Submissions Report

MANILDRA SOLAR FARM

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1 INTRODUCTION

The Manildra Solar Farm is proposed in Central Western NSW on cleared farmland Molong Manildra Road, Manildra in Central Western NSW (the 'proposal site'). The proposal encompasses the construction and operation of a solar photovoltaic array over an area of approximately 120 hectares, with associated electrical infrastructure, maintenance facilities, access tracks and minor upgrades to adjacent roads.

The proposal is a Part 3A Major Project under the *NSW Environmental Planning and Assessment Act 1979* and therefore the consent authority is the Minister for Planning. The proposal is also consistent with the criteria of *Critical Infrastructure* as it is a power generator with the capacity to generate in excess of 30MW.

The proponent for the Manildra Solar Farm proposal is Infigen Suntech Australia Pty Ltd (Infigen Suntech). Infigen Suntech is a joint venture formed between Infigen Energy Limited (Infigen Energy) and Suntech Power Australia Pty Ltd (Suntech) to deliver utility scale photovoltaic solar projects in Australia. Infigen Energy is a specialist renewable energy business that develops, owns and operates renewable energy generation facilities across Australia, the United States and Germany. Suntech is the world's largest producer of silicon solar modules, with offices in 13 countries.

An Environmental Assessment (EA), prepared by **ngh**environmental, was submitted to the NSW Department of Planning and placed on public exhibition from the 11th of November to the 13th of December 2010. During this period, submissions were sought from the local community, government agencies, interested parties and other stakeholders.

Key issues were formalised in the Director General's Requirements for the preparation of the Environmental Assessment. Investigation of these issues formed the major part of the Environmental Assessment. These issues were investigated via specialist reports and by desktop assessment.

Specialist investigations were carried out in the key areas of:

Biodiversity impacts	Visual impacts
Aboriginal archaeological impacts	Noise impacts

These investigations were appended to the EA in full and are summarised in the body of the EA.

Additionally, since the submission of the EA to the Department of Planning:

- Flora and fauna investigations were undertaken, specific to threatened species impacts, to validate the assumptions made in the Biodiversity Assessment
- A heritage assessment was undertaken to determine the significance of a stone cottage adjacent to an access track to the proposal site.

These investigations are appended to this Submissions Report and are summarised under the relevant agency response headings in this report.

1.1 PURPOSE OF THIS REPORT

This Submissions Report has been prepared by Infigen Suntech and **ngh**environmental. It:

- Considers and responds to the issues raised in the public and agency submissions for the Manildra Solar Farm
- Includes the results of the additional studies undertaken to assess the impact of the proposal
- Describes any changes to the proposal, including a revised set of Statements of Commitments

2 THE PROPOSAL

2.1 SUMMARY OF THE PROPOSAL

The proposal remains as described in the Environmental Assessment (**ngh**environmental 2010). That is:

Infigen Suntech proposes to construct a 50 megawatt (MW) capacity solar farm on cleared farmland at Molong Manildra Road, Manildra in Central Western NSW (the 'proposal site'). The solar panel array would occupy approximately 120 hectares. The solar farm would have an expected operating life of up to 50 years. The decommissioning phase would remove all above ground infrastructure from the site and rehabilitation would be undertaken in consultation with the land owner.

The key infrastructure elements for the project would include:

- A PV array incorporating rows of panels and a series of central inverters and kiosk transformers
- Cabling between the PV array and central inverters (underground or frame-secured)
- Cable connection to the existing 132kV substation (underground)
- Internal access tracks and upgrades to existing roads
- Site office, operations and maintenance and research office buildings
- Temporary construction facilities such as a site compound and equipment laydown area

2.1.1 Photovoltaic array

The PV array being considered consists of Suntech poly-crystalline solar panels mounted on a fixed steel support frame. The maximum height of the array would be 3.5 metres.

The proposed Suntech panels are efficient modules suitable for utility scale solar power generation. Each panel would be approximately 2 metres long x 1 metre wide. The PV panels would be arranged in rows, with sufficient spacing between rows to allow maintenance activities such as weed control or panel washing as required.

The PV panel mounting structures would be supported by steel posts driven into the ground or on precast concrete footings installed on the natural ground surface or in shallow excavations. It was considered that the fixed PV array would have the least visual and other environmental impacts as well as lower operational and maintenance requirements. A fixed PV array solar farm therefore forms the basis for this proposal.

2.1.2 Connection to the existing Manildra substation

The cable connection between the solar farm and existing substation would be through an underground transmission line.

2.1.3 Access tracks

On site access tracks required for construction and operation would be gravel formations up to 8 metres in width and may be reduced to 5 metres in width during operation. Tracks would be constructed around the PV array and maintained for the lifetime of the solar farm.

2.1.4 Buildings

Temporary construction buildings would be installed within a fenced facilities area. Additionally, the following permanent buildings may be constructed at the site: a site office and an operations and maintenance building incorporating a control room with monitoring and workshop facilities.

2.1.5 Project timing and staging

The construction timeline for the project would be dependent on the timing of approval and funding arrangements and the supply of key components. However, assuming approval in late 2010, the eight month construction period would commence in April 2012. Construction works would be confined to standard construction hours (Monday-Friday 7am-6pm, Saturday 8am-1pm).

2.1.6 Operational management

A site manager would be employed to manage the facility. Security staff or services would also be engaged. The PV array and other equipment would be inspected and maintained on an 'as needs' basis. A supervisory control and data acquisition (SCADA) system would monitor the operational solar farm and identify any electrical faults.

Periodic weed control would be undertaken as required using a spray unit mounted on a vehicle. Groundcover vegetation around the panel rows would be either slashed or grazed by sheep. Regular washing of the solar panels is not expected to be required. If required, water would be sourced from the Bogan Shire Council or commercial water suppliers to remove dust or bird excrement. Detergent would not be used.

2.1.7 Decommissioning

The expected life span of the PV infrastructure is 30-50 years. At the end of the project all above-ground infrastructure would be removed.

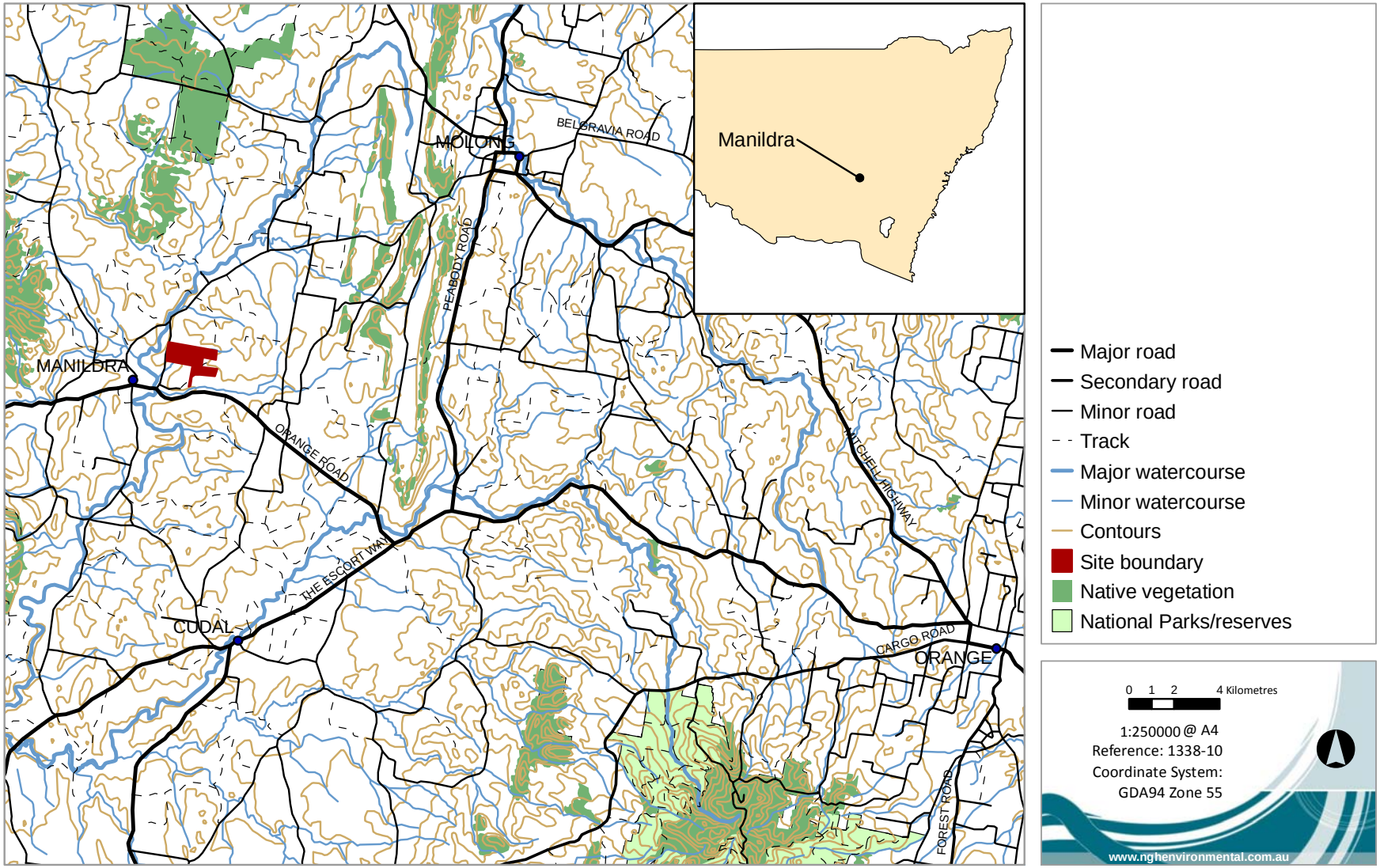

Figure 2-1 Location of the proposal

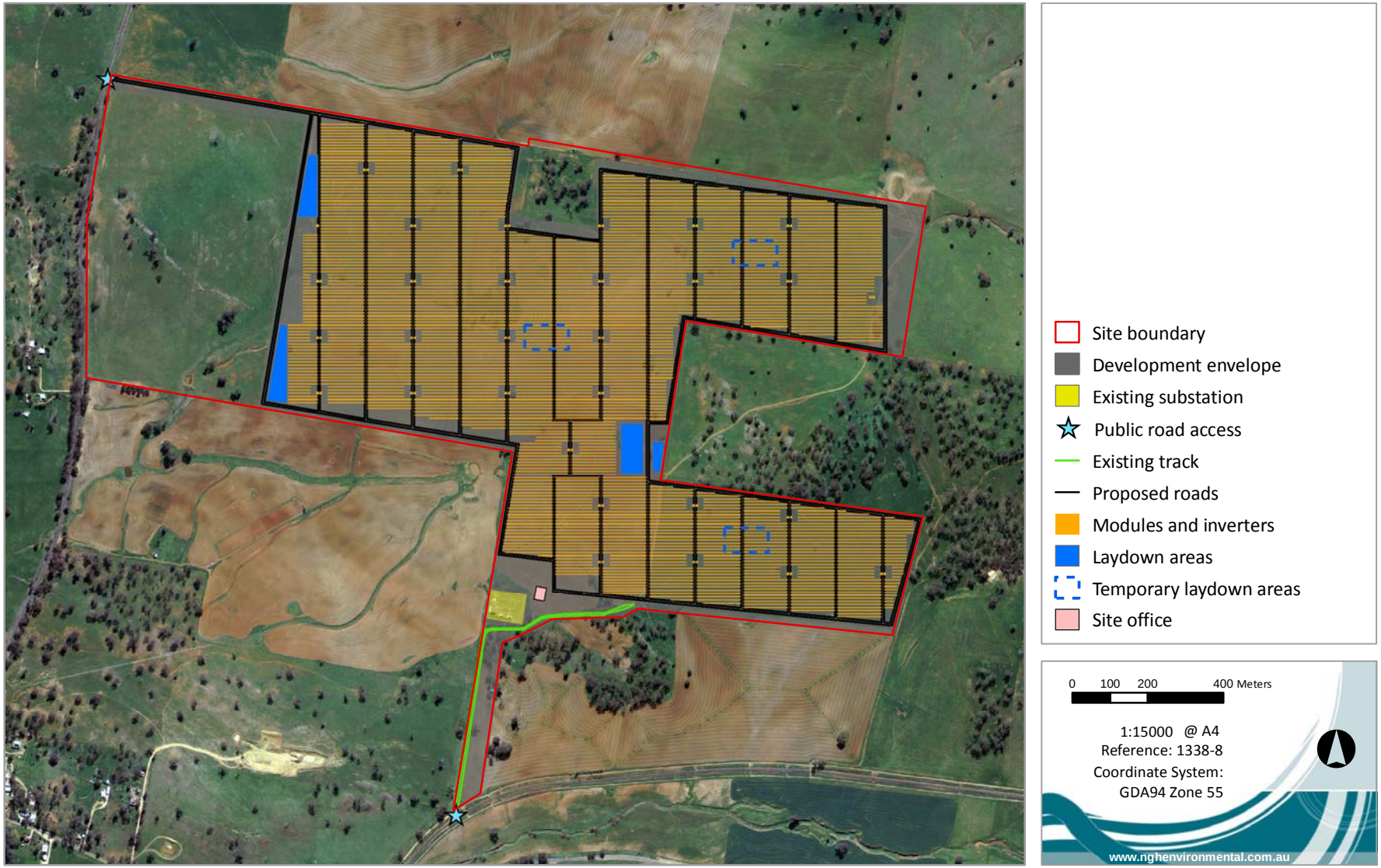

Figure 2-2: Proposed Manildra Solar Farm layout, View 1: Site boundary, panels and roads

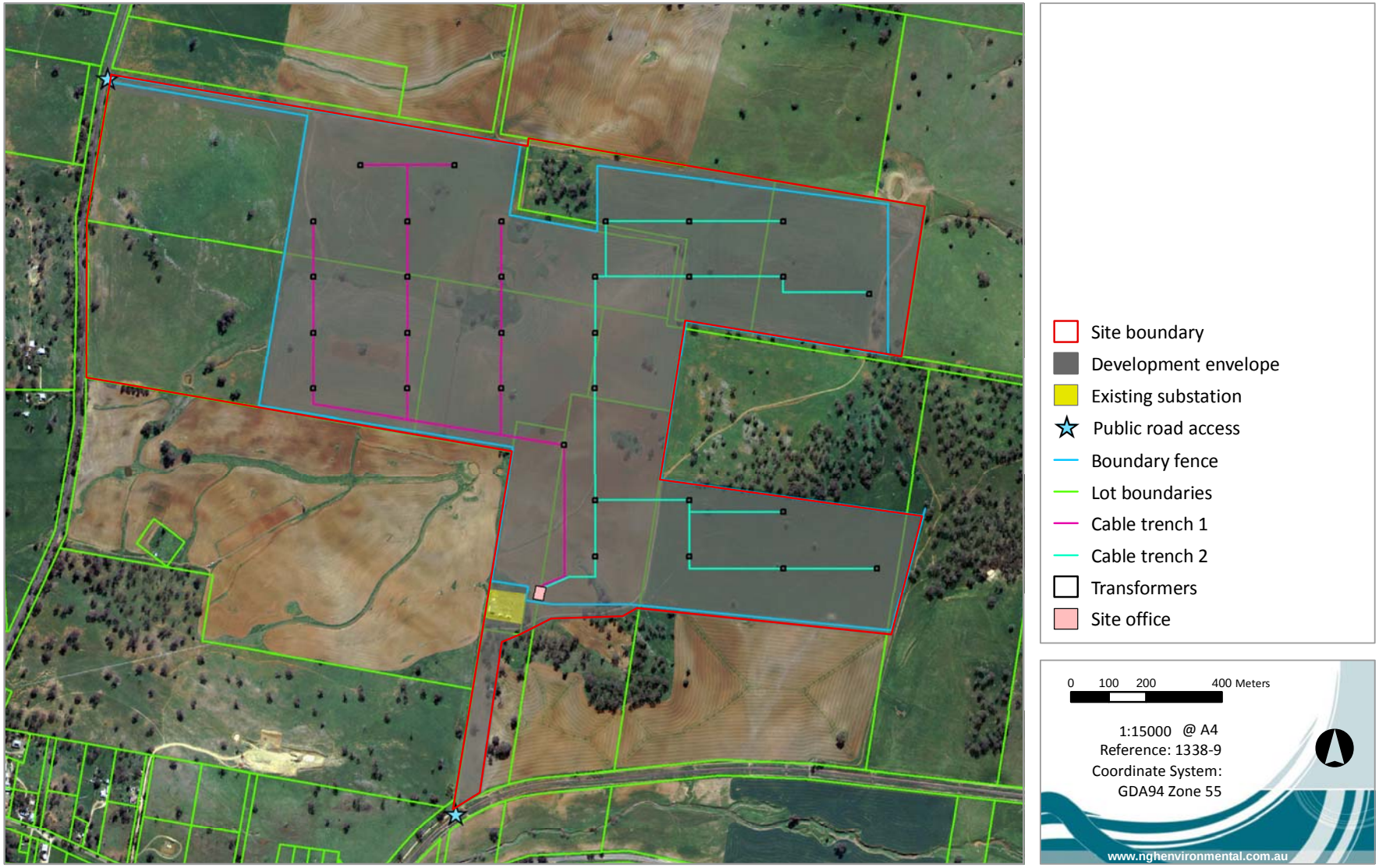

Figure 2-3: Proposed Manildra Solar Farm layout, View 2: Cadastral boundaries, cable trenches and fencing

2.2 PROJECT BENEFITS

The Manildra solar farm would be clean, renewable and sustainable, and would emit zero greenhouse gases during operation. Based on a proposed operating capacity of 50 MW, the solar farm would generate enough renewable energy to power up to 10,000 homes and would be the equivalent of removing approximately 15,000 cars from Australian roads each year.

The solar farm would contribute to Australia's Renewable Energy Target (RET) of sourcing 20% of electricity from renewable sources by 2020.

The Manildra solar farm would:

1. Provide reliable energy in a market where demand would soon exceed supply.
2. Reduce green house gas emissions that contribute to climate change.
3. Assist in meeting Federal and State energy supply and carbon emission policy objectives to enhance the contribution made by renewable energy sources to meeting demand.
4. Contribute to the development of the utility scale renewable energy industry in NSW.
5. Assist in providing the experience and learning required by local industry to further develop utility scale solar in Australia.
6. Provide a local and regional economic stimulus through jobs and training.

Solar resource modelling based on satellite imagery correlated with onsite data collection has confirmed that there is an ample solar resource at the proposal site. The solar farm has been sited specifically to utilise existing grid connection infrastructure, maximising the economic efficiencies of the proposal.

Building a solar farm of this scale at Manildra would be a major boost to the Australian solar energy industry. It would provide local employment opportunities both throughout the construction and operational phases, and would also help to develop local and regional capabilities in solar photovoltaic plant construction.

3 CONSIDERATION OF SUBMISSIONS

3.1 EXHIBITION PERIOD AND LOCATION

The Manildra Solar Farm Environmental Assessment was on public exhibition from Thursday 11th of November to Monday 13th of December 2010 at:

- Department of Planning, Information Centre, 23-33 Bridge Street, Sydney
- Nature Conservation Council of NSW, Level 2/5 Wilson Street Newtown NSW 2042
- Cabonne Council, 101 Bank Street, Molong

Local residents were notified of the exhibition period through newspaper advertisements placed in the local papers by the Department of Planning. A media release was issued by Infigen Suntech.

