

Appendix L

Contamination and soils assessment (Envirowest Consulting)

Preliminary contamination investigation

The Macquarie River to Orange pipeline project

Ref: R11369c.1

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Executive summary

Background

The project is one step to improving the water security for Orange. It involves construction and operation of infrastructure required to transfer approximately 12 ML/day of water a distance of approximately 37 km from the Macquarie River to the Suma Park Dam at Orange.

The infrastructure required to transfer the water includes an offtake structure and pump stations, an underground pipeline (approximately 37 km in length), a discharge structure, and ancillary infrastructure (power supply).

In summary, the project would involve construction and operation of the following infrastructure:

- 37 km of 375 mm diameter water rising main between the Macquarie River and Suma Park Dam.
- An offtake structure and pump station located at the upper Macquarie River.
- Two booster pump stations and break tanks along the pipeline route.
- Power supply to pumps and other infrastructure.
- Telemetry controls to enable remote operation of the infrastructure including pumps and valves.
- A discharge structure at the Suma Park Dam.

Objectives of the investigation

A preliminary site investigation was conducted in accordance with the contaminated land management planning guidelines State Environmental Planning Policy No. 55 (SEPP 55) to determine the soil contamination status of the proposed The Macquarie River to Orange pipeline project corridor including land adjacent to and within the pipeline corridor.

Investigation

Inspections of the pipeline corridor were made in November and December 2011. Available records were also reviewed.

Conclusions

The private land-use was predominantly grazing. Road reserves were vacant or occasionally grazed. Historical mine workings were identified at several locations. The desk top study and site walkover identified six areas of known or potential contamination.

Naturally occurring asbestos (NOA) is known to occur along sections of the pipeline corridor. NOA was observed during the site walkover on the soil surface and is expected in the subsoil between chainages 34600m and 34950m (Summer Hill Creek first crossing to intersection of Banjo Paterson Way and Ophir Road. Disturbance of NOA during construction activities requires to be in accordance with Orange City Council *Naturally Occurring Asbestos Planning Procedures*.

Potential areas of contamination included historic mine workings, cattle yards and saline areas within drainage depressions and lines. Contaminants of concern are heavy metals, OCP and salt.

Spoil generation, erosion and sedimentation, dust generation, chemical contamination of soils and surface waters, salinisation and import of fill are potential contaminating activities during construction works. Implementation of management activities including spoil reuse, spoil off-site disposal, sediment and erosion control plans, protocols for actions if hydrocarbon spills and leaks are identified and classification of imported fill as Excavated Natural Material (ENM) will reduce the risk of these activities impacting on workers and the environment.

Contamination risk of the operation phase is expected to be low. Adoption and implementation of sediment and erosion control plans for exposed soils will reduce the risk of environmental impact.

Recommendations

Appropriate work procedures to protect the safety of workers within the NOA area.

Development of erosion and sedimentation plans are required to minimise the risk of salinisation, erosion and sedimentation during construction works and operation of the pipeline.

Waste classification of spoil generated from areas adjacent to mine workings.

Laboratory analysis of imported backfill material according to a sampling, analysis and quality plan is required to determine suitability and classification as ENM prior to use as backfill within the trench.

If potential contamination is discovered during site works, a soil sampling and analysis investigation should be undertaken by a suitably qualified person.

Contents

	page
Executive summary	3
1. Introduction	6
2. Scope of work	6
3. Site identification	6
4. Site history	7
5. Site condition and environment	9
6. Sampling analysis plan and sampling methodology	11
7. Results and discussion	11
8. Site characterisation	13
9. Conclusions and recommendations	14
10. Report limitations and intellectual property	16
11. References	17
Figures	18
Figure 1. Locality map	
Figure 2. Photographs of the site	

1. Introduction

1.1 Project Overview

The project is one step to improving the water security for Orange. It involves construction and operation of infrastructure required to transfer approximately 12 ML/day of water a distance of approximately 37 km from the Macquarie River to the Suma Park Dam at Orange.

The infrastructure required to transfer the water includes an offtake structure and pump stations, an underground pipeline (approximately 37 km in length), a discharge structure, and ancillary infrastructure (power supply).

