



# **Preliminary Land Capability, Salinity and Contamination Assessment - Ingleside Release Area, Ingleside NSW**

## **DRAFT EXECUTIVE SUMMARY**

**For: NSW Department of Planning & Environment**

**NOVEMBER , 2014**

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# 1 EXECUTIVE SUMMARY

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## 1.0 Introduction

SMEC Australia Pty Ltd (SMEC) was engaged by NSW Department of Planning & Environment (DP&E) to prepare a Land Capability, Salinity and Contamination Assessment for the Ingleside Release Area, Ingleside NSW. This report is a technical paper developed to inform the precinct planning process for Ingleside. The precinct planning is being developed as a partnership between the Department of Planning and Environment, Pittwater Council and Urban Growth NSW.

The Ingleside precinct occupies approximately 715 hectares within Pittwater Council Local Government Area (LGA) and is located approximately 20 km north-east of the Sydney CBD.

It is understood that the Draft Structure Plan will accommodate a mixture of land uses including environmental living, low and medium density dwellings (and a range of other land uses) in the future, in order to meet the strategic planning requirements of the NSW State Government (see Figure 1).

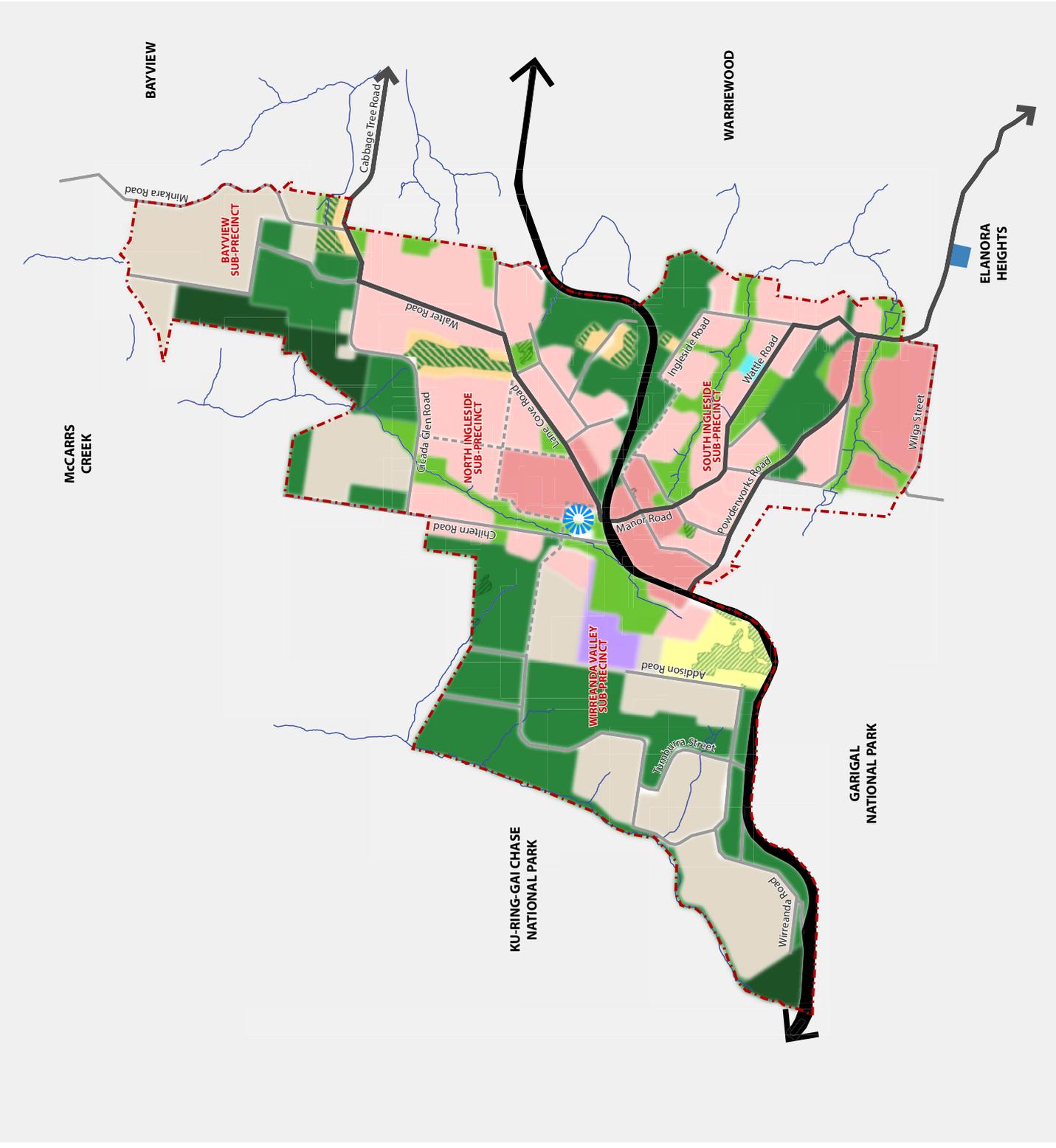


Figure 1: Ingleside Precinct Map

DRAFT STRUCTURE PLAN

**KEY**

- Precinct Boundary
- Open Space
- Land Proposed for Conservation
- Existing National Park Estate
- Vegetated Corridor (Private Land)
- Endangered Ecological Community
- Low Density Residential
- Medium Density Residential
- Environmental Living
- Rural Lots
- Existing School
- Proposed Neighbourhood Centre
- Existing Elanora Heights Shops
- Bahai Temple
- Sydney Water

0 200m 400m 600m 800m 1km

## 1.1 Objectives

The key objectives of the Land Capability, Salinity and Contamination Assessment for the subject area were to:

