Table 3: Historic aerial photograph observations 1947 – current.

Year	484 Bringelly Road (Lot 7 DP 1203674)	488 Bringelly Road (Lot 6 DP 1203674)	Surrounding Land Use
1947	Site is cleared, with scattered patches of trees, and likely used as agricultural land. No site infrastructure is visible.	Site is cleared, with patch of trees near eastern boundary, and likely used as agricultural land. No site infrastructure is visible.	Dwellings and sheds visible to north, west, south west and south east. Immediate surrounding lands are used for market gardens, orchards, and/or agricultural land. Undeveloped bushland further to north east and east. Bringelly Road constructed to south.
1961	Little change from 1947 photo.	Dwelling and sheds visible near western boundary.	Intensified rural development. Market gardens and dams on property to east. Fourth Avenue constructed.
1970	Evidence of current or past market garden land use.	Additional sheds constructed adjacent to western boundary. Evidence of market garden land use in northern and south eastern portions of lot.	Increase in rural development.
1994	Dwelling and sheds constructed in southern portion of lot. Northern market garden use has discontinued. Trees in central portion of the lot have grown.	Additions to dwelling. Some sheds previously constructed removed, replaced with new sheds. Northern portion for market garden use appears discontinued. Lot near eastern boundary appears to be used as market gardens, or possibly dilapidated greenhouses. Dam visible in northern portion of lot.	Increase in rural development, including greenhouses to (distant) south west. Surrounding market gardens largely disused. Stockpiles of rubbish on lot immediately to the north.
2007 (Google Earth Maps)	Growth of trees across central and southern portions of lot.	Additional sheds constructed near western boundary.	Greenhouses constructed on properties to west, north west and east. Increase in stockpiled rubbish north of lot.
2017 (Nearmap)	Growth of trees in central portion of lot, otherwise little change from 2007 photo.	Some sheds in central portion of lot replaced. Growth of trees on lot.	Greenhouses removed to north west and south west. Reduction in surrounding market gardens.

3.4 Walkover Site Inspection

Results of the site walkover inspection on 18 May, 2017 are summarised in Table 4.

Table 4: Summary of site walkover.

Lot ID	Lot Infrastructure	Walkover Summary
484 Bringelly Road (Lot 7 DP 1203674)	Dwelling	Brick and tile dwelling near southern boundary of lot.
	Sheds	Metal carport to north west of dwelling, containing vehicles, and fuel containers.
	Pond	Weatherboard and fibrous cement sheeting clad (PACM) shed in central portion of lot, containing tools, vehicle batteries, and tyres.
		Stockpiles adjacent to shed, containing timber, tree stumps, and metal items.
		Corrugated iron and metal shed, formerly used as dog kennel. Fibrous cement sheeting clad (PACM) addition to east of shed.
		Pieces of fibrous cement sheeting (PACM) observed adjacent to shed.
		Septic tank located to north of dwelling.
		Burnt area near north western boundary.
		Market gardens near western boundary (not currently planted out).
		Northern portion of lot is grassed paddock, trees in central portion of lot and near south eastern boundary.
488 Bringelly Road (Lot 6 DP 1203674)	Dwelling	Weatherboard and tile dwelling located in south western portion of lot. Pieces of fibrous cement sheeting (PACM) observed underneath dwelling.
	Sheds	Metal carport located near south western boundary, containing vehicles, household tools and other items.
		Brick garage in good condition in central portion of lot, containing tools, bicycles, and household items.
		Corrugated iron and metal wire sheds located near western boundary and in central portion of lot, formerly used as dog kennels (currently vacant).
		Weatherboard and fibrous cement sheeting clad (PACM) shed near western boundary, unable to access shed.
		Shed located near eastern boundary, unable to access shed.
		Stockpile located near shed, including containers of unknown content, household items, plastic items and timber.
		Metal and netting greenhouse near south eastern boundary, overgrown and no longer in use.
		Northern portion of lot is grassed paddock, trees and overgrown vegetation and weeds; pond located in northern portion of lot.
		Rusty metal drum located near south eastern boundary, containing evidence of burnt material.

4 Potential for Contamination

4.1 Areas of Environmental Concern/Contaminants of Potential Concern

Our assessment of site AECs and COPCs (Table 5) for the investigation area is made on the basis of available site history, aerial photograph interpretation and site walkovers. A map showing locations of identified AECs is provided in Attachment C.

Table 5: Area of environmental concern and contaminants of potential concern within the investigation area.

