1244/371/04

26 February, 2013

The Director General
Department of Planning
23-33 Bridge Street
Sydney, 2000

Attention: Ms. Christine Chapman - Environmental Planning Officer, Major Development Assessment

Southlands Remediation and Development Project – Modification under S.75W of Project Approval - 06_0191 – Reconfiguration of Compensatory Flood Storage Basin, Reconfiguration of Lots 7, 8 and 9, Reconfiguration of Lots 3-6 Boundary, Addition of wording requested by OEH Accredited Site Auditor

Further to the issuance of the Project Approval (06_0191) for the Southlands Project and our subsequent discussions relating to a number of minor modifications to that Consent, we hereby seek modification to the Consent on behalf of our client Orica Australia Pty Ltd.

The modifications seek variation to the current Project Approval and proposes the following changes as set out in the summary table below. The main changes are then identified and assessed following.

The modifications generally maintain the project as approved with only minor variations to the overall Project Approval.

Major Issues	Existing Consent Description	Proposed Modification Description
Construction Components	The Project would generally include: • site remediation works over the whole site (Areas 1, 2 and 3); • flood mitigation and drainage works over Areas 1, 2 and possibly into Area 3 • staged subdivision of Areas 1, 2 and 3 into 9 lots; • establishment of 6 industrial use warehouses (with a gross floor area of 46,500 m2) in Area 1 each with ancillary office components; • traffic improvement works at the intersection of Hill Street and Botany Road; and • carparking and landscaping works.	The Project would generally include: • site remediation works over the whole site (Areas 1, 2 and 3); • reconfiguration of the compensatory flood basin and drainage works with an increase in storage area on the western portion of the site, reducing developable land area; • staged subdivision into 11 lots (note: previous Orica pipeline easements are now being created as two lots to be owned by Orica); • establishment of 6 industrial use warehouses (with a gross floor area of 36,170 m2 a reduction of 10,330m2 GFA) in Area 1 each with ancillary office components; • traffic improvement works at the intersection of Hill Street and Botany Road;

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		• access via private driveways from McPherson Street and Coal Pier Road; • carparking and landscaping works.
Built Area	• total warehouse GFA -42,500 m2 ; • total office GFA -4,000 m2 ; • total awning -1,840 m2 ; • floor space ratio -51%	• total warehouse GFA -32,170 m2; • total office GFA -4,000 m2 ; • total awning -1,709 m2 ; • floor space ratio -39%
Subdivision	• 9 lots approved; • Lots 1 – 6 in the Stage 1 area for new warehouse /office development	• 11 lots are proposed on Southlands plus a small area for the Council cycleway expansion. The two additional lots are merely created by swapping former easement over Orica pipeline into lots to be owned by Orica; • existing lots 1 – 6 are proposed to be modified with minor variations to the widths and sizing; • The internal driveway has been added into the area of lots 3 – 6 with reciprocal Right of way for all lots; • The Council footpath on Coal Pier Road is proposed to be widened by approx. 400mm to allow the foot path/cycleway agreed with Council; • Lots 7, 8 and 9 on the eastern portion of Southlands are reconfigured to show one large lot (Lot 9) covering the compensatory flood basin area and Lots 7 and 8 as future development lots subject to Auditor approval; • Lots 10 and 11 were previously shown as easements. These two areas are now proposed as lots to be maintained in Orica ownership to service groundwater wells and pipelines.
Easements	A range of easements approved across the site to allow Orica access for future remediation works.	All easement maintained as per the current approval but modified to suit the revised subdivision plan. Two former pipeline easements are now to be lots owned by Orica, with access and services easements across to suit the new lots;
Vehicle access	Each lot (1-6) has access directly to McPherson Street or Coal Pier Road and each lot.	Each lot has direct access to McPherson Street or Coal Pier Road. All lots will also have access to the internal driveway allowing improved access through lots 3 – 6 allowing for one way movement of trucks through the site and less conflict between cars and trucks.
Car Parking	440 spaces including accessible parking as per Australian Standards.	Car parking provided for revised building configuration on Lots 1-6 including 341 spaces
Compensatory Flood Basin and Flood Solution	Delivered as a compensatory flood basin primarily located on the eastern portion of the site;	• Modified basin area based on new hydrogeological evidence. New basin configured to avoid any chance of unsuitable incursion of groundwater into the basin; • New basin modified to now extend onto both the eastern and western

		portions of southlands; • Developable area on Lots 1 and 2 reduced by 11,140 m2 as a result; • Maintains a result of no flood impact on adjoining properties; • Revised flood difference drawings for the 2 year (Figure D9), 10 year (Figure D10) and 100 year ARI events (Figure D11) have been reproduced as new Figure 9a, Figure 10a and Figure 11a.
Modifications to the RAP	The Project Approval (Schedule 3 Condition 3) requires that: *3. The Proponent shall remediate the site in accordance with the Site Auditor approved RAP prior to the commencement of Operation. Amendments to the approved RAP required as a result of further site investigations must be approved by the Site Auditor.*	All modifications required to the RAP are to be agreed with the Site Auditor.
Requested additional Consent wording by the OEH Accredited Site Auditor.		"As discussed, it would be really helpful if the Approval included a sentence (Probably in Paragraph 4 of Schedule 3), requiring that the Auditor-approved LTSEMP be implemented and maintained in operation. The site auditor guidelines require an auditor to identify a mechanism for enforcement before approving a long-term EMP, and this would be the best mechanism" (Email from Mr Chris Jewell, OEH Accredited Site Auditor, 22 December, 2011)
Section 94 Contributions / VPA	The Proponent shall pay developer contributions to a maximum amount of $3,543,214.00 prior to the issuance of an Occupation Certificate payable to Council in accordance with Orica's offer dated 26 July 2011, for the provision of infrastructure within the Botany Bay local government area.	The amount of S.94 Contributions in respect of Lots 1 – 6 has been varied to the reduction in GFA on Lots 1 – 6. S.94 contributions for any future development of Lots 7 and 8 would be determined when use applications or modifications are put forward for these lots; Condition No.12 of Schedule 2 is therefore proposed to be updated to show a required maximum contribution of $3,110,914, as set out in this letter;
Green and Golden Bell Frog Ponds	Two ponds approved	Two ponds maintained but relocated on site after detailed design with the ecologist.

The main modifications include:

1. **Reconfiguration of the Compensatory Flood Storage Basin**. The compensatory basin was previously proposed predominantly on the eastern portion of Southlands. As part of Phase 1 site investigation works, test trenching was undertaken across the extent of the approved basin area to determine the

possibility of exposing any unsuitable ground water flows into the basin. As a result of those investigations, the basin area has had to be reconfigured, expanding it on the western side of Southlands and extending it further to the north. In turn the area along the eastern boundary of Southlands has been identified as an area that should be maintained unexcavated and above the 1:100 flood level. The updated basin configuration has been determined based on revised flood modelling prepared by Aurecon, who have designed the revised basin to meet the terms of the current approval;

2. **Reconfiguration of Existing Lots 7, 8 and 9** to create 2 lots (7 and 8) that have direct access to McPherson Street and Lot 9 which covers the majority of the compensatory basin on the eastern half of the site. Lots 7 and 8 are zoned for industrial use (General Industrial – IN1) but this amendment does not seek their development although they may be sold in the future for compliant industrial use (with their use being the subject of separate approval);

3. **A minor reconfiguration of the lot widths and sizing to approved lots 1 - 6, that shuffles lot frontages along McPherson Street and improves access to the internal site driveway.** The minor shuffling of the lot widths is to provide a better width of lot for Lot 3, but has necessitated a minor shuffling of Lots 3 – 6 along McPherson. In addition all lots are to be provided access to the internal driveway and its ownership has now been added into Lots 3-6 with reciprocal ROW's for each lot, resulting to a minor change in area for Lots 1 - 6.

   The minor variation in lot widths and sizing has had the consequential effect of creating minor modifications to the warehouse designs to suit the new lots and access. As a consequence we have therefore updated the plans and elevations for the warehouse buildings on Lots 3 – 6 to suit the new lot widths.

4. **Requested additional Consent wording by the OEH Accredited Site Auditor.** The Auditor has requested that some minor additional wording be added into the final consent. Unfortunately his advice did not reach the Department prior to the finalisation of the Project Approval. Accordingly, we would request that the suggested wording of the Site Auditor be added. Specifically the Auditor made the following request:

   "As discussed, it would be really helpful if the Approval included a sentence (Probably in Paragraph 4 of Schedule 3), requiring that the Auditor-approved LTSEMP be implemented and maintained in operation. The site auditor guidelines require an auditor to identify a mechanism for enforcement before approving a long-term EMP, and this would be the best mechanism" (Email from Mr Chris Jewell, OEH Accredited Site Auditor, 22 December, 2011)

Discussions with the DoPI officers also suggest the deletion of Stage 2 drawings that were not approved as part of the original Project Approval be included at this time. A revised drawing list is therefore attached to this modification.