In summary, the project would involve construction and operation of the following infrastructure:

- 37 km of 375 mm diameter water rising main between the Macquarie River and Suma Park Dam.
- An offtake structure and pump station located at the upper Macquarie River.
- Two booster pump stations and break tanks along the pipeline route.
- Power supply to pumps and other infrastructure.
- Telemetry controls to enable remote operation of the infrastructure including pumps and valves.
- A discharge structure at the Suma Park Dam.

1.2 Project Location

The proposed offtake structure would be located on the south side of the Macquarie River immediately upstream of the confluence with Boshes Creek. The water carried along the pipeline would discharge into the Suma Park Reservoir at Orange via the discharge structure, located approximately 10 m east of the existing saddle dam (at the north-west corner of the dam wall).

The proposed route for the pipeline contains road reserves, including Ophir Road and Long Point Road. In most (up to 70% of the route) areas the pipeline would need to cross private land. It is proposed that the majority of the pipeline would be underground and would not impact on farming or other land uses.

The project would be located in both the Orange and Cabonne local government areas. The majority of the pipeline would be located in the Cabonne local government area.

The Macquarie River to Orange pipeline project is a drought relief project. The pipeline has a length of 37 km and construction corridor 20 m wide. A trench will be installed at a depth of 1.2 to 2 m along the corridor.

2. Scope of work

Envirowest Consulting Pty Ltd was commissioned by GHD to undertake a preliminary contamination investigation, in accordance with the contaminated land management planning guidelines, from the *Contaminated Land Management Act 1997* and the *State Environmental Policy No. 55 (SEPP 55)*, of the proposed Macquarie River to Orange pipeline project corridor. The objective was to identify past potentially contaminating activities adjacent to or within the pipeline corridor, identify potential contamination types, discuss the site condition and assess the health risk to workers and on-site personnel constructing the pipeline.

3. Site identification

The assessment area included land adjacent to and within The Macquarie River to Orange pipeline project corridor. The pipeline corridor is approximately 37km long extending from the Macquarie River to Suma Park Dam (Figure 1) and includes road reserves and private land. The pipeline corridor is expected to be 6 to 20m wide with several pumping stations along the corridor.

The pipeline corridor is measured in chainages with 0m being the offtake point at the Macquarie River.

4. Site history

4.1 Zoning

The pipeline corridor is located within the local government areas of Orange and Cabonne. Zoning of land within Orange City Council is 1a General Farming, 1c Rural Residential and 6 Open Space under the Orange LEP 2000. Zoning of land within Cabonne Council is 1a, General Rural under the Cabonne LEP 1991.

4.2 Site visit and description

Site inspections were undertaken in November and December on foot and in vehicles by traversing the proposed pipeline corridor.

4.3 Land-use

Land-use along the pipeline corridor includes road reserves and private land. Road reserves consist of maintained grassland areas and native woodlands adjacent to roads including Ophir Road, Lookout Road, Oaky Lane and Long Point Road. Land-use on private land ranges from rural-residential to rural and includes grazing of sheep and cattle on semi-improved grasslands.

4.4 Council records

Orange City Council and Cabonne Council were contacted on 15 February 2012 regarding contamination issues associated with lots located within the pipeline corridor. No contamination issues were identified within either Council's records.

4.5 Information sources

Site inspection November and December 2011 by Greg Madafiglio, Andrew Ruming and Leah Desborough

Orange 1:25,000 topographic map

Ophir 1:25,000 topographic map

Kerrs Creek 1:25,000 topographic map

NSW OEH records of public notices under the CLM Act 1997

WorkCover search of Dangerous Goods licences

NSW OEH groundwater and soil database

Department of Mineral Resources

4.6 Chronological list of site uses

Historical land-use of the pipeline corridor is expected to be similar to that currently occurring. Mining activities are also known to have occurred in the locality and are expected to have impacted on sections of the pipeline corridor.

A review of the Orange, Ophir and Kerrs Creek 1:25,000 topographic maps all based on 1982 aerial photography with field revision in 1987 identified the pipeline corridor was not built-up. Vegetation ranged from scattered vegetation to medium vegetation.

Two sets of livestock yards and several areas of abandoned mine workings were identified along the pipeline corridor.

