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Melissa Halloran
Department of Planning, Industry and Environment
4 Parramatta Square
12 Darcy Street
Parramatta NSW 2150

By email: melissa.halloran@planning.nsw.gov.au

Dear Melissa,

Supplementary Investigations – Wagga Wagga Strategic Activation Precinct – Flooding and Water Quality

Rhelm have completed supplementary investigations to support the proposed extension of the development area for the Wagga Wagga Special Activation Precinct (SAP) Masterplan. This letter documents the findings of these supplementary investigations. It should be read in conjunction with our report *Wagga Wagga Special Activation Precinct Flooding and Water Quality Final Adopted Scenario Report* dated July 2020 (Our reference: J1233 R03 Rev 1).

Overview

The investigation assessed the need for provision of water management facilities to support:

- zoning of a site at 466 Byrnes Road Bomen (Lot 22/DP1265468) as Regional Enterprise (previously proposed to be zoned Rural Activity); and
- the provision of additional permitted uses at a site at Trahairs Road Bomen (Lot 4/DP1249028), located within the Rural Activity Zone.

Both sites drain to the Eunonyhareenyha Valley (Eunony Valley) and are shown in **Figure 1**.

This investigation has been undertaken using the same methodology undertaken documented in our report *Wagga Wagga Special Activation Precinct Flooding and Water Quality Final Adopted Scenario Report Rev 1* (Rhelm, 2020).

The investigation considers:

- Locating and sizing of additional water management features required to support the change in land use, including water quality treatment and stormwater detention infrastructure,
- Identification of water-related development constraints, including existing mapped waterways, associated Strahler Stream Order and the groundwater protection zone.

The catchments are close to the ridgeline and have no flood concerns aside from localised runoff which would be managed through the provision of suitable stormwater drainage at the site development phase.

