Maryland Development Company Pty Ltd
Remedial Action Plan for Basin C and V6

St Marys Development Site, NSW

20 November 2019

57591/ 125864 (Rev 0)

JBS&G Australia Pty Ltd

www.jbsg.com.au

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Abbreviations

Term	Definition
ACM	Asbestos Containing Material
AF/FA	Asbestos Fines / Fibrous Asbestos
Bgs	Below Ground Surface
BTEX	Benzene, toluene, ethylbenzene and xylenes
B(a)P	Benzo(a)pyrene
DP	Deposited Plan
DQIs	Data Quality Indicators
DQOs	Data Quality Objectives
EIL/ESL	Ecological Investigation/Screening Levels
EPA	NSW Environmental Protection Authority
ESA	Environmental Site Assessment
HIL/HSL	Health Investigation/Screening Levels
LEP	Local Environmental Plan
LOR	Limit of Reporting
OCPs	Organochlorine pesticide
OEH	NSW Office of Environment and Heritage (includes EPA)
NOW	NSW Office of Water (formerly Department of Water and Energy, DWE)
PAHs	Polycyclic aromatic hydrocarbons
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percentage Difference
SEPP	State Environmental Planning Policy
TRH	Total Recoverable Hydrocarbons
TCLP	Toxicity characteristic leaching procedure
VOCs	Volatile organic compounds

1. Introduction & Objectives

1.1 Introduction

JBS&G Australia Pty Ltd (JBS&G) was engaged by Maryland Development Company Pty Ltd (the Client), to prepare a Remedial Action Plan (RAP) for detention Basins C and V6 located in the north-western portion of the St Marys Development Site.

The proposal involves the construction of two detention basins (Basins C and V6, the basins) to detain, treat and attenuate stormwater runoff from Village 3 and Village 6 of the Jordan Springs development (the development site). The basins are located within the north-western extent of the St Marys Development Site and within the Wianamatta Regional Park. Basins C and V6 will be constructed wetlands and act as water quality improvement basins with the provision for active stormwater detention during high flows.

Basin C will have a surface area of approximately 1.8 hectares and a notional depth of 1.7m. Whereas Basin V6 will be approximately 0.3 hectares and a notional depth of 1.6m.

Each basin is designed to contribute to the water quantity and quality management objectives under the *Sydney Regional Environmental Plan No. 30 – St Marys* (SREP 30) and Penrith City Council's (Council) Water Sensitive Urban Design Policy (December 2013). The basins will incorporate the features for both water quality treatment and detention including a drainage inlet point, low level culvert outlet, spillway with erosion protection and vegetated slopes to provide effective nutrient removal. An access track along the side of each basin with access ramps will be constructed for regular inspection and maintenance access.

The locations of the proposed Basins C and V6 footprints (the site, the basins) and the proposed lot boundaries they fall within (Lot 4 DP1216994 and Lot 5 DP1216994 respectively) are shown on **Figure 1**.

JBS&G conducted a Detailed Site Investigation (DSI, JBS&G 2019a[1]) at the site in which minor B(a)P/B(a)P TEQ and TRH impacts were identified at location BC04, and asbestos fragments identified in the western portion of Basin C would require management through implementation of an RAP.

As such, this RAP has been developed to detail requirements to remediate and validate identified impact in general accordance with relevant guidelines made or approved by the NSW Environment Protection Authority (EPA).

1.2 Objective

The objectives of this RAP are to:

- Summarise the site characteristics;
- Define the extent of remediation required;
- Provide details of the proposed remediation methodology, including consideration of relevant regulatory requirements, as well as associated safety and environmental management controls;
- Confirm the criteria relevant to future open space land use of the Basins; and
- Provide details on validation program and validation reporting.

[1] *Detailed Site Investigation – Basin C and V6, St Mary's Development Site, NSW (Rev 0*) JBS&G Australia Pty Ltd, 20 November 2019 (JBS&G 2019a)

2. Site Condition & Surrounding Land Uses

2.1 Site Identification

The location of the site is shown in **Figure 1**, the site layout is shown on **Figure 2**. The site details are summarised in **Table 2.1** below.

Table 2.1 Summary Site Details

Lot Number	Lot 4 DP1216994 and Lot 5 DP1216994
Street Address	Off Delany Circuit and Agnes Way, Jordan Springs, NSW.
Site Area	Basin C overall footprint – 1.8 ha, and Basin V6 overall footprint 0.3 ha
Local Government Authority	Penrith City Council
Geographic Coordinates (MGA 56)	290288.125 E 6266927.578 N
Current Land-use	Vacant – grassed and woodland areas
Proposed Land-use	Drainage

2.2 Site Description

Generally, the basin areas are currently heavily vegetated with trees, shrubs and grasses. An unsealed access track with inclusions of concrete and asphalt was observed running in an east to west direction through both the location of the proposed basins. Concrete culverts were observed underlying the access track at a number of locations. A tributary of South Creek was observed as traversing through the south-eastern portion of Basin C. The general site layout is provided in **Figure 2**.

2.3 Surrounding Land Use

The Basins are generally within the heavily vegetated bushland of the Wianamatta Regional Park, with specific surrounding land uses described below:

- North – Village 3 and Village 6 of the Jordan Springs development are located north of the site. The villages comprise residential housing and associated roads. Beyond the villages is characterised by rural areas of Llandilo. Xavier College (high school) was located to the north-west.
- South – Areas south of the site comprised further areas of the Wianamatta Regional Park, with the eastern portion of the Jordan Springs Development located approximately 600 m to the south.
- West – a portion of bushland within the Wianamatta Regional Park was located west of the site, with the northern portion of the Jordan Springs development, the Northern Road and the residential suburb of Cranebrook were located further to the west.