4.7 Buildings and infrastructure

No buildings were located within the investigation area. Several dwellings are nearby.

Infrastructure within the pipeline corridor includes bitumen and unsealed roads, driveways, farm fences and cattle yards.

4.8 Contaminant sources

Several areas of historical mine related activities were identified along the pipeline corridor. The mine workings were identified at:

- between chainages 21933m and 21957m at Summer Hill Creek fourth crossing where abandoned mine workings have been fenced;
- between chainages 24250m and 224350m opposite El Dorado homestead (Lot 130 DP44101);
- between chainages 30900m and 30910m at cuttings near Pearces Lane where old mines with reported shafts and underground workings were identified; and
- between chainages 32760m and 32770m, 780m north of Kennett Place where abandoned mine workings were observed.

One set of yards were identified in close proximity to the pipeline corridor. The cattle yards were identified at:

- chainage 34860m where cattle yards are 85m north of Summer Hill Creek first crossing.

Serpentinite which may contain naturally occurring asbestos (NOA) in the form of chrysotile is known to occur in the southern section of the pipeline corridor. Serpentinite gravel and rock containing NOA fibres was identified on the soil surface at:

- between chainages 34880m and 34950m on the eastern side of Ophir Road.

Serpentinite may also be present in the subsoil at:

- between chainages 34600m and 34950m located from Summer Hill Creek first crossing to intersection of Banjo Paterson Way and Ophir Road.

4.9 Contaminants of concern

Contaminants of concern associated with the mine related activities are:

- heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury).

Contaminants of concern associated with the yards are:

- heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury); and
- organochlorine pesticides (OCP).

Contaminants of concern associated with the serpentinite are:

- asbestos.

Contaminants of concern associated with construction activities are:

- sediment
- dust
- erosion
- salinity
- hydrocarbons (TPH C6-C36)

4.10 Relevant complaint history

Nil

4.11 Contaminated site register, licences

The site is not listed on the NSW OEH Contaminated Land: Record of Notices (accessed 19 December 2011).

The site is not listed on the NSW OEH Contaminated sites notified to the EPA (accessed 19 December 2011).

No WorkCover dangerous goods licences are known to be registered on the site.

4.12 Historical land-use of adjacent land

The Orange City Council Resource Recovery Centre is located on the western side of Ophir Road between chainages 35928m and 36260m. The recovery centre is operated according to an EPA licence and contaminants are expected to be restricted to the site. No impact from the recovery centre is expected on the pipeline corridor.

Land-use adjacent to the remainder of the pipeline corridor is similar to that within the corridor. Adjacent land-use is not expected to impact on the contamination status of the pipeline corridor.

4.13 Integrity assessment

The site history was obtained from a site inspection and history review. The information is consistent with the current site condition and to the best of the assessor's knowledge is accurate.

5. Site condition and environment

5.1 Surface cover

Six types of surface cover were observed over the length of the pipeline corridor. These were:

- Bitumen – identified along part of Ophir Road;
- Gravel – identified along part of Ophir Road, Lookout Road, Oaky Lane and Long Point Road and residential driveways;
- Semi-improved to improved grasslands – identified within road reserves and on private land. Grasslands comprise native and introduced pasture grasses and some weeds. Some water tolerant species such as *Juncus* were identified within drainage depressions;
- Woodlands – grasses are sparse within the woodlands due to shading provided by native eucalypt trees. Surface cover is dominated by fallen leaf litter and twigs;
- Open woodlands – groundcover within the open woodlands consisted of native grasses with some introduced species; and
- Riparian – includes water tolerant species in permanent or ephemeral drainage lines.

5.2 Topography

The pipeline corridor traverses a series of crests, upper slopes, mid-slopes, lower slopes, flats and drainage lines. Elevation ranges from between 380 metres above sea level at the off-take point at the Macquarie River to 870 metres above sea level at chainage 36260m. Slopes on the decline to the Macquarie River are moderately to steeply inclined and range up to 70%. Aspect varies along the pipeline corridor.

