6. Contaminated Land

An investigation was undertaken to identify potentially contaminated sites affected by the proposed Emu Swamp Dam, and Urban and Irrigation Pipeline (the Project). The investigation focused on current and historical conditions within:

- the Full Supply Level (FSL) area of land inundation for both the Urban Water Supply Dam and the Combined Urban and Irrigation Dam;
- the land area within the projected 1 in 100 year potential flood line;
- a 200m buffer area around the FSL; and
- the land and road reserve affected by the proposed urban and irrigation pipeline routes.

Details of these activities and their relevant findings are summarised below.

6.1 Existing Environment

The methodology for the contaminated land investigation involved:

- search of the Queensland Environmental Protection Agency (EPA) Environmental Management Register (EMR) and Contaminated Land Register (CLR) of property lots within the Project;
- review of historical aerial photography of the inundation area;
- drive-by survey of the inundation area and pipeline route; and
- review of historical mining activities.

6.1.1 EMR/CLR Database

6.1.1.1 Introduction

The principal sources of land-use planning data for contaminated land in Queensland are the EMR and CLR databases administered by the EPA. The EMR is a land-use planning and management register. Land that has been or is being used for a Notifiable Activity, and of which the EPA has been notified, is recorded on the EMR. The EMR provides information on historic and current land uses, including whether the land has been or is currently used for a Notifiable Activity, or has been known to have been contaminated by a hazardous contaminant. Notifiable Activities are those that cause or are likely to cause contamination. The following list identifies thirty-eight Notifiable Activities listed under Schedule 2 of the *Environmental Protection Act 1994* (EP Act):

- Abrasive blasting
- Aerial spraying
- Asbestos manufacture or disposal
- Asphalt or bitumen manufacture
- Battery manufacture or recycling
- Chemical manufacture or formulation
- Chemical storage
- Coal fired power station
- Coal gas works
- Defence establishments or training areas
- Drum reconditioning or recycling
- Dry cleaning
- Electrical transformers
- Landfill
- Lime burner
- Livestock dip or spray race operations
- Metal treatment or coating
- Mine wastes
- Mineral processing
- Paint manufacture or formulation
- Pest control
- Petroleum or petrochemical industries
- Petroleum product or oil storage
- Pharmaceutical manufacture
- Printing
- Railway yards

- Engine reconditioning works
- Explosives production or storage
- Fertiliser manufacture
- Foundry operations
- Gun, pistol or rifle range
- Herbicide or pesticide manufacture
- Scrap yards
- Service stations
- Smelting or refining
- Tannery, fellmongery or hide curing
- Waste storage, treatment or disposal
- Wood treatment and preservation

The CLR is a register of 'risk' properties which have been demonstrated (through scientific investigation) to be contaminated land which is causing or may cause serious environmental harm . Land is recorded on the CLR when scientific investigation shows it is contaminated and action needs to be taken to remediate or manage the land.

The Registers do not provide a definitive list of contaminated or potentially contaminated properties. The Registers record properties that are known to the EPA as being contaminated or having the potential for contamination as the result of an existing or past Notifiable Activity being undertaken on the property.

It is important to note that the absence of a property from either Register does not necessarily mean that a property has not been used for a Notifiable Activity or another activity, which may have resulted in contamination.

6.1.1.2 Potential Notifiable Activities

All Notifiable Activities listed in Appendix 2 of the *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland*, May 1998 (DoE, 1998) were considered as potential contamination sources during this review. However, in a typical rural environment it is unlikely that all thirty-eight Notifiable Activities are likely to occur. The following list of Notifiable Activities likely to occur in rural environments were used as a guide in identifying potentially contaminated sites for this Project, but were not limited to:

