Urunga Antimony Processing Plant Contaminated Site - Project Application & Preliminary Environmental Assessment

Prepared for: NSW Department of Planning

Prepared by: Clayton Colmer. Senior Environmental Officer

June 12

NSW GOVERNMENT Department of Primary Industries Soil Conservation Service

On behalf of NSW Catchment & Lands – Crown Lands

DOCUMENT CONTROLS

Document Description	Urunga Antimony Processing Plant Contaminated Site - Project Application & Preliminary Environmental Assessment
Document Status	Final
Document Date	12 June 2012
Prepared for	Manager Industry NSW Department of Planning
Prepared by **Signed:**	Clayton Colmer Senior Environmental Officer – Consult Soil Conservation Service 36 Marina Drive COFFS HARBOUR NSW 2340 Phone: (02) 6691 9623 Mobile: 0437 013 126 Email: clayton.colmer@scs.nsw.gov.au 
Reviewed by	Richard Chewings Manager Natural Resource Services Catchments and Lands Level 1 45 Wingewarra St DUBBO NSW 2830

Table of Contents

Figures

Photos

1 INTRODUCTION

The Soil Conservation Service (SCS) has been engaged by the Catchments and Lands Division (Crown Lands) of the Department of Primary Industries to project manage the remediation of contaminated land at the derelict Antimony processing site in Urunga NSW.

The project is being delivered in 2 stages:

Stage 1 – Investigation and Remedial Action Plan (RAP)
Stage 2 – Implementation of RAP

Stage 1 of the works is currently underway. Stage 2 will require significant disturbance at the site for the purpose of remediation and hence is being referred to the Minister for Planning and the Director-General of Planning for approval under the *Environmental Planning and Assessment (EP&A) Act 1979.*

To enable an assessment of the planning requirements by the Minister and the Director-General of Planning, this Preliminary Environmental Assessment (PEA) has been prepared.

1.1 Purpose of PEA

This preliminary environmental assessment aims to achieve the following:

1. Provide a Preliminary Environmental Assessment (PEA) for Stage 2 of the remediation project;
2. Make a Project Application to NSW Department of Planning seeking the Director General's Requirements (DGR's) for addressing environmental factors related to the Stage 2 remediation works; .
3. Seek confirmation that the proposal for Stage 2 Implement the Remediation Action Plan, is a 'project' to which the Environmental Planning and Assessment (EP&A) Act 1979 applies;
4. Apply under section 75E of the EP&A Act, for approval of the Minister to carry out the project.

1.2 Scope of PEA

This assessment details the location and environmental context of the site and also summarises the background on this contaminated site.

It also provides an outline of the possible remediation works required to address the contamination at the site and makes a preliminary assessment of environmental factors related to the possible remediation options.

1.3 Remediation Objective

The Stage 2 remediation works proposed can broadly be classified as *environmental protection works* which intends to rehabilitate the land to a state which prevents further environmental degradation and allows natural recovery to *restore* lost environmental qualities.

The level of recovery and restoration is intended to be sufficient to enable the visual amenity of the natural environment to be improved, and that the human landuse is safely returned to a passive form of public recreation.

2 SITE DESCRIPTION

2.1 Location

The site is located on the southern side of Hillside Drive, adjacent to the Pacific Highway, approximately 1.5km from the town centre of Urunga on the mid-north coast of NSW. It is located in the eastern coastal portion of the Bellingen Shire Council local government area. A site plan is shown below in Figure 4, and the google earth hyperlink is as follows: ..\..\Data & Graphics\Urunga Antimony Site.kmz.

2.1 Land Titles

The contamination is known to be located across several land parcels (see Figure 4) :

1. Lot 1 DP 874874 (Crown Land - former Tickner property)
2. Lot 2 DP 874874 (Crown Land - former Tickner property)
3. Lot 253 DP 46013 (Aboriginal Land with excised portion to Crown Land)

The Lot 253 DP 46013 land was awarded to the Coffs Harbour Aboriginal Land Council following a successful land claim in 1985 (ALC 2128). The claim was later amended to excise the portion of contaminated land back to the Crown. The boundary of exclusion has been indicated (see Figure 1) but is not yet formally defined, awaiting the results of the Stage 1 detailed investigation.

Previous land titles historically relevant to the former Tickner parcel were Portion 169 and 138 DP 755552 which were subdivided in the 1990's to Lot 1 & Lot 2 DP 874874.

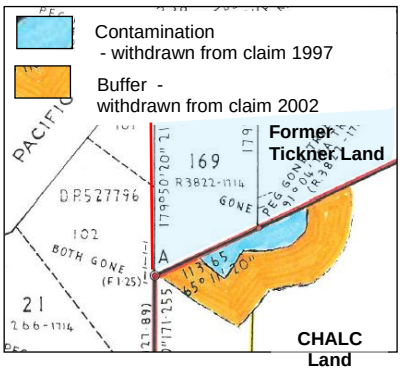


Figure 1 Excised area of land claim due to contamination

2.1 Environmental Context

Landscape:

The site is generally low lying (<10 m AHD) and occupies both the toe of a footslope of a moderate sloped ridge and also fans out into a flat estuarine coastal backswamp landscape (<2 m AHD).