5.3 Soils and geology

The pipeline corridor traverses the North Orange, Macquarie, Mookerawa, Panuara and Burrendong Soil Landscapes with the dominant landscape being Mookerawa (Kovac *et al.* 1990). Red podzolics and red earths occur on the mid-slopes to crests and yellow earths, yellow soloths, yellow solodics and brown solodics on the lower slopes and drainage lines.

Erosion hazard is high to very high in the Burrendong and Paunara Soil Landscapes, moderate in the Mookerawa and North Orange Soil Landscapes and low in the Macquarie Soil Landscape. Erosion was observed along the length of the pipeline corridor in disturbed areas, table drains, areas of concentrated flow and the exposed contact between basalt and siltstone.

Soil salinity risk is moderate to high in drainage depressions and drainage lines in the Mookerawa, Panuara and Burrendong Soil Landscapes on yellow soloths and yellow solodic soils (Kovac *et al.* 1990). Soil salinity problems are low on other topographic features. No evidence of salinity including salt crystals on surface, salt tolerant vegetation and road conditions, was observed during the site walkover.

The site walkover identified the pipeline corridor to primarily contain geological units comprising siltstone, basalt, rhyolite, monzonite, sandstone and ashstone.

5.4 Surface water

The pipeline corridor forms part of the Macquarie River catchment with subcatchments comprising Summer Hill Creek, Emu Swamp Creek, Oaky Creek and Boshes Creek. The pipeline draws water from an offtake point in the Macquarie River (chainage 0m). The pipeline corridor traverses numerous ephemeral drainage lines and permanent creeks including Summer Hill Creek at first (chainage 34956m), second (chainage 34100m), third (chainage 29700m) and fourth (chainage 21956m) crossings, El Dorado Gully (chainage 24581m), Kittys Creek (chainage 20840m), Oaky Creek (chainage 14000m), an unnamed drainage line adjacent to Bulgas Road (chainage 36730m) and an unnamed drainage line north of Kennett Place (chainage 32774m).

No dams are located within the pipeline corridor.

5.5 Groundwater

No operational bores are located within the pipeline corridor.

The Department of Natural Resources NSW Natural Resource Atlas (2011) identifies thirty bores within 1km of the site. These bores are licensed for domestic, stock and irrigation. Three bores were drilled as test bores.

Two bores are less than 10m in depth and water bearing zones are expected to be in an unconfined aquifer. The remainder of the bores are greater than 10m in depth confined in rock including basalt, quartz, schists, granite, rhyolite and shale. Standing water levels at the time of construction ranged between 9 to 30m.

5.5 Evidence of contamination checklist

Site layout showing industrial processes	None known
Sewer and service plans	Underground services are located along the pipeline corridor
Manufacturing processes	None known
Underground tanks	None known
Product spills and loss history	None known, no pesticide mixing or storage areas on the site
Discharges to land, water and air	None known

Disposal locations, presence of drums, wastes and fill materials	Nil
Soil staining	Nil
Fill	Nil
Visible signs of plant stress, bare areas	No bare areas due to contamination identified.
Odours	Nil
Ruins	Nil
Other	-

6. Sampling analysis plan and sampling methodology

Analysis of soil samples did not form part of the investigation scope.

7. Results and discussion

7.1 Identified contamination

Naturally occurring asbestos

Serpentine gravel and rock containing NOA fibres was identified at:

- between chainages 34600m and 34950m (from Summer Hill Creek first crossing to intersection of Banjo Paterson Way and Ophir Road) on the soil surface and in profile.

Disturbance of NOA during construction activities requires specific safety management and approvals. Management of the site during excavation works will be in accordance with Orange City Council *Naturally Occurring Asbestos Planning Procedures* and include appropriate personal protection equipment (PPE), air monitoring and site clearance following works. Excavated material may require removal and off-site disposal to an appropriately licensed landfill.

7.2 Potential contamination

7.2.1 Mine workings

Evidence of mine workings was identified at:

- between chainages 21933m and 21957m at Summer Hill Creek fourth crossing where abandoned mine workings have been fenced;
- between chainages 24250m and 224350m opposite El Dorado homestead (Lot 130 DP44101);
- between chainages 30900m and 30910m at cuttings near Pearces Lane where old mines with reported shafts and underground workings were identified; and
- between chainages 32760m and 32770m, 780m north of Kennett Place where abandoned mine workings were observed.

