ANNEXURE 9

Geotechnical and Preliminary Environmental Report

prepared by

Coffey Geotechnics

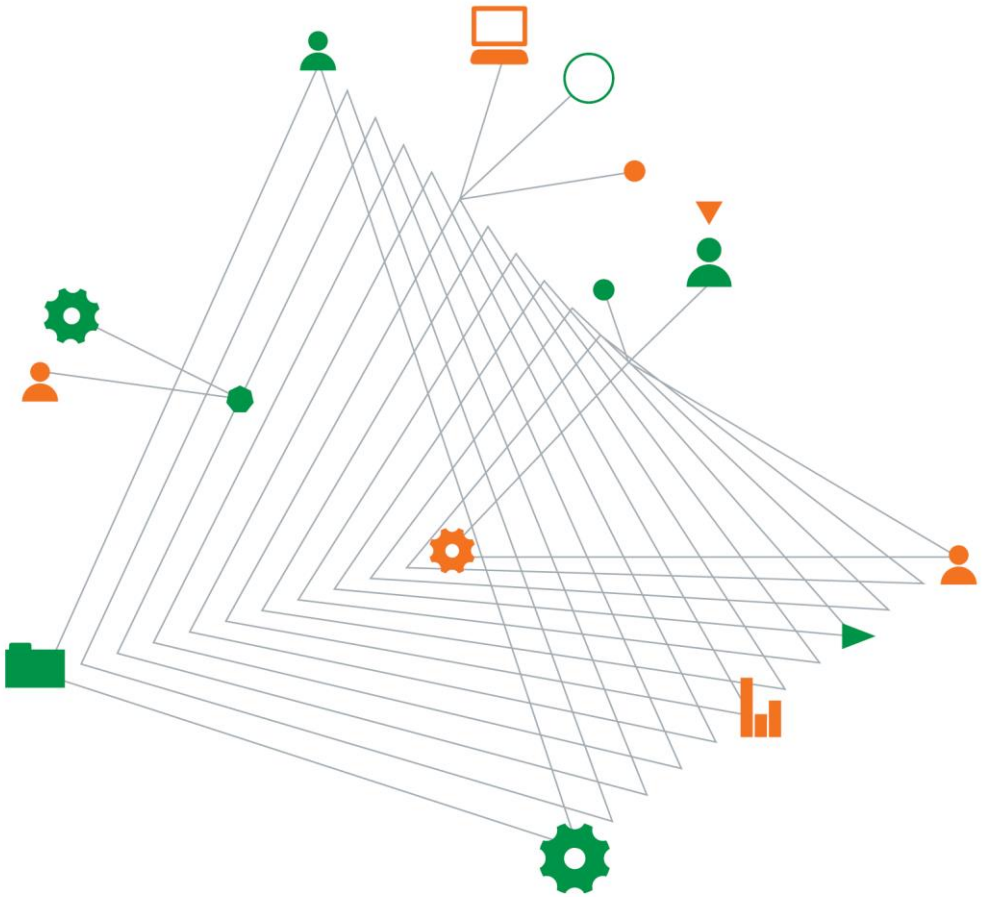
ANNEXURE 9

Manildra Group

Phase 1 Contamination Assessment, Acid Sulfate Soils Investigation, and Riverbank Stability Assessment

Proposed Beverage Grade Ethanol Plant, Main Manildra Plant, Bolong Road, Bomaderry

7 November 2016



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Phase 1 Contamination Assessment, Acid Sulfate Soils Investigation, and Riverbank Stability Assessment

Prepared for
Manildra Group

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Executive summary

Manildra Group Pty Ltd (Manildra) intend to undertake modifications to the existing Ethanol Distillery Plant at their Bomaderry plant to increase the production of 'beverage' grade ethanol, and to modify the type and location of the Water Balance Syrup Recovery Evaporator. Cowman Stoddart is acting on behalf of Manildra in submitting the modification request of an existing Development Application to the NSW Department of Planning and Environment (DPE).

As part of this planning submission, a Phase 1 contamination assessment and Acid Sulfate Soils assessment will need to be submitted as supporting documentation to fulfil DPE's requirements for the environmental assessment for this modification proposal. In addition, Manildra require geotechnical advice in relation to the proximity of the various structures proposed to the northern bank of the Shoalhaven River and potential effects of the proposed structures on the stability of the river bank. This report presents the results of the above assessment which was carried out in the proposed development areas.

The scope of work developed to meet these objectives included review of site history information (including review of intrusive investigations previously undertaken across the proposed development areas), and making additional site observations.

Site history information indicated that local area was generally used as rural grazing land until the mid-20th century. The Manildra Main Factory plant operated as a Horlicks Malt factory from the 1960's to 1970's, after which is was acquired by Manildra. Several buildings were present to the east of the Main Manildra Factory and may have included some farmhouse buildings and structures. To the east, the site operated as a Dairy Farmers factory until 2013. Treatment water ponds were installed between 1984 and 1993 as part of the Dairy Farmers treatment works. A BOC gas plant was constructed adjacent the proposed car park area between 1994 and 2004.

The assessment identified the following potential contamination issues arising from historical and current activities undertaken at the site, in context to the proposed industrial development:

- Localised petroleum hydrocarbon contamination adjacent the railway line to the south of the proposed ISO container storage area and railway siding.
- Bonded Asbestos Containing Material (ACM) was noted in former topsoil beneath fill in the proposed cooling tower, evaporator and ISO container storage area, and bonded ACM was noted on the ground surface in the southern area of the former Dairy Farmers property, near the proposed railway siding.
- Elevated zinc, anthracene and phosphorous concentrations within water situated in former treatment ponds.

To address the potentially unacceptable contamination issues in the remaining areas, Coffey recommends that the following additional assessment, management and remedial measures are implemented:

- Implementation of an management plan to manage risks to known asbestos impacts;
- The residual water within the treatment ponds will need adequate management prior to redevelopment. Manildra may want to further explore the applicability of irrigating this water on their adjacent environmental farm as long it meets their existing license conditions and they are allowed to transport it across.
- With respect to asbestos contamination in soil could be remediated through excavation and offsite disposal. The handling of asbestos impacted soil requires the preparation of an asbestos removal plan and licensed contractor. Following completion of removal activities, a clearance certificate would be issued by a suitably qualified asbestos consultant. Such work should be carried out by appropriately qualified and licensed contractors in accordance with all relevant codes of practice and standards such as the *National Occupational Health and Safety Commission (2005): Code of Practice for the Safe Removal of Asbestos (2nd Ed)[NOHSC:2002(2005).*

Alternatively, the asbestos impacts could be managed on site through onsite capping and containment. This could involve capping with a layer of 'clean' fill (with the inclusion of a warning layer) or capping with a pavement. This option may have practical implications as it would require increasing site levels and may not be costs effective. On site management would also require preparation of a site management plan that would need to be followed during and post construction for the life of the site, notation of the contamination such as on the planning certificate under Section 149 of the Environmental Planning and Assessment Act (1979) and/or Section 88B of the Conveyancing Act 1919 and the local Council would need to be consulted to see if they would accept such an option.

In the interim, the potential risks to site workers due to asbestos impact (both above and below ground) should be incorporated in existing management plans (alternatively a management plan should be developed). The management plan should outline how these asbestos impacts can be managed so the risk to site workers is reduced to an acceptable level.

- The ground surface in the south of Lot 143 area should be inspected by a competent person for the presence of ACM materials. If present, these materials should be removed in accordance with relevant NSW legislation.
- As direct assessment of all areas was not possible during this work, we recommend that observations be made during the demolition of the any existing plant for evidence of contamination. For example during removal of the diesel Above Ground Storage Tank (AST) near the proposed ethanol plant area

Based on a review of the previous information, we have assessed that there is a low likelihood of a potentially unacceptable risk to future site users (maintenance and construction workers) due to contamination in the remaining areas of the site assessed as part of this report. Therefore we consider that these areas are suitable for the proposed land use. The issues in the remaining areas could be managed during construction works to render these areas suitable for the proposed use, assuming the recommendations above are successfully implemented.

Based on our previous investigations along the river bank and many sites with the Manildra Plant, the proposed new structures are relatively remote from the northern bank of the Shoalhaven River, and all heavily loaded structures will be founded on piles extending to rock. Therefore the proposed structures and storage areas should not affect the stability of the river banks.