- aerial spraying – operating premises used for;
  - filling and washing out tanks used for aerial spraying: or
  - washing aircraft used for aerial spraying.
- chemical storage (other than petroleum products or oil) – storing more than 10 tonnes (t) of chemicals (other than compressed or liquefied gasses) that are dangerous goods under the dangerous goods code;
- landfill – disposing of waste (excluding inert construction and demolition waste);
- livestock dip or spray race operation – operating a livestock dip or spray race operation;
- mine wastes - ;
  - storing hazardous mine or explosive wastes, including, for example, tailings dams, overburden or waste rock dumps containing hazardous contaminants; or
  - exploring for, or mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants.
- mineral processing – chemically or physically extracting or processing metalliferous ores;
- petroleum product or oil storage – storing petroleum products or oil –
  - in underground tanks with more than 200 Litres (L) capacity; or
  - in above ground tanks for:
  - petroleum products or oil in class 3 in packing groups 1 and 2 of the dangerous goods code – more than two 500 L capacity; or
  - petroleum products or oil in class 3 in packing groups 3 of the dangerous goods code – more than 5,000 L capacity; or

  - petroleum products that are combustible liquids in class C1 or C2 in Australian Standard AS 1940, "the storage and handling of flammable and combustible liquids" published by Standards Australia – more than 25,000 L capacity.
- railway yards – operating a railway yard including goods –handling yards, workshops and maintenance areas;
- scrap yards – operating a scrap yard including automotive dismantling or wrecking yard or scrap metal yard; and
- service stations – operating a commercial service station.

6.1.1.3 EMR/CLR Search Results

Thirty-four individual property lots were identified as being within the proposed Emu Swamp Dam and surrounding buffer area. A search was conducted of all thirty-four lots on both the Stanthorpe Shire Council's (SSC) and EPA's contaminated site registers (EMR and CLR) and found that:

- none of the lots were listed on the CLR; and
- none of the lots were listed on the EMR.

Along the proposed pipeline network, thirteen individual property lots were identified as having a potentially Notifiable Activity. Four additional properties (service stations-see below) were also identified during the drive-by survey. A search was conducted of all seventeen properties on both the SSC's and EPA's contaminated site registers (EMR and CLR) and found that:

- none of the lots were listed on the CLR; and
- fourteen of the lots were listed on the EMR (Note: an individual Service Station covered eight Lots).

The properties searched and the EPA EMR search results for properties at the proposed Emu Swamp Dam and surrounding buffer area are presented in **Table 6-1**. The properties searched and the EPA EMR search results for properties along the proposed Urban and Irrigation Pipeline route are presented in **Table 6-2** and **Table 6-3** respectively. EPA EMR search results are presented in **Appendix F.**. The location of each of the sites identified as having a Notifiable Activity is presented in **Figure 6-1**.

Table 6-1 EPA EMR/CLR search results for the Inundation Area and Surrounding Buffer

Lot Plan Number	EMR/CLR Search Results	Lot Plan Number	EMR/CLR Search Results
Lot2 RP55215	Not Listed	Lot1 RP49661	Not Listed
Lot1 RP55215	Not Listed	Lot2 RP63905	Not Listed
Lot1 RP52709	Not Listed	Lot470 B3415	Not Listed
Lot2 RP904551	Not Listed	Lot1 RP63905	Not Listed
Lot1 RP904551	Not Listed	Lot438 BNT1235	Not Listed
Lot2 RP12336	Not Listed	Lot95 BNT4	Not Listed
Lot7 RP222897	Not Listed	Lot132 SP183767	Not Listed
Lot89 RP902806	Not Listed	Lot131 SP183767	Not Listed
Lot1 RP902806	Not Listed	Lot39 RP1522	Not Listed
Lot2 RP55215	Not Listed	Lot4674 PH512	Not Listed
Lot1 RP55215	Not Listed	Lot5 RP222897	Not Listed
Lot1 RP52709	Not Listed	Lot4 RP12336	Not Listed
Lot2 RP904551	Not Listed	Lot90 BNT318	Not Listed
Lot1 RP904551	Not Listed	Lot4 SP140693	Not Listed
Lot2 RP12336	Not Listed	Lot39 (B) BNT1522 (AP3412)	Not Listed
Lot2 RP122990	Not Listed	L2 RP210334	Not Listed
Lot2 SP145917	Not Listed	Lot1 RP61938	Not Listed
Lot87 BNT288	Not Listed	Lot2 RP55216	Not Listed
Lot101 BNT728	Not Listed	Lot6 RP222897	Not Listed
Lot152 BNT574	Not Listed	Lot3 SP140702	Not Listed