Soils

Reference to the Macksville Nambucca 1:100,000 Soil Landscape Map indicates the bedrock slopes above the mill at the site is in the *Pine Creek (pn)* landscape being gravelly red kurosols. The low footslopes above the tailings area are mottled grey red clays of the *Bowra Creek (ba)* soil landscape. The wetland area below the tailings is

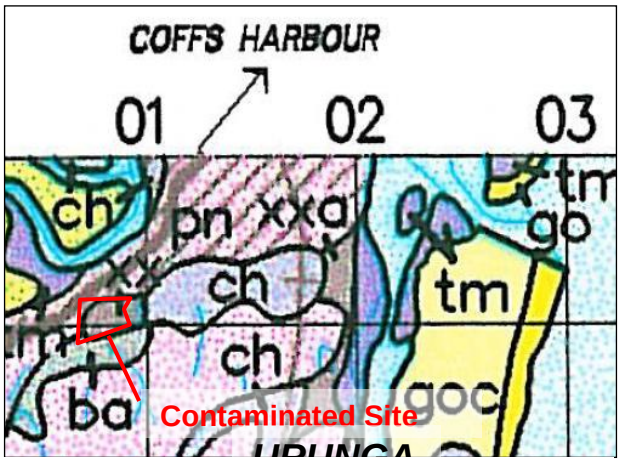


Figure 2 Extract fromSoil Landscape Map

predominantly permeable acid peats and impermeable grey humic clays of the *Charlmont (ch)* soil landscape group (typically wetlands). This soil types contains high sulphide content presumably both organic and inorganic forms.

Groundwater

Groundwater is typically at or near the surface and is suspected of being part of a 'flow through' regime from the unnamed tributary to the Kalang River and wetland below the site. The tailings material and underlying peat are expected to be highly permeable and hence the contaminants have high groundwater connectivity.

Surface Waters

The site sits between the footslope of a small ridge to the north and west and a registered SEPP 14 wetland (no. 354) to the south and east. Several small drainage lines meander through the site from the small catchment of the ridge above. Flooding of the wetland inundates the site from below. Hence the poorly drained site is impacted by surface waters.

The unnamed tributary and wetland waters flow into Station Creek and connect to Urunga Lagoon, an identified area of importance for marine aquatic ecology.

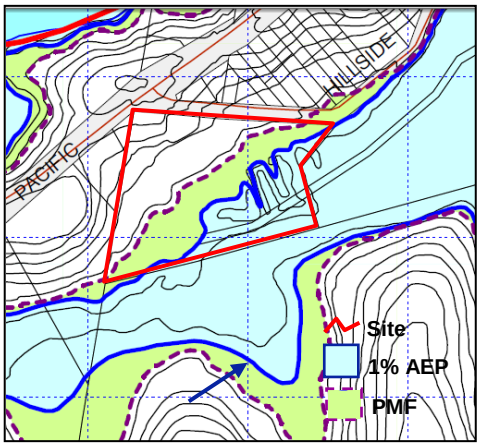


Figure 3 Extract from BSC Flood Map

Habitat

A terrestrial fauna survey of the wetland was conducted in 2001 (Body & Redpath, 2003) which identified one species listed as endangered (*Black-necked Stork*) and six species listed as vulnerable (*Australasian Bittern, Glossy Black Cockatoo, Grey Crowned Babbler, Mangrove Honeyeater, Northern Long-eared bat and Little bentwing Bat*) under the *Threatened Species Conservation Act 1995*.

Photo 1 Black-necked stork

An aquatic survey was not conducted.

Vegetation associations surrounding the wetland were also mapped by the same study which identified 55 species (none threatened) and recognised four distinct associations, being;

Swamp Sclerophyll Forest – in poorly drained areas around wetland perimeter dominated by *Melaleuca quinquenervia* (Paperbark) and replaced by *Corymbia intermedia* (Pink Bloodwood) and/or *Eucalyptus robusta* (Swamp Mahogany) where drainage is less impeded;

Wet Sclerophyll Forest - at the eastern wetland boundary with the North Coast railway dominated by Blackbutt and in association with *E. robusta* (Swamp Mahogany), *Lophostemon confertus* (Brushbox) and *Syncarpia glomulifera* (Turpentine);

Dry Sclerophyll Forest - occupies significant areas south of the wetland and has various dominants including *E. pilulauris* (Blackbutt) *Corymbia intermedia* (Pink Bloodwood) or *E. Microcorys* (Tallowood) and Allocasuarina littoralis (Black She-oak).;

Exotic vegetation – north of the wetland behind private yards dominated by garden plants and weeds.

