



Nebraska Estate, St Georges Basin

Primary Erosion and Sediment Control Plan - Lot Based Development

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Standard Erosion Control Measures

1.0 INTRODUCTION

1.1. Purpose

Changes in land use from rural and bushland settings to other forms have the potential to:

- cause dramatic disturbances to the soil
- destroy vegetation
- alter natural drainage pathways
- affect the environmental and amenity values adversely, not only at the site, but areas downstream of it.

To minimise the potential for this to occur all builders/developers are required to prepare an Erosion and Sediment Control Plan showing they will minimise soil erosion and trap sediment that may be eroded from the site during the construction of any works requiring a development consent that involves the disturbance of the ground. The complexity of the Plan depends upon the nature and the scale of the particular development, especially the amount of land likely to be disturbed.

This plan will form the initial link in the chain to minimise on-site erosion and off-site sedimentation and therefore adverse environmental impacts associated with lot based development within Nebraska Estate.

1.2. Project Description

Nebraska Estate was a 'paper subdivision' registered in 1919 and released without any infrastructure to support its development. At the time of preparing this report, the land has very limited development potential due to the relevant planning controls. The land has generally remained undeveloped and un-serviced bushland with the exception of a few existing authorised structures.

After numerous studies and public exhibitions Council adopted a Planning Proposal based on a constrained development option that would enable up to 23 dwellings to be approved. The Planning Proposal was submitted to the Department of Planning and Infrastructure in late 2014.

1.3. Scope of this Plan

The purpose of this document is to serve as a primary broad based erosion and sediment control plan (ESCP) to outline the requirements and fundamental principles that must be followed in the planning and implementation of erosion and sediment control measures for the construction of lot based development, including dwellings and driveways.

This Primary ESCP will need to be supplemented by a site specific erosion and sediment control plan (i.e. a drawing) prepared for each individual property by the owners builder or consultant.

1.4. Legislative Requirements

The key environmental legislation relating to soil and water quality management includes:

- The Protection of the Environment Operations Act 1997 (POEO Act)
- The Environmental Planning and Assessment Act 1979 (EP&A Act)

1.5. Supporting Documents

This document should be read in conjunction with the following supporting documents:

- Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom, 2004).
- Planning for Erosion and Sediment Control on Single Residential Allotments (<http://www.environment.nsw.gov.au/resources/stormwater/ErosionSedFlyer.pdf>)

2.0 SITE CHARACTERISTICS

2.1. Topography

The subject land is characterised by undulating slopes and three broad drainage depressions, draining to St Georges Basin at Home Bay via three unnamed watercourses and shown in Figure 1.

The south western and south eastern edge of the site are bounded by unnamed water courses, with the third water course running through the centre from north east to south west. The entire site thus comprises of four main sub-catchments separated by one ridge orientated north to south, and another orientated north east to south west.

The land is generally gently inclined with slope ranges of between 0-5° and elevations ranging between 2 and 22 metres AHD.



Figure 1 - Elevation of Subject Land (source SCC On-Site Effluent Disposal Assessment)

2.2. Soils and Geology

The geology of the area is dominated by Shoalhaven Group (Permian sedimentary formations) with the exception of Quaternary alluvial deposits in lower areas and creek lines.

The Land Capability Assessment conducted by Morse McVey & Associates Pty Ltd in 1994 identified two soil landscapes:

- Wandrawandian – occurs on crests and side slopes. Duplex (textural contrast) soils (typically clay loam topsoil over light-medium clay subsoil). Topsoil limitations include high erodibility, low fertility and strong acidity. Subsoil limitations include moderate to high erodibility, low fertility, strong acidity, potential aluminium toxicity and poor drainage.
- Tomerong Creek soil landscape – occurs on the lower lying land associated with the un-named watercourses. Characterised by low slopes (<5%) and high clay and silt content with high reactivity (large shrink-swell characteristics), low fertility, strong acidity, and potential aluminium toxicity.

