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Mark Albert Surtees
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Dear Mark

Re: 104-116 Regent Street – Wee Hur – Air Quality Assessment

RWDI Australia Pty Ltd (RWDI) has been engaged by The Trust Company (Australia) Limited ATF WH Redfern Trust (Wee Hur) to conduct a qualitative Air Quality Impact Assessment (AQIA) for the Environmental Impact Statement (EIS) for the proposed development at 104-116 Regent Street, Redfern. The development includes the construction of an 18 storey mixed-use building accommodating ground floor retail premises and 411 bed student housing accommodation with indoor and outdoor communal spaces, on-site bicycle parking and ancillary facilities.

The development's Secretary's Environmental Assessment Requirements (SEARs) SSD 12618001, Key Issue 17, requires consideration of air quality. The relevant SEARs requirement and reference within the report has been provided in Table 1

Table 1: SEARs Air Quality Requirement and relevant reference.

Item	Sears	Report Reference Section
17	*"The EIS must include an air quality assessment of onsite and offsite air quality impacts, including odours, in accordance with the relevant EPA guidelines. The assessment must detail construction and operational air quality impacts both onsite and on nearby sensitive receivers and outline the proposed management and mitigation measures that would be implemented to reduce any air quality impacts".*	Risk Assessment of Dust Impacts from Construction Works and Operational Air Quality

SITE DESCRIPTION

The site is located at 104-116 Regent Street, Redfern. The site has a frontage of approximately 34 metres on Regent Street and a frontage of approximately 25 metres to Margaret Street.

The proposal comprises the redevelopment of the site as summarised below:

- Construction of an 18-storey building comprising a total of 9,562m² gross floor area with a mix of land use activities including:
  - Level 1: 72 m² of retail floorspace, 490m² of communal area for the student accommodation, 102 bicycle parking spaces, loading and waste management facilities and ancillary services and facilities.
  - Upper levels: student accommodation providing a total of 411 beds, including ensuite rooms, studios and two-bedroom configurations, with indoor and outdoor communal spaces on Levels 2, 4 and 16 and additional indoor communal areas on Levels 2 and 4.
  - Hard and soft landscaping within the outdoor communal terraces on the roof-top of the podium level and Levels 4 and 16.
- Public domain improvements including provision of a landscaped through-site link connecting William Lane to Margaret Street and associated improvements to the Regent Street and Margaret Street frontages, including awnings and footpath upgrades.

The site is bounded as follows:

- Regent Street to the east which has high traffic volumes greater than 40,000 vehicles per day (AADT);
- Margaret Street to the south;
- future student accommodation approved under SSD 9194 to the west; and
- existing retail/shop with student housing approved under SSD 10382 to the North.

The location of the site and nearby sensitive receivers are summarised in Table 2 and presented in Figure 1.

Figure 1: Proposed Site and Neighbouring Sensitive Receivers

Table 2: Summary of nearby sensitive receivers.

Item	Sears	Report Reference
1	Residential	Mixed use building with residential apartments at 11 Gibbons Street, Redfern (SSD 7749)
2	Residential	Future 18 storey residential building with at 90-102 Regent Street, Redfern (SSD 10382)
3	Residential	Future 18 storey residential building 13-23 Gibbons Street, Redfern (SSD 9194)
4	Residential & Commercial	Existing mixed-use building with residential apartments across Regent Street.
5	Retail	Existing retail tenancy within the former St Luke's Presbyterian church at 118 Regent Street Redfern.

AIR QUALITY CRITERIA

Introduction

The NSW EPA's Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (the Approved Methods) sets out applicable impact assessment criteria for a number of air pollutants.

Impact Assessment Criteria

Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to air quality. The sections below identify the pollutants of interest in this study and the applicable air quality criteria for each pollutant.

The criteria presented in the Approved Methods are consistent with the National Environment Protection Council's (NEPC), National Environment Protection (Ambient Air Quality) Measure, 2016 (NEPM).

Table 3 summarises the air quality goals for CO (Carbon Monoxide), NO_2 (Nitrogen dioxide) and particulate matter (PM_{10} and $PM_{2.5}$) that are relevant to this study. The air quality goals relate to the total concentrations of dust and particulate matter in the air and not just that from the project. Therefore, some consideration of background levels needs to be made when using these goals to assess impacts.

