

Mr Andy Nixey  
Department of Planning and Environment  
GPO BOX 39  
SYDNEY NSW 2001

Dear Mr Nixey

**SSD 8903 – IVANHOE ESTATE STAGE 1 – ENVIRONMENTAL IMPACT STATEMENT (EIS)**

I am writing to you in reply to your invitation to the Environment Protection Authority (EPA) to make a submission concerning the above project EIS.

The EPA requests that this submission be read in conjunction with its letters dated 12 September 2017 (concept) and 6 December 2017 (stage 1) in respect of the draft Secretary's environmental assessment requirements (SEARs) for the project.

The EPA emphasises that it does not review or endorse environmental management plans or the like for reasons of maintaining regulatory 'arm's length'. As such, the EPA has not reviewed any environmental management plan forming part of or referred to in the EIS.

The EPA further notes that the development includes demolition of existing roads and utilities (including defunct substations) and staged construction of the new road network, services and utilities along with construction and operation of buildings A1 and C1.

The EPA has identified the following site specific concerns based on the project information available on the Department of Planning and Environment major projects web site:

- (a) the need for a detailed assessment of potential site contamination, including detailed assessment of the footprint and surrounds of existing buildings, roads and utilities following their demolition;
- (b) construction phase noise and vibration impacts (including recommended standard construction hours and intra-day respite periods for highly intrusive noise generating work) on noise sensitive receivers such as surrounding residences;
- (c) construction phase dust control and management,
- (d) construction phase erosion and sediment control and management;

- (e) operational noise impacts on noise sensitive receivers (especially surrounding residences on adjoining and adjacent holdings) arising from operational activities such as commercial waste collection services and mechanical services (especially air conditioning plant);
- (f) practical opportunities to implement water sensitive urban design principles, including stormwater re-use; and
- (g) practical opportunities to minimise consumption of energy generated from non-renewable sources and to implement effective energy efficiency measures.

Should you require clarification of any of the above please contact John Goodwin on 9995 6838.

Yours sincerely



**SARAH THOMSON**  
**Unit Head, Metropolitan Infrastructure**  
**NSW Environment Protection Authority**

**Attachment A**

Contact officer: JOHN GOODWIN

## ATTACHMENT A

### - ENVIRONMENT PROTECTION AUTHORITY COMMENTS -

#### IVANHOE ESTATE RE-DEVELOPMENT (STAGE 1)

#### 1. General

The EPA considers that the project comprises distinct phases of construction and operation and has set out its comments on that basis.

The EPA notes the proximity of surrounding residences which may be adversely affected by noise impacts during demolition, site preparation, bulk excavation, construction and operation phases of the project.

#### 2. Construction phase

The EPA anticipates that site establishment, demolition, bulk earthworks, construction and construction-related activities will be undertaken in an environmentally responsible manner with particular emphasis on –

- the site contamination remediation action plan accompanying the EIS,
- compliance with recommended standard construction hours,
- intra-day respite periods from high noise generating construction activities (including jack hammering, rock breaking, pile boring or driving, saw cutting),
- feasible and reasonable noise and vibration minimisation and mitigation,
- effective dust control and management,
- erosion and sediment control, and
- waste handling and management, particularly concrete waste and rinse water.

##### 2.1 Site contamination

The EPA understands that a site auditor accredited under the Contaminated Land Management Act has been engaged for the project. The EPA anticipates that that auditor would continue to be engaged at least until a section A Site Audit Statement has been issued to certify the whole of the lands comprising the Ivanhoe Estate have been made suitable for the proposed uses.

The EPA understands that -

- demolition of existing buildings on the development site is to be (or has been undertaken) pursuant to a separate assessment process,
- demolition of existing roads, electricity substations and utilities are to be undertaken as part of Stage 1 of the Ivanhoe Estate Re-development project,
- whilst the Remediation Action Plan includes an unexpected finds protocol it does not appear to explicitly address post-demolition investigation of the footprint and immediate environs of existing buildings, roads, electricity substations and utilities, and

- the proponent proposes to remove all hazardous materials and contaminated soil from the development site for proper disposal at a facility legally able to accept those wastes.

The EPA anticipates that given the age of some of the existing buildings, utilities and electricity substations on the Ivanhoe Estate masterplan development site –

- (a) asbestos containing materials are likely to be encountered during demolition of existing buildings and utilities, and
- (b) PCBs may be encountered during and post demolition of existing electricity substations.