Acid sulfate soils are likely to be encountered at depths greater than 3m in the proposed development areas and potentially at depths greater than 2m in the vicinity of the proposed car park, and will require management if disturbed during development.

We draw your attention to the attached sheets entitled "Important Information about your Coffey Environmental Report" and to the statement of limitations in Section 8 in this report.

Abbreviations

ACM	Asbestos Containing Material
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ASS	Acid Sulfate Soils
ASSMP	Acid Sulfate Soils Management Plan
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
COPC	Chemical of Potential Concern
DA	Development Application
ESWMS	Environmental and Work Safe Method Statements
LOR	Limit of Reporting
µg/L	micrograms per litre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
NATA	National Association of Testing Authorities
NEPM	National Environment Protection (Assessment of Site Contamination) Measure
NSW DEC	Department of Environment and Conservation of New South Wales
NSW EPA	Environmental Protection Authority of New South Wales
NSW OEH	Office of Environment and Heritage of New South Wales
NOHSC	National Occupational Health and Safety Commission
OCP	Organochlorine pesticides
OPP	Organophoshorous pesticides
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated Biphenyls
PPE	Personal Protective Equipment
TP	Test Pit
TRH	Total Recoverable Hydrocarbons

1. Introduction

1.1. General

Manildra Group Pty Ltd (Manildra) intend to undertake modifications to the existing Ethanol Distillery Plant at their Bomaderry plant to increase the production of 'beverage' grade ethanol, and to modify the type and location of the Water Balance Syrup Recovery Evaporator. Cowman Stoddart is acting on behalf of Manildra in submitting the modification request of an existing Development Application to the NSW Department of Planning and Environment (DPE).

As part of this planning submission, a Phase 1 contamination assessment and Acid Sulfate Soils assessment will need to be submitted as supporting documentation to fulfil DPE's requirements for the environmental assessment for this modification proposal. In addition, Manildra require geotechnical advice in relation to the proximity of the various structures proposed to the northern bank of the Shoalhaven River and potential effects of the proposed structures on the stability of the river bank.

This report presents the results of the above assessment which was carried out in the proposed development areas in general accordance with our proposal (Ref: ENAUWOLL04315AA-R01-dated 12 August 2016) and subsequent variations. The location of the proposed development is shown in red outline in Figure 1. Selected additional details of the proposed development areas are shown in Figures 2 and 3.

1.2. Proposed Development

The proposed development will take place at the main Manildra Factory site (herein referred to as 'the site') and will generally comprise:

Central and Eastern Plant Areas

- Relocation of previously approved evaporator;
- Beverage grade ethanol plant. Existing structures (two water tanks, diesel above ground tanks, a brick pump house, and redundant former plant) will be demolished as part of these works;
- Installation of three above ground tanks. Two 400kL tanks (tanks 1 and 2) will be installed in the ethanol recovery area. An existing tank will be removed to make room for one of these tanks. A 1,000kL tank (tank 8) will be installed in the ethanol storage area.
- Cooling towers;
- New gantry pipe connecting the ethanol plant, tanks and cooling towers;
- Electrical substation;
- Emergency ISO tank container area, including extension of an access road (as shown in red) from the former Dairy Farmers complex to the east;
- An internal access road to and from the ISO tank container storage facility; and
- Two railway sidings will be extended along the southeastern side of former Dairy Farmers site. To accommodate the extension of the railway siding, existing water treatment tanks, pump house and piping will be removed, and existing water treatment ponds will be filled in.

Adjacent the BOC Gas Facility

- Proposed car parking area near the existing BOC gas facility. This will involve the redevelopment of the existing paved car parking in this area of the site, and re-laying of additional pavement for parking purposes. A relatively minor amount of earthworks may take place in this area (to an assumed depth of 0.5m below the existing ground level).

For the purposes of this assessment, the proposed construction areas listed above are referred to collectively as 'the site'. These areas are also shown in Figure 1.

In accordance with the Environmental Planning and Assessment Act 1979, an assessment of the potential for contamination at the site is required in accordance with State Environmental Planning Policy 55 (SEPP 55) – Remediation *of Land* to assess whether the site is considered suitable for the proposed land use.

1.3. Objectives

The objectives of the assessment was to:

- Assess the likelihood for contamination to exist in the area of the proposed development (listed above) from past or present activities and make recommendations on the need for further investigation/remediation with respect to an industrial land use (if required).
- Assess the potential for ASS to be present in the area of the proposed works within the anticipated depth of disturbance, based on existing data from previous Coffey assessments in surrounding areas, with recommendations on the need for management.
- Provide geotechnical advice in relation to the proximity of the various structures proposed to the northern bank of the Shoalhaven River and potential effects of the proposed structures on the stability of the river bank.

2. Scope of work

To address the objectives outlined above, Coffey carried out the following scope of work:

Geotechnical Advice

- Review of existing information from previous Coffey test holes at or near the vicinity of the proposed development areas. Some boreholes and shallow test pits have previously been drilled in the vicinity of the proposed site for environmental and geotechnical assessment purposes;
- A site visit by a Coffey principal geotechnical engineer to observe the present surface conditions at the sites for the proposed structures and storage area and the general condition of the nearest sections of riverbank;
- Report of our observations and advice in accordance with the objectives outlined above.

Phase 1 Environmental Assessment and Acid Sulfate Soils Assessment

- A site visit by a Coffey engineer/scientist to make observations of the site area to visually assess potential sources of contamination.
- Undertaking a desk study and site history review, including review of ASS risk maps for the area, review of previous relevant environmental reports available to Coffey, interviews with people familiar with the history of the site; and review of contaminated land records information in the public register maintained by NSW EPA;

- Reporting, including presenting the results of the fieldwork, identifying potential Areas of Environmental Concern (AECs) and Contaminants of Potential Concern (COPCs) and making conclusions with respect to the objectives in Section 0.

3. Environmental Setting

3.1. Site identification

The site consists of multiple areas, as outlined in red in Figure 1. Site identification details are summarised in Table 1.

Table 1: Summary of site details

Site Address:	Bolong Road, Bomaderry, NSW
Site Area:	Irregular – refer to Figures 1 to 3 for proposed construction areas
Site Identification:	The various portions of the site are situated in the following Lots: Main Manildra Factory • Lot 1 in Deposited Plan 838753 • Lot 143 in Deposited Plan 1069758 • Lot 241 in Deposited Plan 1130535
Current Zoning:	IN1- General industrial under Shoalhaven City Council Local Environment Plan 2014
Current Land Use:	Industrial use – part of the Shoalhaven Starches facility
Surrounding Land Uses	**General** The Shoalhaven River is located to the south of the proposed development areas, and rural/agricultural land use is located to the north and east. Commercial areas of Bomaderry are located to the west of the Main Manildra Factory. <u>Proposed Ethanol Plant Modifications and Railway siding</u> Bolong Road to the north, the former Dairy Farmers site to the east, ethanol plant to the west, and Shoalhaven river to the south. <u>Proposed Car Park</u> BOC Gas facility to the north, Bolong Road to the south, Abernathys Drain to the west, and open paddock to the east.

3.2. Local geology and hydrogeology

Reference to the 1:100,000 Kiama Soil Landscape Series Sheet (9028, First Edition), produced by the Department of Conservation and Land Management NSW (1993) indicates that the site is located on Shoalhaven Soils. These soils are described as moderately deep Prairie Soils on levees, Red Earths and Yellow and Red Podzolic Soils on terraces and Alluvial Soils and Gleyed Podzolic soils on the floodplains.

Reference to the 1:250,000 Wollongong Geological Series Sheet (S1 56-9, First Edition) prepared by the NSW Department of Mines (1952) indicates the site is likely to be underlain by Quaternary Alluvium, gravel, swamp deposits and sand dunes.

Previous investigations (Coffey 2008, 2009 and 2014) in the Main Manildra Factory area indicated the presence of fill ranging between 0.5m to 2.5m depths, generally comprising of silty sand/ sandy silt/gravelly sand or bedding sands. Generally, deeper fill soils were encountered to the south of the site, towards the river embankment. The fill is underlain by alluvium (clayey silt/ silty sand) or estuarine soils (dark grey silty clay) to depths generally greater than 5m below ground surface.