2.4 Topography and Hydrology

Based on the Spatial Information Exchange SIX Maps the site is generally flat with elevations ranging between 30 and 40 m AHD. Regional topography is anticipated to fall to the east and towards South Creek.

Precipitation at the site is anticipated to seep into unsealed areas with excess surface waters expected to flow overland into onsite surface water bodies.

The unknown tributaries within the site flow into South Creek approximately 2km east of the site. South Creek drains a very large catchment in western Sydney, originating at Narellan, over 30 km to the south. The catchment is a long narrow strip up to 8 km wide with an approximate area of 18,000 ha. The catchment includes residential, agricultural and industrial areas. The creek flows northwards from the development site through mainly agricultural areas before meeting the Hawkesbury River at Windsor, 18 km to the northeast.

2.5 Geology

Reference to the 1:100 000 Geological Series Sheet 9030 for Penrith (NSW Department of Minerals and Energy 1991) indicates that the site is underlain by Bringelly Shales of the Wianamatta Group. This geological unit is comprised of shales, claystones and occasional fine to medium grained sandstone.

South Creek soils are found on floodplains, valley flats and drainage depressions of the channels on the Cumberland Plane. The landscape is usually flat with incised channels. The soils are often very deep layered sediments over bedrock or relict soils. Where pedogenesis has occurred structured plastic clays or structured loams in and immediately adjacent to drainage lines, red and yellow podzolic soils are most common terraces with small areas of, structured grey clays, leached clay and yellow solodic soils. Flood hazard, seasonal waterlogging, localised permanently high water tables, localised water erosion hazards, localised surface movement potential are associated limitations of the landscape.

Luddenham soils are typically characterised by undulating to rolling low hills on Wianamatta Group shales, often associated with Minchinbury Sandstone. Local relief is between 30–40 m, slopes 5–20%. The landscape is typically characterised by narrow ridges, hillcrests and valleys; extensively cleared tall open forest; shallow (<100 cm) dark podzolic soils) or massive earthy clays on crests; moderately deep (70–150 cm) red podzolic soils on upper slopes; moderately deep (<150 cm) yellow podzolic) and prairie soils on lower slopes and drainage lines. Limitations of soils in the Luddenham group are water erosion hazard, localised steep slopes, localised mass movement hazard, localised shallow soils, localised surface movement potential; localised impermeable highly plastic, moderately reactive subsoil.

2.6 Hydrogeology

A review of information obtained from the Department of Primary Industries Office of Water Groundwater Mapping Tools (NSW office of Water (OoW 2019[2]) indicated there are no registered bores within 1.5 km radius of the site.

Based on previous works conducted throughout the former ADI St Marys property reported in HLA (1999), groundwater was observed in an upper unconfined aquifer and a lower regional semi-confined aquifer. The shallow aquifer was understood to occur at depths between 2 m and 10 m below the surface and within quaternary alluvium and highly weathered shale. The water table occurred in the sandy to silty clay above the weathered shale and/or shale bed rock. The groundwater flow pattern on a regional scale follows the general topography of the area, which in this case is anticipated to be to the east south-east towards the tributary of South Creek.

Groundwater in the shallow upper aquifer was reported as fresh to brackish as well as saline (electrical conductivity (EC) 300 to 40 000 □S/cm). High salinity, high total dissolved solids (TDS 150 to 20 000 mg/L), slightly acidic pH and low dissolved oxygen concentrations reported, suggested groundwater in the upper aquifer is impractical for any domestic, agricultural or industrial use.

Based on regional information including limited hydraulic conductivity testing conducted in other areas of the property, permeability of the unconfined alluvial aquifer is anticipated to be low due to the high clay and silt content of the alluvium.

On a regional scale, groundwater flow was observed to follow the surface water drainage patterns. The groundwater movement was slow to very slow due to the low permeability and the gentle hydraulic gradients.

2 Groundwater Monitoring Overview Map, NW Department of Planning, Industry and Environment, accessed 31 October 2019, https://realtimedata.waternsw.com.au/water.stm

2.7 Acid Sulphate Soils

A review of the Acid Sulfate Soil Risk Map for Springwood/Riverstone (DLWC 1997[3]) there are no known occurrence of acid sulphate soils in the vicinity of the site.

3 *Acid Sulfate Soil Risk Map Edition Two – Springwood/Riverstone,* Department of Land and water Conservation (DLWC 1997)

3. Summary of Detailed Site Investigation

3.1 Detailed Site Investigation (JBS&G 2019a)

JBS&G conducted a Detailed Site Investigation at the proposed Basin C and V6 locations.

The Investigation was undertaken for the purpose of assessing potential for contamination based on current and historical site activities, to draw preliminary conclusions of the potential contamination status of the site and to assess potential soil, surface water and groundwater issues which may affect the basin's construction and future use.

The scope of works for the assessment included:

- A review of available site history and background information to identify potential areas of environmental concern (AECs) and associated contaminants of potential concern (COPC);
- A detailed inspection of the site and surrounds to assess the presence of potential AECs;
- Development and documentation of a conceptual site model (CSM) based on the available information;
- Implementation of a detailed site investigation program including soil, surface water and groundwater sampling;
- Comparison of collected data against relevant EPA endorsed criteria in relation to assessment, from a site contamination perspective, of land use suitability; and
- Preparation of a detailed site investigation report in general accordance with relevant EPA Guidelines;

Based on the works conducted, the site was generally characterised as free of gross contamination with the exception of limited impact within the access track in Basin C associated with B(a)P and asbestos.

Additionally, no issues with surface water or groundwater which would affect the proposed development were identified.