Photo 2 Classic image of dead paperbarks in Swamp Scl. Forest

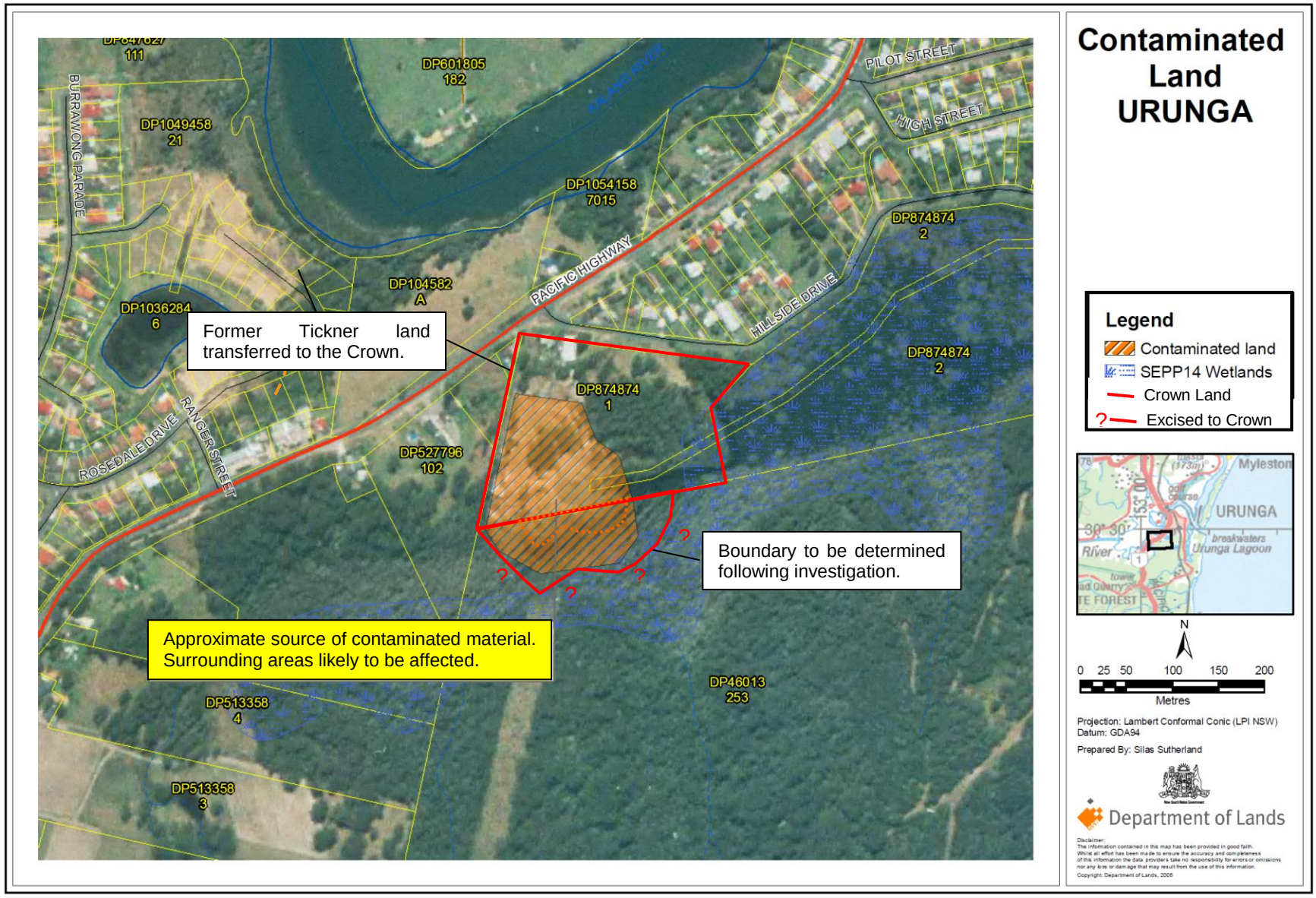


Figure 4 Site Location

3 BACKGROUND

3.1 Site History

The antimony processing plant was operated by the company "Broken Hill Antimony P.L." and processed stibnite (antimony sulphide) ore mined from Wild Cattle Creek, Dorrigo (1969-1974). In 1974, operations at the plant ceased due to the closure of mining production at Wild Cattle Creek. No clean up operations or remedial work was undertaken when the site was abandoned.

In the late 1970' s, the property and processing plant was purchased by Mr R Tickner. In 1980, "Australian Antimony N.L." applied to the Bellingen Shire Council to restart operations. The application was refused. In the early 1980's, the company excavated a series of drains to act as storage dams to supply water needed for future milling. Since then, no further development has occurred.

In 1994 Mr Tickner approached the Bellingen Shire Council to seek Development Approval for residential use of Portions 169 and 138. Approval was not given.

Crown Lands became aware of the site in 1995 when Tickner came to their counter and reported the issue. Tickner approached Crown Lands following Council refusal of a development application for a retirement village due to the contamination. Crown Lands immediately took action to protect the public by erecting fencing and warning signs.

In 1995 and again in 1997, the then Department of Land and Water Conservation (DLWC) conducted detailed investigations into contamination for the purpose of remediating the site.

Crown Lands have been seeking funding to remediate the site from numerous sources since 1997. In 2011, the Environment Protection Authority (EPA) sought to place a remediation order upon the freehold owner of the site. This resulted in an agreement to transfer the ownership of the freehold land to Crown Lands to enable remediation to occur.

The EPA is revising the order to cover the whole site and is collaborating with Crown Lands which are now responsible for the remediation.

