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Richard Mawer
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Goodman
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Dear Richard

Port Botany Industrial Estate Turning Head Flood Impact Assessment

1 Introduction

Orica Australia/DBL Property have recently undertaken development of a site located on the corner of Coal Pier Road and McPherson Street in Banksmeadow NSW. Hydraulic modelling for the site was conducted by Aurecon. Final modelling using as-constructed survey was previously undertaken to confirm acceptable flood impacts to satisfy requirements of the Project Approval.

Goodman has identified that the fire brigade has requested a turning head be installed to the NE corner of the carpark which may reduce the storage capacity of the northern basin by 23 m^3 in volume. The approximate extent of works are shown in a drawing markup by Costinroe Consulting stamped Co9349.06-SK01 (see attached).

Aurecon was commissioned to assess the feasibility of this modification to the constructed fill platform and determine whether there would be any impact to overall flood storage within the site and the effect on flood levels within and exterior to the property.

2 Background

Orica Australia has developed an industrial estate known as “Southlands” at Banksmeadow near Botany Bay. The land is located in the lower part of the water catchment of Springvale and Floodvale Drains. In 2007, Aurecon undertook a flood investigation of the proposed Orica Southlands site and surrounding areas. The investigation involved survey, hydrologic modelling using RAFTS and hydraulic modelling using a MIKE 11 one-dimensional hydraulic model. The modelling and interpretation of results was submitted in the report *ORICA/Goodman Southlands Remediation/Development Project* (Aurecon, March 2009).

The NSW Department of Planning (DoP) undertook a review of the previous modelling works using independent consultants (Webb McKeown & Associates). Comment on the development was also accepted from surrounding landholders. A meeting with DoP to discuss comments from the review suggested a number of additional tasks, primarily that two-dimensional hydraulic modelling be undertaken to address most of these comments.

In response to these comments the modelling exercise was extended utilising a two-dimensional hydraulic model, updating the model to include changes in the surrounding area and new developments that have occurred since the original model. The study also included alterations to the development plans to incorporate further flood mitigation measures to ensure no adverse flood impacts thus satisfying the planning criteria. Results of this model were presented in *ORICA*

Southlands Remediation and Development Project Hydraulic Modelling Report and Response to Exhibition Submissions/Comments (Aurecon, November 2010). Further modification of the proposed development layout and flood mitigation works were reported in an addendum letter report titled *Southlands – Detailed Design 2D Flood Re-Modelling – Addendum Advice Regarding Variation to Compensatory Flood Basin Design and Impact* (Aurecon, 22 February 2013).

Approval for the project was granted subject to a number of conditions, including Schedule 3 Condition 10, requiring a Validation Assessment of the flood modelling once an as constructed survey has been undertaken to confirm that the flood impact is no greater than indicated in Figures D9a, D10a and D11a of the addendum report. Hydraulic modelling for this validation assessment was undertaken following receipt of as-constructed survey data in May 2015 and results were reported to Orica Australia/DBL Property in a letter report *Orica Southlands – Hydraulic Modelling Flood Validation Assessment Review* (Aurecon, May 2015)

3 Hydraulic assessment

Hydraulic assessment of the Orica Southlands development was undertaken using a MIKE FLOOD linked 1D/2D hydraulic model to represent the existing, proposed development and as-constructed site conditions. Assessment of the modifications requested by Goodman been conducted by:

- Creating a 3D digital model of the proposed turning head from the markup provided by Goodman
- Creating a new hydraulic model topography file to represent the proposed changes
- Simulation of design events (50%, 10% and 1% AEP) for each scenario
- Comparison of peak water levels resulting from the modified scenarios with pre-development and as-constructed levels

4 Assessment results

The development site is located between Floodvale Drain, which flows southward adjacent to Coal Pier Road to the west, and Springvale Drain, which flows adjacent to Nant Street to the east. Ground levels for the pre-development and as-constructed site conditions are shown in Figure 1.

Previous hydraulic investigations identified that the development site was relatively flood prone, and flow transfers through the site, typically from west to east, during even minor events. The site development provides a dedicated flowpath along the northern property boundary. This flowpath has been carefully sized in terms of both capacity and elevation to match existing flow capacity through the site so as not to worsen conditions in either drain. Flood levels and depths for the 50%, 10% and 1% AEP flood events are provided for pre-development and as-constructed conditions in Figure 2 to Figure 7.