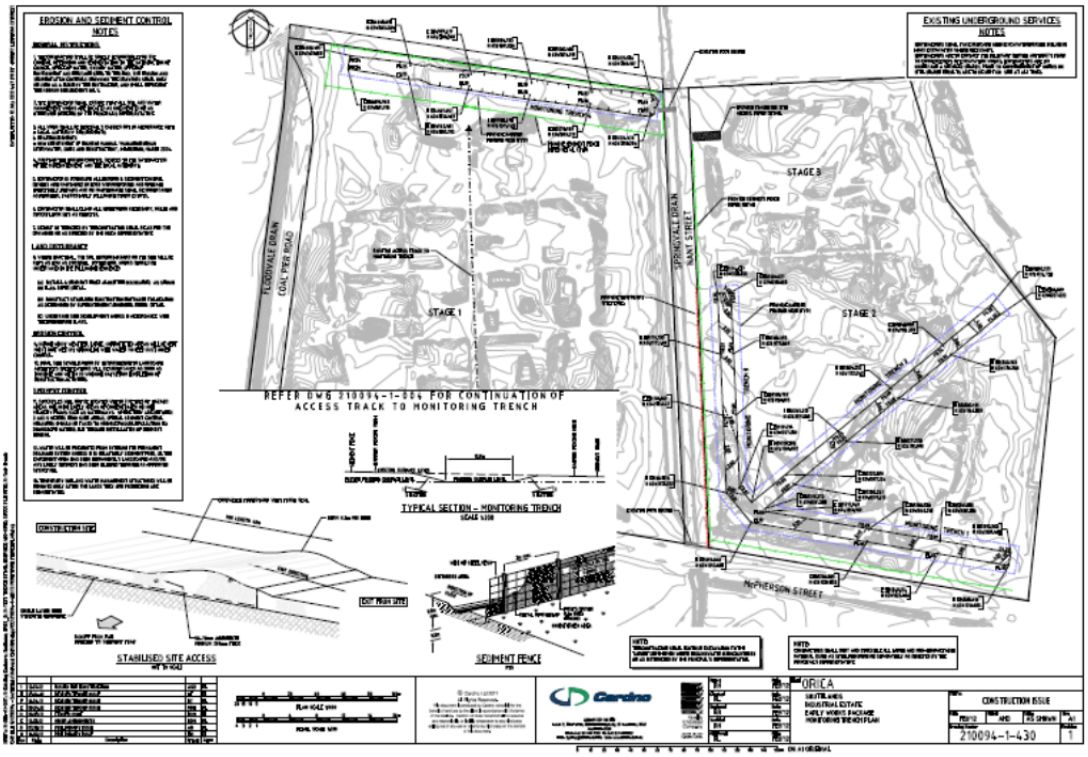
Details of the Main Modifications and Impact Assessment

1. **<u>Reconfiguration of the Compensatory Flood Storage Basin</u>.**

Following the issuance of the Project Approval, Orica commenced works on site with a range of investigatory test trenches, cut into the approved compensatory flood basin to reflect design levels. (See trench locations as shown in the following drawing).

The trenching was done to test the depth of ground water and the potential for groundwater intrusion into a future compensatory basin. In addition the project hydrogeologist has had the benefit of additional data on ground water levels in the approved basin area gathered on an annual basis along with some targeted shallow groundwater wells showing rainfall events and dry periods.

Following excavation of the trenches it was determined that due to levels of perched groundwater, particularly along the eastern boundary of the site, that the designed basin could not be delivered without the risk of unacceptable intrusion of ground water. Specifically the hydrogeologist recommended minimum levels for the basin and that no cut be undertaken along the eastern portion of the site



Accordingly, the extent of the approved compensatory flood basin across the site was required to be modified, yet to still meet the terms of the Consent in terms of flood impacts. This has had the impact of increasing flood storage areas on the western portion of Southlands (at the expense of developable land – with some

11,140 m2 of land being removed from Lots 1 and 2) and the expansion of the basin further to the north on the eastern side.

Aurecon were therefore re- engaged to assist in redefining the flood basin to ensure that the design and capacity of the basin met the results of their initial design and to meet the needs of the existing Project Approval, not impact on adjoining properties.

Their advice (*Southlands – Detailed Design 2D Flood Re-Modelling – Addendum Advice Regarding Variation to Compensatory Flood Basin Design and Impact, Aurecon Letter to Orica, Dated 25 January 2013***)** concludes with the reproduction of updated diagrams for the flood impact demonstrated in the difference diagrams (flooding impacts from the existing situation) for the 2 year, 10 year and 100 year events. (Revised diagrams D9a, D10a and D11a)

This indicates that there is no significant impact on any adjoining properties, matching that previously approved.

We therefore see that with a modification to the basin drawings there are only minor variations required to the existing conditions of consent to reflect the altered basin design and the new flood difference diagrams.

Aurecon advice in relation to the revised basin configuration and their updated flood modelling delivering the revised basin design is attached.

In accordance with the revised compensatory flood basin updated bulk earthworks drawings defining the extent of earthworks across the site to deliver the updated basin and flood free areas are therefore attached. These drawings are proposed to replace the previous Aurecon Civil Drawings C010 and C020. (see summary of modified drawings table.

Modifications to the Project Approval Conditions are therefore sought as follows (as shown in red):

Schedule 3

8. Surface Water and Flooding

The Proponent shall provide flood storage, in accordance with the EA and PPR, to compensate for the amount lost due to filling within the floodplain of Springvale and Floodvale Drains. The compensatory flood storage shall:

a) *be constructed as required to the east and west of Springvale Drain and immediately upstream of McPherson Street;*

b) *include a control structure on the Springvale Drain to control flows into the detention basin;*

c) ~~*include a low flow pipe to allow draining of the detention basin;*~~ *(Note, this is no longer required as the basin level is now generally matching the Nant Street levels)*

d) *be constructed in accordance with the report Orica Southlands Remediation and Development Project Hydraulic Modelling Report and Response to Exhibition Submissions/Comments – (Report Ref: 204617, 29th November 2010, Revision 3 by Aurecon, as amended by Southlands – Detailed Design 2D Flood Re-Modelling – Addendum Advice Regarding Variation to Compensatory Flood Basin Design and Impact, Aurecon Letter to Orica, Dated 25 January 2013); and*

e) be carried out to the satisfaction of the Director-General.

The Proponent shall ensure that all flood mitigation works are completed prior to the commencement of construction of the warehouse buildings.

9. Hydraulic Modelling Flood Validation Assessment Report

The Proponent shall commission and pay the full cost of a Hydraulic Modelling Flood Validation Assessment Report to confirm that the 'as constructed' Stage 1 compensatory flood storage works have been undertaken in accordance with the principles outlined in Orica Southlands Remediation and Development Project Hydraulic Modelling Report and Response to Exhibition Submissions/Comments – (Report Ref: 204617, 29th November 2010, Revision 3 by Aurecon as amended by Southlands – Detailed Design 2D Flood Re-Modelling – Addendum Advice Regarding Variation to Compensatory Flood Basin Design and Impact, Aurecon Letter to Orica, Dated 25 January 2013), and that the flood impact is no greater than indicated in Figures D9a, D10a and D11a of that report (refer to Appendix 6). The assessment must:

a) be conducted by a suitably qualified, experienced and independent expert whose appointment has been endorsed by the Director-General;
b) be submitted to the Director-General and Council within 6 weeks of the completion of the Stage 1 flood mitigation works and prior to the construction of any warehouse units;
c) include a detailed survey from a Registered Surveyor on all key structures;
d) provide easy to read figures indicating any differences between the results provided on Figures D9a, D10a and D11a of the Southlands – Detailed Design 2D Flood Re-Modelling – Addendum Advice Regarding Variation to Compensatory Flood Basin Design and Impact, Aurecon Letter to Orica, Dated 25 January 2013;
e) determine whether the 'as constructed' Stage 1 works have been undertaken in accordance with the design principles outlined in the Aurecon 2010 report and comply with the requirements in this approval; and if necessary; and
f) recommend and prioritise measures to be undertaken in the event that the assessment shows that the flood impact exceeds that shown on Figures D9a, D10a and D11a of the Southlands – Detailed Design 2D Flood Re-Modelling – Addendum Advice Regarding Variation to Compensatory Flood Basin Design and Impact, Aurecon Letter to Orica, Dated 25 January 2013 report and that the works as executed are not in accordance with this approval.

10. Should the Hydraulic Modelling Flood Validation Assessment report required by condition 10, Schedule 3 of this approval, identify an exceedence or non-compliance, then the Proponent shall undertake/employ additional mitigation to the satisfaction of the Director-General within the timeframe specified by the Director-General to achieve the approved flood impact as shown in Appendix 6.