B(a)P and B(a)P TEQ in soil were identified as exceeding the ecological and human health criteria respectively at location BC04 0-0.1 m. The impact is considered to be associated with asphalt materials within the access track and was deemed as requiring management.

Asbestos containing materials (ACM) consisting of fragments of non-friable ACM were identified within the western portion of the access track within the Basin C location. Approximately 5 to 10, 2-5 cm fragments were identified at the surface of the access track within the areas shown on **Figure 3**.

In order to manage the impacts identified preparation and implementation of a remedial action plan (RAP) including validation was deemed a requirement.

3.2 Waste Management Plan (JBS&G 2019b)

Based on the results of the DSI summarised in **Section 3.1**, JBS&G prepared a waste management plan (WMP, JBS&G 2019b[4]) to identify potential waste generated during construction and to provided procedures for the management of wastes or reuse of materials during the development works.

It is noted that the WMP should form part of the implementation of this RAP.

Materials identified at the Basins included:

[4] *Waste Management Plan – Proposed Construction Works at Basin C and V6, St Mary's Development Site, NSW (Rev* 1 JBS&G Australia Pty Ltd 20 November 2018 (JBS&G 2019b)

- Vegetation - consisting of branches, grass, leaves, plants, loppings, tree trunks, tree stumps and similar materials, and including any mixture of those materials. Volume/quantity not able to be defined at this stage;
- Fill materials - limited to access tracks, noted to have inclusions of concrete and asphalt. Fill materials are anticipated to be present from the surface to a depth of approximately 0.5 m below ground surface (bgs), and consist of approximately 600 m^3 within Basin C and 100 m^3 in Basin V6;
- Asbestos impacted fill materials - identified in the western portion of the Basin C access track as identified on **Figure 3**. An approximate volume of 100 m^3 asbestos impacted fill is estimated;
- Construction materials – concrete culverts were observed at a number of locations. Construction materials associated with service infrastructure including concrete and steel was also observed.
- Natural soils – all soils at the site except for fill identified within the access tracks consist of natural soils. Natural soils are also anticipated to underly the access track.

The majority of materials are anticipated to comprise natural soils consistent with the definition of VENM and acceptable for reuse within the development site.

Of the materials identified, fill materials limited to the identified B(a)P impact and asbestos impacted fill are relevant to this RAP. These materials require offsite disposal as General solid waste (non-putrescible) and General solid waste (non-putrescible) mixed with special waste (asbestos) as outlined below. A waste classification letter for each waste type of materials designated for offsite disposal will be required prior to offsite disposal occurring.

4. Remedial Plan

4.1 Extent of Remediation

As discussed in **Section 3** and based on previous works conducted, remediation is limited to B(a)P/TRH impacted soils on the access track surrounding BC-04 and asbestos impact on the western section of the access track.

Impact is surficial in nature and is anticipated to extend approximately 0.3 -0.5 m below the surface.

The approximate lateral extent of PAH and asbestos impacted areas are shown on **Figure 3**. However, the final lateral and vertical extent of remediation required in these areas will be contingent upon visual/olfactory observations, and validation sampling.

4.2 Remedial Objectives

The remediation objectives are as follows:

- Removal of unacceptable risks to human health and the environment and aesthetic issues associated with the identified PAH and asbestos impacts relating to the proposed basins;
- Addressing any unexpected finds as may arise during the remedial works;
- Validate the remedial works in accordance with the relevant NSW EPA guidelines and with reference to the RAP requirements; and
- Document the validation process.

This RAP has been prepared with reference to the following guidelines:

- *Managing Land Contamination, Planning Guidelines, SEPP 55 – Remediation of Land*. Department of Urban Affairs and Planning 1998 (DUAP 1998);
- *Sampling Design Guidelines*. NSW EPA 1995 (EPA 1995);
- *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*. NSW Office of Environment and Heritage 2011 (OEH 2011);
- *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition)*. NSW Environment Protection Authority 2017 (EPA 2017);
- *National Environment Protection (Assessment of Site Contamination Measure) Measure 1999 (As Amended 2013)*. National Environment Protection Council (NEPC 2013);
- *Code of Practice for the Safe Removal of Asbestos, 2nd Edition.* National Occupational Health and Safety Commission, April 2005 (NOHSC 2005); and
- *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia*. Environmental Health Directorate, May 2009 (DOH 2009).

4.3 Remedial Strategy

Noting the relatively small scale of impact as identified in **Sections 3.1** and **4.1**, and noting the requirement for a timely, pragmatic approach, the following remedial strategy is considered most practical:

- Excavation and off-site disposal of asbestos impacted materials identified. It is noted that this remedial strategy is consistent with the approach adopted regarding asbestos in other areas of the development site; and
- Excavation of B(a)P impacted soils and reuse of those soils within a less sensitive land use area within the development site such as beneath a paved roadway or within a

commercial/industrial land use area, if opportunity exists to do so. Or excavation and offsite disposal in accordance with NSW EPA Waste Classification Guidelines (EPA 2014).

4.4 Approvals, Licences and Notifications

SEPP 55 requires Council to be notified 30 days before Category 2 remediation works commence, and within 30 days of completion.

The appointed remediation contractor is required to obtain a site-specific permit approving the asbestos works from NSW SafeWork / WorkCover. A permit will not be granted without a current licence and the permit application must be made at least seven days before the work is due to commence.

Removal of non-friable ACM (>10 m^2) is required to be conducted by a contractor holding at least a Class B licence. A Class A licensed contractor, air monitoring and Licensed Asbestos Assessor involvement is required should work involve friable asbestos.