Table 3: Impact assessment criteria – dust and particulate matter

Pollutant	Averaging period	Criteria
Total suspended particulates (TSP)	Annual	90 µg/m³
Particulate matter ≤10 µm (PM_{10})	Annual	25 µg/m³
	24-hour	50 µg/m³
Particulate matter ≤2.5 µm ($PM_{2.5}$)	Annual	8 µg/m³
	24-hour	25 µg/m³
NO_2	1-hour	246 µg/m³
	Annual	62 µg/m³
CO	15 minutes	100 mg/m³
	1 hour	30 mg/m³
	8 hour	10 mg/m³

Existing Environment

Local climatic conditions

Long-term climatic data from the closest Bureau of Meteorology (BoM) weather station at Sydney Airport Aeronautical Meteorological Office (AMO) (Site No. 066037) were analysed to characterise the local climate in the proximity of the Study Area. The Sydney Airport AMO weather station is located approximately 5km west-northwest of the Study Area.

Table 4 and **Figure 2** present a summary of data from the Sydney Airport AMO weather station collected over a 71 to 87-year period for the various meteorological parameters.

The data indicate that January is the hottest month with a mean maximum temperature of 26.5 degrees Celsius (ºC) and July is the coldest month with a mean minimum temperature of 7.2ºC.

Rainfall peaks during the first half of the year declines during the latter, with an annual average rainfall of 1083.7 millimetres (mm) over 96.0 days. The data indicate that June is the wettest month with an average rainfall of 122.5mm over 8.8 days and September is the driest month with an average rainfall of 60.3mm over 6.8 days.

Relative humidity exhibits little variability across the year. Mean 9am relative humidity ranges from 61% in October to 74% in June. Mean 3pm relative humidity levels range from 49% in August to 63% in February.

Wind speeds during the warmer months have a greater spread between the 9am and 3pm conditions compared to the cooler months. Mean 9am wind speeds range from 12.6 kilometres

per hour (km/h) in May to 16.3km/h in October. Mean 3pm wind speeds range from 17.1km/h in May to 25.3km/h in November.

Table 4: Monthly climate statistics summary – Sydney Airport AMO

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Temperature													
Mean max. temperature (°C)	26.5	26.4	25.3	22.9	20.0	17.6	17.0	18.4	20.6	22.6	24.1	25.8	22.3
Mean min. temperature (°C)	18.9	19.1	17.6	14.2	11.0	8.7	7.2	8.2	10.5	13.3	15.5	17.5	13.5
Rainfall													
Rainfall (mm)	95.9	111.1	115.7	109.3	98.6	122.5	69.6	76.8	60.3	70.3	81.5	74.0	1083.7
Mean No. of rain days (≥1mm)	8.1	8.5	9.2	8.6	8.5	8.8	6.7	6.8	6.8	7.8	8.4	7.8	96.0
9am conditions													
Mean temperature (°C)	22.4	22.3	21.1	18.2	14.6	11.9	10.8	12.5	15.7	18.4	19.9	21.6	17.4
Mean relative humidity (%)	70	73	73	71	73	74	71	65	62	61	64	66	69
Mean wind speed (km/h)	14.4	13.8	12.9	12.9	12.6	13.4	13.3	14.4	15.5	16.3	16.0	14.8	14.2
3pm conditions													
Mean temperature (°C)	24.8	24.8	23.9	21.7	19.0	16.6	16.1	17.2	19.0	20.7	22.1	23.9	20.8
Mean relative humidity (%)	60	63	61	59	58	57	52	49	51	54	56	58	57
Mean wind speed (km/h)	24.1	23.0	21.0	19.3	17.1	17.8	18.2	20.8	23.1	24.6	25.3	25.2	21.6