The turning head encroaches into the northern flowpath. Although the earthworks proposed for the turning head represent a relatively small volume and minor change in level, the flow capacity and elevation of the northern flowpath are important for maintaining the correct flow balance between Floodvale and Springvale Drains. The turning head is located at the key control point for the channel, particularly during minor events, and could potentially have an adverse impact.

Afflux (difference in peak flood level) between Scenario 1 and Pre-Development levels and between Scenario 1 and As-Constructed levels are provided in Figure 8 to Figure 10. These show that the turning head works have some minor localised impact, but otherwise the difference to As-Constructed levels are negligible (<1 mm).

External to the property, when compared to the as-constructed scenario some minor impacts (1-2 mm) are observed in Floodvale Drain to the south for the 50% AEP event (Figure 8b) and to the north for the 1% AEP event (Figure 10b), however these are well removed from the works area and are considered to be more likely related to minor instabilities in the model than an impact of the works.

5 Conclusions and recommendations

Overall, the turning head can be concluded to have negligible impact. The works are located at a V-shape control section in the northern bypass channel, so some compensatory works on the other side of the 'V' could be considered but do not appear to be necessary.

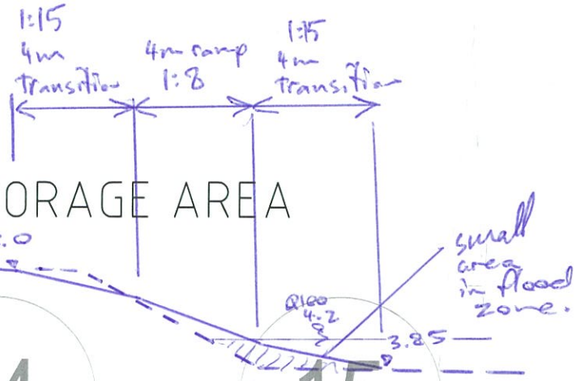
Should you have any queries please do not hesitate to contact the undersigned.