Significant soil constraints were identified and include:

- High soil erodibility (values of 0.026 and 0.046 used in the universal soil loss equation – USLE), and;
- Moderately dispersive subsoil (with dispersion percentage ranging from 1.3 – 3.3), meaning that the clay particles can be more readily eroded and transported to the downstream environment. Soils on the site have been classified as Type F (fine textured) soils.

Acid Sulfate Soils

The lower reaches of the flood prone land were identified by the Huskisson Acid Sulfate Soils Risk map as having a high probability of Acid Sulfate Soils (ASS) occurring within one metre of the ground surface. This land is identified as 'Class 2' on the Acid Sulfate Soils map that forms part of Shoalhaven LEP 2014, to which clause 7.1 applies. Clause 7.1 can also be triggered for works within 500m of adjacent Class 1, 2, 3 and 4 land that is below 5m AHD. Refer to Clause 7.1 of SLEP 2014 for further details.

The affected area is encompassed within the area that is proposed to be zoned E2 – Environmental Conservation, where no additional residential development is proposed. Appropriate investigations, including preparation of an ASS management plan, would be required to be undertaken prior to undertaking any works associated with upgrading of Fisherman Road or excavation for the purpose of providing water or sewerage services.

In 2001, Environmental and Earth Sciences P/L undertook an ASS investigation along the path of the proposed sewerage line for Park Road, Nebraska Estate. This investigation involved soil and groundwater testing at the southern end of the subject land. The results of the investigation are summarised below:

- There was negligible PASS. A borehole within the main watercourse contained low concentrations of soil sulphides but these were considered non-reactive.
- As a cautionary measure, it was recommended that any soil excavated from the watercourse, should be mixed with 4 kg of lime per ton of soil.
- Groundwater should be monitored if dewatering is undertaken for periods exceeding one week.
- Any concrete or metallic structures placed between the banks of the watercourse should have a buffer of at least 150 mm of sand mixed with lime at a ratio of 5 kg per ton of sand.

2.3. Flooding

The modelled extent of stormwater inundation in Nebraska Estate is shown in Figure 2, This figure displays the results from several flood studies:

- 'St Georges Basin Flood Study', Webb, McKeown and Associates P/L, 2001
- 'St Georges Basin Floodplain Risk Management Study and Plan Climate Change Assessment', WMA Water 2013
- A site specific draft preliminary catchment analysis prepared from airborne laser scanning (ALS) survey over Nebraska Estate by Shoalhaven City Council, 2006.

