



PROJECT ANTHRACITE

# The DPRK's Chemical Facilities:

Kanggye Area: Site Profile 5

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# Executive Summary

Kanggye city in Jagang Province, North Korea is regularly cited in open source reporting as hosting key components of North Korea's chemical weapons (CW) research and production infrastructure. However, only limited imagery analysis has been published to date on the possible location of these facilities. To address this gap, a review of literature was undertaken to consolidate CW sourcing claims and identify physical features that could be corroborated in satellite imagery.

Four areas of interest were selected based on the results of this research: the General Precision Machine Plant; Jangjagang Machine Tool Plant; Kanggye Tractor Plant (also known as Plant No. 26); and a military storage site. A multitemporal analysis of medium- and high-resolution satellite imagery was conducted for each area. Thermal readings from Landsat-8 and Landsat-9 satellite sensors provided an additional means of remotely analysing the study areas. Mapping of land surface temperature (LST) informed assessments on the spatial distribution of heat and signs of exothermic activity.

Satellite imagery and LST data proved inconclusive in identifying Kanggye's reported CW sites. The Kanggye Tractor Plant aligned most closely with attributes cited by sources: rail connectivity; proximity to munition production; and underground access points. Other areas analysed shared similar visual indicators, but are assessed as more likely to have a supporting logistical or manufacturing role, whether for CW or conventional weapons.

It should be emphasised that this report is exploratory and set out to test the widely published assertion that CW facilities are located in Kanggye. Observations at the four areas of interest provide a baseline for further research and multispectral imagery analysis. Current findings indicate a low confidence in the sites being CW related.

## Acknowledgements

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# DPRK's Chemical Facilities: Kanggye: Site Profile 5

## Project Background

North Korea has long been assessed by many countries as having a CW programme. In 2006, a South Korean defence ministry white paper estimated that between 2,500 and 5,000 tons of chemical warfare agents were stored in facilities across the country. This figure has been reiterated in subsequent documents, including a 2022 white paper.<sup>1</sup>

The 2017 assassination of Kim Jong Un's half-brother Kim Jong-nam with the nerve agent VX,<sup>2</sup> in an attack that was widely accepted as being orchestrated by North Korea,<sup>3</sup> served as a reminder of the longstanding North Korean CW programme, and to highlight that very little is known about it, in contrast to the international attention paid to the country's missile and nuclear programmes.<sup>4</sup>

In an attempt to identify means of bridging that gap, in March 2022, RUSI published a feasibility study in partnership with the UK's Defence Science and Technology Laboratory that concluded that open source tools could help to increase understanding of North Korea's chemical industry, allowing hypotheses about CW production to be developed and refined.<sup>5</sup> The study formed part of a multi-year project on North Korean WMD in cooperation with VERTIC and the James Martin Center for Nonproliferation Studies.<sup>6</sup>

1. Ministry of National Defence, The Republic of Korea, *2022 Defense White Paper* (Seoul: Republic of Korea, Ministry of Defense, 2022), p. 32.
2. Organisation for the Prohibition of Chemical Weapons (OPCW), 'Statement by H.E. Ambassador Ahmad Nazri Yusof, Permanent Representative of Malaysia to the OPCW at the Eighty-Seventh Session of the Executive Council', EC-87/NAT.14, 14 March 2018, <[https://www.opcw.org/sites/default/files/documents/EC/87/en/ec87nat14\\_e\\_.pdf](https://www.opcw.org/sites/default/files/documents/EC/87/en/ec87nat14_e_.pdf)>, accessed 4 January 2024.
3. Hannah Ellis-Petersen and Benjamin Haas, 'How North Korea Got Away with the Assassination of Kim Jong-nam,' *The Guardian*, 1 April 2019.
4. See, for example, Nuclear Threat Initiative (NTI), 'The CNS North Korea Missile Test Database', 28 April 2023, <<https://www.nti.org/analysis/articles/cns-north-korea-missile-test-database/>>, accessed 7 May 2023; Hans M Kristensen and Matt Korda, 'Nuclear Notebook: How Many Nuclear Weapons Does North Korea Have in 2022?', *Bulletin of the Atomic Scientists*, 8 September 2022, <<https://thebulletin.org/premium/2022-09/nuclear-notebook-how-many-nuclear-weapons-does-north-korea-have-in-2022/>>, accessed 7 May 2023.
5. Cristina Varriale and Sarah Clapham, 'Remote Assessment of North Korea's Chemical Weapons: Feasible or Not?', *RUSI Occasional Papers* (March 2022), <<https://www.rusi.org/explore-our-research/publications/occasional-papers/remote-assessment-north-koreas-chemical-weapons-feasible-or-not>>, accessed 24 April 2026.
6. VERTIC, 'North Korean Weapons of Mass Destruction Capabilities', <<https://www.vertic.org/programmes/vm/dprk/>>, accessed 16 July 2025.

One of the conclusions of the feasibility study was that:

Future work will need to consider industrial capability as a network; looking at single sites in isolation will leave knowledge gaps. Although this approach as applied to a single site will help inform assessments of activity taking place there, it will not support a holistic understanding of a CW capability. This is because it is unlikely that an individual facility is responsible for start-to-finish production of CW.<sup>7</sup>

Based on the feasibility study and with the support of Global Affairs Canada, RUSI initiated Project Anthracite, a three-year project to use open source tools and remote-sensing technologies to provide a networked overview of North Korea's chemical industry, by profiling associated sites and seeking to understand their role in North Korea's chemical industry, as well as any links they might have to CW production.<sup>8</sup>

CW production programmes have predominantly had their roots in the chemical industry, from research into new pesticides to the supply of raw materials and intermediates. Many chemicals that have formed part of historic worldwide CW programmes have been included in the Annex on Chemicals, which forms part of the Chemical Weapons Convention (CWC).<sup>9</sup> This annex defines the basis for allocating one of three schedules to some chemicals. Which schedule is allocated depends on aspects such as toxicity, quantity of use for purposes not prohibited by the CWC, and whether the chemical has been used as a CW or identified as a precursor. For completeness, it should be noted that a chemical can be classed as a CW without being in any of the schedules.

### Site Selection

Kanggye is the provincial capital of Jagang Province and a transportation hub connecting regional towns and cities by rail and road networks. It lies 33 km from the international border between North Korea and China. The city has political and historical significance as the former capital of North Korea during the Korean war. Despite being largely destroyed in 1950, it has gone on to become a prominent industrial centre and a symbol of North Korean economic strength.

7. Varriale and Clapham, 'Remote Assessment of North Korea's Chemical Weapons', pp. 31–32.

8. RUSI, 'Project Anthracite: Assessing the Chemical Weapons Capability of the DPRK', <<https://rusi.org/explore-our-research/projects/project-anthracite-assessing-chemical-weapons-capability-dprk>>, accessed 28 October 2024.

9. OPCW, 'Annex on Chemicals', <<https://www.opcw.org/chemical-weapons-convention/annexes/annex-chemicals/annex-chemicals>>, accessed 3 May 2023.

Kanggye city and Jagang Province are well known for their association with North Korea's ballistic missile launches, defence institutes and civil industry.<sup>10</sup> The city is also regularly cited in open source reporting as forming part of North Korea's CW national infrastructure, described by different sources as a site of CW production, testing and munitions filling.<sup>11</sup>

The city has a range of manufacturing plants and light industry factories used for both civil and military purposes. Recent additions to Kanggye's civil facilities include a science and technology library, a condiments factory and a footwear factory. These and other developments point to the regime's recent efforts to modernise and expand Kanggye's industrial sector and workforce.

Military installations of note include the General Precision Machine Plant (GPMP), Jangjagang Machine Tool Plant (JMTP) and Kanggye Tractor Plant, all of which have been referenced as being involved in the production of arms and munitions.<sup>12</sup> Kanggye city is also a regional centre for higher education and research. It was formerly the home of North Korea's National Defence University, before the institute was relocated to Pyongyang in the early 2000s.<sup>13</sup> The city is currently the location of the Lee Jae Sun Military Academy, as well as universities of agriculture, education, engineering and medicine.

Given the city's military installations, industrial capabilities, logistical connections and educated workforce, Kanggye is well suited to hosting CW operations. However, only limited imagery analysis has been published on the possible location(s) of reported facilities. This study builds on the current literature by identifying and analysing locations of interest that may be associated with CW activities.