3.2 RESPONSES RECEIVED

The Department of Planning received a total of 4 submissions; all were from government agencies. No submissions were received from individual members of the public or representative groups.

Table 3-1 Responses received

Category	Number of submissions
Individual members of the public	0
Interest groups	0
Government agency submissions	4
Total	4

4 PROPONENT'S RESPONSE TO COMMUNITY SUBMISSIONS

Not applicable. No community submissions were received in relation to the Manildra Solar Farm proposal.

5 PROPONENT'S RESPONSE TO GOVERNMENT AGENCY SUBMISSIONS

5.1 DECCW

Issue	Response
Additional studies: Flora	Additional flora investigations were conducted (included in Appendix B) in fulfilment of SoC 1 of the EA. As a result of these investigations, the original SoC has been deleted.
Additional Assessment: Historic heritage	An assessment of heritage significance was prepared (included in Appendix B) to determine the heritage significance of the abandoned stone cottage, in fulfilment of SOC 51 of the EA. As a result of this assessment, the original SoC has been deleted.
Offset strategy	DECCW advised that any offset strategy must be developed using either DECCW's 'Principles for the use of biodiversity offsets in NSW', or the Biobanking assessment Methodology. DECCW further noted that when using the 'Principles' the offset strategy must address all the principles not merely one of these principles (i.e. maintain or improve). It is proposed to modify SOC 2 as set out below: **SOC 2 MODIFICATION** *An Offset Plan will be prepared by an ecologist consistent with the 'Principles for the use of biodiversity offsets in NSW', as outlined in the Biodiversity Assessment, and submitted for approval prior to the commencement of works. The plan would be developed in consultation with the landowner and would offset the impact of the development for the period that the impact occurs.*

5.2 NSW OFFICE OF WATER

Issue	Response
Groundwater interception or use requires licensing	Section 7.4.1 of the EA states "*No groundwater extraction or works are planned at the proposal site as part of the proposal*". The installation of the solar array and infrastructure would not affect the net amount of water reaching the surface of the ground during rain or flooding events nor its ability to infiltrate and replenish groundwater systems. In the event water is required for panel washing, it would be sourced through commercial supplies. Therefore, it is not considered that a licence is required. No new SOC is considered warranted.
Water Management Plan	NOW requests that a water management plan be included in the CEMP and OEMP. The CEMP and OEMP would incorporate surface water quality management of construction impacts, including road construction works. SOC 65 of the Manildra Solar Farm EA includes provision for monitoring of surface water quality following heavy rainfall events in the *Erosion and Sediment Control sub-plan* of the CEMP, which addresses NOW's concerns regarding surface water quality monitoring. No new or modified SOC is considered warranted.
Preparation of a flood management plan	NOW requests that a flood management plan be included in the CEMP and OEMP. SOC 66 of the EA indicated that specialist advice would be sought prior to determination to establish the need for a flood management plan to be prepared and implemented at the site. Advice was sought from Footprint Engineering (refer Appendix B), which considers that a flood management plan is not warranted at the Manildra Solar Farm site. As a result of these investigations, the original SoC has been deleted and no commitment to prepare a flood management plan has been made or is considered warranted.
Provision of CEMP and OEMP to NOW for review prior to project commencement	NOW requests that the CEMP and OEMP to be provided to NOW for review prior to project commencement. SOC 67 of the EA states "*The site CEMP and OEMP could be provided to the New South Wales Office of Water for review of soil and water management measures for construction and operation, if required".* It is now recommended that SOC 67 is modified as follows: **SOC 67 MODIFICATION** *The site CEMP and OEMP **would** be provided to the New South Wales Office of Water for review of soil and water management measures for construction and operation, **prior to project commencement**.*

5.3 LACHLAN CATCHMENT MANAGEMENT AUTHORITY

Issue	Response
Environmentally Sensitive Area Mapping (ESA)	The Lachlan CMA advised that consultation of the environmental sensitivity mapping layers held by Cabonne Council would identify environmentally sensitive areas of concern. The constraints analysis mapping included in the Biodiversity Assessment (Appendix E of the EA), which was based on site specific flora and fauna surveys, is considered to have provided more accurate mapping of ecologically sensitive areas at the proposal site. Combined with field assessments of other environmental factors, such as hydrology and soils, the constraints mapping is considered an appropriate tool to avoid sensitive areas and lead to improved management of natural resources within the proposal site. No new or modified SOC is considered warranted.
Operation Management Plan to address during and post construction issues	The Lachlan CMA suggest that an Operation Management Plan accompany the EA to address (during and post construction) chemical use, promotion of ground cover, protection of native vegetation and biodiversity, soil degradation issues and water quality. The EA includes a commitment to an Operational Environmental Management Plan and Groundcover Management Plan, in order to ensure the issues listed above are managed post-construction. No additional or modified SOC is considered warranted.

5.4 CARBONNE COUNCIL

Issue	Response
Impact summary	The Council note the impact types and assessment methodology of the EA. They note a heritage assessment of the stone cottage near the site is to be carried. out. This assessment has now been completed and is attached to this Submissions Report, Appendix B. Council note that any water sourced for the construction or decommissioning phases will be subject to negotiations with Central Tablelands Water; the proponent acknowledges this. The Council note that the project may have economic benefits for the town, including employment during construction and operation and flow on capital investment in Manildra.
Traffic and access	The Council note traffic and access impacts are particularly of concern: increased traffic on Old Orange Road may impact the surface of the road and amenity of the immediate area. The proponent has committed to working with the roads authorities (RTA and Council) to ensure any road damage is addressed. A traffic management plan would consider safety during the construction phase.
Environmental controls and site management	Council have an interest in ensuring the environmental controls and site management minimise any risk to the locality. The proponent commits to the preparation of construction and operational environmental management plans. These would be submitted to DoP and so have no direct role for Council, excepting consultation where relevant (ie in the preparation of the traffic management plan). This is considered to be the appropriate framework within which to manage environmental controls.

6 MODIFICATIONS TO THE PROPOSAL

As a result of the submissions from Government agencies and further studies, a number of changes have been made to the Statement of Commitments as follows:

6.1 DELETED SOCS

The survey referred to in these SoCs have now been undertaken. They are documented in Appendix B.

SOC 1 DELETED

A supplementary flora survey during spring (November) would be undertaken to confirm the assumptions of the Biodiversity Assessment (Appendix E), in areas including the western paddock, western access and areas identified on the Biodiversity Constraints map (Figure 6-1) that would be impacted by infrastructure.

SOC 51 DELETED

An assessment of heritage significance would be prepared to determine the heritage significance of the abandoned stone cottage. This would be prepared by a heritage consultant, pre-determination.

SOC 66 DELETED

Advice from a Hydrologist would be sought prior to determination regarding the potential flooding risks (eg to access and location of infrastructure) and the need for a Flood Management Plan to be prepared and implemented at the site. Should a Flood Management Plan be required, it would be incorporated into the CEMP and OEMP.

6.2 NEW SOCS

No additional SOCs are proposed to accompany the proposal.

6.3 MODIFIED SOCS

The following SoCs have had points removed, added or clarified. The number refers to the numbering in the publically exhibited EA. The revised SoCs are now presented in Appendix A (renumbered).

SOC 2 MODIFICATION

An Offset Plan will be prepared by an ecologist consistent with the 'Principles for the use of biodiversity offsets in NSW', as outlined in the Biodiversity Assessment, and submitted for approval prior to the commencement of works. The plan would be developed in consultation with the landowner and would offset the impact of the development for the period that the impact occurs.

SOC 67 MODIFICATION

The site CEMP and OEMP would be provided to the New South Wales Office of Water for review of soil and water management measures for construction and operation, prior to project commencement.

7 CONCLUSION

This Submissions Report responds to the comments and issues raised in submissions from the community and Government agencies following the public exhibition of the Manildra Solar Farm EA. Specialist advice has been sought from the consultants involved in the original assessment in preparing these responses. The Submissions Report fulfils the requirements of Section 75H of the *Environmental Planning and Assessment Act 1979*.

In response to the submissions and on the basis of additional investigations:

- 3 Statements of Commitment have been deleted
- No new Statements of Commitment have been created
- 2 Statements of Commitment have been modified

In consideration of the assessment of the impacts from the project contained in the EA and the proposed mitigation measures committed to in the revised Statement of Commitments (included as Appendix A of this report and supported by additional studies included in Appendix B of this report), it is believed that all relevant issues and concerns have been addressed and that the project should now proceed for approval by the Minister.

APPENDIX A REVISED STATEMENTS OF COMMITMENT

Biodiversity

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
1	**Loss or modification of habitat**	**Minimise and offset impact**	**An Offset Plan will be prepared by an ecologist consistent with the 'Principles for the use of biodiversity offsets in NSW', as outlined in the Biodiversity Assessment, and submitted for approval prior to the commencement of works. The plan would be developed in consultation with the landowner and would offset the impact of the development for the period that the impact occurs.**	**Pre-construction**	**CEMP**
2	Infrastructure related biodiversity impacts	Minimise biodiversity impacts	The PV array, site access tracks and other infrastructure should be sited to avoid constraints identified within the Biodiversity Assessment constraints mapping. These include: • The larger stands of Box-Gum Woodland across the site • Hollow bearing trees • Isolated shade trees where possible • Native grassland and associated rock outcrops in the Western Paddock • As far as possible rock outcrops across the proposal site together with a minimum 2.5 metre buffer to avoid shading.	Design phase	CEMP
3	Infrastructure related biodiversity impacts	Minimise biodiversity impacts	Areas of high biodiversity value would be clearly identified throughout construction and protected from the direct and indirect impacts of the Proposal. Contractors and staff would be made aware of the significance and sensitivity of these areas.	Design phase	CEMP
4	Infrastructure related biodiversity impacts	Minimise biodiversity impacts	The western paddock of the proposed solar farm site should be avoided if possible to minimise impacts to grassy groundcover flora comprising the Box-Gum Woodland EEC.	Design phase	CEMP
5	Construction impacts	Minimise biodiversity impacts	Where security concerns permit perimeter fences should not contain barbed wire, particularly the top strands. If a cycisolated mesh fence is to be used efforts should be made to increase the visibility to fast flying parrots.	Design Construction	CEMP
6	Construction impacts	Minimise biodiversity impacts	If used, and where practicable, power poles and overhead powerlines will be bird-safe using flags or marker balls, large wire size and wire and conductor spacing.	Design Construction	CEMP

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
7	Infrastructure related biodiversity impacts	Minimise biodiversity impacts	If the removal of any hollow bearing trees was required this activity would be proceeded by a pre clearance check by a qualified ecologist including anabat survey and stagwatching.	Pre-construction	CEMP
8	Infrastructure related biodiversity impacts	Minimise biodiversity impacts	Works will avoid impacts to mature eucalypts wherever possible. Tree protection standards should comply with Australian standard AS4970-2009 Protection of trees on development sites (Standards Australia, 2009). Wherever practicable, excavations and vehicle/machinery movements will occur outside the canopy dripline of large eucalypts.	Design phase Construction	CEMP
9	Construction impacts	Minimise biodiversity impacts	Existing farm tracks should be used wherever possible to minimise the number of new roads.	Construction	CEMP
10	Construction impacts	Minimise biodiversity impacts	Where cement is included in cable trench backfill, at least 20 centimetres of cement-free topsoil will be replaced as the top layer in the backfill.	Construction	CEMP
11	Construction impacts	Minimise biodiversity impacts	Where practicable, whole sods will be removed with an excavator where these areas are well-vegetated with dense root systems. Sods will be stored in moist, shaded conditions and replaced following the works. Sod storage time will be minimised and sods will be replaced in a manner that maximises the chances of re-establishment.	Construction	CEMP
12	Construction impacts	Minimise biodiversity impacts	Where possible, as a precaution, works should be planned to avoid sensitive times for Superb Parrots - September to January.	Construction	CEMP
13	Construction impacts	Minimise biodiversity impacts	Excavated topsoil, subsoil will be stored separately and replaced in a manner that replicates the original profile as closely as possible.	Construction	CEMP
14	Construction impacts	Minimise biodiversity impacts	Where practicable, grass surfaces and shrubs will be retained or restored on infrequently used vehicle routes.	Construction	CEMP
15	Construction impacts	Minimise biodiversity impacts	Site stabilisation, rehabilitation and revegetation of all disturbed areas would be undertaken without delay.	Construction	CEMP
16	Construction impacts	Minimise biodiversity impacts	As a general rule, disturbed areas will be used preferentially for vehicle and machinery access, materials laydown, stockpiling of cleared vegetation and the deposition and retrieval of spoil whenever practicable.	Construction	CEMP
17	Construction impacts	Minimise biodiversity impacts	Works will be avoided during, and immediately following heavy rainfall events to protect soils and vegetation at the site.	Construction	CEMP

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
18	Construction impacts	Minimise biodiversity impacts	Weed / pathogen controls will be implemented, including: o Machinery and vehicles used in construction works will be washed before and after site access to reduce the introduction and spread of weeds and pathogens. o Laydown sites for excavated spoil, equipment and construction materials will be weed-free or treated for weeds wherever practicable. o Weed monitoring will be carried out at all sites after the completion of construction works and ongoing weed control will occur where noxious or invasive species are recorded. In particular, monitoring will be undertaken during the following late spring/early summer, and remedial action taken as required. o Sediment control materials should be weed free (straw bales, geotextiles). o Imported materials such as sand and gravel will be sourced from sites which do not show evidence of noxious weeds or Phytophthora infection.	Construction	CEMP
19	Construction impacts	Minimise biodiversity impacts	If dams are removed during site development works, alternative watering points should be established to compensate for their loss and maintain similar habitat resources for native fauna.	Construction	CEMP
20	Construction impacts	Minimise biodiversity impacts	Any trench sections left open for greater than a day would be inspected daily, early in the morning and any trapped fauna removed. The use of ramps or ladders to facilitate trapped fauna escape is recommended.	Construction	CEMP
21	Construction impacts	Minimise biodiversity impacts	Rock and log habitat removed during the construction phase will be reinstated following the works.	Construction	CEMP
22	Construction impacts	Minimise biodiversity impacts	Where tree hollows are required to be removed, these should be replaced by nest boxes of similar size in nearby trees.	Construction	CEMP
23	Construction impacts	Minimise biodiversity impacts	Wherever possible small rock outcrops at the site should be excluded from the array, together with a minimum 2.5 metre buffer to avoid shading.	Construction	CEMP

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
24	Operational impacts	Minimise biodiversity impacts	A groundcover management plan would be developed that would include regular monitoring of vegetation cover and composition and allow for adaptive management. This would include: • Establishment of a shade tolerant perennial groundcover across the cropping and exotic dominated grazing paddocks prior to the installation of the PV arrays • Advice from an agronomist in relation to preferred species/varieties, establishment methods of alternative pastures and best practice management. • Where information is lacking, trials may be required onsite	Pre-construction Construction operation	CEMP OEMP
25	Operational impacts	Minimise biodiversity impacts	If localised erosion is detected, effective treatments would be applied without delay, such as hardening with mulch, reseeding and covering with an open weave jute matting, gypsum application to improve structure and infiltration, protection with geotextile fabric or localised flow dispersal and diversion structures.	Operation	OEMP
26	Operational impacts	Minimise biodiversity impacts	The space between the PV array rows should be maintained and kept clear to enable access by vehicles for ongoing weed control, and pasture renovation if required.	Operation	OEMP
27	Operational impacts	Minimise biodiversity impacts	Efforts should be made to minimise disturbance to the existing groundcover during construction. Construction and maintenance vehicles should not access the site when soils are very wet to minimise soil compaction and disturbance.	Construction Operation	CEMP OEMP
28	Operational impacts	Minimise biodiversity impacts	Fencing along Molong Manildra Road should be maintained so as macropods and other large native fauna are not funnelled along the perimeter fence and onto the road creating a traffic hazard and collision risk to the animal.	Operation	OEMP
29	Operational impacts	Minimise biodiversity impacts	Monitoring of fauna site habitat usage pre and post construction is recommended but not considered essential.	Operation	OEMP

Visual amenity

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
30	Deterioration of visual amenity during construction	Mitigate impacts	Measures to reduce visual impacts during construction, including but not limited to the following: • Dust reduction throughout the construction process • Restoration of any earthworks required for the construction • Clearing of existing vegetation would be kept to a minimum	Construction	CEMP
31	Deterioration of visual amenity by solar panels and associated infrastructure	Mitigate impacts	Measures include but are not limited to the following: • Colour of above ground infrastructure to be sympathetic to the landscape character • Underground cabling to be utilised if practical • The design and location of ancillary works are to incorporate measures which would reduce this visual impact	Construction Operation	CEMP OEMP
32	Deterioration of visual amenity at surrounding residences and roads	Mitigate impacts	• Visual screen planting is to be undertaken in the form of boundary planting around the solar farm, foreground planting at affected viewpoints and residential tree planting. • Screening vegetation would be planted along the northern, southern and western perimeters of the site. • Roadside planting along the eastern edge of Manildra Molong Road may be undertaken to ensure views from the road are fragmented • Tree planting would be undertaken in consultation with relevant landowners to achieve screening for homesteads with visual impacts to strategically block parts of the development. • Species typical of the area would be selected to enhance the existing landscape character.	Post construction	OEMP
33	Creation of a visual attraction	Maximise visual opportunities	A designated viewing area may be provided where visitors would be able to safely view the solar farm and surrounding landscape.	Construction Operation	CEMP OEMP

Archaeology and Aboriginal heritage

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
34	Disturbance to artefacts	Minimise impact	Where possible, the artefact scatter comprising five stone artefacts would be avoided.	Detailed design Construction	CEMP
35	Impact on local Aboriginal community	Minimise impact	Ongoing consultation would be undertaken with Registered Aboriginal Parties	All	CEMP OEMP

Noise

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
36	Noise impacts to sensitive receivers	Compliance	Construction would be undertaken during standard working hours of: • Monday – Friday: 7am to 6pm • Saturday: 8am to 1pm Sunday and public holidays: No work	All	CEMP OEMP
37	Noise impacts to sensitive receivers	Compliance	• Construction staff would be made aware of noise sensitive receivers and would be made aware of noise reduction options.	All	CEMP OEMP
38	Noise impacts to sensitive receivers	Compliance	Periods of respite would be provided in the case of unavoidable maximum noise level events.	All	CEMP OEMP
39	Noise impacts to sensitive receivers	Compliance	Reasonable and feasible measures to reduce noise would be implemented and could include reducing the throttle setting and turning off equipment when not being used.	All	CEMP OEMP
40	Noise impacts to sensitive receivers	Compliance	Equipment and plant would be maintained to reduce noise emissions.	All	CEMP OEMP
41	Noise impacts to sensitive receivers	Compliance	Mobile plant clustering near residences would be avoided.	All	CEMP OEMP
42	Noise impacts to sensitive receivers	Compliance	A 24 hour toll-free contact phone number for enquiries during the works would be provided.	All	CEMP OEMP
43	Noise impacts to sensitive receivers	Compliance	A documented complaints process would be implemented and would include an escalation procedure so that if a complainant is not satisfied there is a clear path to follow.	All	CEMP OEMP
44	Noise impacts to sensitive receivers	Compliance	Where complaints occur safeguards would be reviewed to determine if further safeguards are required or possible.	All	CEMP OEMP