4.5 Site Establishment

The potential extent of remediation is summarised in **Section 4.1** and shown on **Figure 3**. The remedial contractor shall secure remedial areas to ensure that all safety and environmental controls are implemented, consistent with **Sections 7** and any other site-specific management plans and safe work method statements (SWMS). These controls will include, but not be limited to:

- Locate and isolate all required utilities in the proximity of the works;
- Site signage and contact numbers;
- Establish and supervise site entry gate; and
- Appropriate decontamination areas for personnel and plant, if required.

4.6 Remedial Works

4.6.1 Remediation of B(a)P/TRH Impacted Soils at BC04

The following remediation works shall be undertaken on impacted soils identified at location BC04 within the area shown on **Figure 3**:

- Environmental Consultant to mark out the impacted area;
- Contractor to establish appropriate remedial work zone around the impacted area;
- The contractor will excavate the B(a)P/TRH impacted soils at BC04 to the depth advised by the supervising environmental consultant. Anticipated to be between 0.3 and 0.5 m bgs subject to confirmation of depth of fill and asphalt inclusions;
- Relocation of the materials to a suitable area (beneath paved road or commercial industrial land use area) within the development site, or offsite disposal of materials in accordance with **Section 4.8**; and
- The final extent, vertical and lateral to be directed by the Environmental Consultant. Once the extent is reached the environmental consultant shall inspect the excavation and conduct validation sampling as per **Section 6**.

4.6.2 Remediation of Asbestos Impacted area

The following remediation works shall be undertaken on asbestos impacted soils identified within the western portion of Basin C area shown on **Figure 3**:

- Environmental Consultant to mark out the impacted area;
- Work to be conducted be a Class B licensed asbestos removalist;

- Contractor to establish appropriate remedial work zone around the impacted area;
- The contractor will excavate the asbestos impacted soils to the depth advised by the supervising Environmental Consultant. Anticipated to be between 0.2 and 0.5 m bgs subject to confirmation of depth of fill and visible ACM inclusions;
- Soils to loaded directly into truck and disposed offsite in accordance with EPA (2014) as per **Section 4.8**; and
- The final extent, vertical and lateral to be directed by the Environmental Consultant. Once the extent is reached the Environmental Consultant shall inspect the excavation and conduct validation sampling as per **Section 6**.

4.7 Air Monitoring

Perimeter air monitoring should be conducted during removal of asbestos impacted soils in accordance with the requirements of the National Occupational Health and Safety Commission (NOHSC) Asbestos Code of Practice and Guidance Notes, including The Safe Removal of Asbestos (2nd Ed) [NOHSC: 2002(2005)] and The Management and Control of Asbestos In Workplaces [NOHSC: 2018(2005)].

4.8 Off-Site Disposal

Impacted fill materials proposed to be disposed off-site are to be taken to an appropriately licensed facilities. Fill/soil materials requiring disposal from site shall be classified in accordance with *Waste Classification Guidelines Part 1: Classifying Waste, November 2014, NSW EPA* (EPA 2014).

Based on works conducted, waste has been preliminarily classified as General solid waste (non putrescible)' (GSW) for B(a)P impacted soils (noting additional characterisation may be required to confirm classification) and 'General solid waste (non putrescible) mixed with Special waste (asbestos) for asbestos impacted soils in accordance with EPA (2014). Specific waste classification letters will be required to be provided prior to offsite disposal occurring.

Any unexpected finds varying significantly from impacted materials already identified at the site and the subject of this RAP, will require additional characterisation and classification in accordance with EPA (2014a) guidance.

The contractor must be aware of and conduct all waste disposal in accordance with all relevant regulations including ensuring material is removed to a facility lawfully able to receive the waste. All waste tracking documentation including disposal dockets must be maintained by the contractor and must be provided to the engaged Environmental Consultant for inclusion in the validation report.

4.9 Material Tracking

For materials relocated within the development site, tracking records shall be required including:

- Date;
- Source location including coordinates;
- Material type (i.e. B(a)P impacted soils at location BC04);
- Volumes;
- Placement location including coordinates, development site area, depth (if applicable); or
- Stockpile location including coordinated if temporary stockpiling is required. Survey of final placement would be required following temporary stockpiling.

In addition, and as discussed in **Section 4.8**, all waste tracking documentation including disposal dockets must be maintained by the contractor and provided to the Environmental Consultant for inclusion in validation reporting.

4.10 Validation

Validation of the remedial works will be conducted by the Environmental Consultant to demonstrate the remediation objectives have been achieved. Details of the validation program are provided in **Section 6.**

4.11 Site Disestablishment

On completion of the remediation works all plant / equipment and safety / environmental controls shall be removed from the site by the appointed remediation contractor. All equipment used during remediation works will need to be appropriately decontaminated or disposed as waste by the contractor, in accordance with relevant waste regulations.

5. Contingency Plan

Given the remedial approach consists of removing all impacted materials from the basins, the risk for contingencies is considered low.

Potential for unexpected finds to be identified during works is acknowledged. The unexpected finds protocol as presented in **Section 5.1** below is to be adopted during the works.

The Contingency Plan is required to be part of the Principal Contractors Work Health, Safety and Environmental Plan (WHSP), as also described in **Section 7**.