13. Following the construction of each warehouse unit the Proponent shall undertake Flood Impact Validation to demonstrate that construction has not changed the flood impact levels shown on Figures D9a, D10a and D11a of the Southlands – Detailed Design 2D Flood Re-Modelling – Addendum Advice Regarding Variation to Compensatory Flood Basin Design and Impact, Aurecon Letter to Orica, Dated 25 January 2013 (refer to Appendix 6) and validated in accordance with condition 9, Schedule 3.

2. Reconfiguration of Lots 7, 8 and 9 (and the reconfiguration of Orica Pipeline easements as Lots 10 and 11)

The existing consent shows the eastern side of southlands divided into three lots. These 3 lots are to be maintained but reconfigured to create 2 lots (7 and 8) that have direct access to McPherson Street and Lot 9 which covers the majority of the compensatory basin on the eastern portion. Lots 7 and 8 are zoned for industrial use (General Industrial – IN1) but this amendment does not seek their development

although they may be sold in the future for compliant industrial use (with their use being the subject of separate approval);

Traffic Impacts

As traffic generation was a major consideration in the original consent, Traffix Traffic Engineers have been requested to review the proposed modification and assess any impacts associated with the alteration and the potential development of Lots 7 and 8 in the future. The loss of developable area in Stage 1 largely offsets the potential development from new Lots 7 and 8.

Traffix concludes that

In summary, the proposed modifications are considered supportable. The increased traffic volumes associated with the inclusion of Lots 7 & 8 within the first stage of development is effectively off-set by the reduced floor areas now proposed within the original Stage 1 application area. As such, there is minimal change to the previously adopted traffic volumes and inherent impacts associated with the previous Stage 1 approval.

A full copy of their assessment of the modification is attached to this letter.

S.94 Contributions

The existing Project Approval requires S.94 Contributions to be paid to Botany Bay City Council prior to the issuance of an Occupation Certificate as follows:

Schedule 2, Condition 12
The Proponent shall pay developer contributions to a maximum amount of $3,543,214.00 payable to Council generally in accordance with the offer dated 26 July 2011, for the provision of infrastructure within the Botany Bay local government area. The contributions to be paid are to reflect the proportion of each lot in Stage 1 as a percentage of the total land area of Stage 1.

As the current modification proposes a major reduction in built GFA on Lots 1 – 6 (-10,330m2) the contributions are proposed to be amended as follows:

Required S. 94 Contribution	Rate in CP	Required Contribution
Community facility	$259.00 per empl.	$140,870.10
Administration	$42.00 per empl	$22,843.80
Shopping Centre Improvements (City Wide)	$188.00 per empl.	$102,253
Open Space and Recreation	$1,745.00 per empl.	$949,105.50
Total per Employee	**$2,234.00**	**$1,215,073**
Transport Management (based on Stage 1 site area 9.39 ha)	$20.19 Per m^2 site area	$1,895,841
Total Payment Required		**$3,110,914**

1. Rates are based on the January 2006 CP. The Council has advised (19 July 2011) that the rates have not changed since the time the CP has been adopted and the rates remain as originally adopted;
2. Based on Total Site area of 93,900 m2 of new lots 1 - 6 excluding Nant Street Corridor, DOL lands, Orica Pipeline lots (10 and 11) , and gross floor area of 36,170m2 as shown on final (Mod 1) Project Plan;
3. Employee numbers determined in accordance with Botany CP as Transport/Storage/ Warehousing at 1 employee per 66.5 m2 = 543.9 employees
4. Contributions for Lots 7 and 8 are proposed to be levied at the stage of a use Application for those lots

Contributions applicable to each lot are therefore as follows.

Lot	Area	Required Contribution
1	28000	$871,378
2	24300	$746,857
3	10500	$368,822
4	9100	$341,003
5	9900	$371,229
6	12100	$411,626
Total	**93900**	**$3,110,914**

S.94 contributions for any future development of Lots 7 and 8 would be determined when use Applications or Modifications are put forward for these lots;

Condition No. 12 of Schedule 3 of the Project Approval is therefore proposed to be modified as follows:

The Proponent shall pay developer contributions to a maximum amount of $3,110,914 payable to Council generally in accordance with the offer dated 26 July 2011 (as modified by PA Modification 1), for the provision of infrastructure within the Botany Bay local government area. The contributions to be paid are to reflect the proportion of each lot in Stage 1 as a percentage of the total land area of Stage 1.

3. A minor reconfiguration of the lot widths and sizing to approved lots 1- 6, that shuffles lot frontages along McPherson Street and improves access to the internal site driveway

This modification comes about due to a desire to provide a better, wider lot frontage for Lot 3 (allowing for the retention of key Orica infrastructure at the corner of Coal Pier Road and McPherson Street). As a consequence Lots 3 – 6 have been marginally shuffled along McPherson Street, varying their frontages and overall lot sizing.

In addition the internal driveway that previously served Lots 1 and 2 only, is now proposed to form part of Lots 3 – 6, allowing all lots to have access to this driveway. This provides for an improved access and circulation system allowing trucks to move through the sites in a one way direction, minimising conflicts with cars on Lots 3 – 6. The driveway is shown as part of Lots 3 – 6 with reciprocal ROW's ensuring maintenance of the driveway by landowners in favour of all other users.

This variation therefore requires a modification to lots sizes but has no impact on the physical proposal compared to the current Approval. It does however allow for improved traffic circulation through the site allowing trucks to circulate through the lots and reduce conflict with cars on Lots 3 – 6.

At the request of Botany Bay City Council we have also expanded the existing footpath and cycleway along Coal Pier Road by approximately 400mm to allow for an improved cycleway along the Coal Pier Road frontage.

The new modified lot layout is therefore shown on modified plan SRD DA016 (G), which shows the modified lot areas.

As a consequence we have made the relevant changes to other consent drawings where the lot boundary impacts on building design. Accordingly we lodge amended versions of plans, sections and elevations to the warehouse buildings that occupy Lots 3 -6. No change to the development results from these minor modifications as it merely modifies the building dimensions to suit each lot.

4. Additional Wording Requested by the OEH Accredited Site Auditor

The Auditor did request that some minor additional wording be added into the final consent. Unfortunately his advice did not reach the Department prior to the finalisation of the Project Approval. Accordingly, we would request that the suggested wording of the Site Auditor be added. Specifically the Auditor made the following request:

> *"As discussed, it would be really helpful if the Approval included a sentence (Probably in Paragraph 4 of Schedule 3), requiring that the Auditor-approved LTSEMP be implemented and maintained in operation. The site auditor guidelines require an auditor to identify a mechanism for enforcement before approving a long-term EMP, and this would be the best mechanism" (Email from Mr Chris Jewell, OEH Accredited Site Auditor, 22 December, 2011)*

We would propose that Condition 6 in Schedule 3 be modified as follows:

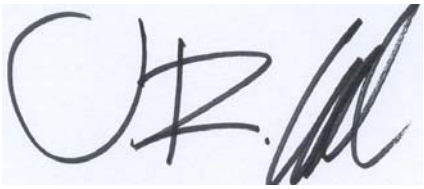
6. *Prior to the commencement of Operation, the Proponent shall prepare and submit a Long Term Site Environmental Management Plan (LTSEMP), to the satisfaction of the Site Auditor. The LTSEMP shall be prepared in accordance with the requirements outlined in the NSW DECC Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition), April 2006, as referenced in the RAP. The plan shall be designed to ensure activities which could potentially or directly result in exposure of future land users to the contaminated soils beneath the physical barrier are precluded or limited / controlled. The plan shall include:*
   - *a) description of the nature and location of contamination remaining on Site;*
   - *b) the objectives of the LTSEMP;*
   - *c) procedures for residual contamination management;*
   - *d) responsibilities for the LTSEMP implementation; and*
   - *e) an implementation schedule for each action in the LTSEMP.*

   The Auditor-approved LTSEMP shall be implemented and maintained by the landowner for the duration of site occupation and operation following remediation and development works.

This modification has no impact on the approved development and merely creates a mechanism for enforcement of the LTSEMP.

Should you require any additional information please do not hesitate to contact the undersigned or Mr Graeme Richardson at Orica on 0412616151.