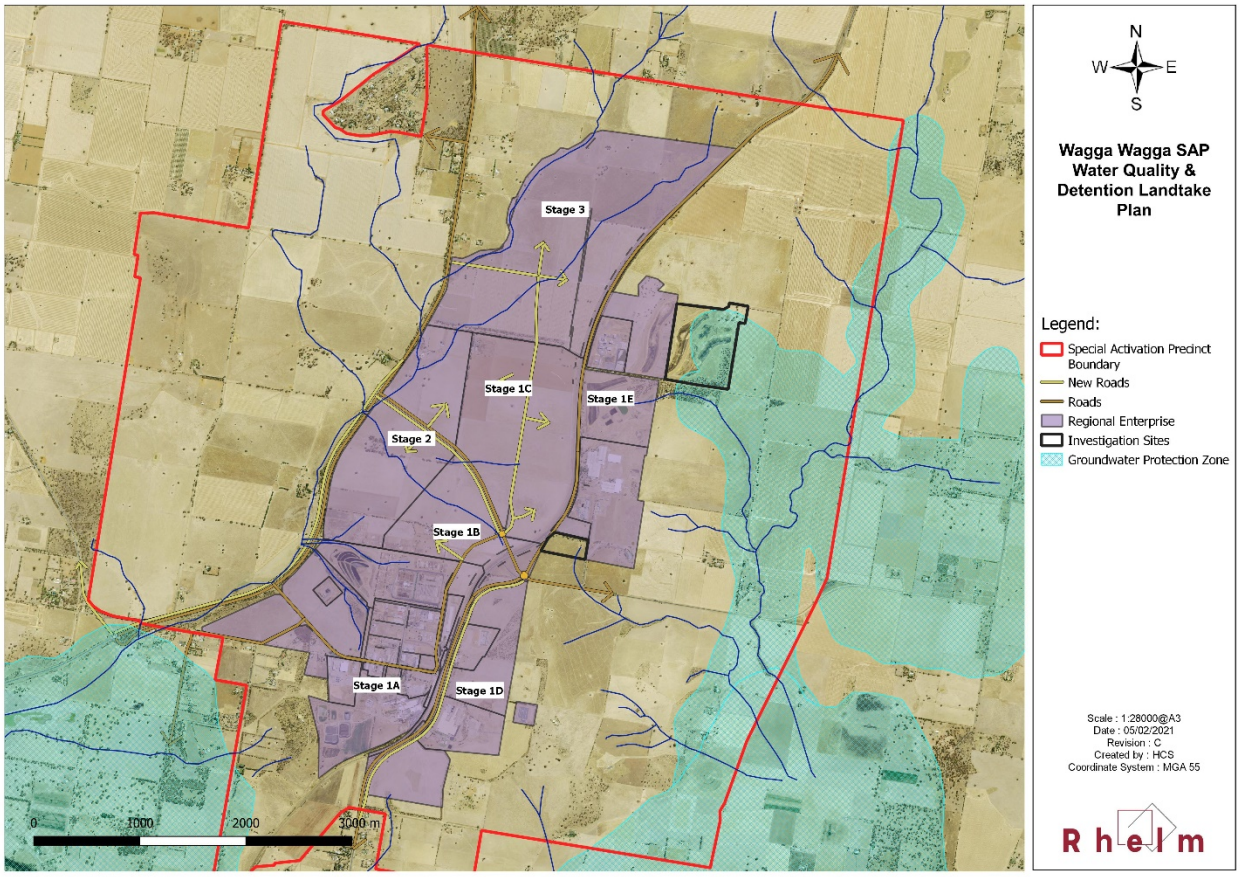

Figure 1. Locality Plan

Location and Sizing of Water Management Features

The process for sizing the water management basins is consistent with the process undertaken for the assessment detailed in Rhelm (2020).

Flood detention basins are the most common way of controlling the generation of additional runoff associated with urbanisation of the lots. The flood detention basin sizing was conducted using the RAFTS hydrological model (Section 4 (Rhelm, 2020)).

The sizing process assessed the land use change based on the proposed revision of land use. The land use changes cause the impervious fraction of the catchment to increase which leads to increased rates of runoff. The hydrological model was re-run for the proposed lot development using the same adjusted land use fraction impervious assumptions. This resulted in increases in runoff and flows through the catchments. These increases have been mitigated using detention basins.

The detention basin sub catchments were refined to be consistent with the previous study (Rhelm, 2020). As these basins have been designed following the completion of the original Masterplan studies and as there are no regional basins included in these areas, they have been developed as independent stand-alone basins that are capable of mitigating up to the 0.5% AEP event (to address the effects of climate change, as discussed in Rhelm (2020)). The basin design aimed to include the water quality component of the study in the base of the basin (with the sizing calculated in the same fashion as documented in Rhelm (2020)). This is shown schematically in **Figure 2**.

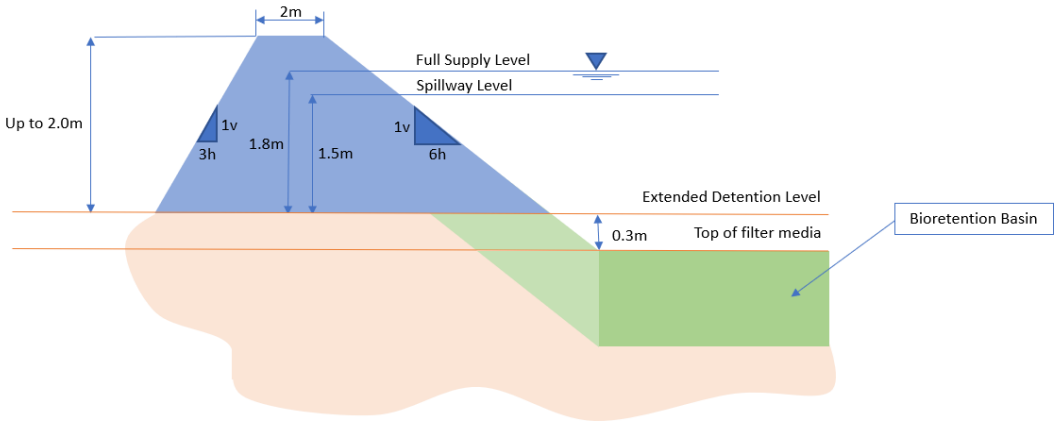

Figure 2. Embankment assumptions for Combined Detention/Bioretention Basin Design

A summary of the development areas and the results of the detention and water quality volume assessment, including land allocation required are summarised in **Table 1**. Suggested locations for the basins to fit within the identified land allocation are provided on **Figure 3**.

Table 1. Proposed development area, water treatment and detention volumes

Catchment	Development Area (Ha)	Water Treatment Area (m^2)	Detention Volume (m^3)	Water quality and Detention Land allocation (m^2)
Lot 22 / DP1265468	7.5	1,300	2,400	4,500
Lot 4 / DP1249028	40.8	12,500	13,700	19,300

Surface Water and Related Development Constraints

Within Lot 22/DP1265468 there is an existing first order Strahler watercourse identified under the *Water Management (General)*, see **Figure 4**. There is no visible evidence of a watercourse (bed or banks) at this location (as determined by inspection of aerial photography) and as a result, it is not expected that a setback or vegetated riparian zone (VRZ) would need to be applied. For this site there are no other known water-related constraints, aside from paddock tress (identified also on **Figure 4**). The extent of a VRZ associated with the first order stream is shown on **Figure 4,** but it would be reasonable that the site be developed without provision for a VRZ.