Traffic and Access

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
45	Safety and asset protection	Minimise risk	The proponent would develop and implement a Traffic Management Plan (TMP) in consultation with roads authorities to facilitate appropriate management of potential traffic impacts. The TMP would include provisions for: • Scheduling of deliveries and managing timing of transport to minimise impacts on road and rail traffic • Limiting the number of trips per day • Undertaking community consultation before and during all haulage activities • Designing and implementing temporary modifications to intersections, roadside furniture, stock grids and gates • Managing the haulage process, including the erection of warning and/or advisory speed signage prior to isolated curves, crests, narrow bridges and change of road conditions • Designation of a speed limit would be placed on all of the roads that would be used primarily by construction traffic • Preparation of a Transport Code of Conduct to be made available to all contractors and staff • Identification of a procedure to monitor the traffic impacts during construction and work methods modified (where required) to reduce the impacts • Provide a contact phone number to enable any issues or concerns to be rapidly identified and addressed through appropriate procedures • Reinstatement of pre-existing conditions after temporary modifications to the roads and pavement along the route.	Construction and decommissioning	CEMP
46	Safety and asset protection	Minimise risk	The proponent would use a licensed haulage contractor with experience in transporting similar loads, responsible for obtaining all required approvals and permits from the RTA and Councils and for complying with conditions specified in those approvals.	Construction and decommissioning	CEMP
47	Safety and asset protection	Minimise risk	The proponent would prepare road dilapidation reports covering pavement and drainage structures in consultation with roads authorities for the route prior to the commencement of construction and after construction is complete. This report would include consideration of the Old Orange Road rail crossing.	Construction and decommissioning	CEMP
48	Safety and asset protection	Minimise risk	The proponent would repair any damage resulting from the construction traffic (except that resulting from normal wear and tear) as required during and after completion of construction at the proponent's cost or, alternately, negotiate an alternative for road damage with the relevant roads authority.	Construction and decommissioning	CEMP

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
49	Safety and asset protection	Minimise risk	Route specific mitigation measures, which would be investigated and detailed further in the Traffic Management Plan, include accessing the site via Old Orange Road and using the existing access track within site boundaries.	Construction and decommissioning	CEMP

Historic Heritage

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
51	Impact to a potential heritage item (abandoned stone cottage)	Manage direct impacts	Should direct impacts on the cottage ruin or part of its built fabric be required (including road upgrades or heavy vehicle vibration), impacts would be managed in accordance with the assessment of heritage significance recommendations, above, and in consultation with an noise and vibration specialist. This may include: • Traffic management measures, such as 'go slow' areas or vibration loggers • Fencing or demarcating the site • Clear identification of the feature on CEMP site maps and staff induction	Construction	CEMP
52	Disturbance to a potential historic relic	Minimise disturbance	In the event of an item of heritage significance being uncovered at the proposal site after works commence, the NSW Heritage Branch (Department of Planning) should be contacted prior to further work being undertaken at the site.	Construction Decommissioning	CEMP

Soils and Landforms

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
53	Soil loss and soil quality	Minimise impact	Progressive Erosion and Sediment Control Plans would be prepared for the site, including controls at drainage lines and slopes.	Construction	CEMP
54	Soil loss or stability of landform loss	Minimise risks	Access track construction and management would comply with guidelines set down in DLWC (1994), Landcom (2004) and DECC (2008b).	Construction	CEMP
55	Soil quality	Minimise impact	Avoid compaction of soil resulting from vehicle access and laying of materials particularly during saturated soil conditions, and remediate as necessary.	Construction	CEMP
56	Soil quality	Minimise impact	Where cement is included in cable trench backfill, at least 20 centimetres of cement-free topsoil would be replaced as the top layer in the backfill.	Construction	CEMP
57	Soil loss or stability of landform loss	Minimise risks	Concrete wash would be deposited in an excavated area, below the level of the topsoil, or in an approved landfill site. Where possible, waste water and solids would be reused onsite.	Construction	CEMP
58	Soil loss or stability of landform loss	Minimise risks	Access routes and tracks would be confined to already disturbed areas, where possible. All contractors would be advised to keep to established tracks.	Construction	CEMP
59	Soil quality	Minimise risks	A spill response plan would be developed for all phases of the project. This would include trigger points of when to notify the DECCW.	Construction Decommissioning Operation	CEMP OEMP
60	Soil loss or stability of landform loss	Minimise impact	If concentrated rainsplash and runoff below the panel rows result in localised erosion, the affected soils at the site should be treated and protected without delay.	Operation	OEMP
61	Soil loss or stability of landform loss	Minimise impact	The proponent would routinely monitor soil condition and vegetation cover below the array and liaise with the landowner regarding stock and vegetation management issues as required.	Operation	OEMP
62	Soil loss or stability of landform loss	Minimise impact	Thick and continuous pasture cover should be established prior to the installation of the array, and maintained at all times, including during winter and drought periods if possible.	Pre-construction Operation	CEMP OEMP

Hydrology and Water Quality

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
63	Deterioration of water quality (Surface Water)	Minimise risk	Infrastructure placement, including tracks, substations, control buildings, stockpiles, and site compounds and turnaround areas, would not be sited within 40 metres of a major drainage line or water course	Detailed design	CEMP
64	Deterioration of water quality (Surface Water)	Achieve neutral or beneficial water quality impact	The proponent would prepare a Erosion and Sediment Control Plan (ESCP) as a sub-plan of the Construction Environmental Management Plan. This plan would include the following provisions: • Sediment traps would be installed wherever there is potential for sediment to collect and enter waterways • Stockpiles generated as a result of construction activities would be bunded with silt fencing, (mulch bunds or similar) to reduce the potential for runoff from these areas • On the steeper slopes check banks or berms would be installed across the trenchline, as appropriate, following closure of the trench. These would discharge runoff to areas of stable vegetation • Stabilisation and site remediation would be undertaken as soon as practicable throughout and post construction • Soil and water management practices would be developed as set out in Soils and Construction Vol. 1 (Landcom 2004) • Monitoring of surface water quality would be undertaken following heavy rainfall events	Construction	CEMP
65	**Deterioration of water quality (Surface Water)**	**Achieve neutral or beneficial water quality impact**	**The site CEMP and OEMP would be provided to the New South Wales Office of Water for review of soil and water management measures for construction and operation, prior to project commencement.**	**Construction** **Operation**	**CEMP** **OEMP**
66	Water supply	Minimise risk	Undertake liaison with representatives of Cabonne Council regarding the potential supply of construction water	Construction Operation	CEMP, OEMP
67	Deterioration of water quality (Surface Water)	Minimise risk	All vehicles onsite would follow established trails and minimise onsite movements	Construction Operation	CEMP, OEMP
68	Deterioration of water quality (Surface and Ground Water)	Minimise risk	Machinery would be operated and maintained in a manner that minimises risk of hydrocarbon spills	Construction Operation	CEMP OEMP
69	Deterioration of water quality (Surface and Ground Water)	Minimise risk	Maintenance or re-fuelling of machinery would be carried out on hard-stand in accordance with industry standards for fuel transfer	Construction	CEMP

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
70	Deterioration of water quality (Surface and Ground Water)	Minimise risk	Design of concrete batch plants would ensure concrete wash would not be subjected to uncontrolled release. Areas of the batching would be bunded to contain peak rainfall events and remediated after the completion of the construction phase. Waste sludge would be recovered from the settling pond and used in the production of road base manufactured onsite. The waste material would be taken from the batching plant to be blended in the road base elsewhere onsite.	Construction	CEMP
71	Deterioration of water quality (Surface and Ground Water)	Minimise risk	Carry out dust suppression as required through either watering or chemical means (environmentally friendly polymer based additives to water).	Construction Decommissioning	CEMP
72	Deterioration of water quality (Surface Water)	Achieve neutral or beneficial water quality impact	A Site Restoration Plan (SRP) would be prepared as part of the Construction Environmental Management Plan. This would set out protocols for restoration works including: • Site Preparation • Stabilisation • Revegetation • Monitoring	Construction Decommissioning	CEMP
73	Deterioration of water quality (Surface and Ground Water)	Minimise risk	A Spill Response Plan would be prepared as part of the CEMP and OEMP including: • Identify persons responsible for implementing the plan if a spill of a dangerous or hazardous chemical/waste would occur • Identify all chemicals required for the proposal, including physio-chemical properties, risks posed to water quality objectives and appropriate methods of storage of these chemicals. • Locate Material Safety Data Sheets (MSDS) for all chemical inventories at on site and readily available • Comply with manufacturers recommendations in relation to application and disposal where chemicals are used • Report any spill that occurs to the Construction Manager regardless of the size of the spill • Establish clearly defined works and refuelling areas • Spill protocols in this plan would dictate when the EPA would be notified • Chemical / fuel storage areas would be identified, and be bunded to prevent loss of any pollutants • Hydrocarbon spill kits would be stored at the site. A number of site staff are to be	Construction Operation Decommissioning	CEMP OEMP

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
			trained in the use of the spill kits		
74	Deterioration of water quality (Surface and Ground Water)	Minimise Risk	The proponent would notify the NSW DECC EPA in the event of any spill that had the potential to pollute waters	Construction Operation	CEMP OEMP
75	Protection of ground water	Minimise risk	Undertake investigations, as part of the geotechnical investigation, to ensure that the project would have no material adverse effect on groundwater/aquifers as a result of blasting activities	Pre-construction	CEMP
76	Deterioration of water quality (Surface and Ground Water)	Minimise risk	Monitor bunded infrastructure to ensure that volume of oil could be fully contained in the event of leak	Operation	OEMP
77	Deterioration of water quality (Surface and Ground Water)	Minimise risk	Maintain septic systems, if installed, to meet appropriate Australian standards	Construction Operation Decommissioning	CEMP OEMP

Air Quality and Climate

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
78	Air quality	Minimise risks	Dust levels at stockpile sites would be visually monitored. Dust suppression would be implemented if required. Stockpiles would be protected from prevailing weather conditions	Construction	CEMP
79	Air quality	Minimise risks	Undertake ongoing visual dust monitoring and suppression (if required) during the construction phase. Monitoring would regularly assess the effectiveness of dust suppression activities. Monitoring would regularly assess the effectiveness of dust suppression activities.	Construction	CEMP
80	Air quality	Minimise risks	Should a complaint relating to dust by a resident be received, dust monitoring would be undertaken. The proponent would assess the dust gauges and identify additional mitigation measures, where required.	Construction	CEMP
81	Air quality	Minimise risk	Vegetation cover would be maintained throughout operation.	Operation	OEMP

Waste Management and Resource Use

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
82	Waste generation	Minimise waste and maximise recycling of materials	The proponent would prepare a **Waste Management Plan** to be included within the **Construction Environmental Management Plan**. It would include but not be limited to the following: • The scope for reuse and recycling would be evaluated • Provision for recycling would be made onsite • Wastes would be disposed of at appropriate facilities • Toilet facilities would be provided for onsite workers and sullage from contractor's pump out toilet facilities would be disposed at the local sewage treatment plants or other suitable facility agreed to by Council • Excavated material would be used in road base construction where possible. Surplus material would be disposed of in appropriate locations on site (on agreement with the landowner), finished with topsoil, and revegetated.	Construction Operation	CEMP OEMP
83	Waste generation	Maximise recycling of materials	PV modules would be recycled, where possible.	Decommissioning	

Socio-economic and Community

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
83	Impact on current land use	Minimise impact	Develop, implement and monitor the effects of a Site Restoration Plan**.** The plan would aim to stabilise disturbed areas. The Plan would consider: • Appropriate stabilisation techniques across the precincts • Suitable species for re-seeding (native, locally occurring species would be given preference) in areas dominated by native cover • Monitoring for weed and erosion issues	Construction Decommissioning	CEMP
84	Impact on current land use	Minimise disruption	Liaison would be undertaken with neighbouring landowners to provide information about the timing and routes to be used during construction and decommissioning. This could be in the form of advertising and provision of a contact point for further inquiries. The aim would be to reduce the risk of interference with agricultural activities on affected roads and road verges.	Construction	CEMP

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
85	Impact on local community	Maximise positive impact of proposal	Liaise with local industry representatives to maximise the use of local contractors and manufacturing facilities in the construction and decommissioning phases of the project.	Construction	CEMP
86	Impact on local community	Maximise positive impact of proposal	Liaise with the local visitor information centres to ensure that construction and decommissioning timing and haulage routes are known well in advance of works and to the extent practical coordinated with local events, such as the Agricultural show.	Construction	CEMP
87	Impact on local community	Maximise positive impact of proposal	Make available employment opportunities and training for the ongoing operation of the solar farm to local residents where reasonable.	Operation	OEMP
88	Impact on local community	Provide accurate information	Dissemination of accessible and independent information on solar farm impacts.	Pre-construction	CEMP

Land Use and Mineral Resources

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
89	Impact on current land use	Minimise impacts	A Site Restoration Plan would be developed to ensure stabilisation of disturbed areas as quickly as possible. The Plan would consider: • Appropriate stabilisation techniques across the precincts. • Suitable species for re-seeding (native, locally occurring species would be given preference) in areas dominated by native cover. • Monitoring for weed and erosion issues.	Construction Decommissioning	CEMP
930	Impact on Manildra Common Pit	Minimise impacts	The proponent would consult the Cabonne Council regarding any potential traffic issues during construction of the Solar Farm, for incorporation into the Traffic Management Plan.	Pre-construction	CEMP
91	Impact on current land use	Minimise disruption	Liaison would be undertaken with neighbouring landowners and landowners adjoining access roads, to provide information about the timing and routes to be used during construction and decommissioning. This could be in the form of advertising and provision of a contact point for further inquiries. The aim would be to reduce the risk of interference with agricultural activities on affected roads and road verges.	Construction	CEMP
92	Impact on current land use	Minimise impact	Grazing of sheep within the panel areas is likely to occur. The carrying capacity is likely to be reduced, however condition of the site would be considered in relation to stocking rates.	Operation	OEMP

Health and Safety

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
93	Radiation exposure from EMFs	Minimise exposure	Adhere to standard industry approaches and policies with respect to EMF through maintenance of adequate easements around transmission lines.	Operation	OEMP
94	Radiation exposure from EMFs	Minimise exposure	The substation upgrade and transmission lines would be located as far as practical from residences, farm sheds, and yards in order to reduce the potential for both chronic and acute exposure.	Operation	OEMP

Fire and Bushfire Issues and Impacts

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
95	Bushfire risk	Minimise risk	The proponent would prepare a Bushfire Management Plan as part of the Construction Environmental Management Plan and Operation Environmental Management Plan. The Rural Fire Service and NSW Fire Brigade would be consulted in regard to its adequacy to manage bushfire risks during construction, operation and decommissioning. The plan would as a minimum include: • Hot-work procedures, asset protection zones, safety, communication, site access and response protocols in the event of a fire originating in the solar farm infrastructure, or in the event of an external wildfire threatening the solar farm or nearby persons or property. • Fire response planning would address any potential for dangerous gas emissions from the solar farm during a fire event to affect firefighters and neighbouring residents. • Flammable materials and ignition sources brought onto the site, such as hydrocarbons, would be handled and stored as per manufacturer's instructions. • During the construction phase, appropriate fire fighting equipment would be held onsite when the fire danger is very high to extreme, and a minimum of one person on site would be trained in its use. The equipment and level of training would be determined in consultation with the local RFS. • Asset protection zones (APZs), based on the NSW policy document Planning for Bushfire Protection, would be maintained around the site buildings and in the transmission line corridor. Workplace health and safety protocols would be developed to minimise the risk of fire for workers during construction and during maintenance in the control room and amenities.	Construction Operation Decommissioning	CEMP OEMP

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
			• Fire extinguishers would be stored onsite in each of the site buildings.		
96	Bushfire risk	Minimise risk	If sowing of pasture grasses in the PV array area is required, low growing species should be selected.	Construction Operation	CEMP OEMP
97	Bushfire risk	Minimise risk	Pasture would be maintained at a low height (<100mm) below the PV array using sheep grazing or slashing.	Operation	OEMP
98	Bushfire risk	Minimise risk	Appropriate firefighting equipment would be maintained on the site during the operation of the solar farm, including protective clothing. Staff would be trained in its use.	Operation	OEMP
99	Bushfire risk	Minimise risk	A formal response procedure would be developed for operation staff at the solar farm, including procedures for notification of neighbouring and downwind landholders if required.	Operation	OEMP

APPENDIX B ADDITIONAL STUDIES

B.1 FLORA ADDENDUM

Biodiversity Assessment Addendum

MANILDRA SOLAR FARM

DECEMBER 2010

Document Verification

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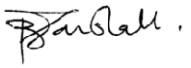
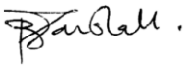
V1.0	07/12/10	Kelly Simpson Dave Maynard		Brooke Marshall Andrew Morrison	 	Brooke Marshall	

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1 INTRODUCTION

A Biodiversity Assessment (the original Biodiversity Assessment; **ngh**environmental 2010) was completed in November 2010 as part of an environmental assessment for the proposed Manildra Solar Farm, proposed to be located in central western New South Wales.

The Department of Planning issued Director Generals Requirements on 01 September 2010 indicating that the EA must specifically consider threatened flora species and Endangered Ecological Communities that have potential to occur on the site. The seasonal timing of the fieldwork for the Biodiversity Assessment (winter 2010) was not sufficient for some threatened entities and a recommendation of the BA was:

> *Supplementary surveys, prior to finalisation of infrastructure layout, are required to confirm the assumptions of this assessment as follows:*
>
> - *A supplementary flora survey in spring (November) would be required to confirm if threatened species including Silky Swainson-pea (Swainsona sericea), Small Purple-pea (Swainsona recta), Austral Toadflax (Thesium australe) inhabit areas to be impacted by the development, to confirm the assessment of the EEC derived grassland, and to confirm the quality of threatened reptile habitat in the western paddock if works are to impact on this area (no works are planned in this area.) The probability of these species occurring is considered low and the surveys would be undertaken to validate the assumptions made in the Assessment of Significance. If these species are detected on the site it would be recommended that they be managed to ensure significant impact on local populations does not result (ie exclusion zones or other management).*

Additionally, several woodland areas within the site boundary were considered to require additional fauna habitat assessment.

This supplementary survey addendum addresses the commitment above and presents:

- The methods and results of targeted searches for identified subject species, and other State- and Commonwealth-listed threatened species potentially present at the subject site
- Updated information regarding the seasonal variation in species composition and vegetation condition and distribution at the site, particularly with respect to the condition of areas of Box Gum Woodland Derived Grassland EEC
- The methods and results of additional fauna habitat assessments undertaken within those areas highlighted in Figure 6-1 of the original Biodiversity Assessment
- Further recommendations considered to be required to manage the identified biodiversity impacts

2 METHODS

The supplementary survey was undertaken by botanist, Kelly Simpson, on 23rd and 24th November 2010.