10. Daniel Pinkston, 'The North Korean Ballistic Missile Program', Strategic Studies Institute, February 2008, <<https://apps.dtic.mil/sti/tr/pdf/ADA477526.pdf>>, accessed 15 October 2025; Thomas Maresca, 'North Korea Launches Short-Range Ballistic Missiles Ahead of Trump's Return to White House', UPI, 14 January 2026, <[https://www.upi.com/Top\\_News/World-News/2025/01/14/North-Korea-short-range-ballistic-missile-launch-Trump-White-House/4811736833465/](https://www.upi.com/Top_News/World-News/2025/01/14/North-Korea-short-range-ballistic-missile-launch-Trump-White-House/4811736833465/)>, accessed 20 January 2026.
11. International Crisis Group, 'North Korea's Chemical and Biological Weapons Programs', Asia Report No. 167, 18 June 2009, p. 7, <<https://www.crisisgroup.org/sites/default/files/167-north-korea-s-chemical-and-biological-weapons-programs.pdf>>, accessed 12 September 2025; Joseph S Bermudez Jr, 'Overview of North Korea's NBC Infrastructure', 38 North, June 2017, <<https://www.38north.org/2017/06/nkinstability061317/>>, accessed 12 September 2025.
12. Hon Min, 'Kim Jong-un's Inspection on Major Munition Factories', Korea Institute for National Unification, 23 August 2023, <<https://repo.kinu.or.kr/bitstream/2015.oak/14581/1/CO23-22%28e%29.pdf>>, accessed 15 October 2025; Kyung-Joo and Sung-Jun Bae, 'North Korean Munitions Factories: The Other Side of Arms Transfer to Russia', 38 North, 24 June 2024, <<https://www.38north.org/2024/06/north-korean-munitions-factories-the-other-side-of-arms-transfers-to-russia/>>, accessed 15 October 2025.
13. Joseph S Bermudez Jr, 'A History of Ballistic Missile Development in the DPRK', James Martin Center for Nonproliferation Studies, 1999, pp. 2-3, <<https://www.jstor.org/stable/pdf/resrep09894.5.pdf>>, accessed 12 October 2025; Kim Jeong Yoon, 'Why Did N. Korea Relocate its National Defense University?', *Daily NK*, 6 February 2020, <<https://www.dailynk.com/english/why-north-korea-relocate-national-defense-university/>>, accessed 10 October 2025.

## Methodology

The findings of this report are derived from open source research and an analysis of medium- and high-resolution satellite imagery. Open source intelligence (OSINT) methods were used to identify, collate and critically evaluate reporting referring to CW infrastructure in Kanggye city. The research phase drew upon material from academia, think tanks, online press, social media, government communications and special interest blogs. To aid subsequent imagery analysis, research efforts focused on identifying descriptions of physical features that could be corroborated with satellite imagery. As a caveat, it is recognised that open source information specifically on CW in Kanggye is extremely limited. While a variety of primary and secondary sources were used to build a framework for further analysis, the reliability and accuracy of the CW claims are largely unverified.

Imagery analysis was conducted on select areas of interest, following a broad area search within the Kanggye city administrative boundary. A spatio-temporal approach was taken to identify and track structural changes of note over a 10–15-year period at these sites. The purpose of this change analysis was to identify new buildings or equipment that may indicate the site’s functional purpose, or which may denote a substantive increase or decrease in operational activity. The selected timeframe provided the best spatio-temporal resolution of satellite imagery (that is, the best image resolution and coverage) for a visual investigation of the areas under scrutiny.<sup>14</sup> In analysing features, consideration was given to factors of locational context, size, shape, shadow, tone/colour, texture, pattern and associated features.<sup>15</sup> The resulting analysis was reviewed within the project team. The report was also externally peer reviewed, with inputs addressed as appropriate.

14. To note, many of the buildings at the sites of interest have their origins in the mid-1950s to 1970s, thereby precluding imagery analysis of their early construction phases.

15. Aaron Jabbour and Renny Babiarz, *Geospatial Data, Information, and Intelligence* (London: Artech House, 2023), pp. 119–67.

A land surface temperature (LST) analysis was undertaken as an additional means of site assessment. True colour (red/green/blue) and false colour (infrared/red/green) satellite imagery was supplemented with Landsat-8/9 LST data to determine any localised hotspots. The results supported analysis on the presence or absence of exothermic activity that could be attributed to individual buildings or clusters of buildings.

Landsat Thermal Infrared Sensor (TIRS) instruments provide a spatial resolution of 100 m<sup>2</sup> sampled down to 30 m<sup>2</sup>, with temporal coverage every eight days. Seven contemporary dates with unobstructed views (that is, when there was no cloud cover) were used to provide a preliminary baseline of observable heat patterns.<sup>16</sup> Surface temperature data was extracted specific to the perimeter of each area of interest, with the LST data converted to degrees Celsius and normalised to a figure between 0 and 1. Findings for each area were visualised in heat mapping using an 18-step colour scheme, where deep blue is the coolest temperature and dark red the warmest within the extracted data layer.

Heat signatures are of course not unique to facilities involved in CW R&D, production, storage or deployment. However, the Scientific Advisory Board of the Organisation for the Prohibition of Chemical Weapons (OPCW) has recommended thermal imaging as a novel capability for CW verification.<sup>17</sup> Research has also shown LST to have potential application in the detection, monitoring and modelling of CW agents.<sup>18</sup> LST has therefore been used in this study as a further exploratory exercise to complement and enrich available data sources. Specific attention was given to abnormal readings that might correlate with vents, incinerators or furnaces.

16. Dates: 28 September 2023, 29 September 2024, 7 July 2025, 15 August 2025, 9 September 2025, 2 October 2025, 3 October 2025, using Landsat-8 and Landsat-9 Level 2 Science Product. Courtesy of the U.S. Geological Survey (USGS).
17. OPCW, 'Report on the Scientific Advisory Board on Developments in Science and Technology for the Fourth Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention', RC-4/DG.1 Annex 1, 30 April 2018, pp. 50–52, <[https://www.opcw.org/sites/default/files/documents/CSP/RC-4/en/rc4dg01\\_e\\_.pdf](https://www.opcw.org/sites/default/files/documents/CSP/RC-4/en/rc4dg01_e_.pdf)>, accessed 20 February 2026.
18. Gary Sutcliffe, Lucy Berthoud and Mark Stinchcombe, 'Using Satellite Data for CBRN (Chemical, Biological, Radiological, and Nuclear) Threat Detection, Monitoring and Modelling', *Surveys in Geophysics* (Vol. 42, May 2021), pp. 734–35.

## Visual Indicators of CW Facilities

The OSINT research phase found recurrent mentions of Kanggye as a location of CW facilities. However, specific detail on the function or characteristics of these facilities is sparse, and where it does exist, is often reliant on unverified, single-source claims. Kanggye's role in North Korea's CW infrastructure has been variously described as comprising R&D, production of agents and preparation of chemical warheads. Three named locations are regularly cited:

1. The Kanggye Chemical Weapons Factory, also known as the No. 108 Factory.
2. The Kanggye Tractor Plant, also known as the No. 26 Factory.
3. The Bio-Chemical Research Institute.

Only limited observations are offered on physical features that may be attributed to these and other potential CW-related sites in Kanggye. Features mentioned include:

- a 'main CW research facility' co-located with a CW production plant;<sup>19</sup>
- a facility used for 'CW agent final preparation and filling of artillery shells' at a munition plant or plants in Kanggye;<sup>20</sup>
- underground facilities at CW factories, possibly used for quality control testing;<sup>21</sup>
- the bulk shipment by train of chemical feed stocks and precursors to CW factories in Kanggye for CW production, followed by the onward transport by train of CW agents to 'Army- and Corp-level storage facilities';<sup>22</sup>
- production and storage facilities in 'highland areas' disguised as 'fertilizer, pesticide and pharmaceutical factories'.<sup>23</sup>

An illustrative visualisation of the supply-chain relationships stated in open source reporting is shown in Figure 1.

19. International Crisis Group, 'North Korea's Chemical and Biological Weapons Programs'.

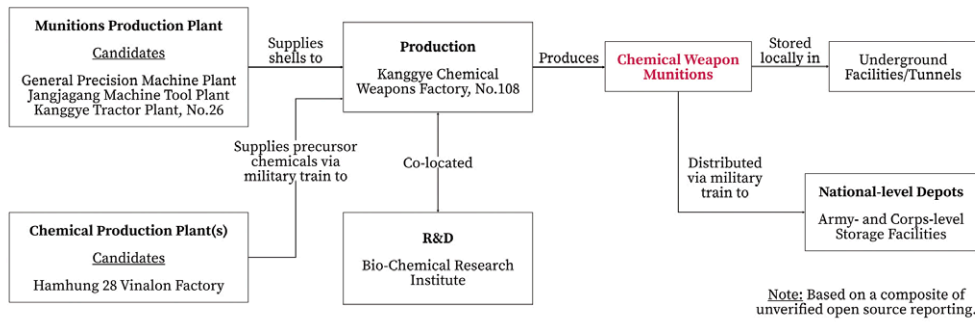
20. Anthony H Cordesman, 'Web Book: The Military Balance in the Koreas and Northeast Asia', Center for Strategic & International Studies, 31 January 2017, pp. 233, <<https://www.csis.org/analysis/web-book-military-balance-koreas-and-northeast-asia>>, accessed 12 September 2025. The report cites an NTI webpage, dated December 2015, which has since been removed.