Table 6-2 EPA EMR/CLR search results for the Urban Pipeline

Lot Plan Number	EMR/CLR Search Results	Lot Plan Number	EMR/CLR Search Results
Lot61 SP122464	Not Listed	Lot1 RP31766	Not Listed
Lot218 SP122460	Hazardous Contaminants	Lot2 RP59328	Not Listed
Lot4 RP41874	Not Listed	Lot5 BNT1243	Service Station
Lot42 BNT215	Not Listed	Lot285 RP12383	Service Station*
Lot2 SP145251	Not Listed	Lot286 RP12383	Service Station*
Lot221 SP122463	Hazardous Contaminants	Lot287 RP12383	Service Station*
Lot2 RP162655	Not Listed	Lot288 RP12383	Service Station*
Lot2 RP12375	Not Listed	Lot289 RP12383	Service Station*
Lot212 SP122455	Hazardous Contaminants	Lot290 RP12383	Service Station*
Lot2 RP896231	Not Listed	Lot291 RP12383	Service Station*
Lot2 RP31768	Not Listed	Lot292 RP12383	Service Station*

* This individual Service Station covers eight Lots. SSC identified all eight lots as having the same Notifiable Activity

- **Table 6-3 EPA EMR/CLR search results for the Irrigation Pipeline**

Lot Plan Number	EMR/CLR Search Results	Lot Plan Number	EMR/CLR Search Results
Lot61 SP122464	Not Listed	Lot1 RP31766	Not Listed
Lot218 SP122460	Hazardous Contaminants	Lot2 RP59328	Not Listed
Lot4 RP41874	Not Listed	Lot5 BNT1243	Service Station
Lot42 BNT215	Not Listed	Lot285 RP12383	Service Station*
Lot2 SP145251	Not Listed	Lot286 RP12383	Service Station*
Lot221 SP122463	Hazardous Contaminants	Lot287 RP12383	Service Station*
Lot2 RP162655	Not Listed	Lot288 RP12383	Service Station*
Lot2 RP12375	Not Listed	Lot289 RP12383	Service Station*
Lot212 SP122455	Hazardous Contaminants	Lot290 RP12383	Service Station*
Lot2 RP896231	Not Listed	Lot291 RP12383	Service Station*
Lot2 RP31768	Not Listed	Lot292 RP12383	Service Station*