2.1 TARGETED SURVEYS FOR THREATENED FLORA SPECIES

The targeted surveys involved searches on foot through all areas of suitable habitat within the development envelope. Foot-based searches were conducted in linear transects spaced approximately 10m apart. In addition to these targeted searches, areas of suitable habitat adjacent to the development envelope were surveyed using the random meander method as documented by Cropper 1993. In total, approximately 5 person hours was spent on the targeted searches, covering 17 hectares. The locations of the transects and random meanders are shown in Figure 2-1.

During searches, particular attention was paid to native species composition and diversity to confirm condition assumptions made during the original survey for the Biodiversity Assessment. Any additional species not observed during the winter survey were noted and a revised species list is provided in Appendix A.

2.2 CONDITION ASSESSMENT OF BOX GUM WOODLAND DERIVED GRASSLAND EEC

An assessment of the condition of Box Gum Woodland EEC within areas identified in the original Biodiversity Assessment was undertaken. In total, seven areas of Box Gum Woodland and Box Gum Woodland Derived Grassland were surveyed as to their condition using the random meander method as documented by Cropper 1993 (refer to Figure 2-1). Notes were taken on vegetation structure, species diversity and condition to validate the vegetation mapping and condition observed during the winter survey. Any discrepancies between the two surveys were noted.

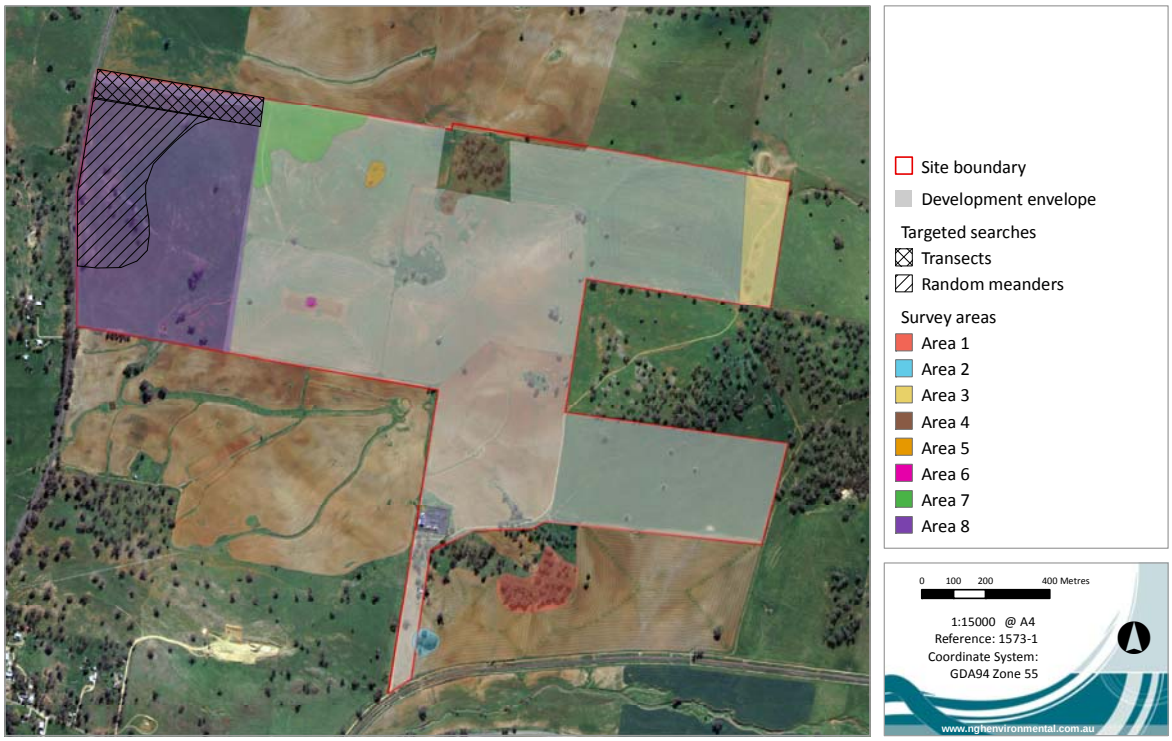

Figure 2-1 Locations of targeted threatened species searches and eight additional survey areas

2.3 FAUNA HABITAT ASSESSMENTS

The focus of the supplementary fauna survey was to undertake additional habitat assessments within areas not previously surveyed and to confirm the condition of threatened reptile habitat within the western paddock. In total, six additional habitat assessments were undertaken and involved recording the presence and quality of threatened fauna habitat (including hollow bearing trees, rock outcrops, proximity to water, stands of native grass, fallen timber, watercourses, mistletoe as well as past and present disturbance). Further assessment of the condition of threatened reptile habitat was also undertaken within the western paddock and involved searches for small black ants (food source for Pink-tailed Legless Lizards) as well as opportunistic sightings of any reptiles within this area. Habitat assessment were conducted in all areas surveyed excluding Area 7 (Figure 2-1)

3 RESULTS

3.1 CONDITION ASSESSMENT OF BOX GUM WOODLAND EEC

Notes obtained from each of the areas surveyed are provided below in Table 3-1. The condition assessments of Box Gum Woodland EEC located at the site, including the derived grassland in the western paddock found to be of poor to moderate condition, are consistent with the observations of the winter survey with the exception of two areas.

1. The treeless area within Area 3 comprised a mix of native grasses and exotic groundcover and has been reassessed as Box Gum Woodland Derived Grassland (EEC TSC) in poor condition (refer to Figure 3-1).
2. Area 7 as outlined in Figure 2-1, was dominated by native Spear Grasses (*Austrostipa* spp.) at the time of the survey and has also been reassessed as Box Gum Woodland Derived Grassland (EEC TSC) in poor condition (refer to Figure 3-2).

A revised figure showing vegetation communities at the Manildra Solar Farm site is provided as Figure 3-3.

The area of poor condition Box-Gum Woodland to be impacted by the proposal has increased from 3 hectares to 13 hectares due to the addition of the native pasture in Area 7. No additional impacts to poor to moderate condition Box-Gum Woodland will occur. Due to its degraded state and poor condition the conservation value of the additional area is considered low. The assumptions made in the original Biodiversity Assessment are considered to be applicable and a significant impact to this community is therefore considered unlikely.

Figure 3-1 Area 3 showing patches of native grasses in foreground.

Figure 3-2 Area 7 showing dominant native Spear Grasses.

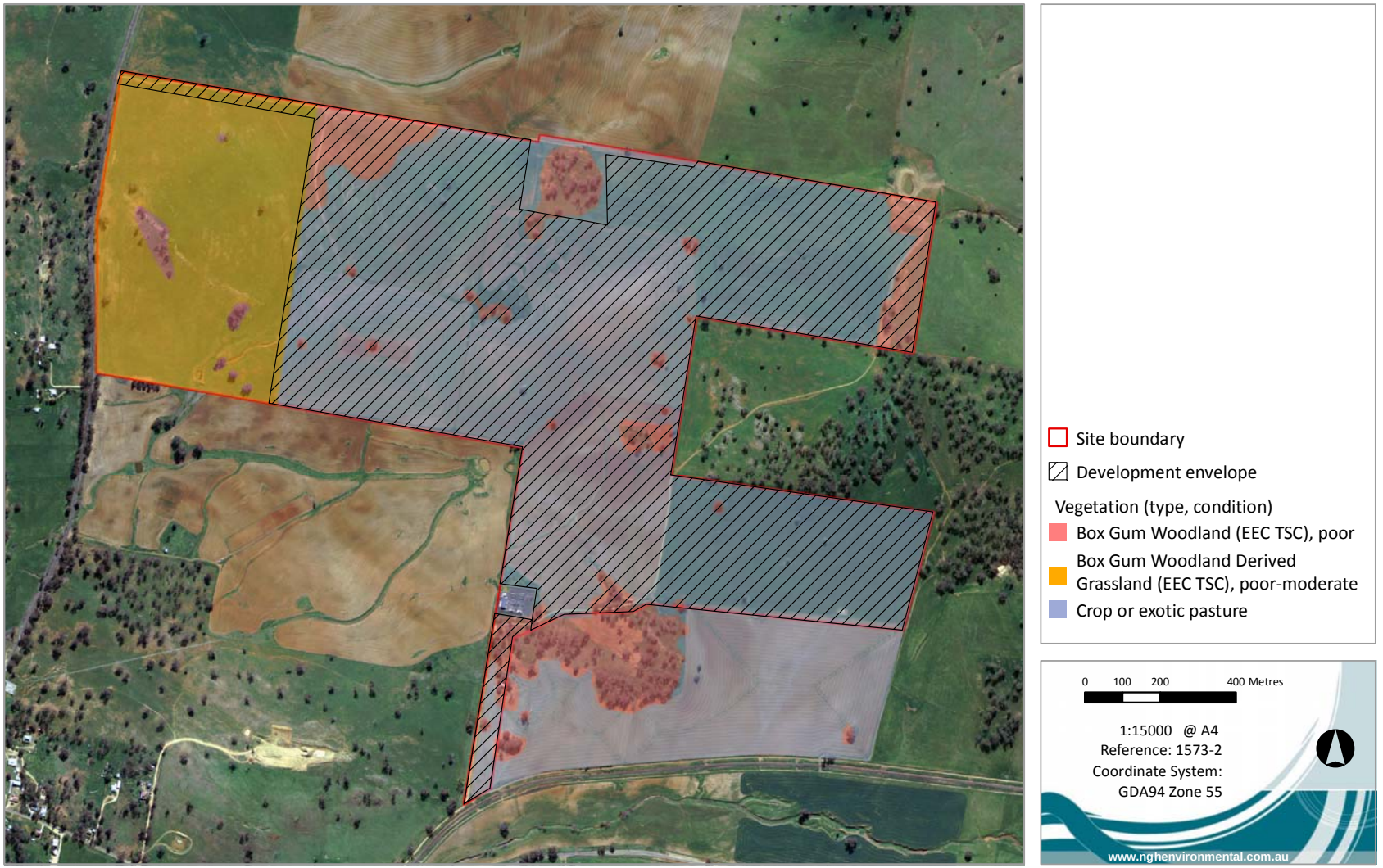

Figure 3-3: Map showing revised vegetation community boundaries at the subject site.

Table 3-1 Results of Box Gum Woodland condition assessments undertaken within the proposed Manildra Solar Farm site.

Location	Notes	Condition	Consistent with winter survey?	Located within Development Envelope?
Area 1	Woodland dominated by White Box (*Eucalyptus albens*) 15-18m tall and average Diameter-at-Breast-Height (DBH) of 20-40cm. Groundlayer (90% cover) to 1m tall and dominated by the exotic species **Echium plantagineum, *Sonchus oleraceus, *Lolium perenne, *Cirsium vulgare* and **Trifolium* sp. Small patches of native grasses (*Austrostipa* sp. and *Austrodanthonia* sp.) noted in areas.	Poor	Yes Box Gum Woodland EEC (TSC) Poor	No
Area 2	Small isolated area of Yellow Box (*Eucalyptus melliodora*) and Blakely's red Gum (*E. blakelyi*) surrounding small waterhole. Groundlayer (80% cover) to 1.5m tall dominated by **Echium plantagineum, *Sonchus oleraceus, *Avena fatua* and **Lolium perenne.*	Poor	Yes Box Gum Woodland (EEC TSC) Poor	No
Area 3	Small patch of White Box (*Eucalyptus albens*) 20-22m tall and average DBH 30-120cm and Kurrajong (*Brachychiton populneus*). Groundlayer dominated by a mix of native and exotic species including *Austrostipa* sp., *Austrodanthonia* sp., **Lolium perenne, *Hordeum leporinum, Chloris truncata* and *Wahlenbergia* sp. Exotic species predominately occurring around tree bases.	Poor	No Change from exotic pasture to Box Gum Woodland Derived Grassland (EEC TSC) Poor	Yes
Area 4	Isolated patch of White Box (Eucalyptus albens) 15-20m tall and DBH 20-50cm with occasional Kurrajong (*Brachychiton populneus*). Groundcover predominately exotic including **Echium plantagineum, *Lolium perenne, *Bromus catharticus* and **Cirsium vulgare.* Small patches of *Austrostipa* sp. and *Austrodanthonia* sp. also noted.	Poor	Yes Box Gum Woodland (EEC TSC) Poor	No

Location	Notes	Condition	Consistent with winter survey?	Located within Development Envelope?
Area 6	Isolated single Yellow Box tree (Eucalyptus melliodora) 15m tall and DBH 70cm, surrounding by cropped land and exotic groundcover within tree drip line.	Poor	Yes Box Gum Woodland (EEC TSC) Poor	Yes
Area 7	Area of native grassland dominated by Spear Grasses (*Austrostipa* spp.) and smaller patches of Wallaby Grass (*Austrodanthonia* sp.) and Windmill Grass (*Chloris truncata*). Small patches of exotic grasses including **Eragrostis cilianensis* and **Hordeum leporinum*. Low native forb diversity with only Burr Daisy (*Calotis* sp.) and Fuzzweed *(Vittadinia muelleri)* observed despite targeted searches for threatened species.	Poor	No Change from exotic pasture to Box Gum Woodland Derived Grassland (EEC TSC) Poor	Yes
Area 8	Western paddock comprises a mix of native grass dominated areas and areas which are predominately exotic. Better quality areas occur along the western half of the paddock where a number of native forb species, including one orchid, were noted as well as the native Kangaroo Grass (*Themeda australis*). Areas of poorer quality groundcover are located in higher points, beneath trees (sheep camps) and within disturbed areas such as the existing access road along the northern fence line.	Poor to moderate	Yes Box Gum Woodland Derived Grassland (EEC TSC) Poor to moderate	The northern access road would be utilised as part of the proposal. All areas of moderate quality EEC within the western paddock are located outside the development area.

3.2 TARGETED SURVEYS

None of the threatened species targeted during the survey were recorded at the subject site. Species diversity within these areas was generally found to be low (<5 native non-grass species) with the exception of an area along the western boundary of the western paddock where a number of native forbs were recorded including Chocolate Lily (*Dichopogon strictus*), Common Fringe Lily *(Thysanotus tuberosus)* and Wedge Diuris *(Diuris dendrobioides)* (Figure 3-4).

Climatic conditions had been favourable prior to the survey with good rains over the winter season as well as in the preceding weeks. This had resulted in greater native species diversity within better quality areas of the subject site such as the western paddock, where a number of native wild flowers and an abundance of native grasses were noted. This suggests that it is likely that if the threatened species targeted at the site were present they would have been detectable.

Areas of potential habitat targeted within the development area contained limited native forb diversity despite the dominance of Spear Grasses (*Austrostipa* spp.) in certain areas. All areas surveyed within the development area, including Area 3, Area 7 and the northern access road in the western paddock, were found to be lacking in native species diversity and are unlikely to support any of the targeted threatened species.

Figure 3-4 Wedge Diuris (*Diuris dendrobioides*) in flower at the subject site

3.3 FAUNA HABITAT SURVEYS

Six habitat evaluations targeting threatened species habitat were undertaken across the subject area including three areas located within the proposed development envelope (Figure 2-1). Results of these assessments are found below in Table 3-2 and were used to confirm the quality of threatened species habitat, particularly reptile habitat, as assessed in the original Biodiversity Assessment.

A total of 45min was spent rock-rolling in Area 8. A total of 30 rocks were able to be rolled and only one rock supported a colony of small ants (potential refuge and food source for Pink-tailed Legless-lizards).

Three additional hollow bearing trees to those identified within the original Biodiversity Assessment were recorded within the development envelope in Area 3. Details of these trees are provided in Table 3-3.

Table 3-2 Results of fauna habitat assessments undertaken during the supplementary survey

Location	Notes	Photo	Located within Development Envelope?
Area 1	Remnant White Box Woodland surrounded by cropped land. Groundcover predominately exotic with only minor patches of native grasses and no midstorey structure. Limited hollow bearing tree potential due to the age class of the vegetation however some dead stags noted which may provide small fissures for microbats. Embedded granitic surface rocks and small areas of fallen timber (<5% cover) provide limited reptile habitat. No mistletoe observed.		No
Area 2	Small isolated stand of eight Yellow Box trees surrounding small dam (5m x 3m) within cropped area. Groundcover predominately exotic (80% cover) including Paterson's Curse, Sowthistle, Wild Oats and Perennial Ryegrass with one small patch (2m x 2m) of native Spear Grass. Limited fringing vegetation around dam and no emergent aquatic vegetation. Bubbles observed on dam surface possibly from tortoises (tortoise shell found in adjacent paddock). Trees, including one dead stag, likely to comprise small hollows and fissures although no obvious hollows were observed. No mistletoe noted.		No

Location	Notes	Photo	Located within Development Envelope?
Area 3	Small area of four White Box trees (20-22m tall) DBH range 30-120cm within narrow paddock area. Midstorey structure minimal with only two Kurrajong trees present. Groundcover comprises a mosaic of native grasses (Spear Grass, Wallaby Grass and Windmill Grass) and exotic species including Perennial Rye, Barley Grass and Spear Thistle. Two species of the common native Bluebell (*Wahlenbergia stricta* and *W. communis)* were also noted as common throughout the patches of native grass although general native diversity was low with no other native forbs observed. Three hollow bearing trees were noted in this area, potentially providing habitat for hollow dependent fauna species. However, no scratch marks were present on the tree trunks and no evidence of parrot nesting was observed (for details of the hollows refer to Table 3-3). Small area of fallen timber noted at tree bases and minimal exposed surface rock (<1% cover).		Yes, proposal would require the removal of three hollow bearing trees from this area (refer to Table 3-3).
Area 4	Small isolated stand of remnant White Box (15-20m tall) DBH 20-50cm, less than 5% canopy cover with scattered Kurrajong trees in the midstorey. Groundcover predominately exotic, particularly surrounding tree bases. Approximately 10-15 hollow bearing trees, including a number of dead stags with small hollows and fissures located in this area. Limited reptile habitat with only small areas of fallen timber (<2% cover) and no rock outcrops. Large concrete tank with no top located just to the north of the stand. Area currently used for bee boxes		No

Location	Notes	Photo	Located within Development Envelope?
Area 5	Isolated stand of four Pepper trees (one hollow bearing). Groundcover heavily grazed and dominated by exotic species. Areas of fallen timber and rock outcrops/piles present although these areas are generally disturbed by stock and past cultivation suggesting that the habitat is not suitable for threatened reptile species.		Yes
Area 6	Solitary, isolated Yellow Box tree (15m tall, DBH 70cm) surrounded by cropped land with exotic groundcover species occurring beneath the tree. No hollows observed. Minimal habitat value for fauna.		Yes

Location	Notes	Photo	Located within Development Envelope?
Area 8	Western paddock comprises a mosaic of native grassland and exotic groundcover. This area comprised the greatest diversity of native forb species and also contains large rock outcrop areas. These rocky areas represent the best quality reptile habitat within the subject site due to the presence of native grasses and low to moderate grazing levels. However, findings of this survey confirmed the finding of the BA in that the rocks present are largely embedded (providing few shelter sites for species with a preference for shallowly embedded or surface rocks such as Pink-tailed Worm-lizard and terrestrial skinks) and food resources are limited (few black ant nests were discovered under rocks – 1 nest for 30 rocks rolled). These rocky outcrop areas were also being utilised by stock at the time of the survey.		No

Table 3-3 Details of additional hollow bearing trees located within the Development Envelope (Area 3)

Tree Species	Hollow number and size#	Easting	Northing	Sign of fauna occupation
White Box (DBH 120cm)	5S, 3M	661048	6328207	None
White Box (DBH 70cm)	2S, 3M, 2L	661050	6328207	None
White Box (DBH 100cm)	1S, 3M	661070	6328243	None

Hollow Size: S = <6cm, M = 6 to 10cm, L = >10cm

4 CONCLUSIONS AND RECOMMENDATIONS

The Manildra Solar Farm Biodiversity Assessment concluded that the impacts to flora and fauna values at the subject site resulting from the proposal would not be significant in light of the general low condition of the native vegetation within the development envelope, the low habitat values and the presence of better quality habitat in areas adjacent to the development area and the surrounding locality.