21. Ministry of National Defense, The Republic of Korea, *1990 Defense White Paper* (Seoul: Republic of Korea, Ministry of Defense, 1991), pp. 73-74.

22. Bermudez Jr, 'Overview of North Korea's NBC Infrastructure', pp. 15, 18.

23. Lee Sang-yong, 'N. Korea Elevates Chemical Weapons as Strategic Deterrent', *Daily NK*, 9 July 2025, <<https://www.dailynk.com/english/north-korea-elevates-chemical-weapons-strategic-deterrent/>>, accessed 12 September 2025.

Figure 1: Reported Supply Chain Relationships for CW Production in Kanggye



Source: The author, based on open source reporting cited in this report.

Given the opaque and sometimes conflicting nature of open source reporting on CW in Kanggye, a generalist approach was necessary when selecting possible visual indicators. The following features, observable in satellite imagery and typically associated with chemical, biological, radiological and nuclear (CBRN) installations, provided a framework to guide imagery analysis of the areas of interest:

- chemical production equipment, including storage tanks and piping
- ventilation system(s)
- remote location
- underground or buried location
- higher level of security
- clear transport links to storage facilities, particularly rail
- CBRN command, supply or deployment vehicle(s).

These generic functional characteristics were combined with physical attributes mentioned by primary sources (Figure 2), specifically: co-location with a munitions factory; proximity to railway infrastructure; and visible signs of underground facilities. Together, these visual indicators informed assessments on whether individual sites aligned with source reporting and how likely they were to have a CW purpose.

It is acknowledged that, while some or all these indicators may be present, they do not definitively confirm a CW site. It must be considered that the selected areas on interest may not have any association with CW.

Figure 2 : Review of Sources Referring to CW in Kanggye, Jagang Province

Publication Year	Publisher	Source Type	Claim				Named CW-Related Locations in Kanggye
			CW Production	CW Research	Under-ground Facilities	Movement by Train	
1991	Republic of Korea Ministry of National Defense <sup>24</sup>	Government intelligence (implied)		✓			Chemical Research Institute of the Academy of National Defense Sciences Kanggye
1997	US Senate Sub-Committee <sup>25</sup>	North Korea defector	✓				Kanggye Chemical Factory
2004	Korea Institute for International Economic Policy <sup>26</sup>	Sourcing not stated	✓	✓			
2009	International Crisis Group <sup>27</sup>	Government intelligence (implied)	✓	✓			
2010	<i>Chosun Daily</i> <sup>28</sup>	North Korea defector	✓	✓			Kanggye General Tractor Plant No.26, Bio-chemical research centre
2012	Nuclear Threat Initiative <sup>29</sup>	Sourcing unclear	✓				

24. Ministry of National Defense, The Republic of Korea, *1990 Defense White Paper*, pp. 73-74.

25. United States Senate, 'North Korean Missile Proliferation: Hearing Before the Subcommittee on International Security, Proliferation, and Federal Services Of The Committee on Governmental Affairs', 105<sup>th</sup> Congress, First Session, 21 October 1997, p. 7, <<https://www.govinfo.gov/content/pkg/CHRG-105shrg44649/pdf/CHRG-105shrg44649.pdf>>, accessed 15 September 2025.

26. Korea Institute for International Economic Policy, 'North Korea Development Report 2003/04', 30 July 2004, p. 180, <[https://www.kiep.go.kr/gallery.es?mid=a20301000000&bid=0001&b\\_list=10&act=view&list\\_no=724&nPage=166&vlist\\_no\\_npage=0](https://www.kiep.go.kr/gallery.es?mid=a20301000000&bid=0001&b_list=10&act=view&list_no=724&nPage=166&vlist_no_npage=0)>, accessed 15 September 2025.

27. International Crisis Group, 'North Korea's Chemical and Biological Weapons Programs'.

28. *Chosun Daily*, 'How N.Korea Goes About Exporting Arms', 10 March 2010, <<https://www.chosun.com/english/north-korea-en/2010/03/10/MMEAH65XF37UJMKYPOC6J6GHZE/>>, accessed 15 September 2025.

29. NTI, 'North Korea Chemical Facilities', 25 May 2012, <<https://www.nti.org/analysis/articles/north-korea-chemical-facilities/>>, accessed 15 September 2025.

Publication Year	Publisher	Source Type	Claim				Named CW-Related Locations in Kanggye
			CW Production	CW Research	Under-ground Facilities	Movement by Train	
2013	Chogabje and <i>MK News</i> <sup>30</sup>	North Korea defector		✓	✓		Biochemical weapons research institute, Institute of Biochemistry, 105 Laboratory
2013	<i>Daily NK</i> <sup>31</sup>	North Korea defector		✓			
2013	38 North <sup>32</sup>	North Korea defector	✓				
2017	38 North <sup>33</sup>	Author interview data (implied)	✓	✓	✓	✓	Kanggye Chemical Weapons Factory (also known as No. 108 Factory or Bio-Chemical Research Center)
2018	International Institute for Strategic Studies <sup>34</sup>	North Korea defector (author interview)	✓		✓	✓	
2018	<i>Daily NK</i> <sup>35</sup>	Unnamed source 'in Pyongyang'	✓		✓		Kanggye Chemical Weapons Factory No. 361; Kanggye General Tractor Plant No. 26; Kanggye General Machine Plant No. 93; Songgang 11 Electric Wire Factory
2025	<i>Daily NK</i> <sup>36</sup>	Unnamed 'high-ranking source' in North Korea	✓				

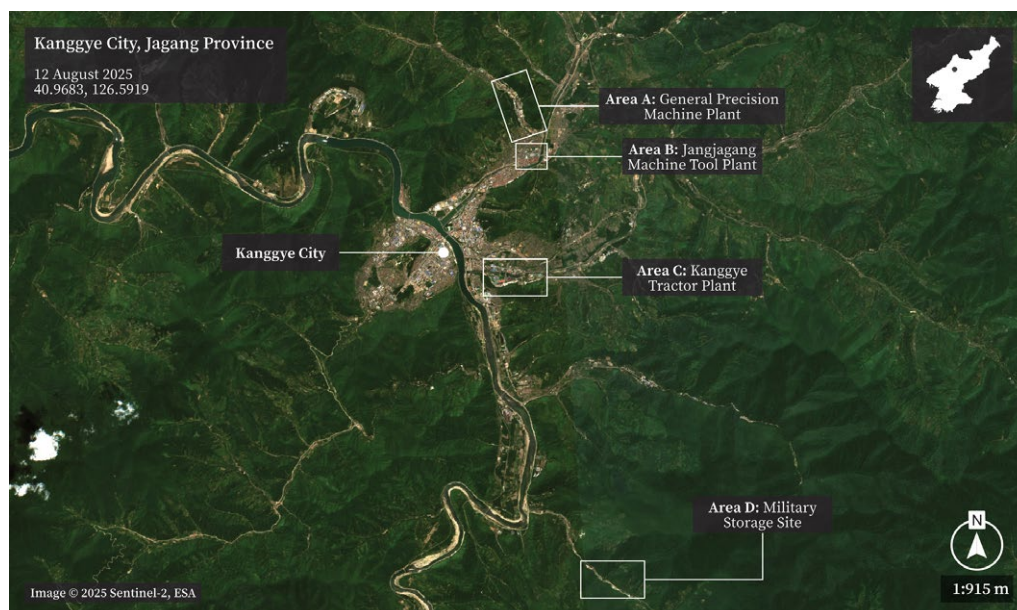
Source: The author.

30. Chogabje, “北, ‘105 연구소’서 화학무기 연구” [“North Korea Researches Chemical Weapons at “105 Institutes”], 9 September 2013, <[http://chogabje.com/board/view.asp?C\\_IDX=52726&C\\_CC=AB](http://chogabje.com/board/view.asp?C_IDX=52726&C_CC=AB)>, accessed 15 September 2025; *MK News*, ‘北, 화학무기비밀리연구개발하는곳따로있어...’ [“North Korea has a Separate Facility for Secret Research and Development of Chemical Weapons”], 5 September 2013, <<http://news.mk.co.kr/newsRead.php?year=2013&no=809872>>, accessed 15 September 2025.
31. Daily NK, ‘Concerns Raised vis NK Chemical Weapons History’, 12 September 2013, <<https://www.dailynk.com/english/concerns-raised-vis-nk-chemical-we/>>, accessed 15 September 2025.
32. Joseph S Bermudez Jr, ‘North Korea’s Chemical Warfare Capabilities’, 10 October 2013, 38 North, <<https://www.38north.org/2013/10/jbermudez101013/>>, accessed 15 September 2025.
33. Bermudez Jr, ‘Overview of North Korea’s NBC Infrastructure’.
34. IISS, ‘The Conventional Military Balance on the Korean Peninsula’, June 2018, p. 28, <<https://www.iiss.org/globalassets/media-library---content--migration/images/comment/military-balance-blog/2018/june/the-conventional-military-balance-on-the-korean-peninsula.pdf>>, accessed 15 September 2025.
35. Ha Yuna, ‘Underground Military Factories in North Korea Expanded to Hide Nuclear Arsenal’, *Daily NK*, 10 July 2018, <<https://www.dailynk.com/english/underground-military-factories-in-north-korea-expanded-to-hide-nuclear-arsenal/>>, accessed 15 September 2025.
36. Lee, ‘N. Korea Elevates Chemical Weapons as Strategic Deterrent’.

