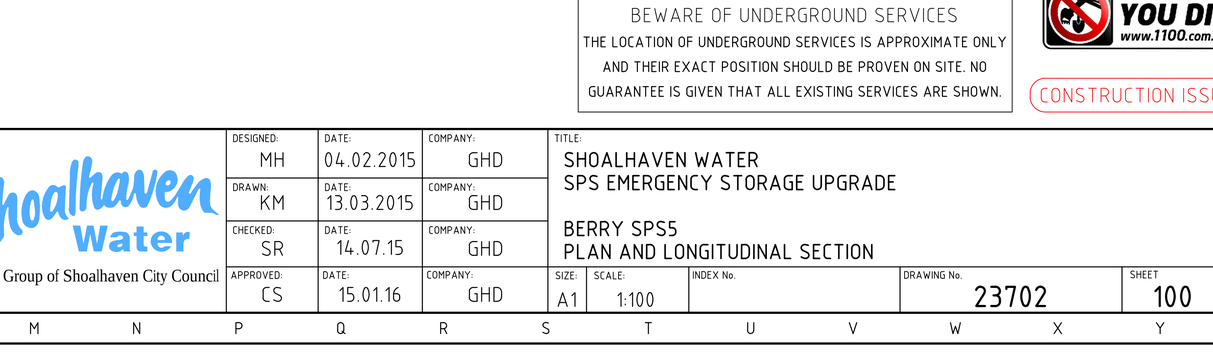
POINT	EASTING	NORTHING	COMMENTS
1	288184.58	6149337.68	CENTRE OF STORAGE TANK
2	288191.09	6149335.19	CONNECTION TO WET WELL
3	288187.94	6149335.33	VENT PIPE CONNECTION TO TANK
4	288190.03	6149334.53	22° BEND DN150 VENT PIPE
5	288190.99	6149334.56	VENT PIPE CONNECTION TO WET WELL
6	288180.95	6149333.03	CONNECTION TO SCREENING PIT
7	288178.91	6149330.44	CONNECTION TO EXISTING HEADWALL

SURVEY CONTROL POINTS

POINT	EASTING	NORTHING	LEVEL	REMARKS
270	288182.28	6149426.36	10.682m	SSM173206
271	288315.22	6149345.27	12.924m	SSM49938
276	288184.20	6149341.74	9.575m	DPY
277	288192.89	6149335.41	9.375m	BM
278	288198.47	6149309.36	9.473m	DPY

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- PROPOSED SEWER
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL



NOTES:

1. SURVEY DATA PROVIDED BY SHOALHAVEN WATER.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL CO-ORDINATES ARE IN METRES TO THE MAP GRID OF AUSTRALIA (MGA 56-94).
4. ALL CHAINAGES ARE IN METRES.
5. VENT LINE SHALL BE LAID AT A CONTINUOUSLY FALLING GRADE OF 1% FROM WET WELL TO STORAGE TANK.
6. GAS TANK IS FOR RETIREMENT VILLAGE/NURSING HOME. VEHICULAR ACCESS TO BE MAINTAINED DURING CONSTRUCTION. WORKS TO BE MANAGED SO THERE IS NO IMPACT ON THE TANK DURING CONSTRUCTION.
7. CONTRACTOR TO MANAGE THE WORKS SO THAT VEHICULAR ACCESS TO THE EXISTING SPS IS MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
8. CONTRACTOR TO LOCATE THE EXISTING WATER SERVICES AND RELOCATE IN CONSULTATION WITH SHOALHAVEN WATER.

PLAN
SCALE 1:100

SECTION A
SCALE 1:100 H; 1:100V

SECTION B
SCALE 1:100 H; 1:100V

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

WARNING
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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

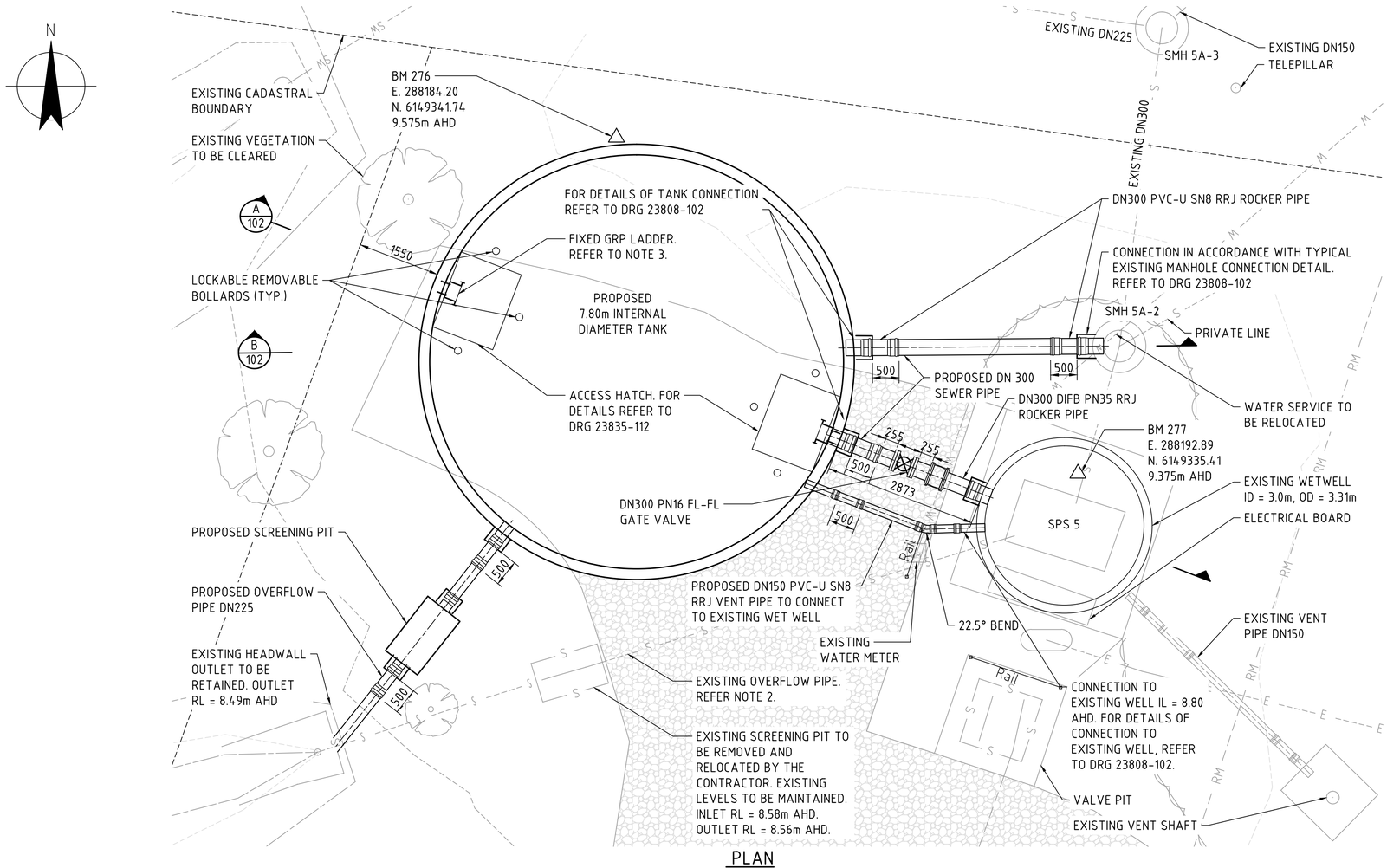
		DATE:	COMPANY:
DESIGNED:	MH	04.02.2015	GHD
DRAWN:	KM	13.03.2015	GHD
CHECKED:	SR	14.07.15	GHD
APPROVED:	CS	15.01.16	GHD

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

BERRY SPS5
PLAN AND LONGITUDINAL SECTION

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
A1	1:100		23702	100	0

Plot Date: 15/01/16 - 10:43 Cad File: G:\23\1426652\CADD\Drawings\Package 2\23702-100.dwg



PLAN
SCALE 1:50

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

LEGEND

- EXISTING RISING MAIN
- EXISTING SEWER MAIN
- EXISTING STORM WATER
- EXISTING DRAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICITY BELOW GROUND
- EXISTING ELECTRICITY ABOVE GROUND
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- GARDEN BOUNDARY
- EDGE OF BANK
- LOT BOUNDARY
- BUILDING BOUNDARY
- EXISTING FENCE
- EXISTING VEGETATION
- TREES
- BENCH MARK
- SEWER MANHOLE
- ASPHALTIC CONCRETE
- CONCRETE
- GRAVEL

NOTES:

1. FOR DESIGN AND CONSTRUCTION SPECIFICATION FOR EMERGENCY STORAGE TANK REFER TO DRAWING 24051-102.
2. TEMPORARY OVERFLOW PIPE TO BE MAINTAINED DURING CONSTRUCTION.
3. FIXED GLASS REINFORCED PLASTICS (GRP) LADDER TO BE "TYPE A" TO WSA PS-315. LADDER MOUNTING, FASTENING COMPONENTS AND MOVABLE TOP EXTENSIONS TO BE STAINLESS STEEL GRADE 316.

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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

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GHD
57 Graham Street Nowra NSW 2541
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E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

DESIGNED: MH	DATE: 04.02.2015	COMPANY: GHD	
DRAWN: KM	DATE: 13.03.2015	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

BERRY SPS5
EMERGENCY STORAGE TANK DETAILS

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
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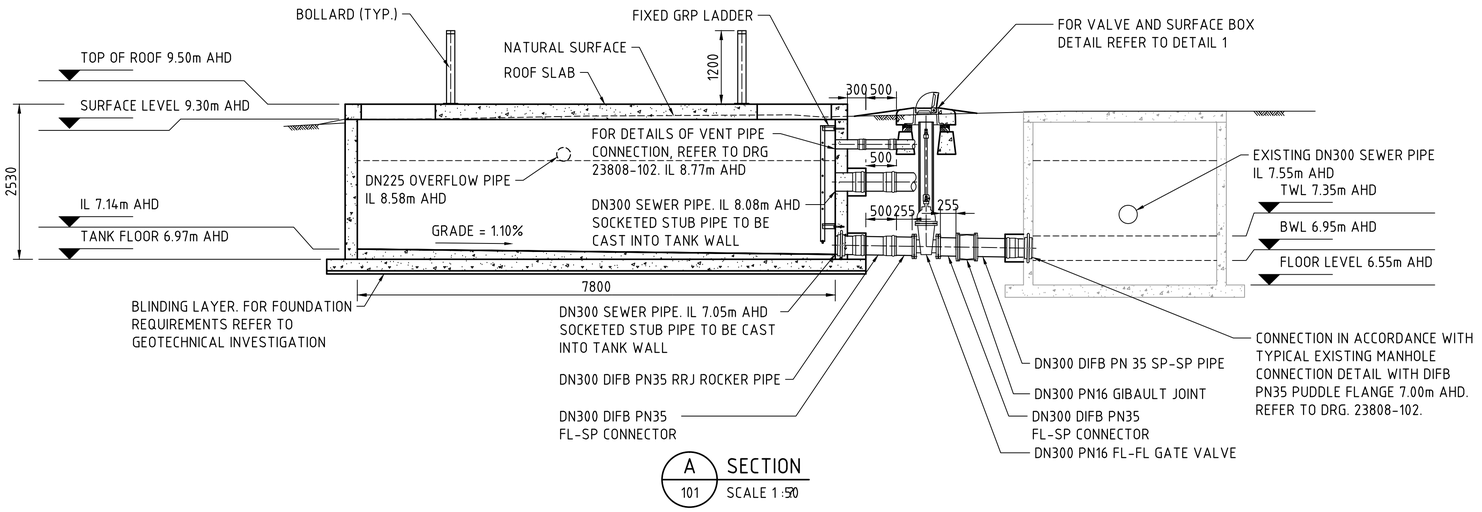
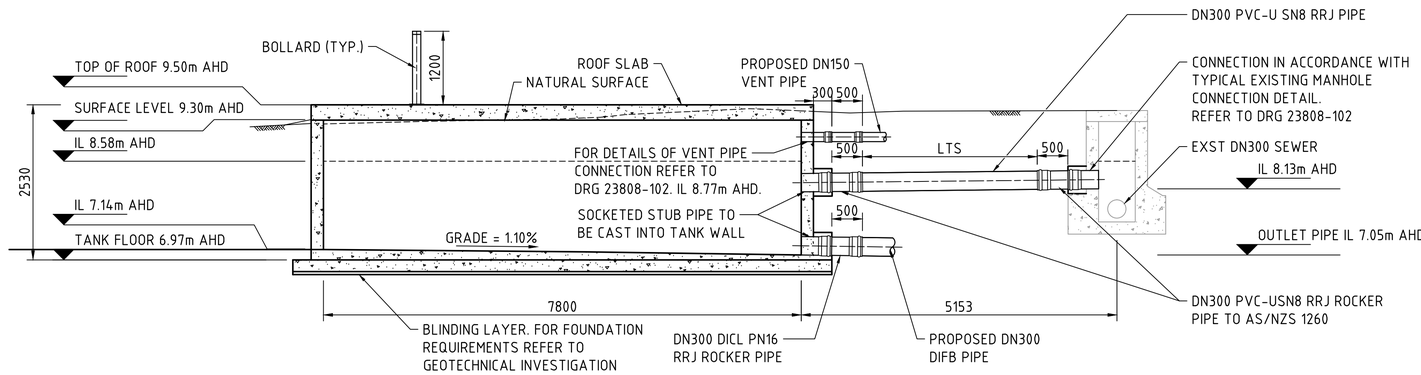
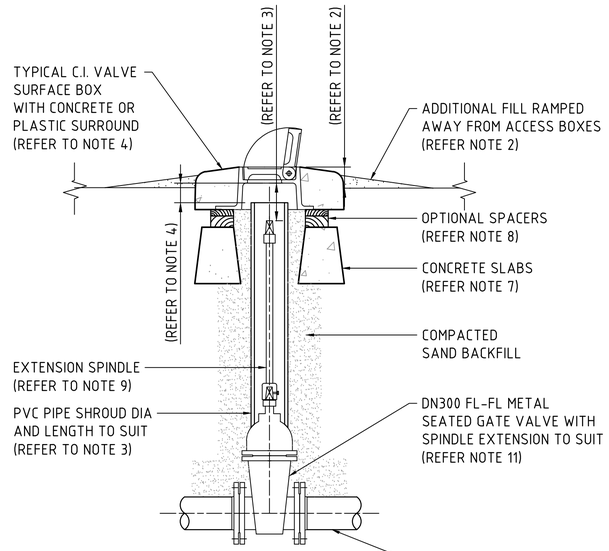
Plot Date: 15/01/16 - 10:43 Cad File: G:\23\1426652\CADD\Drawings\Package 2\23702-101.dwg



A 101 SECTION
SCALE 1:50



B 101 SECTION
SCALE 1:50



1 - DETAIL
SCALE 1:20

NOTES:

1. ALL LEVELS ARE IN METRES TO AHD.
2. TOP OF BOX IS TO BE FLUSH WITH F.S.L.
3. BOX, COVER, SHROUD AND FOOTING TO BE INSTALLED BETWEEN 100 AND 200mm ABOVE THE SPINDLE, SO THAT NO LOADING IS TRANSMITTED TO THE PIPE.
4. PVC PIPE SHROUD (LENGTH AND DIAMETER TO SUIT) TO EXTEND TO WITHIN VALVE BOX, BUT NOT LESS THAN 50mm FROM THE UNDER SIDE OF THE LID
5. VALVE SURFACE BOX TO HAVE :
   - HINGED COVER TO CLOSE IN THE DIRECTION OF FALL OF LAND.
   - A TYPICAL RECYCLED PLASTIC SURROUND OR EQUIVALENT CONCRETE SURROUND (435mm DIAMETER MIN)
6. ROUND VALVE BOX TO BE :
   - IN ACCORDANCE WITH AS 3996
   - 250mm - DIA MIN.
   - ENCASED IN A CONCRETE SHROUD (100mm MIN)
   - CLASS D LOADING IN TRAFFICABLE AREAS
7. FOOTINGS OR SLAB REQUIRED IN :
   - TRAFFICABLE AREA - CONCRETE SUPPORT SLABS TO SPAN THE TRENCH AND TO EXTEND 300 MIN ONTO SUPPORTIVE EARTH.
8. RECYCLED PLASTIC, CONCRETE OR HARDWOOD SPACERS MAY BE USED TO RAISE FRAME SURFACE LEVEL
9. EXTENSION SPINDLES SHALL BE PROVIDED WHERE DEPTH FROM F.S.L. TO TOP OF GATE VALVE EXCEEDS 350mm.
10. ALL DUCTILE IRON FITTINGS SHALL BE PN35 AND EPOXY LINED.
11. GATE VALVES SHALL BE METAL SEATED, PN16 CLOCKWISE CLOSING AND SHALL BE TO AS 2638.1.
12. DUCTILE IRON VALVES SHALL BE NYLON OR FUSION BONDED EPOXY (FBE) COATED TO AS/NZS 4158.
13. ALL FLANGES SHALL BE PN16 MINIMUM TO AS4087.
14. POLYETHYLENE SLEEVING TO BE PROVIDED ON ALL DUCTILE IRON PIPES AND FITTINGS IN ACCORDANCE WITH AS3681.

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

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CONSTRUCTION ISSUE

No.	REVISION DETAILS		
0	ISSUED FOR CONSTRUCTION	KM	15.01.16

CONSULTANT DETAILS:
GHD
57 Graham Street Nowra NSW 2541
T 61 2 4424 4900 F 61 2 4424 4999
E noamail@ghd.com W www.ghd.com

CONSULTANT REFERENCE No.
23-1426652-01

Shoalhaven Water
A Group of Shoalhaven City Council

DESIGNED: MH	DATE: 07.07.2015	COMPANY: GHD	
DRAWN: KM	DATE: 09.07.2015	COMPANY: GHD	
CHECKED: SR	DATE: 14.07.15	COMPANY: GHD	
APPROVED: CS	DATE: 15.01.16	COMPANY: GHD	

TITLE:
SHOALHAVEN WATER
SPS EMERGENCY STORAGE UPGRADE

BERRY SPS5
EMERGENCY STORAGE TANK DETAILED SECTIONS

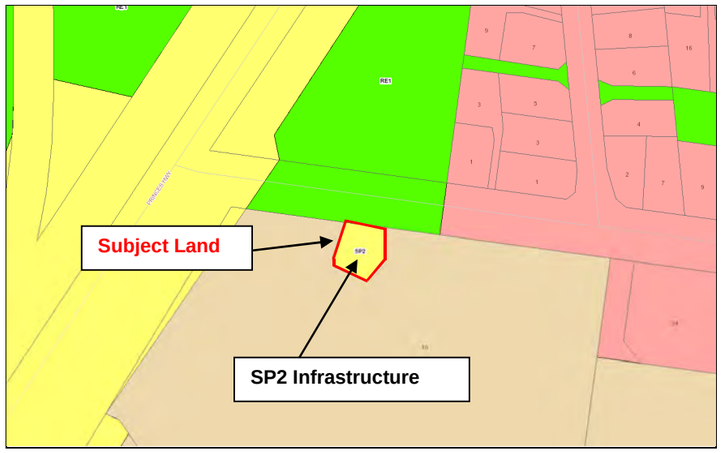
SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A1	1:50		23702	102	0

Plot Date: 15/01/16 - 10:43 Cad File: G:\23\1426652\CADD\Drawings\Package 2\23702-102.dwg