For Lot 4 / DP1249028 there are no watercourses identified on the site under the *Water Management (General)* Regulation to consider. Under the present conditions there is a stand of trees on the site and it has been assumed that these would be retained under any future development scenario (this is shown in **Figure 3**). The proposed detention/water quality basin has been located to avoid the groundwater protection zone. A more topographically suitable location for the basin on Lot 4 / DP1249028 would be further to the east and supplementary geotechnical investigations may reveal that placing a lined basin at this location would not impact on groundwater.

Conclusion

Based on the findings of this assessment, an adjusted Masterplan layout with respect to surface water management is provided in **Figure 5**.

The inclusion of Lot 22/DP1265468 within the areas to be rezoned to Regional Enterprise is considered to be suitable provided the proposed water detention and quality basin is included. The site drains to the Eunony Valley and additional runoff from the change in land use will need to be managed onsite to avoid any impacts on flooding in downstream areas for events up to and including the 1%AEP event (for existing and future conditions). The proposed bioretention treatment area within the base of the basin has been sized to manage key water quality pollutant loads from the site in the same manner as reported in Rhelm (2020).

The provision of additional permitted uses at Lot 4 / DP1249028 is considered to be suitable provided the proposed water detention and quality basin is included. The site also drains to the Eunony Valley

and additional runoff from the change in land use will need to be managed onsite to avoid any impacts on flooding in downstream areas for events up to and including the 1% AEP event (for existing and future conditions). The proposed bioretention treatment area within the base of the basin has been sized to manage key water quality pollutant loads from the site in the same manner as reported in Rhelm (2020).

Should you have any queries regarding this advice, please do not hesitate to contact either myself or Louise Collier on 02 9098 6998.