5.1 Unexpected Finds

While considered unlikely, the possibility exists for hazards that have not been identified to date to be present at the site and encountered during redevelopment works. Examples of hazards which may be present are generally detectable through visual or olfactory means, for example:

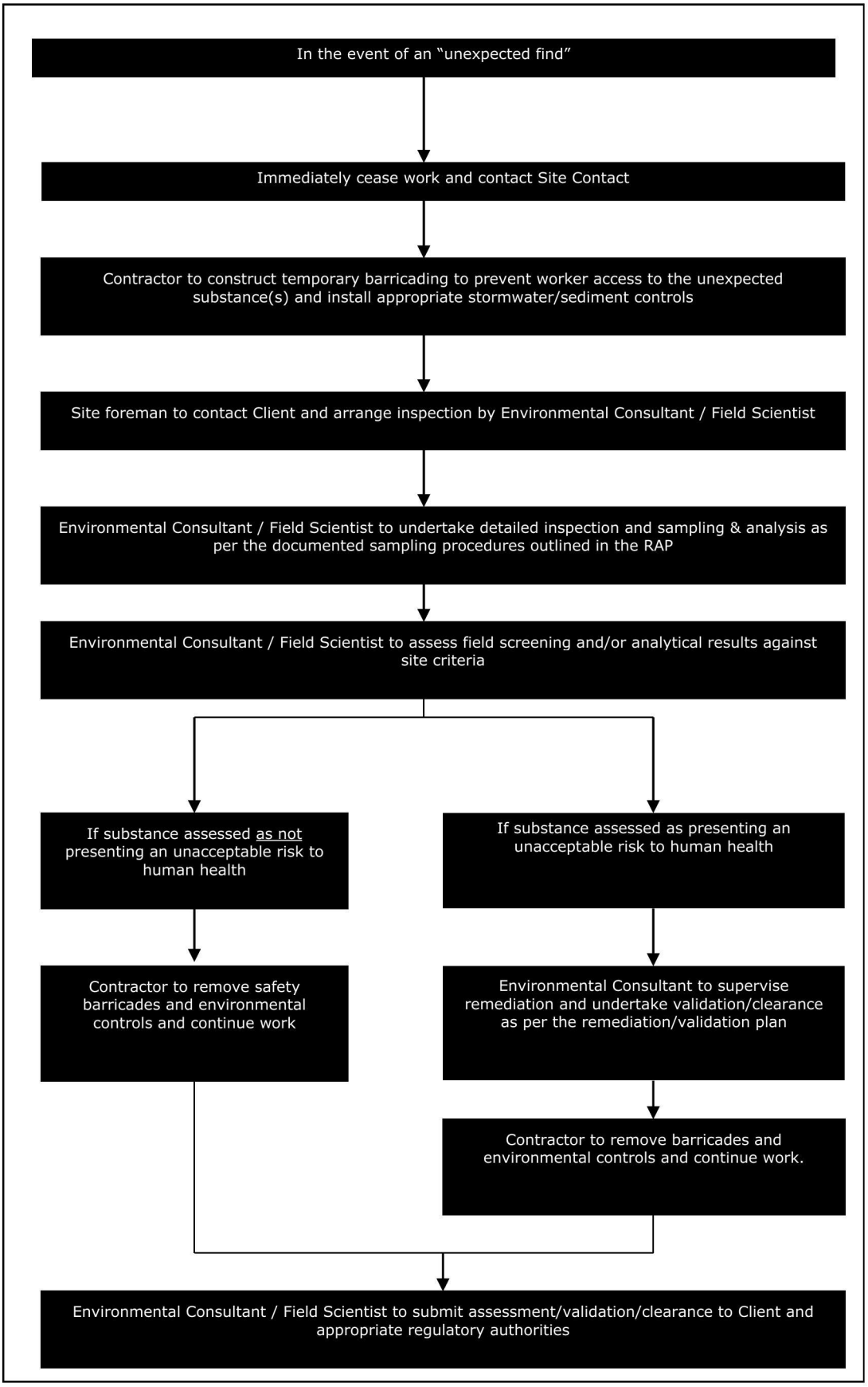
- The presence of significant aggregates of friable asbestos materials (visible);
- Excessive quantities of Construction/Demolition Waste (visible);
- Hydrocarbon impacted materials (visible/odorous);
- Drums or USTs (visible); and
- Oily Ash and/or oily slag contaminated soils/fill materials (visible/odorous).

As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned substances (or any other unexpected potentially hazardous substance) be identified, the procedure summarised in **Table 5.1** is to be followed.

An enlarged version of the unexpected finds protocol, suitable for use on site, should be posted in the Site Office and referred to during the Site Specific Induction by the remediation contractor.

The sampling strategy for each “unexpected find” shall be designed by a suitably qualified Environmental Consultant. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, is it at concentrations which pose an unacceptable risk to human health or the environment.

Table 5.1 Unexpected Finds Protocol



5.2 Contingency Scenarios

5.2.1 Remedial Strategy Failure

In the event the proposed remediation works do not meet the validation criteria, or if the selected remedial strategy is not able to proceed, the following actions will be considered to ensure firstly the safety and health of people and the environment and secondly that the overall project objectives are achieved.

1. Continued controlled excavation until validation is achieved.
2. Reassessment of remedial and validation options.

5.2.2 Complaints

Due to the nature of the activities and type of contaminants potentially at the site there is a potential for complaints to be received from members of the public relating to environmental emissions including:

1. Noise and vibration arising from excavation; and
2. Dust emissions arising from excavation, material handling and placement.

Monitoring of all environmental emissions shall be undertaken during the works and appropriate actions taken to further control emissions following receipt of a complaint. Such additional controls may include the following actions:

1. Disturbance of soils during meteorologically favourable periods only; and/or
2. Covering or wetting down soils which are generating dust.

5.2.3 Severe Weather

Weather will be monitored on a daily basis via checking an internet based weather service provider. Should severe weather be forecast works will stop until safe to re-commence. All site management controls will be implemented to the extent practicable prior to any severe weather events.

6. Validation Plan

6.1 Overview

Validation data is required to be collected to verify the effectiveness of the remediation works and document the condition of the site as being suitable for the proposed future uses.