Yours sincerely

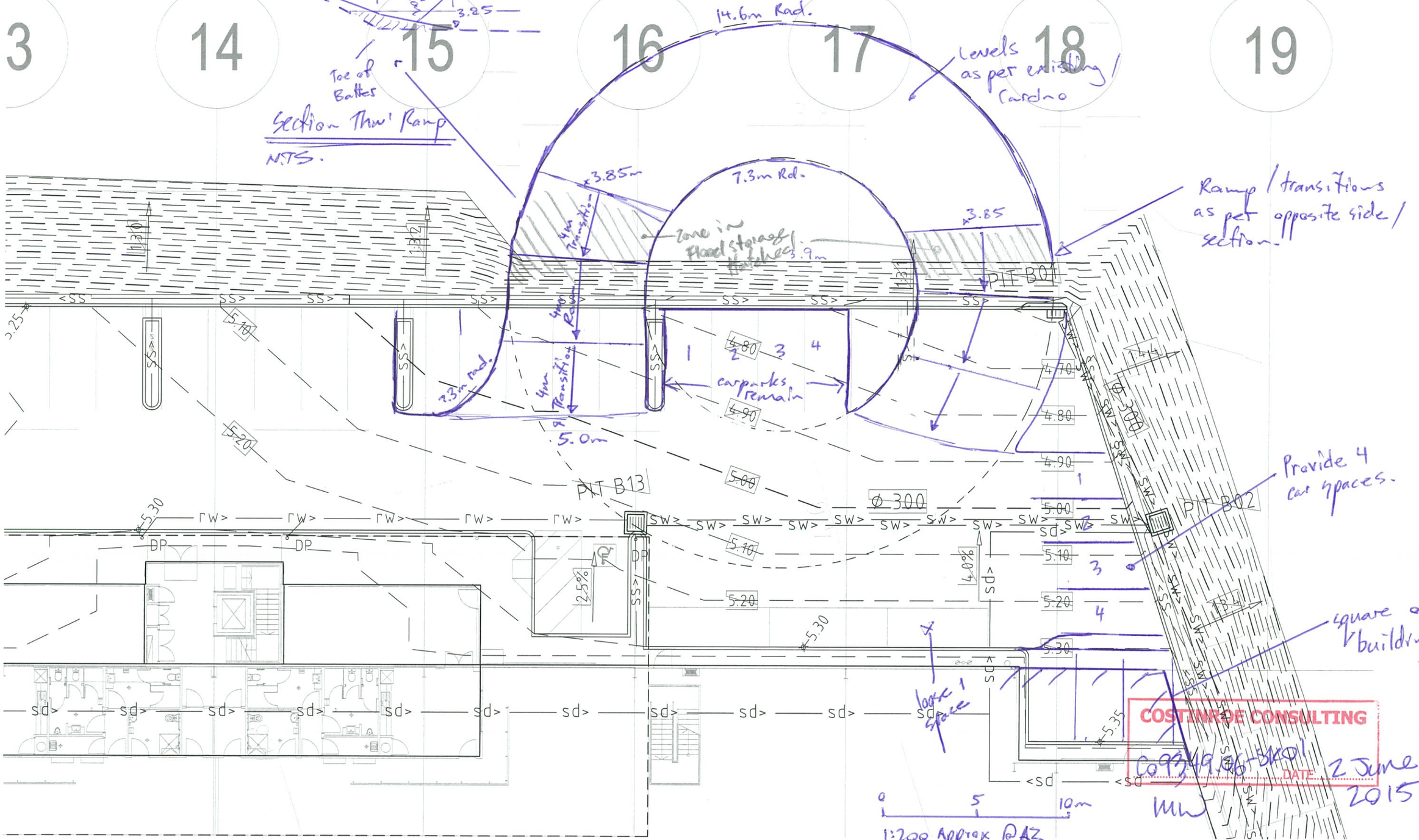
Luke Toombes
Senior Water Engineer

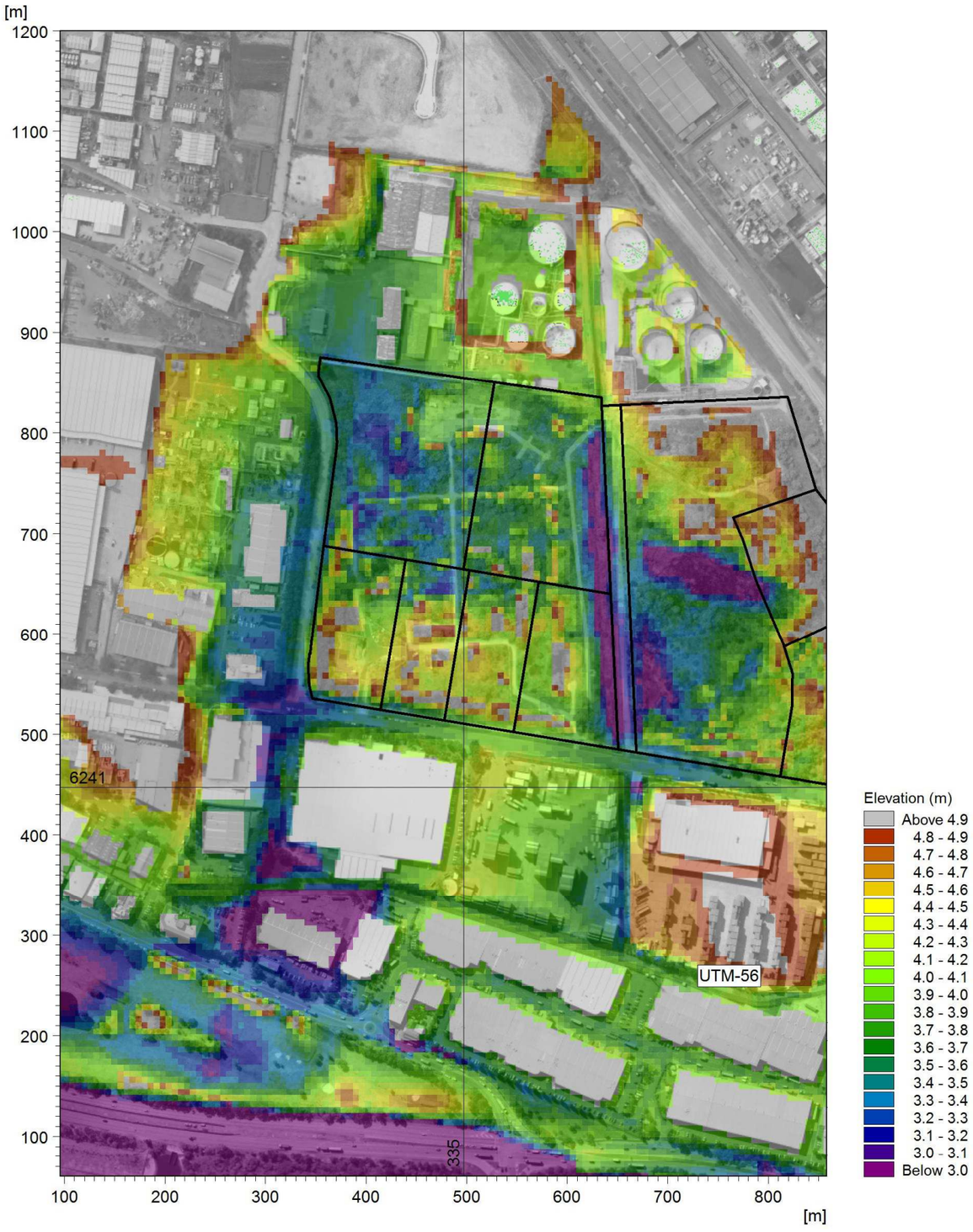
Enc: Sketch Co9349.06-SK01 (Costinroe Consulting, 2 June 2015)
Figure 1 Model bathymetry (pre-development and as-constructed)
Figure 2 50% AEP flood levels (pre-development and as-constructed)
Figure 3 10% AEP flood levels (pre-development and as-constructed)
Figure 4 1% AEP flood levels (pre-development and as-constructed)
Figure 5 50% AEP flood depths (pre-development and as-constructed)
Figure 6 10% AEP flood depths (pre-development and as-constructed)
Figure 7 1% AEP flood depths (pre-development and as-constructed)
Figure 8 Scenario 1: Turning Head Only – 50% AEP flood level difference
Figure 9 Scenario 1: Turning Head Only – 10% AEP flood level difference
Figure 10 Scenario 1: Turning Head Only – 1% AEP flood level difference