The pipeline corridor is located adjacent to mine workings and is potentially impacted by mine workings. The depth of mine workings is expected to be confined to less than 200mm below the surface.

Mine related activities are likely to be a source of significant contamination. Potential contaminants associated with the mine workings are heavy metals.

7.2.2 Stock management facilities

Cattle yards were identified at:

- chainage 34860m (85m north of Summer Hill Creek first crossing).

The cattle yards are not within the pipeline corridor and are unlikely to be a source of significant contamination. Potential contaminants associated with the cattle yards are stock drenches which are identified by analysis for heavy metals and OCP.

No sheep yards or dips were identified within the pipeline corridor.

7.2.3 Salinity

Saline soils may potentially be present in the drainage depressions and drainage lines traversed by the pipeline corridor.

Soil disturbance works within drainage depressions and drainage lines should be managed in accordance with the Landcom *Managing Urban Stormwater: Soils and Construction* ("Blue Book") manual which will include management of saline soils and groundwater ingress into trenches.

7.3 Potential construction impacts

7.3.1 Spoil generation

Spoil material will be generated during construction of the main project elements including pump stations, the offtake to the river, access roads and the pipeline trench. Spoil generated from the construction of the pump stations and offtake will be reused locally for backfill, noise attenuation, landforming and screening. Excess spoil is unlikely to be generated.

Access roads will be primarily in cut with some sections in fill. As much of the spoil will be reused on-site where possible although excess spoil is expected. Excess spoil will be reused or disposed to an appropriate landfill.

Spoil generated from pipeline trench construction will be reused as backfill. Approximately 60% of the spoil generated is expected to be used as backfill in the trench. Excess spoil generated from trench excavations and is proposed to be stored for reuse by Orange City Council or Cabonne Council or appropriately disposed off-site.

Spoil generated from areas of NOA (Section 7.1) will be considered asbestos waste. NOA spoil will be managed in accordance with Orange City Council *Naturally Occurring Asbestos Planning* Procedures. Spoil generated from areas adjacent to mine workings (Section 7.2.1) to a depth of 200mm will require analysis for waste classification to enable appropriate reuse or disposal. All other spoil material is expected to be classified as either general solid waste (DECC 2009), virgin excavated natural material (VENM) (DECC 2009) or excavated natural material (ENM) under the ENM exemption (2008).

7.3.2 Erosion and sedimentation

Soils along the length of the pipeline corridor have a moderate to very high erosion hazard. Existing erosion was identified resulting from concentrated flows, disturbed areas and the exposed point of contact between siltstone and basalt. Construction activities will create in disturbed areas resulting in an increase the risk of erosion potentially resulting in sedimentation of waterways.

Erosion and sedimentation for the development should be managed in accordance with the Landcom *Managing Urban Stormwater: Soils and Construction* ("Blue Book") manual which will include rehabilitation and maintenance of disturbed areas following construction activities.

7.3.3 Dust generation

Construction activities have the potential to create dust from excavation works, stockpiles and bare areas. Dust creation has the potential to impact on surrounding vegetation and neighbouring properties.

Dust creation from the development should be managed in accordance with the Landcom *Managing Urban Stormwater: Soils and Construction* ("Blue Book") manual which will include rehabilitation and maintenance of bare areas following construction activities.

7.3.4 Salinity

Saline soils may potentially be present in the drainage depressions and drainage lines traversed along the pipeline corridor.

Soil disturbance works within drainage depressions and drainage lines should be managed in accordance with the Landcom *Managing Urban Stormwater: Soils and Construction* ("Blue Book") manual which will include management of saline soils and groundwater ingress into trenches.

7.3.5 Chemical contamination of soils and surface waters

Hydrocarbon spills and leaks from construction vehicles have potential to contaminate soils and surface and groundwaters.

A management plan is recommended to be implemented which describes protocols for hydrocarbon storage and actions to be taken if spills or leaks are identified.

7.3.6 Import of fill

Fill may be imported to the pipeline corridor and used in the construction trench around the pipe. Potential exists for the fill to be contaminated.

It is recommended the fill material be classified as ENM under the *NSW Excavated Natural Material Exemption 2008 (ENM)*.