Yours faithfully
DBL Property Pty Limited



Jeffrey Lord
Director

Cc. Graeme Richardson - Orica

Summary of Modified Drawings

Architectural Plans

Drawing Number / rev. no.	Title	Modified	Details of Modification
SRD DA001/G	Cover & Location Plan	Yes	Cover details and dwg list updated
SRD DA002/G	Aerial Context Plan	Yes	Updated to show stage 1 works only
SRD DA003	Context Plan	Deleted	
SRD DA004	Staging Plan	Deleted	
SRD DA005	Masterplan	Deleted	All site plan information now shown on SRD DA 006
SRD DA006/F	Stage 1 Site Plan	Yes	Modified to match new subdivision boundaries and extent of basin area;
SRD DA007/F	Stage 1 Roof Plan	Yes	Modified to suit modified building layout
SRD DA008/F	Stage 1 Elevations	Yes	Modified to suit modified building layout
SRD DA009/F	Stage 1 Elevations/ Sections	Yes	Modified to suit modified building layout
SRD DA010/F	Stage 1 Detail Elevations	Yes	Modified to suit modified building layout
SRD DA011	Stage 2 Site Plan	Deleted	DoPI recommended deletion as Stage 2 has not been approved.
SRD DA012	Stage 2 Roof Plan	Deleted	DoPI recommended deletion as Stage 2 has not been approved.
SRD DA013	Stage 2 Elevations/ Sections	Deleted	DoPI recommended deletion as Stage 2 has not been approved.
SRD DA014	Stage 2 Road Link Site Plan	Deleted	DoPI recommended deletion as Stage 2 has not been approved.
SRD DA015	Previously Deleted		
SRD DA016/G	Proposed Subdivision Plan	Yes	Modified to match revised subdivision proposal
SRD DA017/F	Proposed Easements Plan	Yes	Modified to reflect revised subdivision but maintaining all original easements on land not owned by Orica.

Engineering Plans

C010	Bulk Earthworks Plan – Stage 1	Yes	Modified to show amended basin plan and flood free areas Replaced with new Cardno Plan **210094-DA-001 (Rev. B)**
C020	Bulk Earthworks Cross Sections – Stage 1	Yes	Modified to show amended basin plan and flood free areas and revised pad levels. Replaced with new Cardno Plan **210094-DA-002 - 004 (Rev. B)**

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22 February 2013

Mr Graeme Richardson
General Manager
Botany Transformation Projects
Orica Australia Pty Ltd

Dear Graeme

Southlands – Detailed Design 2D Flood Re-Modelling – Addendum Advice Regarding Variation to Compensatory Flood Basin Design and Impact

Introduction and Background

The Southlands Remediation and Development Project Approval - 06_019, was issued on 16 April 2012.

As part of that Approval, Aurecon was engaged by the proponent (Orica) to prepare a flood investigation involving modelling of various flood events. The flood modelling resulted in the design of a compensatory flood storage basin on the site aimed at mitigating flood impacts on adjoining properties. The flood modelling was presented in the Report, *Orica Southlands Remediation and Development Project Hydraulic Modelling Report and Response to Exhibition Submissions/Comments – Report Ref: 204617, 29th November 2010, Revision 3.* That flood modelling was reviewed by the Department of Planning and Infrastructure and by their independent consultants *Webb McKeown and Associates* and was endorsed by the Consent, subject to the following key conditions:

Schedule 3

Surface Water and Flooding

8. *The Proponent shall provide flood storage, in accordance with the EA and PPR, to compensate for the amount lost due to filling within the floodplain of Springvale and Floodvale Drains. The compensatory flood storage shall:*

    a) *be constructed to the east of Springvale Drain and immediately upstream of McPherson Street;*
    b) *include a control structure on the Springvale Drain to control flows into the detention basin;*
    c) *include a low flow pipe to allow draining of the detention basin;*
    d) *be constructed in accordance with the report Orica Southlands Remediation and Development Project Hydraulic Modelling Report and Response to Exhibition Submissions/Comments – (Report Ref: 204617, 29th November 2010, Revision 3 by Aurecon); and*
    e) *be carried out to the satisfaction of the Director-General.*

    The Proponent shall ensure that all flood mitigation works are completed prior to the commencement of construction of the warehouse buildings.

Hydraulic Modelling Flood Validation Assessment Report

9. *The Proponent shall commission and pay the full cost of a Hydraulic Modelling Flood Validation Assessment Report to confirm that the 'as constructed' Stage 1 compensatory flood storage works have been undertaken in accordance with the principles outlined in Orica Southlands Remediation and Development Project Hydraulic Modelling Report and Response to Exhibition Submissions/Comments – (Report Ref: 204617, 29th November 2010, Revision 3 by Aurecon), and that the flood impact is no greater than indicated in Figures D9, D10 and D11 of that report (refer to Appendix 6). The assessment must:*

    a) *be conducted by a suitably qualified, experienced and independent expert whose appointment has been endorsed by the Director-General;*

b) be submitted to the Director-General and Council within 6 weeks of the completion of the Stage 1 flood mitigation works and prior to the construction of any warehouse units;
c) include a detailed survey from a Registered Surveyor on all key structures;
d) provide easy to read figures indicating any differences between the results provided on Figures D9, D10 and D11 of the Aurecon 2010 report;
e) determine whether the 'as constructed' Stage 1 works have been undertaken in accordance with the design principles outlined in the Aurecon 2010 report and comply with the requirements in this approval; and if necessary; and
f) recommend and prioritise measures to be undertaken in the event that the assessment shows that the flood impact exceeds that shown on Figures D9, D10 and D11 of the Aurecon 2010 report and that the works as executed are not in accordance with this approval.

10. Should the Hydraulic Modelling Flood Validation Assessment report required by condition 10, Schedule 3 of this approval, identify an exceedence or non-compliance, then the Proponent shall undertake/employ additional mitigation to the satisfaction of the Director-General within the timeframe specified by the Director-General to achieve the approved flood impact as shown in Appendix 6.

13. Following the construction of each warehouse unit the Proponent shall undertake Flood Impact Validation to demonstrate that construction has not changed the flood impact levels shown on Figures D9, D10 and D11 of the Aurecon 2010 report (refer to Appendix 6) and validated in accordance with condition 9, Schedule 3.

Following the issuance of the Project Approval, Orica commenced works on site with a range of investigatory test trenches, cut into the approved compensatory flood basin to reflect design levels. The trenching was done to test the depth of ground water and the potential for groundwater intrusion into a future compensatory basin. In addition the project hydrogeologist had the benefit of additional data on groundwater levels in the approved basin area gathered on an annual basis showing rainfall events and dry periods.

Following excavation of the trenches it was determined that due to levels of perched groundwater, particularly along the eastern boundary of the site, that the designed basin could not be delivered without the risk of unacceptable intrusion of groundwater. Specifically the hydrogeologist recommended minimum levels for the basin and that no cut be undertaken along the eastern portion of the site.

Accordingly, the extent of the approved compensatory flood basin across the site was required to be modified, yet to still meet the terms of the Consent in terms of flood impacts. This has had the impact of increasing flood storage areas on the western portion of Southlands (at the expense of developable land) and the expansion of the basin further to the north on the eastern side of Springvale Drain.

Aurecon was therefore re-engaged to assist in redefining the flood basin to ensure that the design and capacity of the basin met the results of the initial design and to meet the needs of the existing Project Approval, no impact on adjoining properties.

Description of Flood Modelling and Proposed additional flood mitigation works

As noted above, as part of the detailed design process of the bulk earthworks for the Southlands site, the development of an alternative design has been required due to issues identified in the initial site investigation works. Aurecon has undertaken a number of design iteration model simulations to determine the impacts of proposed designs and recommended changes to the compensatory basin design to implement flood mitigation solutions. This was done with the aim of still meeting the primary objective of no impact on adjoining properties and the existing Project Approval Conditions.

The design iterations have concluded with the current proposed design put forward in this modification to the Project Approval. The changes from the approved design include:

- A reduction of the flood storage to the east of Springvale Drain with less excavation along the eastern boundary of the site.

- No requirement for a low flow pipe from the eastern side of the site into Springvale drain as the levels of the proposed basin area match those of Nant Street. The basin will therefore drain naturally.
- Alteration to the hydraulic outlet from the Stage 1 basin within Springvale Drain upstream of Macpherson Street, with a natural channel constriction incorporated in place of a weir structure.
- An increase in the storage along the northern boundary of the site with an increased channel width and excavation.
- The introduction of a weir in the northern channel adjacent to Springvale Drain which was required to limit the volume of water breaking out of the Floodvale Drain during minor flood events. The weir consists of a 10m wide weir sill at RL3.6m with 1V:80H batters to the earthworks building pad to the south and to the property boundary to the north.
- The northern channel grades from the two stage weir back to Floodvale Drain at RL 3.0m

The flood model set-up, other than the changes noted above, has remained as per the original modelling exercise and described in the report *Orica Southlands Remediation and Development Project Hydraulic Modelling Report and Response to Exhibition Submissions/Comments – Report Ref: 204617, 29th November 2010, Revision 3.*

Model results

As per Consent condition 9, the flood difference maps for the 2 year (Figure D9), 10 year (Figure D10) and 100 year ARI events (Figure D11) have been reproduced in Figure D9a, Figure D10a and Figure D11a of this report, respectively.