CAPE FLOOD STORAGE AREA

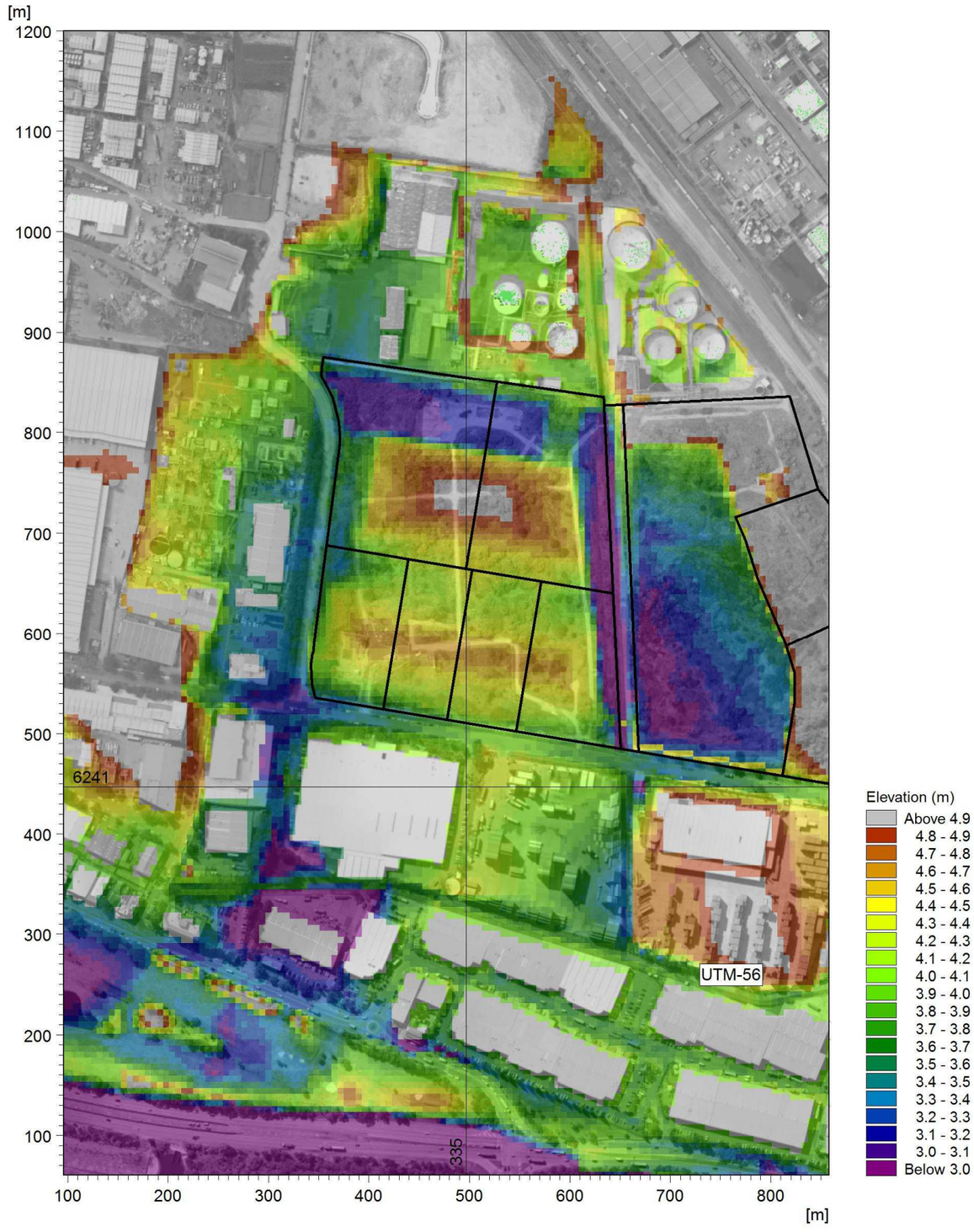


Section Thru' Ramp
N.T.S.