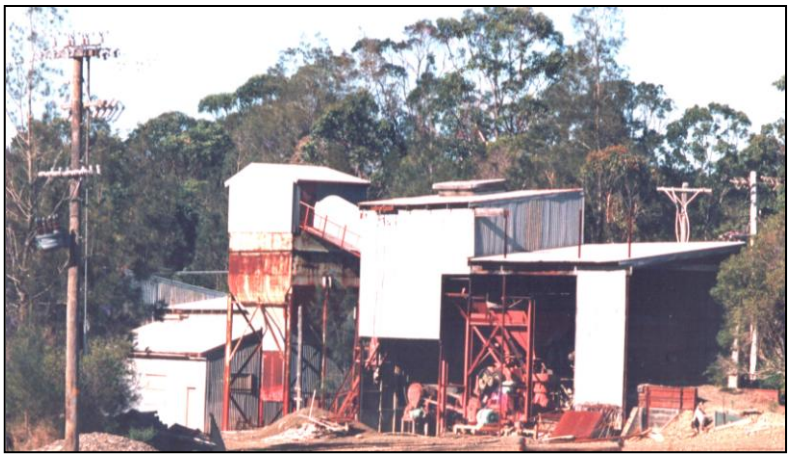
In late 2011, it was announced that the Environmental Trust had allocated $700,000 towards the project. Also, despite not being a mine site, the DPI Derelict Mines Committee has indicated an allocation of a further $700,000 towards the project in the public interest. Project planning is now underway with on-ground remediation works expected to occur in 2013.

The Soil Conservation Service (SCS) has been engaged to manage Stage 1 of the project, namely developing the remedial action plan. SCS will be utilising the services of GHD Pty Ltd to provide specialist expertise in the development of the plan.

3.2 Ore Processing

The antimony ore, stibnite (Sb_2S_3), which was transported to the mill for purification, contained impurities in the form of arsenic (as arsenopyrite) and mercury (as cinnabar). The ore was crushed, then passed through flotation cells to separate the precious metals from the rock waste. The flotation method was used to concentrate stibnite. This produced a high grade concentrate containing over 60% antimony with recoveries as high as 95%.

Reject material was dumped as tailings on the foreshore (upgradient) of the adjacent wetland. The mill operated on an open circuit basis, discharging tailings and waste water. Chemicals used during the purification process included copper sulphate, sodium cyanide, lead nitrate, dextrine, sodium ethyl xanthate and cresylic acid. Waste mill water was also contaminated with dissolved antimony and arsenic salts during treatment of the crushed ore.



All steps within the flotation method used to concentrate stibnite were performed at an alkaline pH, particularly the final flotation at pH 11.5. To obtain this pH, large amounts of caustic soda and soda ash were added.

Photo 3 Derelict Antimony Processing Mill

3.3 Contamination

The contamination at the site can be classified into three broad zones:

1. Source Zone: The deposited tailings and raw ore bodies which were dumped above and below the wetland currently covering an area of approximately 1 ha.
2. Impact Zone: The transport of sediments and leachate from the source zone into the surrounding landscape, predominantly in the wetland and likely to be mostly contained within the excavated 'L' shaped trench along the southern and eastern perimeter.
3. Receptor Zone: The wider toxicity to sensitive biota in the receiving wetland area including upstream and downstream aquatic fauna and peripheral vegetation.

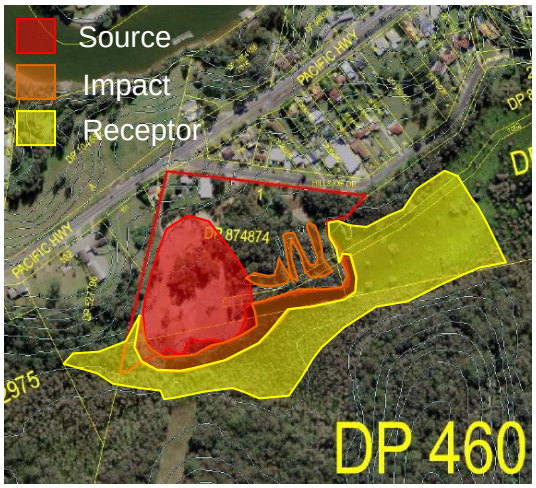


Figure 5 Indicative contamination zones

Source Zone

The source of the contamination was through the historical activities of antimony ore crushing and processing which deposited tailings in a plume across the lower portion of the site. Whilst the processing activities occurred on the Tickner land, the associated tailings spread over time to impact on an adjoining SEPP14 wetland on the Crown land.

The DLWC investigations showed an estimated 9,000m^3 of tailings, which cover over a hectare of the site, were actively eroding and high levels of contaminants including antimony, arsenic, copper, lead, zinc, chromium and mercury had been detected.

Concentrations of these contaminants were found to be several orders of magnitude above the ANZECCINH&MRC (1992) guideline values. For example, antimony was 620 times above guideline levels, arsenic (490x), mercury (S I x) copper (34x), lead (6x), zinc (5x) and chromium (2x). Metal concentrations within the tailings decreased with increasing distance from the processing plant.

Impact Zone

Contaminated water and tailings have spread downstream into the freshwater and brackish SEPP 14 wetland. The transport of these toxic materials via sediment and leachate into the wetland is thought to be partially intercepted by the 'L' shaped trench which may represent the practical limit of the Impact Zone.

