



## **WEST LAKES**

### **SUMMARY OF EPA INVESTIGATIONS**

#### **RELEVANT TO THE DISPERSAL OF SLUDGE DURING THE DEVELOPMENT OF WEST LAKES**

The Environment Protection Agency (EPA), on behalf of the Environment Protection Authority has carried out investigations in areas of West Lakes in regard to the dispersal of sewage sludge. These investigations were initiated following information provided to the EPA that indicated that sewage sludge from a former sludge disposal lagoon located on the western side of the Port Adelaide Wastewater Treatment Plant (PAWTP) had been dispersed over the surface of extensive areas of the completed earthworks during the development of West Lakes. The areas initially identified as being potentially affected by the sludge included the Newport area to the north of the PAWTP, the Woodlake 6 area to the west of the PAWTP and the whole of Delfin Island.

The investigations carried out by the EPA currently have involved:

- The research and collation of historical and anecdotal information, including a review of historical aerial photographs, related to the removal and disposal of sludge from the PAWTP.
- A preliminary investigation of 18 selected public reserve areas located within the areas potentially affected. This involved the sampling of soils from 21 boreholes and the chemical analysis of 67 individual samples of the surface and near surface soils for a range of heavy metals.

The main conclusion arising from the preliminary EPA investigation was that the results indicated that there were issues identified in regard to impacts from the dispersal of sludge on public reserve areas that warranted further investigation. The findings of soil contamination in some of the reserves suggested a need for more testing.

- Further extensive investigation over the same assessment area in both public reserve areas and road reserves adjacent to the residential housing. This involved the sampling of soils from 162 boreholes and the chemical analysis of 584 individual samples of the surface and near surface soils for cadmium. An additional 78 soil samples were tested as part of the quality assurance quality control procedures.

## **Historical and Anecdotal Information:**

A summary of the historical and anecdotal information related to the dispersal of sludge during the development of West Lakes is provided separately from this synopsis. The following information is a summary of historical information related to the PAWTP and the former sludge lagoons.

The PAWTP commenced operations in the 1930s and treated sewage and wastewater from the wider Port Adelaide and Woodville areas, including large industrial areas. Initially six drying beds were utilised for the drying of sludge until larger disposal areas were established following extensions to the treatment works. The larger disposal areas included:

- A southern sludge lagoon of approximately 5.1 hectares which was located to the south of the plant in a low-lying area of land. This area was used for sludge disposal from about 1952 to 1964. The sludge was subsequently covered with soil and the area was initially used as the West Lakes development office and depot and a depot for the dredging contractor engaged to dredge the waterways at West Lakes. The area now includes the City of Charles Sturt depot, the eastern portion of Lochside Drive, approximately 8 residential properties to the west of the Council depot, and possible part of the north eastern corner of the Riverside Golf course.
- A western sludge lagoon of approximately 7.7 hectares was formed to the west of the plant and was used from the mid 1960s until 1977. West Lakes Ltd acquired a portion of this area, removed the sludge and filled the lagoon with soil for redevelopment for residential housing. The sludge from the remainder of the lagoon, within the PAWTP was also removed and the lagoon filled as part of the rehabilitation of the plant to provide a buffer zone between the plant and the residential development. The sludge from this lagoon is the sludge of most interest in relation to the dispersal of sludge in the West Lakes development.

The portion of this western lagoon used by West Lakes Limited now includes the residential areas in the area of Lakeview Avenue, Frome Crescent, Eildon Court and Yampi Place.

## **Chemical Analysis of Sludge:**

The sewage sludge, due to the probable treatment of a wide range of industrial and domestic wastes, potentially included a wide range of chemical substances. Chemical analysis for an extensive range of organic and inorganic chemical compounds was carried out and the Department of Human Services has advised that cadmium is the element of principal interest with respect to any potential risks to human health. Other heavy metals, including copper and zinc, are contained in the sludge and may exceed acceptable health based levels but the management of risks arising from cadmium would provide adequate protection of human health for these other elements. All other organic and inorganic compounds were considered to not pose unacceptable risks to human health.

## **Guideline Investigation Levels:**

The National Environment Protection (Assessment of Site Contamination) Measure, 1999 (NEPM) defines “Background concentration” as the naturally occurring, ambient concentrations of chemical substances in the local area of a site.

A number of studies have attempted to determine background concentrations of heavy metals in soils in Australia and in South Australia. The Contaminated Sites Monograph Series No 4, 1995, “Trace Element Concentrations in Soils from Rural and Urban Areas of Australia” was a study undertaken across Australia. This publication also contains reference to other studies including those by K. G. Tiller from the CSIRO, data from the South Australian Housing Trust collated by Mr P Torr, EPA, South Australia, and ANZECC/NHMRC Guideline Background Concentrations.

This information indicates that background concentrations vary across Australia and South Australia. For instance the background concentrations of cadmium in urban areas in South Australia are usually around 1 mg/kg or less and rarely above 3 mg/kg.