Online licensed groundwater bore searches undertaken in previous investigations have identified several licensed monitoring bores within a 500m radius of the sites. These reports indicated that there are no licensed groundwater bores used for potable or stock watering use in downgradient areas of the site.

Based on observations made of the local area, surrounding topography, and proximity of the nearby Shoalhaven River, groundwater is expected to be located at a depth of between 2m and 3m bgs and flow to the south towards the river.

3.3. Acid sulfate soil occurrence

ASS is naturally occurring soil and sediment containing iron sulfides which when exposed to oxygen can generate sulfuric acid.

Reference to the Burrier/Berry 1:25,000 Acid Sulfate Soil Risk Map (1997) Edition 2, prepared by the Department of Land and Water Conservation (DLWC), indicates that the site is mapped to be within an area with a low probability of ASS occurrence being described as elevated alluvial plains and levees. ASS, if present, is considered to be greater than 2m below the ground surface. The map shows areas immediately to the south of the site within the river, as being estuarine bottom sediments with a high probability of ASS occurrence.

Previous assessments by Coffey (2008, 2009 and 2014) and GHD (2015) indicate that acid sulfate soils are likely to exist at depths greater than 2m to 4m in the proposed development areas.

4. Site Observations

A site walkover was conducted by a senior environmental scientist from Coffey on 24 August 2016. This part of the site is situated within the Main Manildra Factory, and the boundaries of the site were not physically defined. During the walkover, Coffey personnel were accompanied by Mr John Studdert, the Environmental Coordinator of the Manildra plant. Mr Studdert provided Coffey with information relating to current and historical operations at the Main Manildra Factory. Some of this information is included below, and general plant wide information is included in Section 5.3. See Figure 1 for locations of the proposed development areas.

At the time of the site walkover, the railway spur in the eastern portion of Lot 143 was not part of the proposed development, therefore this area was not observed. Site walkover notes in this area are based on site observations made during a Coffey site engineer in 2014 (Coffey, 2015) and are discussed in Section 5.2.2.

4.1. Proposed loading / ISO tank container storage area

This area is situated in the eastern part of the plant. This area was generally covered by gravel fill, with a concrete pad noted in the centre of this portion. The concrete pad was constructed approximately 8 years ago and operated as a working base for the construction of ethanol tanks several years previously. During the site walkover, this pad (and immediate surrounding areas) were used for storage of miscellaneous industrial parts, such as pipework, two above ground tanks (formerly containing cyclohexane), empty pallets and wooden cable spools (Photograph 1).

Photograph 1. Looking south across the concrete pad

Approximately 20 IBC containers (containing various forms of acid), and a metal skip bin which appeared to be full of scrap metal, concrete sleepers, and plastic and metal formwork materials were noted to the west of the concrete slab. An open grassed area was observed in the western portion of the proposed IBC storage and loading area. To the south of the concrete pad, a metal shed and metal shipping container was observed. The shed and container appeared to be used as fitter's workshop. During the walkover, a worker was observed to be undertaking cutting work in this area (Photograph 2). Visual evidence of staining was not observed in this area.

Photograph 2. Looking southwest towards a site shed, possibly used as a workshop.

4.2. Proposed evaporator / cooling towers / substation

The proposed evaporator / cooling towers / substation is to be situated on a gravel access road. Visual evidence of staining was not observed in this area. A compressor shed followed by a railway line and spur was situated to the south of the proposed substation, as indicated on existing plans. The compressor is electrically powered, and situated on a platform approximately 0.8m above the ground. The base of the compressor shed is concrete. No visual evidence of leakages were noted.

Photograph 3. Looking north across the gravel access road.

4.3. Proposed tanks 1 and 2– ethanol recovery area

The proposed tanks 1 and 2 will be situated within the existing ethanol recovery area (Photograph 4). The ethanol recovery area is a concrete bunded area where three existing tanks (containing ethanol) are currently located. One of these tanks will be removed as part of the development. The tanks were observed to be in good condition, and there was no apparent visual evidence of leakages / staining, and the concrete bunds appeared to be in good condition.

4.3.1. Proposed tank 8 – ethanol storage area

The proposed tank 8 will be situated within the existing ethanol storage area (Photograph 5). The ethanol storage area is a concrete bunded area where an existing tank and concrete plinth was observed. According to information provided by Manildra, the proposed tank 8 is likely to be situated on top of the existing concrete plinth. The tanks were observed to be in good condition, and there was no apparent visual evidence of leakages / staining, and the concrete bunds appeared to be in good condition.

Photograph 4. Looking west towards the existing tanks in the ethanol recovery area. The tank in the right side of the photograph will be removed.

Photograph 5. Looking west towards the proposed location of Tank 8 in the ethanol storage area. This tank will be situated on the existing concrete plinth

4.4. Beverage Grade Ethanol Plant

The proposed ethanol plant is to be situated to the east of the existing control room. The proposed plant footprint partially encompasses an existing gantry and chemical storage area (containing various ethanol, alcohol and ether based products), as shown in Photograph 6. Four partially filled IBC containers and two above ground tanks were observed situated over concrete pavement. There did not appear to be significant leakages or evidence of staining in the proximity of the containers and tanks.

The eastern portion of the proposed ethanol plant is currently occupied by two large above ground tanks used for water storage, three 1,000L diesel above ground tanks (Photograph 7) , and a brick pump house. These structures will be demolished. The tanks are situated on an elevated gantry, in a self bunded steel holding pen. The tanks were observed to be in good condition, and visual or olfactory evidence of leakages were not observed. The purpose of these tanks is to power pumps in the adjacent pump room in emergency situations.

Photograph 6. Looking west towards the existing gantry, to be removed to make room for the proposed ethanol plant

Photograph 7. Looking west towards the above ground diesel tank bund. This will be removed as part of the development

Visual observations were made of the pump room interior (Photograph 8). Four pumping motors were observed, fixed to a concrete floor slab. The pumps appeared to be in good condition, and no visual or olfactory evidence of contamination observed. Relatively minor quantities (<100L) of cleaning and maintenance chemicals were observed in the pump room. Generally, the standard of housekeeping appeared to be high.

Photograph 8. Interior of the pump room

Photograph 9. Redundant structure to the south of the water tanks

A structure was observed to the south of the water tanks (Photograph 9), immediately outside the proposed ethanol plant footprint. Mr Studdert indicated that the structure was the cooling tower for the dimethyl ether (DME) plant, this structure will be removed during the development. The structure is situated on a concrete plinth. Visual evidence of fuel storage and contamination relating to this structure was not observed.

4.5. Proposed additional carpark areas

Proposed additional carpark spaces are to be situated on the north side of Bolong Road, near the BOC gas facility (see Figure 2). At present, the majority of this area comprises a gravel hardstand carpark, with an existing open drainage line and culverts along the southern and eastern perimeter (Photograph 10). Mr Studdert indicated this drainage line will be filled in and surrounding areas require some earthworks (i.e. cut to fill) to level the terrain in this area. Evidence of filling beneath the carpark has occurred in this area (Photograph 11). The drainage line discharges to Abernathys Creek further north-west.

Photograph 10. Drainage line around perimeter of carpark

Photograph 11. Evidence of fill beneath carpark

5. Site history

A site history search was undertaken for the site, and included a review of previous environmental reports available to Coffey, interviewing people familiar with the history of the site, and review of contaminated land records in the public register maintained by NSW EPA.

5.1. Review of NSW EPA records

5.1.1. Contaminated land database

A search of the NSW OEH Contaminated Land Record[1] was carried out on the 17 August 2016. The contaminated land public record is a searchable database of:

- Actions taken by the EPA under section 15, 17, 19, 21, 23, 26 or 28 of the Contaminated Land Management Act 1997 (CLM Act)
- Actions taken by the EPA under section 35 or 36 of the Environmentally Hazardous Chemicals Act 1985 (EHC Act) (Note: Some notices under section 35 of the EHC Act 1985 were issued by the State Pollution Control Commission, which was the NSW government agency responsible for managing contaminated sites before the EPA was established in 1992.)
- Site audit statements provided to the EPA under section 52 of the CLM Act on sites subject to an in-force declaration or order.

The search noted no records or listings for the site, or within 1km of the site.