Sincerely,

Heath Sommerville
Senior Engineer

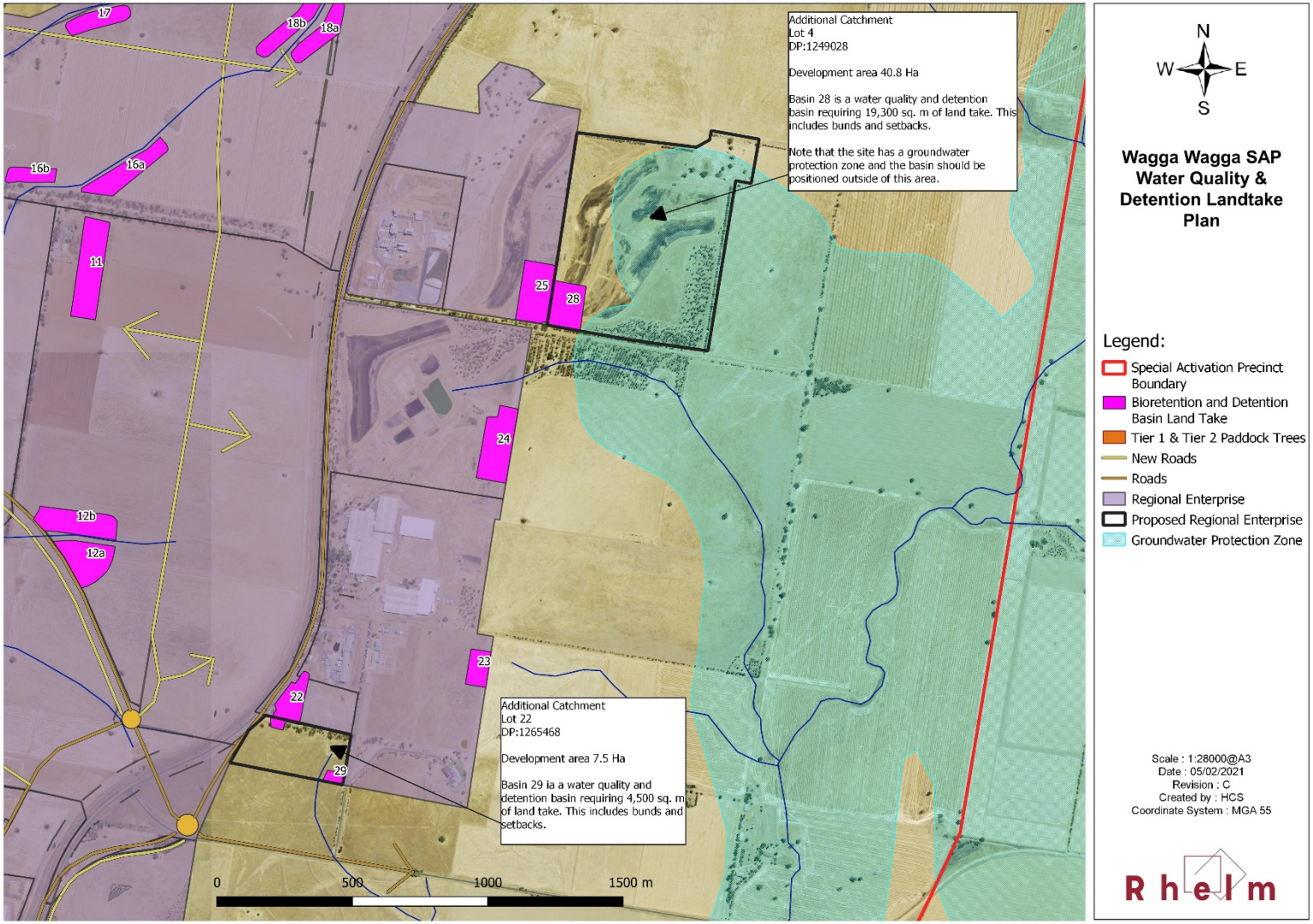

Figure 3. Updated Water Quality and Detention Landtake Plan

Figure 4. Vegetated Riparian Zone for First Order Stream within Lot 22, DP1265468

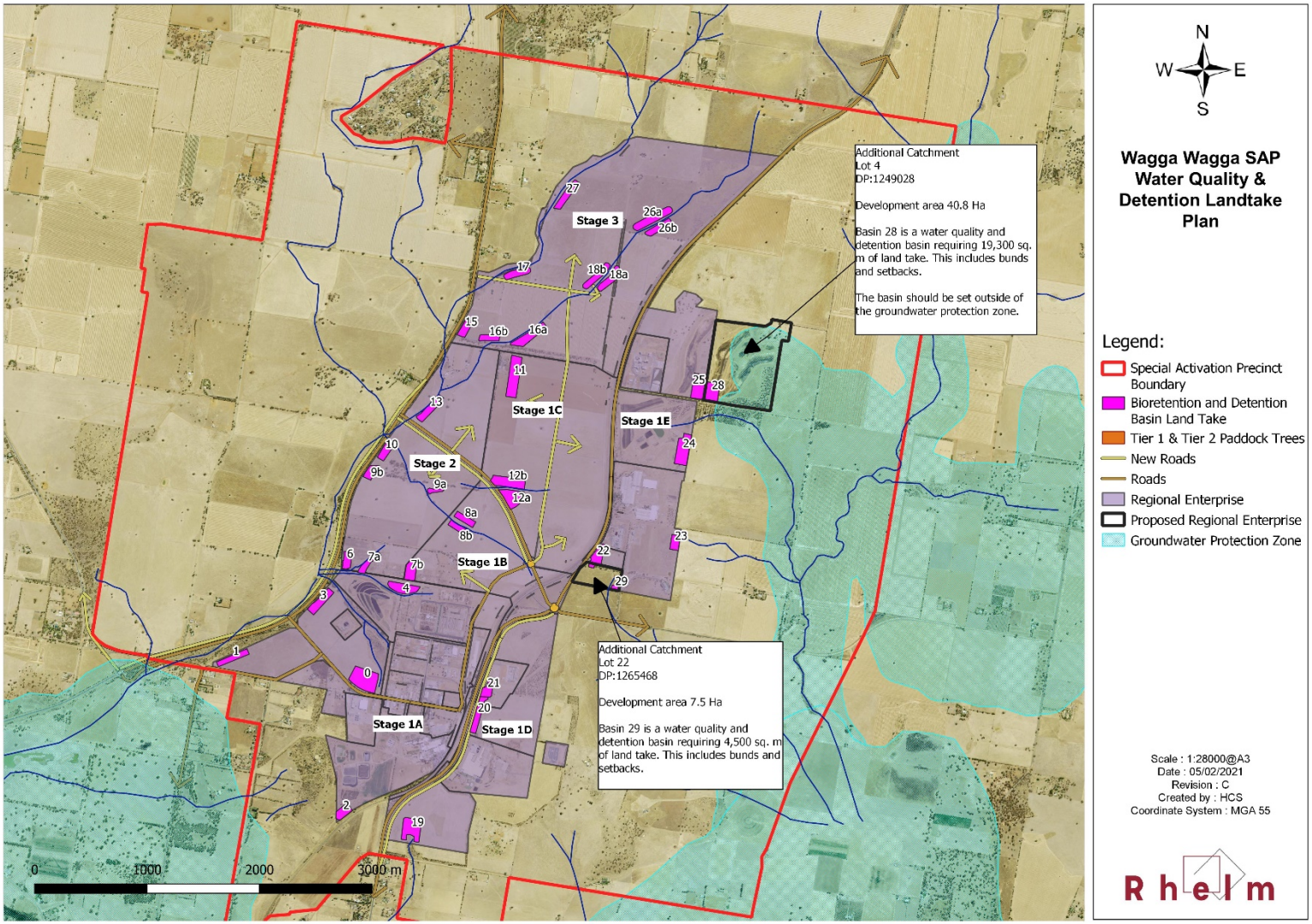

Figure 5. Adjusted Master Plan Layout