Local meteorological conditions

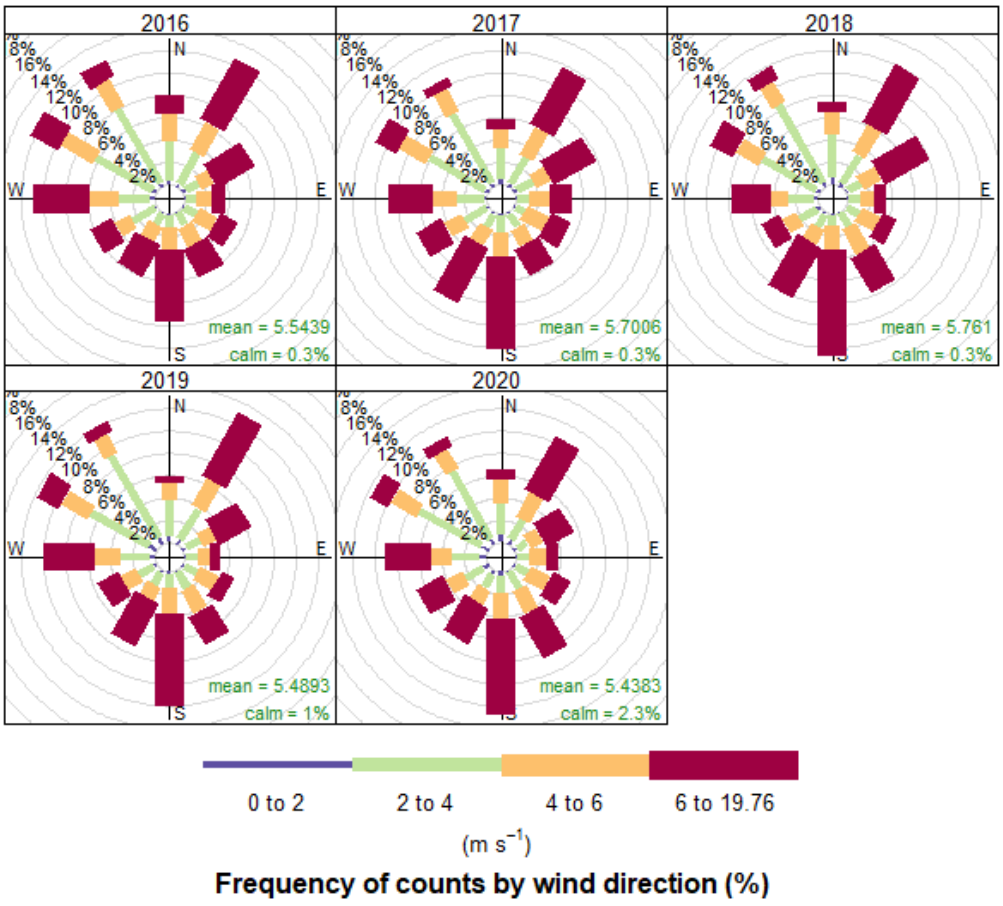
Meteorological conditions strongly influence air quality. Most significantly, with respect to wind speed and wind direction.

Observations of wind speed and direction from the Office of Environment and Heritage (OEH) Air Quality Monitoring Station (AQMS) at Sydney Airport have been selected to represent typical wind patterns in the area surrounding the site.

The Sydney Olympic Park AQMS is located at a closer distance from the site, however the Sydney Airport AQMS is considered more representative of Sydney winds (ie southerlies and north westerlies).

Figure 2 presents annual "wind rose" plots for the Sydney Airport AQMS, the period 2016 to 2020, inclusive. As can be seen from the plots, winds from the south and north-west to north-north-east are most common in the area.

Figure 2: Windrose Plots – Sydney Airport OEH AQMS, 2016-2020



Ambient Air Quality Data

Data from Cook and Phillip Sydney CBD air quality monitoring station (AQMS) has been used to establish typical ground level concentrations of the main airborne pollutants of interest.

A summary of these pollutants for 2020 is presented in Table 5 with the impact criteria.

Table 5: Air Quality Monitoring Results from Cook and Phillip Sydney CBD AQMS

Year	PM_{10} (µg/m³) Annual average	$PM_{2.5}$ (µg/m³) Annual average	NO_2 (µg/m³) Annual average	CO (mg/m³) Maximum 1 hour
2020	15.7	7.8	24.4	4.4
Impact Criteria	25	8.0	62	30

As can be seen from the monitoring results in Table 5, the air quality in that region is reasonably good based on 2020.

Construction Dust Assessment

Assessment Methodology

This section presents a qualitative assessment of potential air quality impacts associated with the proposed excavation/construction works, as these would typically generate the highest level of dust and has been conducted in general accordance with the methodology described in Guidance on the assessment of dust from demolition and construction (IAQM, 2014) prepared by the UK Institute of Air Quality Management (IAQM). This approach presents the risk of dust soiling and human health impacts associated with construction and demolition works and involves the following steps:

- Step 1: Screen the need for a detailed assessment;
- Step 2: Assess the risk of dust impacts arising, based on:
  - The potential magnitude of dust emissions from the works; and,
  - The sensitivity of the surrounding area.
- Step 3: Identify site-specific mitigation; and,
- Step 4: Consider the significance of residual impacts, after the implementation of mitigation measures.

Risk Assessment of Dust Impacts from Construction Works

The following qualitative risk assessment of potential dust impacts has been conducted for the proposed construction works.

Step 1 – Screen the need for a detailed assessment

The IAQM guidance document recommends that a risk assessment of potential dust impacts from construction activities be undertaken when sensitive receptors are located within:

- 350m of the boundary of the site; or,
- 50m of the route(s) used by construction vehicles on public roads up to 500m from the site entrance(s).