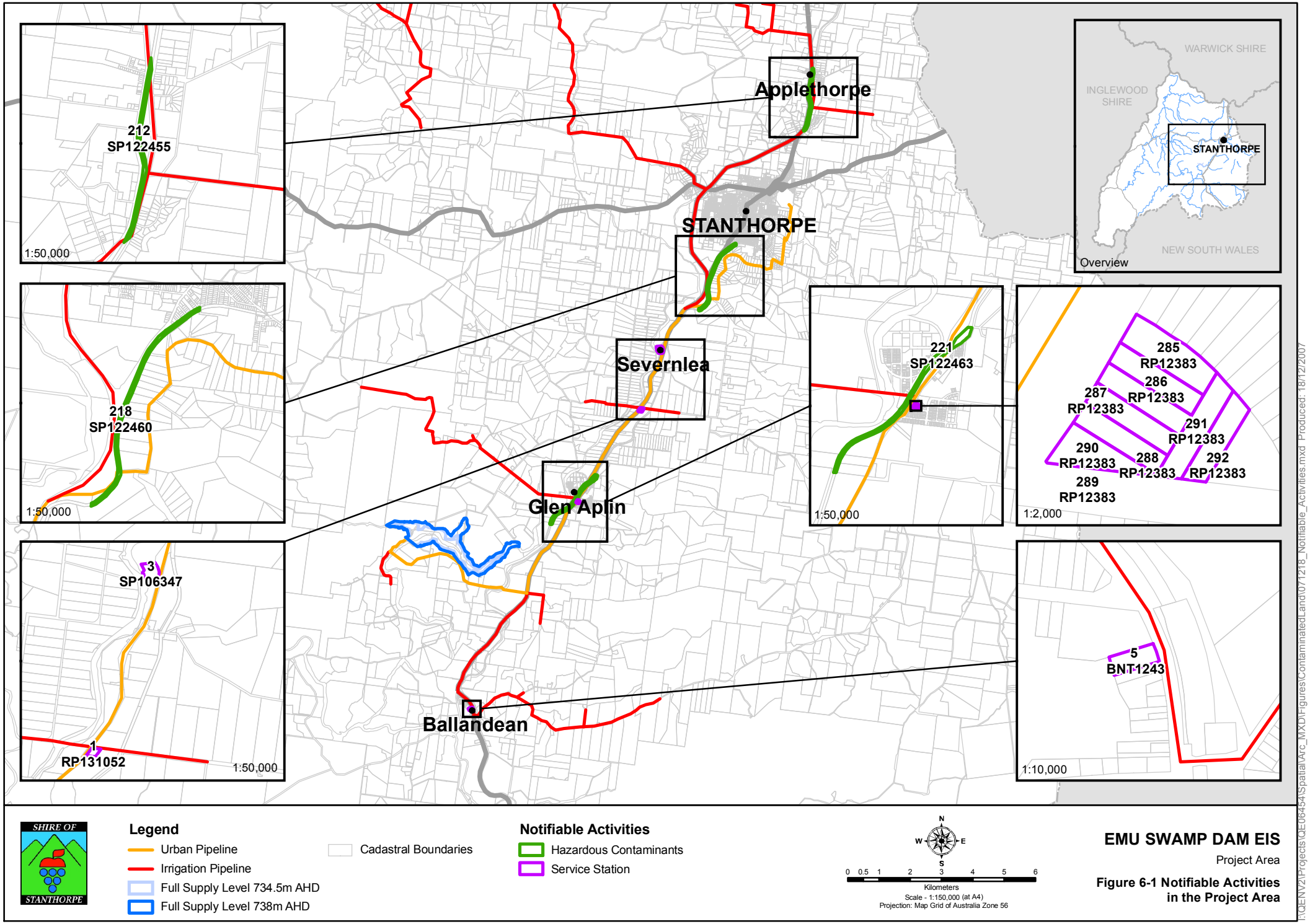
* This individual Service Station covers eight Lots. SSC identified all eight lots as having the same Notifiable Activity

6.1.1.4 Queensland Rail Land

Not all Queensland Rail (QR) land is listed on the EPA's EMR or CLR. Both QR and the QLD EPA acknowledge that past practices may have resulted in the presence of soil contaminants within any area of railway land in QLD. Potential contaminating activities that may be associated with railway land in QLD typically includes:

- disposal of ash material;
- stockpiling of fill and ballast;
- use of herbicides/pesticides; and
- petroleum product and oil storage.

Typically, QR corridor land is listed on the EMR for arsenic residue from historical herbicide/pesticide spraying. Limited soil sampling and testing has been conducted within QR corridors, however it is expected that levels of arsenic are low, as procedures usually prevented or limited the herbicide treatment in sensitive areas near residential buildings, creeks, etc. The application of herbicide was also limited by equipment, only a thin strip spray was directed onto the railway track. It is likely that residues of arsenic still exist in track formation soils as arsenates bind well to soil particles. Depending on site specific information i.e. soil type, if the land has been disturbed or if fill material has been imported, the depth of potential contamination from arsenic residue is unlikely to exceed 0.5m below ground surface and is unlikely to extent less than 2 m laterally from the centre of the track.