The EPA is unclear about the relative timing of the site investigations undertaken for the purposes of assessment of Stage 1 of the Ivanhoe Estate re-development and the demolition of existing buildings and electricity substations across the 'masterplan' re-development site.

The EPA, having regard to foregoing and the nature of the proposed use, considers that:

- (a) an accredited site auditor should certify that the development site (i.e. Stage 1) can be made suitable for the proposed use if the site is remediated in accordance with the Remedial Action Plan;
- (b) a Section A site audit statement (SAS) and accompanying site audit report (SAR) must be prepared at the completion of remediation and validation certifying suitability for the proposed use of the development site;
- (c) additional investigation, including the footprint of demolished buildings, roads, electricity substations and utilities should be undertaken and the scope of that investigation detailed in a sampling and analysis quality plan to be provided to the site auditor for review;
- (d) further details of the proposed remediation and validation strategy be provided to the site auditor in a Works Plan and a Validation Sampling and Analysis Quality Plan (VSAQP) for review by the site auditor prior to remediation commencing; and
- (e) an asbestos management plan (AMP) be prepared and submitted to the site auditor for review.

## **Recommendations**

1. That the proponent be required to implement the recommendations of the Remedial Action Plan as conditioned by the accredited site auditor.
2. The proponent be required to ensure that following demolition of any existing buildings, roads, electricity substations and in-ground utilities further investigation is undertaken of soil contamination within the footprint of those buildings, roads, electricity substations and in-ground utilities prior to undertaking any construction.
3. The proponent be required to conduct additional site investigation and prepare an updated Remedial Action Plan to address any identified contamination with proper regard to the -
  - (i) NSW EPA Sampling Design Guidelines,
  - (ii) Guidelines for the NSW Site Auditor Scheme (3<sup>rd</sup> edition) 2017,
  - (iii) Guidelines for Consultants Reporting on Contaminated Sites, 2011
  - (iv) the National Environment Protection (Assessment of Site Contamination) Measure 2013 as amended.

The proponent should comply with the processes outlined in *State Environmental Planning Policy 55 - Remediation of Land (SEPP55)* when assessing the suitability of the land and any remediation required in relation to the proposed sensitive use.

4. The proponent be required to:

- (a) provide a site audit statement (SAS) and accompanying site audit report (SAR) prepared following completion of remediation and validation, certifying suitability of the development site for the proposed use prior to undertaking any construction;
- (b) ensure that any contamination identified as meeting the trigger in the EPA 'Guidelines for the Duty to Report Contamination') is notified in accordance with requirements of section 60 of the Contaminated Land Management Act'; and
- (c) ensure the proposed development does not result in a change of risk in relation to any pre-existing contamination on the site so as to result in significant contamination.

**Note:** The EPA requires all reports submitted to the EPA to comply with the requirements of the *Contaminated Land Management Act 1997* to be prepared, or reviewed and approved, by a certified consultant.

5. The proponent be required to satisfy the requirements of the Protection of the Environment Operations (Waste) Regulation 2014 with particular reference to Part 7 'asbestos wastes'.

**Note:** The EPA provides additional guidance material at its web-site:  
<http://www.environment.nsw.gov.au/waste/asbestos/index.htm>.

6. The proponent be required to consult with Safework NSW concerning the handling of any asbestos waste that may be encountered during the project.

## 2.2 Noise and vibration

The EPA anticipates that demolition of roads and utilities, site preparation (including tree clearing), bulk earthworks, construction and construction-related activities are likely to have significant noise and vibration impacts on surrounding residences.

EIS Appendix Z (the acoustic assessment report) for the project is not consistent with the guidance documents adopted by the project SEARs.

### **Recommendation**

The proponent be required to provide a detailed noise impact assessment report in respect of construction noise and vibration that:

- (a) identifies all potentially affected noise sensitive receivers (including inter alia 137-143 Herring Road, Morling College and Macquarie Baptist Church);
- (b) adopts construction noise management levels derived from background noise measurements undertaken in accordance with the guidance material in the Noise Policy for Industry – please refer to section 3.1 under the heading 'background noise';
- (c) includes intermittent vibration sources which are typically the most common type of vibration source from this type of construction;
- (d) adopts the appropriate intermittent vibration targets set out in *Assessing Vibration, A Technical Guideline (DEC, 2006)*;

- (e) includes recommended limits for human comfort set out in *Assessing Vibration, A Technical Guideline (DEC, 2006)*; and
- (f) includes an assessment of potential construction stage impacts on road traffic noise in accordance with the guidance material provided in the *NSW Road Noise Policy (EPA, 2013)*.