## Areas of Interest

Areas of interest were identified using this fused framework of generic and source-derived indicators. Four sites were selected based on these criteria after a broad area search of Kanggye (Figure 3).

Figure 3: Locations of Areas A, B, C and D Within and in the Vicinity of Kanggye City



Source: Sentinel-2, ESA, 12 August 2025. Annotated by the author.

### Area A: General Precision Machine Plant

The GPMP (Figure 4) is one of at least three sites in Kanggye city referenced as a probable munitions plant. Declassified Central Intelligence Agency (CIA) reporting, drawing on CORONA reconnaissance satellite imagery, lists an operational ammunition plant ‘Number 93’ at the same location as the GPMP from at least 1970.<sup>37</sup> It is unclear whether this historical function has continued to the present day.

37. CIA, ‘KH-4 Mission 1109 IPIR Number 12 Oak Supplement Part VIII 5-23 March 1970’, CIA FOIA Electronic Reading Room, 1 April 1970, p. 42, <<https://www.cia.gov/readingroom/document/cia-rdp78t04562a000300080001-4>>, accessed 10 January 2026. Further CIA reporting notes that the site underwent an expansion in 1977. See CIA, ‘Vol. 4 of 4 Volumes Annual Index to Photographic Exploitation Products January-December 1977’, CIA FOIA Electronic Reading Room, 1 March 1978, p. 430, <<https://www.cia.gov/readingroom/document/cia-rdp78b07179a000200040001-3>>, accessed 10 January 2026.

The GPMP's public-facing name was confirmed by the Korean Central News Agency (KCNA), North Korea's state-run media outlet, following a visit by Kim Jong Un in or around June 2019.<sup>38</sup> A still taken from a publicised video of the visit can be geolocated to a courtyard at the facility (Figure 4, inset).

Figure 4: GPMP, Area Overview



Source: Google Earth, Airbus, 2 September 2022 (base image) and 13 November 2021 (inset image); Maxar Technologies, 28 October 2020 (inset image). Annotated by the author. Source of inset image of Kim Jong Un official visit: Jeffrey Lewis, 'NEXT AND LAST', June 2019.

The plant is situated in a narrow valley to the north-northeast of the city and covers an area of approximately 30.3 hectares. It is relatively isolated from the rest of Kanggye due to the channelling effect of the mountainous terrain. Transit routes in and out of the facility are limited. The main point of access is via a single-carriageway road and a smaller subsidiary road. The site has no rail connectivity. Despite this, the GPMP's high status and prominence as an industrial centre are evident. In addition to its manufacturing infrastructure, supply yards and vehicle parks, the plant has a dedicated gate entrance, memorials and monument, extensive support buildings, and landscaping throughout the central facility area. A hydroelectric power plant is also

38. KCNA Watch, 'Supreme Leader Kim Jong Un Gives Field Guidance to Kanggye General Precision Machine Plant', 1 June 2019, <<https://kcnawatch.org/newstream/1559338289-31691884/supreme-leader-kim-jong-un-gives-field-guidance-to-kanggye-general-precision-machine-plant/>>, accessed 10 October 2025; Jeffrey Lewis, 'NEXT AND LAST! Kim visited the Kanggye General Precision Machine Plant. @ DaveSchmerler and I had suspected this plant was located at the place wrongly pinned as the Jangjagang Machine Tool Factory. Now we have an external shot to confirm the location: 40.996, 126.613.', X post, 1 June 2019, <<https://x.com/ArmsControlWonk/status/1134871142445928448>>, accessed 10 October 2025.

located near the entrance of the valley and may provide the GPMP with a dedicated or primary power source.<sup>39</sup> An air defence position is near the plant, as is the case with Areas B, C and D in this study.

Of note, the absence of protective infrastructure – such as berms and blast walls – and the plant’s location next to a residential area reduce the possibility of high-yield munitions production and storage. Instead, it is more likely that the GPMP is involved in the manufacture of shell casing or component parts.

Historical satellite imagery (Figure 4, insets) shows visual indicators of underground facilities at the GPMP: subsurface structures on the valley side, at least two tunnel entrance points, and possible vents on high ground. It is likely that these underground structures are used for hardened storage or an extended subterranean area of plant operations. Imagery also shows an active vehicle park with possible military trucks present (Figure 4). This observation corresponds with separate reporting that munitions factories in Kanggye are under nominal civilian control but receive direction from the Second Economic Committee’s General Machine Industry Bureau and the Nuclear-Chemical Defence Bureau’s Equipment Department.<sup>40</sup>

Structural developments at the GPMP over a 15-year timeframe (2010 to 2025) have been minimal. The most substantive change was the construction of a new H-shaped building between 2018 and 2020, replacing and expanding existing units (Figure 5). The H-shaped building is the largest building on site and holds a central position. Its installation probably represents an effort to modernise and increase the plant’s capacity. Landscaping has also been undertaken to beautify the surrounding area with a paved square flanked by two ponds. To the north-northwest, a further building complex was constructed between 2020 and 2021 in the support area of the GPMP (41.004064, 126.607725), though its purpose is unknown.

39. For details of Kanggye’s hydroelectric power stations, see Martyn Williams, ‘North Korea’s Energy Sector: New and Local Hydropower’, 38 North, 11 July 2023, <<https://www.38north.org/2023/07/north-koreas-energy-sector-new-and-local-hydropower/>>, accessed 5 November 2025; Peter Makowsky, Jenny Town and Samantha J Pitz, ‘North Korea’s Hydroelectric Power - Part 2’, 38 North, 29 August 2019, <<https://www.38north.org/2019/08/hydropower082919/>>, accessed 5 November 2025.

40. Cordesman, ‘Web Book’, p. 234.

Figure 5: Construction of H-Shaped Building at the General Precision Machine Plant, 2018–2020



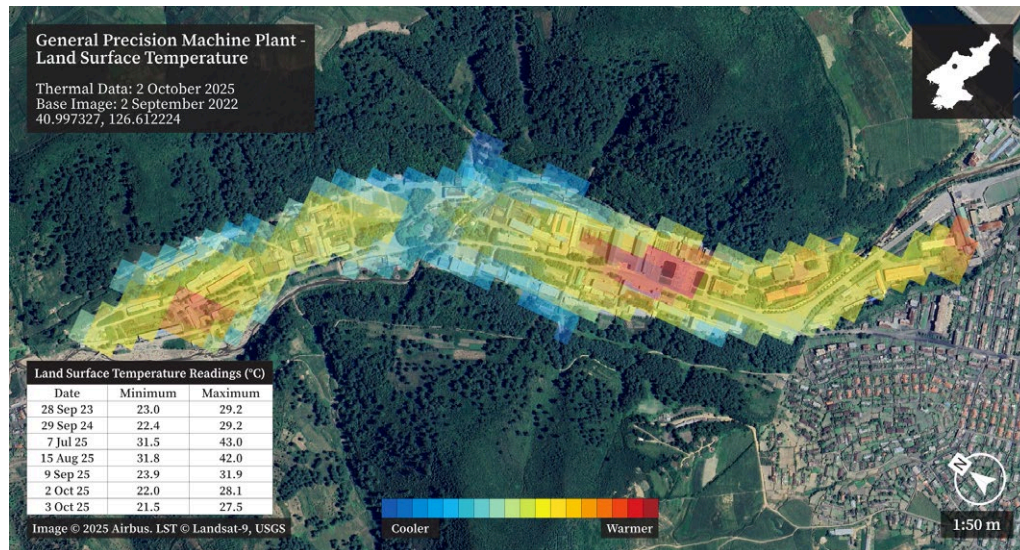
Source: Google Earth, CNES / Airbus, Maxar Technologies. Annotated by the author.