ANNEXURE 2

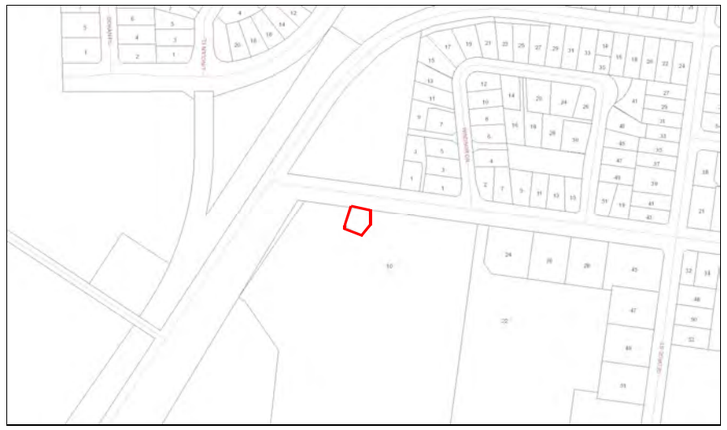
Shoalhaven LEP 2014 Mapping

ANNEXURE 2

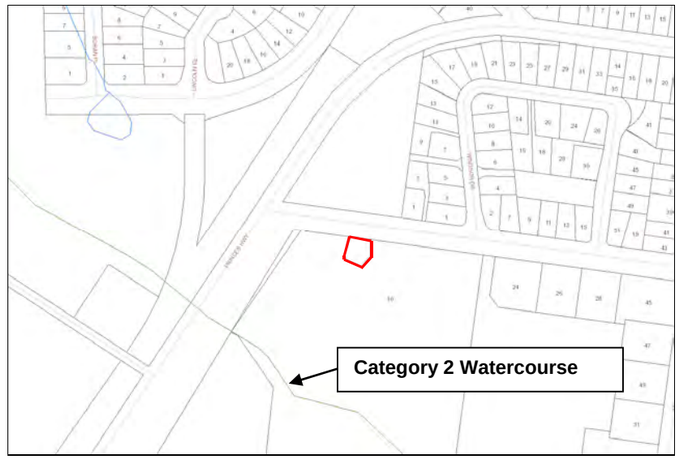


a) Land Zoning

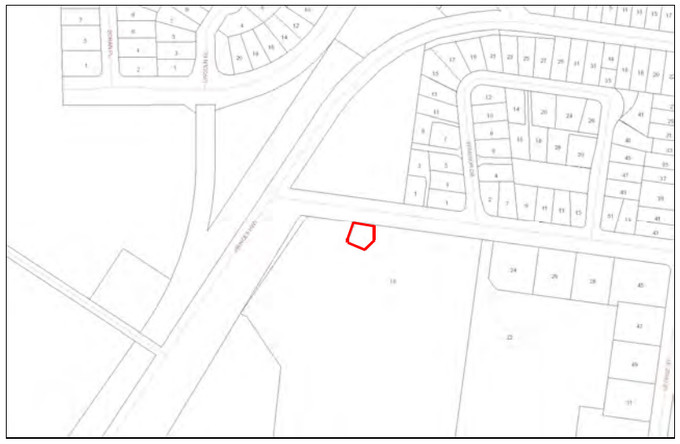
b) Heritage



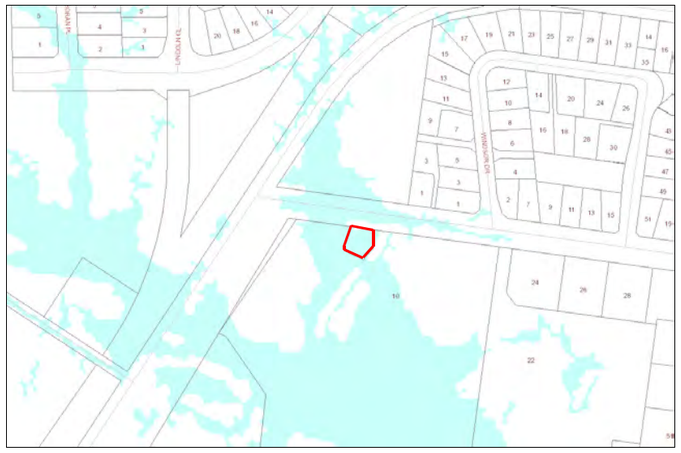
c) Biodiversity



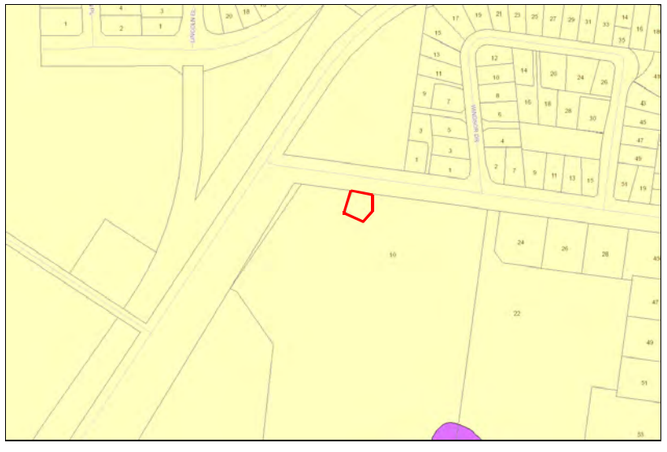
d) Riparian Lands and Watercourses



e) Scenic Protection

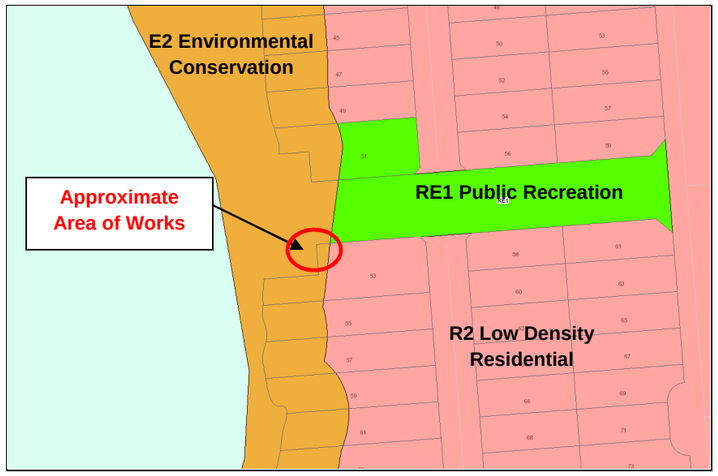


f) Flood Planning

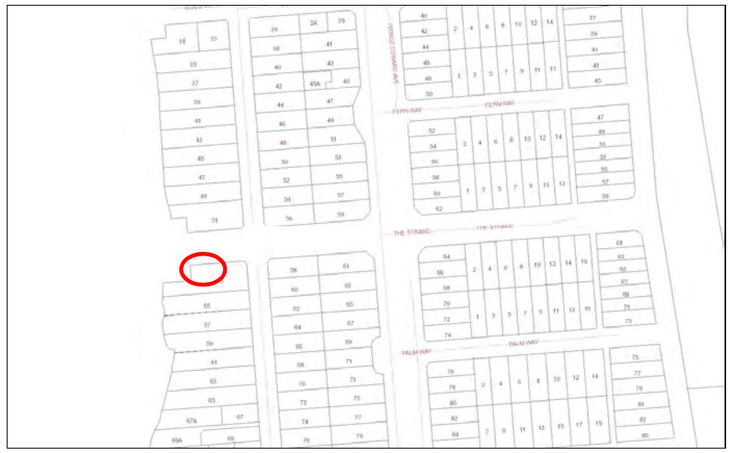


g) Acid Sulfate Soils

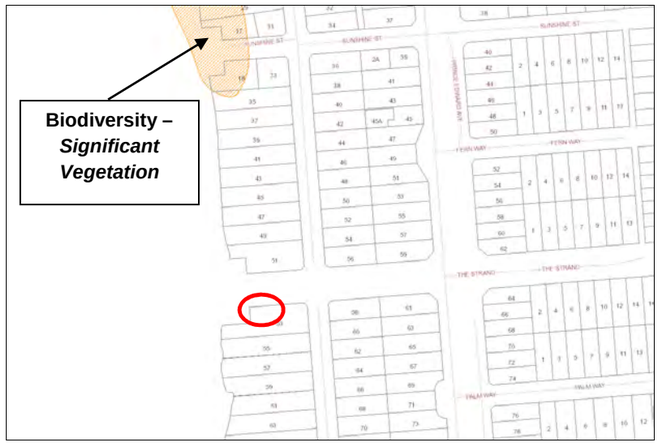
Figure 1: Mapping for <u>Berry – SPS5</u> (all mapping has been extracted from Shoalhaven LEP 2014)



a) Land Zoning

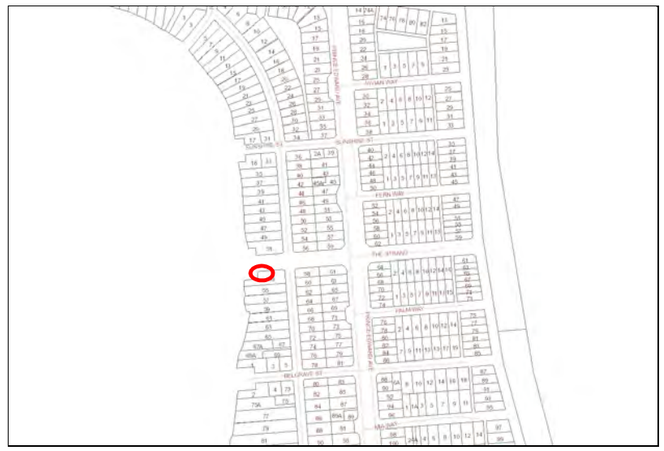


b) Heritage



c) Biodiversity

d) Riparian Lands and Watercourses

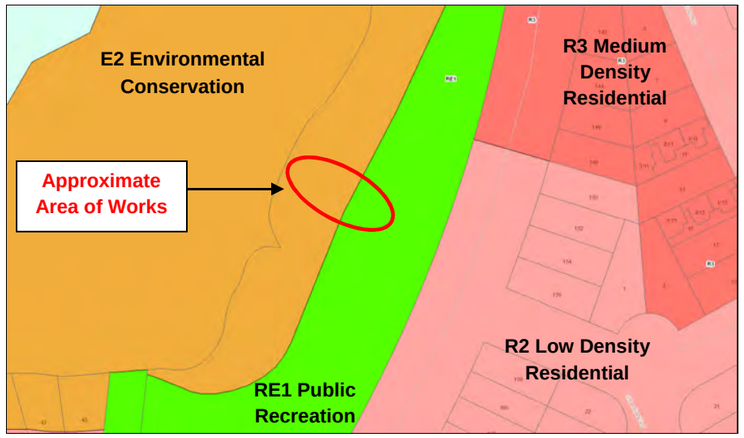


e) Scenic Protection

f) Flood Planning

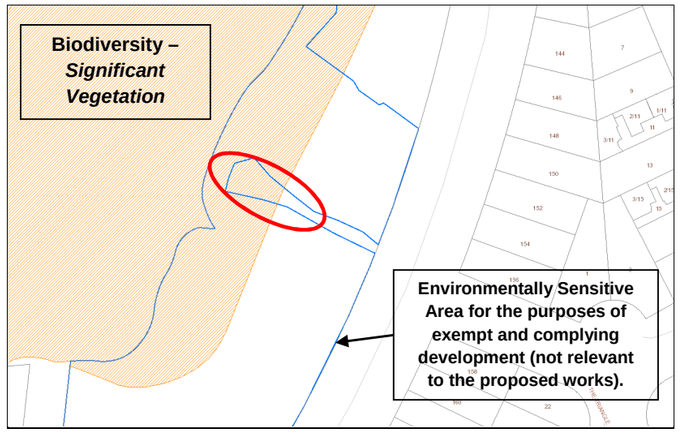
g) Acid Sulfate Soils

Figure 2: Mapping for <u>Culburra – SPS5</u> (all mapping has been extracted from Shoalhaven LEP 2014)

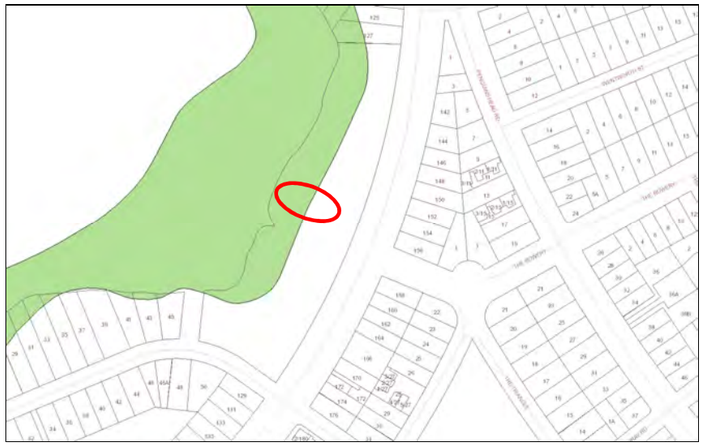


a) Land Zoning

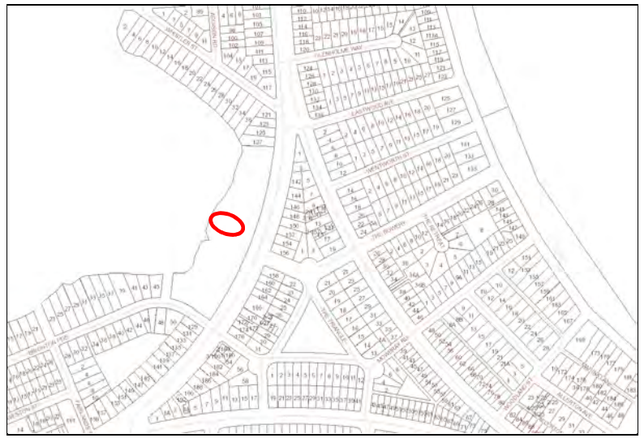
b) Heritage



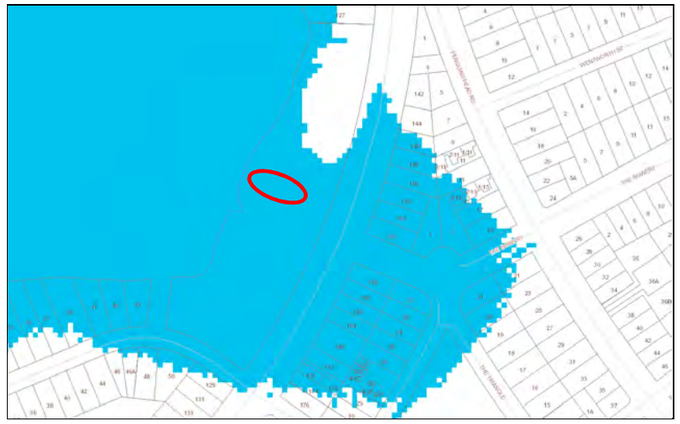
c) Biodiversity



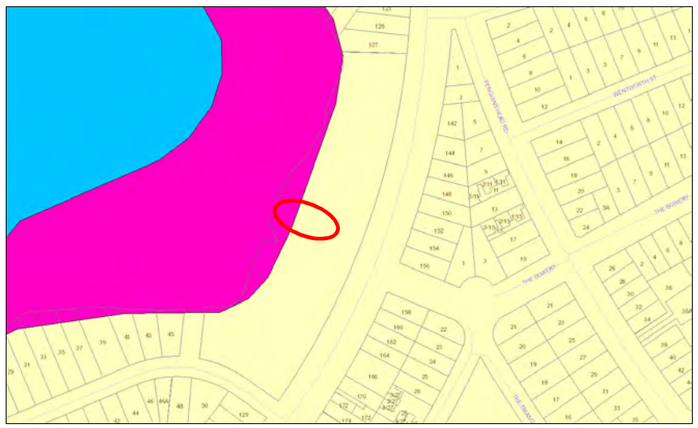
d) Riparian Lands and Watercourses



e) Scenic Protection

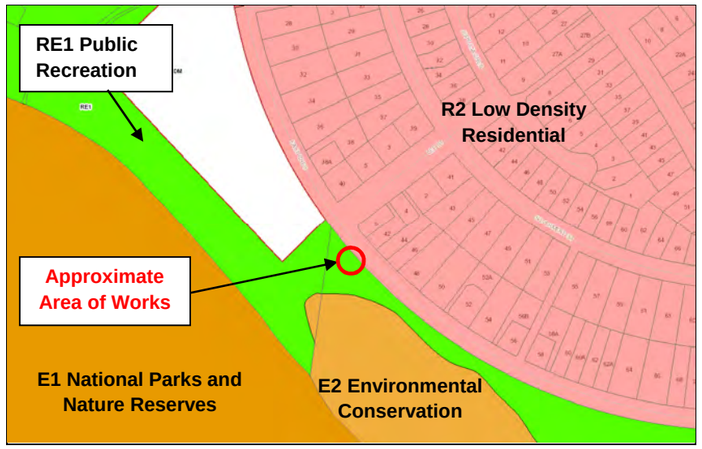


f) Flood Planning



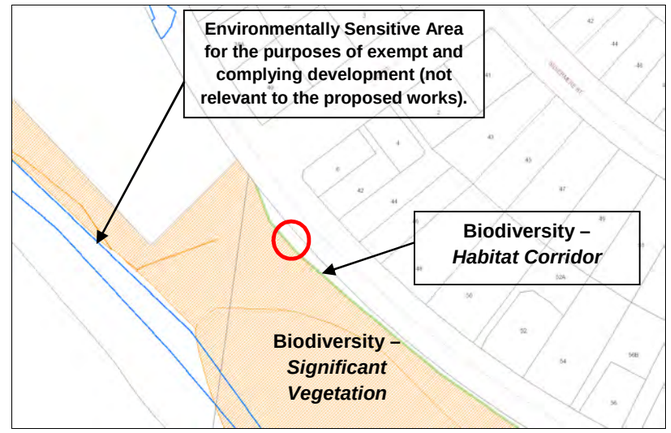
g) Acid Sulfate Soils

Figure 3: Mapping for <u>Culburra – SPS6</u> (all mapping has been extracted from Shoalhaven LEP 2014)

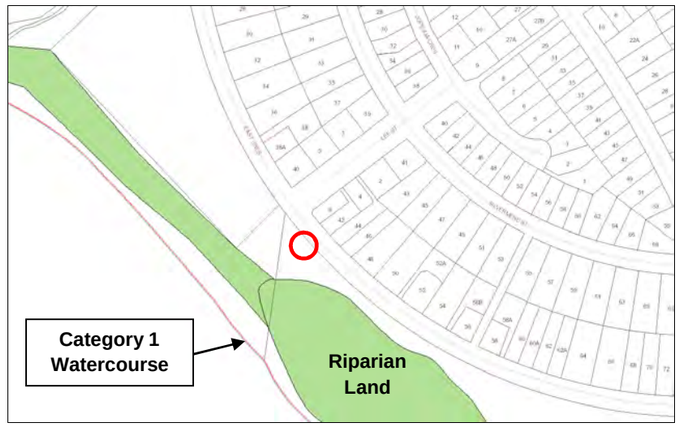


a) Land Zoning

b) Heritage

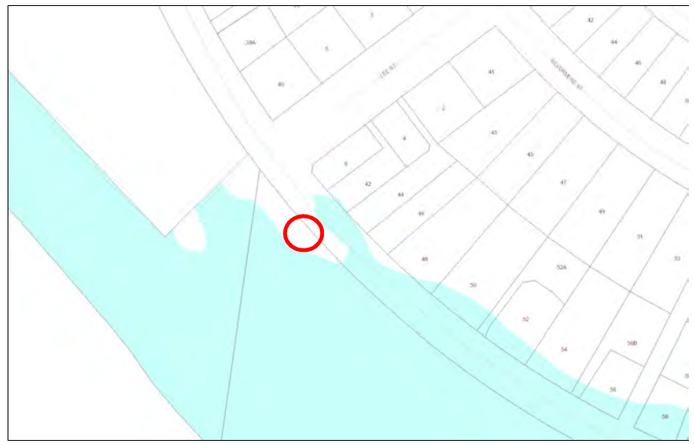


c) Biodiversity

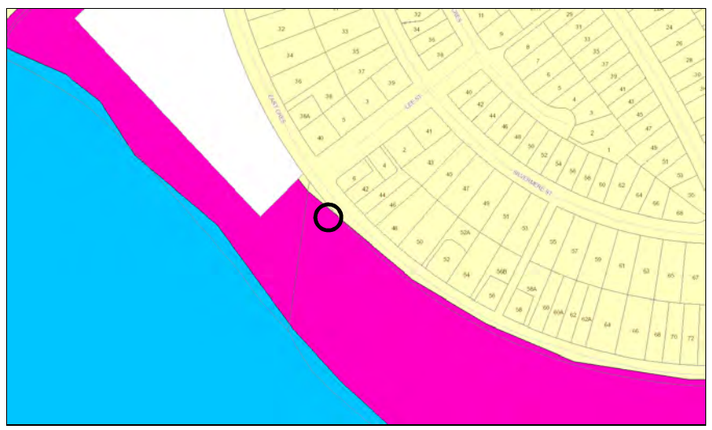


d) Riparian Lands and Watercourses

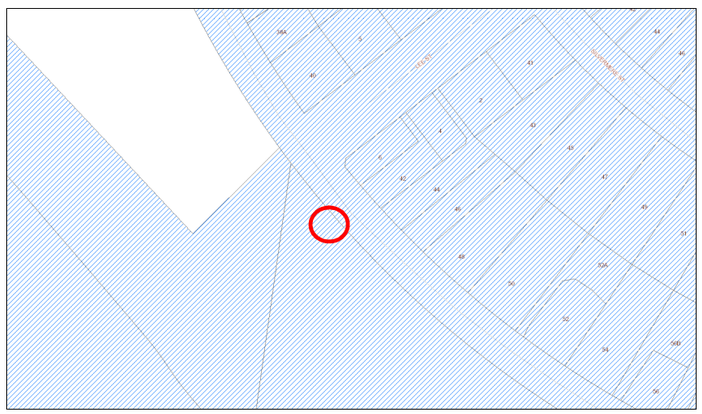
e) Scenic Protection



f) Flood Planning

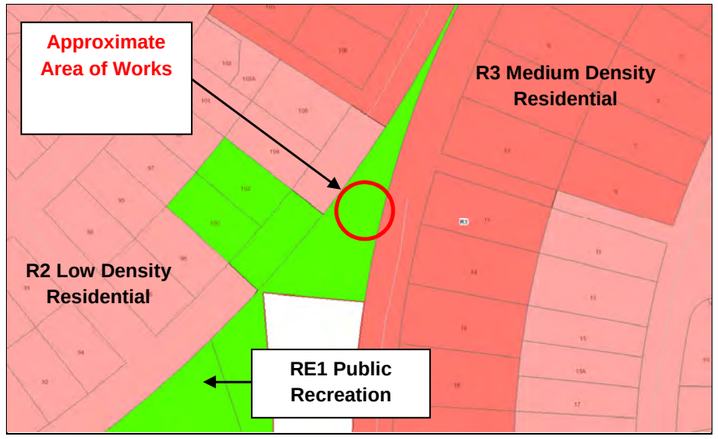


g) Acid Sulfate Soils



h) Clause 7.20 Development within the Jervis Bay Region

Figure 4: Mapping for <u>Culburra – SPS9</u> (all mapping has been extracted from Shoalhaven LEP 2014)