Metal concentrations in the surface waters closest to the tailings in 1997 were above the ANZECC guidelines for antimony, copper, arsenic and cyanide and elevated readings were recorded for iron and aluminium. Mercury was not detected in water samples. Lead readings were restricted to the 'L' shaped trench.

Evidence of dead vegetation (*Melaleuca sp*.) occurs along the wetland periphery closest to the site.

Receptor Zone

The wider contamination of the wetland and waters flowing to Station Creek and Urunga Lagoon represents the Receptor Zone which is a threat to sensitive flora and fauna in the adjacent aquatic environment.

The DLWC report determined that within 250 m downstream of the plant, heavy metals concentrations fell within environmentally acceptable levels as per relevant ANZECC guidelines of the time. Station Creek at the far eastern end of the DLWC study area had no detectable arsenic, copper or lead.

Acid Sulfate Soil

As a complication to the site, there is a low risk of acid sulphate soil occurrence in the lower reaches of the site within the wetland peats, underlying grey clays and in the tailings. Where pyritic material is exposed to oxygen, acid generation will occur which would exacerbate the mobilisation of metal contaminates.

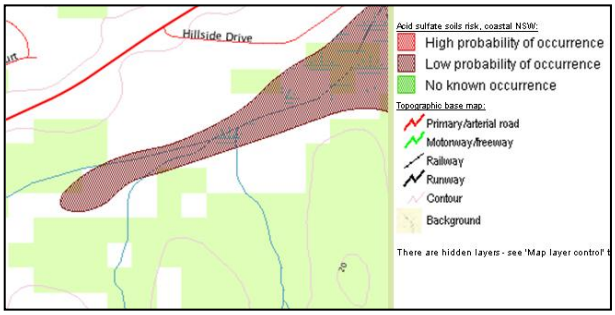


Figure 6 Extract from ASS Risk Map

3.4 Previous Reports

The list of known previous contamination investigations of the site include:

- Department of Mineral Resources – 1974 to 1977 (not located)
- Soil Conservation Service – 1984 (not located)
- State Pollution Control Commission – 1984 (not located)
- R.J.Hicks (UNE B.App.Sc Student) – 1993 (copy held)
- Department of Land and Water Conservation – 1995 (relevant material held)
- Department of Land and Water Conservation – 1997 (copy held)

The 1997 DLWC investigation summarises the preceding reports and is considered the only reliable study due to them having sufficient sampling detail to draw meaningful scientific conclusions.

3.5 Previous Remediation Options

The 1997 DLWC report considered several options for the remediation of the site, including:

i. doing nothing;
ii. on-site burial of the tailings in-situ beneath the watertable or water surfaces;
iii. excavating, relocating and burying the tailings off-site;
iv. further processing of the tailings to remove contaminants;
v. vertical mixing.

The option recommended by DLWC, was to contain the tailings on-site (No. ii) to prevent further erosion and oxidation.

A recent EPA review of the original report has suggested further investigation and reassessment of the most appropriate remediation strategy.

4 PROPOSAL

4.1 Stage 1 – Investigation and Remediation Action Plan

An investigation is currently underway to fill in the data 'gaps' from the previous investigations and hence more accurately define the quantity and quality of the contaminated material. The investigation will also aim to delineate the boundaries of the Source Zone and the Impact Zone to best determine the extent and scope of the required remediation work. Remediating the Receptor Zone is not considered feasible and will be addressed indirectly by dealing with the source and allowing natural processes to restore habitat. The results of the current investigation will be used to develop the most effective remediation options for consideration by the EPA.

The final preferred option, once approved will be detailed in a Remediation Action Plan (RAP) for subsequent implementation during Stage 2 which is the subject of this application.

4.2 Stage 2 - Project Scope

The detailed scope of the proposed Stage 2 remediation will not be available until Stage 1 is complete late in 2012. However at this preliminary stage, four broad options for remediating the site are under consideration. These are, in hierarchical order:

1. Off-site Reprocessing: Removal of source material, long haul transport, and off-site reprocessing at an appropriate ore processing facility;
2. Off-site Disposal: Removal of source material, treatment on-site, long haul transport, and disposal to a licensed facility with possible containment cell;
3. On-site Disposal: Removal of source material, treatment on-site, short haul transport for disposal to a possible containment cell on-site;
4. In-situ Containment: Leave source material in place, possible stabilisation, and construct containment system in-situ to separate from surface and ground waters.

4.3 Disturbance Activities

Generally, all four options will involve the following disturbance activities:

- excavating contaminated material within the wetland for the purpose of bulk removal or to allow construction of a barrier between the source material and the waterbodies;
- landform earthworks across the site to divert uncontaminated clean water away from the site and control the flow of surface water across the contaminated site;
- importing clean material for engineering purposes including impervious dam walls, surface capping, void filling, land reshaping or habitat purposes;
- dewatering of surface or groundwater which enters the excavation works;
- installing groundwater bores for the purpose of monitoring before and after the remediation works;

Depending on the preferred option, the following activities may also occur:

- clearing of vegetation both native regeneration and weeds, for the purpose of extracting underlying contaminated material or providing a site for on-site burial in a containment cell or similar;
- treatment of contaminated material on-site using imported stabilising agents;
- haulage of treated material off-site via public roads to a licensed receival facility for long term storage or reprocessing.

