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Lockyer Focal catchment – modelled loads reduction

(Confidential briefing note 3)

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This report

This report is part of the Healthy Country Project. The Healthy Country project is a Queensland Government funded 'proof of concept' initiative to demonstrate that bringing together the best science, planning and on ground implementation can significantly reduce non-urban diffuse pollutants loads entering the waterways. It started in January 2008 with an $8 million investment. Project partners include the SEQ Healthy Waterways Partnership (SEQ HWP), SEQ Catchments Ltd, Queensland Primary Industries and Fisheries (QPIF) Dept of Employment and Economic Development and the SEQ Traditional Owners Alliance (SEQTOA). The project aims to develop methods for reducing sediment loads to Moreton Bay by 50%. This report documents the distribution of catchment works in the Lockyer Focal Area and estimates the likely effects of those works on sediment supply at the whole of catchment scale.

Sediment Loads in Lockyer Focal Area

In the *Phase 2c report: Rehabilitation priorities Lockyer Focal Area – Final Report (June 2010)* the weight of evidence from the modelling, field assessments and the tracing results show that sediment export in the Focal Area is dominated by surface soil erosion primarily from cropping land (80%). Channel erosion is estimated to contribute about 20% of the sediment. Sediment delivery to the drainage network from grazing areas is considered to be close to natural background rates (~0.05 t/ha/yr), with about 140 t/yr being delivered to the main channel. The erosion from cropping land was predicted to deliver ~300 t/yr to the drainage network, with farm dams trapping about 20 t/yr before it reaches the main channel. The combined surface soil export to the main channel from cropping and grazing land is estimated to be ~420 t/yr.

Modelling assumptions

Note: The modelling assumptions below are made on the basis of catchment works being at or close to maximum efficiency.

Sediment control structures: Where erosion control structures have been placed across drainage lines it has been assumed that they have similar sediment trap efficiency to small farm dams. For similar sized farm dams in the SE region of Australia Neil and Fogarty (1991) predicted the sediment trap efficiency to range from 24% to 91%, with a mean value of 64% (also see Verstraeten and Prosser, 2008). No figures are yet available for similar dams in semi-tropical regions threfore a more conservative estimate of 50% trap efficiency is used here. Where the structures have been placed in sequence it has been assumed that each structure has the same trapping efficient such that two structures in sequence will reduce the sediment supply from the upstream catchment area by 1 – (0.5 x 0.5) = 0.75 or 75%, and so forth.

Riparian Fencing: Fencing along stream-lines has been assumed to improve riparian cover to 100% effectively decreasing bank erosion to zero.

Re-vegetation: Improve vegetative cover to 100% - effectively stopping hillslope erosion