The findings of this supplementary survey support these conclusions. Two additional small areas of Box Gum Woodland Derived Grassland EEC were detected within the development. The area of EEC to be impacted has increased from 3.2 hectares to 13.5 hectares however, the quality of this vegetation to be impacted is assessed to be poor and its removal is not considered to result in the local extinction of the endangered community. The condition of Box Gum Woodland Derived Grassland EEC located in the western paddock was confirmed as comprising areas of moderate quality native grassland with a number of native forbs and one orchid species recorded. These areas of native vegetation would not be affected by the proposed works.

None of the threatened subject species were recorded at the subject site and, on the basis of observed condition and integrity of the majority of the potential habitat at the site, their occurrence is considered unlikely. The timing of the survey and preceding weather conditions were considered suitable for detecting these species and targeted searches would likely have detected these species if present.

The supplementary fauna survey confirmed the assumptions presented in the BA in terms of the low probability of the threatened reptiles Little Whip Snake and Pink-tailed Worm-lizard occurring on the site. The survey concluded that threatened reptile habitat at the site is generally in poor condition due to stock grazing, cultivation and exotic species. Better quality habitat is located in the western paddock where grazing pressure is lower and native grass species are more prevalent, however, the probability of threatened reptile populations occurring even here is unlikely. This area would not be affected by the proposed works.

Three additional hollow bearing trees were recorded within the development area in Area 3 bringing the total number of hollow bearing trees that may be removed by the proposal to nine. Although conducted within the Superb Parrot Breeding season, no evidence of Superb Parrot nesting was recorded within these additional hollows or elsewhere on the site. The removal of up to nine hollow bearing trees does not change the assessments of significance for hollow dependant threatened species contained in the BA and, based on habitat characteristics of the site, history of disturbance and nearest records, it is considered unlikely that any threatened hollow dependant fauna species utilise the site for roosting or nesting. The following statements of commitment, presented in the EA, provide additional assurance that the proposal is unlikely to have a significant impact on hollow dependant threatened fauna species:

- SoC 8 If the removal of any hollow bearing trees is required, this activity would be preceded by a pre-clearance check by a qualified ecologist including Anabat survey and stag watching.
- SoC 13 Where possible, as a precaution, works should be planned to avoid sensitive times for Superb Parrots - September to January.

- SoC 23 Where tree hollows are required to be removed, these should be replaced by nest boxes of similar size in nearby trees.

The approach of pre-clearance surveys has been adopted as a precautionary measure as it is considered unlikely that threatened species occur within the hollows onsite. This approach enables the detection of hollow usage by threatened species that may move onto the site between the project approval and works commencing. An additional SoC is proposed to ensure impacts to significant hollow-bearing trees and therefore hollow dependant fauna, are minimised:

NEW SoC PROPOSED

If pre-clearance surveys identify hollow bearing trees that are significant to the viability of local threatened species populations (for example a threatened microbat roost tree) these trees would be retained and infrastructure would be redesigned to accommodate them.

5 REFERENCES

Bishop (1996) *Field Guide to Orchids of New South Wales and Victoria.* UNSW Press, Sydney

Department of Environment, Climate Change and Water (DECCW) (2010b) Threatened species, populations and ecological communities of NSW, Department of Environment and Climate Change NSW accessed at http://www.threatenedspecies.environment.nsw.gov.au/index.aspx.

Department of Environment, Water, Heritage and the Arts (DEWHA) (2010) Special Profile and Threats Database, Department of Environment, Water, Heritage and the Arts, Australian Government. Accessed at http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Harden, G.J. (ed.), (1990-2002) *Flora of New South Wales*. Volumes 1-4, Royal Botanic Gardens Sydney, University of New South Wales Press, Kensington, New South Wales.

nghenvironmental (2010) Biodiversity Assessment - Manildra Solar Farm, prepared for Infigen Suntech, November 2010

Appendix A REVISED FLORA SPECIES LISTS

The survey area was stratified into 3 relatively homogeneous survey zones based on Proposal elements, vegetation structure and topography:

NP Native and exotic pasture with scattered trees (western area)

EP Exotic pasture (northern area)

CA Cropped areas with scattered trees

Cover/abundance assessments are based on visual estimates of foliage cover (after Carnahan 1997), scored using a modified Braun-Blanquet 6-point scale:

1 1 to a few individuals present, less than 5% cover
2 many individuals present, but still less than 5% cover
3 5 - <20% cover
4 20 - <50% cover
5 50 - <75% cover
6 75 - 100% cover.

Where the cover/abundance of a particular species varies markedly over the random meander survey area, a range of values is provided. In these cases, abundance is based on a standard 20 metre x 20 metre quadrat scale.

Species of conservation significance are bolded. Introduced species are denoted by an asterisk. Noxious weeds declared for the Cabonne Shire Council control area under the *Noxious Weeds Act 1993* are indicated with a 'Δ' symbol. Where uncertainty exists due to the unavailability of mature reproductive material, the taxon is preceded by a question mark, or plants are identified to genus level only. Botanical nomenclature follows G.J. Harden (ed) (1990-2002) Flora of New South Wales, UNSW Press, except where recent changes have occurred.

Additional species recorded during the spring survey are highlighted.

Scientific name	Common name	Family	Abundance		
			NP	EP	CA
TREES					
Brachychiton populneus	Kurrajong	Sterculiaceae		0-2	0-1
Eucalyptus albens	White Box	Myrtaceae	0-2	0-1	2-3
Eucalyptus blakelyi	Blakely's Red gum	Myrtaceae	0-1		
Eucalyptus melliodora	Yellow Box	Myrtaceae	0-1	0-1	0-1
Eucalyptus microcarpa	Grey Box	Myrtaceae			0-1
?Notelaea microcarpa var. microcarpa	Native Olive	Oleaceae	0-1		
**Schinus areira*	Pepper Tree	Anacardiaceae	0-1	0-1	
SHRUBS, SUB-SHRUBS					
Astroloma humifusum	Cranberry Heath	Ericaceae			0-1
Amyema pendulum	Mistletoe	Loranthaceae	0-1		
Enchylaena tomentosa	Ruby Saltbush	Chenopodiaceae			1
Eremophila debilis	Amulla	Myoporaceae	0-1		
Δ**Lycium ferocissimum*	African boxthorn	Solanaceae	1		1
**Marrubium vulgare*	Horehound	Lamiaceae	0-2	0-2	1
Sida trichopoda	Hairy Sida	Malvaceae	0-2		
Δ**Xanthium spinosum*	Bathurst Burr	Asteraceae	2	1	1
VINES AND TWINERS					
Glycine sp.		Fabaceae	0-1		
FORBS					
Acaena ?echinata		Rosaceae	1		
**Acetosella vulgaris*	Sheep Sorrel	Polygonaceae			1
**Arctotheca calendula*	Capeweed	Asteraceae			1
**Brassica sp.*	Canola	Brassicaceae			0-5
Calotis sp.	Burr Daisy	Asteraceae	2-3	1	
**Capsella bursa-pastoris*	Shepherd's Purse	Brassicaceae	2	2	2-3
**Carthamus lanatus*	Saffron Thistle	Asteraceae	0-2		
Chamaesyce drummondii	Caustic Weed	Euphorbiaceae	2	1	
**Chenopodium murale*	Nettle-leaf Goosefoot	Chenopodiaceae	0-1	0-1	0-2
Chenopodium pumilo	Small Crumbweed	Chenopodiaceae	2	2	
**Cirsium vulgare*	Black or Spear Thistle	Asteraceae		1	1
**Conyza bonariensis*	Flaxleaf Fleabane	Asteraceae	2		
Cotula australis	Carrot Weed	Asteraceae	2		
Crassula sieberiana	Stonecrop	Crassulaceae			1
**Cucumis myriocarpus*	Paddy Melon	Cucurbitaceae		0-2	
Dichondra repens	kidney Weed	Convolvulaceae	0-2		
Dichopogon strictus	Chocolate Lily	Anthericaceae	2		
Diuris dendrobioides	Wedge Diuris	Orchidaceae	0-1		
**Echium plantagineum*	Paterson's curse	Boraginaceae	2	2	2-4

Scientific name	Common name	Family	Abundance		
			NP	EP	CA
Einadia nutans	Climbing Saltbush	Chenopodiaceae			0-1
**Erodium cicutarium*	Common Storksbill	Geraniaceae	2	2	2
Geranium solanderi	Native Geranium	Geraniaceae	2	1	
Hydrocotyle laxiflora	Stinking Pennywort	Apiaceae	2		
**Hypochaeris glabra*	Smooth Cat's Ear	Asteraceae			1
**Hypochaeris radicata*	Cat's Ear, Flatweed	Asteraceae	1	2	2
**Lepidium africanum*	Peppercress	Brassicaceae	2	2	2
**Malva parviflora*	Small-flowered Mallow	Malvaceae	2	2-5	2-5
**?Medicago arabica*	Spotted Burr-medic	Fabaceae	2	2	1
Δ**Onopordum acanthium*	Scotch Thistle	Asteraceae			0-1
Oxalis perennans	Oxalis	Oxalidaceae	1-2		1
Rumex brownii	Native Dock	Polygonaceae			1
**Salvia verbenaca*	Vervain	Lamiaceae	1	2	2
**Silybum marianum*	Variegated Thistle	Asteraceae	1	2	2
**Sisymbrium orientale*	Indian Hedge Mustard	Brassicaceae	2	2-3	2-5
**Solanum chenopodioides*	Whitetip Nightshade	Solanaceae			
**Sonchus oleraceus*	Common Sowthistle	Asteraceae			2
**Taraxacum officinale*	Dandelion	Asteraceae			1
Thysanotus tuberosus	Common Fringe-Lily	Anthericaceae	1		
**Trifolium repens*.	White Clover	Fabaceae	0-2	2-3	2-3
**Trifolium* sp.	Clover	Fabaceae	0-22	2-3	2-3
**Urtica urens*	Small Nettle	Urticaceae	0-3	0-5	0-5
Vittadinia muelleri		Asteraceae	0-2		
Wahlenbergia communis	Tufted Bluebell	Campanulaceae	2		
Wahlenbergia stricta	Tall Bluebell	Campanulaceae	2		
GRASSES					
**Avena sp*	Oats	Poaceae		1	2
Austrodanthonia eriantha	Wallaby Grass	Poaceae	0-2	0-2	
Austrodanthonia richardsonii	Wallaby Grass	Poaceae	0-2		
Austrostipa scabra subsp. falcata	Spear Grass	Poaceae	3-5	2	
Austrostipa nodosa	Spear Grass	Poaceae	0-2		
**Bromus catharticus*	Prairie grass	Poaceae	0-2		0-2
Bothriochloa macra	Red Grass	Poaceae	0-4	2-3	
Chloris truncata	Windmill Grass	Poaceae	2	2	
**Cynodon dactylon*	Couch	Poaceae	2-3		
Elymus scaber	Common Wheatgrass	Poaceae	1		
**Eragrostis cilianensis*	Stinking Love-grass	Poaceae	0-3	2-6	
**Hordeum leporinum*	Barley Grass	Poaceae			0-6
Lachnagrostis filiformis	Blown Grass	Poaceae	2	1	
**Lolium perenne*	Perennial Ryegrass	Poaceae		2	1-2

Scientific name	Common name	Family	Abundance		
			NP	EP	CA
Microlaena stipoides	Weeping Grass	Poaceae			2
Panicum effusum	Hairy Panic	Poaceae	0-2	1	
Themeda australis	Kangaroo Grass	Poaceae	0-3		
Triticum aestivum	Common Wheat	Poaceae			0-5
GRAMINOIDS					
Carex ?inversa	Knob Sedge	Cyperaceae	0-2		
Lomandra filiformis ssp *coriacea*	Wattle Mat-rush	Lomandraceae	2		
FERNS					
Cheilanthes sieberi ssp *sieberi*	Rock or Mulga Fern	Sinopteridaceae		1	1

B.2 FLOOD MANAGEMENT PLAN ADVICE

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Ms Amy Webb
ngh environmental
PO Box 470
BEGA NSW 2550

Dear Amy,

Proposed Manildra Solar Farm, Manildra
Preliminary Hydrological and Hydraulic Assessment

Footprint (NSW) Pty. Ltd (Footprint) has been commissioned by ngh environmental on behalf of the development proponent Infigen Suntech Australia Pty Ltd to provide advice as to whether a Flood Management Plan is warranted for the above development.

It is understood that the development will involve the construction and operation of a 50 megawatt capacity solar farm on a 180 hectare site adjacent to Molong Manildra Road, Manildra. The solar module array will comprise a series of photovoltaic modules mounted on fixed frames, arranged in a series of rows between 1 and 3 metres above the ground and would occupy approximately 100 hectares.

The land at the proposed site is gently undulating with elevation ranges from 450 to 490m. A dry drainage line runs diagonally across the site in a north-east to south-west orientation. The drainage line drains to Mandagery Creek which lies approximately 400m west of the proposed site and forms part of the Lachlan River Catchment.

Hydrological Assessment

The drainage line catchment was sub-divided into three sub-catchments as shown in Figure 1. Sub-catchment boundaries were derived such that peak flows were able to be established at several different locations along the drainage line within the subject site.

Peak flows were established using the Probabilistic Rational Method in accordance with Australian Rainfall and Runoff (Engineers Australia – 2003) and are summarised in Table.1 below for each location.

Table.1 – Peak Flow Summary

		Peak Flow (m^3/s)		
Peak Flow Location	Area (km^2)	5 yr ARI	20yr ARI	100yr ARI
1	1.22	2.0	4.3	10.2
2	1.70	2.2	7.8	11.2
3	2.52	3.2	7.1	16.6

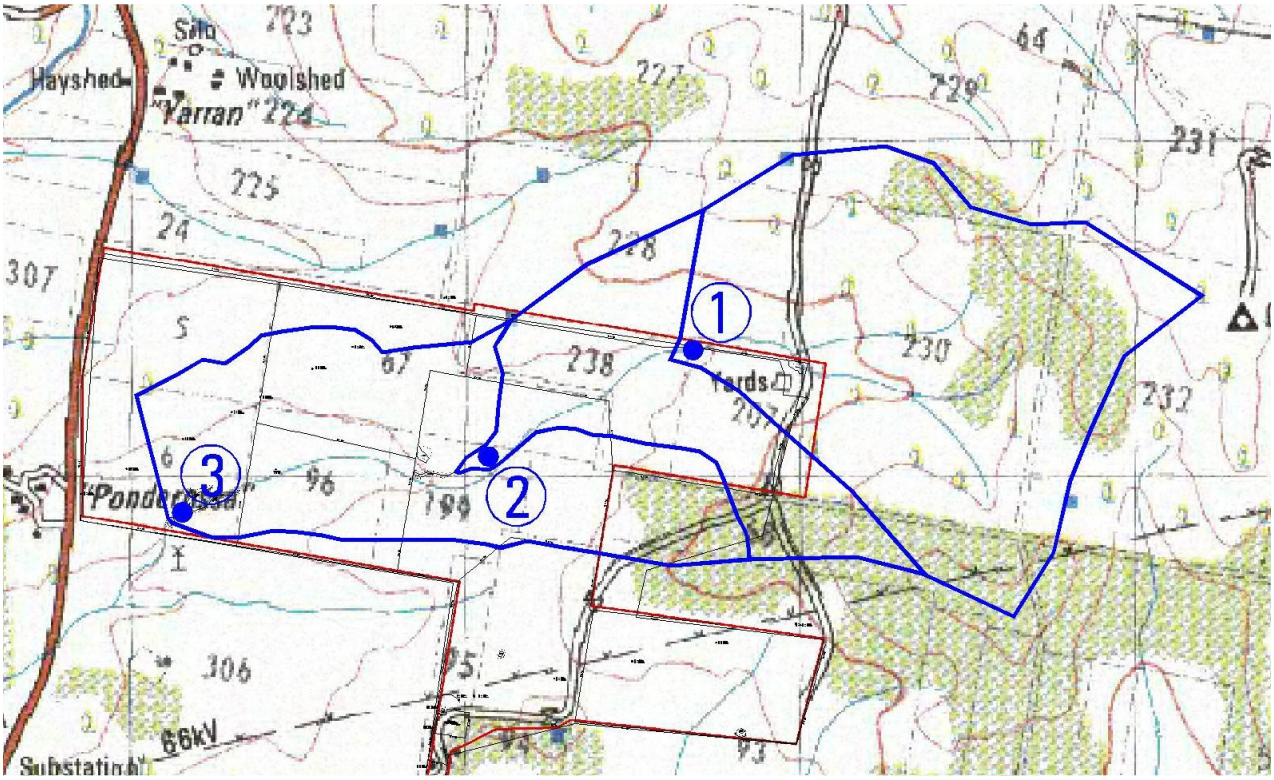


Figure.1 – Sub-catchments

Hydraulic Assessment

Cross sections were extracted from the site survey at each peak flow location in addition to two other locations midway between the peak flow locations 1and 2 & 2and 3 (see Figure.2) to enable the flow depth and flow extent to be determined at each cross section.

To calculate the flow depth and flow extent each cross section was input into Hydroflow Express Extension for AutoCAD®Civil3D® 2011 which uses the Manning's Equation to solve flow area based on cross sectional profile, slope and channel roughness. For the purposes of this assessment a Manning's roughness of 0.04 was adopted which is typical (and perhaps conservative) for low flow depths over pasture lands.

Detailed output results, including cross section plots and water surface profile for the 1 in 100 year event, are attached to this letter and Table.2 provides a summary of the results.