Applethorpe
STANTHORPE
Severnlea
Glen Aplin
Ballandean
212
SP122455
1:50,000
218
SP122460
1:50,000
3
SP106347
1
RP131052
1:50,000
221
SP122463
1:50,000
285
RP12383
286
RP12383
287
RP12383
291
RP12383
290
RP12383
288
RP12383
292
RP12383
289
RP12383
1:2,000
5
BNT1243
1:10,000
WARWICK SHIRE
INGLEWOOD SHIRE
STANTHORPE
NEW SOUTH WALES
Overview
SHIRE OF STANTHORPE
Legend
Urban Pipeline
Irrigation Pipeline
Full Supply Level 734.5m AHD
Full Supply Level 738m AHD
Cadastral Boundaries
Notifiable Activities
Hazardous Contaminants
Service Station
N
W
E
S
0 0.5 1 2 3 4 5 6
Kilometers
Scale - 1:150,000 (at A4)
Projection: Map Grid of Australia Zone 56
EMU SWAMP DAM EIS
Project Area
Figure 6-1 Notifiable Activities in the Project Area
I:\QENY2\Projects\QE06454\SpatialArc_MXD\Figures\ContaminatedLand\071218_Notifiable_Activities.mxd Produced: 18/12/2007

6.1.2 Aerial Photography Review

Current and historical aerial photography was reviewed to examine historical land use for any visible potentially contaminating activities in the inundation area for the project. Current digital imagery (2007) was supplied by Sinclair Knight Merz (SKM). Stanthorpe Shire Council (SSC) provided 2003 satellite imagery and 1999 aerial imagery of the Project area. Additionally, historical aerial photography obtained from the QLD Department of Natural Resources and Mines (DNRW) included:

- Stanthorpe 1999 (1:37,500) QAP5714, Run 6, Frame 133;
- Stanthorpe 1989 (1:25,000) QAP4832, Run 8, Frame 44 and 45;
- Stanthorpe 1972 (1:24,000) QAP2408, Run 1, Frame 58 and 59;
- Stanthorpe 1956 (1:14,300) QAP653, Run 35, Frame 41; and
- Stanthorpe 1948 (1:29,900) SVY448, Run 6, Frame 5165.

The photographs displayed the continued rural land use history of the area with small agricultural farms primarily located along the roads surrounding the proposed dam area. The 1948 photograph showed large areas of natural vegetation on both sides of the Severn River within and around the proposed Emu Swamp Dam. Agricultural farmland was concentrated primarily along the major road corridors, including the New England Highway to the east and Fletcher Road to the south, and the Southern Railway Line and Sutton Lane to the southeast. Small pockets of agricultural farmland were evident along Emu Swamp Road, immediately to the north. The majority of agricultural farmland was evident north of the proposed dam site, at the Stirling Road, Emu Swamp Road intersection.

Coverage of the 1956 photography was limited to the eastern side of the proposed Emu Swamp Dam. No significant changes were observed in the 1956 photograph from the 1948 photograph.

A significant increase in agricultural farmland, along the major road and rail corridors was evident in the 1972 photograph. Agricultural farmland extended along the entire length of Fletcher Road and was more evident along Sutton Lane and the Southern Railway Line. An increase in agricultural farmland was evident along Emu Swamp Road, Stalling Lane and in the central part of the proposed Emu Swamp Dam, on both sides of the Severn River. Large areas of natural vegetation were evident on both sides of the Severn River, primarily at the eastern and western ends, within and around the proposed Emu Swamp Dam.

Only a slight increase in agricultural farmland had occurred in the 1989 photograph from the 1972 photograph and similarly in the 1999 photograph from the 1989 photograph. This pattern is also evident in the 2003 satellite imagery and the current 2007 digital imagery.

No potential Notifiable Activities were observed in and around the proposed dam site in any of the historical aerial photographs reviewed. Historical aerial photographs of the proposed Emu Swamp Dam are provided in **Appendix F.**.

6.1.3 Drive-by Survey

SKM staff visually surveyed areas abutting all accessible roads around the proposed dam site that may be affected by the project. Small agricultural farms, rural properties, wineries, and vegetation reserves were observed during the survey. No potential contamination issues were observed during the drive-by survey within the proposed dam site area.