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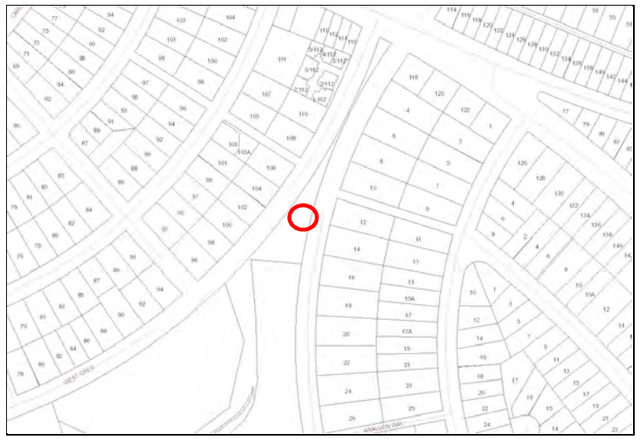

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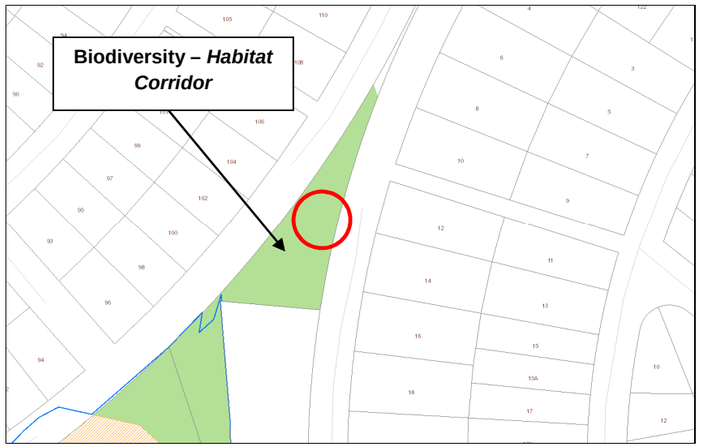

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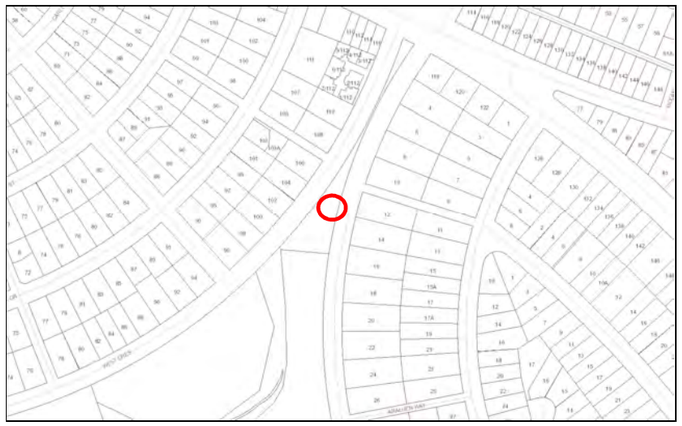

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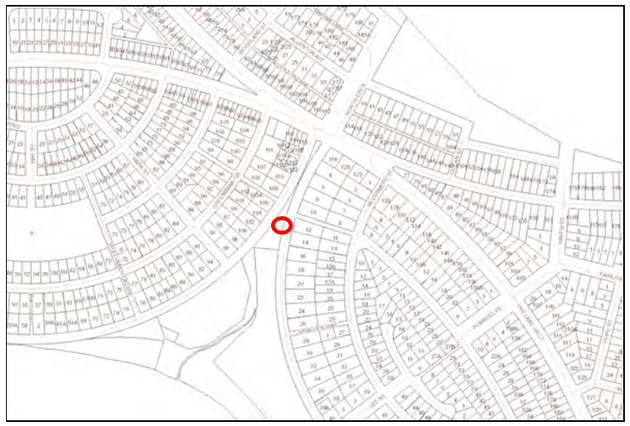

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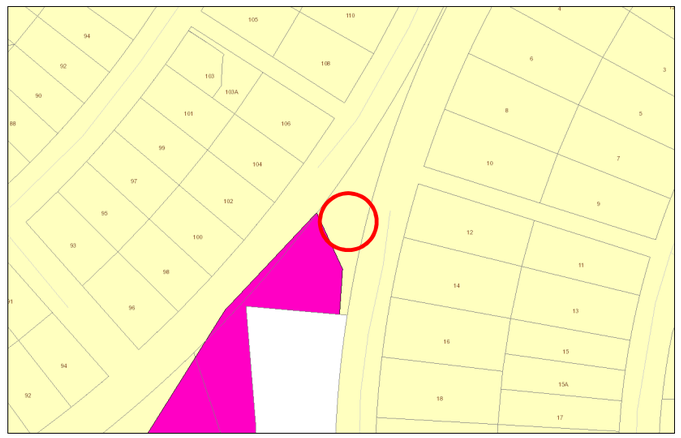

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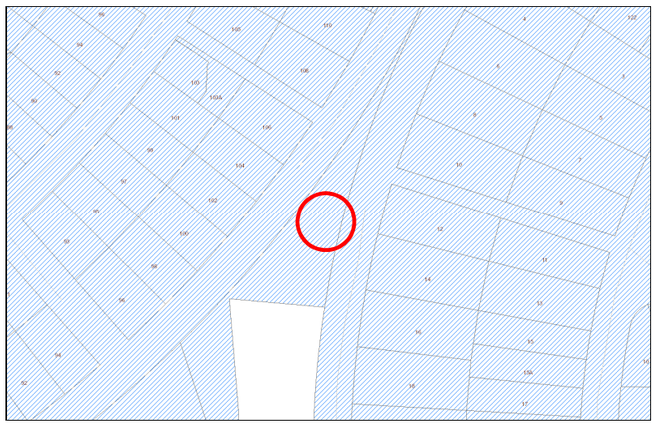
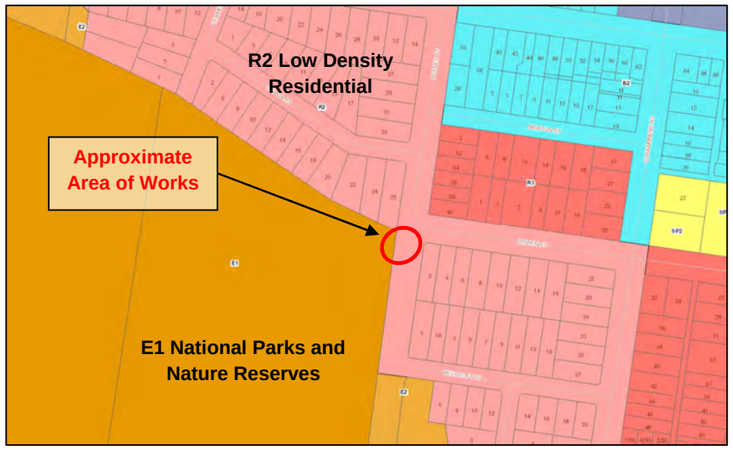


i) Clause 7.20 Development within the Jervis Bay Region

Figure 5: Mapping for Culburra – SPS10 (all mapping has been extracted from Shoalhaven LEP 2014)



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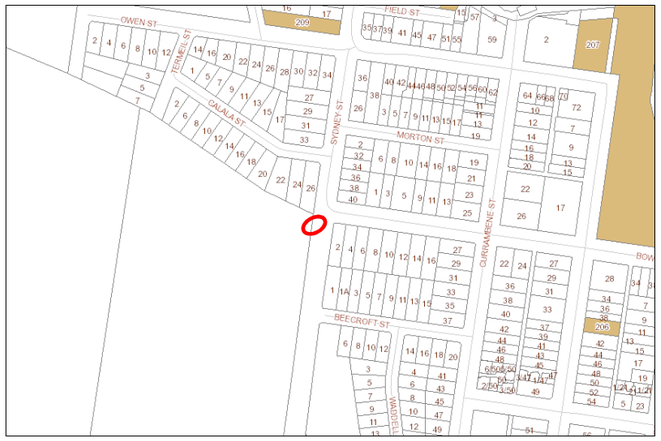

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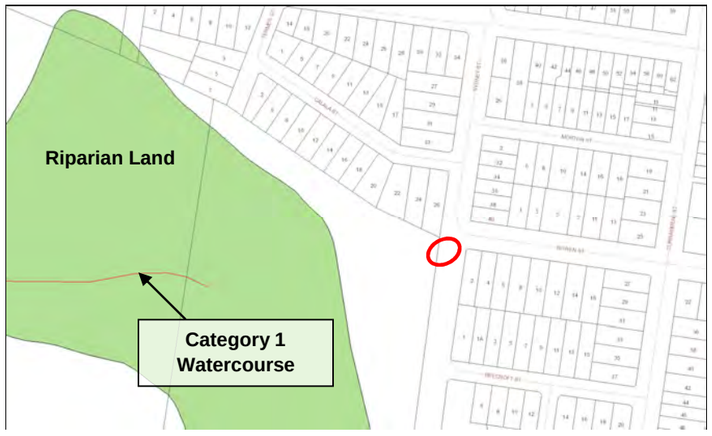
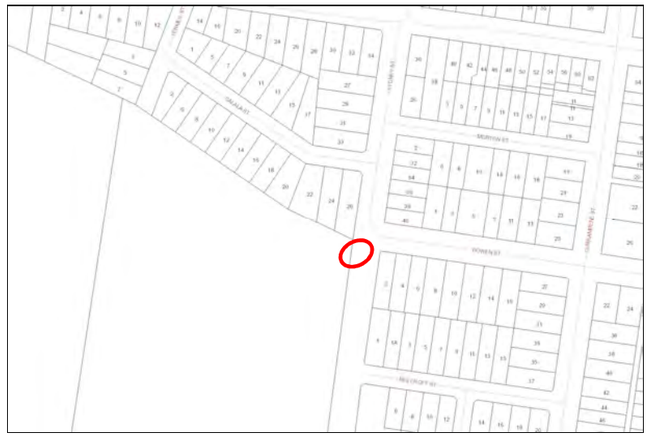
c) Biodiversity



d) Riparian Lands and Watercourses



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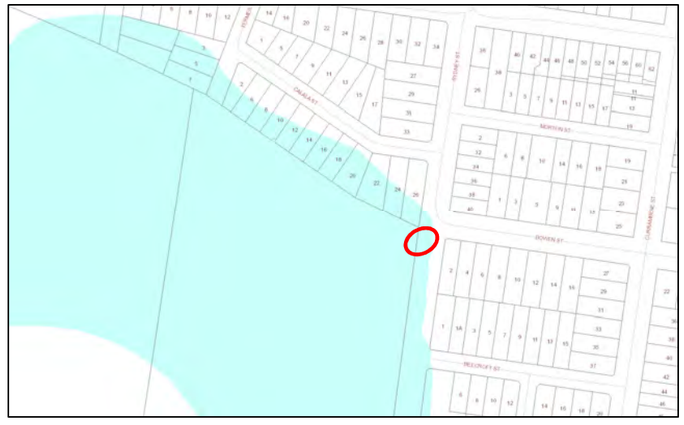

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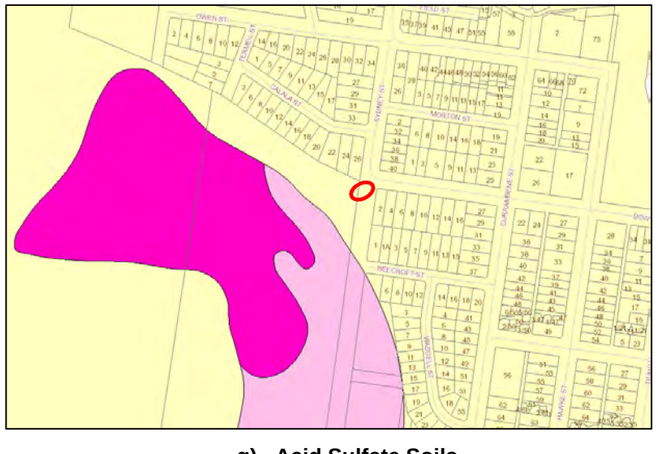
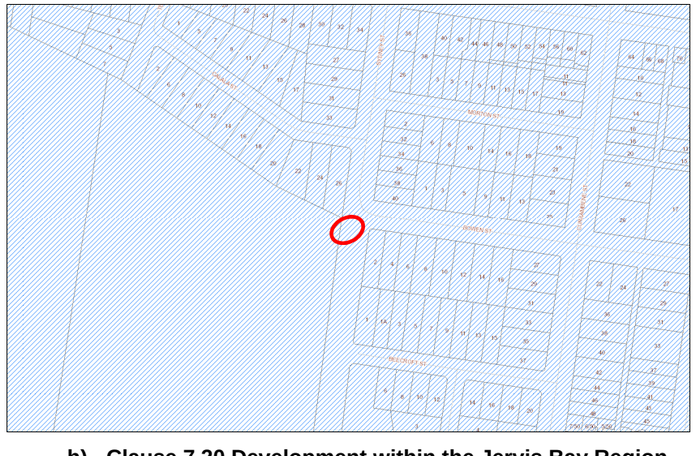
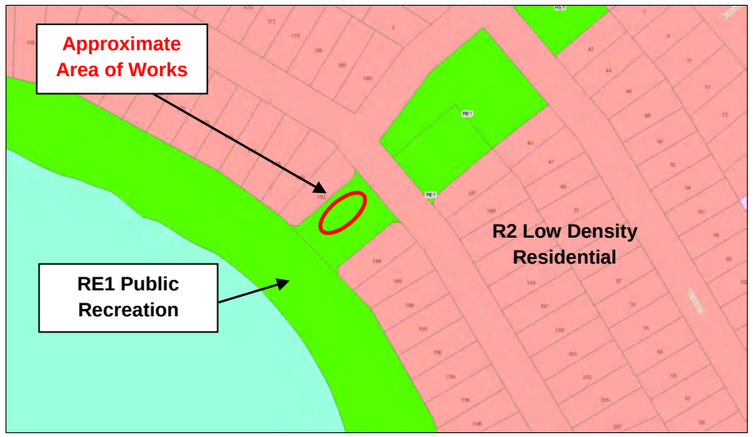


g) Acid Sulfate Soils



h) Clause 7.20 Development within the Jervis Bay Region

Figure 6: Mapping for <u>Huskisson and Vincentia – SPS3</u> (all mapping has been extracted from Shoalhaven LEP 2014)



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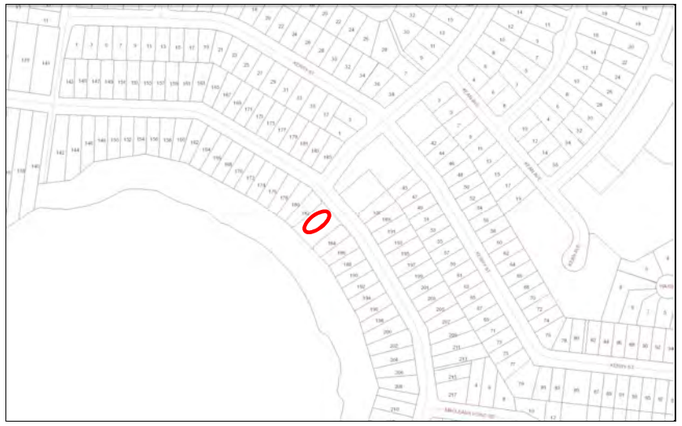

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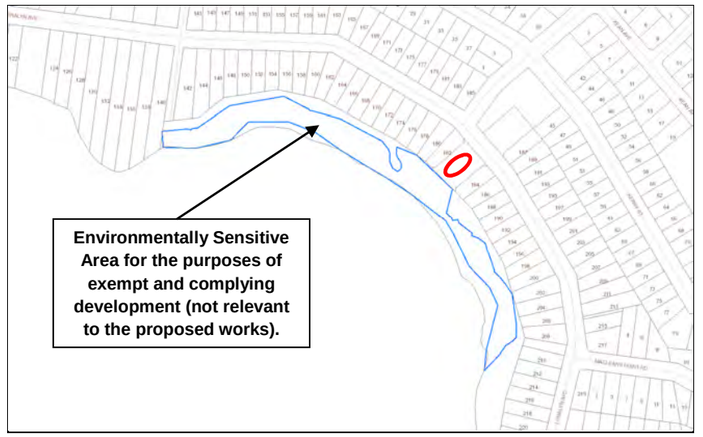