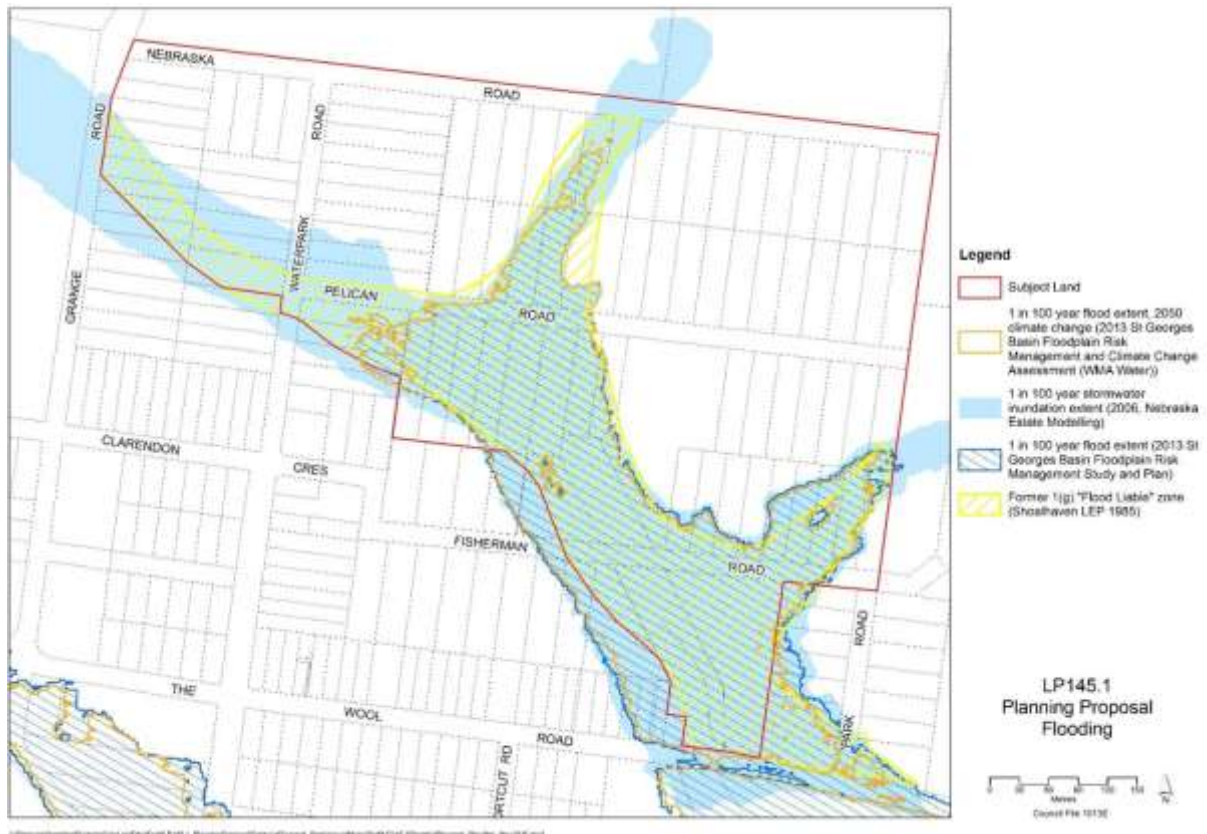


Figure 2 – Flood-related information (source SCC Project Brief)

2.4. Flora and Fauna

The subject site is home to a number of endangered, threatened or protected plant species. Swamp Sclerophyll Forest, is categorised as an endangered ecological community (EEC) under the NSW Threatened Species Conservation Act (BES, 2009). This EEC broadly corresponds to the flood prone land area, which also contains a population of protected Biconvex Paperbark (*Melaleuca biconvexa*). The north east corner of the subject land also contains a large number of threatened orchid species, one of which (*Pterostylis ventricosa*) was actually discovered in Nebraska Estate in 2000.

2.5. Aboriginal Cultural Heritage

Archaeological studies were undertaken in Nebraska Estate in 1994, 1995 and 2001. The first of these identified two small scatters of stone artefacts and one isolated artefact within the drainage lines. All three Aboriginal sites are located within the proposed E2 zone and no further residential development is proposed on the affected land. Some ground disturbance will be necessary for the construction of infrastructure and if these works uncover any additional artefacts the necessary requirements will be undertaken in order to comply with the NSW National Parks and Wildlife Act and regulations.

3.0 CALCULATED SOIL LOSS

The annual average soil loss during construction activities on the subject site has been estimated at 560 tonnes/ha/year using the Revised Universal Soil Loss Equation as defined in Managing Urban Stormwater: Soils and Construction, Volume 1 and using the values below.