### 2.2.1 General construction hours

The EPA emphasises that demolition, site preparation, bulk earthworks, construction and construction-related activities should be undertaken during the recommended standard construction hours.

The EPA emphasises that it has provided detailed guidance, being the Interim Construction Noise Guideline (ICNG), to all public authorities and that ICNG Table 1 sets out the recommended standard construction hours for all public authority projects. The EPA has previously provided detailed advice to the proponent concerning its construction/demolition projects, including the expectation of compliance with the standard hours. However, Section 6.2.1.1.1 to EIS Appendix Z '*Stage 1 DA Acoustic Assessment*' appears to suggest (by reference to the Ryde Council Development Control) that alternative extended construction hours should be adopted for the project.

### Recommendation

The proponent be required to ensure that as far as practicable all demolition, site preparation, bulk earthworks, construction and construction-related activities likely to be audible at any noise sensitive receivers such as surrounding residences are only undertaken during the standard construction hours, being -

- (a) 7.00 am to 6.00 pm Monday to Friday,
- (b) 8.00 am to 1.00 pm Saturday, and
- (c) no work on Sundays or gazetted public holidays.

### 2.2.2 Intra-day respite periods

The EPA anticipates that those demolition, site preparation, bulk earthworks, construction and construction-related activities generating noise with particularly annoying or intrusive characteristics (such as those identified as particularly annoying in section 4.5 of the Interim Construction Noise Guideline) would be subject to a regime of intra-day respite periods where:

- (a) they are only undertaken after 8.00 am,
- (b) they are only undertaken over continuous periods not exceeding 3 hours with at least a 1 hour respite every three hours, and
- (c) 'continuous' means any period during which there is less than an uninterrupted 60 minute respite between temporarily halting and recommencing any of the intrusive and annoying work referred to in Interim Construction Noise Guideline section 4.5.

The EPA emphasises that intra-day respite periods are not proposed to apply to those demolition, site preparation, bulk earthworks, construction and construction-related activities that do not generate noise with particularly annoying or intrusive characteristics.

### Recommendation

The proponent be required to schedule intra-day 'respite periods' for construction activities identified in section 4.5 of the Interim Construction Noise Guideline as being particularly annoying to noise sensitive receivers, including surrounding residents.

### 2.2.3 *Idling and queuing construction vehicles*

The EPA is aware from previous major infrastructure projects that community concerns are likely to arise from noise impacts associated with the early arrival and idling of construction vehicles (including concrete agitator trucks) at the development site and in the residential precincts surrounding that site.

#### **Recommendation**

The proponent be required to ensure construction vehicles (including concrete agitator trucks) involved in demolition, site preparation, bulk earthworks, construction and construction-related activities do not arrive at the project site or in surrounding residential precincts outside approved construction hours.

### 2.2.4 *Reversing and movement alarms*

The EPA has identified the noise from 'beeper' type plant movement alarms to be particularly intrusive and is aware of feasible and reasonable alternatives. Transport for NSW, Barangaroo Delivery Authority/Lend Lease and Leighton Contractors have undertaken safety risk assessments of alternatives to the traditional 'beeper' alarms. Each determined that adoption of 'quacker' type movement/reversing alarms instead of traditional beepers on all plant and vehicles would not only maintain a safe workplace but also deliver improved outcomes of reduced noise impacts on surrounding residents. Interim Construction Noise Guideline Appendix C provides additional background material on this issue.

#### **Recommendation**

The proponent be required to consider undertaking a safety risk assessment of site preparation, bulk earth works, construction and construction-related activities to determine whether it is practicable to use audible movement alarms of a type that would minimise the noise impact on surrounding noise sensitive receivers, without compromising safety.

### 2.3 Dust control and management

The EPA considers dust control and management to be an important air quality issue during demolition, site preparation, bulk earthworks and subsequent construction.

#### **Recommendation**

The proponent be required to minimise dust emissions on the site, and prevent dust emissions from the site.