Validation activities will be required for the following aspects:

- Collection of appropriate environmental data from excavations formed by the removal of contaminated soils;
- Collection of appropriate environmental data from residual soils underneath stockpiles where excavated contaminated material may be stored;
- Collection of appropriate environmental data from soils to be disposed off-site (if not already covered by the Waste Classification Letter Reports) or imported to the site;
- Tracking the movement of all soil and fill material on site;
- Tracking the movement of waste materials requiring off-site disposal; and
- Validation of any unexpected finds.

6.2 Validation B(a)P/TRH Impacted Soils at BC04

Subsequent to removal of BC04 impacted soils as per **Section 4.6.1**, the following will be completed to demonstrate the successful removal of impacted materials:

- The post excavation surface shall be inspected by an Environmental Consultant to confirm the extend of impact has been excavated. In the event the inspection of the excavation identifies the presence of visual indicators that impact remains, further excavation/removal of identified impact may be required prior to implementation of a repeated inspection;
- Once all impact has been removed to the satisfaction of the Environmental Consultant, representative soil samples shall be collected from the excavation base at a rate of 1/100 m^2 and if walls are greater than 300 mm, 1/10 m on the excavation walls (as per **Table 6.1**), with a minimum of one sample per excavation base and face and submitted to a laboratory NATA accredited for TRH/PAH analyses, to confirm the excavation is free of impact; and
- Upon receipt of both visual and laboratory data confirming the impact is within the adopted ecological and human health criteria, the excavation shall be deemed clear by the environmental consultant.

6.3 Validation of Asbestos Impacted Area

Subsequent to removal of asbestos impacted soils as per **Section 4.6.2**, the following will be completed to demonstrate the successful removal of impacted materials:

- The post excavation surface shall be inspected by an Environmental Consultant to confirm the extend of asbestos impact has been excavated. In the event inspection of the excavation identifies the presence of visible ACM, further excavation/removal of identified impact may be required prior to implementation of a repeated inspection;
- Once all impact has been removed to the satisfaction of the Environmental Consultant, representative soil samples shall be collected from the excavation base at a rate of 1/100 m^2 and if walls are greater than 300 mm, 1/10 m on the excavation walls (as per **Table 6.1**), with a minimum of one sample per excavation base and face and submitted to

a laboratory NATA accredited for asbestos analyses, to confirm the excavation is free of impact; and

- Upon receipt of both visual and laboratory data confirming the impact is within the adopted human health criteria, the excavation shall be deemed clear by the Environmental Consultant;

6.4 Validation Sampling Program

Validation sampling of the remedial excavations shall be conducted in accordance with Table 6.1 below:

Table 6.1: Characterisation / Remediation and Validation Sampling Program

Item	RAP Sampling Frequency			Analytical Suite
Remedial Excavation				
	Excavation Floors	**Excavation Walls**	**Materials**	
Excavation formed by the removal of the TRH and PAH impacted fill at BC04	1 / 100 m^2 (10 m grid)	No significant walls anticipated, if walls >300 mm are created they will be sampled at 1 / 10 m (from each distinct horizon / material type / 1 m vertical soil profile)	N/A	TRH, PAHs
Asbestos impact in the western portion access track, Basin C	1/100 m^2 (10 m grid)	No significant walls anticipated, if walls >300 mm are created they will be sampled at 1 / 10 m (from each distinct horizon / material type / 1 m vertical soil profile)	N/A	Asbestos[1] (500 mL)

Note 1: Asbestos analysis will be undertaken for validation samples collected from the fill profile only.

6.5 Validation Criteria

Validation regarding asbestos will be conducted to no visible asbestos identified during validation inspections and no asbestos as AF/FA detected in validation samples analysed.

For all other contaminants including B(a)P, PAHs and TRH, current national human health and ecological based guidance values from NEPC (2013) for regional open space land use scenarios will be adopted.

6.6 Validation Reporting

At the completion of remediation and validation works, a Validation Report will be prepared by the Environmental Consultant in general accordance with the NSW EPA (2011) 'Guidelines for Consultants Reporting on Contaminated Sites' documenting the works completed.

The report will contain information including:

- Results of previous investigations conducted at the basins;
- Details of the remediation works conducted;
- Information demonstrating that the objectives of the RAP have been achieved, in particular the validation sampling results and assessment of the data against validation criteria;

- Information demonstrating compliance with appropriate regulations and guidelines;
- All material tracking data, including waste transport and disposal documentation provided by the contractor;
- Any variations to the strategy undertaken during the implementation of the remedial works;
- Details of any environmental incidents occurring during the course of the remedial works and the actions undertaken in response to these incidents; and
- Other information as appropriate, including any requirements for ongoing monitoring / management.

7. Health, Safety and Environmental Management

Consideration of site contamination issues is required by the remediation contractor in preparation of a Health & Safety Management Plan (WHSP)/ Safe Work Method Statement (SWMS) prior to commencement of ground disturbance works. The Plan shall contain procedures and requirements that are to be implemented as a minimum during the works to address site personnel exposure to contamination impacts.

The objectives of the WHSP/SWMS, requirements are:

- To apply standard procedures that minimises risks resulting from the works;
- To ensure all employees are provided with appropriate training, equipment and support to consistently perform their duties in a safe manner; and
- To have procedures to protect other site workers and the general public.

These objectives will be achieved by:

- Assignment of responsibilities;
- An evaluation of hazards;
- Establishment of personal protection standards, mandatory safety practices and procedures;
- Monitoring of potential hazards and implementation of corrective measures; and
- Provision for contingencies that may arise while operations are being conducted at the site.

In addition to the normal construction-related matters, the WHSP/SWMS shall address the following site-specific hazards associated with the works relating to the management of contaminated soil:

- Contact with asbestos contaminated soils;
- Contact with contaminated soil (incl. dust), and vapours, including requirements for specific Personal Protective Equipment (PPE); and
- Heat/cold stress associated with adoption of additional PPE etc requirements.