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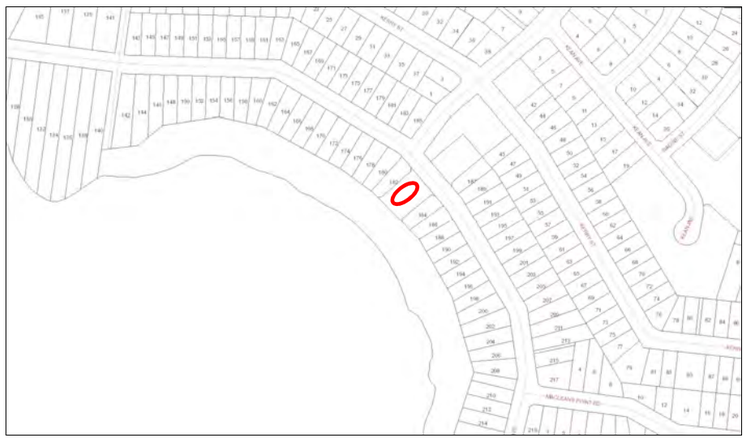
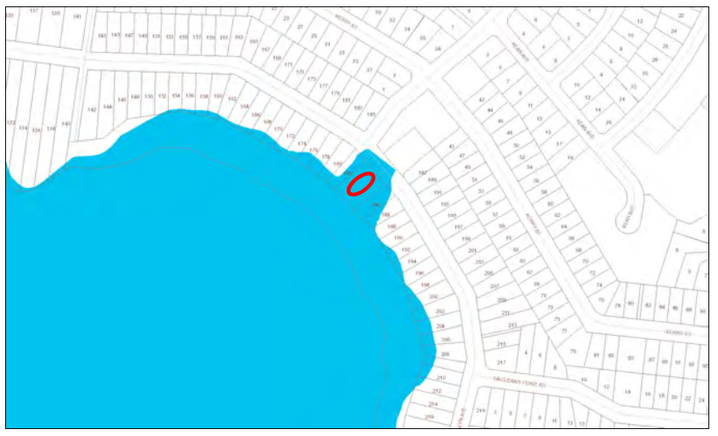
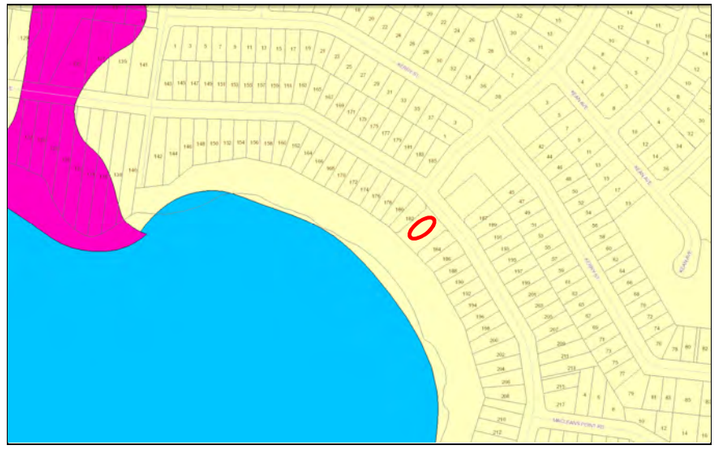


d) Riparian Lands and Watercourses

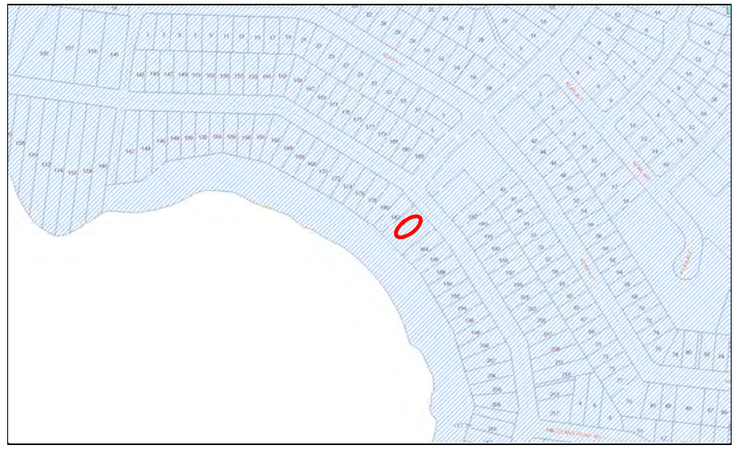
e) Scenic Protection



f) Flood Planning

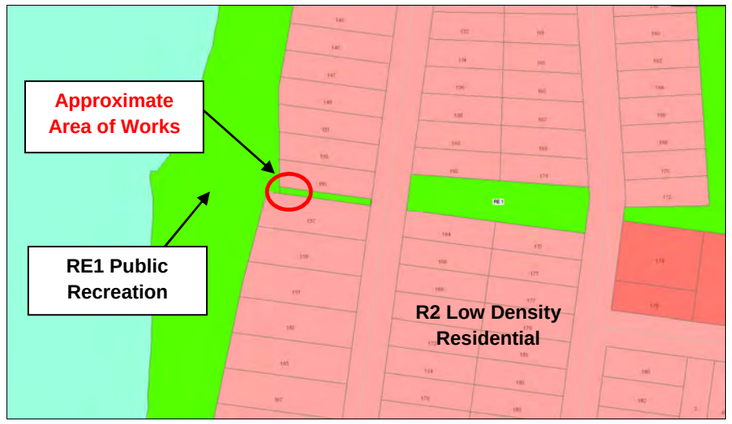


g) Acid Sulfate Soils



h) Clause 7.20 Development within the Jervis Bay Region

Figure 7: Mapping for <u>St. Georges Basin – SPS10</u> (all mapping has been extracted from Shoalhaven LEP 2014)



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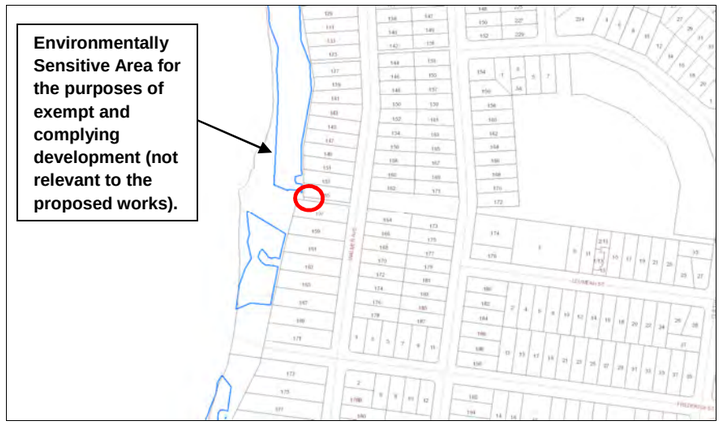
b) Heritage



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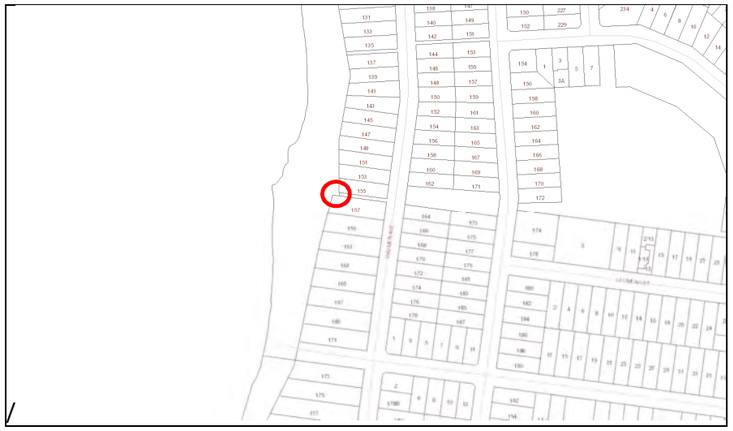
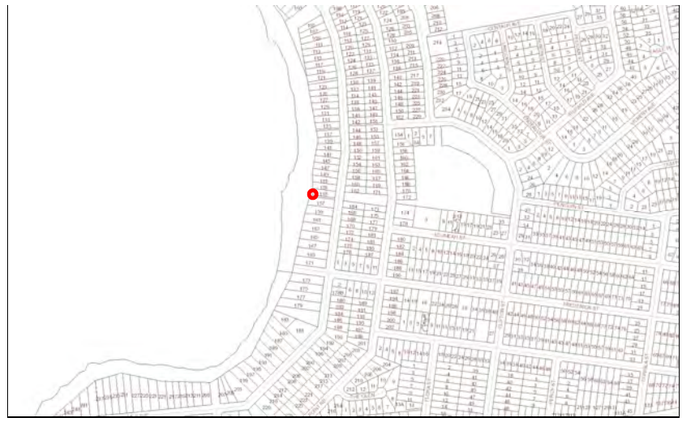


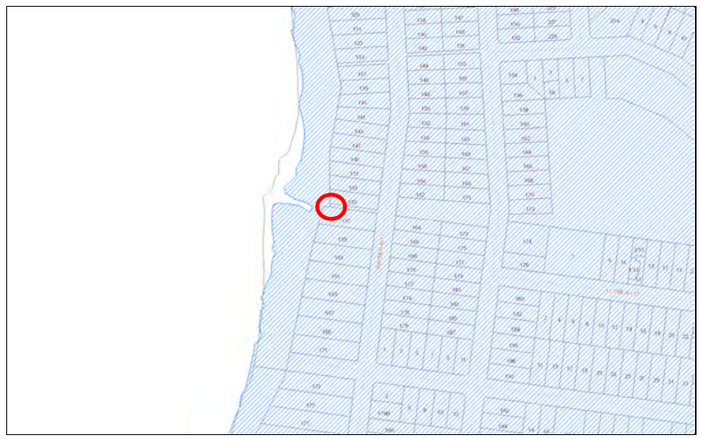
d) Riparian Lands and Watercourses



e) Scenic Protection

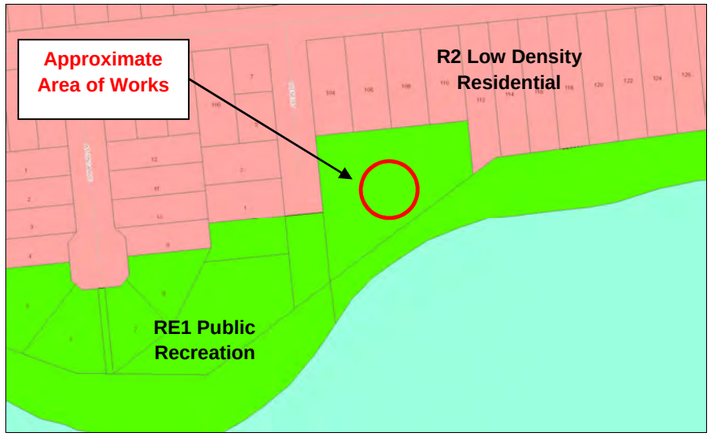
f) Flood Planning

g) Acid Sulfate Soils



h) Clause 7.20 Development within the Jervis Bay Region

Figure 8: Mapping for <u>St. Georges Basin – SPS12</u> (all mapping has been extracted from Shoalhaven LEP 2014)



a) Land Zoning

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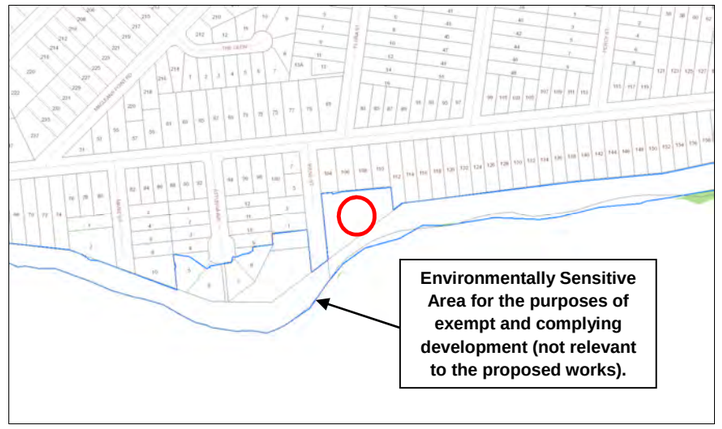
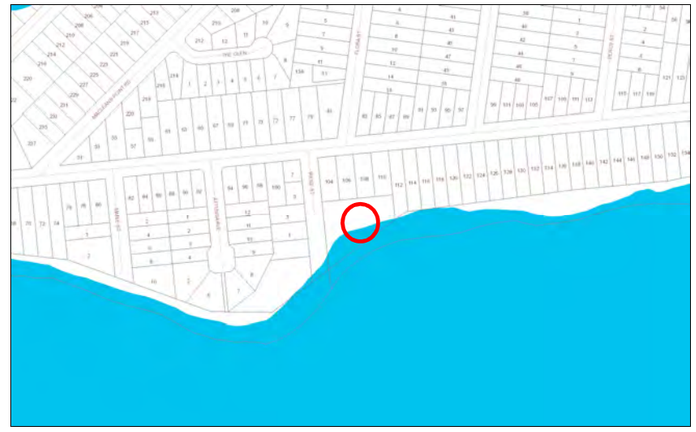


c) Biodiversity

d) Riparian Lands and Watercourses

e) Scenic Protection



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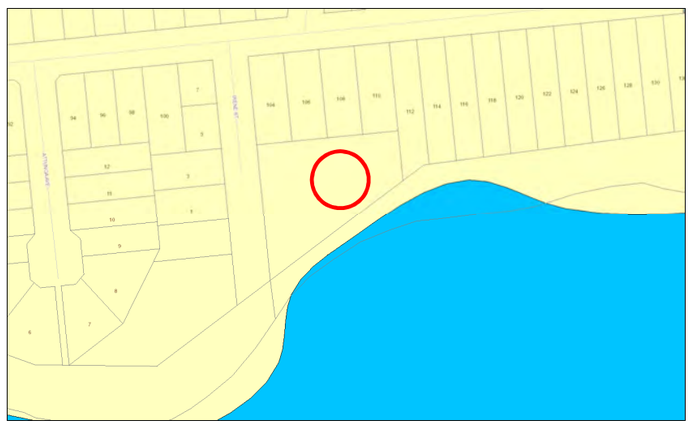
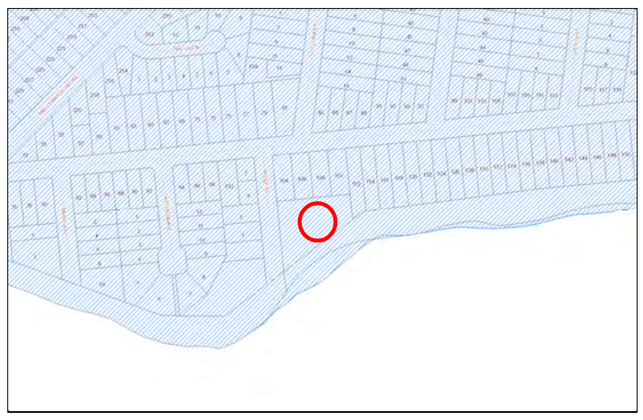
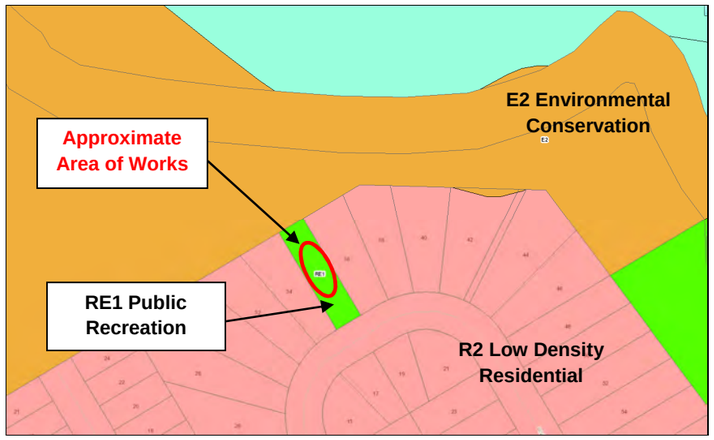


g) Acid Sulfate Soils



h) Clause 7.20 Development within the Jervis Bay Region

Figure 9: Mapping for St. Georges Basin – SPS13 (all mapping has been extracted from Shoalhaven LEP 2014)



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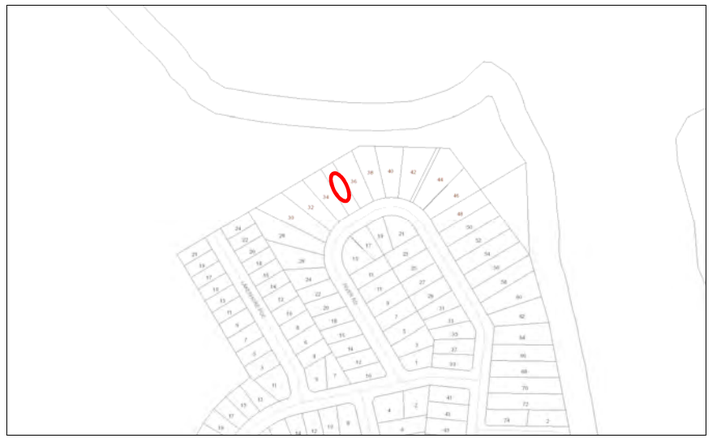

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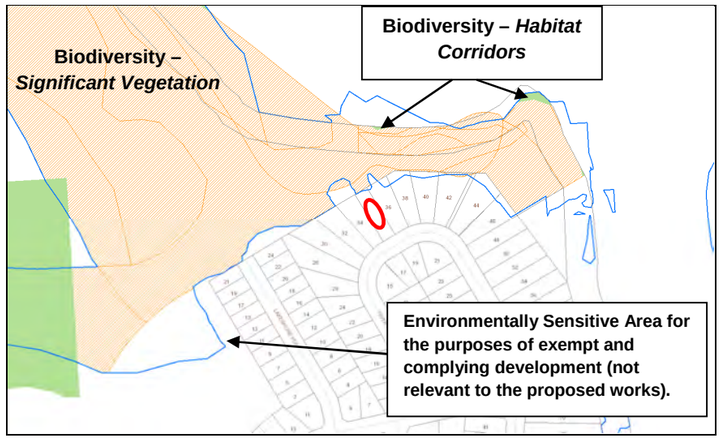
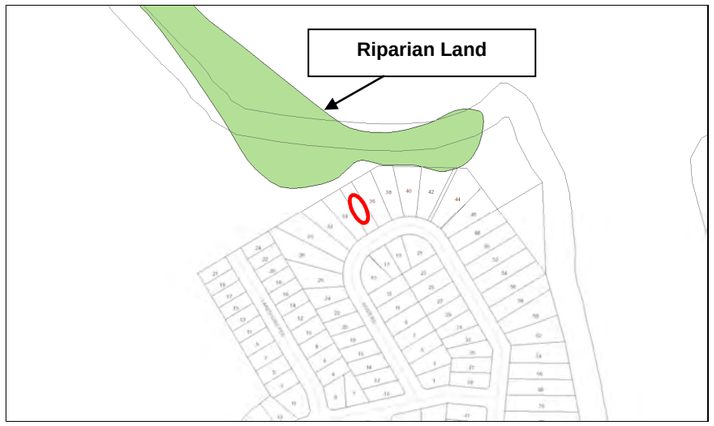
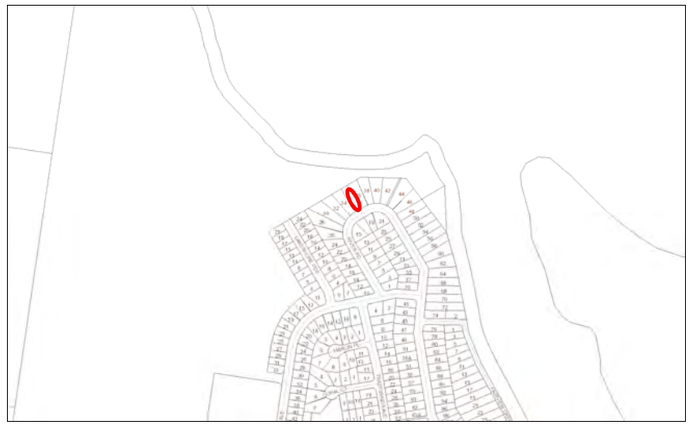


c) Biodiversity



d) Riparian Lands and Watercourses



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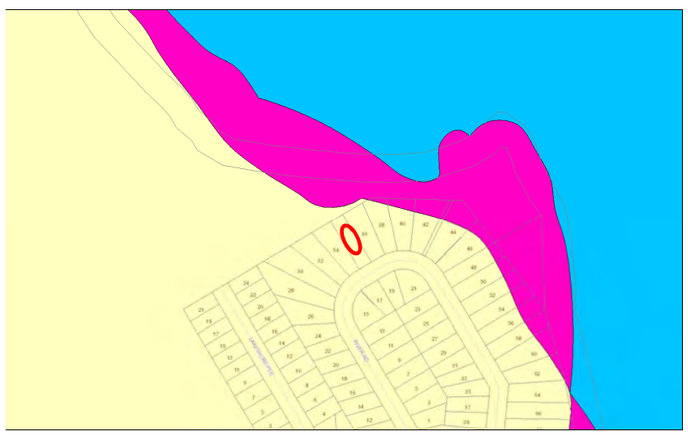
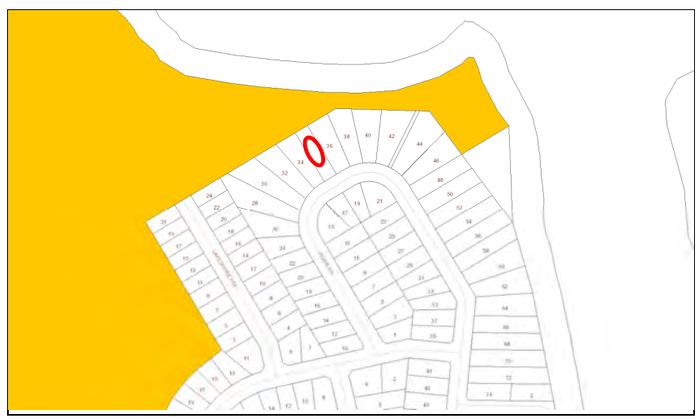
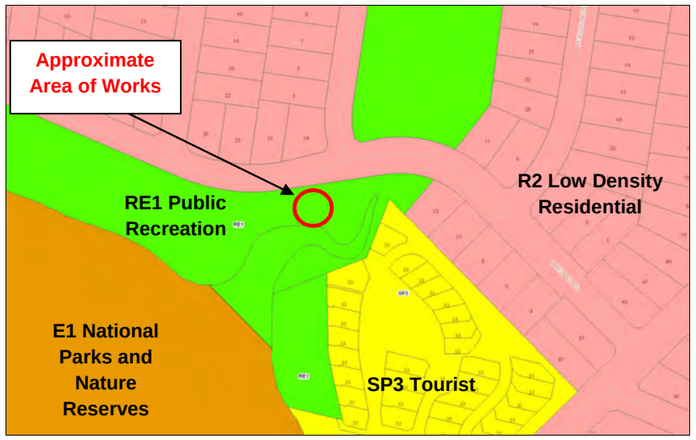