### 2.4 Sediment control

*Managing Urban Stormwater Soils and Construction, 4<sup>th</sup> Edition* published by Landcom (the so-called 'Blue Book') provides guidance material for achieving effective sediment control on construction sites. The proponent should implement all such feasible and reasonable measures as may be necessary to prevent water pollution in the course of developing the site.

The EPA emphasises the importance of –

- (a) not commencing demolition, site preparation, bulk earthworks, construction and construction-related activities until appropriate and effective sediment controls are in place, and
- (b) daily inspection of sediment controls which is fundamental to ensuring timely maintenance and repair of those controls.

## 2.5 Groundwater management

The EIS indicates that intercepted groundwater is proposed to be managed using 'sump and pump' methods during the construction phase. However, the EIS is unclear whether the proponent proposes to:

- (a) discharge intercepted groundwater to Shrimptons Creek, and
- (b) what, in any, measures are proposed to ensure that any groundwater to be discharged to Shrimptons Creek would not pollute waters.

### **Recommendation**

The proponent be required to ensure that it does not cause or permit pollution of waters should any intercepted groundwater be discharged to Shrimptons Creek.

## 2.6 Waste control and management (general)

The proponent should manage waste in accordance with the waste management hierarchy. The waste hierarchy, established under the [Waste Avoidance and Resource Recovery Act 2001](#), is one that ensures that resource management options are considered against the following priorities:

**Avoidance** including action to reduce the amount of waste generated by households, industry and all levels of government

**Resource recovery** including reuse, recycling, reprocessing and energy recovery, consistent with the most efficient use of the recovered resources

**Disposal** including management of all disposal options in the most environmentally responsible manner.

All wastes generated during the project must be properly assessed, classified and managed in accordance with the EPA's guidelines to ensure proper treatment, transport and disposal at a landfill legally able to accept those wastes.

The EPA further anticipates that, without proper site controls and management, mud and waste may be tracked off the site during the project.

### **Recommendation**

The proponent be required to ensure that:

- (1) all waste generated during the project is assessed, classified and managed in accordance with the EPA "*Waste Classification Guidelines Part 1: Classifying Waste*", November 2014 and the 2016 Addendum thereto;
- (2) the body of any vehicle or trailer, used to transport waste or excavation spoil from the premises, is covered before leaving the premises to prevent any spill or escape of any dust, waste, or spoil from the vehicle or trailer; and
- (3) mud, splatter, dust and other material likely to fall from or be cast off the wheels, underside or body of any vehicle, trailer or motorised plant leaving the site, is removed before the vehicle, trailer or motorised plant leaves the premises.



## 2.7 Waste control and management (concrete and concrete rinse water)

The EPA anticipates that during the project concrete deliveries and pumping are likely to generate significant volumes of concrete waste and rinse water. The proponent should ensure that concrete waste and rinse water is not disposed of on the project site and instead that:

- (a) waste concrete is either returned in the agitator trucks to the supplier or directed to a dedicated watertight skip protected from the entry of precipitation, and
- (b) concrete rinse water is directed to a dedicated watertight skip protected from the entry of precipitation or a suitable water treatment plant.

### **Recommendation**

The proponent be required to ensure that concrete waste and rinse water are

- (a) not disposed of on the development site, and
- (b) prevented from entering waters, including any natural or artificial watercourse.

## **3. Operational phase**

The EPA considers that environmental impacts that arise once the development is operational should be able to be largely averted by responsible environmental management practices, particularly regarding:

- (a) feasible and reasonable noise mitigation measures;
- (b) stormwater management measures designed and implemented to protect the environmental values of Shrimptons Creek;
- (c) waste management in accordance with the waste management hierarchy;
- (d) water sensitive urban design; and
- (e) energy conservation and efficiency.

### 3.1 Noise and vibration impacts

The EPA anticipates the proposed development may have significant operational noise impacts on nearby sensitive receivers, especially residences.

EIS Appendix Z '*Acoustic Assessment Report*' mistakenly refers to the:

- the "NSW **Planning** Noise Policy for Industry" instead of the Noise Policy for Industry; and
- "NSW Environmental Protection **Agency**" instead of the Environment Protection Authority.