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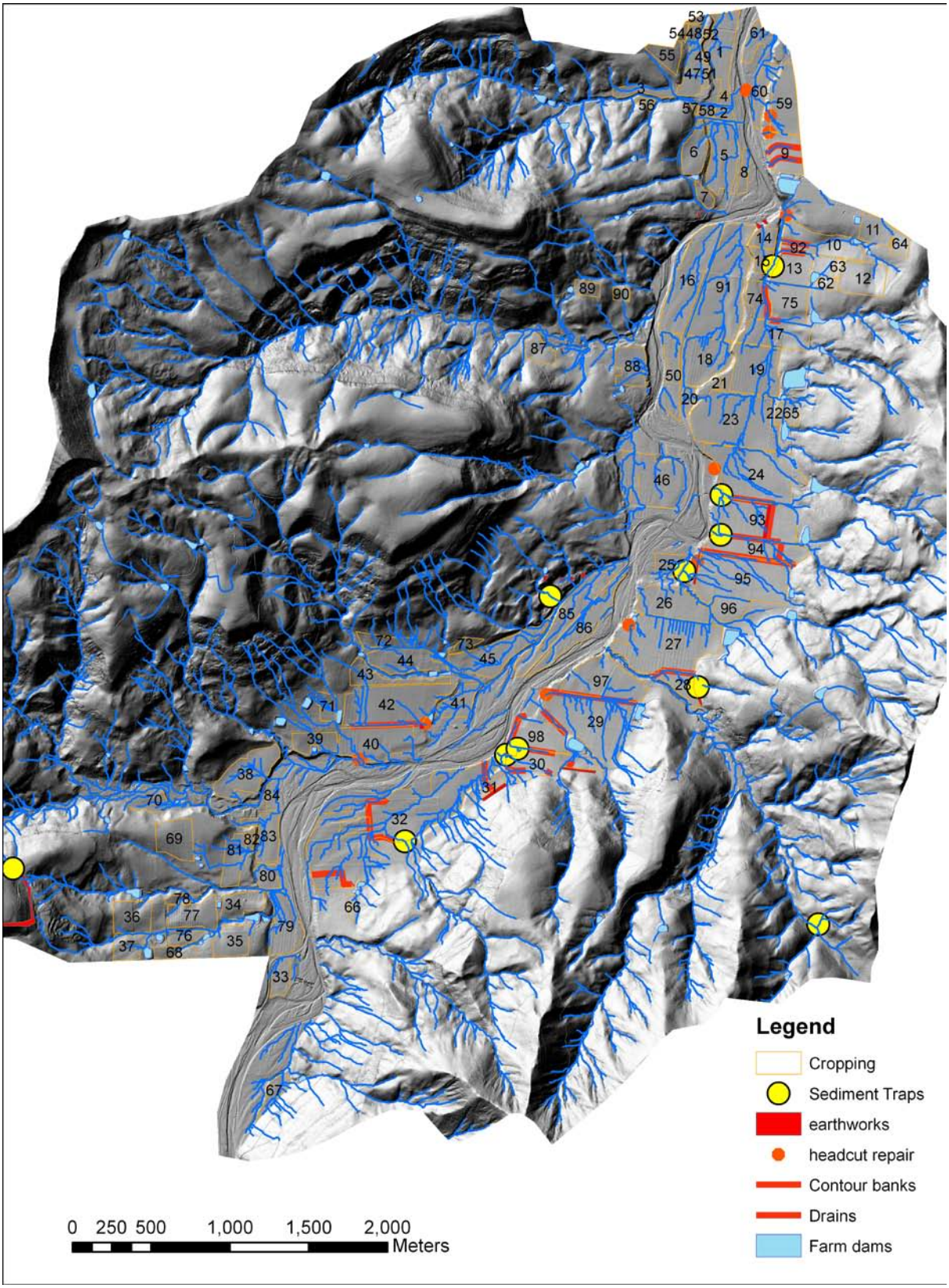

Figure 1: Map of the Lockyer Focal Area showing the location of the on-ground work. The numbers relate to the cropping area identification used in the *Phase 2c report: Rehabilitation priorities Lockyer Focal Area – Final Report (June 2010)*

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Modelled sediment reduction

The type and distribution of catchment works is shown in Figure 1. This data was provided by SEQ-catchments as PDF images and excel spreadsheet.

Whole of catchment scale: At this stage no significant in channel works have been undertaken so they have not been considered in this report. A total of 2134 ha of the 3800 ha area has been targeted for cover management. These areas are not shown in Figure 1. Given the sediment delivery to the drainage network from grazing areas is considered to be close to natural background rates (~0.05 t/ha/yr) these broad-acre activities are unlikely to have a significant effect on the total load. Most of the works as shown in Figure 1 are located in the cropping areas following the recommendations in the *Phase 2c report: Rehabilitation priorities Lockyer Focal Area – Final Report (June 2010.* The combination of sediment traps and flow diversion structures in the cropping areas is predicted to decrease sediment supply to the main channel from cropping land from ~280 t/yr to 230 t/yr, or about 20%. In the absence of further works this is the predicted reduction at the whole of catchment scale.

Summary

- Most of the rehabilitation works in Lockyer Focal Area were in areas identified as high priority areas by our initial sediment budget modeling.
- At the whole of catchment scale the works are predicted to decrease sediment export by ~20 %.
- If additional funds were available, further appropriately located sediment trap structures would produce additional reduction of the sediment load.
- At this stage no significant in-channel works have been undertaken so they have not been considered in this report. It is however noted that in-channel works are proposed. To decrease sediment generation from the channel margins vegetation management to increase the density and extent of cover along the channel should be done throughout the Focal Area.
- Note that the above results rely heavily on sediment budget modelling and expert opinion to determine the effectiveness of catchment works. There is little data with which to calibrate the current models or to determine the effectiveness of the catchment works. This highlights the need for a properly designed and resourced monitoring, evaluation and learning program to accompany future works.

Neil, D.T., Fogarty, P., 1991. Land-use and sediment yield on the Southern Tablelands of New South Wales. Australian Journal of Soil and Water Conservation 4, 33–39.

Verstraeten, G., Prosser, I., 2008. Modelling the impact of land-use change and farm dam construction on hillslope sediment delivery to rivers at the regional scale Geomorphology 98 199–212