As shown in **Figure 1**, a number of sensitive receptors are located within 350m of the site and within 50m of routes used by construction traffic. Therefore, an assessment of dust impacts is considered necessary under the guideline.

Step 2A – Potential dust emission magnitude

The following section evaluates the potential dust emission magnitude for earthworks, construction and trackout (i.e. haulage) activities. These emission magnitudes have been classified based on the examples provided in the IAQM guidance document (Section 7, Step 2: Assess the Risk of Dust Impacts).

The dust emission magnitude associated with **earthworks** activities may be classified as:

- **Large:** total site area >10,000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100,000 tonnes;
- **Medium:** total site area 2,500m^2 – 10,000m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m – 8m in height, total material moved 20,000 tonnes – 100,000 tonnes; and,
- **Small:** total site area <2,500m^2, soil type with large grain (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <20,000 tonnes, earthworks during wetter months.

The total site area is less than 2,500m^2. Therefore, the dust emission magnitude for earthworks activities is classified as **small**.

The dust emission magnitude associated with **general construction** activities may be classified as:

- **Large:** total building volume >100,000m^3, on site concrete batching, sandblasting;

- **Medium:** total building volume 25,000m^3 – 100,000m^3, potentially dusty construction material (e.g. concrete) on site concrete batching; and,
- **Small:** total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The total building volume of new structures to be built would be between 25,000 - 100,000 m^3. Therefore, the dust emission magnitude for the construction of the development is classified as **medium**.

The dust emission magnitude associated with trackout by heavy vehicles may be classified as:

- **Large:** >50 heavy vehicle (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- **Medium:** 10-50 heavy vehicle outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and,
- **Small:** < 10 heavy vehicle outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

It is unknown how many heavy vehicle movements would occur. It is estimated to range from 10-20 vehicle during construction. Therefore, the dust emission magnitude for trackout is classified as **medium**.

Step 2B – Sensitivity of surrounding area

The sensitivity of the surrounding area to dust impacts considers a number of factors, including:

- Specific receptor sensitivities;
- The number of receptors and their proximity to the works;
- Existing background dust concentrations; and,
- Site-specific factors that may reduce impacts, such as trees that may reduce wind-blown dust.

Specific sensitivities for dust soiling and human health impacts at receptors relevant to this study are summarised in Table 6.

Table 6: Receptor sensitivities

Sensitivity	Example land uses	
	Dust soiling	Human health
High	Dwellings, museums and culturally important collections, medium-long term carparks and car showrooms	Residential properties, hospitals, schools and residential care homes
Medium	Parks and places of work	Offices and shops

Sensitivity	Example land uses	
	Dust soiling	Human health
Low	Playing fields, footpaths, short-term carparks and roads	Footpaths, playing fields and parks

Residents in nearby apartments are considered highly sensitive to both dust soiling and health impacts. These receptors are likely to be located withing 50 metres of the works. There is potential for more than 100 of these receptors to be located within 50 metres of the works.

Based on the above factors and following the decision matrix in Table 6 of the IAQM guidance document and presented in Figure 3, the area surrounding the works is determined to have a medium sensitivity to dust soiling impacts.

Figure 3 Area sensitivity decision matrix – dust soiling

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)[c]			
		‹20	‹50	‹100	‹350
High	›100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	›1	Medium	Low	Low	Low
Low	›1	Low	Low	Low	Low

In accordance with the decision matrix in Table 6 of the IAQM guidance document and presented in Figure 4 the area surrounding the works is determined to have a medium sensitivity to human health impacts from construction dust.

Figure 4 Area sensitivity decision matrix – human health

Receptor Sensitivity	Annual Mean PM_{10} concentration[c]	Number of Receptors[d]	Distance from the Source (m)[e]				
			‹20	‹50	‹100	‹200	‹350
High	›32 µg/m³ (›18 µg/m³ in Scotland)	›100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m³ (16-18 µg/m³ in Scotland)	›100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m³ (14-16 µg/m³ in Scotland)	›100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	‹24 µg/m³ (‹14 µg/m³ in Scotland)	›100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	›32 µg/m³ (›18 µg/m³ in Scotland)	›10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m³ (16-18 µg/m³ in Scotland)	›10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m³ (14-16 µg/m³ in Scotland)	›10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	‹24 µg/m³ (‹14 µg/m³ in Scotland)	›10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

The determinations of area sensitivities to dust soiling and human health impacts from the proposed works are summarised in Table 7.