Examination of these figures shows that there is no afflux on adjoining properties and in fact leads to a decrease in flood levels in most areas. There are some minor differences when comparing Figures D9a, D10a and D11a (attached to this report) with Figures D9, D10 and D11 of the Aurecon 2010 report, with some increases in flood level within the Southlands site boundary due to the changes to on-site mitigation measures.

Conclusion

The revised earthworks design differs from the earthworks that were the subject of the Project Approval. This has come about due to newly identified site constraints. However, the modified design solution meets the primary objective of no impact on adjoining properties and has followed the principles of the existing Project Approval conditions.

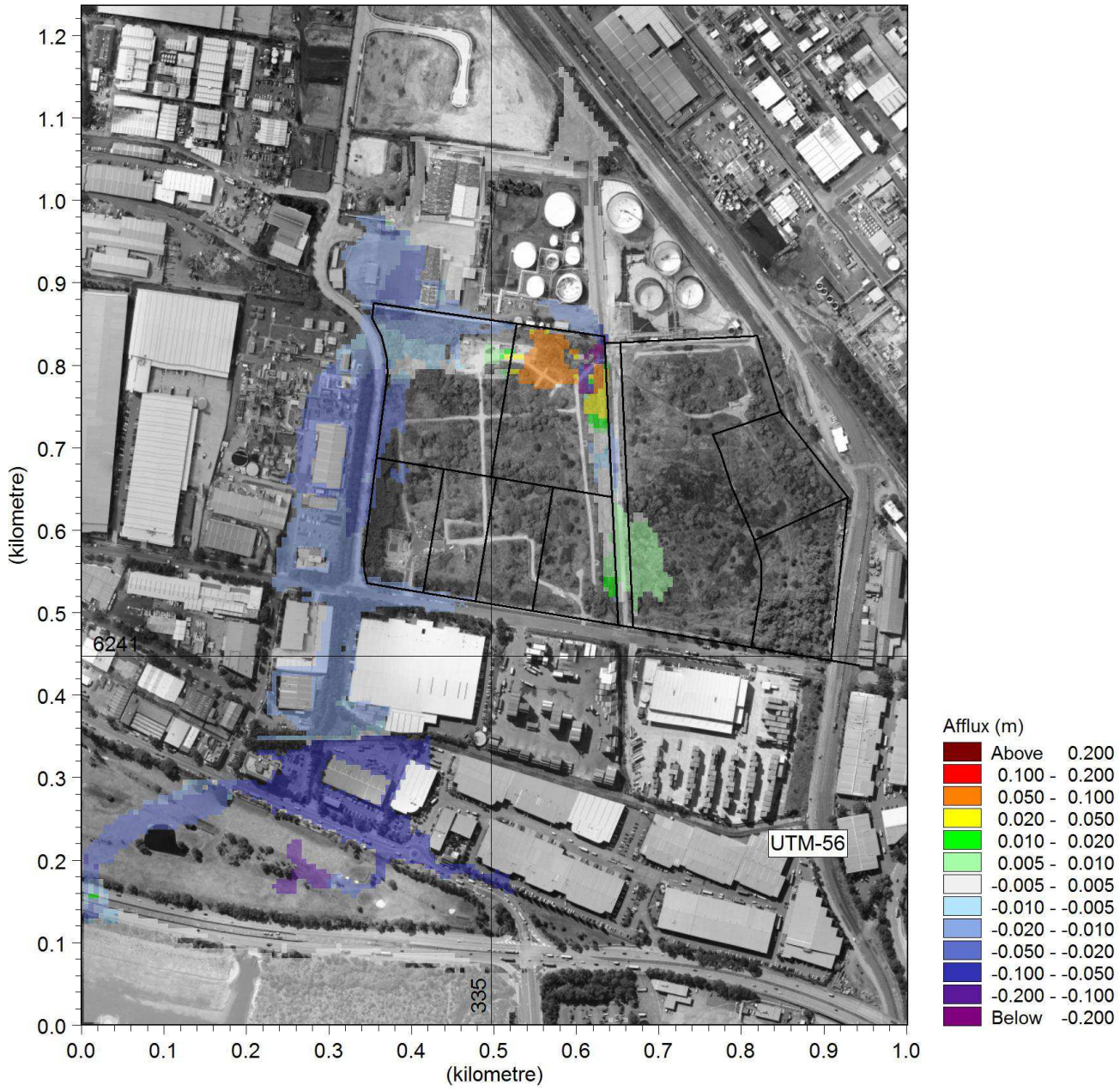
As required by Conditions 9, 10 and 13 (noted above) “as constructed earthworks” will be required to demonstrate compliance with Figures D9a, D10a and D11a. It is anticipated that the construction of warehouse units will not have any impact on the flood regime as the building pads within the bulk earthworks for buildings are above the 100 year ARI flood levels.