4.4 Project Strategy

Site Establishment

The remediation works will be supported by key management plans including:

- Occupational Health and Safety Management Plan;
- Environmental Management Plan;
- Soil and Water Management Plan;
- Traffic Management Plan;
- Waste Management Plan.

The site will be enclosed inside a full perimeter of security fencing (to waters edge) which will require modification or extension of the existing.

The proposed access will be relocated from the current position adjacent to the Pacific Highway to the south on Hillside Drive.

Appropriate warning signs related to construction and hazardous waste will be displayed.

The site will be cleared of residual building waste including old processing mill structures and dumped rubbish from later activities.

Photo 4 Current access gate

Excavation

Photo 5 Tailing in wetland

The scale of excavation could require full removal of at least 9,000 m^3 of contaminated material from the edge and within the SEPP 14 wetland.

The actual extent of excavation will be specifically determined during Stage 1 works.

Any excavation from the wetland will require an appropriate barrier system to contain sediment and/or leachate derived from the excavation.

Excavated material would be validated with contamination testing to determine appropriate treatment mix (not applicable if being reprocessed). Treated contaminated material would be loaded to machinery for haulage to final disposal site.

Excavation works would be supervised by qualified environmental officers.

Leachate or groundwater ingress to the excavation will require sampling and if required, treated and disposed accordingly.

Haulage

Where the preferred option requires off-site disposal or reprocessing, heavy trucks and trailers will be required to transport the material using the public road system. Estimated truck and trailer capacities ($30m^3$) requires up to 300 heavy vehicle movements.

The transport vehicle movements will require appropriate approvals by RMS, Local Councils, and EPA. Transport vehicles will be managed by appropriate logistical support (Police, route planning, timing, etc)

Importing Material & Land forming Works

Any excavation will be backfilled with soil that is deemed suitable for the final land use. The use of treated contaminated material will be investigated during Stage 1. Where materials are to be imported, they will be tested to verify classification as Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM).

Earth materials will be placed in accordance with engineering specifications and landscaping plans. A soil conservation officer will supervise the implementation of any required erosion and sediment control measures in accordance with IECA best practice guidelines.

4.5 Post Remediation Landuse

The intention of Crown Lands is to use the site as Public Open Space.

4.6 Validation

After remediation, the site will be subjected to validation testing by a NSW Accredited Contamination Site Auditor. The validation testing will confirm that contaminated material is sufficiently separated from the receiving environment and that residual contamination is below accepted thresholds for the final proposed landuse.

4.7 Monitoring

The site will be subject to ongoing monitoring post remediation. The level and scope of monitoring will depend on the remediation option however will likely include monitoring of groundwater, surface water, soil, and possibly treated contaminated material (if applicable).

5 LEGISLATION

5.1 Commonwealth legislation

Environment Protection and Biodiversity Conservation Act 1999

A search of the *Commonwealth Environment Protection and Biodiversity conservation Act* (EP&BC Act) National Environmental Significance database determined the site is near one threatened ecological community, 26 threatened species, and 21 migratory species.

Referral to the commonwealth for approval requires further investigation.

Figure 7 Extract from EPBC Act Protected Matters Report

5.2 State legislation

Contaminated Land Management Act 1997

Under Section 14 of the *Contaminated Land Management Act*, the EPA issued a final Management Order No. 20111405 (22/02/2012) on both the Tickner and Crown Land sites. The final order includes both the former Tickner land and the Crown Land.

A Remediation Action Plan (RAP) is currently being prepared for the site as part of Stage 1.

State Environmental Planning Policy No 14 (Coastal Wetlands)

The site of the contamination remediation works encroaches across a State Environmental Planning Policy No 14 (SEPP 14) Coastal Wetland (see Figure 4) and hence the provisions of the SEPP apply. However, the proposed remediation is classified as *'restoration works'* under SEPP 14 which means:

"*works that are carried out to restore or enhance the natural values of coastal wetlands in order to rectify a breach of this Policy (including works to restore or enhance plant communities, water levels, water flow and soil composition),* and *"do not have a significant impact on the environment beyond the site of the works"*

Such restoration works require consent from the determining authority, NSW Planning.

State Environmental Planning Policy No. 55 (Remediation of Land)

Reference to *Section 9* of *SEPP 55* determined that the proposed remediation work is classified as *Category 1: Remediation Work Requiring Consent* as the works are subject to another state planning policy (SEPP 14) and is to be carried out in an identified environmental protection and wetland area.

Consent to undertake the work is dictated by the relevant environmental planning instrument that applies to the land which being State Significant Development (SSD), is NSW Planning.

State and Regional Development SEPP

Reference to *Schedules 1* and *2* of the *State and Regional Development SEPP* determined that the remediation work falls under *Section 24 Remediation of contaminated land* as it is classified as *Category 1 Remediation Work*.

Hence the works are considered State Significant Development (SSD).

Environmental Planning and Assessment Act 1979

As the remediation of the contaminated site is State Significant Development (SSD), *Division 4.1* under *Part 4* of the *Environmental Planning and Assessment Act EP&A Act* applies.