The drive-by survey was also conducted along the proposed pipeline network. This survey concentrated on potential contamination issues that were evident within the road corridor or immediately next to the proposed road corridor (where the proposed water pipeline is likely to go). Four potential sites were identified along the proposed pipeline network. The four properties were all active service stations (also listed on EMR – refer to **Section 6.1.1.3**).

No visible signs of contamination were observed at the four service stations. All four properties were searched on the EPA's (EMR/CLR) register. It was confirmed that all four properties were listed as having the Notifiable Activity of a Service Station. All four properties are identified in **Table 6-2** and **Table 6-3** and EPA EMR search results are presented in **Appendix F**.

6.1.4 Historical Mining Activities

Historical Mining information was sourced from the Stanthorpe and District Historical Society Inc. at the Stanthorpe Museum.

In 1872, alluvial tin was discovered in the Stanthorpe district at Paddock Creek (now Eukey), Quart Pot and Spring Creek. Fine grained tin grains were collected by panning or sluicing. Water was used to wash soil collected using a pick, shovel and wheelbarrow from in and around nearby creek beds. Trenches were also cut, by hand, into the ground in pursuit of walnut-sized pieces of ore. Large areas of ground were disturbed in obtaining the visible grains of ore with discarded spoil being left behind (Figure 5-6). The collected tin ore was then smelted into bars at Kettle Swamp near the Stanthorpe Golf Course.

The procedure of collecting the alluvial tin ore is not considered to be a contamination concern. The procedure did not include any form of mineral processing to extract the tin ore from waste material as all ore was manually washed using water to separate the heavier ore from waste material. The smelting process involved simply melting the raw tin ore and pouring the molten ore into bars for shipment.

- **Figure 6-2 Tin miners, Stanthorpe mineral district, 1873**

Source: John Oxley Library, State Library of Queensland

6.1.5 Summary

This review of contaminated land did not identify any potential contamination concerns within the proposed Emu Swamp Dam and buffer area. No potential Notifiable Activities were observed from historical aerial photographs and no potential contamination issues were observed during the drive-by survey within and around the proposed Emu Swamp Dam and buffer areas.

Historical alluvial tin mining occurred around the Stanthorpe district. The alluvial tin mining process did not include or generate any potential sources of contamination.

The following potential contamination concerns were identified along the proposed pipeline network:

- four service stations were identified south of Stanthorpe along the New England Highway. All four sites were listed on the EPA's EMR having the Notifiable Activity of a Service Station; and
- three properties (all railway corridors) were listed on the EPA's EMR having the Notifiable Activity of Hazardous Contaminants identifying these properties as having possible high levels of arsenic contamination.

6.2 Potential Impacts

Potential contaminated land impacts for the project fall into two basic categories:

- existing contamination: Potential impacts from existing contamination are likely to occur through increased contact/exposure to contaminated sites. This could include increased human contact during construction and/or post construction activities and possible human and aquatic ecosystem exposure when the dam site becomes inundated making contaminants potentially available in the water column and sediments; and
- potential Future Contamination: Potential impacts of project construction, operation and maintenance activities that could cause releases of substances that could cause land to become contaminated.

The potential for both types of impact are discussed separately below.

6.2.1 Existing Potentially Contaminated Sites

The investigation of contaminated land did not identify any existing potential contamination within the proposed Emu Swamp Dam Area. Therefore, existing contaminated land related impacts within the proposed Emu Swamp Dam Area is unlikely.

Potential existing contamination concerns along the proposed pipeline network include service stations and possible arsenic contamination along railway corridors.

6.2.1.1 Service Stations

All four service stations are currently operating as general stores/roadhouses/service stations. Sources of potential contamination from service stations would include the storage of fuel in underground storage tanks (UST) and their associated infrastructure. Potential contaminants of concern from service stations are likely to include petroleum products and heavy metals.