The EPA notes with concern the proximity of the surrounding residences and other noise sensitive receiver locations. There is a need for appropriate operational noise mitigation and management measures, particularly regarding:

- (a) the design and location of waste storage facilities;
- (b) time restrictions on waste collection services to commercial premises including the child care centre;

- (c) design, selection and operation of mechanical ventilation plant and equipment; and
- (d) time restrictions on grounds maintenance using powered equipment (e.g. leaf blowers, brush cutters and lawn mowers).

### Background noise measurement

The EPA emphasises that properly establishing background noise levels in accordance with guidance material (i.e. Fact Sheets A and B) of the New South Wales Noise Policy for Industry (NPI) is fundamental to a consistent approach to the quantitative assessment of noise impacts of development.

The NPI specifies that at least a 'week's worth' of valid monitoring data is required to establish background noise levels and that noise levels measured during rainfall should be excluded when deriving those background levels. However, the EPA considers that the background noise measurements relied upon to calculate the rating background levels and derive the project noise trigger levels presented in EIS Appendix Z have not (as required by SEARs item 21) been undertaken in accordance with the guidance material provided in the Noise Policy for Industry. For instance, EIS Appendix Z:

- (a) does not identify all potential noise sensitive receiver locations;
- (b) presents unattended background noise measurements from monitoring that was not undertaken at the reasonably most- (or potentially most-) affected residences;
- (c) appears to neglect the EPA's EIS submission concerning the *SSD 8707 Ivanhoe Estate Re-development Concept Plan* highlighting the inadequacy of the background noise measurements;
- (d) in respect of background noise measurements, is inconsistent with and omits items listed in section *B3 'Reporting requirements'* to Fact Sheet B of the Noise Policy for Industry;
- (e) does not identify how or where weather data in respect of the background noise measurement period was sourced nor which periods were excluded for the purposes of determining rating background levels and thus are not able to be relied upon as representing one weeks' worth of valid data;
- (f) indicates that unattended background noise measurements appear to have been affected by some periods of extraneous noise without such noise being accounted for and thus (in the absence of adequate explanatory information) is not able to be relied upon for the purposes of determining representative background noise levels.

### **Recommendations**

1. The proponent be required to submit a noise impact assessment for Stage 1 that presents background noise measurements undertaken in accordance with the guidance material in Fact Sheets A and B to the Noise Policy for Industry 2017.
2. The proponent be required to submit a noise impact assessment for Stage 1 that reports background noise measurements in accordance with the reporting requirements set out in Fact Sheet B to the Noise Policy for Industry 2017.

### Project noise trigger levels

EIS Appendix Z incorrectly states that the Noise Policy for Industry is intended to limit the audibility of noise emissions. Instead, the Noise Policy for Industry sets out a framework for the derivation of project

noise trigger levels that are used to assess the potential impacts of noise and indicate the noise level at which feasible and reasonable noise management measures should be considered.

The proponent is required to use appropriate Rating Background Levels (RBLs) to develop project noise trigger levels at all potentially affected sensitive receivers. However, EIS Appendix Z relies on RBLs calculated (as indicated above) from background noise measurements undertaken otherwise than in accordance with the guidance material provided in the Noise Policy for Industry. It does not identify all potentially affected sensitive receivers likely to be impacted by the development.

Section 5.1.2.1 to EIS Appendix Z states that the “[i]ntrusive criteria for the project are based on the minimum RBL recommended by the EPA for the project site are detailed in the table ...” however the intrusiveness criteria presented in that table (i.e. Table 12) are not based on the EPA’s minimum RBLs Noise Policy for Industry.

Section 5.1.2.2 to EIS Appendix Z states that pursuant to the Noise Policy for Industry “... the residential receivers in the vicinity would be considered Urban.” but offers no justification for assigning all surrounding residences to the Urban residential receiver category.

The maximum noise level event trigger level for  $L_{eq,15min}$  in Table 14 and Table 15 is incorrect and instead the trigger levels for maximum noise level events should be derived in accordance with section 2.5 of the Noise Policy for Industry.

EIS Appendix Z does not adequately demonstrate that applying one set of project noise trigger levels is appropriate for all potentially affected residential receivers.

### **Recommendation**

The proponent be required to submit a noise impact assessment for Stage 1 that reports project noise trigger levels derived in accordance with the Noise Policy for Industry.