An environmental impact statement must accompany a SDD application.

Protection of the Environment Operations Act 1997

Reference to *Schedule 1* of The *Protection of the Environment Operations Act (POEO Act)* shows that the remediation works would require an *Environmental Protection License* as it falls under *Clause 15 Contaminated soil treatment* as is greater than 1,000 m^3 per year.

The remediation works would also have to comply with various sections of the POEO Act related to pollution of air, noise, waters and land.

5.1 Local legislation

Bellingen Local Environmental Plan 2010

The land parcels fall across three land zonings under the Bellingen LEP 2010. These are:

R1 – General Residential
E2 – Environmental Conservation
E3 – Environmental Management

The proposed remediation works are classified as *Environmental Protection Works* under the LEP which means "*works associated with the rehabilitation of land towards its natural state or any work to protect land from environmental degradation, and includes bush regeneration works, wetland protection works, erosion protection works, dune restoration works and the like, but does not include coastal protection works".*

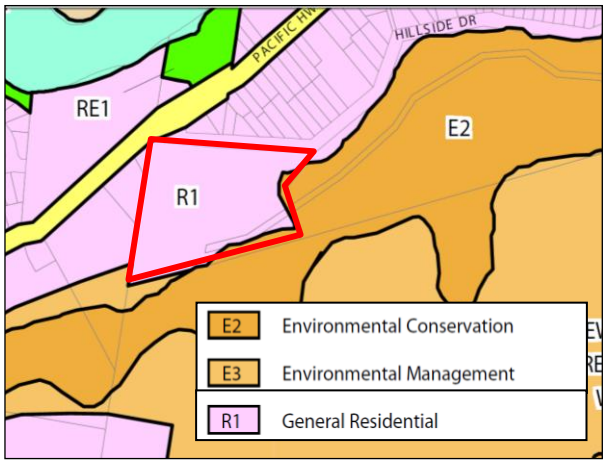


Figure 8 Extract from Belligen Shire Council LEP 2010

R1 – General Residential

The relevant objective of the zone is to ensure that any non-residential land uses permitted within the zone are compatible with the amenity of the area.

Environmental Protection Works (being other development) is permitted with consent under this zoning.

E2 – Environmental Conservation (SEPP 14 Wetland)

The objectives of E2 are to protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values. And to prevent development that could destroy, damage or otherwise have an adverse effect on those values.

Environmental Protection Works are permitted with consent under this zoning.

E3 – Environmental Management

The objectives of E3 are to protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values. And to provide for a limited range of development that does not have an adverse effect on those values.

Environmental Protection Works and *Water Storage Facilities* are permitted with consent under this zoning.

6 PRELIMINARY ENVIRONMENTAL ASSESSMENT

6.1 Environmental Factors

The following key environmental factors related to the remediation works are:

- Waste;
- Stormwater;
- Groundwater;
- Habitat;
- Air Quality;
- Dust;
- Noise;
- Traffic;
- OH&S

A preliminary evaluation of these issues is discussed below.

6.2 Waste

This proposal is primarily targeting the management of waste at the site due to it being classified as contaminated. Tailings and raw ore left in-situ have been a long term source of pollution into the downstream environment. It has caused damage primarily to the aquatic environment in the SEPP 14 wetland.

Risk

Risk associated with the management of waste is considered the most significant factor in this preliminary assessment.

i. Releasing contaminated bulk tailings or eroded sediment into the wetland and adjoining riparian land;
ii. Mixing natural acidic material with contaminated material which increases leachate into adjoin wetland;
iii. Long term containment fails causing re-dispersal of contaminants into receiving waters;
iv. Release of contaminated or acidic groundwater into adjacent wetland;
v. Loss of contaminated material (bulk, fragments, or dust) during transport along public roads impacting many users and long length of public space;
vi. Loss of contaminated material (bulk, fragments, or dust) in highly sensitive areas (residential areas, town centres and conservation areas);

Mitigation

i. Contaminated Waste is to be investigated by qualified and experienced contamination experts to determine concentrations and extent as per Stage 1 of the project (in progress);
ii. Preparation of appropriate remedial action plan (in progress);
iii. Planning approvals and cross agency input for remediation to be sought (includes this report);
iv. Implementation of remedial action plan;

v. Validation sampling and reporting post remediation;
vi. Any disposal of waste is to be in accordance with agency guidelines, approvals and licenses.

6.3 Stormwater

The site sits below a small catchment and extends into the SEPP 14 Wetland. The coastal area is also subject to high rainfall events and localised flooding. Hence stormwater influences on contamination is considered significant.

Risk

Surface water from rainfall events presents the following risks:

i. Erosion of any exposed contaminated material and transported via stormwater to accumulate in low lying area of site, predominantly the wetland;
ii. Dissolved or mobilised contaminants in stormwater passing through the site entering the wetland.
iii. Inundation by flood waters causing mass movement of contaminated material.
iv. Inundation of flood waters breaching a containment facility and releasing contaminated material.