For the purposes of initial comparison of results from this investigation, the Interim Urban Ecological Investigation Levels, as listed in the NEPM, are used (for cadmium this is 3 mg/kg).

The NEPM also provides health based investigation guideline levels for a range of exposure settings. For example, the investigation guideline levels for cadmium are listed as:

20 mg/kg - for ‘standard’ residential with garden/accessible soil (home-grown produce contributing less than 10% of vegetable and fruit intake; no poultry); and

40 mg/kg – parks, recreational open space and playing fields.

It is essential that the numbers listed are not used indiscriminately but are interpreted with adequate knowledge of their derivation and limitations. They should also not be interpreted as indicating actual risks to human health or default levels for clean-up action as professional judgement should always be exercised and this may entail a site specific risk assessment.

The numbers listed in the NEPM can however be used to indicate that further assessment may be required to adequately assess any potential risks to human health and the environment.

## **Outcomes of EPA Investigations:**

Regarding the issues being addressed, the EPA investigations, together with the currently available historical information, now indicate that:

1. Sewage sludge from the sludge lagoons formerly part of the Port Adelaide Wastewater Treatment Plant was not used as general landfill in the major earthworks undertaken at West Lakes.
2. The sewage sludge from the former western sludge lagoon was spread on the surface of the completed earthworks only in specific areas of West Lakes essentially to allow the sludge to dry.
  - This operation only commenced in September 1977, nearly 6 months after the official opening of the West Lakes development.
  - Information suggests that some of the dried sludge may have been removed and used for other purposes, including the making of fertiliser.
  - However, information also suggests that some of the sludge may have been disposed in some reserve areas (presumably as a fertiliser), ploughed into the surface soils (in some discrete areas), or the remnant sludge (remaining after removal of the dried sludge for other purposes) mixed with surface soils (in some discrete areas) during subsequent development works.
3. An extensive range of chemical testing was carried out on the original sludge material. The Department of Human Services advise that cadmium is the element of principal concern with respect to any potential risks to human health from the dispersal of the sludge material.
4. The following areas are not affected by the dispersal of sludge:
  - The public waterways and the beaches on Delfin Island; and
  - The residential areas outside the initial assessment area.
5. The major part of Delfin Island is unlikely to be affected by the dispersal of sludge but this needs to be confirmed by the sampling and testing of soils within a proportion of residential properties. The part of Delfin Island where this does not apply is located in the northeastern area where further assessment is required.
6. The following other areas within the assessment area are potentially affected by the sludge and would require further assessment:
  - Some public reserve areas where sludge may have been placed on the surface prior to completion of the additional landscaping works at those reserves;
  - Some limited residential areas of West Lakes including:
    - Those areas where remnants of the sludge may have remained after removal of the dried sludge; and

- Those areas located over, or in the immediate vicinity of, the former sludge lagoons where possible layers or isolated pockets of buried sludge may exist.
7. Groundwater in the shallow aquifer (at approximately 3 to 4 metres below the surface) may be affected by heavy metals (not necessarily from the sludge) in the West Lakes development area and should not be used for any purpose until further notice. The Department of Human Services has issued a warning to this effect.

The EPA will continue to address the issues related to the dispersal of sewage sludge in the affected areas. An investigation strategy has been developed and this includes:

- The EPA will offer to carry out the sampling and testing of soils in residential properties on Delfin Island (in those areas indicated by the outcomes of the EPA investigations that may not be affected by the sludge). This will be subject to the desires (and approval) of the owners of residential properties to confirm that these properties are not affected by the sludge;
- The EPA will carry out further intensive investigation (in reserves and residential properties) in those areas where current information indicates that properties may be affected by the sludge;
- The EPA will carry out investigations of surface and near surface soils in selected public reserves in the wider West Lakes development area to confirm that the sludge was not transported and disposed in these reserves;
- The EPA will also carry out assessments into the quality of groundwater in the West Lakes region. This work will commence as soon as possible, initially in the areas near the PAWTP in conjunction with the work recently carried out at the PAWTP (by SA Water) and the Council Depot site (by the City of Charles Sturt). The work will include any licensed or unlicensed bores located in this area. The need for assessment of groundwater quality in the wider areas of West Lakes will be determined following the outcomes of this work, and other information that is available, with respect to the general quality of groundwater in this area.

The Department of Human Services reassures residents that the risks to human health in all of the areas that may be potentially affected by the sludge are minimal except for those few people with significant and long term exposure from home-grown produce or from contaminated surface soils. DHS will continue to communicate with, and provide advice to, residents who may have particular concerns.

The EPA considers that those residents in areas not affected by the dispersal of sludge should be able to continue their everyday lives in the manner that they choose.

The EPA also considers that, in those areas where further investigation is warranted, residents should be able to continue their everyday lives with minimal interruption subject to any advice from, or precautions recommended by, the Department of Human Services. The EPA requests that residents in these areas provide assistance to the EPA, as appropriate, to continue to address the unresolved issues related to the sludge.