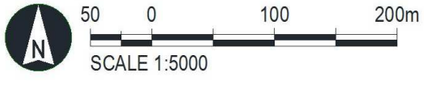


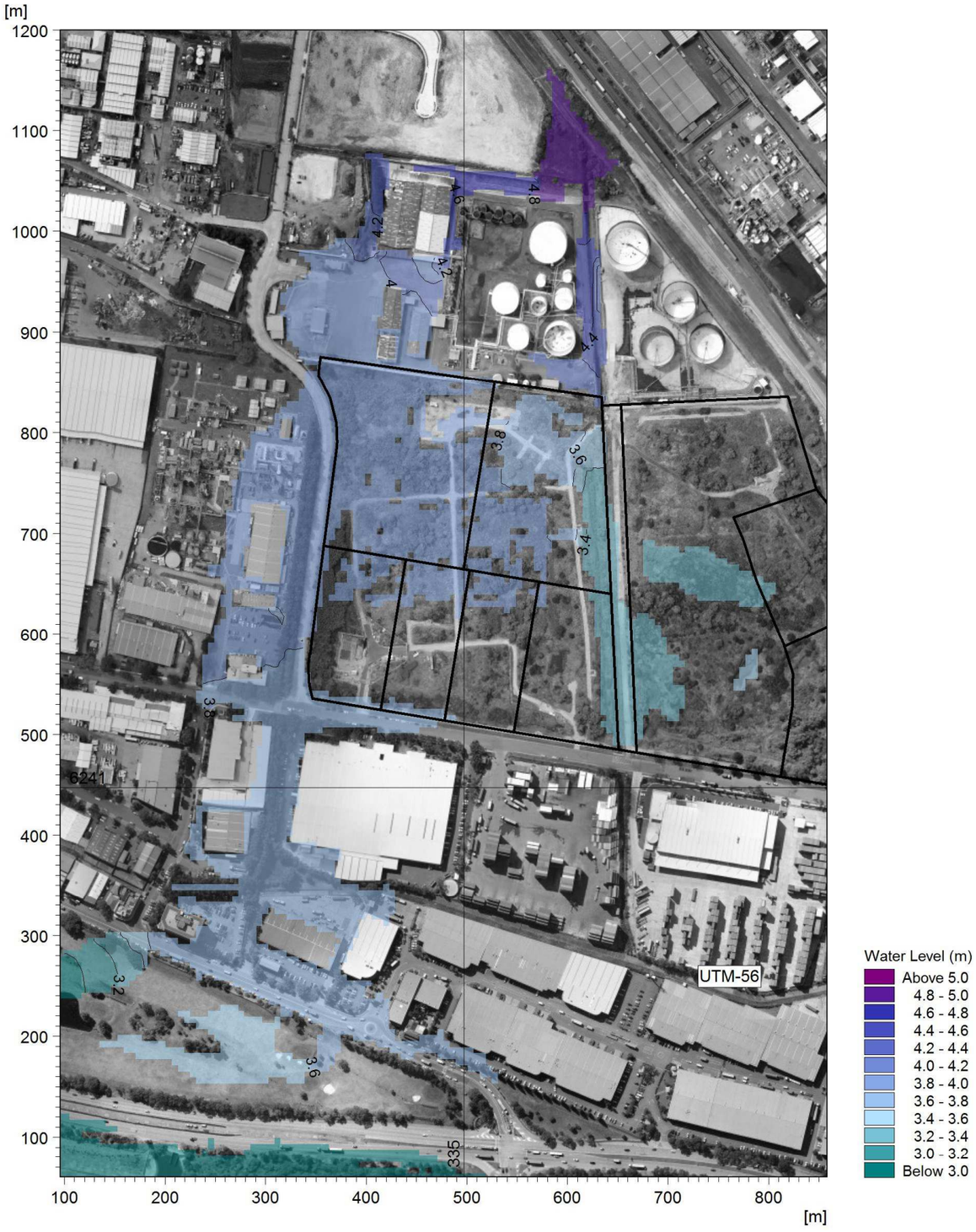


(a) Pre-Development

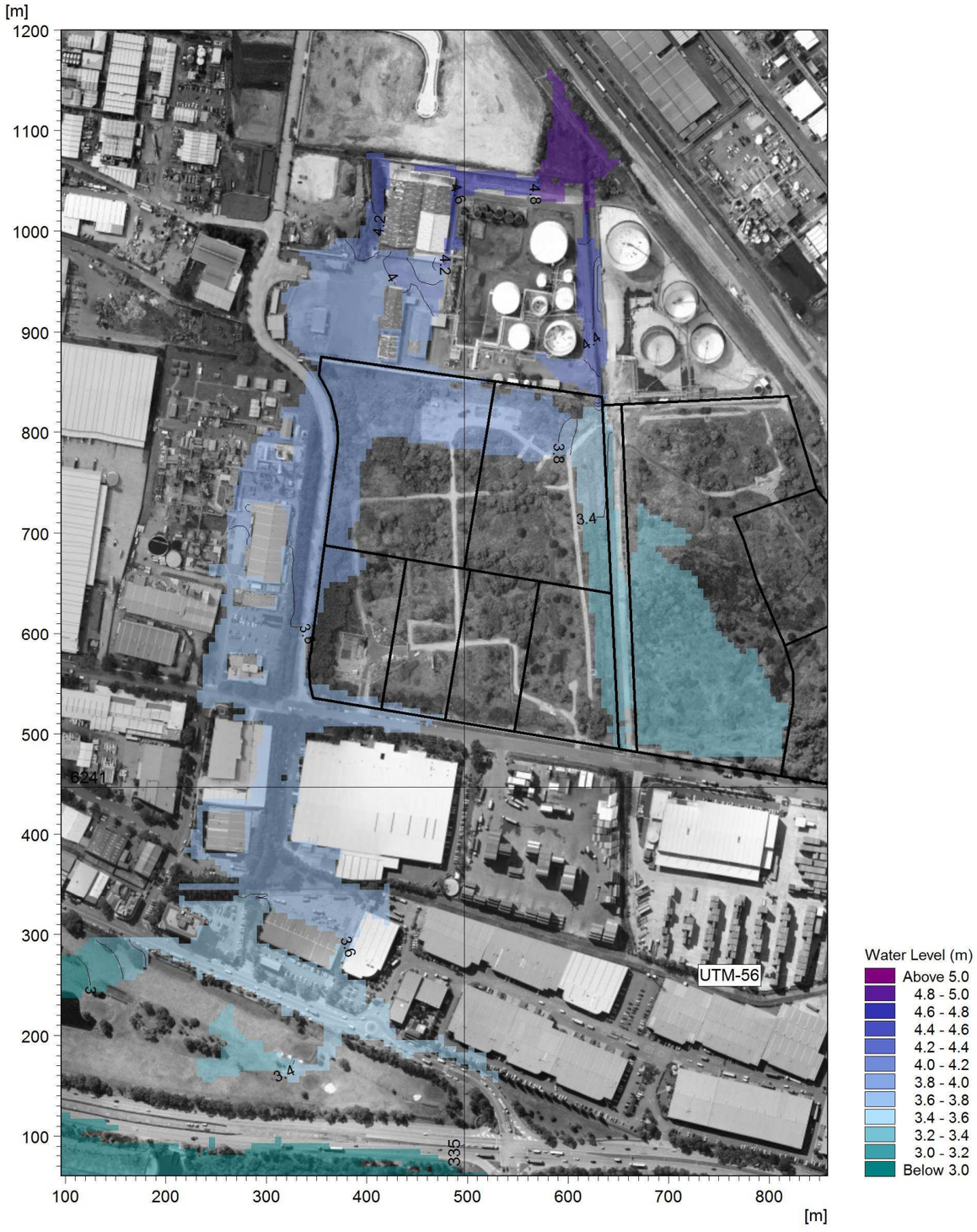