Regards

David Whyte

Senior Engineer – Water

Aurecon



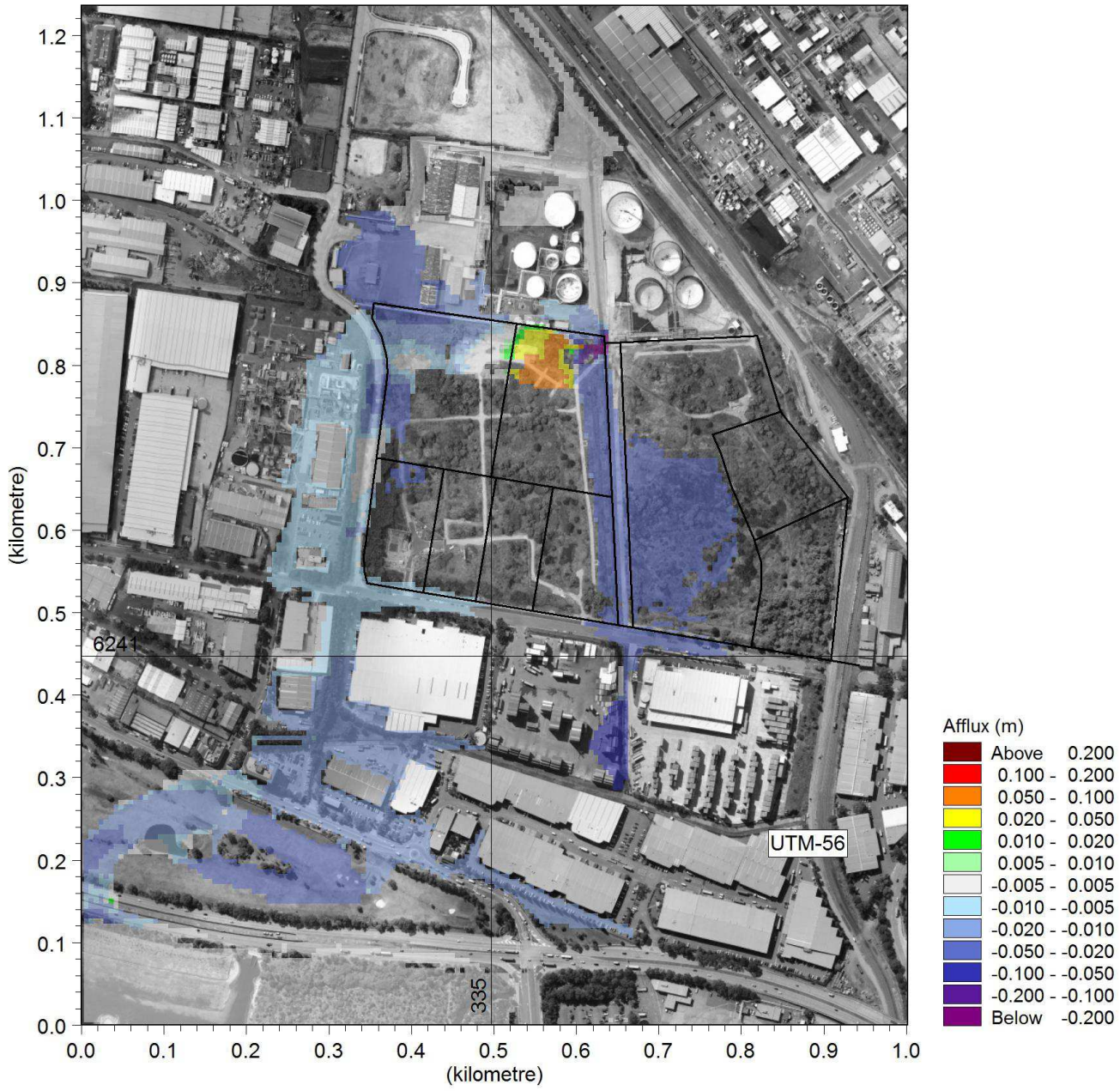
N

75 0 150 300m

SCALE 1:7500

Southlands Industrial Estate **Figure D9a**

Final Development Scenario 50% AEP flood level difference map

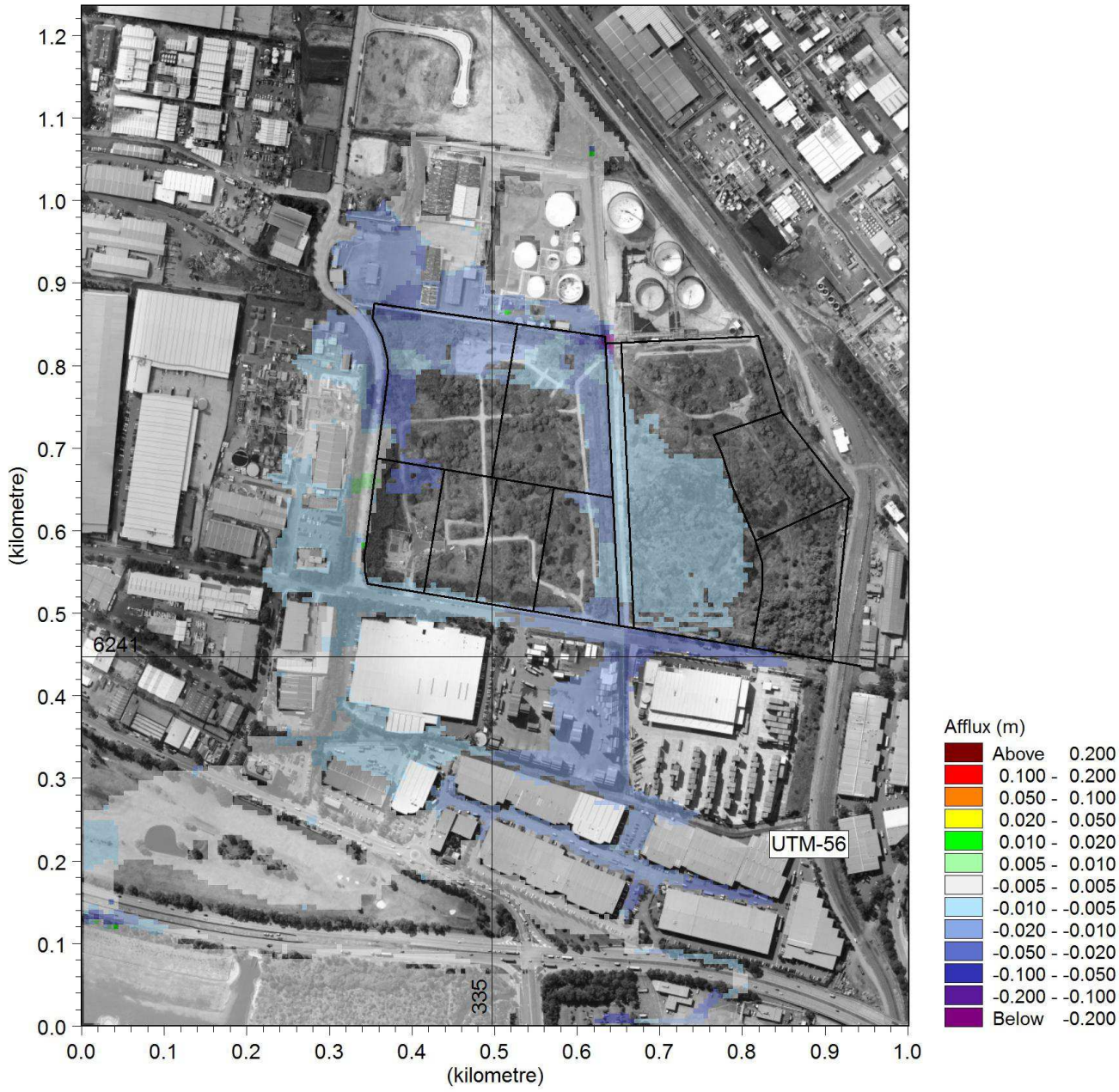


75 0 150 300m

SCALE 1:7500

Southlands Industrial Estate **Figure D10a**

Final Development Scenario 10% AEP flood level difference map



75 0 150 300m

SCALE 1:7500

Southlands Industrial Estate **Figure D11a**

Final Development Scenario 1% AEP flood level difference map

Reference: 12.060l01v02

traffix
traffic & transport planners

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director graham pindar
acn: 065132961
abn: 66065132961

25 February 2013

Orica Australia Pty. Limited
C/- DBL Property
Level 6, 432 Kent Street
Sydney NSW 2000

Attention: Mr Jeff Lord,

Re: Orica Southlands - McPherson Street, Banksmeadow – Section 75W Modification (MP 06_0191)

Dear Jeff,

We refer to your correspondence dated 5th February 2013 and, in particular, the proposed amendments to the site planning in response to necessary changes to the flood storage basin. In this regard, we have reviewed these amended plans and now advise as follows.

Proposed Modifications

A detailed description of the proposed works is included in the Environmental Assessment, provided separately on behalf of Orica Australia Pty Limited. In summary, the proposed changes of particular relevance from a traffic perspective are as follows:

- Reduction for the Stage 1 building areas from 46, 510m^2 to 36,170m^2 (a 10,340m^2 reduction), and
- Inclusion of Lots 7 & 8 within the Stage 1 development with a developable site area of some 23,422m^2.

For the purposes of this assessment, it is assumed that Lots 7 & 8 may potentially provide up to 11,711m^2 of building floor area, including office floor area (~1,100m^2). This adopts a building area to developable site area ratio of 0.5 : 1, which compares with a ratio of 0.47 : 1 for the previously approved Stage 1 developable area. As such, this assessment is considered to provide a conservative assessment.

Traffic Generation & Impacts on Previous Modelling

The RMS Guide to Traffic Generating Developments recommends the following traffic generation rate for warehousing developments:

- 0.5 trips per 100m^2 gross floor area

This rate is applicable to both warehouse area and ancillary office areas, provided the office component does not exceed 20% of the overall floor area. In this regard, a comparison of the traffic volumes associated with the approved Stage 1 project application and the proposed development is provided in Table 1, below.

Table 1: Traffic Generation Comparison – Approved vs. Proposed Modification

Stage / Lots	Approved		Proposed		Relative Change in Traffic Volumes (veh/hr)
	Area	Vehicle Trips	Area	Vehicle Trips	
Stage 1 - Warehouse	42,510	213	32,170	161	-52
Stage 1 - Office	4,000	20	4,000	20	nil
Lots 7 & 8 - Warehouse	n/a – not included in approved traffic volumes		10,611	53	+53
Lots 7 & 8 – Office			1,100	6	+6
TOTAL	46,510	233	41,873	240	+7

It can be seen from the Table 1 that the proposed modifications will result in only a marginal increase in traffic of only 7 vehicles per hour during peak periods. This equates to a single additional vehicle movement (two-way) every 8.5 minutes and will have minimal, if any, impact on the previously approved arrangements.

A summary of the modelling results for the critical intersections of Botany Road with Hill Street and Exell Street under the previously approved Stage 1 development scenario is provided in Table 2 below. This modelling includes that additional 20 metres required to be provided for the right turn storage lane on approach to the Hill Street intersection, as indicated by the detailed outputs included in **Attachment 1**.

Table 2: Peak Hour Intersection Performance: Approved

Intersection Description	Control Type	Period	Degree of Saturation	Intersection Delay	Level of Service
Botany Road / Hills Street	Priority	AM	0.543	18.4	A
		PM	0.230	13.3	A
Botany Road / Exell Street	Priority	AM	0.517	16.3	B
		PM	0.568	16.4	B

It can be seen from Table 2 that the critical intersections of Botany Road with Hill Street and Exell Street operates satisfactorily in both the AM and PM peak periods.

Conclusions

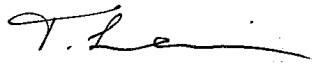
In summary, the proposed modifications are considered supportable. The increased traffic volumes associated with the inclusion of Lots 7 & 8 within the first stage of development is effectively off-set by the reduced floor areas now proposed within the original Stage 1 application area. As such,

there is minimal change to the previously adopted traffic volumes and inherent impacts associated with the previous Stage 1 approval.

We trust the above is of assistance and please contact the undersigned should you have any queries or require any further information regarding the above.