7.4 Potential operational impacts

7.4.1 Erosion and sedimentation

The risk of operational activities resulting in contamination is expected to be low. Activities which expose soil will increase the risk of erosion and potentially resulting in sedimentation of waterways.

Erosion and sedimentation for the development should be managed in accordance with the Landcom *Managing Urban Stormwater: Soils and Construction* ("Blue Book") manual which will include rehabilitation and maintenance of disturbed areas during operation.

8. Site characterisation

8.1 Environmental contamination

Areas containing NOA are known to occur within the pipeline corridor.

Potential areas of heavy metal and OCP contamination exist within the pipeline corridor. Drainage depressions and drainage lines may contain saline soils.

8.2 Chemical degradation production

Heavy metals, OCP and NOA do not degrade.

8.3 Exposed population

Exposure by humans to the potential and known contaminants is unlikely under the current management practices. Disturbance of the NOA during construction activities may result in exposure of workers to the contaminants.

9. Conclusions and recommendations

9.1 Summary

The private land-use was predominantly grazing. Road reserves were vacant or occasionally grazed. Historical mine workings were identified at several locations. The desk top study and site walkover identified six areas of known or potential contamination.

Naturally occurring asbestos (NOA) is known to occur along sections of the pipeline corridor. NOA was observed during the site walkover on the soil surface and is expected in the subsoil between chainages 34880m and 34950m. NOA is expected to occur in the subsoil between chainages 34600m and 34950m (Summer Hill Creek first crossing to intersection of Banjo Paterson and Ophir Roads. Disturbance of NOA during construction activities requires to be in accordance with Orange City Council *Naturally Occurring Asbestos Planning Procedures*.

Potential areas of contamination included historic mine workings, cattle yards and saline areas within drainage depressions and lines. Contaminants of concern are heavy metals, OCP and salt.

Spoil generation, erosion and sedimentation, dust generation, chemical contamination of soils and surface waters, salinisation and import of fill are potential contaminating activities during construction works. Implementation of management activities including spoil reuse, spoil off-site disposal, sediment and erosion control plans, protocols for actions if hydrocarbon spills and leaks are identified and classification of imported fill as Excavated Natural Material (ENM) will reduce the risk of these activities impacting on workers and the environment.

Contamination risk of the operation phase is expected to be low. Adoption and implementation of sediment and erosion control plans for exposed soils will reduce the risk of environmental impact.

9.2 Assumptions in reaching the conclusions

An accurate history has been obtained and typical past farming practices were adopted.

9.3 Suitability for proposed use of the site

Areas identified as containing NOA require specific safety measures to ensure worker health is not impacted during disturbance.

Areas identified as potentially containing contaminants require additional investigations prior to determination of suitability.

Drainage depressions and drainage lines require implementation of appropriate sediment and erosion control plans to minimise risk on waterways and surrounding soils from potentially saline soils.

The remainder of the pipeline corridor is not expected to impact on the health of on-site workers.

9.4 Limitations and constraints on the use of the site

Works in areas containing NOA require specific safety management and approvals.

Activities which may result in erosion and sedimentation require to be managed by an erosion and sediment control plan.

9.5 Recommendation for further work

Work on NOA is required to be undertaken in accordance with Orange City Council policies and procedures.

Development of erosion and sedimentation plans are required to minimise the risk of salinisation, erosion and sedimentation during construction works and operation of the pipeline.

Waste classification of spoil generated from areas adjacent to mine workings.

Laboratory analysis of imported fill according to a sampling, analysis a quality plan (EPA 1997) is required to enable classification as ENM prior to use as backfill within the trench.

If potential contamination is discovered during site works, a soil sampling and analysis investigation should be undertaken by a suitably qualified person.