All site workers completing ground disturbance activities, or those working in proximity to such works, are required to be inducted into the requirements of the WHSP/SWMS prior to commencement of works

8. Conclusions and Recommendations

8.1 Conclusions

The RAP presented herein details the contaminated soil remediation and validation requirements for the Basins. It is considered that if all of the procedures in this RAP are appropriately followed, the site can be made suitable for the proposed use.

8.2 Recommendations

It is recommended that:

- Waste classification letters for BC04 and asbestos impacted areas are provided by an Environmental Consultant prior to offsite disposal occurring; and
- The unexpected finds protocol as provided in **Section 5.1** is implemented throughout works.

Upon completion of the remediation works, the Validation Report is required to be prepared to verify remedial works were completed in accordance with the RAP.

9. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

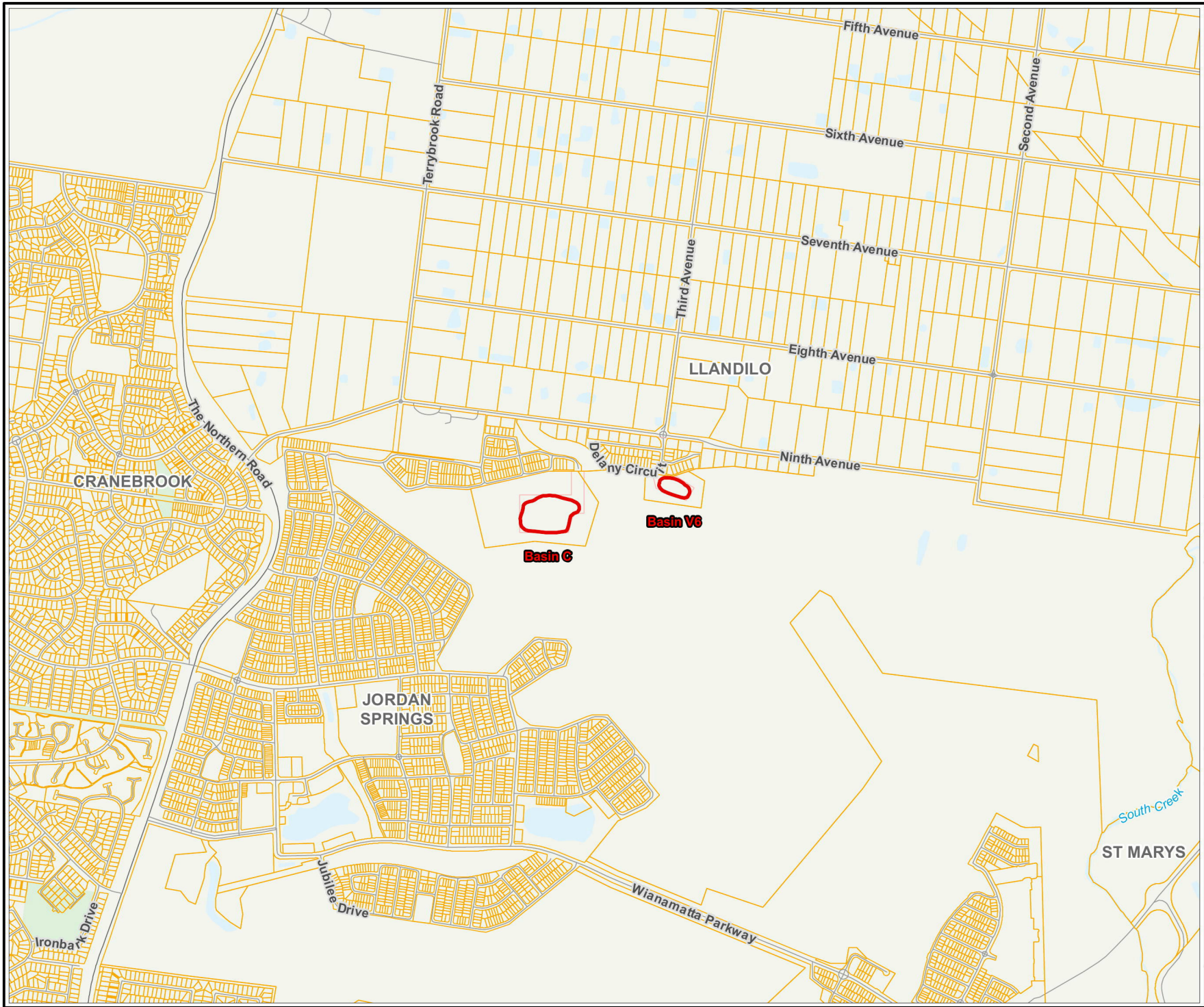
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend:

- Approximate Site Boundary
- Cadastre (NSW LPI, 2019)
- Proposed Cadastre
- Primary Road
- Local Road
- Waterbody area
- Waterway
- Parks and reserves