Yours faithfully,

traffix



Tim Lewis
Associate Engineer

Attachments: 1) SIDRA Modelling Outputs

Attachment 1 – SIDRA Modelling Results

For the purposes of this assessment surveys were undertaken at the critical intersections of Hill Street and Exell Street with Botany Road. The surveys were undertaken during the critical AM and PM peak periods. The peak hour flows were then analysed using the SIDRA computer program to determine the key intersection performance characteristics under existing traffic conditions. The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

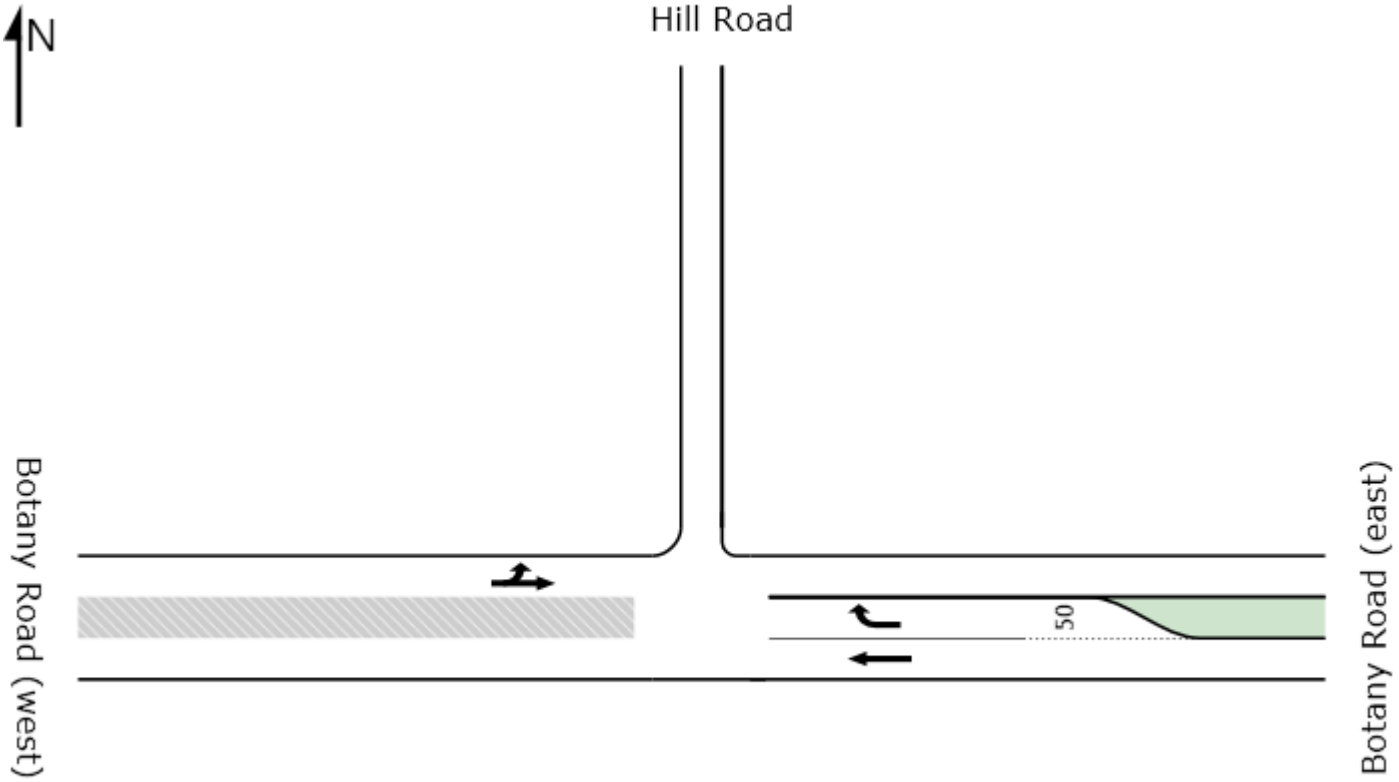
DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below:

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

Attachment 1a – SIDRA Existing Scenario


N
Hill Road
Botany Road (west)
Botany Road (east)
50

LANE SUMMARY

Botany Rd & Hill St
Period: AM
Scenario: Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: Botany Road (east)																
Lane 1	0	375	0	375	20.0	1726	0.217	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	0	196	196	20.0	607	0.323	100	15.2	LOS B	1.5	12.4	50	Turn Bay	0.0	0.0
Approach	0	375	196	571	20.0		0.323		5.2	NA	1.5	12.4				
West: Botany Road (west)																
Lane 1	73	400	0	473	20.0	1709	0.276	100	1.4	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	73	400	0	473	20.0		0.276		1.4	NA	0.0	0.0				
Intersection				1043	20.0		0.323		3.5	NA	1.5	12.4				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model used.

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SIDRA INTERSECTION

LANE SUMMARY

Botany Rd & Hill St
Period: PM
Scenario: Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: Botany Road (east)																
Lane 1	0	500	0	500	20.0	1726	0.290	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	0	86	86	20.0	725	0.119	100	12.7	LOS A	0.5	3.8	50	Turn Bay	0.0	0.0
Approach	0	500	86	586	20.0		0.290		1.9	NA	0.5	3.8				
West: Botany Road (west)																
Lane 1	29	347	0	377	20.0	1717	0.219	100	0.7	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	29	347	0	377	20.0		0.219		0.7	NA	0.0	0.0				
Intersection				963	20.0		0.290		1.4	NA	0.5	3.8				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model used.

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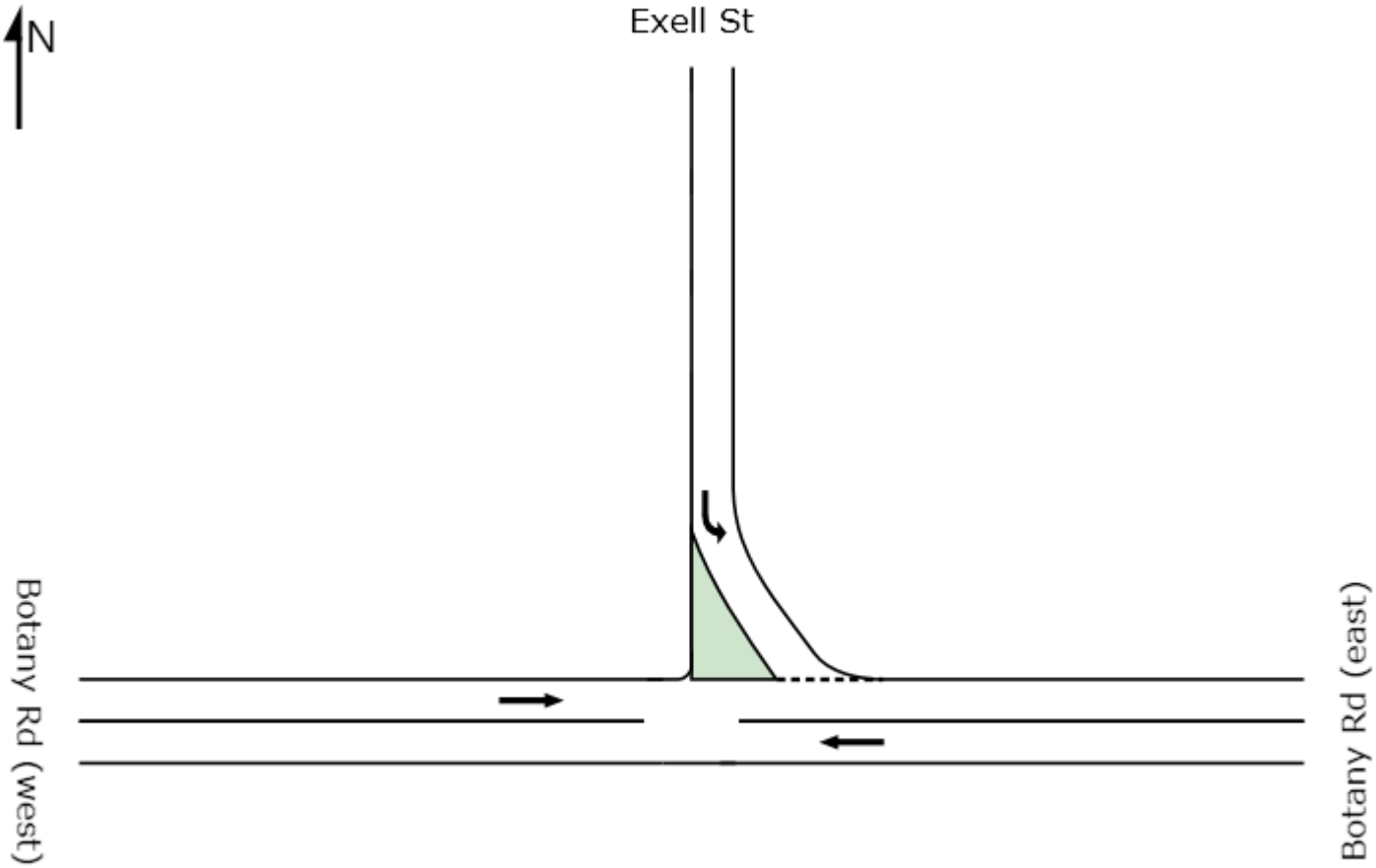
N
Exell St
Botany Rd (west)
Botany Rd (east)

LANE SUMMARY

Botany Rd & Exell Rd
Period: AM
Scenario: Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: Botany Rd (east)																
Lane 1	0	565	0	565	20.0	1726	0.328	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	0	565	0	565	20.0		0.328		0.0	NA	0.0	0.0				
North: Exell St																
Lane 1	173	0	0	173	20.0	523	0.330	100	14.2	LOS A	1.5	12.1	500	–	0.0	0.0
Approach	173	0	0	173	20.0		0.330		14.2	LOS A	1.5	12.1				
West: Botany Rd (west)																
Lane 1	0	424	0	424	20.0	1726	0.246	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	0	424	0	424	20.0		0.246		0.0	NA	0.0	0.0				
Intersection				1162	20.0		0.330		2.1	NA	1.5	12.1				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model used.