No sign of contamination was observed during the drive-by survey at the identified service stations. These sites will not be disturbed by project construction and it is unlikely that contamination, if present, will impact on the proposed location of the pipeline. Therefore the project does not likely require further management/remediation with respect to these sites.

There is the remote possibility that leaked fuels from these USTs could have migrated through soils and groundwater to intersect with the pipeline excavation. Potential impacts during pipeline construction and/or post construction activities, therefore, when working near or adjacent to these sites, could occur through increased worker contact/exposure if contamination is encountered.

6.2.1.2 Railway Corridors (Hazardous Contaminants)

Potential contaminants of concern at these sites include possible arsenic contamination along railway corridors.

Minimal disturbance of these sites will occur from project construction and it is unlikely that contamination, if present, will impact on the proposed location of the pipeline. Therefore the project does not require further management/remediation with respect to these sites. Although there is a low potential to disturb contaminated soil,

a suitably qualified contaminated site professional will be present on-site to observe and monitor construction activities for potential contamination and any unexpected contamination that may exist

Potential impacts during pipeline construction and/or post construction activities, if contamination is encountered, when working at, near or adjacent to these sites, could occur through increased contact/exposure to potential contamination.

6.2.2 Potential Future Contamination from Construction and Operation

Land contamination could potentially result from the spillage or on- site disposal of hazardous materials or wastes used in the construction and/or operation of the project. Project materials and wastes will be managed in a manner that will prevent such contamination. Project construction and operation activities will be managed so potential contamination will not occur from construction and operation activities that will result in land requiring listing on the EPA's CLR. Procedures for the proper storage and management of hazardous materials will be detailed in the Projects Emergency Management and EMPs.

Chemicals, fuels, oils and any other hazardous matter that, if spilled would potentially cause pollution or contamination of land or water. These materials will be stored appropriately to minimise the risk of environmental impact. Chemical storage will comply with Australian Standards and Material Safety Data Sheets (MSDS) requirements. MSDS for products kept on site will be readily available to employees and contractors.

Smaller quantities of chemicals, fuels and oils will be stored in self bunded pallets, within a bunded area in the workshop, or in a bunded container on the site. Bulk quantities of diesel will also be kept in double skinned tanks (self bunding) or within a bunded area.

Waste products, (eg oil/water separator waste, sludges and residues), will be contained within weatherproofed, sealed and bunded areas to ensure stability of the waste containment receptacles and prevent any leakages or spills causing environmental harm to soils, surface water or groundwater. Regular inspections will be carried out of the tanks, bunds and storage areas to ensure integrity.

Standard procedures for the storage, handling, disposal and spill response for potentially hazardous waste materials will follow the EMP. In the event of a large spill, sites will be investigated, managed and remediated in accordance with the requirements of the contaminated land provisions of the EP Act and the QLD EPA Draft Guidelines. Following remediation of these spills, validation sampling will be conducted to verify that remediation has been successful.

6.3 Mitigation measures

The following mitigation measures will be implemented during the construction of the proposed pipeline network as it passes by the four identified service stations:

- if possible, construct the pipeline on the opposite side of the road to each service station;
- have a suitably qualified contaminated site professional on-site to observe and monitor construction activities for potential contamination and any unexpected contamination that may exist in areas adjacent to each service station;
- ensure the construction Occupational Health and Safety (OH&S) plan contains procedures for potential worker exposure protection including detecting and managing flammable/explosive conditions and ingestion of soil and inhalation of dust; and
- ensure the Environmental Management Plan (EMP) contains procedures for the correct disposal of any potentially contaminated soil not placed back into excavation.

The following mitigation measures are recommended during the construction of the proposed pipeline network as it passes through any QR land:

- ensure the construction OH&S Plan contains procedures for potential worker exposure protection including ingestion of soil and inhalation of dust;
- have a suitably qualified contaminated site professional on-site to observe and monitor construction activities for potential contamination and any unexpected contamination that may exist in QR land; and
- ensure the EMP contains procedures for the correct disposal of any potentially contaminated soil not placed back into excavation.