#### **Operational noise emissions (general)**

The EPA notes that in relation to operational noise impact assessment EIS Appendix Z includes the following anomalies -

- (a) at section 5.2.5, the proponent approximates the relationship between  $L_{10}$  and  $L_{eq}$  noise levels of children playing as 2dB without providing evidence to support the validity of that approximation; and
- (b) at Section 5.2.5.1 the proponent refers to child care centre noise at the nearest noise receiver described as “... *Single Storey Residential Dwelling Across Caroline St.*” despite there appearing to be no road named Caroline Street near the development site.

### **Recommendation**

The proponent be required to:

- (a) provide evidence to support the approximation in section 5.2.5 of EIS Appendix Z, and
- (b) clarify the sensitive receiver location (i.e. across Caroline St) referred to in section 5.2.5.1 of EIS Appendix Z.

#### **Mechanical plant and equipment**

Section 5.2.1 to EIS Appendix Z states that “ ... plant selections and locations are not finalised.”

## **Recommendation**

The proponent be required to:

- (a) provide a comprehensive quantitative assessment of operational noise impacts of mechanical plant and equipment (especially ventilation/ air conditioning plant and equipment) on surrounding noise sensitive receivers, especially surrounding residences;
- (b) ensure mechanical plant and equipment installed on the development site does not generate, (either individually or cumulatively) –
  - (i) noise emissions that exceed the Project Noise Trigger Level (day, evening and night assessment periods) measured at the boundary of noise sensitive receiver locations, and
  - (ii) noise emissions that exhibit tonal or other annoying characteristics.

### Goods delivery and waste collection services

The EPA is aware of community concern arising from goods delivery and waste collection services undertaken at other public facilities and especially during evening and night times.

## **Recommendation**

The proponent be required ensure that goods delivery and waste collection services are not undertaken at commercial premises outside the hours of 7.00 am to 6.00 pm Monday to Friday.

### Grounds maintenance using powered equipment

The EPA is aware of community concern arising from grounds maintenance involving the use of powered equipment (example: leaf blowers, lawn mowers, brush cutters) at other public facilities during early morning and evening periods as well as on weekends and public holidays.

## **Recommendation**

The proponent be required ensure grounds maintenance involving the use of powered equipment is not undertaken outside the hours of 7.30 am to 6.00 pm Monday to Friday.

### 3.2 Shrimptons Creek (water quality)

The NSW Water Quality Objectives (WQOs) are the NSW Government endorsed environmental values and long-term goals for surface waters, including Shrimptons Creek.

The EPA understands that the stormwater management system to be installed during stage 1 would serve the whole of the masterplan development site, including the stage 1 development site.

The EPA anticipated that, in response to concerns raised by the EPA at the draft SEARs stage of the assessment process, the proponent would have developed ambient water quality targets for the receiving waters, being Shrimptons Creek, and that those targets would have been developed with having due regard to both the NSW Water Quality Objectives and national water quality guidelines.

Instead, the proponent appears to have adopted measures intended to achieve generic per cent load reductions. In particular, the EIS indicates that proposed stormwater management measures would achieve generic per cent load reductions based on the City of Ryde's requirements (e.g. Gross Pollutants 90%, TSS 85%, TP 65%, TN 45%). However, the EPA emphasises that generic targets do not relate to waterway outcomes and may not contribute to maintaining or restoring the environmental values of the receiving waterways.

## Recommendation

The proponent be required to design and operate the stormwater management system to:

- (a) protect the environmental values of the receiving waterway (being Shrimptons Creek) where those values are currently being achieved; and
- (b) work towards achieving the environmental values of the receiving waterway where those values are not currently being achieved.

### 3.3 Waste management

The proponent should manage waste in accordance with the waste management hierarchy outlined earlier.

## Recommendation

The proponent be required to identify and implement feasible and reasonable opportunities for the re-use and recycling of waste, including food waste.

### 3.4 Water sensitive urban design and energy conservation and efficiency

The EPA acknowledges that EIS sections 3.7 and 3.8 outline a range of proposed environmentally sustainable development measures for stage 1 of the project, such as:

- (a) a range of water sensitive urban design measures, including rainwater harvesting and re-use, and water efficient fixtures in buildings A1 and C1; and
- (b) a range of measures to maximise energy efficiency and minimise energy consumption, including installation of rooftop solar photovoltaic arrays on buildings A1 and C1.

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