JBS&G

Job No: 57591

Client: Maryland Development Company

Version: R03 Rev A	Date 18/11/2019
Drawn By: AS	Checked By: GB

Scale 1:20,000

0 270 540

metres

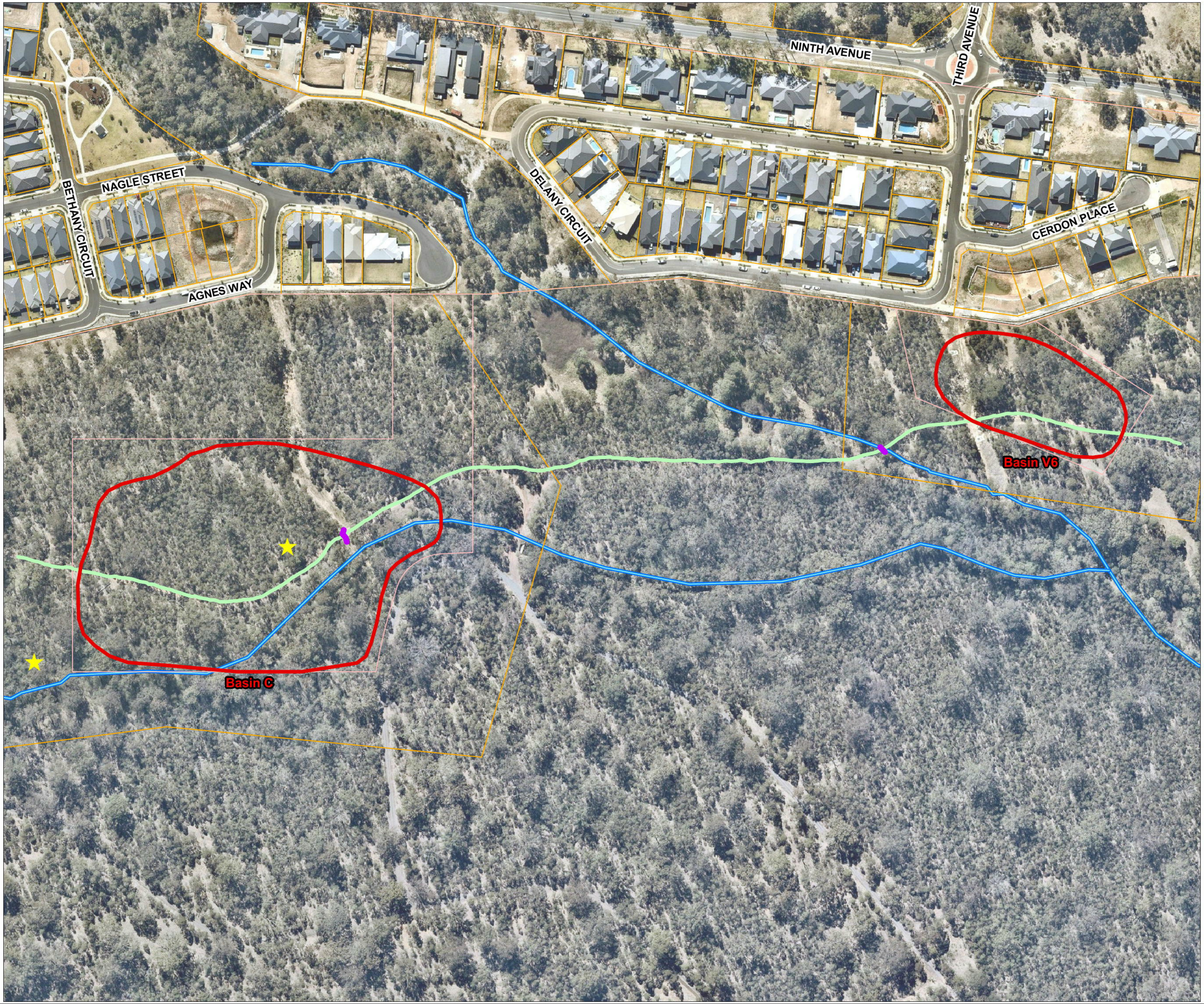
Coord. Sys. GDA 1994 MGA Zone 56

Basin C and Basin V6
Jordan Springs, NSW

SITE LOCATION

FIGURE 1

Reference: NSW DFSI, 2019



Legend:

- Approximate Site Boundary
- Cadastre (NSW LPI, 2019)
- Proposed Cadastre
- South Creek Tributary
- Aboriginal Heritage Sites
- Access Road
- Drainsage Culvert

JBS&G

Job No: 57591	
Client: Maryland Development Company	
Version: R03 Rev A	Date 18/11/2019
Drawn By: AS	Checked By: GB
Scale 1:3,250	

0 40 80
metres

Coord. Sys. GDA 1994 MGA Zone 56

Basin C and Basin V6
Jordan Springs, NSW

SITE LAYOUT

FIGURE 2

elopment Company Pty Ltd_Lend Lease\57591 St Marys Development Site Basin C and V6\GIS\Maps\R03 Rev A\57591_02_SiteLayout.mxd
Reference: www.nearmap.com - Imagery 04-09-2019

Legend:

- Approximate Site Boundary
- Cadastre (NSW LPI, 2019)
- Proposed Cadastre
- South Creek Tributary
- Aboriginal Heritage Sites
- Access Road
- Drainage Culvert
- Sample Locations
- Groundwater Monitoring Wells
- Surface Water Locations
- Old Groundwater Monitoring Wells
- ACM Fragments

Approximate Areas of Impact

- Asbestos Impact
- B(a)P/B(a)PTEQ and TRH Impact

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Job No: 57591

Client: Maryland Development Company

Version: R03 Rev A	Date 18/11/2019
Drawn By: AS	Checked By: GB

Scale 1:1,750

0 20 40

metres

Coord. Sys. GDA 1994 MGA Zone 56

Basin C and Basin V6
Jordan Springs, NSW

IDENTIFIED AREAS OF IMPACT

FIGURE 3

Document Distribution

Rev No.	Copies	Recipient	Date
A	1 x Electronic Copies	Sean Porter - Lend Lease Communities	18 November 2019
0	1 x Electronic Copies	Sean Porter - Lend Lease Communities	20 November 2019

Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	George Black	Seth Molinari	Draft for Client Review		18 November 2019
0	George Black	Seth Molinari	Seth Molinari		20 November 2019

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