5.1.2. Protection of the Environment Operations (POEO) database

A search of the NSW DECC Public Register of the Protection of the Environment Operations (POEO) Act 1997[2] was carried out on 17 August 2016. The POEO public record is a searchable database of:

[1] *www.environment.nsw.gov.au/clm/aboutclmrecord.htm*
[2] *www.environment.nsw.gov.au/prpoeo*

- Environment protection licences;
- Applications for new licences and to transfer or vary existing licences;
- Environment protection and noise control notices;
- Convictions in prosecutions under the POEO Act and the results of civil proceedings;
- Licence review information. Submissions regarding licence review can be made at any time; and
- Exemptions from the provisions of the POEO Act or regulations.

The search noted that there are several licenses (and variations of existing licenses) for the Main Manildra Factory processing site (and adjacent effluent disposal and treatment sites) dating from 2000. The licenses relate to the following scheduled activities:

- Agricultural Processing;
- Chemical Production and Storage; and
- Chemical Industries or Works - other.

Several licenses state the need for several compliance monitoring points (including effluent disposal, stormwater discharge and air monitoring), which are installed across the general Main Manildra Factory area. In addition, soil and groundwater in effluent disposal areas were required to be monitored for a range of nutrients (including nitrate, phosphorous and organic matter). Based on Coffey's previous experience working on the greater Manildra site (which includes Main Manildra Factory), the majority of these licenses relate to areas outside of the current site, and relate to processes that are unlikely to result in significant contamination issues relevant to the industrial land use setting.

Other than license conditions, the only other document made available was an audit compliance report on requirements to prepare a pollution incident response management plan. The audit did not assess whether Manildra had conformed to other conditions in the license permits.

BOC Gas Plant (situated adjacent the proposed car parking areas) has a current EPL license (license number 11164) relating to chemical production and storage of a carbon dioxide processing plant and associated activities. Wastes produced by this plant are discharged to Manildra's effluent pipeline located near Bolong Road, to the south west of the BOC plant (potentially within the proposed car park area).

There were no further POEO licenses within 500m of the site.

5.2. Review of previous environmental reports

Several environmental and geotechnical reports have been undertaken at the Manildra Main Plant facility (and surrounding areas) since 2008. Three contamination assessments (Coffey 2008, Coffey 2009 and Coffey 2015) were undertaken in the vicinity of the Main Manildra Factory. A summary of relevant information from the reports is provided below:

5.2.1. Coffey 2008 preliminary environmental site assessment

Proposed ethanol expansion upgrade works were proposed in 2007 across the Main Manildra Factory. A preliminary environmental site assessment was undertaken to assess the potential for soil contamination and check for acid sulfate soils to be present within the portion of the plant to be redeveloped. The 2007 assessment area encompassed the Main Manildra Factory, however did not extend as far east to include the proposed container storage, evaporator, cooling tower and substation areas.

Anecdotal evidence from site interviews revealed the following information:

- Prior to 1950's, the area was predominantly used for rural grazing purposes; circa 1950's.
- A Horlicks Factory (processing drink products, cheese and gluten), occupying the central plant areas, was constructed.
- In the 1970's, the site operated as the Shoalhaven Starches facility;
- Up until 1993-1994 the majority of the eastern portion of the Manildra plant (which covers the majority of the site) was primarily vacant grazing land, at which point it became paved car parking areas.
- The gas plant (adjacent the proposed car parking areas) was constructed between 1993 and 2002.
- From 2007 the ethanol fermenting tanks were constructed.
- A dangerous goods license search undertaken by Workcover (now SafeWork NSW) on 22 August 2007. A list showed that multiple tanks were licensed in an area referred to as 'Area 2', which encompassed the ethanol fermentation, recovery and storage area that is adjacent where the proposed Tanks 1, 2 and 8 will be installed. These licensed tanks included:
  - A large 2.9ML ethanol above ground tank;
  - Ten above ground tanks ranging from 1.8kL to 5kL in size. Two of these tanks stored petrol, and the remainder stored methyl isobutyl ketone, butanols, propyl alcohol, n-propyl acetate and methanol.
  - An underground tank (either 30kL or 100kL in size), licensed to store Dimethylether.

  The exact locations of these tanks are not shown.
- An earlier site plan (dated 1997) and cross sections identified the following:
  - Several existing ASTs in the vicinity of the proposed tanks 1, 2 and 8 locations. These existing ASTs stored either ethanol or methanol and were stored within a bunded area.
  - A diesel fuel tank (site observations undertaken by Coffey suggest an AST) was situated to the south of the fire pump house, approximately 10m to the northeast of the proposed ethanol plant.
  - The proposed ethanol plant is situated adjacent to a building labelled 'control room' and 'ethanol distillation plant'.

Soil sampling was carried out across the Main Manildra Factory using boreholes and test pits (See Figure 2 for sample locations). Two test pits (CTP29 and CTP31) and two boreholes (CBH110 and CBH114) were undertaken in the proposed car parking areas. Remaining sampling locations were situated at least 20m from other proposed development areas.

Soil sampling in the central and eastern portions of the Main Manildra Factory recorded fill soils ranging from 0.4m to 0.75m, comprising silty sands and some gravel). In the proposed car parking area, fill soils (clayey silts with some blue metal gravels) were encountered to depths between 0.4 and 0.6m. Fill soils across both areas were not indicative of ASS. Underlying soils comprised of alluvial and estuarine silts with varying proportions of clay and sand.

The results of the soil sampling indicated that at the locations tested, concentrations of potential contaminants of concern did not suggest soil contamination, it was noted that the presence of infrastructure and buildings restricted access, and as such relatively localised contamination could exist from previous activities and potential spillages. Samples collected from the fill in the proposed car parking areas were analysed for heavy metals, petroleum hydrocarbons (Total Recoverable Hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAH) and benzene, toluene, ethylbenzene and total xylenes (BTEX)) and pesticides. Concentrations were less than adopted criteria for the proposed industrial/commercial land use.

Acid sulfate soil (ASS) testing in the central plant area suggested that acid sulfate soils were unlikely to be present in the upper 2m. ASS testing in the proposed car parking area suggested that actual ASS could be present from 1m.

5.2.2. Coffey 2015 Contamination Assessment

A starches product dryer was proposed to be constructed in Lot 143 in 2014. A contamination assessment (Coffey, 2015) was undertaken to assess the potential for soil contamination and check for acid sulfate soils to be present in this Lot, which includes the location of the proposed cooling towers, evaporators, substation, ISO container storage areas and railway siding.

The site history search indicated that this portion of the site was used for rural agricultural purposes. A building was present on the site (in the vicinity of the proposed cooling tower/container storage area) in 1961, and was demolished between 1979 and 1993. Lot 143 was acquired by Dairy Farmers in the 1970's, although the western portion of Lot 143 was generally vacant until being used for storage by Manildra (since 2012). Two treatment ponds were constructed in the southeastern corner of Lot 143 sometime between 1984 and 1993. A former treatment pond (to the immediate west of the existing treatment ponds) was backfilled prior to 2013.

A site walkover in the western portion of Lot 143 indicated that the site was generally covered by gravel hardstand and occupied by various pieces of unused equipment, empty 1000L plastic containers and drums, portable shipping containers, sheds, stockpiles of timber and railway sections and a concrete slab. Four drums (labelled as Diesel Engine Oil) and a 1000L plastic container containing waste oil were observed approximately 20m to the east of the proposed ISO container storage area. Some localised oil staining was observed near the waste oil container.

A former effluent treatment facility (including the treatment ponds) was observed in the southeastern corner of the site. The plant comprised of two treatment ponds, two circular concrete aeration tanks (approximately 15m diameter) and several smaller storage tanks and associated pipework. One pond ('Pond 1') was concrete lined and the second pond ('Pond 2') had earthen embankments. The depth of Pond 1 and Pond 2 were estimated to be 3m bgs and 6m bgs, respectively. Some water was observed, with algal growth, at the base of the ponds. A small brick building (labelled 'control room') is situated between the ponds. Pipework was observed to enter this building.

Three stockpiles (comprising ballast, concrete and fill soils respectively) with approximate volumes ranging between 5m^3 and 100m^3 were observed in the central southern portion of Lot 143 to the west of the concrete aeration tanks. Visually, the stockpiles did not appear to contain foreign materials or asbestos containing materials.