- Identify and map soil landscapes within the subject area and the limitations of the land.
- Undertake limited salinity and contamination soil sampling and analysis.
- Assess and provide recommendations for slope stability across the precinct.
- Identify any potential areas of concern from a contamination perspective.
- Map the suitability of land for urban development.
- Provide recommendations for any additional investigations to be undertaken prior to commencing urban development in the precinct.

This report has been prepared for NSW Department of Planning and Environment. The findings of this report are based on a defined scope of works. SMEC performed the works in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession.

The purpose of this report is to provide a preliminary assessment of Land Capability, Salinity and Contamination characteristics of the Ingleside release area. This report does not provide a complete assessment of the defined subject area or the surrounding area.

The absence of any identified hazardous materials within the subject area should not be interpreted as a guarantee that such materials do not exist. As this is a preliminary, broad scale Land Capability assessment, it is not intended to be comprehensive.

The findings of the report are based on a review of desktop information, limited soil sampling and visual observations only and are therefore merely indicative of environmental condition.

No warranty, expressed or implied, is made as to the information and professional advice included in this report. This document has been prepared in good faith and no responsibility can be accepted for inaccuracies contained in any information provided third parties.

The report shall only be used for the purposes stated in the signed contract and shall not be relied upon by any party other than the NSW Department of Planning and Environment for the Ingleside Release Area project.