Single-source reporting states that the GPMP and other military factories in Jagang Province underwent a four-year programme of construction from 2014 to 2018 to expand their underground capacity and connectivity.<sup>41</sup> It is alleged that the GPMP, Kanggye Chemical Weapons Factory, Kanggye Tractor Plant and Songgang 11 Electric Wire Factory were linked by tunnels. There is no evidence in contemporary satellite imagery to corroborate these claims. While it is possible that on-site expansion may have occurred, it is unrealistic that the GPMP and Kanggye Tractor Plant were connected, as they are approximately 5 km apart, through mountainous terrain and under a riverbed.

41. Ha, 'Underground Military Factories in North Korea Expanded to Hide Nuclear Arsenal'.

LST data shows no extremes in temperature at the GPMP. However, localised hotspots are apparent in the vicinity of the H-shaped building (40.997326, 126.612269), support buildings (41.003569, 126.606553) and site entrance (40.993056, 126.614514) (Figure 6). The LST readings for the H-shaped building and support buildings are probably due to their operational use and the high concentration of heat-absorbent materials (concrete, asphalt, metal), resulting in elevated temperatures. The findings for the gate entrance area, however, are unclear as the spatial distribution of heat may be influenced by nearby residential buildings.

Figure 6: LST Image of the GPMP



Source: Google Earth, Airbus, 2 September 2022 (base image). Landsat-9, U.S. Geological Survey (USGS), 2 October 2025 (LST).

There are no strong indicators that the GPMP is the location of the Kanggye Chemical Weapons Factory or Bio-Chemical Research Institute. Findings from satellite imagery demonstrate the possible presence of underground facilities, but no other visual artefacts point to a CW function. The site's congested transit access points and absence of rail connectivity lend weight to the GPMP having a supporting, rather than leading, role in CW production. It may form part of the munitions supply chain, with shells transported to a separate location for weaponisation.

## Area B: Jangjagang Machine Tool Plant

The JMTP (Figure 7) is another suspected munitions factory, located approximately 400 m south of the GPMP main entrance. It is positioned alongside the Bukcheon River and within a mixed residential and light industrial sector of the city.

Open source reporting on the JMTP is limited. Its location and public-facing name have been confirmed in Yonhap News Agency reporting, with an image of Kim Jong Un released in June 2019 geolocated inside the perimeter of a central compound (Figure 7, inset).<sup>42</sup> Separate KCNA reporting provides further insight into the plant, stating that it is equipped with Computer Numerical Control (CNC) machine tools, which are used for the automation of manufacturing processes.<sup>43</sup>

Figure 7: JMTP, Area Overview



Source: Google Earth, Airbus, 2 September 2022. Annotated by the author. Inset: Jeffrey Lewis, X post, 1 June 2019, <<https://x.com/ArmsControlWonk/status/1134871137660260352>>, accessed 10 October 2025..

The plant's total area is significantly smaller than that of the GPMP, standing at approximately 23.2 hectares, including outlying buildings. The main facility, at around 8 hectares, is compact, consisting of an outer cordon of two- and three-storey buildings surrounding a courtyard and two sets of warehouses (40.987203, 126.614814).

42. Song Sang-ho, 'Kim Inspects Factories in First Public Activity in More Than 3 Weeks', Yonhap News Agency, 1 June 2019, <<https://en.yna.co.kr/view/AEN20190601001400325>>, accessed 15 October 2025; Jeffrey Lewis, 'Now we have an exterior shot that allows us to confirm the Jangjagang Machine Tool Factory is precisely where Ko said it was: "in Sokcho-tong sandwiching the Pukch'on River between them, Yonp'ung-tong on one side, and the factory on the other." 40.987, 126.614 Also, bunnies.', X post, 1 June 2019, <<https://x.com/ArmsControlWonk/status/1134871137660260352>>, accessed 10 October 2025.

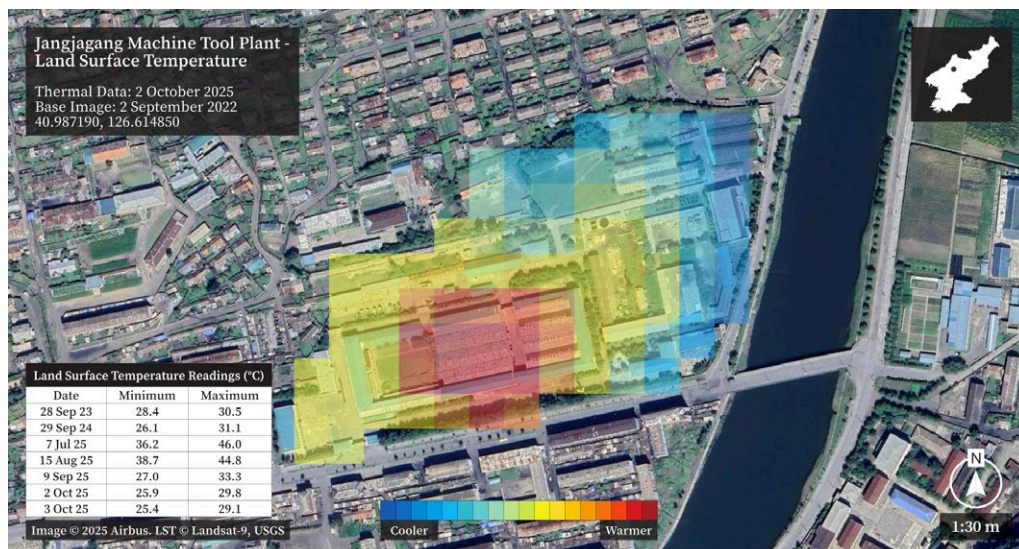
43. KCNA, 'Kim Jong Il Inspects Factories in Jagang Province', 7 October 2010, archived via the Wayback Machine, 15 March 2024, <<https://web.archive.org/web/20240315095746/http://www.kcna.co.jp/item/2010/201007/news30/20100730-18ee.html>>, accessed 15 October 2025.

An enclosed vehicle park with possible military trucks can be observed adjacent to the main facility (40.987514, 126.613981), suggesting both civilian and military use. Like the GPMP, the plant is not equipped with a rail hub. However, it is well connected to the National 65 Highway and road routes to Changgang, 9 km to the north-northeast.

Historical imagery shows minimal structural changes across the site. The main facility has been relatively unchanged for at least 20 years, with only small buildings added on the periphery. There are no visual indicators of chemical production equipment, storage tanks or underground facilities, such as entrance points, vents or bunkers. The JMTP's location next to a river and away from the hillside further reduces the possibility of tunnel networks.

Insights from LST data are also limited. This is primarily due to the spatial resolution of Landsat-8/9 TIRS, sampled at 30 m<sup>2</sup>, which does not allow for a high degree of granularity for small-scale buildings and compounds. While acknowledging this limitation, collected LST data does show a higher temperature at the main compound, centred on the warehouses (Figure 8), which would be consistent with manufacturing and operation of machinery. A more comprehensive longitudinal LST study of this area may discern whether this finding is consistent throughout the year.

Figure 8: LST map of the JMTP



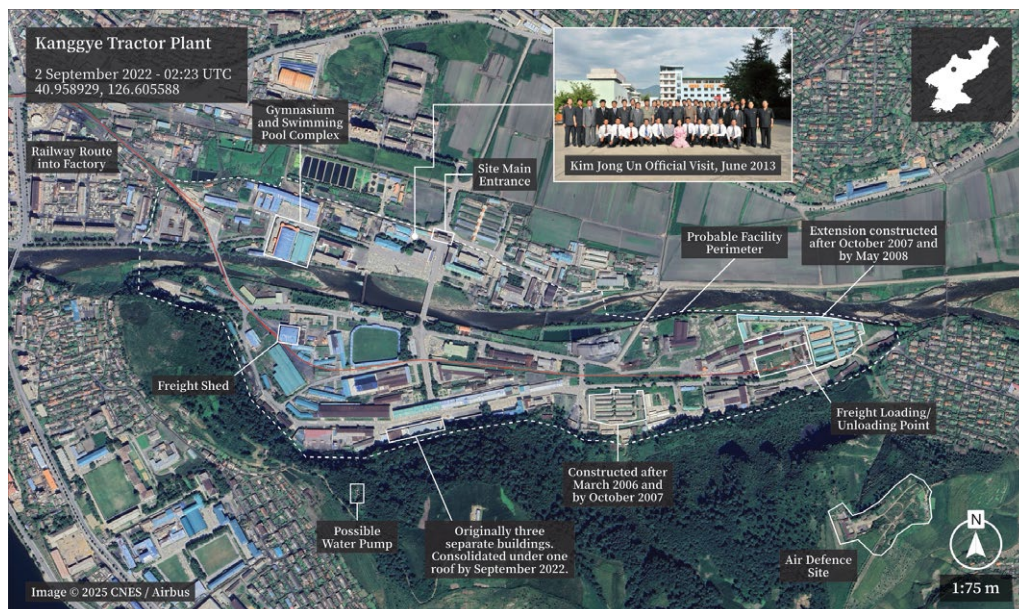
Source: Google Earth, Airbus, 2 September 2022 (base image). Landsat-9, USGS, 2 October 2025 (LST).