Table 7: Sensitivity of the surrounding area

Impact	Key factors	Sensitivity of the area
Dust Soiling	Receptor sensitivity = high >100 receptors within 50m of works	**Medium**
Human Health	Receptor sensitivity = high >100 receptors within 50m of works Annual average PM_{10} concentration < 24 µg/m³	**Low**

Step 2C – Define the risk of impacts

To define the risk of impacts, the dust emission magnitudes for earthworks (small), general construction (medium) and trackout (medium) are combined with the sensitivity of the area, as per Table 8, Table 9 and Table 10, respectively.

Table 8: Risk of dust impacts from earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

In accordance with Table 8, earthworks activities associated with the Proposal are considered to have a low risk of dust soiling impacts and a negligible risk of health impacts.

Table 9: Risk of dust impacts from construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

In accordance with Table 9, general construction activities associated with the Proposal are considered to have a medium risk of dust soiling impacts and a low risk of health impacts.

Table 10: Risk of dust impacts from trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

In accordance with Table 10, vehicle trackout associated with the construction of the Proposal is considered to have a low risk of dust soiling impacts and a low risk of health impacts.

The identified dust risks associated with the construction of the Proposal are summarised in Table 11.

Table 11 Summary of dust risks

Potential impact	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Medium Risk	Low Risk
Human Health	Negligible	Low Risk	Low Risk

Step 3 – Site-specific mitigation

The IAQM guidance document identifies a range of appropriate dust mitigation measures that could be implemented as a function of the risk of impacts. These measures are presented in the Mitigation and Management Section.

Step 4 – Significance of residual impacts

In accordance with the IAQM guidance document, the final step in the assessment is to determine the significance of any residual impacts, following the implementation of mitigation measures. To this end, the guidance states:

> *For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be "not significant".*

Based on the proposed construction works, and the advice in the IAQM guidance document, it is considered unlikely that these works would result in unacceptable air quality impacts, subject to the implementation of the mitigation measures outlined in the Section below.

MITIGATION & MANAGEMENT

Mitigation Measures

The preceding assessment of potential dust impacts from the proposed construction works indicates that, in the absence of specific mitigation measures, the works have a medium risk of dust soiling impacts and a negligible risk of health impacts.

Accordingly, the following mitigation measures are recommended where practicable:

- **Communications**
  - Develop and implement a stakeholder communications plan that includes community engagement before construction work commences on site.
  - Display the name and contact details of the Responsible Person accountable for air quality and dust issues on the site boundary.
  - Develop and implement a Dust Management Plan (DMP) that considers, as a minimum, the measures identified herein.

- **Site management**
    - Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
    - Make the complaints log available to relevant authorities (Council, EPA, DP&E).
    - Record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action taken to resolve the situation in the log book.
- **Preparing and maintaining the site**
    - Avoid site runoff of water or mud.
    - Keep site fencing, barriers and scaffolding clean using wet methods.
    - Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If being re-used, keep materials covered.
- **Construction vehicles and sustainable travel**
    - Ensure all vehicles switch off engines when stationary - no idling vehicles.
- **Measures specific to trackout (haulage)**
    - Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
    - Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Prior to the commencement of construction the dust mitigation management measures recommended should be considered and, where practicable, included in the Construction Environmental Management Plan (CEMP) for the project.

OPERATIONAL AIR QUALITY

The operational air quality assessment a review the potential impacts of air quality and odour to its neighbouring buildings.

With respected to minimising air quality and odour to adjoining properties the following have been considered in the design:

- garbage storage room is located towards the centre of the development and enclosed; and
- the common area kitchens, retail kitchen and SOU kitchenette have all been design for localised façade discharges distributing the potential for odour impacts.

CONCLUSION

RWDI has been engaged to prepare an air quality impact assessment for the construction works and operation for the proposed development at 104-116 Regent Street, Redfern.

A qualitative assessment of potential air quality impacts associated with the proposed construction works has been conducted in general accordance with the methodology described in Guidance on the assessment of dust from construction (IAQM, 2014) prepared by the UK Institute of Air Quality Management (IAQM). In accordance with the IAQM assessment methodology, the construction of the Proposal is considered to have a medium risk of dust soiling impacts and a negligible risk of health impacts. Accordingly, a range of management and mitigation measures have been identified to minimise these impacts. Subject to the implementation of mitigation measures, the residual effects of dust from the project are expected to be not significant and to have a low risk of generating unacceptable air quality impacts.

When designing the project minimising air quality and odour to adjoining properties has been considered.

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully

John Wassermann
Senior Technical Director
RWDI