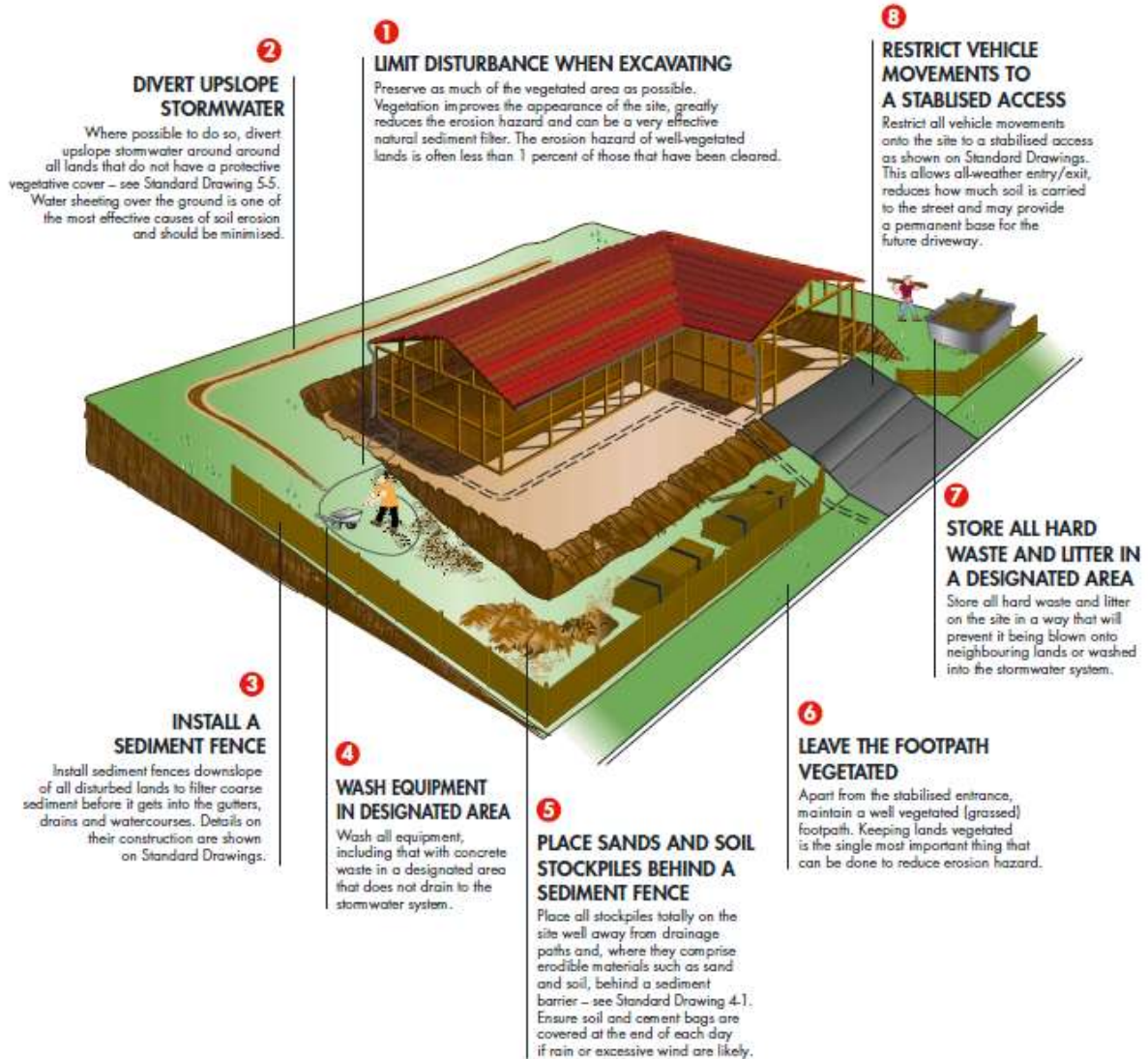
Parameter	Adopted Value	Source/Comment
R – Rainfall Erosivity Factor	4,550	Morse Mcvey, 1994 (Section 2.7)
K – Soil Erodibility	0.046	Morse Mcvey, 1994 (Section 3.2) based on Tomerong Creek Soil Landscape (worst case scenario)
LS – Slope Length/Gradient Factor	2.05	Based on 8% gradient (approx. 5 degrees) and maximum 80m slope
P – Erosion Control Practice Factor	1.3	Assumed Compacted and Smooth
C – Cover Factor	1.0	Recently disturbed soil with no cover

Based on the above calculated soil loss rate the subject site is classified as having **Soil Loss Class 5** and **HIGH Erosion Hazard**.

4.0 BASIC PRINCIPLES OF EROSION AND SEDIMENT CONTROL

The basic principles of erosion and sediment control include:

- i. Making sure everyone working on the site understands how important it is not to pollute stormwater
- ii. Minimising the area of soil disturbance
- iii. Installation of erosion and sediment controls before starting work
- iv. Maintaining erosion and sediment controls throughout the construction phase until the site is appropriately rehabilitated.



5.0 KEY MANAGEMENT STRATEGIES

The following site management practices and treatment measures should be considered and incorporated, as deemed appropriate, into any Site Specific Erosion and Sediment Control Plans prepared for construction of the lot based infrastructure.