It was not possible to confirm the presence of CW-related infrastructure at the JMTP in contemporary or historical satellite imagery. There are no visual indicators, or distinct compartmentalisation in the layout of the facility, to suggest a possible CW role. The plant's distance from the mountainside further precludes the possibility of subterranean tunnelling, a feature regularly cited in CW source claims. Its position, situated directly adjacent to residential areas and civil industry, also presents serious physical and information security risks for a highly sensitive facility. It is therefore more likely that the JMTP is yet another node in the military supply chain, providing artillery or mortar shell casings.

## Area C: Kanggye Tractor Plant

The Kanggye Tractor Plant (Figure 9) is more frequently reported on in national press and among international observers.<sup>44</sup> The site is assumed to be synonymous with the No. 26 Factory and is described as being involved in missile production.<sup>45</sup> It is located to the southeast of the city and straddles the Namcheon River. The river and mountainside serve as a natural barrier, delineating the plant's two halves: the production and logistical facilities south of the river, and the administrative, recreational and possible accommodation facilities to the north. Notably, in contrast with the GPMP and JMTP, the Kanggye Tractor Plant has a dedicated rail hub connected to the national rail system. The plant is also the largest site of the four areas of interest, at 31 hectares and 11.6 hectares in its southern and northern sections, respectively. Checkpoints on the road bridges leading to the southern half of the Kanggye Tractor Plant serve as security measures to control entry-exit into the facility.

Figure 9: Kanggye Tractor Plant, Area Overview



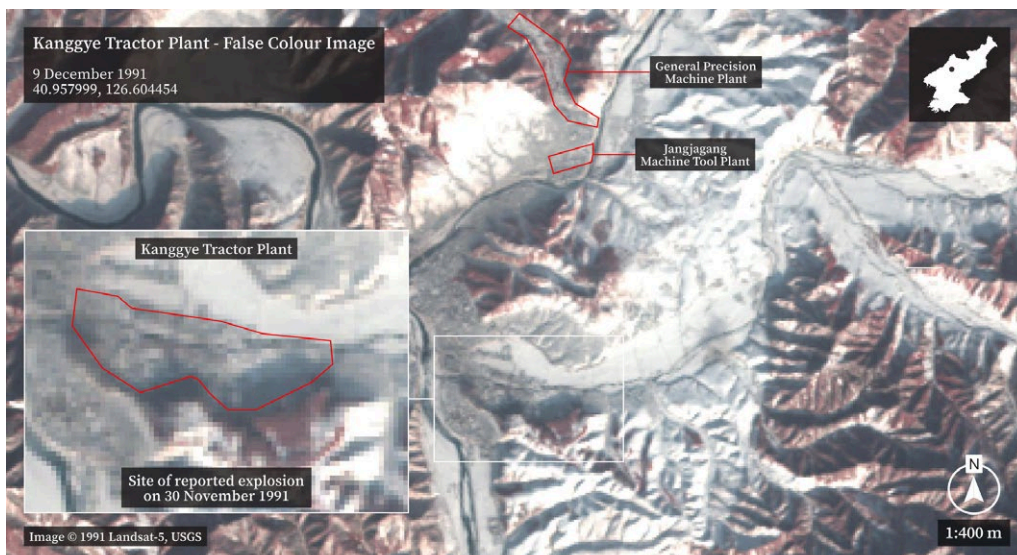
Source: Google Earth, Airbus / CNES, 2 September 2022. Annotated by the author. Inset: North Korea Leadership Watch, 'Kim Jong Un Visits Kanggye Tractor Plant', 23 June 2013, <<https://nkleadershipwatch.wordpress.com/2013/06/23/kim-jong-un-visits-kanggye-tractor-plant/>>, accessed 12 September 2025.

44. NTI, 'No. 26 Factory', <<https://www.nti.org/education-center/facilities/no-26-factory/>>, accessed 15 October 2025; Federation of American Scientists, 'Kanggye No. 26 General Plant', <<https://nuke.fas.org/guide/dprk/facility/kanggye.htm>>, accessed 15 October 2025. The factory is listed as an entity of interest by Open Sanctions. See Open Sanctions, 'Kanggye Tractor Plant', 2 May 2024, <<https://www.opensanctions.org/entities/kprusi-ad9a653cef573ae9c3afc35e35139c38e27dadd2/>>, accessed 15 October 2025.
45. Kyung-Joo Jeon and Sung-Jun Bae, 'North Korean Munitions Factories: The Other Side of Arms Transfers to Russia', 38 North, 24 June 2024, <<https://www.38north.org/2024/06/north-korean-munitions-factories-the-other-side-of-arms-transfers-to-russia/>>, accessed 10 October 2025; NTI, 'No. 26 Factory'.

The plant's association with munitions production is longstanding, but sourcing remains opaque. Declassified CIA satellite imagery geolocates an arms and ammunition plant 'Number 26' at the Kanggye Tractor Plant from at least 1953 to 1973.<sup>46</sup>

A rare direct-access source surfaced in 1993, when a North Korean defector stated that a large-scale explosion occurred at the No. 26 General Plant on 30 November 1991, resulting in the destruction of nearby residential properties and the death of around 200 workers.<sup>47</sup> Confirmation of this event provides an opportunity to corroborate the location of the plant. However, Landsat-5 Thematic Mapper False Colour imagery from 9 December 1991 shows no visible sign of a blast area at the Kanggye Tractor Plant (Figure 10). Other Landsat-5 imagery from the same period returns similar findings, with the caveat that imagery analysis of the site is impeded by a low spatial resolution (30 m<sup>2</sup>) and the obscuring of visibility by hill shadow and heavy snowfall.<sup>48</sup> It is also a possibility that the date provided by the defector is incorrect.

Figure 10: False Colour Landsat-5 Thematic Mapper Image of Kanggye Tractor Plant, 9 December 1991



Source: Landsat-5, USGS, 9 December 1991. Annotated by the author.

46. CIA, 'Organization and Personnel of the North Korean Ministry of Heavy Industry', CIA FOIA Electronic Reading Room, 30 September 1953, p. 8, <<https://www.cia.gov/readingroom/document/cia-rdp80-00810a002500050005-7>>, accessed 10 January 2026; CIA, 'Oak Supplement Part 9 KH-9 Mission 1205 10 March - 11 May 1973', CIA FOIA Electronic Reading Room, 1 May 1973, p. 156, <<https://www.cia.gov/readingroom/document/cia-rdp78t04752a000500010009-3>>, accessed 10 January 2026. Other CIA reports mentioning Plant 26 and Kanggye Tractor Plant are available on the FOIA Electronic Reading Room <<https://www.cia.gov/readingroom/>>.

47. Greg J Gerardi and James A Plotts, 'An Annotated Chronology of DPRK Missile Trade and Developments', *Nonproliferation Review* (Vol. 2, No. 1, 1994), p. 78, <<https://www.nonproliferation.org/wp-content/uploads/npr/gerard21.pdf>>, accessed 12 September 2025.

48. See Landsat-5 Thematic Mapper Level 2 Science Product images: 10 January, 26 January, 21 March 1991. Courtesy of the USGS.

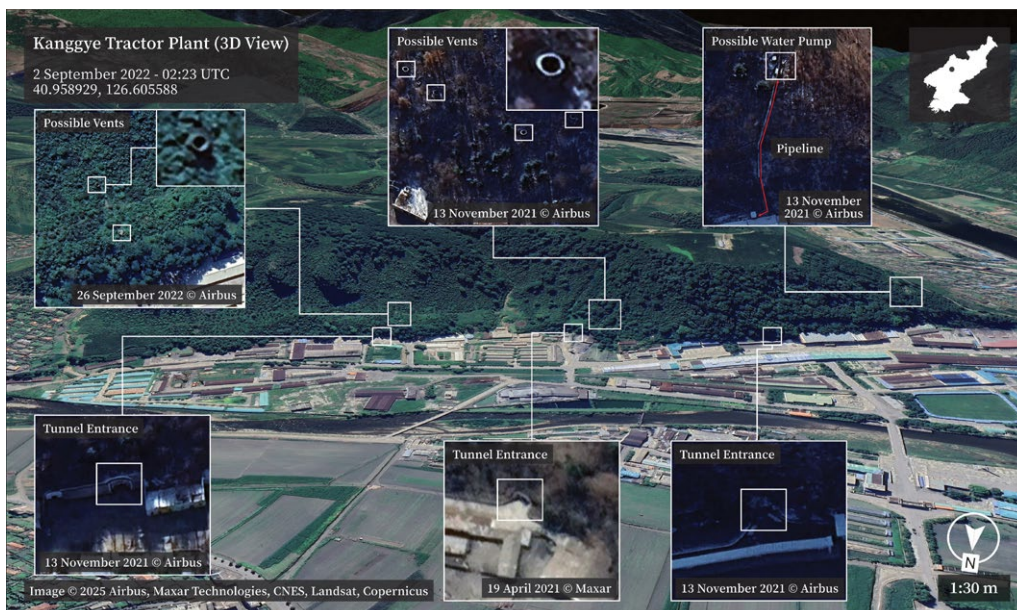
KCNA reporting provides a more recent confirmation of the plant's location and public-facing name. Images published in 2013 show the supposed interior of the Kanggye Tractor Plant and an outdoor image that can be geolocated close to the plant's main entrance (Figure 9, inset).<sup>49</sup> Other official visits to the plant have been publicised in 2009,<sup>50</sup> 2011,<sup>51</sup> 2019<sup>52</sup> and 2023.<sup>53</sup>