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LANE SUMMARY

Botany Rd & Exell Rd
Period: PM
Scenario: Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: Botany Rd (east)																
Lane 1	0	537	0	537	20.0	1726	0.311	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	0	537	0	537	20.0		0.311		0.0	NA	0.0	0.0				
North: Exell St																
Lane 1	167	0	0	167	20.0	554	0.302	100	13.3	LOS A	1.3	10.7	500	–	0.0	0.0
Approach	167	0	0	167	20.0		0.302		13.3	LOS A	1.3	10.7				
West: Botany Rd (west)																
Lane 1	0	396	0	396	20.0	1726	0.229	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	0	396	0	396	20.0		0.229		0.0	NA	0.0	0.0				
Intersection				1100	20.0		0.311		2.0	NA	1.3	10.7				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
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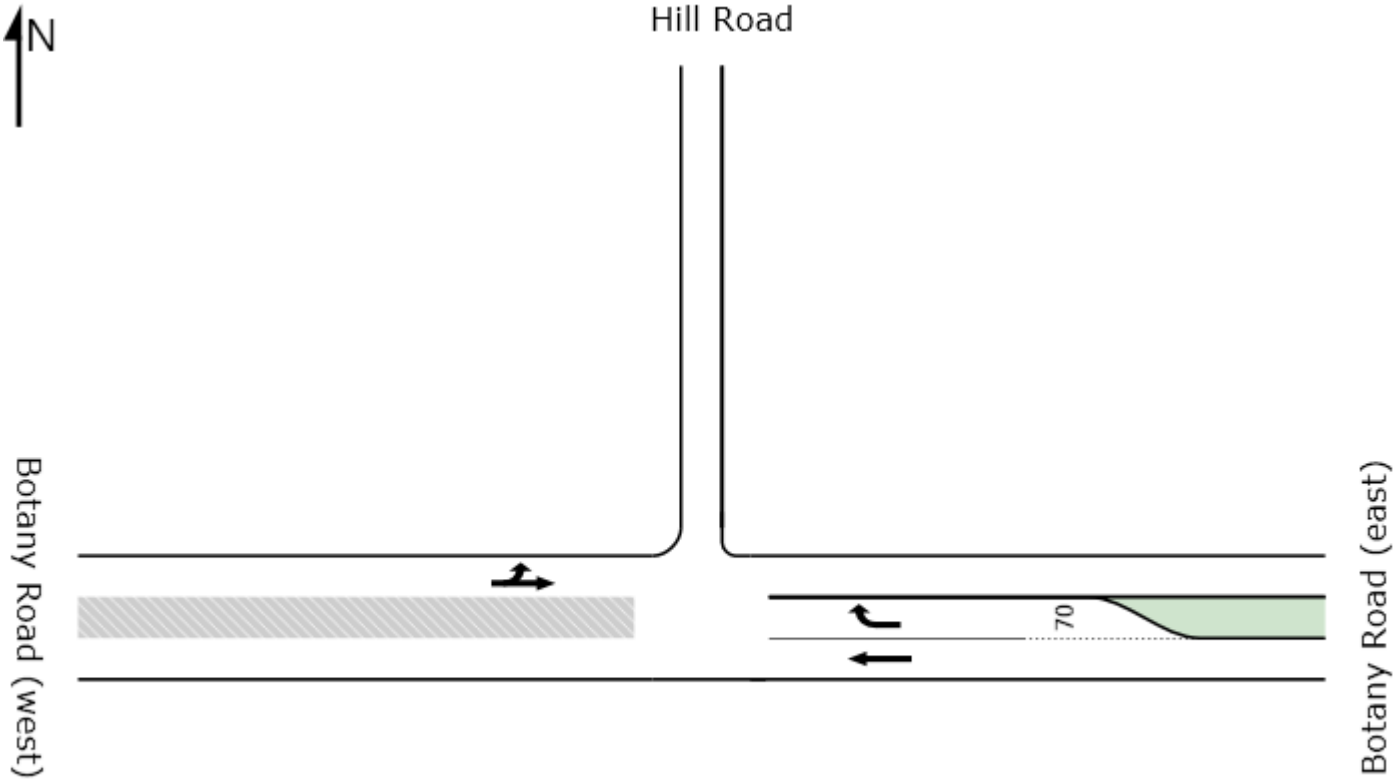
Attachment 1b – SIDRA Approved Scenario


N
Hill Road
Botany Road (west)
Botany Road (east)
70

LANE SUMMARY

Botany Rd & Hill St
Period: AM
Scenario: Existing + Approved Stage 1
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: Botany Road (east)																
Lane 1	0	375	0	375	20.0	1726	0.217	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	0	306	306	20.0	564	0.543	100	18.4	LOS B	3.4	28.2	70	Turn Bay	0.0	0.0
Approach	0	375	306	681	20.0		0.543		8.3	NA	3.4	28.2				
West: Botany Road (west)																
Lane 1	109	400	0	509	20.0	1703	0.299	100	1.9	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	109	400	0	509	20.0		0.299		1.9	NA	0.0	0.0				
Intersection				1191	20.0		0.543		5.5	NA	3.4	28.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model used.

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LANE SUMMARY

Botany Rd & Hill St
Period: PM
Scenario: Existing + Approved Stage 1
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: Botany Road (east)																
Lane 1	0	500	0	500	20.0	1726	0.290	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	0	160	160	20.0	695	0.230	100	13.3	LOS A	0.9	7.7	70	Turn Bay	0.0	0.0
Approach	0	500	160	660	20.0		0.290		3.2	NA	0.9	7.7				
West: Botany Road (west)																
Lane 1	54	347	0	401	20.0	1711	0.234	100	1.2	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	54	347	0	401	20.0		0.234		1.2	NA	0.0	0.0				
Intersection				1061	20.0		0.290		2.5	NA	0.9	7.7				

Level of Service (LOS) Method: Delay (RTA NSW).

Lane LOS values are based on average delay per lane.

Minor Road Approach LOS values are based on average delay for all lanes.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

SIDRA Standard Delay Model used.

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SIDRA INTERSECTION

LANE SUMMARY

Site: Botany Rd & Exell St
APPROVED-AM

Botany Rd & Exell Rd
Period: AM
Scenario: Existing + Approved Stage 1
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: Botany Rd (east)																
Lane 1	0	565	0	565	20.0	1726	0.328	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	0	565	0	565	20.0		0.328		0.0	NA	0.0	0.0				
North: Exell St																
Lane 1	271	0	0	271	20.0	523	0.517	100	16.3	LOS B	3.1	25.2	500	–	0.0	0.0
Approach	271	0	0	271	20.0		0.517		16.3	LOS B	3.1	25.2				
West: Botany Rd (west)																
Lane 1	0	424	0	424	20.0	1726	0.246	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	0	424	0	424	20.0		0.246		0.0	NA	0.0	0.0				
Intersection				1260	20.0		0.517		3.5	NA	3.1	25.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model used.

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LANE SUMMARY

Botany Rd & Exell Rd
Period: PM
Scenario: Existing + Approved Stage 1
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: Botany Rd (east)																
Lane 1	0	537	0	537	20.0	1726	0.311	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	0	537	0	537	20.0		0.311		0.0	NA	0.0	0.0				
North: Exell St																
Lane 1	315	0	0	315	20.0	554	0.568	100	16.4	LOS B	3.8	31.1	500	–	0.0	0.0
Approach	315	0	0	315	20.0		0.568		16.4	LOS B	3.8	31.1				
West: Botany Rd (west)																
Lane 1	0	396	0	396	20.0	1726	0.229	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	0	396	0	396	20.0		0.229		0.0	NA	0.0	0.0				
Intersection				1247	20.0		0.568		4.1	NA	3.8	31.1				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model used.

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