AEC [1]	Potential for Contamination	COPC	Contamination Likelihood
AEC A – Dwellings	Pesticides and heavy metals may have been used underneath dwellings for pest control. Building construction may include ACM, zinc treated (galvanised) metals, and/or lead based paints.	HM, OCP/OPP and asbestos	Low - medium
AEC B – Sheds and former sheds (unable to gain access to some sheds).	Sheds and former sheds may currently (or have previously) stored fuel, oils, asbestos sheeting (PACM), pesticides and/or been treated with heavy metals and pesticides (pest control). Shed construction may include ACM, zinc treated (galvanised) metals, and/or lead based paints.	HM, TRH, BTEX, PAH, OCP/OPP and asbestos	Medium - high
AEC C – Former market garden use	Application of agricultural chemicals, use of pesticides and heavy metals for pest control during site use as market gardens.	HM and OCP/OPP	Medium
AEC D - Stockpiles	Contaminants from unknown contents of stockpiles, containers of unknown content, and general refuse may have spilled or leaked onto underlying soil.	HM, TRH, BTEX, PAH and OCP/OPP and asbestos	Low - medium
AEC E – Former greenhouse	Application of agricultural chemicals, use of pesticides and heavy metals for pest control during former site use as greenhouse.	HM and OCP/OPP	Medium
AEC F – Dam	Contaminants may have washed into and accumulated in dam.	HM and OCP/OPP	Low
AEC G – Fibrous cement sheeting (PACM)	Potential ACM material observed as fibrous cement sheeting pieces and fragments, and used as cladding on some sheds.	Asbestos	High
AEC H – Burnt areas	Contaminants from observed burnt areas may have spilled or leaked onto underlying soil.	HM, TRH, BTEX, PAH, OCP/OPP and asbestos	Low - medium

Notes

[1] Locations identified on AEC map in Attachment C.

4.2 Sensitive Receptors and Exposure Pathways

Table 6 provides a summary of identified sensitive receptors and potential exposure pathways connecting receptors to identified AECs and COPCs outlined in Table 6.

Table 6: Summary of receptors and potential pathways.

Receptor	Pathway
Human Receptors: o Future site residents, visitors and workers. o Site workers during future construction works. o Surrounding residential/rural site occupants and workers.	o Dermal contact. o Oral ingestion of potentially contaminated soil.
Environmental Receptors o Onsite drainage east to an unmapped tributary of Kemps Creek. o Dam is located in the northern portion of Lot 6. o Existing site flora and fauna.	o Migration of contaminated runoff. o Direct contact with site flora and fauna.

5 Conclusions and Recommendations

5.1 Conclusions

Results of the site history review indicate that the site has likely been used for rural purposes since at least 1947, including former market gardens use across the majority of the site. Council records indicate that applications for construction of a dwelling and dog kennels, and additions to dwellings have been determined since 1965.

The following potential contamination sources are summarised as:

- Dwelling construction and maintenance have the potential to have introduced contaminants in the form of asbestos (as a construction material), pesticides (pest control) and heavy metals (paints, pest control, use of galvanised materials).
- Sheds and former sheds may currently or previously have stored fuel, oils or other chemicals, leading to hydrocarbon contamination. Lead based paints, PACM (fibrous cement sheeting containing asbestos) and galvanised metal may have been used during construction.
- Former market garden use across the majority of the site, and former greenhouse use Lot 6 may have introduced heavy metals or pesticides into the soil.
- Stockpiles, including containers of unknown content, may have introduced heavy metals, hydrocarbons, OCP/OPP and asbestos to the site soils.
- Dam on Lot 6 may have accumulated contaminants.
- Fibrous cement sheeting, which could contain asbestos (PACM), was observed on both lots as part of shed structure (fibrous cement sheeting cladding), and as pieces and fragments.
- Evidence of burnt material was observed on both lots. No information is available as to what product/items may have been burnt, and contaminants may have spilled or leaked onto the underlying soils.

Overall, the site is considered to generally have a medium risk of contamination. To determine potential risk of harm to human health and environment under proposed development conditions, assessment of the identified AEC should be undertaken prior to any future

development. We note that the AEC and COPC identified in Table 5 may not be the exhaustive list of all AEC and COPC on the site.

5.2 Recommendations

Prior to the proposed residential development, assessment of the AECs and COPCs as noted in this PSI should be undertaken. However, given the proposed development includes excavation and construction of single level basement car parking, we recommend assessment of identified AECs and COPCs to be undertaken following demolition of all onsite buildings.

Given observed PACM on two sheds, and observed PACM pieces and fragments on both lots, the identified areas should undergo a hazardous material assessment by an appropriately qualified contractor to determine if asbestos or other hazardous material is present, prior to demolition of the sheds. Where hazardous materials are identified, the material is to be removed and disposed of by an appropriately qualified contactor under current controls.

To address potential identified AECs and COPCs, a detailed site investigation (DSI) including intrusive soil sampling and testing is recommended. Testing under all building and former building footprints (plus 1 m curtilage) is recommended following their demolition to determine any residual impacts from previous use.