Mitigation

i. Implement erosion and sediment controls in accordance with Urban Stormwater Manual Volume 1 7 2 (Blue Book) and IECA Guidelines;
ii. Separation and diversion of uncontaminated stormwater away or through the site;
iii. Management of stormwater from the contaminated site which may include a Sediment Retention Basin to allow treatment before discharge (if required);
iv. Remediation design to allow for flooding and expected climate change water level increases.

6.4 Groundwater

The low lying nature of the site coupled with the high groundwater levels provides a high level of sub-terranean connectivity between the contaminated tailings and the wetland.

Risk

Interception of groundwater beneath the contaminated site presents the following risks:

i. Releasing contaminated groundwater into adjacent surface waters;
ii. Mixing of contaminated surface waters with uncontaminated or lesser contaminated groundwaters;
iii. Groundwater inundating open excavations and earthen remediation structures;
iv. Groundwater infiltrating or moving through an on-site containment structure and releasing contaminated leachate.

Mitigation

i. Separate all surfaces waters (uncontaminated or contaminated) from excavations;

ii. Undertake dewatering activities in excavations, sampling, treatment and disposal as necessary;
iii. Consider impermeable barriers around groundwater inflow sections of excavations;
iv. Locate any on-site containment areas away from groundwater influences.

6.5 Habitat

The close proximity to the adjoining SEPP 14 wetland means the remediation works pose a significant risk to the aquatic and riparian habitat surrounding the site.

Risk

Undertaking remediation works produces the following risks:

i. Contaminated material enters the wetland in a short lived but high concentration pattern and increases mortality of flora and fauna both aquatic and terrestrial;
ii. Post remediation, the contaminated material at the remedial area periphery is sufficiently disturbed to increase contamination levels in the wetland;
iii. Dewatering activities or backfilling activities disturbs the water levels and changes the wetland ecotone;
iv. Clearing of native revegetation reduces habitat value for native fauna including threatened species;
v. Disrupting nesting patterns of migratory species due to noise and activity from remediation works.

Mitigation

i. Build upon existing flora and fauna study to categorise the present species and determine the impact on such species;
ii. Implement mitigation measures to lessen impact on species;
iii. Remediation works to have negligible impact outside the remediation boundary;
iv. Monitor water quality during and immediately after the remediation works.

6.6 Air Quality

Air quality is difficult to quantify at this preliminary stage.

Risk

Disruption of the tailings plume presents the following risks:

i. Releasing organic gases relating to anaerobic digestion of organic matter in or adjacent to the wetland;
ii. Exposing contaminants in the tailings plume to oxygen which may release inorganic toxic gases.

Mitigation

v. Make an assessment of risk using expert advice.

6.7 Dust

Dust is likely to be generated during unfavourable climatic conditions from excavation and stockpiling of soil/tailings and movement of heavy vehicles and plant at gate access and within site.

Risk

Generation of dust presents the following risk:

i. Carrying of contaminants into close neighbouring residential properties including pre-school. Carrying contaminants into adjoining environment;
ii. Obstructing visibility on public roads including adjoining Pacific Highway;
iii. Respiratory nuisance/aggravation for workers on-site.

Mitigation

i. Undertake dust suppression activities including watercarts, binders, sealed haul roads, sediment controls at gate;
ii. Use of PPE by on-site workers;
iii. Monitoring of dust (visual or equipment) and non-favourable weather conditions to determine course of action.

6.8 Noise

Noise will be generated by earthmoving machinery on-site to facilitate the remediation work.

Risk

i. Construction noise may disturb neighbouring receptors in residential area;

Mitigation

i. Operating hours to comply with agency guidelines or approval sought to work outside such guidelines;
ii. Machinery and equipment to be fitted with factory issued noise attenuation devices;

6.9 Traffic

Where the proposed remediation option requires off-site disposal or reprocessing, significant vehicle movements will be required along public roads.

Risk

i. Congesting traffic flow around intersection of Hillside Drive and Pacific Highway;
ii. Damaging road surface at Hillside Drive and intersection with Pacific Highway;
iii. Any material (bulk, fragments, dust) lost along public roads causes traffic hazard;
iv. Large number of escorted heavy vehicle movements along the Pacific Highway obstructs traffic.

Mitigation

i. Prepare and implement a Traffic Management Plan;

6.10 Heritage

The heritage status of the site is unknown for both aboriginal and non-aboriginal landuses.

Risk

i. Site has heritage value which will be disturbed during works;;

Mitigation

i. Conduct desktop investigations.

6.11 Occupational Health and Safety

The remediation works present a significant risk to workers on-site through contact with contaminated material.

Risk

i. Infections and diseases associated with acidic material, heavy metals, and gases;

Mitigation

i. Prepare an OH&S Management Plan.

7 REFERENCES

Kuginis,L. & Chandy, J, (1997). *Part 1 Urunga Contaminated Site: Background and Results*. Department of Land and Water Conservation - Centre for Natural Resources

Kuginis,L. (1997). *Part 2 Urunga Contaminated Site: Remediation Options*. Department of Land and Water Conservation - Centre for Natural Resources

Redpath, P. & Body, M., (2003). *Flora and Fauna Evaluation for the Urunga Antimony Contaminated Site: An inventory assessment for an EIS.*

Department of Land and Water Conservation *Macksville - Nambucca 1:100,000 Soil Landscape Series Sheet 9436. DLWC*