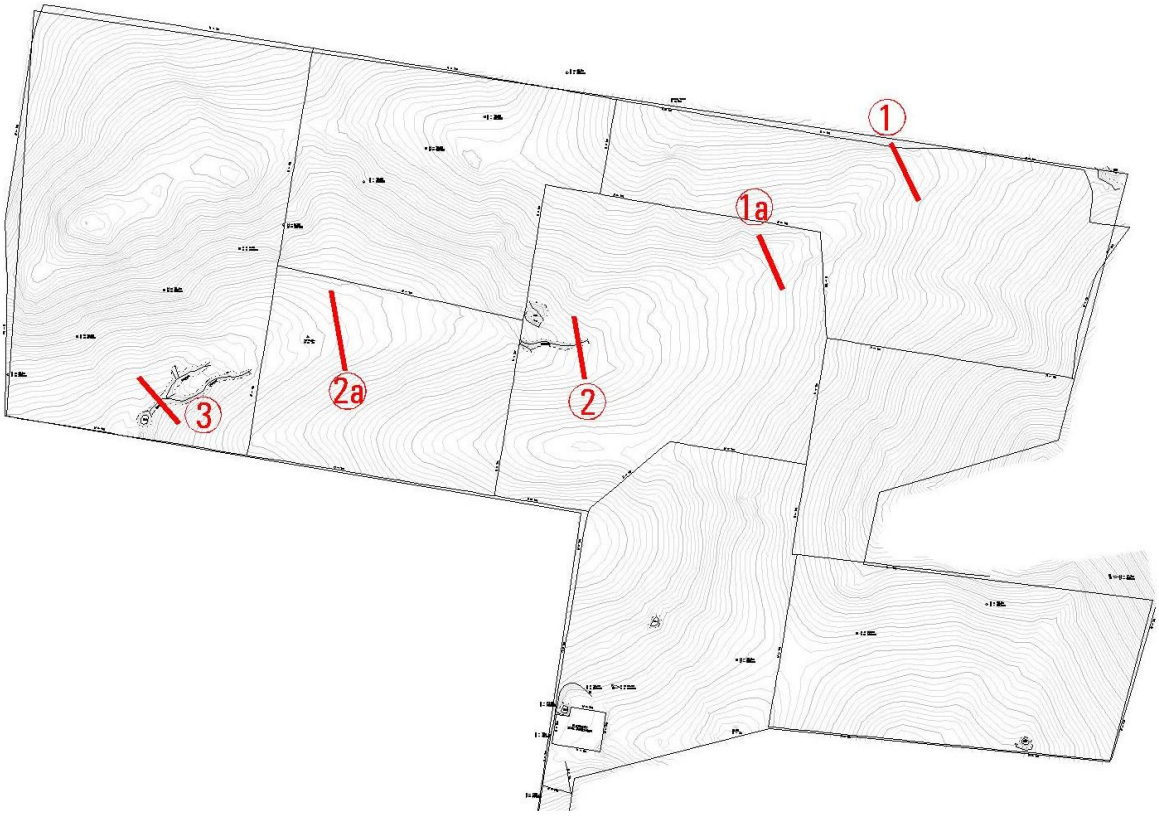


Figure.2 – Drainage Line Cross Section Locations

Table.2 – Hydraulic Summary – 1 in 100 year Results

Peak Flow Location	Flow Depth (m)	Velocity (m/s)	Flow Top Width (m)
1	0.22	1.20	57
1a	0.32	1.19	51
2	0.97	0.69	59
2a	0.59	0.74	75
3	1.15	1.48	21

The results show that flows in the drainage line are typically characterised by shallow, broad low velocity flows with flow depth and velocity increasing as the drainage line become more defined towards the southern boundary of the site (peak flow location 3).

In accordance with the Floodplain Development Manual (DIPNR, 2005) at velocities in excess of 2.0m/s, the stability of foundations and poles can be affected by scour and can become rough and unstable. Since velocities are predicted to be less than 2.0m/s the stability of any solar array modules mounted within or within close proximity to the drainage line should not be compromised.

Further, as the proposed solar array modules are to be located between 1-3m from the ground, and assumed to be at the higher end of this range within the depression, the photovoltaic cells should not impede flows predicted to occur within the drainage line.

To determine the most appropriate location for maintenance access crossings of the drainage line reference should be made to Figure L1 of the Floodplain Development Manual (DIPNR, 2005) and shown below in Figure.3 which indicates safe depths and velocities for vehicles. Locating crossings within the safe range will ensure maintenance access to the entire development site is available even during a major storm event.

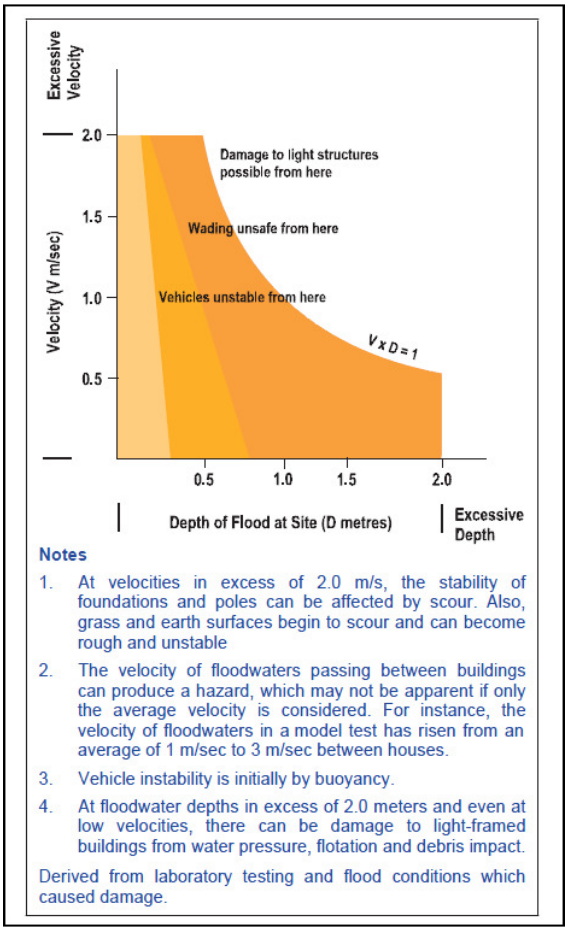


Figure.3 – Velocity & Depth Relationships (DIPNR, 2005)

Recommendations

Based on the above preliminary analysis we do not believe that a Flood Management Plan for the above proposed development is warranted.

Yours sincerely

Ashley Bond
Director/Principal Engineer

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Friday, Nov 26 2010

Peak Flow Location 1 - Northern Boundary

User-defined

Invert Elev (m)	= 480.7520
Slope (%)	= 3.0000
N-Value	= 0.040

Calculations

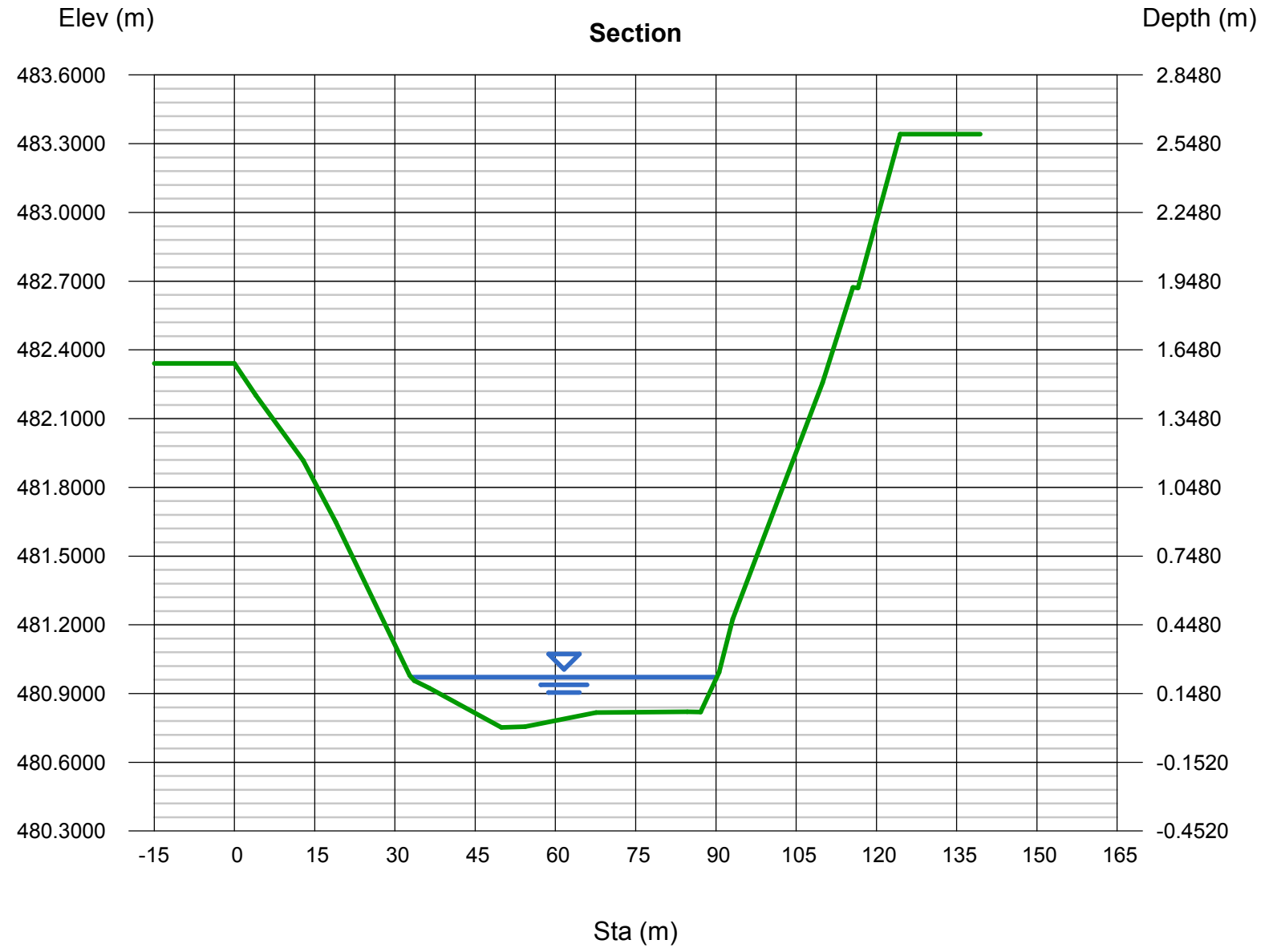
Compute by:	Known Q
Known Q (cms)	= 10.2000

Highlighted

Depth (m)	= 0.2195
Q (cms)	= 10.2000
Area (sqm)	= 8.5112
Velocity (m/s)	= 1.1984
Wetted Perim (m)	= 57.1419
Crit Depth, Yc (m)	= 0.2195
Top Width (m)	= 57.1365
EGL (m)	= 0.2927

(Sta, El, n)-(Sta, El, n)...

(-15.0000, 482.3110, 0.040)-(1.0070, 482.2010, 0.040)-(12.8530, 481.9180, 0.040)-(18.9420, 481.6490, 0.040)-(32.7730, 480.9780, 0.040)-(33.6330, 480.9560, 0.040)-(
-(49.9030, 480.7520, 0.040)-(54.3390, 480.7560, 0.040)-(67.5940, 480.8170, 0.040)-(84.6640, 480.8210, 0.040)-(87.1230, 480.8190, 0.040)-(90.5950, 480.9930
-(109.9240, 482.2570, 0.040)-(115.5790, 482.6730, 0.040)-(116.5580, 482.6700, 0.040)-(124.4230, 483.3420, 0.040)



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Monday, Nov 29 2010

Peak Flow Location 1a - 400m D/S Northern Boundary

User-defined

Invert Elev (m)	= 472.6810
Slope (%)	= 2.1200
N-Value	= 0.040

Calculations

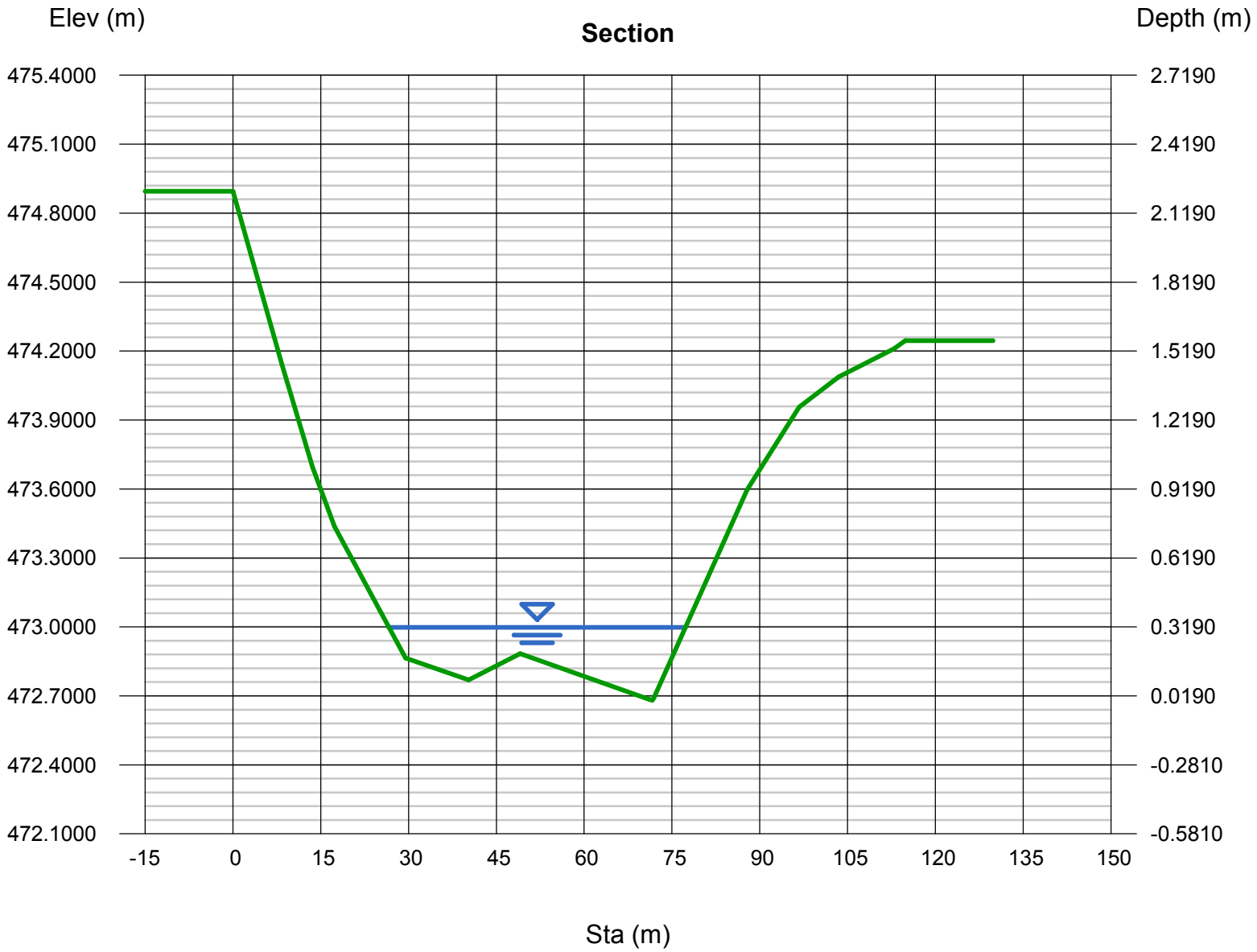
Compute by:	Known Q
Known Q (cms)	= 11.2000

Highlighted

Depth (m)	= 0.3170
Q (cms)	= 11.2000
Area (sqm)	= 9.4419
Velocity (m/s)	= 1.1862
Wetted Perim (m)	= 50.6703
Crit Depth, Yc (m)	= 0.3018
Top Width (m)	= 50.6562
EGL (m)	= 0.3888

(Sta, El, n)-(Sta, El, n)...

(-15.0000, 474.8950, 0.040)-(8.3780, 474.1420, 0.040)-(13.6200, 473.6950, 0.040)-(17.3380, 473.4370, 0.040)-(29.4750, 472.8650, 0.040)-(40.2680, 472.7690, 0.040)-(
-(71.1610, 472.6840, 0.040)-(71.8150, 472.6810, 0.040)-(71.9100, 472.6910, 0.040)-(87.8430, 473.5970, 0.040)-(96.7200, 473.9560, 0.040)-(103.4470, 474.087
-(114.8330, 474.2450, 0.040)



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Friday, Nov 26 2010

Peak Flow Location 2 - Middle of Site

User-defined

Invert Elev (m)	= 462.8450
Slope (%)	= 0.4400
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cms)	= 11.2000

Highlighted

Depth (m)	= 0.9723
Q (cms)	= 11.2000
Area (sqm)	= 16.1068
Velocity (m/s)	= 0.6954
Wetted Perim (m)	= 59.2439
Crit Depth, Yc (m)	= 0.7742
Top Width (m)	= 59.1582
EGL (m)	= 0.9970

(Sta, El, n)-(Sta, El, n)...

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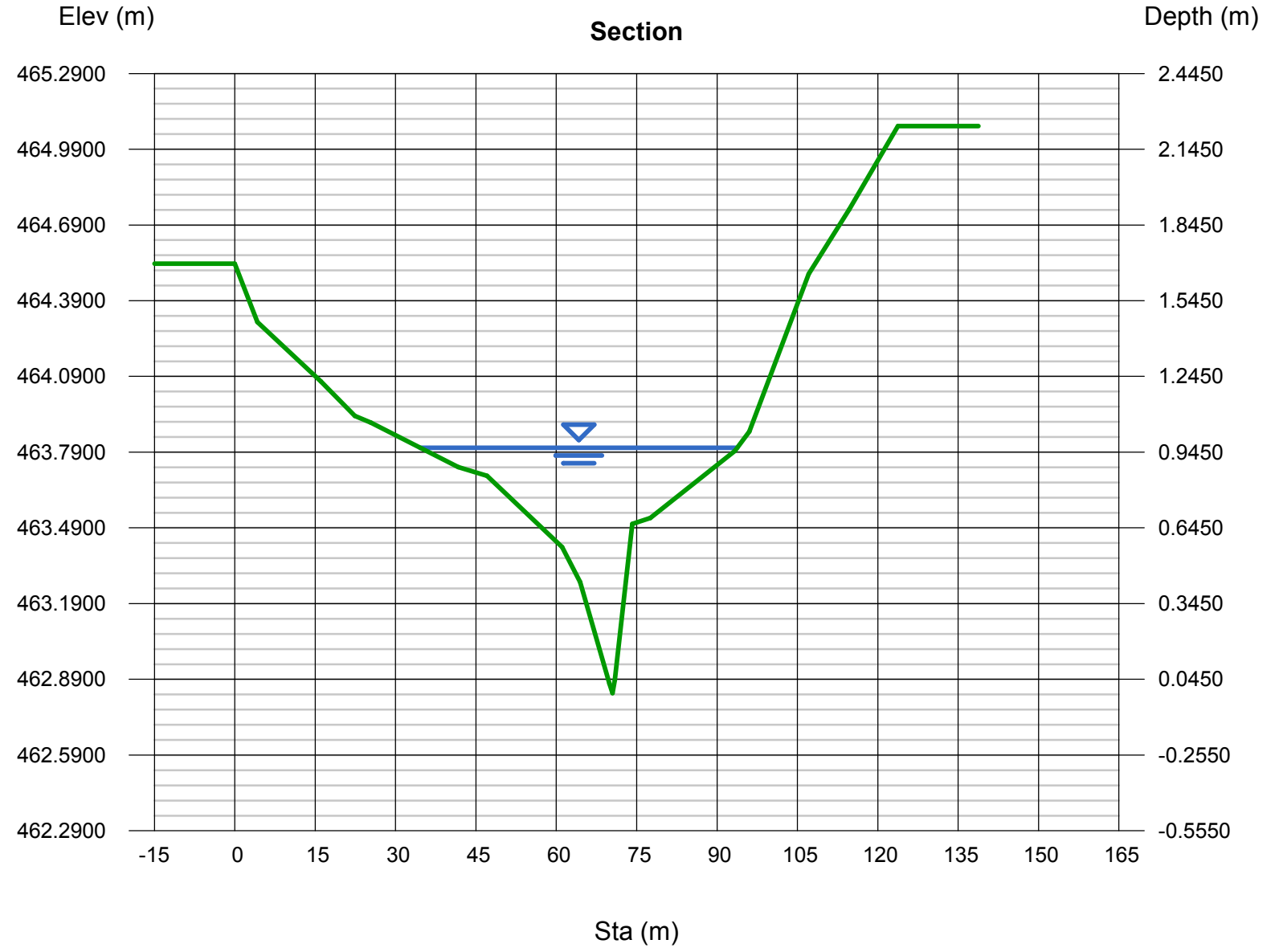