## 1.2 Land Capability Assessment

### 1.2.1 Scope of Works

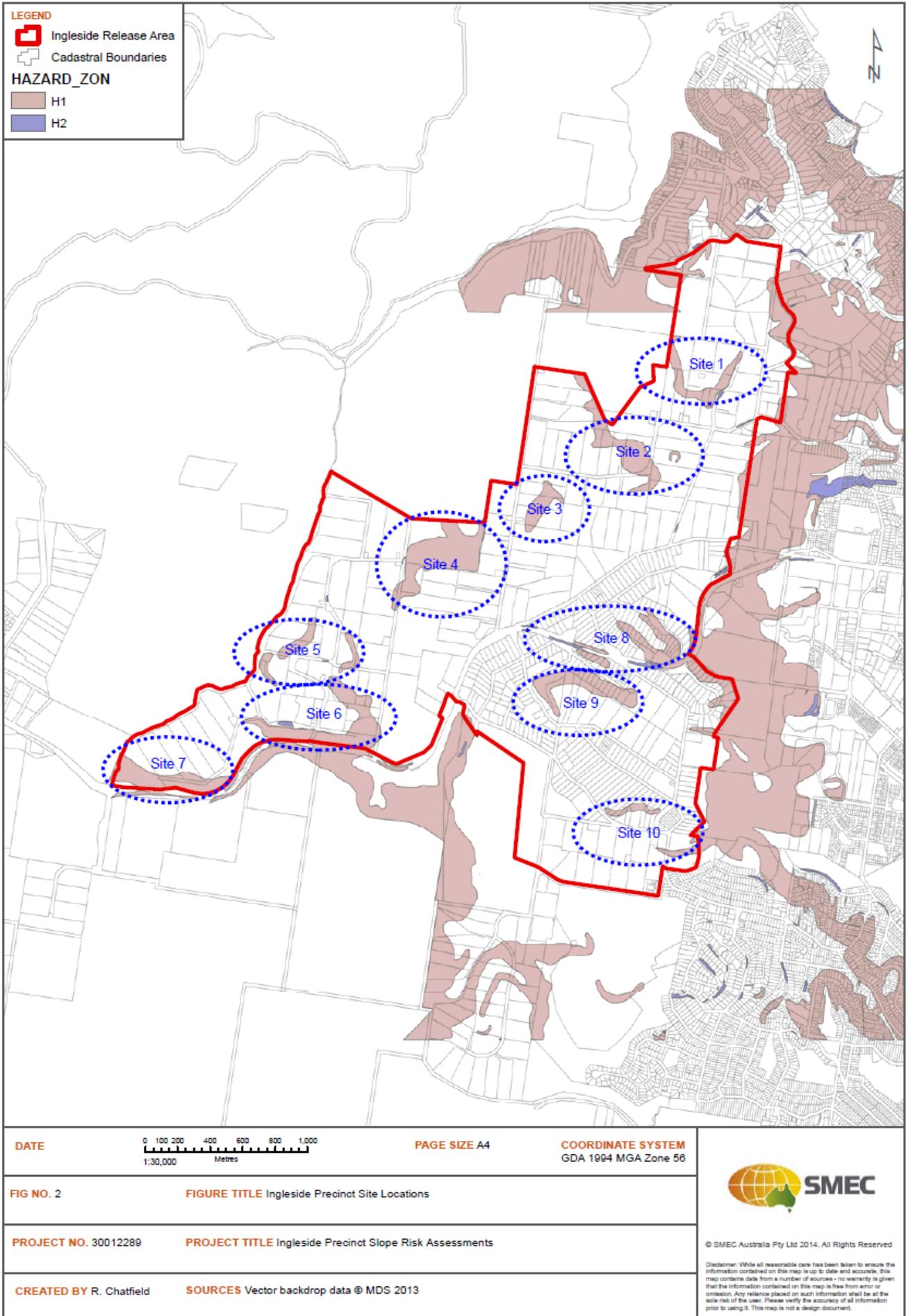
Based on the original scope of works it was planned to undertake intrusive ground investigations across the area to determine the ground conditions and allow detailed slope stability assessments to be undertaken. Subsequent constraints around site access meant that an intrusive ground investigation was not possible, therefore, SMEC has undertaken a visual slope risk analysis of 10 previously delineated set zones within the Ingleside Precinct (see Figure 2).

Specifically, the revised scope of works for the Land Capability assessment comprised:

- Site inspection of the ten sites to identify slope characteristics as visible from the road side or clearly identifiable public land.

- Identify current and potential slope failure mechanisms to inform a slope risk assessment.
- Categorise slope mechanisms in accordance with the Landslide Risk Management guidelines dated March 2007 by Australian Geomechanics Society (AGS, 2007).
- Conduct a risk estimation of identified slope mechanisms (i.e. comparative analysis of likelihood of a slope failure versus consequence of the failure).
- Evaluation of the estimated (assessed) risk by comparing against acceptance criteria.

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## 1.2.2 Assessment

Soil landscapes found in the Precinct are identified in Figure 3 (Figure 3 Soil Landscapes/Acid Sulfate Soil). The Land Capability Assessment included a site inspection at slope risk analysis of 10 previously delineated set zones within the Ingleside precinct to identify slope characteristics, identify current and potential slope failure mechanisms to inform a slope risk assessment and categorise slope mechanisms in accordance with the Landslide Risk Management guidelines by Australian Geomechanics Society (AGS, 2007).