(b) As-Constructed





(a) Pre-Development



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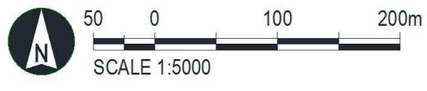
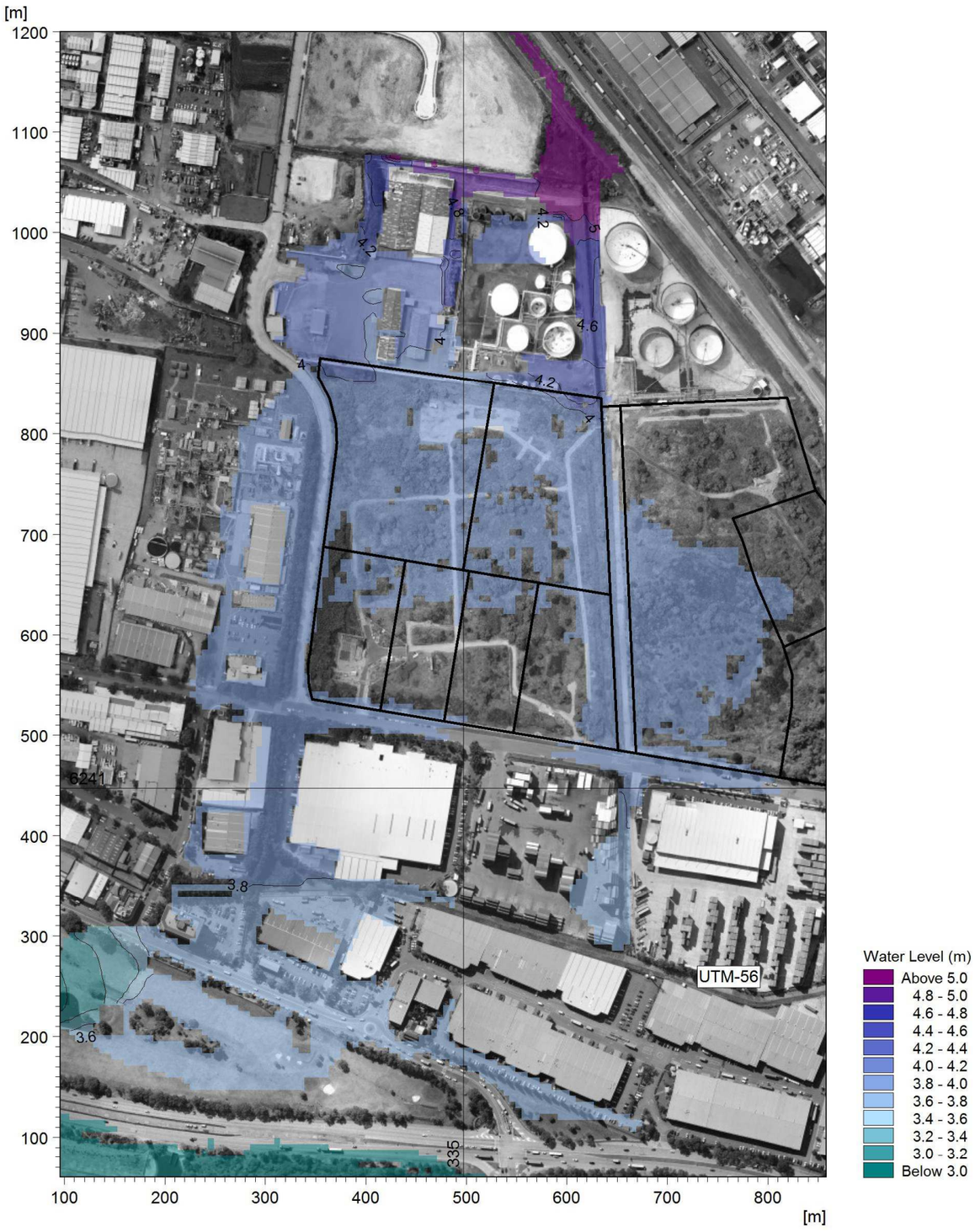
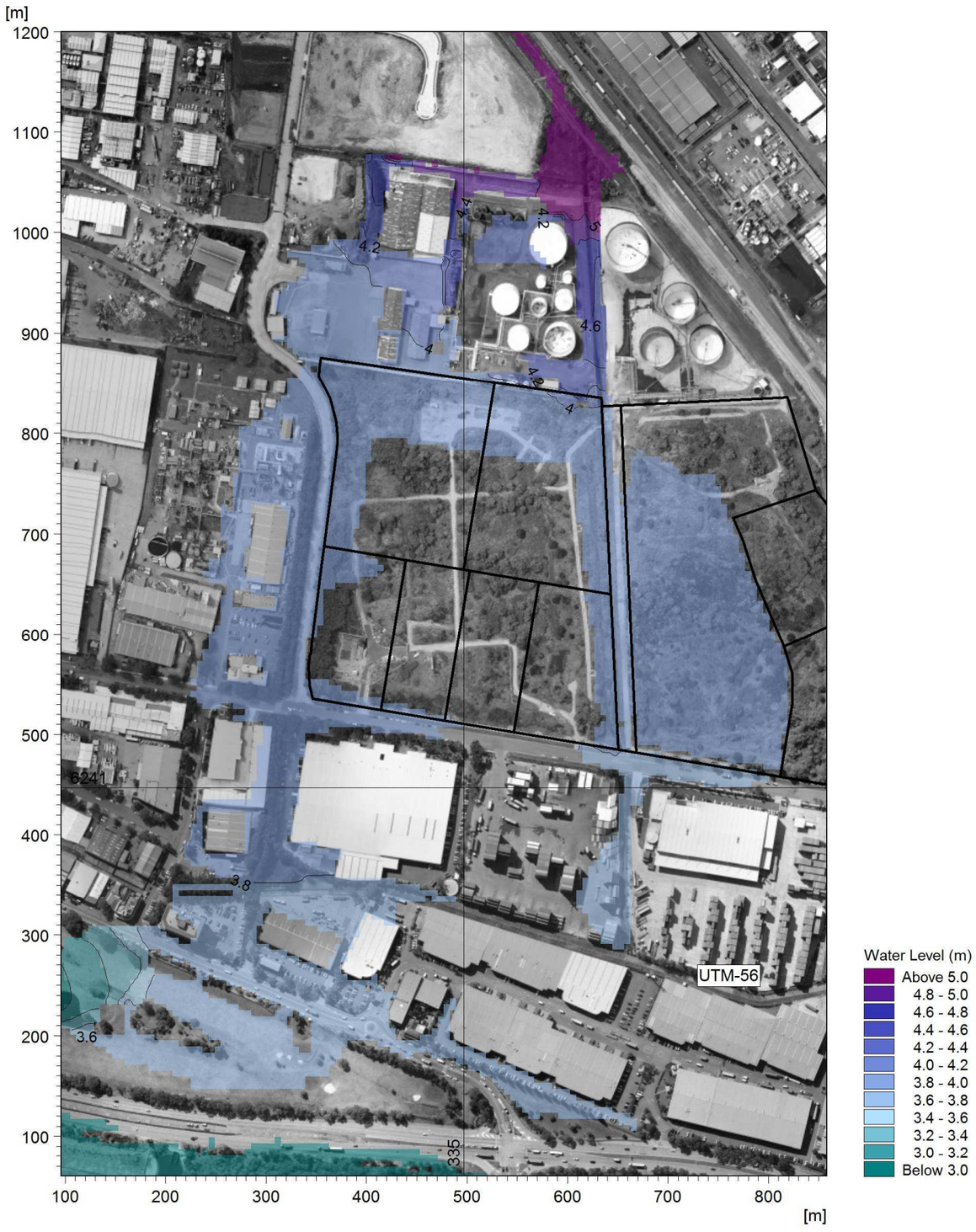




(a) Pre-Development



(b) As-Constructed