Areas around the footprint of the former building in the southwestern side of the Lot (due to potential weathering of hazardous materials), storage of chemicals, areas adjacent the railway siding and fill material were identified as areas of environmental concern (AECs). Soil samples (comprising test pits and surface samples) targeted these areas. The following contamination issues were identified:

- Localised TRH F3 and F4 petroleum hydrocarbon contamination was identified adjacent the railway spur and waste oil IBC container, exceeding adopted human health guidelines for commercial land use via direct contact (although it is less than adopted criteria for intrusive maintence workers). The latter contamination source is outside the current proposed development area and is not considered to have an impact on the current development. The inferred lateral extent of the near surface contamination adjacent the railway line (based on 'step out' surface samples collected) is likely to be 5m; and
- Bonded ACM was noted in former topsoil beneath fill in the area where a former structure was once located. A bonded ACM fragment was also observed near the stockpile area in the central southern portion of Lot 143.

- Concentrations of anthracene, phosphorous and zinc, exceeding trigger values for protection of marine water aquatic ecosystems, were identified in water samples in Pond 1 and/or Pond 2. The zinc and anthracene exceedences are marginally above the trigger levels, noting that the trigger level for anthracene is of low reliability. The phosphorous concentrations exceed the marine water ecosystem trigger values, however are less than the irrigation trigger levels. As there does not seem to be non-conformance issued by the NSW EPA during operation of the treatment works, widespread phosphorous leaching from the ponds to the river is considered unlikely. Furthermore, alluvial soils can have inherently high levels of available phosphorous (Lawrie, 2000), which would suggest that phosphorous rich groundwater discharges to the river across a larger area in the agricultural Bomaderry/Bolong region.
- Nickel concentrations above these trigger values were also identified in a groundwater well (CBH4) downgradient of Pond 1. The source of this exceedence is unknown and could be indicative of regional groundwater quality. The exceeding concentrations detected however are marginally above the trigger levels. Taking into consideration the dilution effects of Shoalhaven River adjacent the site, these elevated concentrations are unlikely to adversely impact the receiving waters.

Coffey recommended the following to address the above contamination issues:

- The residual water within the treatment ponds will need adequate management prior to redevelopment. Manildra may want to further explore the applicability of irrigating this water on their adjacent environmental farm as long it meets their license conditions and they are allowed to transport it across.
- Manildra should improve general housekeeping in the short term prior redevelopment to prevent further or wider spread contamination occurring (e.g. through preventing further hydrocarbon spills). Areas with existing contamination should also be noted to prevent inadvertent access and/or spreading of these soils to other areas.
- The ground surface in the southern area of Lot 143 area should be inspected by a competent person for the presence of ACM materials. If present, these materials should be removed in accordance with relevant NSW legislation.
- With respect to asbestos contamination in soil, this could be remediated through excavation and offsite disposal. Alternatively, the asbestos impacts could be managed on site through onsite capping and containment. This could involve capping with a layer of 'clean' fill (with the inclusion of a warning layer) or capping with a pavement. This option may have practical implications as it would require increasing site levels and may not be cost effective. On site management would also require preparation of a site management plan that would need to be followed during and post construction for the life of the site, notation of the contamination such as on the planning certificate under Section 149 of the Environmental Planning and Assessment Act (1979) and/or Section 88B of the Conveyancing Act 1919.
- The above remedial and management procedures should be further detailed in a Remediation Action Plan (RAP) or similar work plan, which should be prepared prior to intrusive construction works occurring on-site.

The results of acid sulfate soil testing undertaken across Lot 143 suggested that acid sulfate soils are likely to be encountered at depths greater than 4m at the site.

5.3. Site interview information

As discussed in Section 4, information on the site history was obtained by interviewing Mr John Studdert, the Environmental Coordinator at the site.

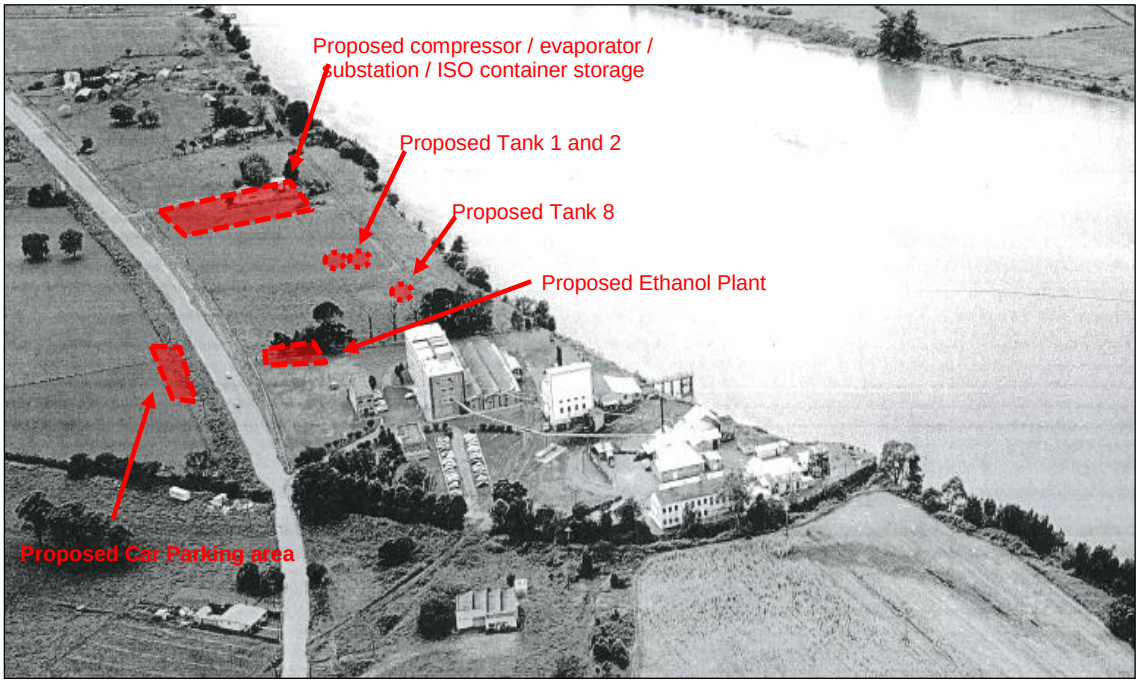
In addition to information presented in Section 4 , Mr Studdert indicated that there had not been significant spills of chemicals, as far as he was aware, in the proposed construction areas. In addition, the existing bunds in the ethanol recovery and storage areas had not been breached.

Chemicals stored in these areas of the site are generally either cleaning products (mostly biodegradable), or relatively benign processing or by-product chemicals such as Dimethylether or ethanol. The Main Manildra Factory has a drainage and filtration system to prevent widespread runoff to surrounding land such as the Shoalhaven River.

5.4. Summary of site history

The following is a summary of the site history:

- General land use in the proposed development areas was agricultural (dairy grazing) prior to the mid-20th century.
- Prior to the Manildra plant, the overall plant was used as a Horlicks factory, producing gluten and cheese. Manildra took ownership of the site circa late 1960's. Prior to this, the general area was likely to be used for dairy farming.
- As shown in the photograph 13 below, the proposed construction areas in the Manildra Plant were situated in farming land, outside of the main plant area buildings prior to the 1970's.
- Historical aerial photography indicated several buildings (likely to be farmhouses) were situated in the proposed evaporator/substation/container storage area prior to 1961, and appear to have been demolished between 1979 and 1993. This portion of the site operated as part of a Dairy Co-op from the early 1970's, which included cattle grazing activities in this area.
- BOC gas plant was constructed adjacent the proposed car park area between 1994 and 2004.
- Since 2012, the proposed compressor/ISO container storage area/evaporator area has been used for storage of miscellaneous equipment and parts.
- The available site history information has not identified evidence of the use of underground tanks or boilers within the proposed development areas; and
- Based on anecdotal evidence, historical reports and visual observations there does not appear to have been significant spills in any of the proposed development sites (noting the comment below relating to data gaps).



Photograph 13: Oblique aerial photograph, looking east across the site. Circa 1960's. Locations are approximate only. Photograph supplied by Manildra.

Based on the available site history information, the size of the site and the proposed development, there is not considered to be significant site history gaps within the Main Manildra Plant areas that would affect the results of this assessment.