Based on the findings of the slope risk analysis, it has been established that the tolerable risk to property for the identified failure mechanisms has not been met, as the risk for study is classed as medium. Recommendations to reduce the risk to tolerable levels may include; scaling the slope, installation of rock bolts and consideration of development location. These risk analyses were based on high level observations. The analysis is conservative because comprehensive and detailed geological mapping of the site was not possible. As such it should be noted that there may be other active or potential slope mechanisms that were not identified. On this basis it is recommended that for any site development a specific slope stability assessment should be undertaken to assess the slope risk based on a detailed site inspection or investigation.

The subject area is considered to present as a high erosion hazard due to the typical characteristics of a colluvial and erosional soil landscapes combined with high rainfall intensity which can generate high soil loss. This high erosional hazard implies that significant erosion will occur during development and after land use is established, even with intensive soil conservation measures. Such erosion hazards infers that planning will need to carefully consider the balance between the probability of long term erosion damage and maintenance or repair needed to ensure the viability of the land use. Where practicable, construction programing should aim to minimise the potential for soil loss by condensing the time from the beginning of land disturbance activities to rehabilitation.

The soil landscapes within the Wirreanda Valley area present a number of soil related environmental constraints for on-site sewage management systems. Soil depths of less than 0.6 metres to bedrock may not have enough capacity to filter nutrients and pathogens. Shallow soil often has a highly variable depth, and incurs a risk of effluent surfacing near the land application area.

SMEC has been advised that existing development in Wirreanda Valley is likely to remain serviced by on-site sewage management systems. The soil landscapes within the Wirreanda Valley area present a number of soil-related environmental constraints. Soil depths of less than 0.5 metres to bedrock may not have enough capacity to filter nutrients and pathogens. Shallow soil often has a highly variable depth, and incurs a risk of effluent surfacing near the land application area. Any decisions about the on-site management of sewage should consider these issues.