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Monday, Nov 29 2010

Peak Flow Location 2a - 450m U/S from Southern Boundary

User-defined

Invert Elev (m)	= 452.8730
Slope (%)	= 0.4500
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cms)	= 16.6000

Highlighted

Depth (m)	= 0.5852
Q (cms)	= 16.6000
Area (sqm)	= 22.3705
Velocity (m/s)	= 0.7420
Wetted Perim (m)	= 74.8830
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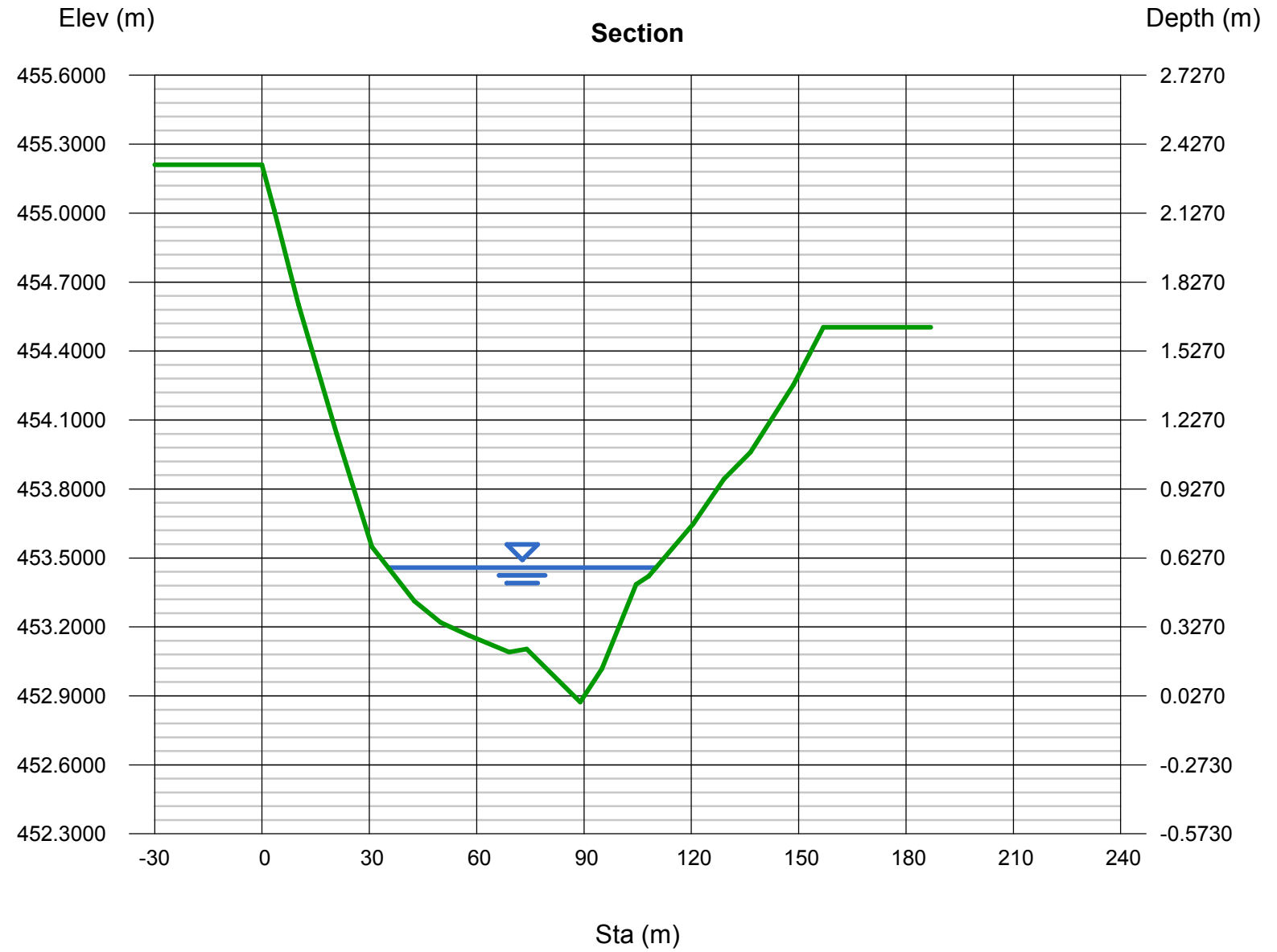

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Friday, Nov 26 2010

Peak Flow Location 3 - Southern Boundary

User-defined

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Slope (%)	= 0.8300
N-Value	= 0.040

Calculations

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Highlighted

Depth (m)	= 1.1521
Q (cms)	= 16.6000
Area (sqm)	= 11.2135
Velocity (m/s)	= 1.4804
Wetted Perim (m)	= 21.3503
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Top Width (m)	= 21.2141
EGL (m)	= 1.2639

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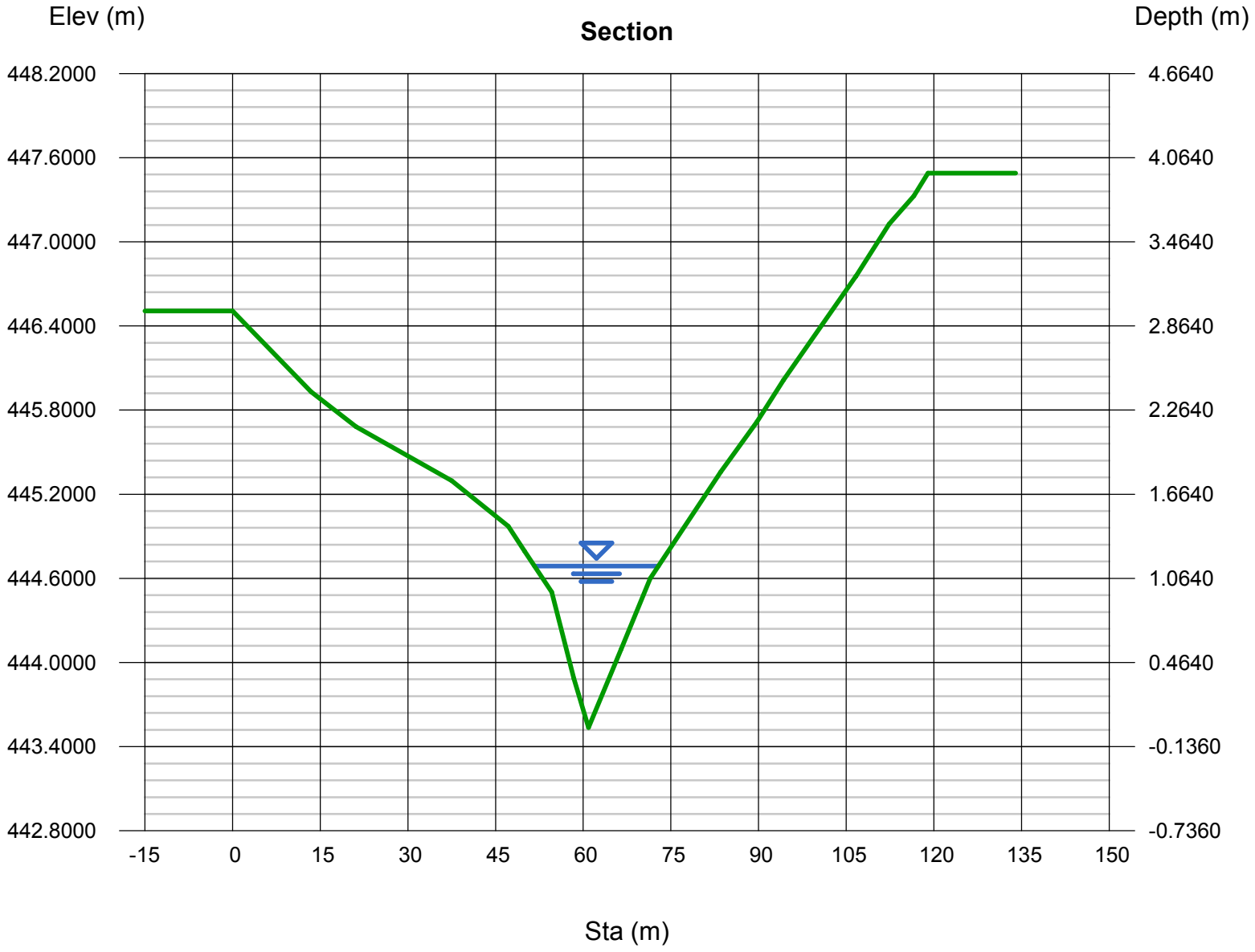


B.3 HISTORIC HERITAGE ASSESSMENT OF SIGNIFICANCE

Heritage Assessment

STONE COTTAGE RUIN

MANILDRA

ngh heritage

www.ngh-heritage.com.au

Document Verification

Job title	Stone Cottage Ruin Heritage Assessment

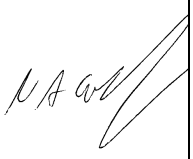
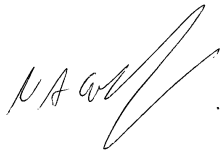
Document Title		Heritage Assessment					
File Location							
Vers.	Date	Prepared by		Checked by		Approved by v1	
v1	2nd December 2010	name	Glenn Shaw	name	Nick Graham-Higgs	name	Nick Graham-Higgs
		Sign.		Sign.		Sign.	

Table of Contents

1 INTRODUCTION

An Environmental Assessment was completed in October 2010 for the proposed Manildra Solar Farm (**ngh**environmental 2010). As part of that environmental assessment a desktop study and site inspection was undertaken to determine any historic heritage values within the proposal site. Heritage databases were also searched at the local, State and National levels.

The results of the database searches concluded there were no listed heritage items within the vicinity of the subject site.

The results of the site inspection identified a stone cottage ruin located adjacent to the road proposed for access to and from the solar farm. Although not heritage listed, the cottage was considered to be of potential historical significance as an early farm house in the Manildra area, possibly dating from the 1870s to 1890s.

The proposed Manildra Solar Farm is not considered in itself to impact directly on the cottage; however other indirect impacts such as dust and noise from heavy vehicles are possible. The environmental assessment (**ngh**environmental 2010) therefore recommended as a Statement of Commitment that a more detailed heritage assessment be prepared to:

- Determine the heritage significance of the stone cottage and
- Confirm that the proposal is not considered likely to have a significant impact in accordance with the NSW Heritage Act 1977 or other relevant legislation.

1.1 BACKGROUND

The stone cottage ruin is located on the southern side of the proposed site for the solar farm development. As mentioned, the cottage was identified as a potential site of historical heritage significance. As part of the overall approval process, this report assesses the significance of the cottage and any potential impacts of the proposal on the ruin.

The site is currently a private landholding, used over time for cropping (wheat and canola) and grazing. The site for the proposed Manildra Solar Farm is almost completely cleared of trees and is divided into several paddocks. The site is largely surrounded by rural residential land used mainly for agriculture and housing. The Manildra Flour Mill, the largest in the southern hemisphere, is located a short distance from the solar farm site.

Infigen Suntech proposes to construct a 50 megawatt capacity solar farm on the farmland at Molong Manildra Road, Manildra in Central Western NSW. The solar panel array would occupy approximately 120 hectares. The key infrastructure elements for the project would include:

- A PV array incorporating rows of panels and a series of central inverters and kiosk transformers.
- Cabling between the PV array and central inverters (underground or frame-secured).
- Cable connection to the existing 132kV substation (underground).

- Internal access tracks and upgrades to existing roads.
- Site office, operations and maintenance and research office buildings.
- Temporary construction facilities such as a site compound and equipment laydown area.

1.2 LOCATION

The site is close to the town of Manildra, 1.5 kilometres from the main street and within the Cabonne Local Government Area (LGA) in Central Western NSW. The landscape comprises undulating plains and low hills dominated by cropped and grazed paddocks and patches of remnant vegetation (Figure 1.1).

Figure 1.1. Location of stone cottage (red arrow) in relation to proposal site, sub-station, access road and Manildra township

(Source: Google Earth)

1.3 REPORT STRUCTURE

This report;

- outlines the background of the current study/proposal (section 1)
- discusses issues such as statutory heritage listings and requirements (section 2)
- provides a brief historical overview of the early settlement of the Manildra area (section 3)
- provides an physical overview of the existing setting of potentially impacted items (section 4)
- makes an assessment of heritage significance based on the NSW Heritage Criteria (section 5)
- makes recommendations regarding the items in regard to potential impacts from the proposal (section 6).

2 LEGISLATIVE REQUIREMENTS

Places of heritage value can be subject to different levels of recognition and protection. This protection (at local, State and Commonwealth levels) includes specific measures for the protection of heritage items. The text below provides a summary of the legislative framework at each level of government.

2.1 NSW HERITAGE ACT

The NSW *Heritage Act 1977* is a statutory tool designed to conserve the cultural heritage of NSW and used to regulate development impacts on the state's heritage assets. Administered by the NSW Heritage Branch (Dept. of Planning), the Act details the statutory requirements for protecting historic buildings and places and includes *any place, building, work, relic, movable object, which may be of historic, scientific, cultural, social, archaeological, natural or aesthetic value.*

State Heritage Register

When items are listed in the State Heritage Register (SHR) applications to carry out works on those items need to be made to the Heritage Council under Section 60 of the Act. A search of the study area and surrounds indicated that none of the items in this report are included in the SHR; therefore no Section 60 applications are required.

Under Section 139 of the Act, a Section 140 permit is required for any disturbance of excavation that will, or there is a reasonable cause to suspect works are likely to result in a relic being uncovered. Section 146 of the Heritage Act applies when any relics are uncovered during works and the State Heritage Branch informed.

The Stone Cottage is not listed in the SHR. The nearest item on the SHR is within Manildra town. No approvals from the Heritage Branch are required for this proposal.

2.2 ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979

The *Environmental Planning & Assessment Act 1979* (EP&A Act) controls land use planning in NSW. The planning system established by the EP&A Act includes Local Environment Plans (LEPs) and other provisions relating to development control.

The site proposed for the solar farm is now covered by the Cabonne LGA. Schedule 1 of the LEP list heritage items in the area governed by the LEP. Similar to the National and State listings, heritage significance may be attributed to an item on social, architectural, natural, scientific, archaeological, aesthetic, historic or cultural grounds.

A total of 43 items are listed on the LEP. However the stone cottage is not listed, and none of the items listed are within the Manildra town or surrounding area, including the solar farm site.

2.3 ENVIRONMENT PROTECTION & BIODIVERSITY ACT

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) enhances the management and protection of Australia's heritage places. Any action that is likely to have a significant impact on heritage protected under the EPBC Act must be referred to the Commonwealth Environment Minister for further consideration.

The Australian Heritage Database (AHD) includes the National Heritage List, which includes the natural, historic and indigenous places that are of outstanding national heritage value to the Australian nation. The AHD also contains the Commonwealth Heritage List that comprises those places on Commonwealth lands and waters or under Australian Government control. Items on both of these lists are protected under the EPBC Act.

The Stone Cottage is not listed in the AHD. There are no heritage items listed under the EPBC Act in the Manildra area.

2.4 UNLISTED HERITAGE ITEMS

It is important to note that while many heritage items have been identified and listed on heritage registers at National, State and local levels, some have not, and penalties can still apply for items destroyed without investigation.

During the site inspection the abandoned stone cottage was identified as being located adjacent to the haulage route of the Manildra Solar Farm. The cottage is likely to be from early European settlement of the Manildra area. No previous assessment of significance appears to have been prepared for this item. The cottage is the subject of this assessment that follows in Section 3-6.

3 HISTORICAL OVERVIEW

This section provides a brief overview of the early settlement of the Manildra town and area. It was beyond the scope of this report for a detailed history of Manildra or the property where the stone cottage is located.

3.1 EARLY SETTLEMENT

Manildra District

The earliest settlement in the Manildra area was known as 'Brymedura', an Aboriginal word meaning 'wild blackfellow', around the year 1840 (Miller 2007).

From the earliest times of settlement in Sydney there was a growing necessity to find other land to grow food for the growing colony. This demand came from wealthy pastoralists, small farmers, ex-convicts and an ever growing number of disillusioned gold prospectors. At first it seemed that only the more privileged would realise the dream of land acquisition, as huge tracts of land were taken up in many parts of the colony. One of these was Brymedura, a property of many thousands of acres extending along Mandagery, Coates and Gumble Creeks (Stapleton 1982).

The country was in the course of being explored with the wealthier settlers taking up large areas. One of these, 'V.C. Wentworth, who had pioneered the crossing of the Blue Mountains in 1813, took up a large tract of land consisting of many thousand acres, extending along the creek systems of Meranburn, Gumble and Garra. This large stock run within the Manildra region was taken over in 1842 by Benjamin Boyd and developed with the assistance of many assigned servants (Miller 2007).

One of the most lucrative mail contractors from Blackman's Swamp (Orange) via Boree to Kurrajong (Parkes) was won by Mr. Denny Toohey. He selected as a site for one of his change stations, the grassy banks known as 'Flash jack Flats', near the ford over the Mandagery. He later applied for, and was granted, a business license and built a shanty he called the Coach and Horses Hotel. He then asked the Government to survey the settlement known as Flash jack Flats for a town. The village that grew up around the Coach and Horses was later known as East Manildra and now as Old Manildra (Miller 2007). The name Manildra could have come from the Aboriginal, Millidurra (junction of the creeks), or "snake- hole", a name given to a waterhole below the rail bridge (Stapleton 1982). However, this is not clear as railway records state that the name Manildra may have been taken from a pastoral property of 8100 ha which is shown in the 1886 Gazetteer.

The little settlement (Figure 3.1) grew on the eastern side of the Mandagery Creek, and consisted of not just the Coach and Horses, but also a store, Catholic Church, small hall, police station, blacksmith shop and several houses (Stapleton 1982).

Figure 3.1. Sketch of Manildra town in 1890
(Source: NLA)

As settlers pushed their way into inland NSW they were impressed with the rich farming land and they sought to acquire it. In 1861 Sir John Robinson, Minister for Lands, put through a land act, allowing some free selection for the selection of smaller farms. Many villages came into being as the need grew to service and feed the influx of small farmers (Stapleton 1982). This meant that free men could select a block of land, carve a home out of bush, clear and farm the land, in the hope that when it was surveyed they could 'take up' the portion and meet the payments. These men and woman brought their families over the mountains and generally making Bathurst as a base set out to wrench a livelihood from the fertile lands of the west. They were usually men of moderate means, some having a few pounds in their pockets, some owning horse or bullock teams and wagons, some having stock and some simply a strong back and skills (Miller 2007).