6. Geotechnical review and site observations

A Principal Geotechnical Engineer from Coffey visited the site on 24 August 2016 to observe the site surface conditions along the northern bank of the Shoalhaven River and banks of Abernethy's Creek and in the vicinity of the proposed structures within the main plant area of Manildra's Shoalhaven Starches. There was no evidence of any progressive or ongoing erosion or collapse of the river of creek banks in the vicinity of the proposed new structures. Previous erosion and local collapse of the river bank occurred during flood events in 2013 and 2015.

Coffey has also reviewed monitoring of ground movement over various sections of the river bank in close proximity to the main plant and the internal railway to the east of the plant. Monitoring methods include downhole inclinometers at six locations, survey monitoring of the rock revetment wall close to the flour mill, and survey monitoring of the tops of the steel sheet piles installed along the sections river bank close to the railway. The sheet piles were installed where local failure of the river bank occurred following high rainfall and flooding events over the past five years.

7. Discussion and recommendations

7.1. Contamination

Based on the site history, the following potentially contaminating activities were identified across the proposed development sites that are relevant to the proposed upgrade works:

- AEC 1 - Potential presence of fill soils (of unknown origin and quality);
- AEC 2 - Presence of potential asbestos containing materials on the ground surface in Lot 143, the and beneath the ground surface in the proposed evaporator/substation/storage area;
- AEC 3 - Maintenance activities and storage of chemicals in the proposed storage/cooling tower/substation area.
- AEC 4 – Historical and current chemical storage.
- AEC 5 – Leaks adjacent the existing railway siding in Lot 143.

Further details of these AECs, relevant to the proposed construction areas, are presented below.

7.1.1. AEC 1 – Potential present of fill soils (of unknown quality and origin)

Fill soils were identified across the sites in previous Coffey reports. Based on observations made in these investigations, supplemented with analytical data of samples collected in the fill, we assess there to be a low likelihood of contamination being present that would result in a potentially unacceptable risk to the proposed site users. During earthworks, should evidence of potential contamination be encountered, works should cease and advice sought from a suitably qualified environmental practitioner.

The source of the asbestos noted beneath gravel hardstanding in the proposed ISO storage/evaporator area is likely to be from weathering / destruction of former buildings present in this area of the site (as discussed in AEC 2 below).

7.1.2. AEC 2 – Asbestos present on the ground surface (or in soil) from current or former buildings

A bonded ACM fragment (i.e. fibro) was observed on the ground surface in the southern area of the site (near SS23, as shown in Figure 3). The source of the fibro is unknown, and was removed during the course of sampling. This area should be inspected for the presence of other bonded ACM materials on the ground surface.

Bonded ACM was identified in former topsoil material (situated beneath gravel fill at approximately 0.2m bgs) located beneath the proposed substation and cooling towers (in Lot 143).The previous site history search identified two clusters of residential (farmhouse) dwellings that were located in the southern and southwestern part of Lot 143, in addition to four other smaller structures present elsewhere in this Lot. These buildings may have contained hazardous materials (such as asbestos eaves and lead based paint). These buildings were removed prior to 1993. Due to the inherent irregular distribution of ACM in the subsurface and the number of ACM finds, it would appear that

adequate asbestos removal was not carried out during building demolition in this area. This area of the site will therefore require remediation/management as part of the proposed development.

7.1.3. AEC 3 – Maintenance activities, railway line and storage in the proposed storage/cooling tower/substation area

The western area of Lot 143 is used for storage of various items, including pipework, chemical containers, general storage and empty IBC containers. In the previous 2014 Coffey assessment, petroleum hydrocarbon contamination was identified within a likely extent of 5m of the railway line, and it likely to be limited to near surface soils. Manildra has informed Coffey that development in this area will be limited to laying of hardstanding. There may be a potentially unacceptable risk to construction workers during earthworks should they come into contact with the petroleum hydrocarbon contamination.

Maintenance activities observed in Lot 143 during the site walkover appear to be relatively minor (e.g. welding with hand tools), therefore potential contamination in this area is unlikely to be present. Manildra should ensure that appropriate housekeeping and site management procedures are adopted to ensure that surface soils in this area are not contaminated.

7.1.4. AEC 4 – chemical storage across the proposed development area

Multiple relatively large above ground storage tanks and structures were observed in the vicinity of the proposed ethanol tanks in the central and western Manildra plant. Based on site history information, these tanks have typically stored relatively benign chemicals (from a contamination perspective), such as syrups, esters, water and ethanol products. Anecdotal information indicates that there has not been large scale leakages or ruptures from these storage containers, and surrounding bunds (where present) appeared to be in good condition with no visual apparent staining observed.

Above ground storage tanks containing diesel were observed near the proposed ethanol plant. Coffey understands the purposes of these tanks is to power adjacent pumps during emergency situations. The tanks are situated within a self bunded steel framework, and no visual or olfactory evidence of leakages were noted. Minor levels of chemical storage (cumulatively less than 100L) were noted in the current pump room.

Based on the site history information, the good standard of housekeeping in the central plant area, and the relatively low quantity of harmful chemicals stored, it is considered unlikely that this AEC would present a potentially unacceptable contamination risk to receptors within the Main Manildra Factory area. This assumes that tanks to be removed are done in a safe, controlled manner and spillages during this process are avoided.

7.1.5. AEC 5 – Railway siding to the south of Lot 143

A railway siding is present along the southern boundary of Lot 143. Multiple surface samples were collected as part of the Coffey 2015 investigation either within the ballast on the railway tracks or on the ground surface adjacent the railway line.

Observations of possible hydrocarbon spillages were observed near the tracks at two locations during sampling. Two samples (SS8 and SS19) collected at these locations recorded TRH F3 concentrations exceeding HSLs, and TRH F2 to F4 concentrations exceeding management limits. Silica gel clean up analysis recorded TRH F2 to F4 similar to initial results, which suggests the hydrocarbons are of petroleum origin (rather than of non-petroleum origin).Petroleum hydrocarbon contamination is probably sourced from leakages from trains and carriages that use this siding. Contaminant distribution is likely to be sporadic and relatively localised around the railway siding.

If this area of the site were to be upgraded as part of the redevelopment, then these soils should be adequately managed. If the siding is to remain, then limited access to this area is likely as there are other physical health risks from being on a rail line. Access to this area is more likely for maintenance workers. The concentrations did not exceed investigation levels for protection of maintenance workers.

7.1.6. Risk to the environment

Given the long history of industrial use in the proposed development areas, there is likely to be localised exceedences of ecological investigation levels. In the context of continuing industrial use of the area, we do not consider terrestrial ecological receptors to be relevant in this land use context.

Nickel and/or anthracene concentrations were recorded to exceed marine water ecosystem protection trigger levels in wells in the proposed ISO container storage and railway siding area in the Manildra Main Plant in a 2015 assessment. The source of these exceedences was unknown and could be indicative of regional groundwater quality. At the time Coffey reported the exceeding concentrations detected were marginally above the trigger levels. Furthermore, the trigger level for anthracene is of low reliability. Taking into consideration the dilution effects of Shoalhaven River adjacent the site, these elevated concentrations are unlikely to adversely impact the receiving waters.

Concentrations of anthracene, phosphorous and zinc, exceeding trigger values for protection of marine water aquatic ecosystems, were identified in water samples in Pond 1 and/or Pond 2. This pond will be backfilled as part of the development, and existing water is likely to be pumped out for disposal. The zinc and anthracene exceedences are marginally above the trigger levels, noting that the trigger level for anthracene is of low reliability. The phosphorous concentrations exceed the marine water ecosystem trigger values, however are less than the irrigation trigger levels. As there does not seem to be non-conformance issued by the NSW EPA during operation of the treatment works, widespread phosphorous leaching from the ponds to the river is considered unlikely. Furthermore, alluvial soils can have inherently high levels of available phosphorous (Lawrie, 2000), which would suggest that phosphorous rich groundwater discharges to the river across a larger area in the agricultural Bomaderry/Bolong region.

7.1.7. Summary and Recommendations

The following table provides a summary of the contamination issues noted and relevant recommendations, in context to the proposed industrial development.