KCNA imagery of the interior reveals a narrow, arched ceiling characteristic of an underground tunnel or enclosed room.<sup>54</sup> Specialised equipment and materials are also visible: CNC machines, form flowing machines, a hot piercer mill and raw steel billets. Commentators have speculated that the plant may be used for the fabrication of centrifuges for North Korea's nuclear programme.<sup>55</sup> The plant's role in ballistic missile, artillery shell and rocket production has also been noted.<sup>56</sup> However, there has been no mention of how this equipment may relate to CW production or if the site may be associated with the Kanggye Chemical Weapons Factory and Bio-Chemical Research Institute.

49. North Korea Leadership Watch, 'Kim Jong Un Visits Kanggye Tractor Plant', 23 June 2013, <<https://nkleadershipwatch.wordpress.com/2013/06/23/kim-jong-un-visits-kanggye-tractor-plant/>>, accessed 12 September 2025. The article cites KCNA reporting.
50. North Korea Leadership Watch, 'The Money Never Runs Out Guidance Tour', 15 December 2009, <<https://www.nkleadershipwatch.org/2009/12/15/the-money-never-runs-out-guidance-tour/>>, accessed 12 September 2025.
51. KCNA, 'Kim Jong Il Provides Field Guidance to Factories in Kanggye City', 7 April 2011, archived via the Wayback Machine 20 August 2011, <<https://web.archive.org/web/20110820101042/http://www.kcna.co.jp/item/2011/201104/news07/20110407-37ee.html>>, accessed 12 September 2025.
52. KCNA, 'Supreme Leader Kim Jong Un Gives Field Guidance to Kanggye General Tractor Plant', 1 June 2019, archived via the Wayback Machine 2 May 2024, <<https://web.archive.org/web/20240502062652/http://www.ryongnamsan.edu.kp/univ/en/revodaily/92cc227532d17e56e07902b254dfad10>>, accessed 12 September 2025.
53. KCNA Watch, 'Respected Comrade Kim Jong Un Gives Field Guidance to Major Munitions Factories', 6 August 2023, <<https://kcnawatch.org/newstream/1691331372-974402204/respected-comrade-kim-jong-un-gives-field-guidance-to-major-munitions-factories/>>, accessed 12 September 2025.
54. North Korea Leadership Watch, 'Kim Jong Un Visits Kanggye Tractor Plant'.
55. Jeffrey Lewis, 'Is This Where North Korea Makes its Centrifuges?', Arms Control Wonk, 24 June 2013, <<https://www.armscontrolwonk.com/archive/206637/is-this-where-north-korea-makes-its-centrifuges/>>, accessed 14 September 2025; Joshua Pollack, 'North Korean Flow-Forming Lathes', Arms Control Wonk, 23 September 2013, <<https://www.armscontrolwonk.com/archive/504026/north-korean-flow-forming-lathes/>>, accessed 14 September 2025; Joshua Pollack, 'North Korean Flow-Forming Machines, ctd', Arms Control Wonk, 13 February 2014, <<https://www.armscontrolwonk.com/archive/504129/north-korean-flow-forming-machines-ctd/>>, accessed 14 September 2025.
56. Jeffrey Lewis and Amber Lee, 'Happiness is a Warm CNC Machine Tool', 38 North, 4 September 2013, <<https://www.38north.org/2013/09/jlewis090413/>>, accessed 14 September 2025; Daniel Wertz, 'North Korea's Ballistic Missile Program', National Committee on North Korea, April 2013, updated by Jeffrey Lewis April 2024, <<https://ncnk.org/resources/briefing-papers/all-briefing-papers/north-koreas-ballistic-missile-program>>, accessed 18 April 2026.

An analysis of contemporary satellite imagery shows tunnel entry points, possible vents, and a water pump station with piping running to the valley floor (Figure 11). Further subterranean entry points are probably enclosed within buildings along the hillside.<sup>57</sup> These observations bear similarities with declassified CIA imagery analysis identifying probable vents and a possible entrance to an underground facility at the ‘Kanggye Tractor and Ammunition Plant’ in December 1962.<sup>58</sup> Collectively, these findings add credence to the common assumption that the hill adjacent to the Kanggye Tractor Plant houses an underground complex of tunnels and manufacturing facilities.

Figure 11: Indicators of Underground Facilities at the Kanggye Tractor Plant (3D View)



Source: Google Earth, Airbus, Maxar Technologies, CNES, Landsat, Copernicus, 2 September 2022 (base image); Maxar Technologies, 19 April 2021 (inset image); Airbus, 13 November 2021, 26 September 2022 (inset image). Annotated by the author.

57. Imagery analyst Jacob Bogle identifies five underground entrances in annotated satellite imagery of the site. The approximate locations of the entrances are: (1) 40.9578, 126.6133; (2) 40.9576, 126.6121; (3) 40.9574, 126.6096; (4) 40.9574, 126.6065; and (5) 40.9578, 126.6017. See Jacob Bogle, ‘The Largest Underground Sites in North Korea’, Access DPRK, 6 June 2022, <<https://mynorthkorea.blogspot.com/2022/06/the-largest-underground-sites-in-north.html>>, accessed 10 October 2025.

58. CIA, ‘Kanggye Tractor and Ammunition Plant PUG North Korea’, CIA FOIA Electronic Reading Room, <<https://www.cia.gov/readingroom/document/cia-rdp83-01074r000100620002-0>>, accessed 10 January 2026.

The Kanggye Tractor Plant underwent a phased expansion of its infrastructure between 2006 and 2008. Historical satellite imagery shows the construction of new warehouses and possible manufacturing facilities at the centre and eastern edge of the main production site.<sup>59</sup> Further small-scale construction and alterations to existing buildings are also visible along the hillside between 2019 and 2022.<sup>60</sup>

More recently, larger buildings have been renovated, including a main hall at the centre of the site (40.958458, 126.604439) (Figure 12). Sentinel-2 imagery shows that changes to the main hall took place after 31 March and by 30 April 2023.<sup>61</sup> Two further buildings – annotated A and B – are in place by June and May 2023, respectively.

Figure 12: Kanggye Tractor Plant with Developments Highlighted

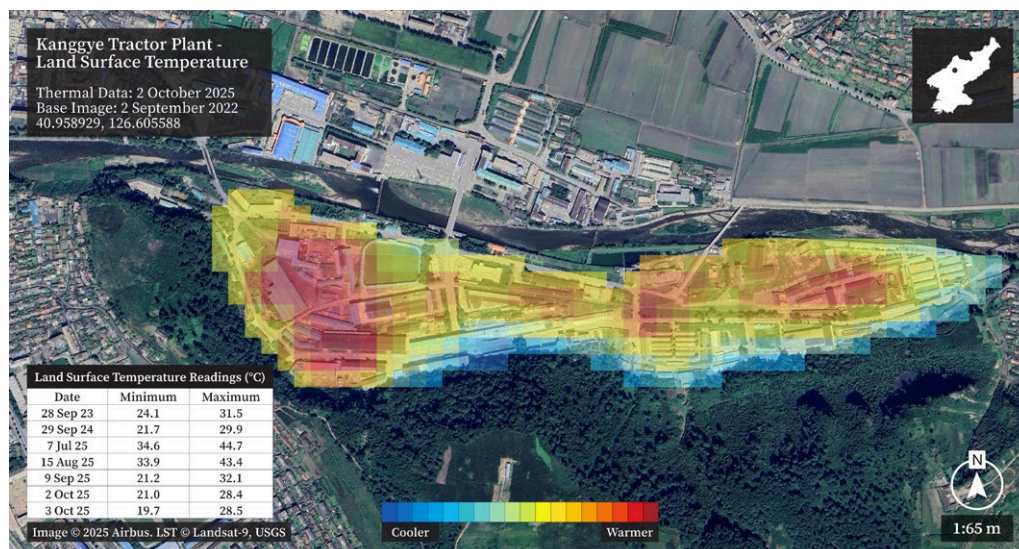


Source: CNES, 4 September 2025. Distribution Airbus DS. Annotated by the author.