The first selector in the Manildra area was Hector Angus. Henry John Townsend had a 100 acre (40 ha) block on the Meranburn - Manildra Creek and Richard Townsend a block further upstream. In the early 1870s came the Cockrams, Ashcrofts, Carneys, and again in the mid eighteen seventies, the Clarkes, Coles, Goodmans, Wards, Cassells, Giffins, Murrays and Millers (Miller 2007). The following names appeared on an early school Roll: Kerr, Giffin, Malone, Kinsela, Toohey and Townsend. These names are a few of the early settlers. Most of the well-known names of Manildra people appeared in the last three decades of the eighteenth century. These families spread across the land, and established homes and farms and the Manildra township (Stapleton 1982).

It is difficult to establish who were the first families to settle in the Manildra district, but many people know that three, four or five generations of their family have lived there. The names mentioned are certainly only a sprinkling of the early settlers of the area and they are mentioned as typical of the day (Stapleton 1982). It is clear that the Giffins were among the early settlers in the

district and Parish maps confirm that this family owned part of the land that is now subject of the proposed Manildra Solar Farm (refer Figures 3.2-3.4) It is highly likely this family built the stone cottage that still stands as a ruin on the property (refer section 4 for photos and description).

Figure 3.2-3.4. Historic Parish maps from 1897, 1913 and 1933 (clockwise from top left) clearly showing the land ownership of a J. Giffin (Lot 95) that includes an early settler's stone cottage ruin and forms part of the land for the proposed solar farm
(source: Land & Property Management)

The building of early farmhouses and sheds was usually undertaken by the farmer himself. He may have had help from friends and neighbours, or from a local self-taught builder. Materials used were those that were available and bark, split logs and shingles were pressed into use, and some used stone (Figure 3.5). Many people managed to obtain corrugated iron for use in building (Figure 3.6). Houses were usually square, sometimes with a hall up the centre. The kitchen was often a separate room at the back (Stapleton 1982).

Figure 3.5. Remains of stone cottage (south)

Figure 3.6. One example of an early pioneer farm house in the Manildra area
(source: State Library NSW)

Over the years the methods of farming have constantly changed. Early settlers also established their own types of fences, using materials that were readily available. They used brush fences, log fences, picket fences (saplings laced together), paling fences (for house and Sheep yards), post and rail fences, and then, moving into the modern era of plain and barbed wire fences and the various types of netting (Stapleton 1982).

Farming in those early days was hazardous. Many of the men taking up land had never farmed before, and had to clear the land, build a house, put up fences, grow a crop and raise the animals (Figure 3.7). The land had to be cleared, fenced and a small home built before any attempt could be made at farming (Hayes 2008). Until their own farm was established men sometimes worked periodically for other farmers in the area who had larger properties.

Figure 3.7. Ploughing in the Manildra area c.1909-1915
(Source: State Library NSW)

At what period the village became known as Manildra is obscure, but it is likely that it was officially named after the original survey requested by Mr. Toohey. Denny Toohey's Coach and Horses Inn and sheltered camping areas on Flash Jack Flats were certainly popular with the early travellers, however the establishment of permanent facilities seemed to favour the road junction at Meranburn. The Meranburn school was established and an Inn conveniently located at the junction of the roads (Miller 2007).

A petition was sent to the Postmaster General on 22nd January 1881 requesting that a permanent Post Office be opened at Manildra. The Manildra Post Office was established in a general store kept by H. G. Banks on 1st October 1891, prior to a permanent post office being built later in the 1890s (Figure 3.8) (Hayes 2008).

Figure 3.8. Manildra Post office in 1901
(source: National Archives of Australia)

Early transport was all horse power, and local coaches, drays, sulkies and carts moved people and goods. The Cobb and Co. Coach service was spreading throughout NSW, and the need for a bridge across the Mandagery Creek became evident. The construction of this bridge in 1879 was a step forward in the opening up of the country to the west. This was an efficient service and Manildra saw two coaches each day passing through from Orange and Molong, on to Parkes and back again. There were regular stopping places where horses were changed over (Stapleton 1982).

Cobb and Co bought up most of the mail contracts; Mr. Toohey's contract being one of them. The mail came via Molong and was delivered to Meranburn. The 25 families residing in the precinct of the little village of Manildra had to either walk the two miles for their mail or wait for the return coach from Meranburn (Miller 2007).

There can be little doubt that the efforts of these people and others led to the rapid development of Manildra and their lobbying for the extension of the railway through Manildra. The two main events, which established Manildra as it is today, would appear to be the coming of the railway and secondly the building of a flour mill within the town boundaries.

Railway

Due to the siting of the railway line and station, the main town grew on the western side of the Mandagery. By the 4th April 1876 the railway had reached Bathurst and construction was being made of the extension to Orange that opened on 19th April 1877, In May 1874 the Municipality of Forbes, urging that a survey be made of a line from Orange to Forbes, presented a memorial to the Minister for Works, John Sutherland (Miller 2007).

When the railway was extended to Molong in 1885 the town became an important transportation point. Molong then assumed the role of commercial centre for farmers and villages to the west and

the northwest, as well as a transhipment point for goods going and coming from Parkes and the large areas to the northwest of that town. Most of the east bound goods consisting of wool, wheat, flour, potatoes and skins were consigned to Darling Harbour and Granville. Some of the grain being purchased by buyers in Molong who had it transported to the coast. Wright Heaton and Co. handled the road traffic west and handled it principally to Parkes, Bumberry, Manildra and intermediate settlements. Between twelve and fourteen teams a week loaded produce for Parkes, which amounted to 250 tons a month (Stapleton 1982).

The coming of the railway and the building of the Manildra station was the real beginning of the new town (Figure 3.9). The station at Manildra was opened in 1893. There were plans for housing schemes in several places, but proximity to the station eventually won out, and the town grew on its present site. A few years later, the building of the flour mill consolidated the town's position (Stapleton 1982).

Figure 3.9. Rail bridge at Manildra c.1893
(source: NLA)

The Mill

The biggest commercial asset of Manildra is its flourmill. This industry was born because of the necessity of the early community to convert a part of their small harvest into edible foods such as gristed meal, flour, bran and pollard. As production grew so did the mill, giving the community an opportunity of work, other than in the rural scene (Miller 2007).

Worrell Brothers had established a small flourmill at Cargo. However, goldmining in the area was on the decline and as the railway was to pass well to the north of Cargo it was decided to move the mill

to Manildra where they could make use of the rail facilities in obtaining supplies and disposing of surplus flour. In 1907 the re-building of the mill was completed and was named 'Worrell Brothers Gem of the West Roller Flour Mills, Manildra.' A steam engine was fitted to supply the extra power required. Electric lighting was installed making it possible to run shift work and employ three or four extra men, in addition to the Worrell family (Miller 2007).

In 1920 the mill was taken over by Mr A. Hamilton and was then known as 'Hamilton's Gem of the West Flour'. After many industrious years the old mill was destroyed by fire in February 1937. Mr Hamilton decided to rebuild, and work commenced in September the same year. The new mill started operations on the 20 April 1938. Electric power was installed in 1942 replacing the old steam engine and boilers which alone escaped the 1937 fire (Miller 2007).

Mr Hamilton sold the mill to Jack Honan and Bill Anderson in 1952 who formed a company called 'Manildra Flour Milling Co. Gem of the West Flour'. Within two years capacity had been increased to twenty four 150lb sacks per hour. A laboratory was established and office staff increased to cope with the additional business. Mr. Honan realised that one of the limiting factors of flourmills was the inability of disposing profitably, of the side products such as bran and pollard. A large stock feed mill was constructed (Figure 3.10) which manufactured animal feed pellets of all kinds. Flour was still in demand for export, surpassing the demand for stock feeds (Miller 2007).

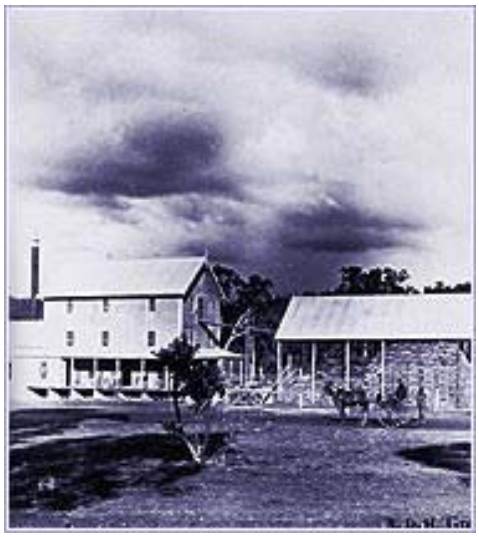


Figure 3.10. The Manildra flour mill c.1952
(source: Manildra Group)

Jack Honan, who eventually became the sole owner, was an astute self made man, with the strength of his own convictions. His habit of shooting first and asking questions afterwards, led to the rapid growth of the company. So much so, that it became too large to be swallowed by the powerful city orientated milling companies and closed down, as was the fate of many of the country flour mills. The mill of today is a large modern complex, producing five tonnes of flour per hour. It. and its associated industries in the Manildra area, employs 60 people. This rapid increase (in the number of employees) took place, fortunately when the traditional rural employees were gradually being replaced by labour saving machines (Miller 2007).

4 PHYSICAL ENVIRONMENT

This section provides a brief overview of the description and current condition of the stone cottage and its surrounding setting. It is not the intention of this assessment, or within its scope, to prepare a detailed condition report or description of the building. The following, along with the historical overview is sufficient to prepare the assessment of heritage significance (section 5).

4.1 STONE COTTAGE

During the site inspection an abandoned stone cottage was identified that is located adjacent to the haulage route of the proposed Manildra Solar Farm (**Error! Reference source not found.**). The cottage is likely to be from early European settlement of the Manildra area.

The building consists of a corrugated iron roof and outdoor kitchen, but is currently in very poor condition. No previous assessment of significance appears to have been prepared for this item. The cottage is located near the access road into the property and is of potential heritage significance for at least its historical association with the early settlement of the Manildra area.

Figure 4.1. South East elevation of the stone cottage

The proposed solar farm site at Manildra is largely cleared and is used for cropping of wheat and canola and pasture for cattle and sheep. The site contains an existing substation located approximately 40 metres north of the cottage (Figure 4.2). The property is located approximately 1.5km north-east of the Manildra township.

Land at the proposal site is gently undulating with rocky patches throughout. Elevation ranges from 450 m to 490 m. The site is at a higher elevation than the majority of the Manildra township. A small creekline runs through a short section of the most western paddock.

Figure 4.2. Location of the cottage (arrow) in relation to the access road (left)

It is likely the stone cottage was built by the Giffin family, who, as mentioned in the previous section were one of the early pioneer families in the Manildra district and came to the area around the 1860s following Robertson's lands act of 1861. Local knowledge of current landholders also confirms that the cottage has been in existence since the earlier settlement days of Manildra.

Physically, the curtilage of the cottage and its setting can be defined by:

- The immediate area of the cottage and any vistas to and from the cottage where the cottage is clearly visible within the old property boundary.
- The above area includes the existing vehicular access track that leads to the house from the main road at the south of the property (the proposed access for the solar farm installation), which is likely to have been the main access to the cottage.

The design of the cottage is considered to be fairly typical of the day and consists of stone cladding, timber frame and iron roof (Figure 4.3). The main section of the cottage is rectangular, with a smaller perpendicular extension to the rear (Figure 4.4). This was likely to be a kitchen with additional storage space or laundry.

Figure 4.3. East elevation of the stone cottage

Although it is possible there are similar examples of this type of farm cottage in the region, the remains of the cottage are the only known example of this style of vernacular farmer's cottage left standing within close proximity to the Manildra township. The cottage is considered to represent a form of design that has largely disappeared from the region.

Figure 4.4. Northern elevation of the stone cottage with extension to the rear

The exterior and interior of the cottage is in poor condition. Sections of the cladding are in poor condition showing significant signs of decay, and are cracked (see above photo).

The roof sheeting, flashings and gutters are mostly in poor condition, with some in fair condition. Sections of the roof sheeting and flashings are loose; although it appears some sections have been recently replaced and are in reasonably good condition (Figure 4.5). The roof to the old verandah has collapsed and only half remains in place, and is held up by one post. There are no existing downpipes attached. There is one chimney that appears in reasonable condition.

The wall linings and ceilings are only in fair condition at best (Figure 4.6). The window and door frames are in fair condition generally. All window glass is missing.

The joinery, fittings and fixtures are in a fairly dilapidated state. The house in its current form and condition would not comply with current construction standards or the Building Code of Australia.

The building would appear to retain most of its original integrity (original elements that are still there) and no major alterations or recent additions are evident.

Figure 4.5. North east elevation that shows part of the roof in good condition and other sections loose and falling apart

The floors are located close to ground level and sub floor spaces would lack ventilation. Other flooring in the house is poor but is in better condition than the room below (Figure 4.6).

Figure 4.6. Interior flooring of a room in the main cottage

Overall, the physical condition of the cottage would appear to be slowly deteriorating in the absence of any agreed strategy in relation to the building. Only a detailed building survey and condition assessment would confirm the integrity of the cottage.

5 HERITAGE SIGNIFICANCE

5.1 INTRODUCTION

Heritage significance is the term used to describe the importance of a particular item, place or landscape. Significance may be derived from the fabric of a place, association with a place or the research potential of a place. This section assesses the significance of the stone cottage against the heritage assessment criteria, and provides a summary statement of heritage significance (Section 5.3).

The basis for assessing significance is the ICOMOS Australia Burra Charter and associated guidelines. The application of the Burra Charter and guidelines to the preparation of conservation plans is outlined in J.S Kerr's *The Conservation Plan* (1990). The essential components of significance involve assessing the historical, aesthetic, scientific and social values of a place.

The NSW Heritage Assessment Criteria embody the above four values but are expressed in a more explicit way. The definitions of these criteria reflect both policy decisions about some of the debates surrounding the heritage significance assessment procedure, the history of heritage management in NSW and the way in which procedures and practices developed.

An item will be considered to be of state and/or local heritage significance if it meets *one* or more of the following assessment criteria.

a) an item is important in the course, or pattern, of NSW 's cultural or natural history

b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW 's cultural or natural history

c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW

d) an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons

e) an item has the potential to yield information that will contribute to an understanding of NSW 's cultural and natural history

f) an item possesses uncommon, rare or endangered aspects of NSW 's cultural or natural history; and/or

g) an item is important in demonstrating the principal characteristics of a class of NSW 's cultural or natural places; or cultural or natural environments.

5.2 HERITAGE ASSESSMENT

Assessment of Significance

The remains of the stone cottage near Manildra are assessed to be of significance against 3 of the above criteria, as identified below.

This assessment is only concerned in why the item is significant. Therefore, where any criteria listed above are not mentioned, the item is *not* considered significant against that criterion.

Criterion (a) an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area)

The property where the house stands is of historical significance as one of the early pastoral properties in the Manildra district.

The history of the ownership of the land from the 19th century on which the stone cottage stands demonstrates the major processes of early European settlement in this area west of Sydney. The establishment of farms in the Manildra region the mid-19th century is part of the story of the rapid spread of Australian settlement based on pastoral expansion.

The cottage and its immediate setting is historically significant as one of the earliest inland farming properties near Manildra. The history of the place demonstrates the major processes of early European settlement. The existing evidence, although in ruin, provides tangible evidence of the use of available resources in the area.

The establishment of farming properties from the 1860s, such as the land where the cottage remains is part of the story of the rapid spread of Australian settlement based on pastoral expansion. As such, the stone cottage is of historic significance at the local level.

Criterion (b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area)

The property on which the stone cottage still stands, albeit in a ruined state, has strong associations with prominent early settlers who were significant in the early settlement and development of the area, namely the Giffin family. The Giffin's were, along with many other early settlers, prominent in the early development of the Manildra district and the town.

Although the place is not known to have any close associations with descendants of the families/individuals who lived and worked there, it is still considered to be significant under this criterion at the local level for its association with one of the early settlers of Manildra.

Criterion (f) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area)

The stone cottage is considered to be a relatively rare example of vernacular construction using available rudimentary building materials, at least in the Manildra district.

Although the condition of the cottage has deteriorated in recent years, it is possibly the only relatively intact example of this form of construction within close proximity to the Manildra

township. No other similar places are currently listed as a heritage item in the local region. The landscape setting surrounding the cottage also makes a minor contribution to the whole significance of the cottage, as the property has remained a pastoral farm.

Overall, the house is considered to be a rare example of its type in the local region.

5.3 STATEMENT OF SIGNIFICANCE

The stone cottage at Manildra is considered a rare example of its type of construction in the local region, using available rudimentary building materials. The relative intactness and integrity of the building and setting illustrate a way of life from the early settlement of the 19th century in the region.

The cottage and setting is of significance because it conserves both the evidence and the physical setting of an early pastoral property and house in local region of Manildra. Descendants of many of the early settlers of this district still have knowledge and memories which relate to these areas and their history.

The setting which surrounds the immediate house yard is contributory to the overall significance of the cottage. The grounds contain some remnant landscape elements including some mature trees and shrubs, which reflect the historic development of the place as an early settler's property.

The land and cottage was the foundation of the Giffin family's land-holding from the 1860s. The Giffin's, along with other early settlers to the district, were responsible for establishing the Manildra district as an important pastoral region of NSW.

Overall, the stone cottage has local heritage significance as part of the history of the local region.

6 CONCLUDING REMARKS

This desktop study identified a number of listed heritage items within the Cabonne Shire LGA. All of these items, however, are located outside of the proposed area for the solar farm.

The construction of the Manildra Solar Farm, which includes the solar module array and associated works, arranged in angled rows, supported by steel posts, in rows 1-3 metres above ground, would not have a direct impact on significant heritage items within the immediate and surrounding area.

The proposal would be located near the remains of an abandoned stone cottage ruin. This ruin is located adjacent to the proposal sites haulage route. The cottage, which is not heritage listed, is a former farm house that has been in existence since the early settlement days of the Manildra area, and has been assessed as being of historical heritage significance to the Manildra area.

The proposed works would not impact directly on the item. The proposed access, including proposed haulage route passes approximately 40 metres away. Due to the transport of heavy vehicles along the access road there is potential for some indirect impact on the remaining fabric from dust and vibration. The actual solar farm infrastructure would be approximately 200 metres from the cottage ruin when installed and would be no visual or physical impact on the cottage.

Although there are no direct impacts considered likely to heritage items as a result of this proposal, this assessment recommends Statements of Commitment (SoC) for the project as follows:

- All staff and contractors are made aware of the stone cottage ruin adjacent to the access road, which is now assessed to be of historical significance. The site of the cottage should be clearly marked out, fenced, and referred to in the CEMP for the proposal.

- Should the current proposal be altered to require the demolition of the cottage ruin or part of its built fabric, or the widening of the access road that would decrease its distance to the cottage, then further assessment would be required. This would be in the form of a Heritage Impact Statement.

- In the event of any other items of heritage significance being uncovered at the proposal site after works commence, the NSW Heritage Branch (Department of Planning) should be contacted prior to further work being undertaken at the site.

In summary, the proposal is not considered likely to have a significant impact in accordance with the NSW Heritage Act 1977, Environmental Planning and Assessment Act 1979, or the Commonwealth Environment Protection and Biodiversity Conservation Act 1999, in terms of heritage. No further heritage approvals are required.

7 REFERENCES

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