g) Acid Sulfate Soils



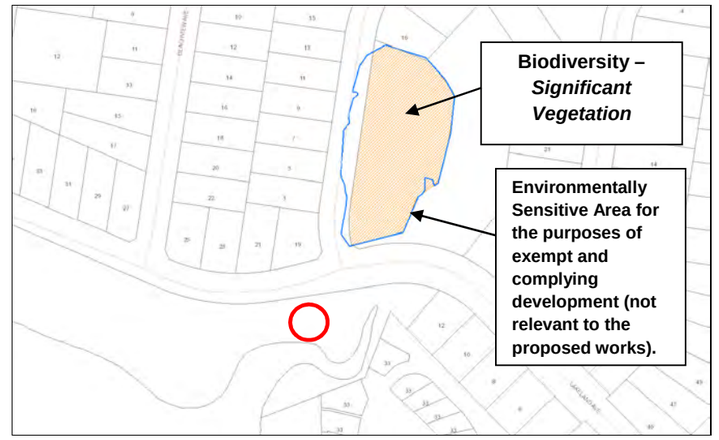
h) Urban Release Area

Figure 10: Mapping for <u>Sussex Inlet – SPS1</u> (all mapping has been extracted from Shoalhaven LEP 2014)



a) Land Zoning

b) Heritage



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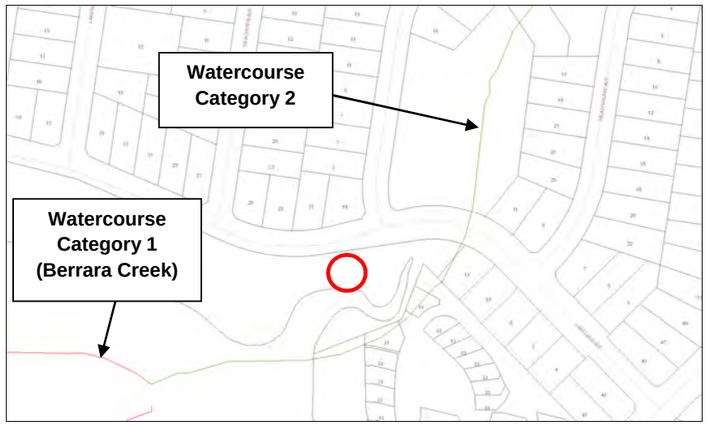
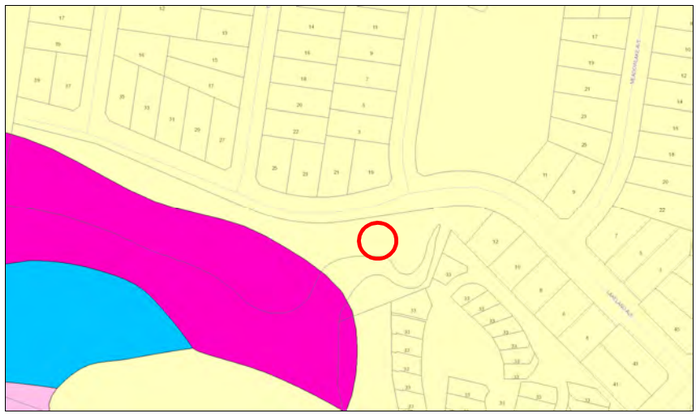


d) Riparian Lands and Watercourses

e) Scenic Protection

f) Flood Planning



g) Acid Sulfate Soils

Figure 11: Mapping for <u>Sussex Inlet – SPS16</u> (all mapping has been extracted from Shoalhaven LEP 2014)

ANNEXURE 3

ANNEXURE 3

Aboriginal Due Diligence Assessment

prepared by

Cowman Stoddart Pty Ltd

ABORIGINAL DUE DILIGENCE ASSESSMENT

ABORIGINAL DUE DILIGENCE ASSESSMENT

PROPOSED PROVISION
OF
EMERGENCY OVERFLOW STORAGE FACILITIES
AT SEWAGE PUMPING STATIONS

VARIOUS LOCATIONS
at
BERRY, CULBURRA, HUSKISSON,
ST GEORGES BASIN and SUSSEX INLET

Prepared for

Shoalhaven City Council

December 2015

Prepared by:

COWMAN STODDART PTY LTD

Town Planning, Agricultural & Environmental Consultants

PROPOSED PROVISION OF EMERGENCY OVERFLOW STORAGE FACILITIES AT SEWAGE PUMP STATIONS

VARIOUS LOCATIONS AT BERRY, CULBURRA, HUSKISSON, ST GEORGES BASIN AND SUSSEX INLET

Ref. 15/24

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COWMAN STODDART PTY LTD

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1.0 INTRODUCTION

Shoalhaven City Council, through Shoalhaven Water, is the responsible water and sewer authority for the Shoalhaven City Local Government Area. Inclusive of the responsibilities, Shoalhaven Water manages the collection, treatment and distribution of water, along with the collection, treatment and disposal of wastewater back into the environment.

As part of the infrastructure utilised in undertaking these functions, Shoalhaven City Council maintain and operate a series of sewage pumping stations in order to transfer sewerage waste to the treatment plants. At times, failures in the system occurs due to varying circumstances such as mechanical failure, power outages and the like. Failures at the sewage pump station sites can lead to accidental discharge of untreated sewage waste into the environment. In order to reduce the risks associated with such accidental discharges, Shoalhaven City Council are planning the provision of emergency storage capacity adjacent to sewage pumping stations in order to provide emergency storage of untreated sewage. Shoalhaven City Council are currently considering the provision of emergency overflow storage capacity at eleven (11) of its sewer pump stations in various locations within townships of Berry, Culburra, Huskisson, St Georges Basin and Sussex Inlet.

In order to consider the impacts of the proposed works, this Aboriginal Due Diligence Assessment addressing the requirements of the DECCW *"Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales"*, has been prepared.

This assessment is accompanied by AHIMS Certificates issued by NSW Office of Environment and Heritage in relation to the subject sites (**Appendix A**).

This Assessment has been prepared in accordance with the requirements of the DECCW *"Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales"* and fulfils the proponents' due diligence obligations under this Code.

2.0 PROJECT AREA

The proposals affect eleven (11) separate sewage pumping stations, located in the townships of Berry, Culburra, Huskisson, St Georges Basin and Sussex Inlet. The following provides relevant details regarding the various sites.

2.1 BERRY

The proposal seeks to provide emergency storage capacity at one sewage pump station in Berry, being SPS 5. **Figure 1** below identifies the location of Berry SPS 5.

Figure 1: Site Locality of Berry SPS 5.

2.1.1 Berry SPS 5

The siting of Berry SPS 5 is to the south of Victoria Street immediately opposite Mark Radium Park which is currently the siting of development associated with the realignment of the Princes Highway, as shown in **Figure 1** above. **Figure 2** is an aerial photo of Berry SPS 5.

Berry SPS 5 is surrounded by the property containing The Arbour Retirement Complex and is sited adjacent the vehicular accessway servicing that development. The subject site features an in-ground pump station, above ground electrical board and a vent pipe, all sited on a hard stand area. **Plate 1** below shows the existing SPS.

The site is in the vicinity of:

- The Arbour Retirement Complex to the south;
- Mark Radium Park to the north;
- The Princes Highway to the west; and
- Residential dwellings within Berry to the north-east.

Figure 2: Aerial photo of Berry SPS 5.

Plate 1: Berry SPS 5.

2.2 CULBURRA

Shoalhaven Council seek to provide emergency storage facilities at 4 sewage pump stations in the township of Culburra. **Figure 3** below identifies the location of the various pump stations.

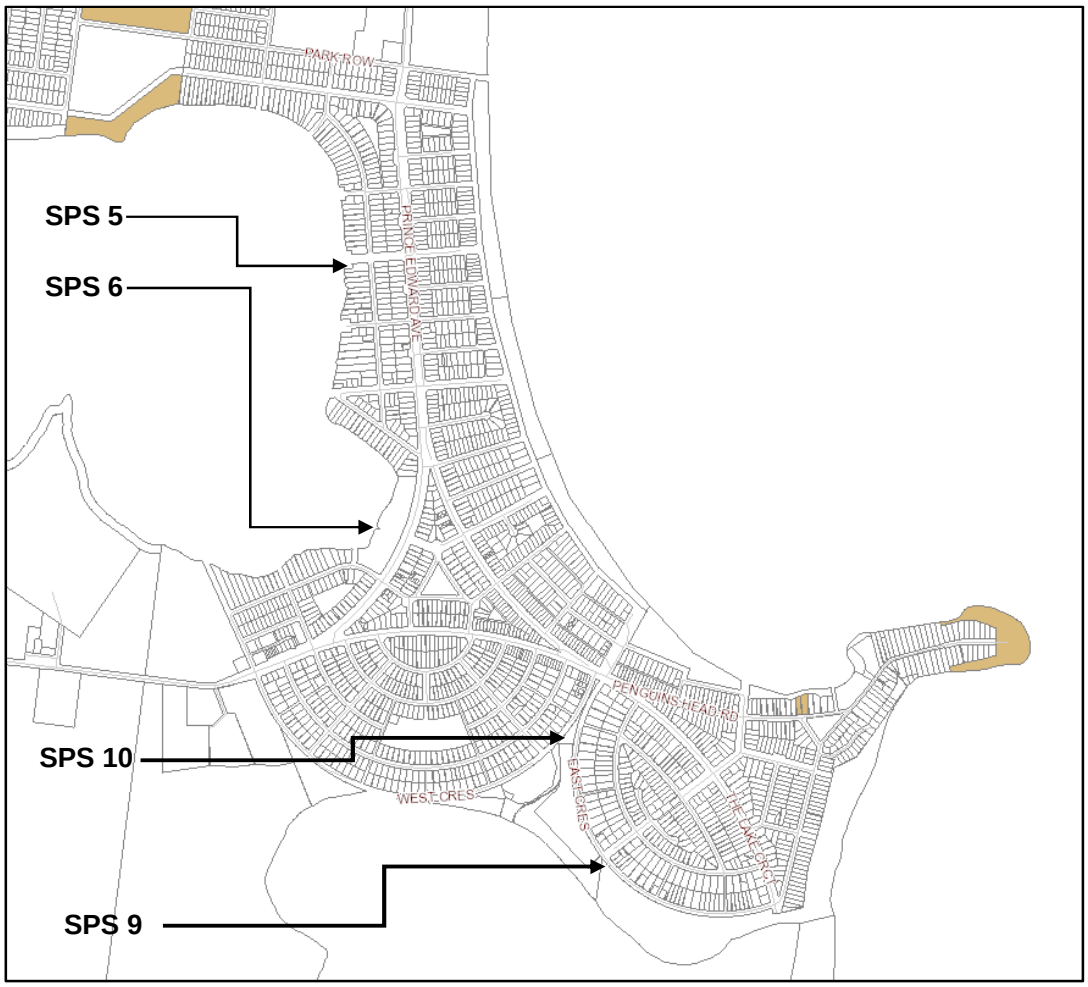


Figure 3: Site locality – Culburra.

2.2.1 Culburra – SPS 5

The siting of Culburra SPS 5 is located within an unconstructed section of The Strand road reserve between properties known as Nos 51 and 51 Addison Road, as shown in **Figure 3** above, and aerial photo being **Figure 4** below.

Culburra SPS 5 features an in-ground pump station, above ground electrical board and a vent shaft, all sited on a hard stand area. **Plate 2** below shows the existing SPS.

The site of Culburra SPS 5 is in the vicinity of:

- Residential development to the south and east;

- The waters of Curley Bay to the west; and
- Vegetated lands to the north, and then residential development fronting Addison Road.

Figure 4: Aerial photo of Culburra SPS 5.

Plate 2: Culburra SPS 5.

2.2.2 Culburra – SPS 6

The siting of Culburra SPS 6 is located to the west of and opposite No. 156 Prince Edward Avenue, as shown in **Figure 3** above, and **Figure 5** below, being an aerial photo of the locality.

Culburra SPS 6 features an in-ground pump station, above ground electrical board and a vent pipe, all sited on a hard stand area. **Plate 3** below shows the existing SPS. Land in the vicinity of the site is:

- Undeveloped to the north and south;
- To the east is single residential dwellings; and
- To the west, land is undeveloped containing vegetated lands, and then the waters of Curleys Bay.

Figure 5: Aerial photo of Culburra SPS 6.

Plate 3: Culburra SPS 6.

2.2.3 Culburra – SPS 9

The siting of Culburra SPS 6 is opposite No 42 East Crescent, Culburra Beach, as shown in **Figure 3** above, and the aerial photo of the locality forming **Figure 6** below. Access to the SPS is via East Crescent which is provided with a sealed surface in this location.

Culburra SPS 9 features an in-ground pump station, above ground electrical board and a vent pipe, all sited on a hard stand area. **Plate 4** below shows the existing SPS.

Land in the vicinity of the site is:

- Undeveloped west of East Crescent; and
- Developed with single residential dwellings to the east.

Lake Wollumboola is sited to the west of Culburra SPS 9, being separated by native vegetation.

Figure 6: Aerial photo of Culburra SPS 9.

Plate 4: Culburra SPS 9.

2.2.4 Culburra – SPS 10

The siting of Culburra SPS 10 is located to the west of the East Crescent Road reserve opposite No. 14 East Crescent, as shown in **Figure 3** above, and the aerial photo of the locality forming **Figure 7** below.

Culburra SPS 10 features an in-ground pump station, above ground electrical board and a vent pipe, all sited on a hard stand area. **Plate 5** below shows the existing SPS. Access to Culburra SPS 10 is via an all-weather gravel access in East Crescent.

In the vicinity of Culburra SPS 10 is generally undeveloped land, with the exception of that to the west, which contains single residential dwellings, separated by naturally vegetated lands.

Figure 7: Aerial photo of Culburra SPS 10.

Plate 5: Culburra SPS 10.

2.3 HUSKISSON AND VINCENTIA

Shoalhaven Council are seeking to provide emergency storage facilities at one location in the Huskisson township, this being SPS 3. **Figure 8** below shows the location of Huskisson SPS 3.

Figure 8: Site Locality Huskisson.

2.3.1 Huskisson and Vincentia – SPS 3

The siting of Huskisson Vincentia SPS 3 is to the west of Sydney Street, sited generally at the intersection of Sydney Street and Bowen Street, as shown in **Figure 8** above, and the aerial photo of the locality forming **Figure 9** below.

Huskisson Vincentia SPS 3 features an in-ground pump station and an above ground electrical board with access via a gravel track from Sydney Street. **Plate 6** below shows the existing SPS.

The area surrounding Huskisson Vincentia SPS 3 contains single residential dwellings to the north and east. Land to the south and west is undeveloped vegetated lands.

Figure 9: Aerial photo of Huskisson Vincentia SPS 3.

Plate 6: Huskisson Vincentia SPS 3.

2.4 ST GEORGES BASIN

Shoalhaven Council seek to provide emergency storage facilities at 3 sewage pump stations in the township of St Georges Basin. **Figure 10** below identifies the location of the various pump stations.

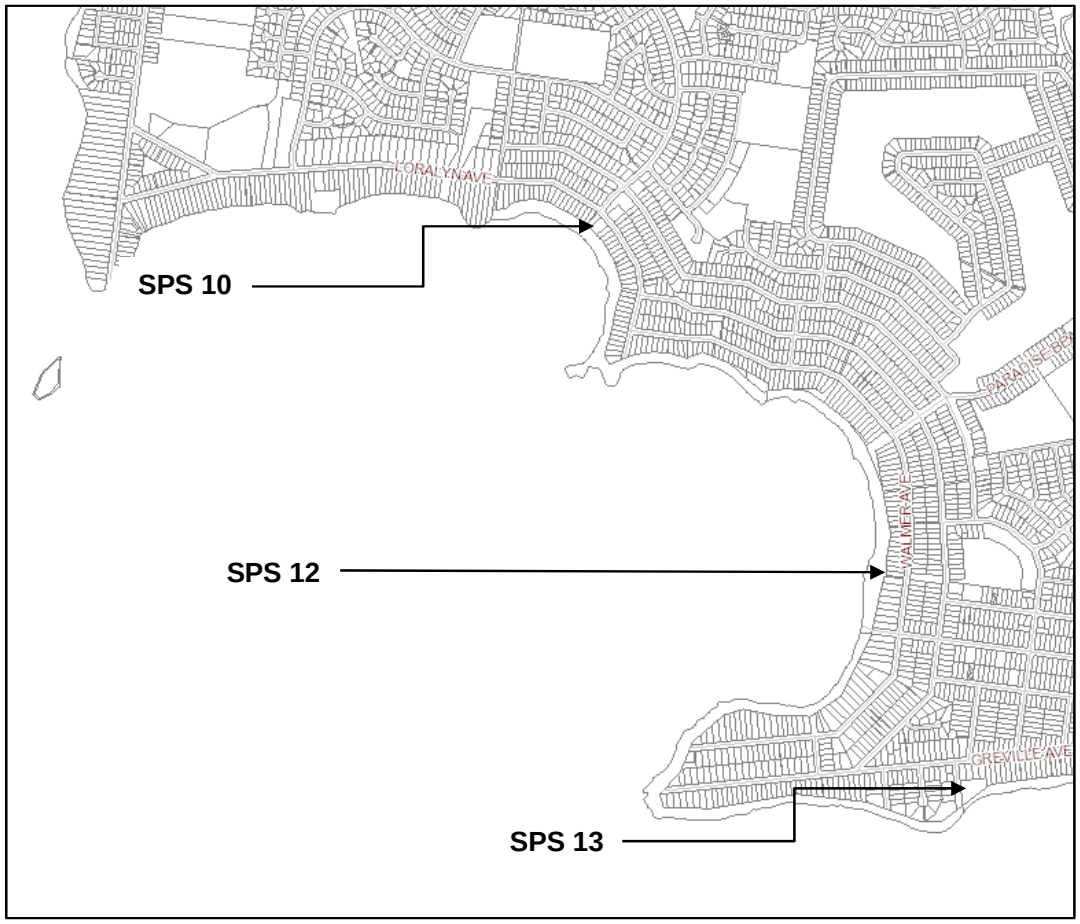


Figure 10: Site locality – St Georges Basin.

2.4.1 St Georges Basin – SPS 10

The siting of St Georges Basin SPS 10 is located to north of No.184 Loralyn Avenue as shown in **Figure 10** above, and the aerial photo being **Figure 11** below.

St Georges Basin SPS 10 features an in-ground pump station, valve pit and overflow structure, all sited on a hard stand area. **Plate7** below shows the existing SPS.

The site of St Georges Basin SPS 10 is in the vicinity of:

- Residential development to the south and north;
- Vegetated land and the waters of St Georges Basin to the west; and
- Vegetated land and residential development to the east of the site fronting Loralyn Avenue.

Figure 11: Aerial photo of St Georges Basin SPS 10.

Plate 7: St Georges Basin SPS 10.

2.4.2 St Georges Basin – SPS 12

The siting of St Georges Basin SPS 12 is located to the north of No.157 Walmer Avenue, as shown in **Figure 10** above, and aerial photo being **Figure 12** below.

St Georges Basin SPS 12 features an in-ground pump station and valve pit sited on a hard stand area. **Plate 8** below shows the existing SPS.

The site of St Georges Basin SPS 12 is in the vicinity of:

- Residential development to the north and south;
- Vegetated land and the waters of St Georges Basin to the west; and
- Vegetated land and residential development to the east of the site fronting Walmer Avenue.

Figure 12: Aerial photo of St Georges Basin SPS 12.

Plate 8: St Georges Basin SPS 12.

2.4.3 St Georges Basin – SPS 13

The siting of St Georges Basin SPS 13 is located to the south of No.104 Greville Avenue and off Irene Street, as shown in **Figure 10** above, and aerial photo being **Figure 13** below.

St Georges Basin SPS 13 features an in-ground pump station, above ground electrical board and a valve pit, all sited on a hard stand area. **Plate 9** below shows the existing SPS.

The site of St Georges Basin SPS 13 is in the vicinity of:

- Residential development to the north;
- Vegetated land and the waters of St Georges Basin to the south; and
- Vegetated land and residential development fronting Irene Street to the west; and
- Vegetated foreshore land to the east.

Figure 13: Aerial photo of St Georges Basin SPS 13.

Plate 9: St Georges Basin SPS 13.