Location	Issue	**Recommendation**
ISO Container storage area and railway siding	Localised petroleum hydrocarbon contamination adjacent the railway line to the south of the proposed ISO container storage area. Previous investigations suggest that this impact is localised to approximately 5m from the existing railway line. Manildra has informed Coffey that earthworks within this area will be limited to hardstanding only. Construction workers could be subject to a potentially unacceptable level of risk should they come into contact with the petroleum hydrocarbon impact.	If this area of the site were to be upgraded as part of the redevelopment, then these soils should be adequately managed. If the siding is to remain, then limited access to this area is likely as there are other physical health risks from being on a rail line. Access to this area is more likely for maintenance workers. The concentrations did not exceed investigation levels for protection of maintenance workers.
ISO Container storage area	Bonded ACM was noted in former topsoil beneath fill in the proposed cooling tower, evaporator and ISO container storage area. The asbestos was likely sourced from former rural buildings in this area.	The ACM should be either excavated and disposed offsite; or managed onsite through capping, containment and long term management. See additional notes after this table.
Railway siding	A bonded ACM fragment (i.e. fibro) was observed on the ground surface in the southern area of the site. The source of the fibro is unknown, and was removed during the course of sampling. T	A licensed contractor should be engaged to remove any visible fragments of ACM from the ground surface in this area of the site followed by a clearance inspection.
Railway siding	Water within former treatment ponds contained zinc, anthracene and phosphorous at concentrations exceeding the adopted freshwater ecosystem protection trigger levels.	The residual water within the treatment ponds will need adequate management prior to redevelopment. Manildra may want to further explore the applicability of irrigating this water on their adjacent environmental farm as long it meets their existing license conditions and they are allowed to transport it across.
All		As direct assessment of all areas was not possible during this work, we recommend that observations be made during the demolition of the any existing plant for evidence of contamination. For example during removal of the diesel Above Ground Storage Tank (AST) near the proposed ethanol plant area.

Based on a review of the previous information, we have assessed that there is a low likelihood of a potentially unacceptable risk to future site users (maintenance and construction workers) due to contamination in the remaining areas of the site assessed as part of this report.

With respect to asbestos contamination in soil could be remediated through excavation and offsite disposal. The handling of asbestos impacted soil requires the preparation of an asbestos removal plan and licensed contractor. Following completion of removal activities, a clearance certificate would be issued by a suitably qualified asbestos consultant. Such work should be carried out by appropriately qualified and licensed contractors in accordance with all relevant codes of practice and standards such as the *National Occupational Health and Safety Commission (2005): Code of Practice for the Safe Removal of Asbestos (2nd Ed)[NOHSC:2002(2005).*

Alternatively, the asbestos impacts could be managed on site through onsite capping and containment. This could involve capping with a layer of 'clean' fill (with the inclusion of a warning layer) or capping with a pavement. This option may have practical implications as it would require increasing site levels and may not be costs effective. On site management would also require preparation of a site management plan that would need to be followed during and post construction for the life of the site, notation of the contamination such as on the planning certificate under Section 149 of the Environmental Planning and Assessment Act (1979) and/or Section 88B of the Conveyancing Act 1919 and the local Council would need to be consulted to see if they would accept such an option.

In the interim, the potential risks to site workers due to asbestos impact (both above and below ground) should be incorporated in existing management plans (alternatively a management plan should be developed). The management plan should outline how these asbestos impacts can be managed so the risk to site workers is reduced to an acceptable level.

7.2. Acid sulfate soil

Based on previous investigations soils beneath depths of 2m in the proposed car park, and 3m in the central and western Main Manildra Factory areas, are considered to be acid sulfate soils. At shallower depths, there is a low risk that acid sulfate soils are present, however this may be influenced by the presence of fill within the site. Should dark grey, high plasticity estuarine clays be encountered in the current site at depths shallower than 3m, these soils should be considered potential acid sulfate soils unless otherwise tested.

Should the proposed development involve excavation of soils from depths greater than 2m at the site, and/or dewatering that could result in a drop in the water table, this could also impact acid sulfate soils, then an acid sulfate management plan (ASSMP) should be developed and actioned. An ASSMP will present the approach and methodology of acid sulfate soil management at the site during the construction phase of the project which is to be followed by Manildra and/or their subcontractors. The ASSMP should be prepared in accordance with the relevant sections of the 1998 ASS Manual prepared by ASSMAC. The detail of the ASSMP can be refined based on the likely volumes to be extracted. For small volumes a simple work plan may be sufficient. If possible, avoidance of disturbing the ASS is preferred.

7.3. Effects of proposed new structures and storage areas on river bank stability and stability of Abernethy's Creek banks

Based on the proposed layout plan provided, the positions of the new structures and storage areas are relatively remote form the northern bank of the Shoalhaven River. Any new heavily loaded structures should be supported on deep piled foundations to rock and therefore should not add any additional load to the soils behind the river bank, including the sections of river bank protected by the existing rock revetment wall and steel sheet pile walls.

In summary the proposed structures and storage areas for the ethanol plant expansion should have no effect on the stability of the current river bank and banks of Abernethy's Creek provided the following general recommendations are complied with:-.

- All heavily loaded structures should be supported on deep foundation systems to rock so that no additional loads are applied to the soil mass close to the banks;
- Cranes or other large temporary surface loads such as building materials should not be located within 10m of the river bank or within 5m of the Abernethy's Creek bank, unless a specific assessment of the crane loads and ground condition is carried out;
- Construction activities that involve significant ground vibration such as pile driving should be avoided in close proximity to the river and Abernethy's Creek.

8. Limitations

The findings contained in this report are the result of discrete/specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the parts of the site assessed at the time the assessment was carried out. The works carried out did not include any intrusive investigations.

Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

Information provided on likely materials within site structures is indicative and based on general observations and does not constitute a hazardous materials building survey.

We have relied on data presented in reports provided by Manildra.

This report should be read in conjunction with the attached sheets entitled “Important Information about your Coffey Environmental Report”.

9. References

ASSMAC - Acid Sulfate Soil Management Advisory Committee (1998). Acid Sulfate Soil Assmessent Guidelines.

Central Mapping Authority of NSW (1987) Berry 1:25,000 Topographic Map

Coffey Geotechnics Pty Ltd (2007). Preliminary Contamination Assessment, Proposed Starches Product Dryer Manildra, Bomaderry, NSW. Report reference GEOTUNAN02584AA-AD. Dated 20 April 2007.

Coffey Environments Pty Ltd (2008) Preliminary Environmental Site Assessment and Geotechnical Investigation, Proposed Ethanol Expansion, Main Manildra Factory, Bolong Road, Bomaderry, NSW. Report reference: ENVIWOLL00111AA-R02. Dated 25 June 2008.

Coffey Environments Pty Ltd (2009) Groundwater Assessment, Main Manildra Factory, Bolong Road, Bomaderry, NSW. Report reference: ENVIWOLL00187AA-R02. Dated 23 March 2009

Coffey Geotechnics Pty Ltd (2014). Geotechnical Investigation and Preliminary Environmental Assessment, Proposed New Silos, Bomaderry, NSW. Report reference GEOTWOLL03658AA-AA. Dated 6 August 2014

Coffey Geotechnics Pty Ltd (2015). Geotechnical Advice and Preliminary Environmental Assessment, New Flour Mill, Bomaderry, NSW. Report reference GEOTWOLL03658AC-AA. Dated 11 February 2015.

Geological Survey of NSW (1966) 1:250,000 Wollongong Geological Series Sheet No. SI 56-9, 2nd edition

ASC NEPM (1999) National Environmental Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013, National Environment Protection Council.

NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme (Second Edition)

NSW DWLC (1997), Burrier-Berry Acid Sulfate Soil risk Map (2nd ed)

NSW OEH (2011), Guidelines for Consultants Reporting on Contaminated Sites

Important information about your **Coffey** Environmental Report

Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

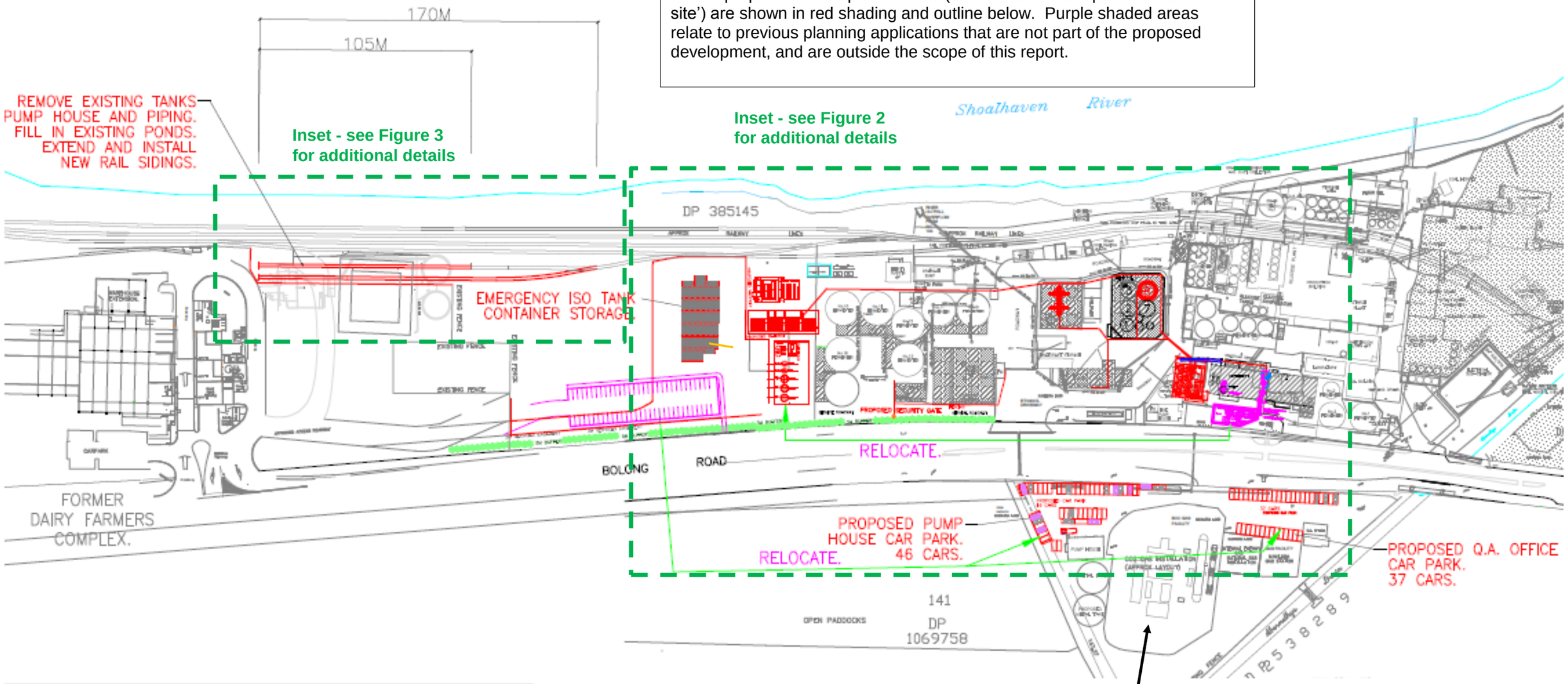
This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

Figures

Note – proposed development areas (referred to in the report text as 'the site') are shown in red shading and outline below. Purple shaded areas relate to previous planning applications that are not part of the proposed development, and are outside the scope of this report.



Revision	description	drawn	approved	date
	Original	JB	MF	4/10/2016
	Rev 1	JB	MF	2/11/2016

Base plan ref:. Overall Site Plan. Drawing Ref MN285-001H, Dated 31 October 2016

drawn	**JB**
approved	**MF**
date	**11/02/2016**
scale	**1:2000 (approx.)**
original size	**A3**

coffey
A TETRA TECH COMPANY

client: **Manildra Group Pty Ltd**

project: **PRELIMINARY CONTAMINATION, ACID SULFATE SOIL AND RIVERBANK STABILITY ASSESSMENT PROPOSED ETHANOL PLANT & OTHER MODIFICATIONS**

title: **SITE LOCATION PLAN**

project no: ENAUWOLL04315AA-R01 Rev 1

figure no: 1

EXISTING – BLACK.
PROPOSED MODIFICATION WORKS–RED
RELOCATED APPROVAL – BLUE
ORIGINAL MOD 2 APPROVAL–MAGENTA

50M 28.17M

TP = test pit
BH = borehole
SS = surface sample

TANK 1,000,000 LT

TWO TANKS
400,000 LT EACH –
EXISTING TANK
TO BE REMOVED.

EXISTING DME STRUCTURE
TO BE REMOVED.
S.C.C. DEMOLITION
APPROVAL NUMBER
DA13/1713.(15/07/2016).

Shoalhaven River

CTP13, CTP14, CTP18 TO CTP26, CTP29

COOLING TOWERS

APPROX RAILWAY LINES

SUBSTATION

NEW PIPE GANTRY

SS14

Compressor room

EMERGENCY ISO TANK CONTAINER STORAGE.

CTP12

SS1

CTP27

CTP15

CBH01

SS10

CTP16

PROPOSED SECURITY GATE

Proposed Tanks 1 & 2 (ethanol recovery area)

Proposed Tank 8 (ethanol storage area)

Diesel AST

BEVERAGE GRADE ETHANOL PLANT

WATER TANKS,PUMP HOUSE & FIRE STATION TO BE REMOVED.
FIRE MONITOR TO REMAIN.

BOLONG RD

EVAPORATORS

RELOCATE APPROVED MOD 2 EVAPORATOR.

CTP31

CBH110

PROPOSED PUMP HOUSE CAR PARK.
46 CARS.

APPROVED RECTIFIER & STRIPPER SHOWN RELOCATED.

CTP29

CBH14

PROPOSED Q.A. OFFICE – CAR PARK.
37 CARS

RELOCATE APPROVED MOD 3 CAR PARK.

0 10 METRE

Approximate area where Bonded ACM was encountered in the subsurface

1 → Photograph number and direction (refer to report text)

Approximate location of previous sample locations (Coffey, 2014)

Approximate location of previous sample locations (Coffey, 2008)

Base plan ref: Proposed Beverage Grade Ethanol Plant. Plan View. Overall Site Plan. Drawing Ref MN285-002J, Dated 31 Oct 2016.

Note – current investigation areas are shown in red outline

drawn	JB
approved	MF
date	10/10/2016
scale	As shown
original size	A3

coffey
A TETRA TECH COMPANY

client: Manildra Group Pty Ltd

project: PRELIMINARY CONTAMINATION, ACID SULFATE SOIL AND RIVERBANK STABILITY ASSESSMENT PROPOSED ETHANOL PLANT MODIFICATION MANILDRA, BOMADERRY, NSW

title: Proposed Development in Main Manildra Factory– previous investigation locations

project no:ENAUWOLL04315AA-R01 Rev 1

figure no: 2

EXISTING — BLACK.

PROPOSED MODIFICATION WORKS — RED

FENCING AND SECURITY GATES — ORANGE

TRUCK ROUTE — GREEN

TP = test pit
CBH = borehole
SS = surface sample

REMOVE EXISTING TANKS PUMP HOUSE AND PIPING FILL IN EXISTING PONDS. EXTEND AND INSTALL NEW RAIL SIDINGS.

170M

105M

EXISTING FENCE

CTP6

CBH4

EXISTING FENCE

SS24

SS7

SS19

CBH5

SS19

SS23
(Bonded ACM fragment observed on ground surfaces nearby)

SS21

SS20

SS19

Pond 2

SS1

NEW FENCE

Pond 1

CTP27

SS2

SS6

CTP7

EXISTING FENCE

EMERGENCY ISO TANK CONTAINER STORAGE.

CTP9

CTP8

CTP10

FORMER DAIRY FARMERS COMPLEX.

CBH3

EXISTING FENCE

EXISTING F

Roadway

Roadway

Approximate location of previous sample locations (Coffey, 2014)

Revision	description	drawn	approved	date
	Original	JB	MF	2 Nov 2016

Base plan ref: Proposed Beverage Grade Ethanol Plant. Plan View. Overall Site Plan. Drawing Ref MN285-011J, Dated 31 Oct 2016

Note – current investigation areas are shown in red outline

drawn	JB
approved	MF
date	10/10/2016
scale	1:600 (Approx)
original size	A3

coffey
A TETRA TECH COMPANY

client: Manildra Group Pty Ltd

project: PRELIMINARY CONTAMINATION, ACID SULFATE SOIL AND RIVERBANK STABILITY ASSESSMENT PROPOSED ETHANOL PLANT MODIFICATION MANILDRA, BOMADERRY, NSW

title: Proposed Development in Main Manildra Factory– previous investigation locations (adjacent railway siding)

project no:ENAUWOLL04315AA-R01 Rev 1

figure no: 3

CTP10

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