5.1. General

- Plan the site before works commence and submit a site specific erosion and sediment control plan with the building application
- Ensure erosion and sediment control are installed at all sites associated with the construction activities including dwellings, sheds and driveways.

5.2. Construction Sequencing

Implement construction programming that promotes good erosion and sediment control including;

- early installation of permanent drainage works, including driveway culverts
- early installation of permanent catch drains (where relevant) to divert water around disturbed areas and structures.
- regular removal of excess sediment accumulation in erosion and sediment control measures
- progressive revegetation throughout the project

5.3. Minimising Extent of Soil Disturbance

- construct access driveways, including vegetated table drains, at the start of the project in order to provide a dedicated vehicle access path from the road carriageway to the building envelope to prevent unnecessary disturbance of other areas on the site
- fence off any E2 zoned land on the site at the start of the project to avoid disturbance of these more environmentally sensitive areas.
- Clear only those lands that must be disturbed by the works.
- Progressively stabilise disturbed areas on completion of sections of works rather than waiting until construction has been finished.
- Stabilise drainage structures as soon as possible following construction.

5.4. Control of Stormwater Runoff

- Construct stabilised diversion banks and drains to divert upslope water around the site
- Construct permanent drainage structures early in the project such as catch drains and culverts (including associated inlet and outlet protection works)
- Maximise the diversion of turbid construction runoff into sediment control devices such as sediment basins and filters.
- Divert runoff from the road formation into the stormwater drainage system as soon as practical to reduce surface flow lengths.

5.5. Practicing good site house keeping

Essentially good site housekeeping means keeping the site in a clean and orderly manner and includes;

- limiting the number of sediment sources by minimising the number of stockpiles. Placing material as it is excavated will help reduce the number of stockpiles and also minimises double handling.
- removing unwanted spoil stockpiles progressively and quickly
- locate stockpiles away from heavily trafficked areas, areas prone to inundation and drainage lines.

5.6. Use of Erosion Control Measures

- Stockpile soil materials in low hazard areas clear of natural depressions, drainage channel or watercourses. Additional protection to be afforded with temporary vegetation, diversion banks and sediment control measures, as required.
- Construct a range of erosion controls including sediment fences, diversion banks and drains and straw bale filters.
- Construct control measures as close as practical to the potential sediment source.
- Control the deposition of mud and soil materials onto local roads through the use of an appropriate stabilised site access.

5.7. Stabilisation of Disturbed Areas

- Ensure the success of the later revegetation by utilising good quality topsoil.
- Ameliorate exposed/disturbed subsoils with gypsum (or other suitable chemical ameliorant) at a rate of 2.5kg/10m² to reduce soil dispersion.
- Progressively and quickly revegetate disturbed areas utilising appropriate species.

- Control dust through progressive revegetation.

5.8. Inspection and Maintenance

- Initiate a program to ensure regular maintenance of all erosion and sediment control measures. Sediment cleaned from structures is to be deposited in a secure location where further pollution will not occur.
- Arrange regular inspections to review and update control measures. Additional inspections should be conducted during and/or immediately following significant (i.e. > 10mm/24hrs) rainfall events to monitor the functioning of controls.

5.9. Temporary Control Measures

Temporary erosion and sediment control measures considered suitable for use during lot based development activities include, but are not limited to the following;

- earth banks/diversion mounds
- sediment fences
- stabilised site access

A suite of standard erosion control measures that may be implemented on site are included in Appendix A and have been extracted from *Managing Urban Stormwater; Soils and Construction, Volume 1* (Landcom , 2004).

In determining of the most appropriate erosion and sediment control measures to incorporate into the Site Specific ESCPs the designer should make reference to *Managing Urban Stormwater; Soils and Construction, Volume 1* (Landcom , 2004).

6.0 REFERENCES

Landcom (2004) *Managing Urban Stormwater; Soils and Construction – Volume 1*

Morse McVey (1994) *Land Capability Report for Nebraska Estate, The Wool Road, St Georges Basin*, Morse McVey and Associates.

APPENDIX A

Standard Erosion Control Measures