2.5 SUSSEX INLET

Shoalhaven Council seek to provide emergency storage facilities at two sewage pump stations in the township of Culburra. **Figure 14** and **15** below identify the location of the two pump stations.

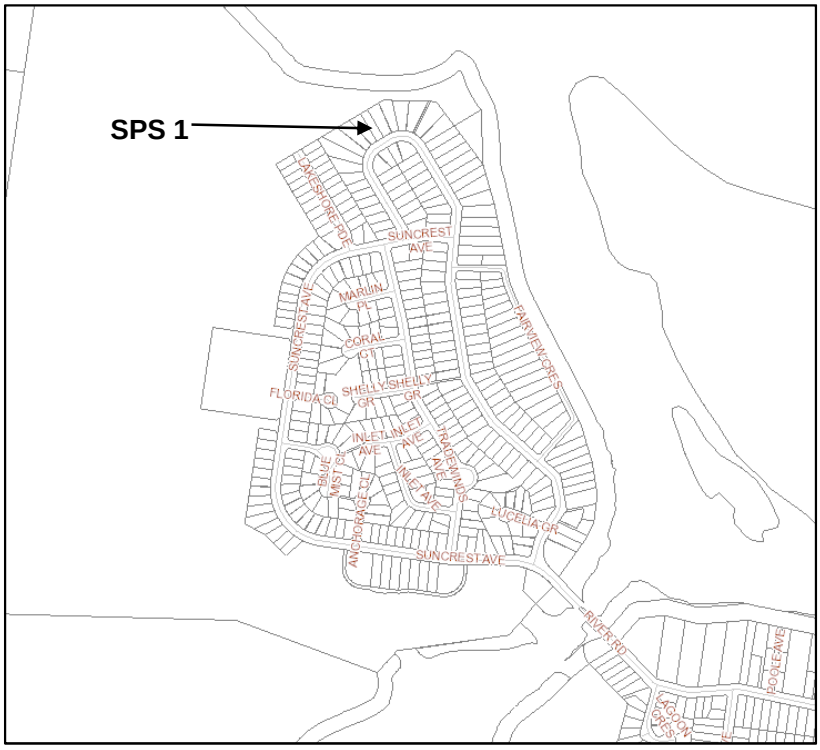


Figure 14: Site locality – Sussex Inlet (SPS 1).

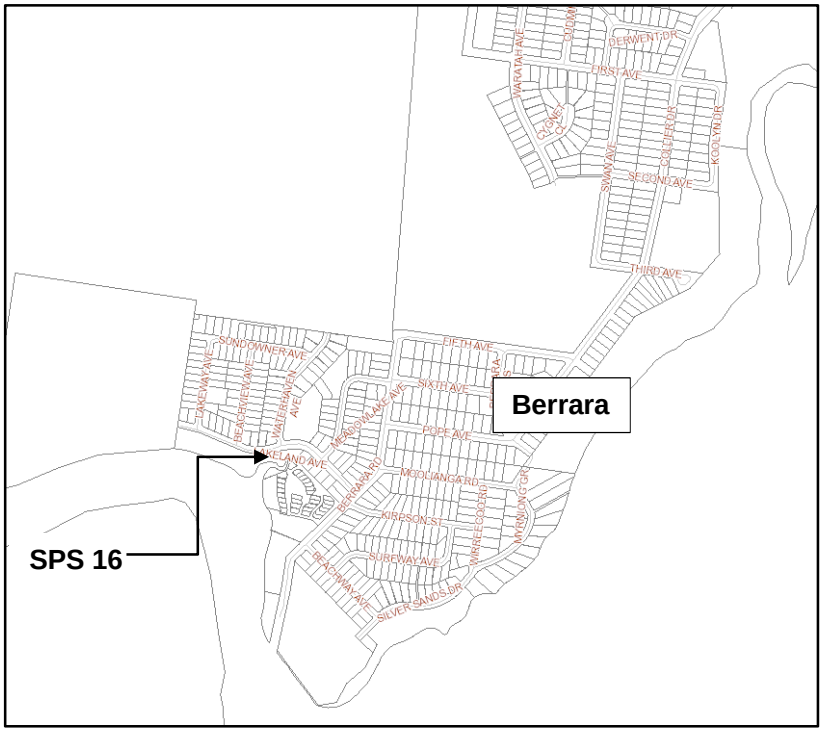


Figure 15: Site locality – Sussex Inlet (SPS 16).

2.5.1 Sussex Inlet – SPS 1

The siting of Sussex Inlet SPS 1 is located between No. 34 and No. 36 River Road, Sussex Inlet, as shown in **Figure 14** above, and aerial photo being **Figure 16** below.

Sussex Inlet SPS 1 features an in-ground pump station, above ground electrical board, vent shaft and valve pit, all sited on a hard stand area. **Plate 10** below shows the existing SPS.

The site of Sussex Inlet SPS 1 is in the vicinity of:

- Residential development to the east and west;
- Vegetated land and the waters of St Georges Basin to the north; and
- Residential development to the south fronting River Road.

Figure 16: Aerial photo of Sussex Inlet SPS 1.

Plate 10: Sussex Inlet SPS 1.

2.5.2 Sussex Inlet – SPS 16

The siting of Sussex Inlet SPS 16 is located within a foreshore reserve south of Lakeland Avenue, Berrara, as shown in **Figure 15** above, and aerial photo being **Figure 17** below.

Sussex Inlet SPS 16 features an in-ground pump station, above ground electrical board, valve pit, chlorine tank, vent pipe and a vent shaft, all sited on a hard stand area. **Plate 11** below shows the existing SPS.

The site of Sussex Inlet SPS 16 is in the vicinity of:

- Residential development and vegetated reserve land fronting Lakeland Avenue to the north;
- The waters of Berrara Creek to the south west; and
- Vegetated lands and a tourist park to the south and south east.

Figure 17: Aerial photo of Sussex Inlet SPS 16.

Plate 11: Sussex Inlet SPS 16.

3.0 PROPOSED ACTIVITY

Shoalhaven City Council proposes to provide emergency overflow storage facilities connected to a number of sewage pumping stations in either in-ground storage tanks, or underground pipes. The intention is to provide capacity of up to 8 hours of gravity flow in the event of pump station failure to avoid untreated effluent waste being discharged into the environment. The rationale of such works is to provide sufficient emergency storage capacity in order that the failures can be rectified before such discharges occur. The works are intended to have a beneficial long term impacts by minimising the occurrence of overflow discharges from the sewerage system.

The following sections detail the proposed works affecting each of the sites.

3.1 BERRY SPS 5

The proposal for Berry SPS 5 is to install an in-ground concrete tank having a diameter of 9.05 m, and a depth of approximately 2.3 m, with the finished level of the tank sitting approximate to the current ground level. The system will be vented via the existing vent pipe provided in conjunction with the established sewage pump station. The works are proposed to be connected to the existing SPS via a 3 m length of sewer pipe.

The tank is proposed to be connected to the existing overflow pipe and head wall.

The works are proposed to the west of the existing pump station in the north-western corner of the allotment, and will require the removal of a small number of trees and shrubs which appear to have been planted in conjunction with the establishment of the sewage pump station.

No additional vent shaft is proposed.

3.2 CULBURRA – SPS 5

The proposal for Culburra SPS 5 is to install an in-ground concrete tank having a diameter of 6.73 m, and a depth of approximately 2.89 m, with the finished level of the tank sitting approximate to the current ground level. The tank will be connected to the existing SPS via a sewer pipe having a length of approximately 6 m.

The works are proposed to the east of the existing pump station and will not require the removal of any significant vegetation, with this being restricted to grass lawn.

No additional vent shaft is proposed.

3.3 CULBURRA – SPS 6

The proposal for Culburra SPS 6 is to install an in-ground concrete tank having a diameter of 7.8 m, and a depth of approximately 3.4 m, with the finished level of the tank sitting approximate

to the current ground level. The tank will be connected to the existing SPS via a sewer pipe having a length of some 2.6 m.

The works are proposed to the south-east of the existing pump station adjacent the existing internal access road that services the sewage pumping station in the north-western corner of the allotment, and will require the removal of a small number of trees.

No additional vent shaft is proposed.

3.4 CULBURRA – SPS 9

The proposal for Culburra SPS 9 is to install an in-ground concrete tank having a diameter of 4.8 m, and a depth of approximately 4.0 m, with the finished level of the tank sitting approximate to the current ground level. The tank will connected to the SPS via a sewer pipe having a length of approximately 2.7 m.

The works are proposed to the north of the existing pump station on the raised area provided in conjunction with the sewerage pumping station. The proposal will result in the removal of a very small number of trees to enable its siting.

No additional vent shaft is proposed.

3.5 CULBURRA – SPS 10

The proposal for Culburra SPS 10 is to install an in-ground concrete tank having a diameter of 7.8 m, and a depth of approximately 4.4 m, with the finished level of the tank sitting approximate to the current ground level. Connection to the SPS via a sewer pipe with a length of approximately 6.9 m.

The works are proposed to the east of the existing pump station adjacent the constructed access serving the established sewerage pumping station. The proposal will result in the removal of a very small number of trees to enable its siting.

No additional vent pipe is proposed.

3.6 HUSKISSON AND VINCENTIA – SPS 3

The proposal for Huskisson and Vincentia SPS 3 is to install a 1.5 m diameter storage pipe having a length of approximately 14.6 m at a depth of approximately 3.9 m, with a soil covering of approximately 2.3 m, along with a 1.05 m manhole. A vent shaft is proposed at the northern end of the storage pipe.

The storage pipe is to be located to the east of the sewage pumping station, between it and Sydney Street.

The proposal will not result in the removal of vegetation as the works are sited on lands that have already been disturbed.

3.7 ST GEORGES BASIN – SPS 10

The proposal for St Georges Basin SPS 10 is to install an in-ground concrete tank having a diameter of 6.0 m, and a depth of approximately 3.44 m, with the finished level of the tank sitting above the surrounding by approximately 400 mm. The tank will be connected to the SPS via: a sewer pipe of approximately 18.5 m, a new manhole, and another new section of sewer pipe of approximately 11.9 m that will connect to an existing manhole adjacent to the SPS.

The works are proposed to the north east of the existing pump station. The proposal will result in the removal of some vegetation to enable the siting of pipes and removal of a very small number of trees to enable siting of the in-ground concrete tank.

No additional vent shaft is proposed.

3.8 ST GEORGES BASIN – SPS 12

The proposal for St Georges Basin SPS 12 is to install an in-ground concrete tank having a diameter of 10.0 m, and a depth of approximately 2.85 m, with the finished level of the tank sitting approximate to the finished ground level. The tank will be connected to the SPS via a sewer pipe of approximately 10.9 m.

The works are proposed to the east of the existing pump station. The proposal will result in the removal of some vegetation to enable the siting of the pipes and the in-ground concrete tank.

No additional vent shaft is proposed.

3.9 ST GEORGES BASIN – SPS 13

The proposal for St Georges Basin SPS 13 is to install a 1.7 m diameter storage pipe having a length of approximately 9.8 m and with two access hatches one of which will include an odour filter. The storage pipe will be placed in-ground with a soil covering of approximately 1.1 m. the storage pipe will connect to the SPS via two new sections of sewer pipe (of approximately 2 m and 3 m), along with a new 1.05 m manhole.

The works are proposed to the south east of the existing pump station and will require a small extension of the existing hard stand to the south and south east.

The proposal will result in the removal of some vegetation to enable the siting of the storage pipe.

No additional vent shaft is proposed.

3.10 SUSSEX INLET – SPS 1

The proposal for Sussex Inlet SPS 1 is to install an in-ground concrete tank having a diameter of 6.0 m, and a depth of approximately 2.38 m, with the finished level of the tank sitting approximate to the current ground level. The tank will be connected to the SPS via a sewer pipe of approximately 16.5 m and a new manhole.

The works are proposed to the south and west of the existing pump station. The proposal will result in the removal of some vegetation to enable the siting of the pipes and the in-ground concrete tank.

No additional vent shaft is proposed.

3.11 SUSSEX INLET – SPS 16

The proposal for Sussex Inlet SPS 16 is to install an in-ground concrete tank having a diameter of 4.0 m, and a depth of approximately 2.93 m, with the finished level of the tank sitting approximate to the current ground level. The tank will be connected to the SPS via a new vent pipe of 4.0 m. A new sewer pipe of approximately 6.3 m will connect the in-ground tank with an existing manhole and the existing sewer.

The works are proposed to the west of the existing pump station. The proposal will result in the removal of a small area of existing landscaping to enable the siting of the vent pipe. The proposed in-ground tank and new sewer pipe will not result in the removal of any vegetation as the land affected is already disturbed.

No additional vent shaft is proposed.

4.0 LEGISLATIVE REQUIREMENTS

This Due Diligence Assessment has been carried out under the *"Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW"*. The Code outlines the reasonable and practicable steps that need to be taken in order to:

- *identify whether or not Aboriginal objects are, or are likely to be, present in an area*
- *determine whether or not their activities are likely to harm Aboriginal objects (if present)*
- *determine whether an AHIP application is required.*

Furthermore, the Code goes on to state that:

> *If Aboriginal objects are present or likely to be present **and** an activity will harm those objects, then an AHIP application will be required.*

AHIP refers to an Aboriginal Heritage Impact Permit, essentially an approval issued by NSW Environment and Heritage, allowing a person to desecrate or harm an Aboriginal Place or Aboriginal Object.

'Harm' is defined by the Code as:

- *destroy, deface, damage an object*
- *move an object from the land on which it is situated*
- *cause or permit an object to be harmed.*

Furthermore, it is worth noting that "disturbed land or land already disturbed by previous activity" is defined by the Code as:

- *Land is disturbed if it has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable.*

  Examples include ploughing, construction of rural infrastructure (such as dams and fences), construction of roads, trails and tracks (including fire trails and tracks and walking tracks), clearing vegetation, construction of buildings and the erection of other structures, construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure) and construction of earthworks.

5.0 ASSESSMENT

5.1 CONSULTATION

Formal community consultation is not a requirement of the Code. This is in relation to the relevant local Council, state agencies, the Aboriginal community or broader public. No formal consultation has been had in regard to this Due Diligence Assessment.

5.2 AHIMS SEARCH

The NSW Office of Environment and Heritage (OEH) maintains the Aboriginal Heritage Information Management System (AHIMS), a database including the following information and details:

- *information about Aboriginal objects that have been reported to the Director General, Department of Premier and Cabinet;*
- *information about Aboriginal Places which have been declared by the Minister for the Environment to have special significance with respect to Aboriginal culture; and*
- *archaeological reports.*

AHIMS searches were completed on 26th June 2015 for Berry SPS 5, Culburra SPS 5, Culburra SPS 6, Culburra SPS 9, Culburra SPS 10 and Huskisson SPS 3, and on 10th December 2015 for St Georges Basin SPS 10, St Georges Basin SPS 12, St Georges Basin SPS 13, Sussex Inlet SP S1 and Sussex Inlet SPS 16. AHIMS searches identify existing findings within 200 m buffer of the relevant project areas. Copies of the AHIMS Search records are provided as **Appendix A**.

The AHIMS searches revealed the following (**Table 1**):

Table 1
AHIMS Findings

Site	*Identified in AHIMS Search*	*No of sites*
Berry SPS 5	Yes	1
Culburra SPS 5	No	–
Culburra SPS 6	Yes	1
Culburra SPS 9	Yes	2
Culburra SPS 10	No	–
Huskisson and Vincentia SPS 3	No	–
St Georges Basin SPS 10	No	–
St Georges Basin SPS 12	No	–
St Georges Basin SPS 13	No	–
Sussex Inlet SPS 1	Yes	4
Sussex Inlet SPS 16	No	–

5.3 SITE INSPECTION

Inspection of the various sites was undertaken on 9th June 2015 for Berry SPS 5, Culburra SPS 5, Culburra SPS 6, Culburra SPS 9, Culburra SPS 10 and Huskisson SPS 3, on 26th November 2015 for St Georges Basin SPS 10, St Georges Basin SPS 12, St Georges Basin SPS 13, and on 27th November 2015 for Sussex Inlet SPS 1 and Sussex Inlet SPS 16. Site visits were undertaken in order to assess previous disturbances and assess the potential of the project area to possess items of Aboriginal Heritage, based on the criteria outlined in the Code.

All of the areas proposed for the activities are readily visible due to the cleared nature and earlier development which has been undertaken to establish the sewer pumping stations.

The inspections concluded that the development sites do not contain any of the following significant features:

- Sand dune system;
- Ridge line, ridge top, or headland;
- Cliff face;
- Cave, rock shelter, or a cave mouth;
- Scarred trees;
- Rock grooves.

The siting of the proposed works are however within 200 m of waters having regard to all sites, with the water being either intermittent watercourses, perennial watercourses, or larger waterbodies.

Application of Due Diligence Code

The Code provides a flow chart to follow in order to outline the process in undertaking the Aboriginal Due Diligence Assessment. **Figure 18** below is this flow chart.

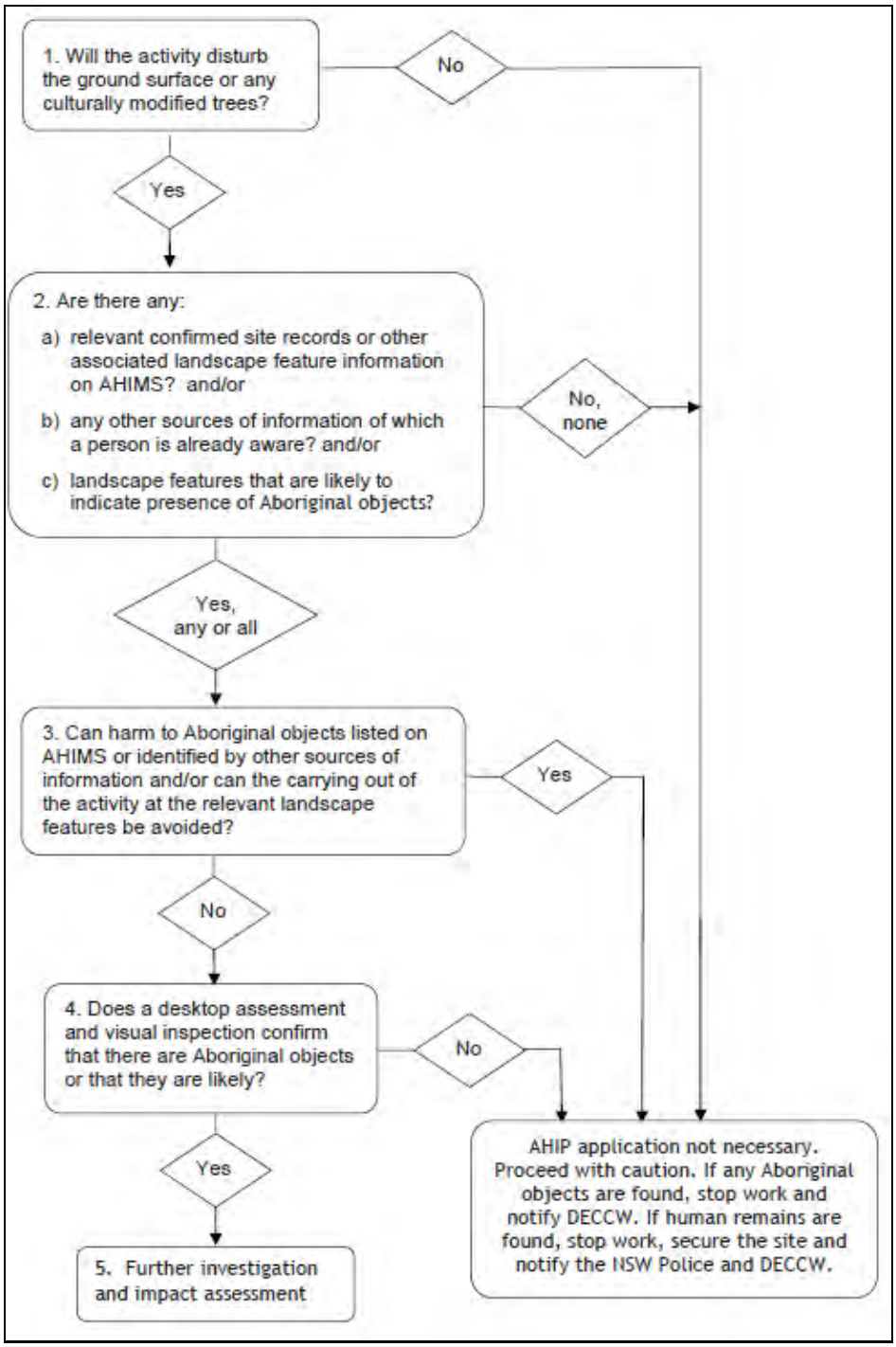


Figure 18: Due Diligence Process flow chart.