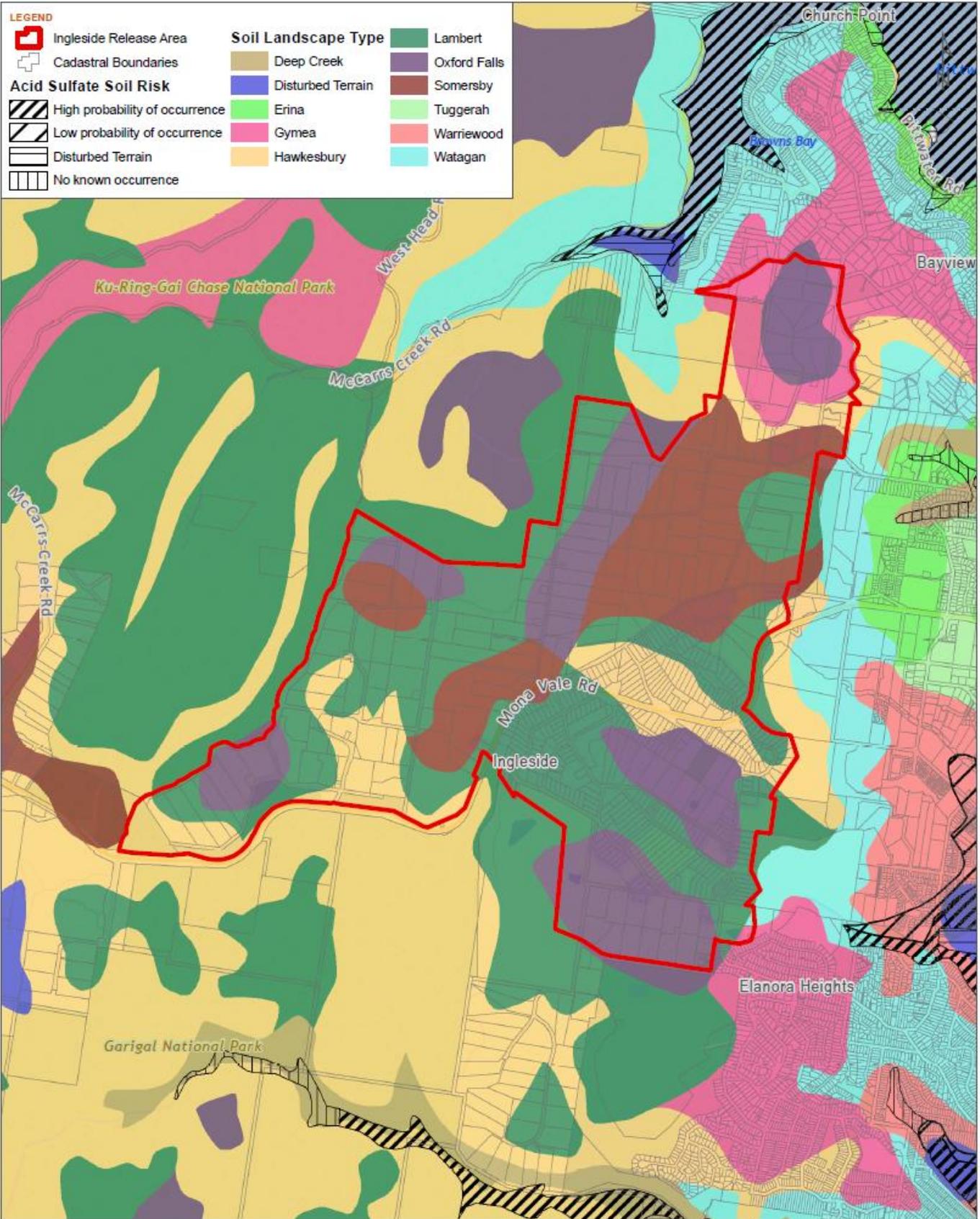
Soil landscapes in the broader subject area can be typically <0.5 metres in the Hawkesbury, Gymea and Lambert soil profile and can present wide sandstone benches on side slopes and with associated rock outcrops. These soil landscapes are characterised by low water holding capacity, low to very low cation exchange capacity (CEC), and low nutrient status. They can be seasonally waterlogged with connected seepage areas and may also seasonally feed into hillside wetlands. Soil depths to bedrock can marginally increase in the Somersby and Oxford Falls soil landscapes with ranges of 0.5–1.0 m.

It is important that on-site sewage management issues are addressed as early as possible in the planning and development process as existing and proposed on-site sewage management within the subject area has potential to impact on the natural and managed

parts of the water cycle through pollution of ground and surface waters with pathogens and nutrients. Moderate soil limitations can sometimes be overcome by appropriate selection, design, and sizing of on-site systems, or by modifying the site.

Ideally, the assessment proceeds from a broad evaluation and desktop analysis to more detailed survey work to ascertain the minimum land application area requirements for on-site sewage management, being the main determinant for likely subdivision potential at these locations.

This study indicates that the regional groundwater flow direction is expected to generally flow to the north-east in accordance with the general site topography with localised variations in areas located nearer to water bodies and creek lines. Local groundwater can present occur at depths ranging from 10-20 mgl and regional groundwater are likely to be deeper at 100-200 mgl. Water quality information contained within the bore logs is limited; however, information that is provided identifies salinity characteristics as good, which indicates reasonable water quality and non-saline groundwater conditions are likely. The limited soil samples collected and analysed for salinity also indicate a 'Non-saline' classification for soils.



<b>DATE</b> 04/08/2014	0 100 200 400 600 800 1,000 1:30,000 Metres	<b>PAGE SIZE</b> A4	<b>COORDINATE SYSTEM</b> GDA 1994 MGA Zone 58	 <p>© SMEC Australia Pty Ltd 2014. All Rights Reserved</p> <p>Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources - no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of all information prior to using it. This map is not a design document.</p>
<b>FIG NO.</b> 3	<b>FIGURE TITLE</b> Soil Landscapes/Acid Sulfate Soil			
<b>PROJECT NO.</b> 30012289	<b>PROJECT TITLE</b> Ingleside Precinct			
<b>CREATED BY</b> R. Chatfield	<b>SOURCES</b> Vector backdrop data © MDS 2013			

## 1.3 Salinity Assessment

### 1.3.1 Scope of Works

The scope of works for the salinity assessment comprised the following:

- A review of available preliminary soil information to determine soil conditions and salinity potential within the subject area.
- Collection and laboratory analysis surface soil samples (including QAQC) from accessible locations within the subject area.
- Laboratory analysis of soil samples for Electrical Conductivity (EC), pH, sulfate and chloride.