10. Report limitations and intellectual property

This report has been prepared for the use of the client to achieve the objectives given the clients requirements. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

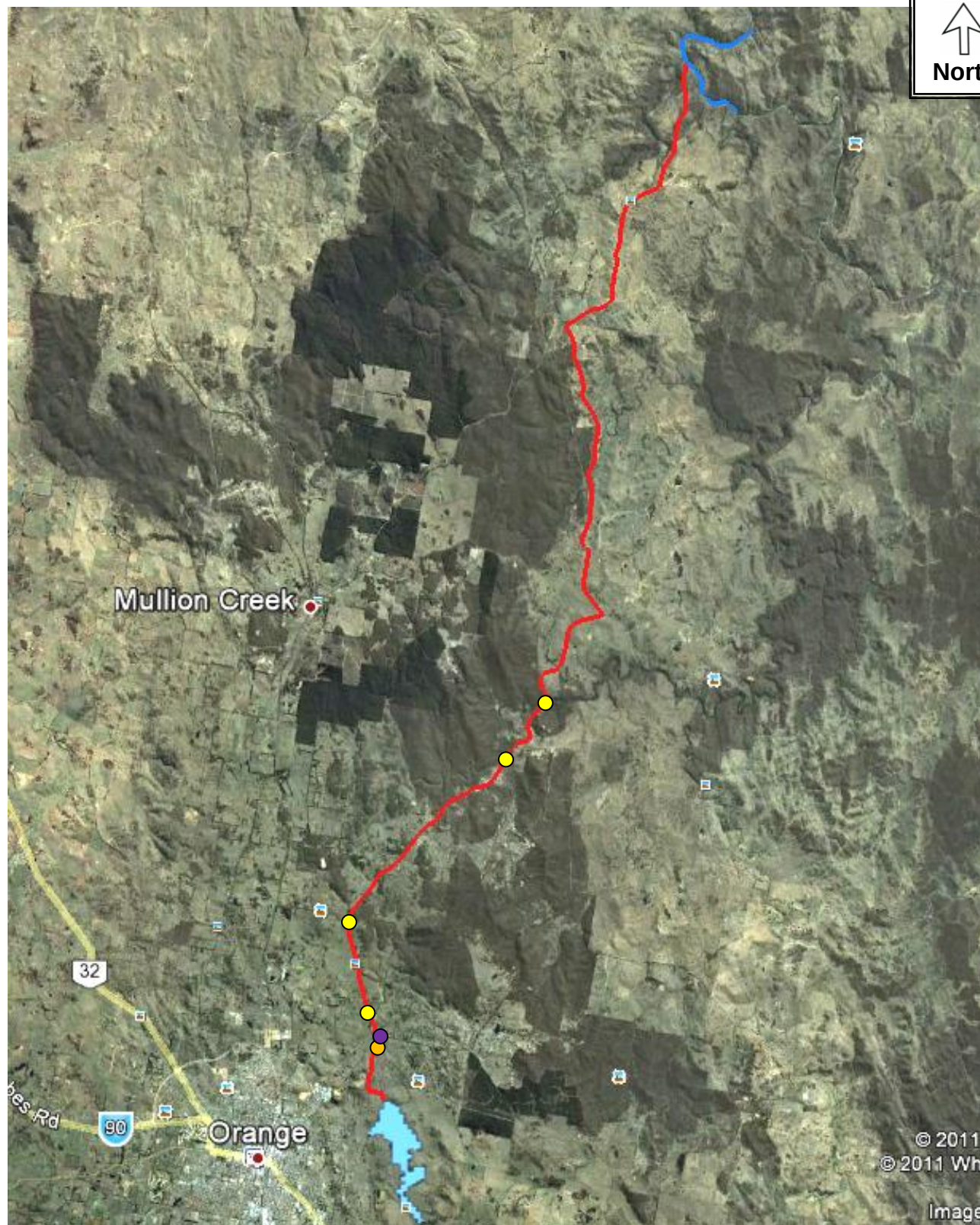
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Figures

Figure 1. Locality map

Figure 2. Photographs of the site



Legend

- Pipeline corridor
- Suma Park Dam
- Macquarie River
- Naturally occurring asbestos
- Yards
- Mines

Figure 1. Locality map

The Macquarie River to Orange pipeline project NSW



Envirowest Consulting Pty Ltd

Job – R11369c.1

Drawn by: LD

Date: 19/12/2011

Figure 2. Photographs of the site taken November and December 2011



Looking north east across area of known surface NOA



Mine workings between chainages 24250m and 24350m



Mine workings and abandoned mine shafts between chainages 21933m and 21957m



Cattle yards at chainage 34860m