Having regard to **Step 1**, the proposed activities will in all instances result in disturbances to the ground having regard to excavation to enable the installation of storage tanks or pipes. This cannot be avoided and is a necessary outcome of the works being proposed.

Step 2 requires a search of the AHIMS database in order to determine if other sites have already been recorded in the area. As outlined above, an AHIMS database search was undertaken, and this identified sites within a 200 m buffer of some of the projects, and this is detailed in **Appendix A** and **Table 1** above. Specifically, those sites affected are restricted to the following:

- Berry SPS 5 – 1 site
- Culburra SPS 6 – 1 site
- Culburra SPS 9 – 2 sites
- Sussex Inlet SPS 1 – 4 sites

Step 2 also requires that regardless of AHIMS database records, the landscape features of the site be considered. According to the Code, Aboriginal objects are often associated with certain landscape features. Landscape features of significance identified by the Code are as follows:

- *within 200 m of waters, or*
- *located within a sand dune system, or*
- *located on a ridge top, ridge line or headland, or*
- *located within 200 m below or above a cliff face, or*
- *within 20 m of or in a cave, rock shelter, or a cave mouth;*
- *and is on land that is not disturbed land (see Definitions) then you must go to step 3.*

Having regard to the project areas and the location of the proposed works, they are all on land that is within 200 m of water. However, more relevantly, they are all on disturbed land. In this regard, the location of the works is on a range of disturbed lands containing:

- access roads; or
- well managed foreshore reserve; or
- raised mounds containing sewer pumping stations and associated infrastructure.

Having regard to all sites, given that the siting of development is entirely on “disturbed lands”, as defined by the Code, it is considered unnecessary to undertake further assessment and it is reasonable to conclude that there are no known objects, or there is a low probability of objects occurring in the area of the activity. The Code stipulates under these circumstances that a proponent can proceed with caution without applying for an AHIP.

6.0 RECOMMENDATIONS

For all sites, the above Due Diligence Assessment has indicated that in applying the DECCW *"Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales"* it is unlikely that any Aboriginal objects will be harmed as the lands are all disturbed lands for the purposes of the Code. Notwithstanding this, the following recommendation is made to ensure that the legislative requirements are fully met in undertaking further development as proposed:

- If during the course of development, any Aboriginal site or object is discovered, works to the site shall cease immediately. Following this, you must notify the OEH of the find, and in consultation with OEH, the relevant Local Aboriginal Land Council and a qualified archaeologist, a management strategy should be developed to manage the identified Aboriginal cultural material. The results shall be forwarded to OEH and application be made for an Aboriginal Heritage Impact Permit where required.

7.0 CONCLUSION

Shoalhaven City Council is considering carrying out works to provide emergency storage capacity adjacent to sewage pumping stations in order to provide emergency storage of untreated sewage. Shoalhaven Water are currently considering the provision of emergency overflow storage capacity at eleven (11) of its sewer pump stations in various locations within the townships of Berry, Culburra, Huskisson, St Georges Basin and Sussex Inlet.

The works will involve either in ground storage tanks, concrete pipes, or a combination of both. The works are proposed in the immediate vicinity of the established sewer pumping station infrastructure. The activity involves the minimal extent of clearing and disturbances necessary to enable the works to be undertaken.

This Due Diligence Assessment has been prepared in accordance with the requirements of the DECCW *"Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales"* and fulfils the proponent's due diligence obligations under this Code.

This assessment has found that the proposed works are to be undertaken on disturbed lands for all sites. As such, the Due Diligence assessment has revealed that the proposal is unlikely to harm any Aboriginal item or place due to the fact that it is sited on "disturbed land" as defined by the Code. Notwithstanding this, recommendation has been made in the unlikely event that an item is unexpectedly discovered in order that the proponent fulfils all legislative obligations and responsibilities.

STUART DIXON
TOWN PLANNER CPP MPIA

APPENDIX A

AHIMS Database Search Records

APPENDIX A

Office of Environment & Heritage

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : Berry SPS 5

Client Service ID : 179282

Stuart Dixon

PO Box 738
NOWRA New South Wales 2541

Attention: Stuart Dixon

Email: stuart@cowmanstoddart.com.au

Date: 26 June 2015

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 1, DP:DP1102281 with a Buffer of 200 meters, conducted by Stuart Dixon on 26 June 2015.

Berry SPS 5

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

1	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Office of Environment & Heritage

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : Culburra SPS 5

Client Service ID : 179557

Stuart Dixon

PO Box 738

NOWRA New South Wales 2541

Attention: Stuart Dixon

Email: stuart@cowmanstoddart.com.au

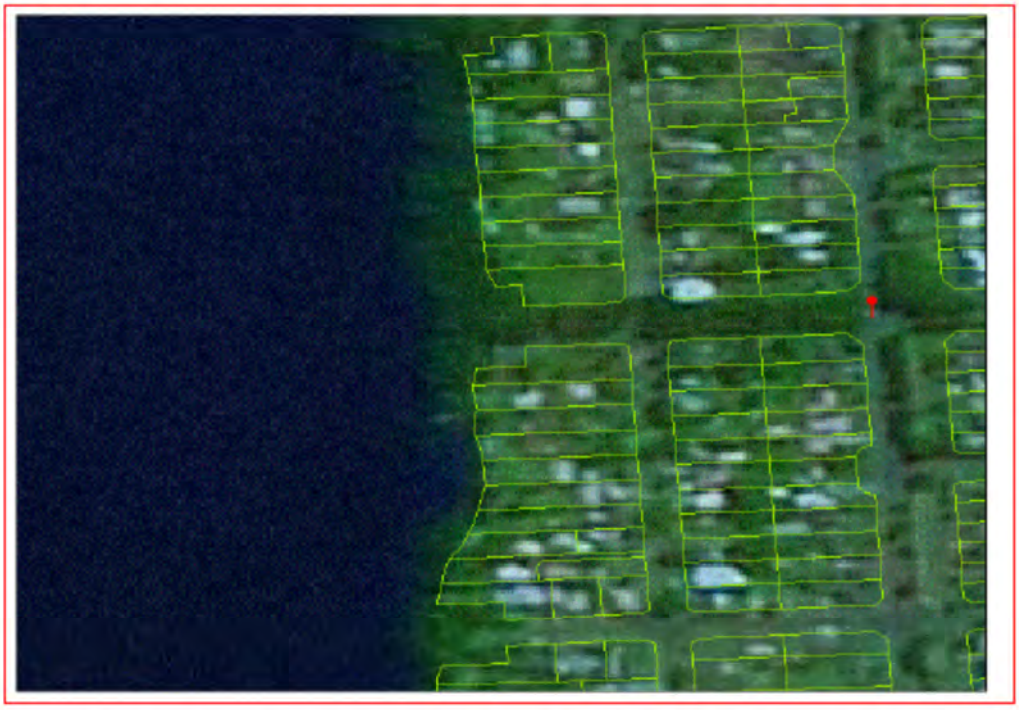
Date: 30 June 2015

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -34.9187, 150.7596 - Lat, Long To : -34.9185, 150.7599 with a Buffer of 200 meters, conducted by Stuart Dixon on 30 June 2015.

Culburra SPS 5

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
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- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Office of Environment & Heritage

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : Culburra SPS 6

Client Service ID : 179555

Stuart Dixon

Date: 30 June 2015

PO Box 738
NOWRA New South Wales 2541

Attention: Stuart Dixon

Email: stuart@cowmanstoddart.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -34.9272, 150.7597 - Lat, Long To : -34.9258, 150.7619 with a Buffer of 200 meters, conducted by Stuart Dixon on 30 June 2015.

Culburra SPS 6

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

1	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

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Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Office of Environment & Heritage

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : Culburra SPS 9

Client Service ID : 179559

Stuart Dixon

Date: 30 June 2015

PO Box 738
NOWRA New South Wales 2541

Attention: Stuart Dixon

Email: stuart@cowmanstoddart.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -34.9376, 150.7687 - Lat, Long To : -34.9374, 150.769 with a Buffer of 200 meters, conducted by Stuart Dixon on 30 June 2015.

Culburra SPS 9

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

2	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

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Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Office of Environment & Heritage

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : Culburra SPS 10

Client Service ID : 179558

Stuart Dixon

Date: 30 June 2015

PO Box 738
NOWRA New South Wales 2541

Attention: Stuart Dixon

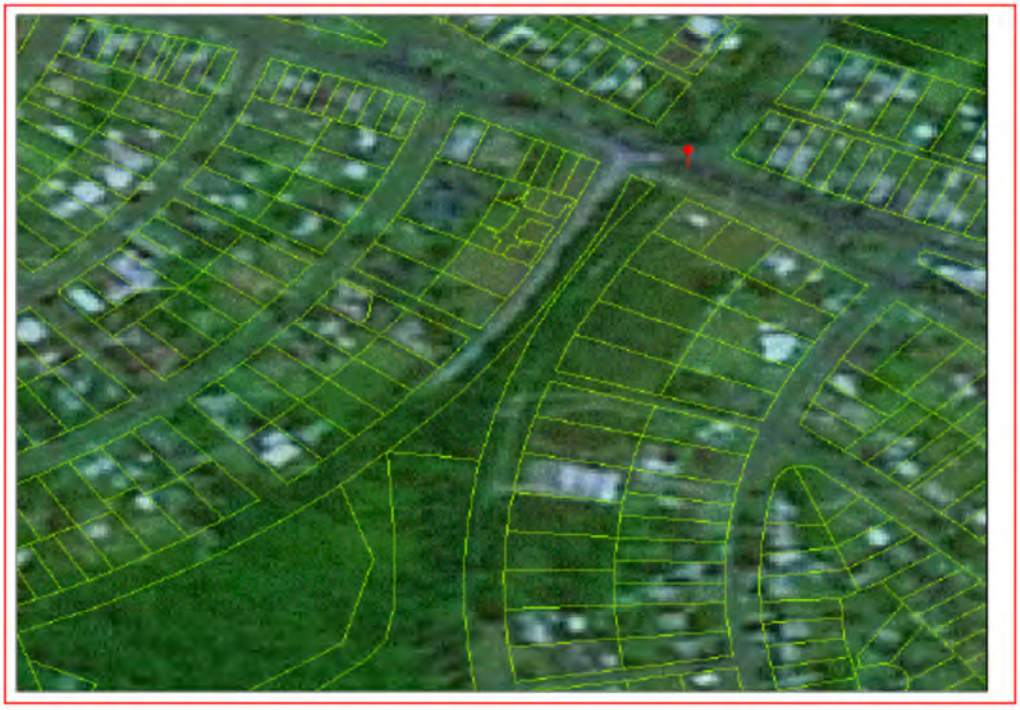
Email: stuart@cowmanstoddart.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -34.9332, 150.7677 - Lat, Long To : -34.9328, 150.7683 with a Buffer of 200 meters, conducted by Stuart Dixon on 30 June 2015.

Culburra SPS 10

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
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Important information about your AHIMS search

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Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Office of Environment & Heritage

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : HUskisson SPS 3

Client Service ID : 179566

Stuart Dixon

PO Box 738
NOWRA New South Wales 2541

Attention: Stuart Dixon

Email: stuart@cowmanstoddart.com.au

Date: 30 June 2015

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -35.0409, 150.6677 - Lat, Long To : -35.0406, 150.6682 with a Buffer of 200 meters, conducted by Stuart Dixon on 30 June 2015.

Huskisson Vincentia SPS 3

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

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- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

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Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Office of Environment & Heritage

NSW GOVERNMENT

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : SGB SPS10

Client Service ID : 203408

Cowman Stoddart Pty Ltd

Date: 10 December 2015

PO Box 738
Nowra New South Wales 2541

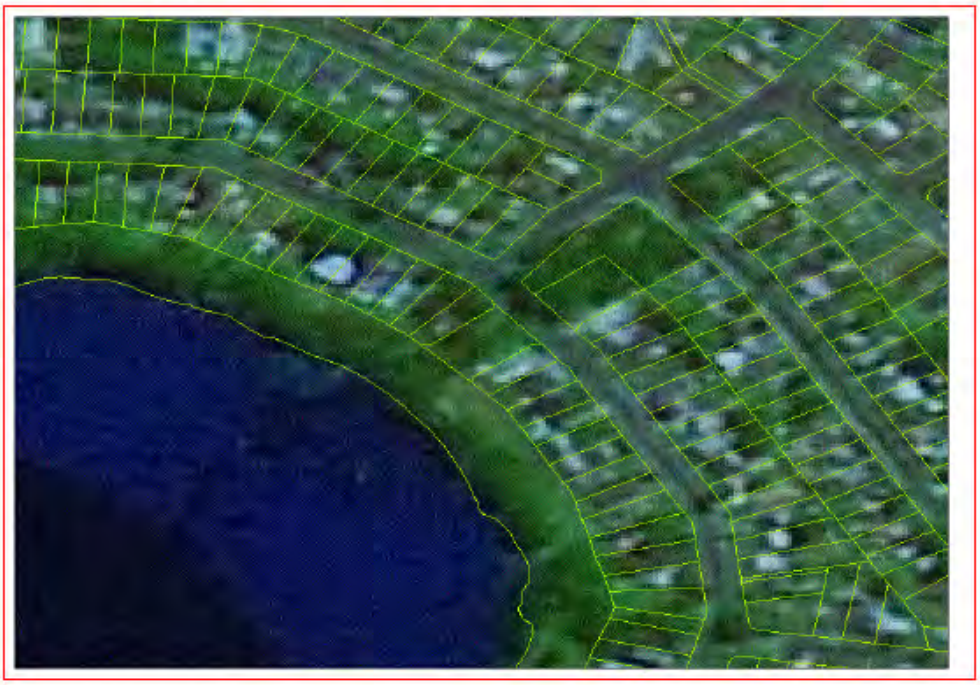
Attention: Angela Jones

Email: angela@cowmanstoddart.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 116, DP:DP25863 with a Buffer of 200 meters, conducted by Angela Jones on 10 December 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
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- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
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- This search can form part of your due diligence and remains valid for 12 months.

Office of Environment & Heritage

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : SGB SPS12

Client Service ID : 203411

Cowman Stoddart Pty Ltd

Date: 10 December 2015

PO Box 738
Nowra New South Wales 2541

Attention: Angela Jones

Email: angela@cowmanstoddart.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 567, DP:DP27855 with a Buffer of 200 meters, conducted by Angela Jones on 10 December 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

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- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
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Office of Environment & Heritage

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : SGB SPS13

Client Service ID : 203412

Cowman Stoddart Pty Ltd

Date: 10 December 2015

PO Box 738
Nowra New South Wales 2541

Attention: Angela Jones

Email: angela@cowmanstoddart.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 2, DP:DP882745 with a Buffer of 200 meters, conducted by Angela Jones on 10 December 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

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Office of Environment & Heritage

NSW GOVERNMENT

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : SI SPS1

Client Service ID : 203414

Cowman Stoddart Pty Ltd

Date: 10 December 2015

PO Box 738
Nowra New South Wales 2541

Attention: Angela Jones

Email: angela@cowmanstoddart.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 116, DP:DP30234 with a Buffer of 200 meters, conducted by Angela Jones on 10 December 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

4	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
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Office of Environment & Heritage

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : SI SPS16 Lot and DP

Client Service ID : 203419

Cowman Stoddart Pty Ltd

Date: 10 December 2015

PO Box 738
Nowra New South Wales 2541

Attention: Angela Jones

Email: angela@cowmanstoddart.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 170, DP:DP234797 with a Buffer of 200 meters, conducted by Angela Jones on 10 December 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

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ANNEXURE 4

ANNEXURE 4

Threatened Species Assessment

prepared by

Gaia Research Pty Ltd

Assessment of the impacts of the proposed removal of trees at St Georges Basin on threatened species of animal

Gaia Research Pty Ltd

December 2015

Requests for information or comments regarding this report are best directed to:

Garry Daly
Gaia Research Pty Ltd
P.O. Box 3109
North Nowra NSW 2541
Phone: 02 4446 0384

This report should be cited as:

Gaia Research Pty Ltd 2015. Assessment of the impacts of the proposed removal of trees at St Georges Basin. Report prepared for Cowman Stoddart Pty Ltd.

This report was prepared on behalf of Cowman Stoddart Pty Ltd by G. Daly. The work was carried out under NPWS Scientific Licence S10470 and Animal Ethics Committee approval 05/2371.

The content and recommendations in this report are the authors and do not necessarily reflect the views of the proponent.

Cover image: Courtesy Mr A. Stevenson.

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EXECUTIVE SUMMARY

A survey was conducted on the corner of Anson St and Loralyn Dr, Saint Georges Basin (the "Subject site") in regard to a proposal to remove two Spotted Gums *Corymbia maculata* in association with an upgrade of Shoalhaven Water's sewerage pumping facility (SGB SPS 10). The survey assessed the trees in regard to their potential use by species listed under the *Threatened Species Conservation Act 1995* (*TSC Act*) and the *Environmental Planning & Assessment Act 1979* (*EP&A Act*). Application of the *EPA Act* as amended by the *TSC Act (1995)* indicates that the action will not have a significant impact on this threatened species as the area of habitat (in this situation two trees) proposed to be removed is small in comparison with the home range of the threatened species (Grey-headed Flying Fox and Little Lorikeet) that may utilise the resource. However, the loss is part of the incremental reduction of forest in the St Georges Basin area.

There is little opportunity to reduce the level/extent of impact for this proposal. However, the consultant recommendations at least 4 parrot nest boxes be installed as an offset to the loss of future nesting sites.

DEFINITION OF TERMS

Within this report the following terms are defined.

- ***Direct impacts*** are those that directly affect habitat and individuals, usually within the footprint of the proposal. They include, but are not limited to, clearing and habitat removal.
- ***Exotic Species*** means species introduced from outside the area, that is from overseas or interstate.
- ***Harm*** It is an offence to harm any animal that is a threatened species, or which is part of an endangered population or an endangered ecological community (NPW Act, s 118A(1)).
- ***Indirect Impacts*** occur when project-related actions affect species, populations or ecological communities in a manner other than direct loss, usually beyond the footprint of the proposal. Indirect impacts can include loss of individuals through predation by domestic and/or feral animals, deleterious hydrological changes (including increased runoff and raising or lowering of the water table), erosion, weed invasion, pollution, trampling or other impacts due to increased human activity within or directly adjacent to sensitive habitat areas, altered fire regimes, habitat fragmentation and disruption of wildlife movement corridors.
- ***Landholder*** means Shoalhaven Water or any subsequent owners if the title of any portion of land is sold or transferred.
- ***Life Cycle*** is the series or stages of reproduction, growth, development, aging and death of an organism.

- ***Local Population*** s the population that occurs in the study area. The assessment of the local population may be extended to include individuals beyond the study area if it can be clearly demonstrated that contiguous or interconnecting parts of the population continue beyond the study area, according to the following definitions.
- ***Locality*** is the area within a 5km radius of the subject site.
- ***Native Vegetation*** means indigenous vegetation as per the *Native Vegetation Act 2003.* This includes indigenous trees, shrubs, groundcover plants and aquatic plants.
- ***OEH*** means Office of Environment and Heritage former Department of Environment, Climate Change and Water.
- ***Proposal*** is the development, activity or action proposed
- ***Risk of Extinction*** is the likelihood that the local population of the species or local occurrence of the endangered population or ecological community will become extinct either in the short, medium or long-term as a result of direct or indirect impacts on the viability of that population and includes changes to the ecological function of communities.
- ***Subject Area*** means the Subject Site and any additional area, which may be affected by the proposal.
- ***Subject Site*** means the area directly affected by the proposal.
- ***Subject Species, Populations or Ecological Communities*** means those threatened species, populations or ecological communities that are known or considered likely to occur in the study area.
- ***Viable*** means the capacity to successfully complete each stage of the life cycle under normal conditions.

1 INTRODUCTION

This report was commissioned by Cowman Stoddart Pty Ltd to assess the impact of a proposal to remove two Spotted Gums *Corymbia maculata* on threatened species of fauna. The proposal is in association with an upgrade of Shoalhaven Water's sewerage pumping facility (**Figures 1** - **2 –** herein called the Subject site). The site SGB SPS 10, is located at the intersection of Anson St and Loralyn Av, St Georges Basin. The lot is partially vegetated and there is existing vehicular access to the pumping station (report cover image).