### 1.3.2 Assessment

With regard to the salinity investigation, the following is concluded:

- There is no known occurrence of salinity within any of the soil units (Somersby, Oxford Falls, Hawkesbury, Gynea and Lambert) mapped within the subject area.
- All soil samples obtained and analysed from the subject area were <2 mS/cm and therefore classified as being non-saline.

Based on the information presented above, a salinity management plan is not considered necessary and no further assessment of soil salinity within the subject area is required.

## 1.4 Land Contamination Assessment

### 1.4.1 Scope of Works

In order to determine the potential for land contamination and particular environmental constraints in the subject area, a Phase 1 Preliminary Environmental Site Assessment (PESA) with limited surface soil sampling was conducted.

The scope of works for the ESA comprised the following:

- Review of available documentation relating to the subject area to identify potential sources of contamination associated with current and historical land use; including:
  - Current and historical aerial photographs.
  - Soil, acid sulfate soils, geological and hydrogeological maps and information.
  - Groundwater borehole database search.
  - Environment Protection Authority (EPA) regulatory database searches.
- A detailed desktop assessment of the subject area to evaluate the risks of contamination within the subject area and identify locations where contamination may pose a potential risk to human health or the environment.
- A general site inspection of the subject area.
- Limited surface soil sampling at accessible locations within the subject area.
- Identify areas where further investigation may be required to characterise the nature and extent of any potential contamination.
- Preparation of a Draft Land Capability, Salinity and Contamination Assessment report presenting information gained during the above tasks.

- Preparation of Final Land Capability, Salinity and Contamination Assessment report including consideration of comments from relevant stakeholders.

### 1.4.2 Assessment

With regard to the contamination investigation, the following is concluded:

- The subject area contains a number of existing land uses and zonings including recreational, private residential, commercial/industrial, schools, hobby farms and nursery related uses.
- The subject area comprises 5 soil landscapes: Gymea, Oxford Falls, Hawkesbury, Somersby, Lambert.
- There is no known occurrence of acid sulfate soils within any of the soil units (Somersby, Oxford Falls, Hawkesbury, Gymea and Lambert) mapped within the subject area. Given the mapped soils units and elevation of the subject area (generally >100m above sea level) ASS are not considered to present a risk within the subject area.
- No soil sample obtained from within the subject area exceeded the adopted site assessment criteria.
- OC pesticides (DDE 0.13 mg/kg) were detected at levels marginally above the LOR (but below site assessment criteria) in sample S38. The sample was obtained from within the vicinity of Powder Works Nursery located on Wilson Avenue.
- PAHs (sum of total 1.3 mg/kg), TRH C10-C40 (210 mg/kg) and TPH C29-C36 (100 mg/kg) were detected at levels either equal to or marginally above the LOR (but below site assessment criteria) in sample S164. The sample was obtained from an undeveloped bush lot. It is assumed that the minor levels PAH and hydrocarbons detected are probably reflective of vehicle emissions within the area.
- Potential high level AEC, from a contamination perspective, that could exist throughout the subject area include:
  - The use of uncontrolled fill material.
  - Industrial facilities and vehicle / equipment maintenance.
  - Small farm holdings / market gardens and nurseries.
  - Existing buildings and site structures.
  - Septic effluent systems.
  - Fly tipping.
- Given the general history of land use within the subject area it is expected that any identified contamination would likely to be limited to relatively localised areas.

With regard to the contamination investigation, the following is recommended:

- The contamination status of each site should be further assessed as part of any future DA process. This may require further assessment of soil and groundwater conditions.
- A Remediation Action Plan should be developed to manage potential sources of contamination should they be identified during additional investigation stages.