The DSI plan is to be developed in accordance with NSW EPA (1995) *Sampling Design Guidelines* and a risk based assessment. Assessment shall address each of the identified AECs and associated COPC identified in Table 5. Results of the site testing shall be assessed against site acceptance criteria (SAC) developed with reference to ASC NEPM (1999, amended 2013).

Provided the above recommendations are adhered to, we consider that the site shall be able to be made suitable for the proposed residential development.

6 Limitations Statement

The preliminary site investigation was undertaken in line with current industry standards.

It is important, however, to note that no land contamination study can be considered to be a complete and exhaustive characterisation of a site nor can it be guaranteed that any assessment shall identify and characterise all areas of potential contamination or all past potentially contaminating land-uses. Therefore, this report should not be read as a guarantee that no contamination shall be found on the site. Should material be exposed in future which appears to be contaminated or inconsistent with natural site soils, additional testing may be required to determine the implications for the site.

Martens & Associates Pty Ltd has undertaken this assessment for the purposes of the current development proposal. No reliance on this report should be made for any other investigation or proposal. Martens & Associates accepts no responsibility, and provides no guarantee regarding the characteristics of areas of the site not specifically studied in this investigation.

7 References

ASC NEPM (1999, amended 2013) *National Environmental Protection Measure, 1999 (site contamination measure).*

Google Maps (2007).

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NSW DPI Water groundwater database, accessed 7 June, 2017, http://allwaterdata.water.nsw.gov.au/water.stm.

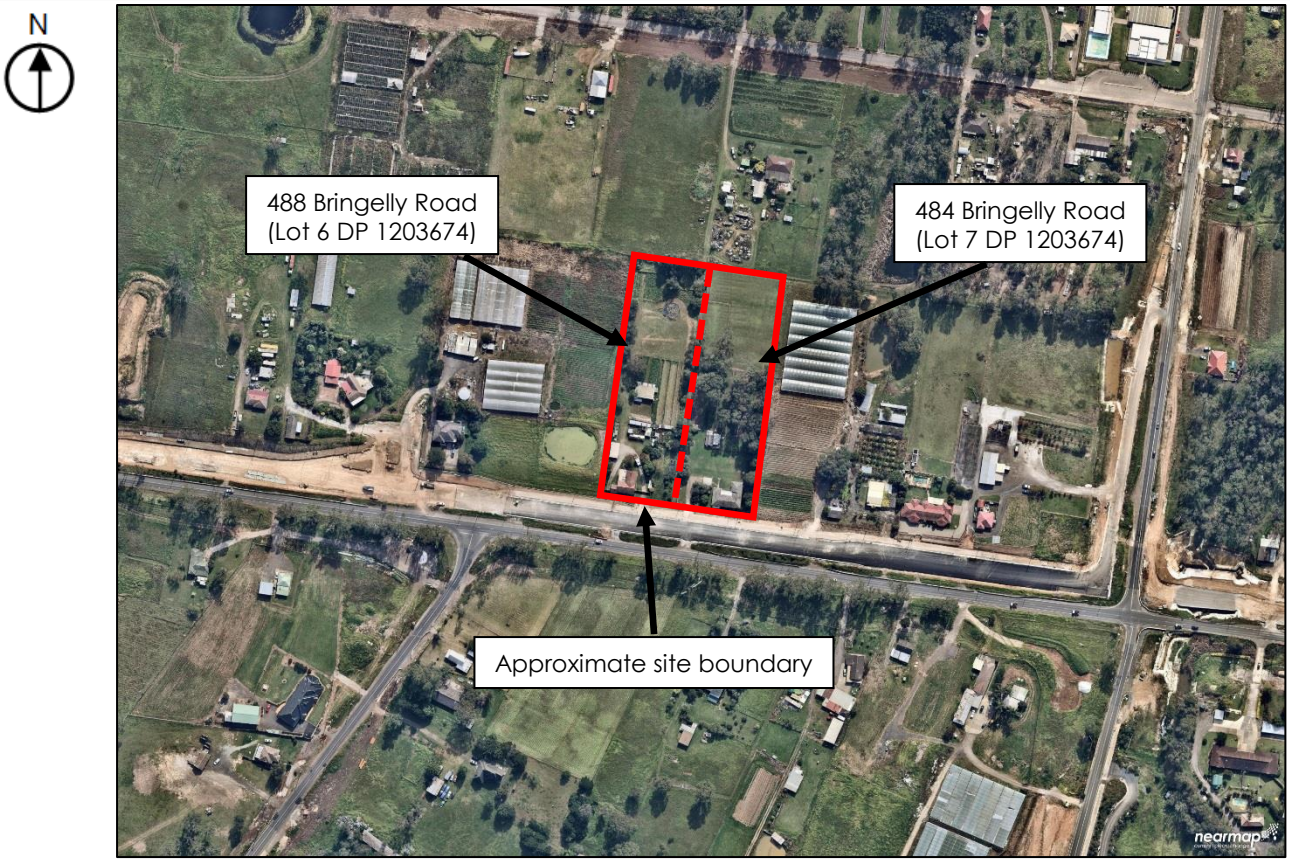
NSW Land and Property Information (LPI) - Aerial photographs (1947, 1961, 1970, 1994).