59. New buildings were constructed in the centre of the facility after March 2006 and by October 2007. Image date: 5 October 2007. Map data: Google Earth, Maxar Technologies. Location: 40.9578, 126.6105. A further series of buildings was constructed on the eastern edge of the facility after October 2007. The buildings can be seen mid-construction by May 2008 and complete by at least April 2009. Image dates: 8 May 2008, 14 April 2009. Map data: Google Earth, Maxar Technologies. Location: 40.9591, 126.6157.
60. Notably, three buildings backing onto the hillside were brought under a single roof after November 2021 and by September 2022. Image dates: 13 November 2021, 2 September 2022. Map data: Google Earth, Airbus. Location: 40.957521, 126.605433.
61. European Space Agency, Copernicus Sentinel data 2025. Sentinel-2 L2A True Colour images: 31 March 2023 and 30 April 2023. Images from 5 April, 10 April, 15 April, 20 April and 25 April 2023 are all obscured by cloud cover.

No extreme temperatures were observed in the LST data readings, suggesting the absence of high-intensity exothermic activities with external vents or chimneys. Nonetheless, a spatial distribution of hotspots is apparent, centring on probable production facilities (Figure 13). Notably, a series of buildings at the centre of the main facility area (40.957978, 126.605881) consistently displayed lower temperature readings across the collected dataset. This may be due to the buildings serving a storage, packing or administrative purpose, whereas other buildings are more likely to contain industrial equipment.

Figure 13: LST Map of Kanggye Tractor Plant, Southern Section



Source: Google Earth, Airbus, 2 September 2022 (base image). Landsat-9, USGS, 2 October 2025 (LST).

Satellite imagery of the Kanggye Tractor Plant confirms the presence of CW-related features: underground structures; direct access to the national rail network; possible vents; heightened security; and at least one pipeline. The site’s longstanding association with munitions production also aligns with source claims of a CW presence in Kanggye. Yet, these similarities are circumstantial. Further information is needed on the nature and physical characteristics of the alleged CW activities to interrogate the Kanggye Tractor Plant’s building layout and heat signatures more thoroughly.<sup>62</sup>

62. A hand-drawn map by North Korea defector Ko Chong-song provides a starting point for a more detailed analysis of Kanggye Tractor Plant. See Jeffrey Lewis, ‘The location of the plant was accurately described by a North Korean defector, Ko Chong-song, who even drew a map. In 2013, North Korea inexplicably released an exterior image that allowed us at the time to confirm Ko’s location: 40.961, 126.606’, X post, 1 June 2019, <<https://x.com/ArmsControlWonk/status/1134871131758813185>>, accessed 10 October 2025.

## Area D: Military Storage Site

The final area is a military storage site approximately 9.5 km south-southeast of Kanggye city centre (40.886561, 126.634789) (Figure 14). It is situated in a narrow valley with limited vehicular access along a single carriageway road linking to the National Highway 65. The compound is co-located with probable military buildings. Although the storage site's size and isolated positioning significantly reduce the possibility of a CW production or research facility, visual confirmation of underground entrances and recent structural changes highlight it as a location of note.

Figure 14: Military Storage Site, Area Overview



Source: Google Earth, Airbus / CNES, 26 September 2022 (base image and right inset image); Maxar Technologies, 19 April 2021 (left inset image). Annotated by the author.

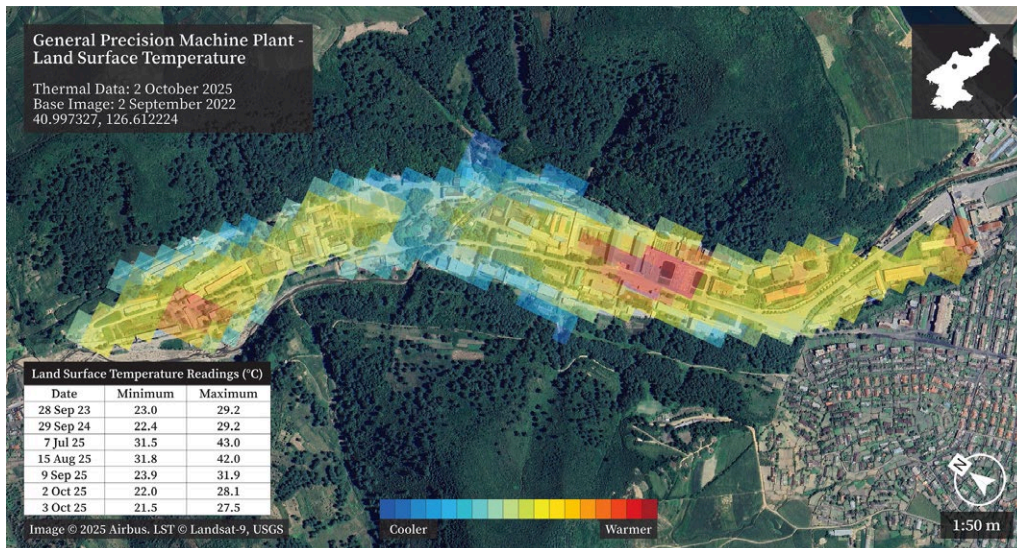
Historical satellite imagery from March 2006 shows five tunnel entrances leading into the southern mountainside.<sup>63</sup> In subsequent imagery from 2007 to 2015, the site underwent improvements to on-site access through the addition of a compound entrance, an expanded gravel foundation, and protective concrete structures at tunnel entry points. Further substantive changes occurred between July and October 2021 as four new buildings were constructed, including a sizeable warehouse (30 m by 65 m) running adjacent to two of the tunnel entrances. In later imagery, a concrete slab foundation can be seen to have replaced the loose gravel surface, and two new support buildings can be identified to the southeast of the main site.<sup>64</sup>

63. Image date: 23 March 2006. Map data: Google Earth, Maxar Technologies.

64. Image date: 26 September 2022. Map data: Google Earth/CNES/Airbus. Approximate locations of the new buildings: (1) 40.885153, 126.639161; and (2) 40.884428, 126.639853.

LST data returned low temperature readings across the area. Slightly elevated temperatures were observed geolocating with concrete surfaces and buildings (Figure 15). This probably corresponds with the heat absorbent qualities of this material, rather than being an indication of heat generation within the buildings.

Figure 15: LST Map of the GPMP



Source: Google Earth, Airbus, 2 September 2022 (base image). Landsat-9, USGS, 2 October 2025 (LST).

Aside from the presence of underground structures, there are no other visual artefacts to suggest a CW function. The site's secluded location also hinders heavy vehicle movement associated with the bulk transport of munitions. The site may be used as a hardened storage facility for specialist equipment or materials. The recent structural developments demonstrate the site's increased operational use. Further research may discern its underlying purpose and any verifiable logistical ties it holds with facilities in Kanggye city.

## Conclusions

True colour satellite imagery has revealed the presence of CW-related visual indicators at each of the sites. Of the areas reviewed for this report, the Kanggye Tractor Plant aligns most closely with source claims. Its rail infrastructure and heritage of ammunition production and the visual confirmation of underground structures highlight the plant as a potential CW candidate. The other three areas analysed for this report all possess characteristics that raise their profile as sites of interest, either as possible subsidiary components of a national CW network or locations that warrant further investigation. However, until new information on the alleged CW installation(s) in Kanggye comes to light, these findings remain circumstantial. Issues of locational context and a dearth of other supporting identifiers result in a low confidence that any of these areas are CW facilities. The findings are therefore inconclusive.

Despite this outcome, this report provides a foundation for further research in what is an otherwise under-researched subject matter. Imagery and thermal analysis of the four sites has revealed detail on their layout, structural developments over time, and the spatial distribution of heat signatures. A deeper analysis of LST data may provide improved temporal and spatial fidelity of hotspots, aiding a building-by-building assessment of their functional purpose. Furthermore, a focus on the storage and distribution element of the CW supply chain presents an alternative investigative angle that is likely to generate additional insights. Analysis by RAND, citing an interview with a North Korean defector, estimates that there are around 75 CW storage locations across North Korea.<sup>65</sup> A pattern of life and traffic analysis of rail shipments into the Kanggye Tractor Plant may reveal peak periods of activity and any logistical relationships it holds with defence depots.

## About the Author

**William Goodhind** is an independent open source intelligence researcher and forensic imagery analyst.



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65. Bruce W Bennett et al., *Characterizing the Risks of North Korean Chemical and Biological Weapons, Electromagnetic Pulse, and Cyber Threats* (Santa Monica, CA: RAND Corporation, 2022), p. 20.



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