1.1 Project objectives

The objectives of the study were to:

- assess the Subject site for threatened species as listed under State and Commonwealth legislation;
- assess the local and regional significance of select threatened species that were either detected on or adjacent to the site or may utilise the site based on known habitat preference;
- identify habitat of conservation significance;
- apply the seven part test in Section 5A of the EP&A Act, as amended by the *Threatened Species Conservation* (TSC) *Act* (1995) to determine whether there is likely to be a significant impact on threatened species or their habitat and endangered ecological communities;
- apply Part 9 of the Commonwealth *Environment Protection and Biodiversity Conservation* (EPBC) *Act* (1999) to determine whether there is likely to be a significant impact on a matter of national significance;
- identify opportunities to avoid, minimise or mitigate impacts and

1.2 Location and description of subject area

Study site
The Subject site (Huskisson 1: 25,000 topographic map GDA 282384 6113284, altitude 3m AHD) is located in the Sydney basin, approximately 26 kilometres south-east of Nowra (**Figure 1**). The site has thin, poorly drained clayey soils derived from Wandrawandian Siltstone and is adjacent to St Georges Basin.

Indigenous vegetation
The descriptions of the vegetation communities are taken from the Office of Environment and Heritage (2013). The original native vegetation has been disturbed as a result of urban development and associated infrastructure. The vegetation communities on the Subject site include regrowth Spotted Gum - Blackbutt shrubby open forest on the coastal foothills (SR641) and Swamp Oak forest (SR650). The Swamp Oak forest shall not be impacted by the proposal.

1.3 Previous Assessments Conducted in the Subject Area

Gaia Research (2002) conducted surveys on LOT 24, DP 803826 and detected Yellow-bellied Gliders (incised trees) and Glossy Black Cockatoo. This survey led Shoalhaven City Council and NPWS (2004) funding a study on the distribution and abundance of the Yellow-bellied Glider in the Subject area. The concept was for council to develop a conservation policy for the glider akin to that developed for the Broulee area in the Eurobodalla Shire (2002). This study has never been finalised and since that period much of the habitat of this threatened species has been removed for urban development.

1.4 Threatened Fauna and flora in the Locality

Records from the Office of Environment and Heritage's (OEH) Atlas of NSW Wildlife and the author's own databases were referenced for threatened species in the area. These databases were used to produce a list of Threatened Species (populations and communities) known to occur within ten kilometres of the subject site.

The Atlas includes species, populations and communities listed under the *TSC* (1995) and the *EPBC Act* (1999). The threatened species known to occur within 10km of the site are given in **Table 1**. This includes:

- Vulnerable
- Endangered
- Critically Endangered (E1) and
- Endangered Ecological Community (EEC)

Table 1
Threatened species Recorded within 10kms of Subject Site

Species Common Name/EEC	Species Scientific Name	TSC Schedule	EPBC Act
Koala	*Phascolarctos cinereus*	V	V
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E
White-footed Dunnart	*Sminthopsis leucopus*	V	
Eastern Pygmy Possum	*Cercartetus nanus*	V	
Yellow-bellied Glider	*Petaurus australis*	V	
Long-nosed Potoroo	*Potorous tridactylus*	V	
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	
Eastern Free-tail Bat	*Mormopterus norfolkensis*	V	
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	
Eastern Bent-wing Bat	*Miniopterus schreibersii oceanensis*	V	
Large-footed Myotis	*Myotis macropus*	V	
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	
Black Bittern	*Ixobrychus flavicollis*	V	
Square-tailed Kite	*Lophoictinia isura*	V	
Sooty Oystercatcher	*Haematopus fuliginosus*	V	
Pied Oystercatcher	*Haematopus longirostris*	V	
Glossy Black Cockatoo	*Calyptorhynchus lathami*	V	
Gang-gang Cockatoo	*Callocephalon fimbriatum*	V	

Little Lorikeet	*Glossopsitta pusilla*	V	
Turquoise Parrot	*Neophema pulchella*	V	
Eastern Ground Parrot	*Pezoporus wallicus wallicus*	V	
Powerful Owl	*Ninox strenua*	V	
Masked Owl	*Tyto novaehollandiae*	V	
Sooty Owl	*Tyto tenebricosa*	V	
Eastern Bristlebird	*Dasyornis brachypterus*	E1	E
Varied Sitella	*Daphoenositta chrysoptera*	V	
Green and Golden Bell Frog	*Litoria aurea*	E1	E
Giant Burrowing Frog	*Heleioporus australiacus*	V	V
Biconvex Melaleuca	*Melaleuca biconvexa*	V	
Magenta Lillypilly	*Syzygium paniculatum*	E1	
Narrow-leaved Wilsonia	*Wilsonia backhousei*	V	
Pretty Beard Orchid	*Calochilus pulchellus*	E1	
Leafless Tongue Orchid	*Cryptostylis hunteriana*	V	V
Jervis Bay Leek Orchid	*Prasophyllum affine*	E1	E
Underground Orchid	*Rhizanthella slateri*	V	
	Pterostylis ventricose	E4	
Swamp-oak Forest		EEC	
Bangalay Forest on Coastal Sands		EEC	
Swamp Mahogany Forest		EEC	

Figure 1
Approximate location of subject site (red circle)

Note: each square represents one kilometre

2 METHODS

The methods used during the preparation of this report do not adhere to those defined under the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working draft*), prepared by the Department of Environment and Conservation (2004) and the *Draft Guidelines for Threatened Species Assessment* prepared by the (then) Department of Environment and Conservation and Department of Primary Industries (2005) as the level of disturbance is relatively small being confined to two trees. The visual assessment focussed on whether the two trees possessed hollows and if those hollows were adequate as habitat for threatened species of fauna.

3 RESULTS

The two trees did not possess hollows. Two species of animal, the Grey-headed Flying Fox and Little Lorikeet, currently listed as threatened under the *Threatened Species Conservation Act 1995* may forage on the trees.

4 ASSESSMENT OF IMPACTS

4.1 Detailed Impact Assessment

Section 5A of the *EP & A Act*, as amended by the *TSC Act*, sets out the factors to be considered in deciding whether there is likely to be a significant effect on threatened species, populations or communities and or their habitat as a result of a proposed activity.

A search of the consultant's database and OEH records revealed a number of threatened species within a ten-kilometre radius of the Subject site. On the basis of habitat preference of the threatened species in the locality and field inspections the impacts from this proposal may impact on the Grey-headed Flying Fox and Little Lorikeet.

The factors of assessment:

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

This factor relates to those species listed on Part 1 and Part 4 of Schedule 1 and Part 1 of Schedule 1A and Part 1 of Schedule 2 of the *TSC Act*, and Part 1 and Part 4 of Schedule 4 of the *Fisheries Management (FM) Act 1994*. The Grey-headed Flying Fox and Little Lorikeet are the species assessed in this report.

Grey-headed Flying Fox

Distribution

The Grey-headed Flying-fox occupies the coastal lowlands and slopes of southeastern Australia from Bundaberg to Geelong and are usually found at altitudes < 200 m (DECCW 2009). Areas of repeated occupation extend inland to the tablelands and western slopes in northern New South Wales and the tablelands in southern Queensland. Sightings in inland areas of southern New South Wales and Victoria are uncommon. There are rare records of

individuals or small groups west to Adelaide, north to Gladstone and south to Flinders Island. In the Illawarra there is a camp at Figtree. This camp is located adjacent to the Princes Highway and has been established in the last decade.

Ecology

Grey-headed Flying-foxes feed primarily on blossom and fruit in canopy vegetation and supplement this diet with leaves (Ratcliffe 1931, Parry-Jones and Augee 1991, Eby 1995, 1998, Tidemann 1999, Hall and Richards 2000). The majority of animals feed on nectar and pollen from eucalypts (genera *Eucalyptus, Corymbia* and *Angophora*), melaleucas and banksias. Grey-headed Flying-foxes forage over extensive areas. One-way commutes of approximately 50 km have been recorded between camps and foraging areas (Eby 1991), although commuting distances are more often < 20 km (Tidemann 1999).

Grey-headed Flying-foxes form camps where adults hang during the day. South of Sydney these camps are mostly seasonal and the bats depart during the cooler months of the year. During the summer breeding season young GHFF are left at the camp while the mothers forage at night. Disturbance of camps during this period can lead to young being abandoned or distressed so that they fall from their roost tree. Once on the ground the young are abandoned.

Threats

The main threats to Grey-headed Flying-fox are the loss of foraging and roosting habitat as a result of clearing for agriculture, urban development and forestry. The bats have been displaced from the Royal Botanic Gardens as destroyed heritage trees. During the summer breeding season young Grey-headed Flying-fox are left at the camp while the mothers forage at night. Disturbance of camps during this period can lead to young being abandoned or distressed so that they fall from their roost tree. Once on the ground the young are abandoned.

The Grey-headed Flying-fox is also threatened from competition from the Black Flying Fox *Pteropus alecto.* The Black Flying Fox has recently expanded its range and now occurs in the Sydney Basin. The two species can share their roost sites with Grey-headed Flying-fox and Little Red Flying Foxes *Pteropus scapulatus.*

A more recent threat is death from extreme temperatures, so called anthropogenic climate induced mass mortality (particularly baby Grey-headed Flying-fox). In January 2013, fifteen thousand Grey-headed Flying-fox died in Sydney and the south coast of NSW with 5000 of these from Bomaderry Creek, Nowra (Daily Telegraph 23 January 2013). Biologists estimate 45,000 flying foxes (Grey-headed and Black Flying Foxes) died in southern Queensland in February 2014 (ABC Radio National PM 26 February 2014). If these losses continue they represent the most severe impact on this species.

Response

The loss of two Spotted Gum will not have a significant impact on the Grey-headed Flying-foxes as the area of foraging habitat removed is small in comparison to that in the area.

Little Lorikeet

Distribution

The Little Lorikeet is endemic to Australia. It is found from near Cooktown south to the South Australian – Victorian boarder (Higgins 1999, Barrett *et al.* 2003). In New South Wales Little Lorikeets are distributed in eucalypt forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri (Barrett *et al.* 2003). In NSW the main areas of observations are from the northern rivers, north-west slopes and the south coast (Higgins 1999).

Life History

There is no evidence of regular migration, but Little Lorikeets are generally considered to be nomadic (Higgins 1999), with irregular large or small influxes of individuals occurring at any time of year, apparently related to food availability. However, long term investigation of the breeding population on the north-western slopes indicates, that breeding birds are resident from April to December, and even during their non-resident period, they may return to the nest area for short periods if there is some tree-flowering in the vicinity (Courtney & Debus 2006). In the Shoalhaven the species is regularly detected during late summer when Scribbly Gum flower, although they have been observed feeding on blossom of other species such as Grey Gum and Blackbutt during spring and summer (G. Daly pers. obs.). In the current assessment birds were seen on several occasions foraging in the flowing Blackbutts, especially the large tree to the south of the Subject site.

The breeding biology of Little Lorikeets is little known, except for long-term observations (43 years) on the north-western slopes by Courtney and Debus (2006). This work, consistent with anecdotal records from around the country, indicates that nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts (Scientific Committee determination 2009). Nest-hollows are used 'traditionally', with the same hollow known to be occupied for at least 29 years (not necessarily by the same individuals) (Courtney & Debus 2006). The breeding season extends from May to September (Higgins 1999) and as long as eucalypt nectar and pollen are available throughout this period, two broods of fledglings can be raised in a season. Clutches are of three to five eggs (Higgins 1999) and broods of three and four young have been recorded, with a single fledgling recorded from one nest (in Scientific Committee determination 2009) and this suggests a minimum age for maturation in the wild also of one year. A life span of 10 years in the wild is a reasonable estimate for a parrot of this size (W. Boles, pers. comm. 2008 in Scientific Committee determination 2009). An approximation of generation time based on the age of maturity plus half of the length of the reproductive period of the life cycle (IUCN 2006) produces an estimate of generation time of approximately five years.

Numbers of Little Lorikeets appear to have declined on the south-west slopes, south coast (R. Allen unpubl. data, cited in Courtney & Debus 2006), and on the north-west slopes of NSW (Courtney & Debus 2006). During the mid 1980's and early 1990's they were a common species in the Budgong area but have since declined though they are regularly detected in flowering Swamp Mahogany, Blackbutt and Scribbly Gum (G. Daly pers. obs.). From these data it appears that there has been at least a moderate reduction in population size over the past 15 years or three generation lengths, a time frame appropriate to the life cycle of the species (Scientific Committee determination 2007 and 2009).

Threats

The major threats to Little Lorikeets are loss of breeding sites and food resources from ongoing land clearing. Most breeding records come from the western slopes, where there has been extensive loss of the woodland habitat of the species due to historic land clearing. Loss of nest trees from road-side verges, often associated with road works, remains an ongoing threat. Of 50 nest hollows studied by Courtney and Debus (2006), 40% were lost during the 43-year study. Many of these losses were anthropogenic, with five nest trees destroyed by bulldozers, three nest trees burnt and two nest hollows taken over by feral honeybees. New nest hollows are not being recruited at a rate that compensates this loss, because overgrazing by livestock prevents the establishment of eucalypt seedlings and smooth-barked eucalypts are not favoured species in farm revegetation works (Courtney and Debus 2006). Extensive loss of eucalypt woodlands will also have resulted in a large reduction in food availability for this species.

Response

The two trees that may be removed may provide foraging habitat for the Little Lorikeet.

Summary

The loss of two non-hollow bearing trees will not have a significant impact on hollow roosting threatened species. The loss of foraging habitat for the Grey-headed Fling Fox and Little Lorikeet will not have a significant impact on the local (NSW) populations.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No local populations are listed as endangered.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii) is likely to substantially and adversely modify the composition of the ecological community such that its occurrence is likely to be placed at risk of extinction,

No endangered populations listed in Part 2 of Schedule 1 of the TSC Act or Part 2 of Schedule 4 of the FM Act, will be affected by the proposal.

(d) in relation to the habitat of a threatened species, population or ecological community:

i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i) The proposal will remove two non hollow-bearing trees.

ii) The habitat is already fragmented by urban development.

iii) The habitat to be removed will not be of critical importance to the survival of the Grey-headed Flying Fox and Little Lorikeet in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly);

The OEH website was searched for critical habitat listed in the Register of Critical Habitat kept by the Director General. Currently (website last updated 12 March 2015) critical habitat has been declared for Little Penguin population at Sydney's North Harbour, Mitchell's rainforest snail in Scotts Island Nature Reserve, Wollemi Pine and Gould's Petrel. There are two recommendations for critical habitat one for the Eastern suburbs Banksia scrub endangered ecological community and the Bomaderry Zieria within the Bomaderry Creek bushland.

The proposal shall not have an adverse effect on critical habitat.

(f) **whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

There is a National Recovery Plan for Grey-headed Flying Fox (2009).

(g) whether the action proposed constitutes or is of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The clearing of native vegetation and loss of hollow-bearing trees are listed as a key threatening process under Schedule 3 of the TSC Act. Clearing of vegetation along with the removal of dead wood would result in removal of habitat for native animals.

Summary of application of the TSC Act

The proposal will remove two healthy Spotted Gums, which constitutes a food resource for the Grey-headed Flying Fox and Little Lorikeet. The action is not considered to put the local population of Grey-headed Flying Fox, at risk of extinction.

4.2 EPBC Act (1999)

Under Part 9 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), any action that has, or is likely to have, a significant impact on a matter of National Environmental Significance (NES), is subject to a referral and assessment process and may progress only with the approval of the Commonwealth Minister for Environment. An action is defined as a project, development, undertaking, activity (or series of activities), or alterations to any of these. The *EPBC Act* currently identifies eight matters of national environmental significance.

- World Heritage properties.
- National Heritage places.
- Ramsar wetlands of international importance.
- Listed threatened species and ecological communities.
- Listed migratory species.
- Commonwealth marine areas.
- Great Barrier Reef Marine Park.
- Nuclear actions.

The Grey-headed Flying Fox, is a listed threatened species. By applying the Commonwealth's criteria for significance the proposed development does not need to be referred to the Commonwealth Minister for the Environment.

5 DISCUSSION

The subject site has been subject to previous disturbance and is now a remnant within an urban landscape. None of the subject trees support hollows and based on diameter at breast height would be approximately 100 years old.

Two vulnerable species the Grey-headed Flying Fox and Little Lorikeet have been detected in the area and are expected to forage on the Spotted Gums when they are in flower. It is necessary to try and avoid, minimise and mitigate impacts from this proposed development. However, avoiding impacts are not possible as the trees shall be removed.

6 CONCLUSIONS

The proposal will require the removal of two non hollow-bearing Spotted Gums. Applying Section 5A of the EP&A Act concludes that the proposal will not have a significant impact on the Grey-headed Flying Fox or Little Lorikeet. By applying the Commonwealth's criteria for significance the proposed development may be referred to the Commonwealth Minister for the Environment.

7 RECOMMENDATIONS

There is little opportunity to reduce the level/extent of impact for this proposal. However, the consultant recommendations at least 4 parrot nest boxes be installed as an offset within the Subject site.

Acknowledgement

We thank Shoalhaven Water and Cowman Stoddart Pty Ltd for the use of **Figure 2.**

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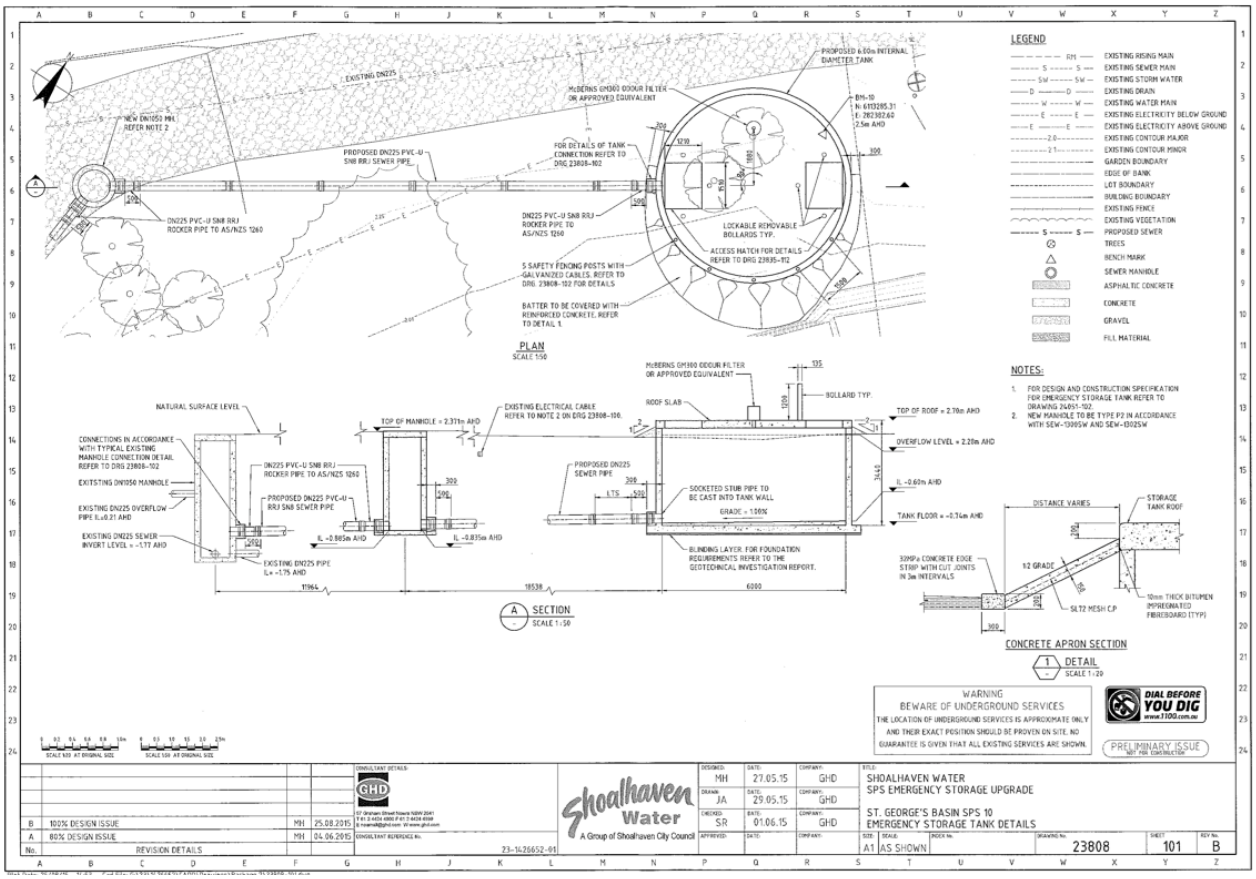

Figure 2
Approximate location of affected trees and proposed actions