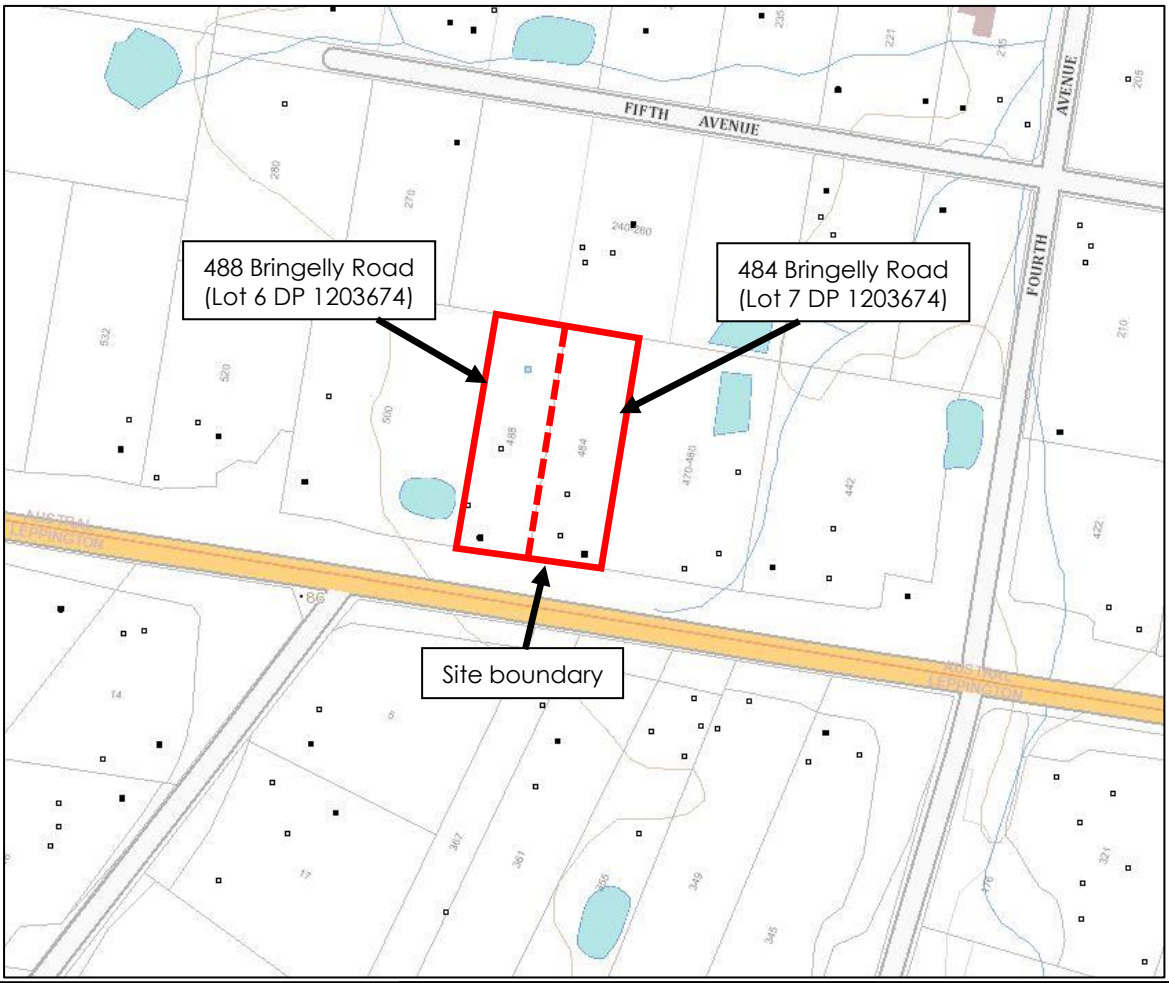
NSW OEH (2011) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, 2nd Edition.*

NSW SIX – *Spatial Information Exchange – Land & Property Information* Aerial photograph (2017). h*ttps://six.nsw.gov.au/wps/portal/.*

SEPP 55 Remediation of Land.

8 Attachment A – Figures





Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	CS	**Site Location** **484 and 488 Bringelly Road, Austral, NSW** **Source: Nearmap, 2017 (top) and** **NSW SIX Viewer, 2017 (bottom)**	Drawing No: FIGURE 1
Approved:	GT		
Date:	6.07.2017		
Scale:	Not to Scale		Job No: P1705935